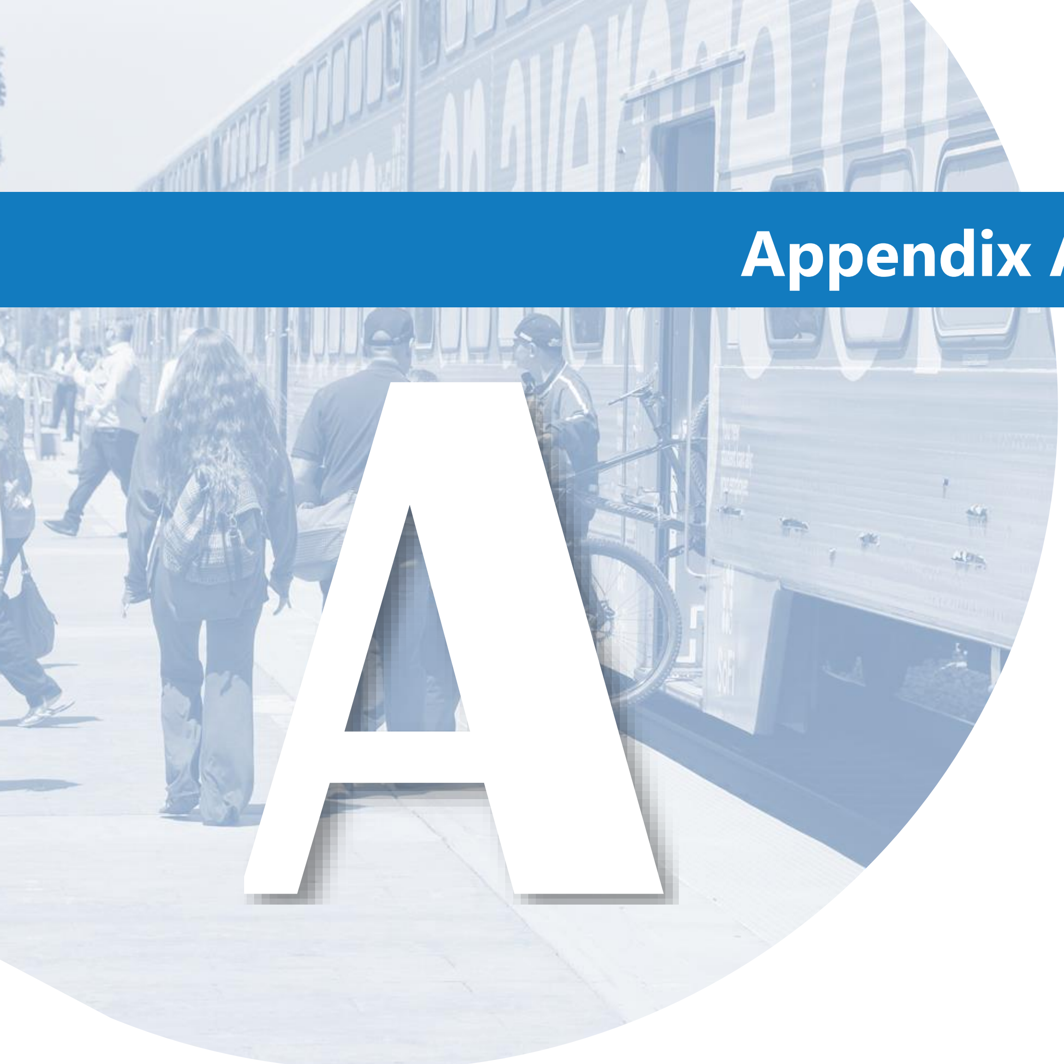


Appendix A

RWCmoves

Existing Conditions

Revised: October 23, 2017

FEHR & PEERS

Redwood City California Founded 1867

Table of Contents

List of Figures

List of Tables

Existing Conditions

This report represents a comprehensive assessment of existing policies and programs, as well as existing transportation conditions within Redwood City. The assessment included a multifaceted community outreach initiative designed to engage the community in the development of the Citywide Transportation Plan, and provide an opportunity for residents, workers, business owners and visitors to communicate their transportation needs. The information provided in this report will help frame Redwood City's transportation demands in the larger context of the Bay Area and help developed recommendations to encourage a balanced transportation network aimed at further improving mobility and accessibility for all travel modes in the City.

Policies and Programs

This section summarizes the existing transportation regulatory framework in Redwood City. It highlights the City's overall transportation policies and goals from the Redwood City General Plan (2010) and precise plans, and includes a summary of on-going transportation planning studies in the City.

Redwood City General Plan (2010) Transportation Policies

Adopted on October 11, 2010, the General Plan is a visioning document that guides the growth and development of Redwood City through 2030. As stated in the introduction to the Circulation Element, "Redwood City's overarching transportation goal is to establish and maintain a balanced, multi-modal transportation network that gets us where we want to go safely and minimizes environmental and neighborhood impacts." The General Plan envisions Redwood City in 2030, and provides supporting policies by which the City will manage land development and the transportation system. It creates a framework for economic development, transportation improvements, and balancing residents' desires with regard to sustainability, City services, parks, and cultural and historic preservation. Below is a summary of the General Plan's Transportation Policies that guide circulation and access in Redwood City.

Vehicular Network Policies

Redwood City's General Plan establishes policies that specifically support and modify the vehicular network. These policies aim to support safety, maintain and enhance the interconnected network of streets, support increasing connectivity of all travel modes east of U.S. 101, and encourage the use of Intelligent Transportation Systems (ITS) to improve efficiency. Additionally, the General Plan supports revaluating the City's Level of Service policy, including developing a new Level of Service policy for Downtown, to emphasize bicycle and pedestrian access and circulation, maintain emergency vehicle response time, and support reduced vehicle miles traveled. This new or modified Level of Service policy has not yet been developed.

Bicycle and Pedestrian Policies

The Redwood City General Plan includes many policies relating to improving bicycle and pedestrian facilities that can be summarized as intending to improve facilities to be more convenient, comfortable, and safe. Specific policies that support this include:

- complete streets and bicycle boulevard street modifications;
- requiring new development projects to provide pedestrian, bicycle, and electric bicycle facilities that connect to existing and planned facilities;
- prioritize pedestrian, bicycle and electric bicycle facilities improvements near schools, transit, shopping, hospitals and mixed use areas;
- encouraging students to walk and bicycle to school; and
- possibly implementing wayfinding signs.

Bicycle policies include expanding the bicycle system to provide a continuous network by eliminating parking if necessary and providing bicycle detectors at signalized intersections,

Transit Policies

The Redwood City General Plan supports an increased use of transit by requiring that new developments improve access to public transit, siting transit stops at safe, efficient, and convenient locations, supporting Caltrain, and facilitating convenient and timely transfers between travel modes. This includes supporting ferry as a viable method of transport, specifically between Redwood City, San Francisco, and possibly the East Bay.

Transportation Demand Management Policies

TDM policies in the Redwood City General Plan encourage consulting with employers and transit providers to provide shuttle services, encourage developments that minimize vehicle trips, promote transit-oriented development with reduced parking requirements, support parking supply and pricing, and consider reducing parking requirements for mixed-use developments or those with comprehensive TDM programs.

Freight and Goods Movement

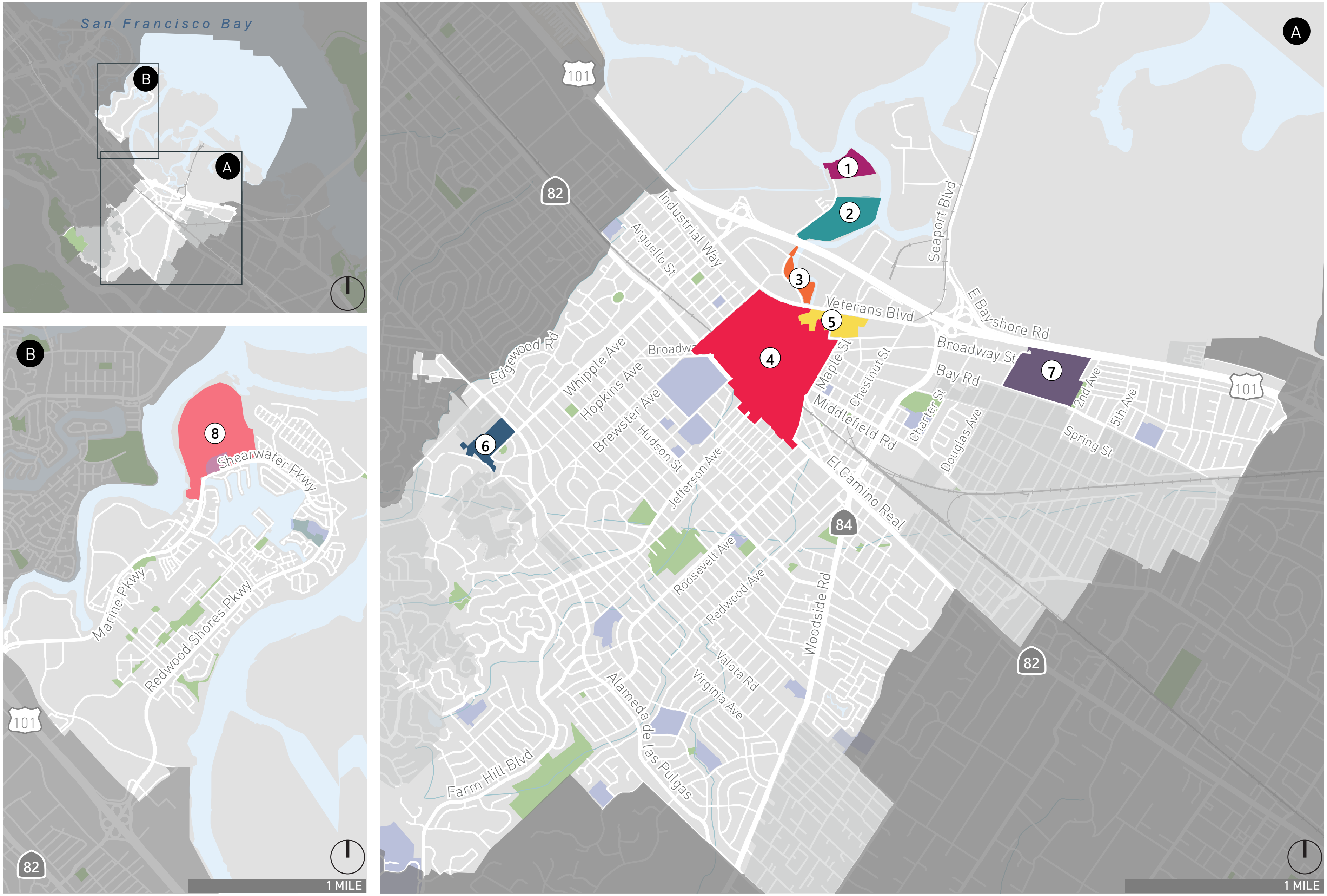
Efficient freight and goods movement in Redwood City is necessary for economic success. Freight and goods movement policies in Redwood City focus on minimizing interactions between freight and vehicles, bicyclists, and pedestrians, and where they do interact, ensuring safety and efficiency.

Redwood City Precise Plans and Regional Plans

Redwood City has developed about a dozen plans over the past 15 years that guide citywide and/or area specific policies and programs, many directly related to transportation and circulation in the City. Key plans and their overall purpose and relevance to transportation are summarized below. Redwood City Precise Plans are shown in **Figure A-1**.

Downtown Precise Plan (adopted 2011, amended 2012, 2013, and 2016)

The Downtown Precise Plan was created to guide public and private land development in downtown Redwood City, which is defined as approximately 183 acres in the City's historic center. Future transportation improvements and projects are outlined in the Precise Plan, including public spaces, complete streets, traffic calming, automobile connectivity improvements, railroad grade separation, and new street network connections. Envisioned transit improvements include streetcars, SamTrans bus terminal improvements, and a transit connection to the Inner Harbor area. The Precise Plan also identified parking strategies and improvements, including reconfiguration of the Main Street parking lot and additional public parking. Downtown parking improvements were developed as part of the subsequent Downtown Parking Management Plan (2013). These improvements are discussed in more detail in the Parking Chapter of this report.



Redwood City Limits
Sphere of Influence
Parks
Schools
Railroad

1 Blu Harbor/Pete's Harbor
2 Peninsula Park Precise Plan Area
3 North Main Street Precise Plan Area
4 Downtown Precise Plan Area
5 Kaiser Medical Center Precise Plan Area
6 Sequoia Hospital Precise Plan Area
7 Stanford in Redwood City Precise Plan Area
8 The Preserve at Redwood Shores

Figure A-1

Redwood City Precise Plan Areas

Downtown Parking Management Plan (2005) and Operational and Programmatic Review (2013)

The Downtown Parking Management Plan was developed to ensure that the prices and time limits on City-owned parking spaces in the Downtown area are well managed. The Plan enacted several parking management strategies including instituting a market rate pricing structure with prices that vary by time of day and location, eliminating time limits, converting the Downtown core to computerized "pay-by-space" parking meters, using the Downtown parking meter revenue for maintenance and operation of the Downtown parking system, and modifying the parking permit program. These actions were identified as the trade-offs for non-market rate priced parking. Additional details about the Plan can be found in *Parking Supply and Demand*.

North Main Street Precise Plan (2008)

The North Main Street Precise Plan was created to expand the City's housing supply and to provide connection between Downtown and the Bayfront with a possible Highway 101 crossing. The crossing would include pedestrian and bicycle access improvements and would provide access to future infill development of residential, office, and limited locally oriented commercial space along Redwood Creek north of Highway 101. The planned creek trail, pedestrian crossing at Brewster Avenue, bulb-outs at Veterans Boulevard, and the crossing to Bayfront at Highway 101 have not yet been constructed or are partially completed.

The North Main Street Precise Plan consists of three distinct plan areas, Plan Area A, B and C. The Plan permits multi-use residential land uses in Areas A, B, and C and mixed use in Area C, with commercial on the ground floor and residential above. Since the Plan's adoption, Plan Area B has been redeveloped to residential townhomes (Plan Area A and C have not yet been redeveloped).

Kaiser Medical Center Precise Plan (2003)

The Kaiser Medical Center Precise Plan was created by reconfiguring the existing campus buildings, access, and parking to accommodate expanding the building area within the campus threefold and adding four new parking structures. The plan area is 15.3 acres and is located between Veterans Boulevard, Beech Street, Marshall Street, and Main Street.

The Plan consists of land use, design and circulation policies that override the area's zoning requirements and incorporate CEQA-related mitigation measures where appropriate. The Plan policies address the following key transportation issues: building orientation and pedestrian circulation, downtown gateways, vehicle circulation, parking, and emergency vehicle access. Transportation specific projects include a connecting bicycle and pedestrian path along Redwood Creek, below Highway 101, and an at-grade crossing at Veterans Boulevard.

Since the Plan's adoption in 2003, some campus buildings have been re-constructed. The parking structures have not yet been completed (as of November 2016).

Peninsula Park Precise Plan (2008)

The Peninsula Park Precise Plan area is contained within the southern half of the Marina Shores Village Precise Plan and expands on the vision and policies of that plan. The Peninsula Park Precise Plan establishes land use, design, and circulation policies that aim to create a distinct, water-oriented, urban residential community. Transportation goals include improving pedestrian circulation, waterfront access and open space, and circulation. Two basic approaches are recommended to promote community development and manage congestion, including reducing the need for vehicular trips by improving pedestrian facilities and expanding the capacity of transit facilities and the efficiency of existing roads. Transportation specific goals include implementing TDM measures, providing privately funded shuttle services and expanded SamTrans bus service, and improving pedestrian and bicycle access to and from the Plan area in the effort of eliminating the need for future roadway and intersection widening. Development in the Plan area is envisioned to align with San Mateo County Congestion Management Plan with the goal of reducing vehicle trips and supporting alternative transit modes such as ferries. Some of the development plans for Peninsula Park have been constructed although at a lower density than was allowed in the Plan; key transportation infrastructure including the bicycle/pedestrian US 101 undercrossing at Main Street, Blomquist Extension, and Redwood Creek Bridge have not been completed yet.

In 2014, an Addendum was prepared from the original Marina Shores Village project (2003). The approved Addendum confirmed that the proposed project, Blu (Pete's) Harbor (2014), was within the scope of and did not create any new impacts beyond those identified in the Marina Shores Village project. Blu (Pete's) Harbor was approved under the CG-R Zoning District. Marina Shores Village was later overturned by referendum, and Blu (Pete's) Harbor now falls under the Peninsula Park Precise Plan.

Sequoia Hospital Precise Plan (2007)

The Sequoia Hospital Precise Plan was created to outline goals and policies to guide the new construction and redevelopment of the Sequoia Hospital campus so the hospital can provide health care service to patients at a campus that is consistent with the surrounding residential neighborhoods. Transportation specific changes proposed in the plan includes: relocating the main campus vehicular entrance from Alameda de las Pulgas to Whipple Avenue, narrowing Whipple Avenue from 48 feet to 36 feet to incorporate more landscaping, and providing a new pedestrian route from a new SamTrans bus stop to the main hospital entrance. Since the adoption of the Sequoia Hospital Precise Plan, much of the plan has been implemented, including proposed transportation improvements.

Stanford in Redwood City Precise Plan (2013)

The Stanford in Redwood City Precise Plan outlines land use, urban design, and circulation policies to create a Stanford facility at the former Mid-Point Technology Park. The plan area is 48 acres and is located between Bayshore Freeway/US 101, Bay Road, the Fire Department Station No.11 and Spinas Park, and Douglas Avenue.

Downtown Redwood City is approximately one mile to the west. The existing low-rise parking lot oriented complex will be redeveloped to be denser and more aesthetically pleasing. Transportation related plan goals are described in the following categories: the Broadway Corridor, campus access, circulation and parking, pedestrian ways, and relationship to downtown and surrounding areas.

Transportation specific goals and policies outlined in the plan include:

- utilizing Broadway as the main access way to campus;
- extending Hurlingame, Warrington, and Barron Avenues through campus to continue the city street grid;
- a strong TDM plan to reduce daily and peak period vehicle trips;
- shuttle service to the Downtown Transit Center; and
- street improvements that allow for a future street car route on Broadway.

Stanford has also agreed to fund several transportation-related community benefits and public improvements, including bicycle system improvements and bus shelter improvements.

Since the Plan's adoption, Phase 1 of the project is under construction. Demolition of existing structures on the site of Phase 1 has begun, and is expected to be completed in 2020. Phase 1 will be approximately 850,000 s.f. – 315,000 s.f. will be net new square footage. Phase 1 of development will require intersection improvements along Broadway, Bay Road, and Woodside Road as outlined in Chapter IV of the Plan.

Climate Action Plan (2013)

Redwood City's Action Plan outlines areas and opportunities to reduce Greenhouse Gas (GHG) emissions to achieve a reduction of 15 percent below 2005 levels by 2020. The plan recommends the following transportation related policies and goals to achieve this reduction: implementing of the Regional Bicycle Share and Last Mile Connection Pilot Programs and documenting of the emissions impacts, completing of the bikeways identified for Redwood City in the San Mateo County Comprehensive Bicycle and Pedestrian Plan and an increase in local bikeways. Additionally, the policies and goals include achieving an eight percent reduction in Vehicle Miles Traveled (VMT) by updating parking policies and management strategies, including the Downtown Parking Management Plan, and achieving a five percent participation rate in the Employee Commute Program for City staff.

Water Emergency Transportation Agency (WETA) Strategic Plan (2016)

The San Francisco Bay Area WETA Strategic Plan's vision is for ferries to run every 15 minutes in the highest volume locations, and that commuting by ferry will be the first-choice option in the Bay Area. The overall Strategic Plan for WETA over the next 20 years includes the goals to expand ferry service and provide quality ferry transportation service. Specifically, by 2035, WETA aims to have add

32 vessels, 9 terminals, 8 routes, and 19 peak hour landings, increase peak capacity by 740 percent and multiply daily riders by five. The long-range plan proposes a new terminal in Redwood City, as well as in Richmond, Treasure Island, Mission Bay (San Francisco), Berkeley, Seaplane Lagoon (Alameda), the South Bay, and the Carquinez Strait.

Redwood City Transportation Impact Mitigation Fee Report (2012 Update)

The Redwood City Transportation Impact Mitigation Fee Report was updated in 2012. The transportation impact fee is assessed on new development for its proportionate share of the costs to citywide transportation improvements attributed to increased trips generated by new development. The fee includes costs associated with intersection improvements, corridor or area-wide improvements, and alternative mode/transportation improvements.

Redwood City Bikeshare Suitability Analysis (2015)

Redwood City was a part of the original Bay Area Bike Share system operated by Motivate that launched in 2013 (in addition to San Francisco, Palo Alto, Mountain View and San Jose). In 2015, Motivate submitted a bid to expand Bike Share into the East Bay and did not include Redwood City, Palo Alto and Mountain View in the continuation of the existing system. Redwood City was given the option to buy the Bike Share system and operate it at their own cost. Redwood City chose to opt out of the Motivate bike share system in mid-2016 and currently has no bikeshare system. Since 2016, Redwood City has been focused on developing a viable bike share system with other peninsula communities.

Ongoing Transportation Planning Projects

There are several ongoing City-sponsored and partner-led transportation-planning projects in Redwood City.

El Camino Real Corridor Plan

In July 2016, the City kicked off the planning process for the El Camino Real Corridor Plan. The Plan aims to consolidate the recently rezoned areas along El Camino Real and establish community benefits, and streetscape improvements to improve the corridor for all users. The Redwood City General Plan envisioned El Camino Real as a "Grand Boulevard" that would provide facilities for biking, walking, transit and would incorporate residential, shopping, and office space. Some of the specific transportation elements currently being considered as part of the Plan include pedestrian activated crosswalks, bike lanes, separated bike lanes/cycle tracks, protected intersections (at-grade road intersection in which cyclists and pedestrians are separated from cars), rapid buses, and transit signal priority. The overall timeline for the project is about 12 to 18 months; thus the plan is tentatively expected to be completed by late 2017/early 2018.

Broadway Streetcar Study

The Broadway Streetcar Study, led by the City of Redwood City, is a feasibility study of a Broadway streetcar line. The study builds off policies outlined in the Redwood City General Plan, and outlines several streetcar corridors in Redwood City that would provide connection to areas outside of Downtown. The study aims to analyze the design and economic feasibility of a streetcar or circulator along Broadway that would connect Stanford in Redwood City to Downtown. In October 2016, the study released its Existing Conditions Report and currently evaluating alternatives for the Broadway streetcar alignments.

Downtown Transit Center Study

The City is also currently working on the Downtown Transit Center Study, which looks at potential short-term and long-term improvements to the Transit Center that would improve functionality, usability, and attractiveness. The study will conduct design studies for the Transit Center, including pedestrian, shuttle, taxi, and bicycle connections, train platform improvements, and inefficiencies in the surrounding parking lots. This study will consider connections to the proposed Broadway Streetcar Line. In the spring of 2017, the study released its draft existing conditions and some preliminary concepts of possible short-term improvements to the Transit Center.

California High-Speed Rail Environmental Analysis

The High Speed Rail Authority with the Federal Railroad Administration started a tiered environmental review process in 2001, per CEQA and NEPA requirements. California High Speed Rail will provide fast, reliable connections between the Bay Area and Los Angeles/Anaheim in Phase I. Phase II will extend the rail line to San Diego and Sacramento. The rail line will stimulate job growth, increase mobility within California, provides an alternative to flying or driving, and will improve air quality. At its completion in 2029, California High Speed Rail will provide service from San Francisco to Los Angeles in less than 3 hours at speeds of over 200 miles per hour. With the San Diego and Sacramento extension, the rail system will be 800 miles long and will include 24 stations.

Originally, Redwood City was one of the mid-Peninsula cities being considered for a high-speed rail stop; however, Redwood City is no longer considered for a stop under its current plans.

Construction is underway at segments between Merced to Bakersfield, while planning continues for segments between Merced and San Jose, and San Jose and San Francisco.

Caltrain Modernization Program

The Caltrain Modernization Program will electrify the existing Caltrain corridor between San Francisco and San Jose, install a Communications Based Overlay Signal System Positive Train Control, and replace Caltrain's diesel trains with high-performance electric trains. The program will cost $1.9 billion and is funded through two multi-party agreements. The program is scheduled to be operational in mid- to late-2021. Modernizing Caltrain will allow for more frequent, faster, quieter, and environmentally clean train service. Electrification will make it possible for Caltrain to meet rapidly increasing ridership demand, which will help alleviate traffic congestion regionally. Specific to Redwood City, Caltrain modernization will increase the number of daily trains from 72 (Existing, in 2013) to 102 (2020 and 2040 Project).

Caltrain Bike Parking Management Plan

The Caltrain Bike Parking Management Plan began in 2016, and is supported by a grant from Caltrans. The plan will identify the mobility needs of bicyclists using Caltrain, define customer service and financial performance measures and goals for the bike parking system, support capital planning activities related to bike parking facilities, analyze different management strategies and administrative options, and recommend a set of reforms and implementation strategies to optimize the Caltrain bike parking system.

Dumbarton Transportation Corridor Study

The Dumbarton Transportation Corridor Study is a feasibility study of the corridor that aims to identify short and long-term strategies to reduce congestion and improve mobility between Alameda, San Mateo, and Santa Clara counties. Congestion on the Dumbarton Bridge (Highway 84), and the rehabilitation and repurposing of the Dumbarton rail bridge is being studied. The Corridor connects Newark, Fremont, and Union City to Redwood City, Menlo Park, East Palo Alto, and Palo Alto.

The study will recommend a program of operational and infrastructure improvements, and identify opportunities to improve access to and on the Dumbarton Corridor for all modes, including transit, bicycle, pedestrian, and auto. One of the long-term goals is to provide BRT service or commuter rail from Union City BART to Redwood City Caltrain.

Grand Boulevard Initiative

The Grand Boulevard Initiative is a collaborative effort between 19 cities, counties, local and regional agencies to modify El Camino Real in its entirety, from the northern Daly City limit to the Diridon Caltrain Station in San Jose. The Initiative aims to make El Camino Real a boulevard that will connect communities by transit and walking and will incorporate a mix of land uses.

The goal of the initiative is to coordinate planning along the length of El Camino; San Mateo County Transit District (SamTrans), Santa Clara Transportation Authority (VTA), Joint Venture Silicon Valley Network, San Mateo City/County Association of Governments (C/CAG), and SAMCEDA (San Mateo Economic Development Association) will collaborate on the initiative. The Initiative will establish a series of policies that will be accepted by all involved jurisdictions, to make El Camino Real function better for all modes and incorporate mixed land uses.

The Grand Boulevard Initiative received a state grant of nearly $350,000 for multi-modal safety and accessibility design improvements on El Camino Real in Redwood City and Palo Alto through Caltrans' Sustainable Transportation Planning program. Traffic calming measures, pedestrian facility upgrades, bicycle considerations and enhanced streetscape designs are design improvements being considered.

C/CAG TDM Grant

Under a C/CAG grant, the City is currently working to develop a Transportation Demand Policy and Plan (TDM Plan) and a framework for establishing a Transportation Management Association for the Downtown area. The goals of the TDM Plan include providing consistent framework to reflect Redwood City's unique needs and characteristics; identifying programs and initiatives encouraged and supported by Redwood City; help identifying ways of reducing vehicle trips overall; and providing clear measures for evaluating the success of programs through monitoring and enforcement. The framework for developing a transportation management association will set up the City for creating this entity. The purpose of the TMA will be to provide a means for employers and developers to coordinate efforts and maximize efficiency of the implemented programs, allowing them to optimize TDM programs. The TDM Plan is being completed in concurrence with the Citywide Transportation Plan and the TDM Plan will ultimately be integrated into the Citywide Plan.

Community Outreach

The Citywide Transportation Plan presents an exciting opportunity to engage with residents, workers and business owners – people who walk, bike, take transit and drive in the City – in order to understand how their experience and quality of life could be transformed with an improved transportation system. Recognizing the value of community outreach, the City purposefully provided several opportunities at the onset of the project for key stakeholders to participate and provide feedback in the study. To ensure comprehensive and in-depth information on Redwood City transportation needs were gathered, community and stakeholder input was collected through a multifaceted outreach approach that included:

- **Community "Pop-Up" Events** – Two community events were held in spring of 2017. The objective of these workshops was to engage and solicit feedback from a broad and diverse audience. These events provided an opportunity to inform the public about the purpose of the study, answer questions, and solicit feedback about existing issues and future opportunities for improving the City's transportation network. The "Pop-Up" events were held at the Fair Oaks Community Center and the Kiwanis Farmer's Market near the Caltrain station.

- **Walking Audit** – A one-day walking audit was held at key roadway and intersection locations in early April 2017. The locations visited during the audit were selected because they represented particularly challenging locations and/or they were representative of issues found throughout the City. The audit provided an opportunity to receive input from those knowledgeable of transportation issues in the City. The walking audit also provided an open forum where potential roadway improvements were discussed at each location, allowing those in attendance to provide feedback.
- **Focus Groups** – A series of focus groups were held with key stakeholders throughout the City. The focus groups allowed for a more in-depth discussion of issues, opportunities, and feasibility of improvements in Redwood City, as well as targeted those not well-represented at other community events or online forums. The focus groups were also a forum for suggestions on improving mobility options, and to measure public interest and willingness to use alternative modes of travel.
- **Interactive Web Map Survey** – An interactive web map survey was created to provide the community with an easily accessible platform to comment about specific mobility experiences at a given location within the City.

Table A-1 provides the date and brief description of each community outreach event that was hosted as part of the project. The following sections describe the information gathered through the community outreach.

Table A-1: Community Outreach Event Summary

Date	Community Outreach Event	Description
March 9, 2017	Focus Group #1	Focus group with members of the Redwood City Chamber of Commerce
April 4, 2017	Walking Audit	One-day walking audit at various locations throughout Redwood City
April 21, 2017	Pop-Up Event #1	Fair Oaks Community Center
April 25, 2017	Focus Group #2	Focus group with members of the "Fun After Fifty" Club at Veterans Memorial Senior Center
April 25, 2017	Focus Group #3	Focus group with members of the Complete Streets Advisory Committee at City Hall
April 29, 2017	Pop-Up Event #2	Redwood City Kiwanis Farmer's Market
June 5, 2017	Focus Group #4	Focus group with transit stakeholders, including Caltrain, SamTrans and commute.org, at City Hall

Community "Pop-Up" Events

Fehr & Peers hosted a booth at two community events. These events were an opportunity to listen to the community regarding existing issues and opportunities, and to build our electronic mailing list/direct interest groups to the website, web map, and social media.

Some key these emerged at each event:

- At the **Fair Oaks Community Center**, participants noted that the public transit system does not serve local roadways, neighborhoods or schools very well in the City. Several community members with small children commented on the lack of transit connectivity to and from local schools, and noted that bus schedules often do not align well with extra-curricular activities. Participants recommended they would like to see more coordination between the schools and transit agencies.
- At the **Redwood City Farmer's Market**, downtown residents were pleased with the area's walkability and the ease of bicycling downtown, and encouraged more bicycle and pedestrian only streets. Participants noted they enjoy the walkable areas but were concerned with congestion, vehicle parking, and bicycle parking in the downtown area. Citywide congestion was also noted as a concern for residents, especially along the key roadways connecting with US 101 and I-280. Residents commented that regular commute traffic often blocks driveways and residential streets are being used as alternate routes by travelers avoiding more congested roadways.

Walking Audit

An all-day walking audit was held at key locations throughout Redwood City on Tuesday, April 4, 2017. The purpose was to observe circulation during the peak time of safety or mobility concern (such as school drop-off periods or peak commute hours). Fehr & Peers worked with City staff to develop a list of key roadway and intersection locations to observe during the walking audit. These locations were representative of common issues found elsewhere in Redwood City.

- Jefferson Ave/Highland Ave
- Farm Hill Blvd/Eden Bower Ln
- Farm Hill Blvd/Emerald Hill Rd
- Woodside Rd/Orchard Ave
- Redwood Shores Parkway/Electronic Arts
- Whipple Ave from Elm Camino Real to Lenolt St
- Jefferson Ave/Clinton St
- Jefferson Ave/Cleveland St

Observations during the walking audit will be used to develop specific suggestions to apply throughout the City's roadway network.

Focus Groups

Four focus groups were held throughout Redwood City in between March and June 2017 to solicit input on the existing transportation issues and opportunities in the City. The focus groups were held with the following groups:

- Businesses and Merchants, Redwood City Chamber of Commerce
- Seniors, Fun After 50 Group, Veterans Memorial Senior Center
- Complete Streets Advisory Committee, City Hall
- Transit Agencies (Caltrain, SamTrans, commute.org), City Hall

Approximately 6 to 10 people participated in each focus group, except the focus group with the "Fun After Fifty" Club where there were approximately 30 to 40 participants. The focus groups were held in an informal setting where participants had the opportunity openly discuss their hopes, concerns, and questions.

Each focus group was 60-90 minutes long, and included a brief presentation of the study and series of questions to generate feedback. Group facilitators focused the discussion and questions on existing conditions and personal experiences that were most relevant to the City and participants' personal mobility choices.

Some key themes emerged within each focus group:

- At the focus group with the **Redwood City Chamber of Commerce**, representatives of local businesses and merchants in the area stressed the need to accommodate high bicycle and pedestrian activity, especially in the downtown area. Participants noted that pedestrian crossings and bicycle lanes should be improved and enhanced to become more visible and clear for all roadway users. Contributors were asked to provide some potential transportation solutions that may benefit the City most, or examples that they have experienced in other cities. These potential solutions included green bike lanes, pedestrian scrambles (traffic signals that allow people to cross in every direction, including diagonally, while all vehicle approaches have a red light), separated walkway and bikeways, traffic signal coordination and priorities, street lighting, and wayfinding.

- At the focus group with the **Fun After Fifty Club**, participants explained and provided examples on some of the typical challenges of traveling in Redwood City. Residents noted they have difficulty traveling in the downtown area due to the challenge of finding parking near their destination and heavy congestion, and expressed interest in a shuttle style service.
- At the focus group with the **Complete Streets Advisory Committee**, members provided feedback on opportunities for improving roadways for each mode of travel. Participants commented on the need to improve the bicycle and pedestrian experiences across and along major barriers in the City, such as Woodside Road, El Camino Real and Jefferson Avenue. Participants also stressed the need for a comprehensive bicycle network, as well as a refined transit network throughout the City.
- At the focus group with **key transit stakeholders**, participants provided input on existing challenges and opportunities for expanding transit service in the City. The Caltrain station was noted as a particular challenge, as it is currently well-utilized but has access and circulation issues that limit its ability to accommodate future increases in transit demand. El Camino Real is the highest used bus transit corridor in the City, and while some improvements are currently being implemented to increase transit speeds, there is limited street space for providing major bus improvements on the corridor. Finally, participants noted the opportunity that downtown Redwood City could connect different forms of transit, including buses, rail, on-demand transit, shuttles, streetcars and access to ferries and the Dumbarton corridor.

Interactive Web Map Survey

An interactive web map survey was created to allow community members to share thoughts and ideas on transportation issues and opportunities at specific locations in Redwood City. Respondents were first asked to answer a series of questions in order to establish their relationship to Redwood City (live, work, go to school, or visitor), their primary commute mode, and some additional information as to what other travel modes they would be most interested in using on their commute. Next, respondents were prompted to select and place a pin, which was categorized by travel mode (walk, bike, bus, train, car, or other), to highlight locations where there are transportation issues and transportation opportunities in the City. After placing a pin on the map, respondents were given the option to provide a reason and/or any additional comments they wished to make in association with each pin placed. There were no limitations on the number of pins a respondent could provide. Following the web map potion of the survey, respondents answered a series of demographic survey questions and were given the option to provide any additional ideas or comments about transportation in Redwood City.

The survey was available on the Project's website from early-March until mid-July 2017. To encourage residents to participate in the map survey, the City distributed business cards and fact sheets, wrote articles about the project and survey for various newsletters, and posted about the survey on NextDoor, Facebook, and Twitter.

Over 800 people responded to the survey and placed over 2,000 specific pins on the web map. Approximately 70 percent of all survey respondents live in Redwood City, while around 30 percent work or go to school there. The majority (60 percent) of survey respondents noted their primary mode of transportation for commuting was driving alone; however, over 70 percent stated they would be interested in using a different mode of transportation to commute if better services or infrastructure were available. When prompted to choose a preferred mode of transportation for commuting, respondents ranked bicycle, taking a public or private bus/shuttle, and Caltrain as the most preferred travel modes.

Respondents placed around 1,500 issue/challenge pins and about 500 positive pins on specific locations in Redwood City. Positive pins were placed most frequently for walking and biking, while issue/challenge pins were placed most frequently for biking, driving and walking. Survey responses were organized into comment categories based on the types of projects that would improve or address problems identified by web map participants. Of all comment categories, the majority (over 350) of survey responses supported new or improved pedestrian facilities, while about 350 responses suggested roadway/intersection improvements (auto-only). Just under 350 responses were for new or improved bike facilities, and just over 200 responses were for transit services. **Figure A-2** shows the locations of all pins placed by respondents on the web map survey. By simply reviewing the total number of pins placed over the entire City, some locations received more responses compared to others, such as Broadway, streets within and surrounding downtown, El Camino Real, streets around Sequoia High School and McKinley Middle School, and along Woodside Road, Whipple Avenue, and Holly Street near US 101.

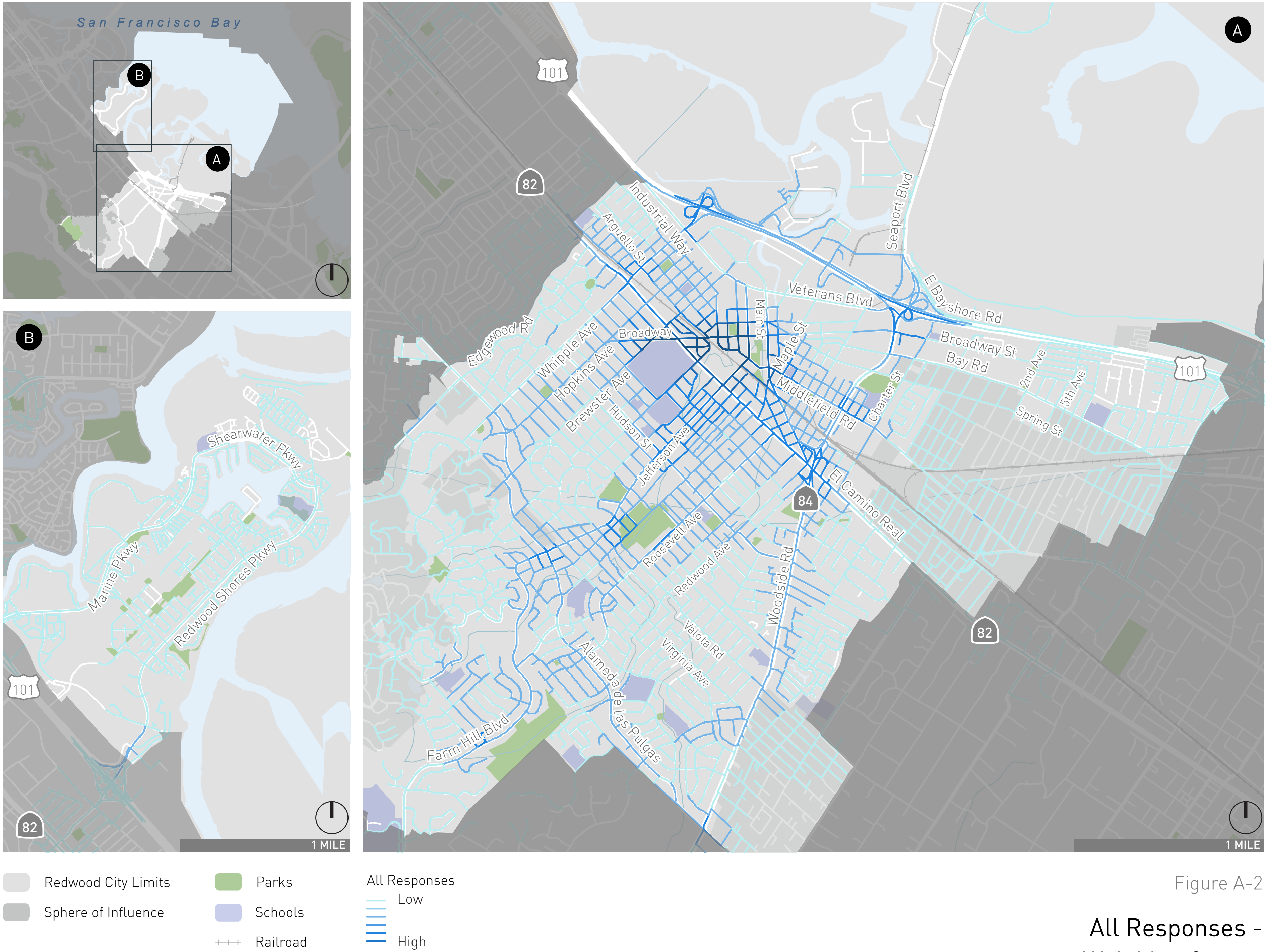


Figure A-2

All Responses - Web Map Survey

Figure A-3 shows the locations of all issue/challenge pins placed by respondents on the web map survey. Over 800 people placed more than 1,500 issue/challenge pins by travel mode on the web map. Some locations received more negative responses than others, such as the Woodside Road/Broadway intersection, areas near downtown, Sequoia High School, and throughout residential neighborhoods in the western-most portion of the City. The most frequently placed issue/challenge pins were for bikes (430) followed by cars (410), pedestrians (400), buses (150), and trains (80).

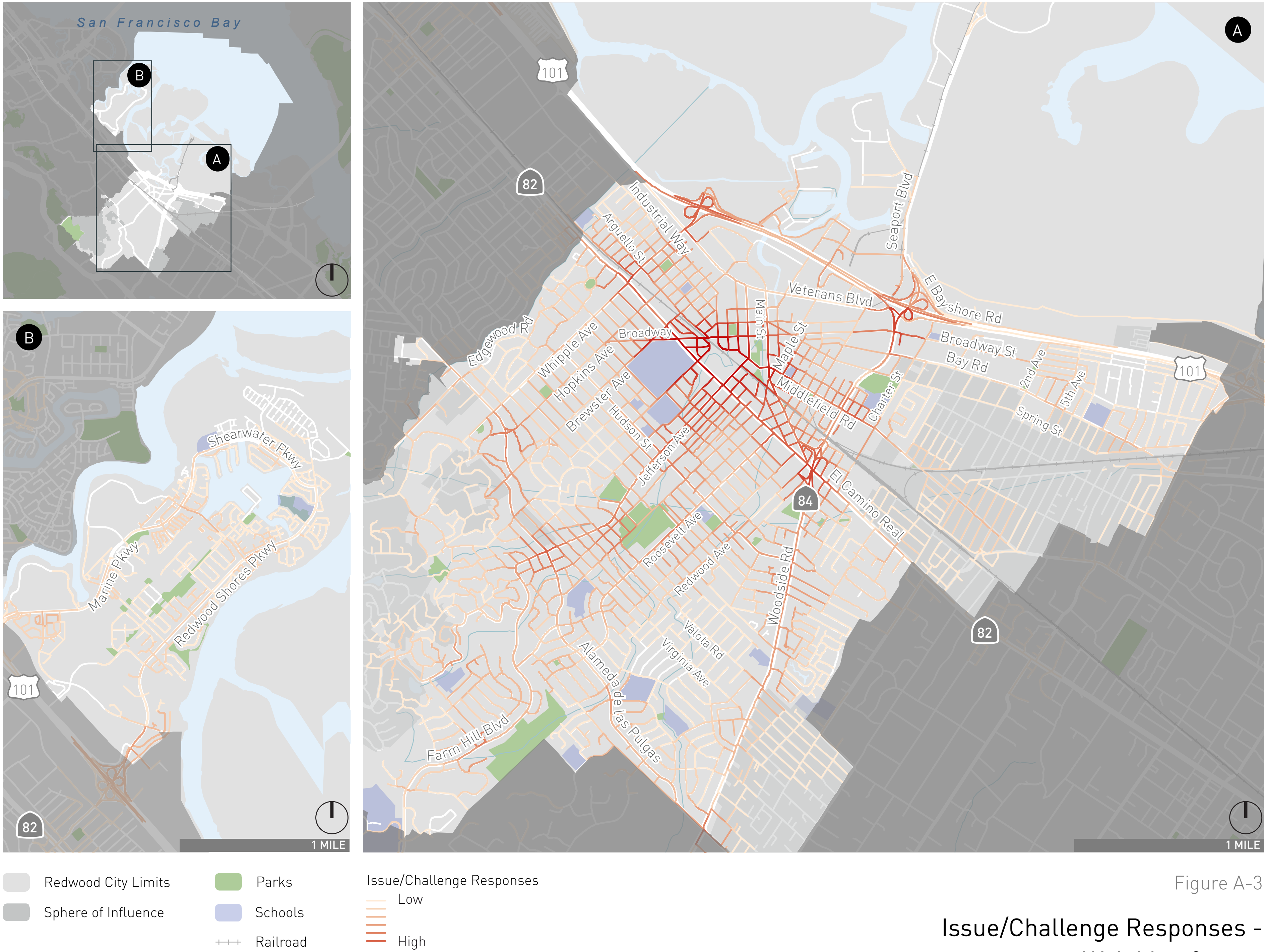
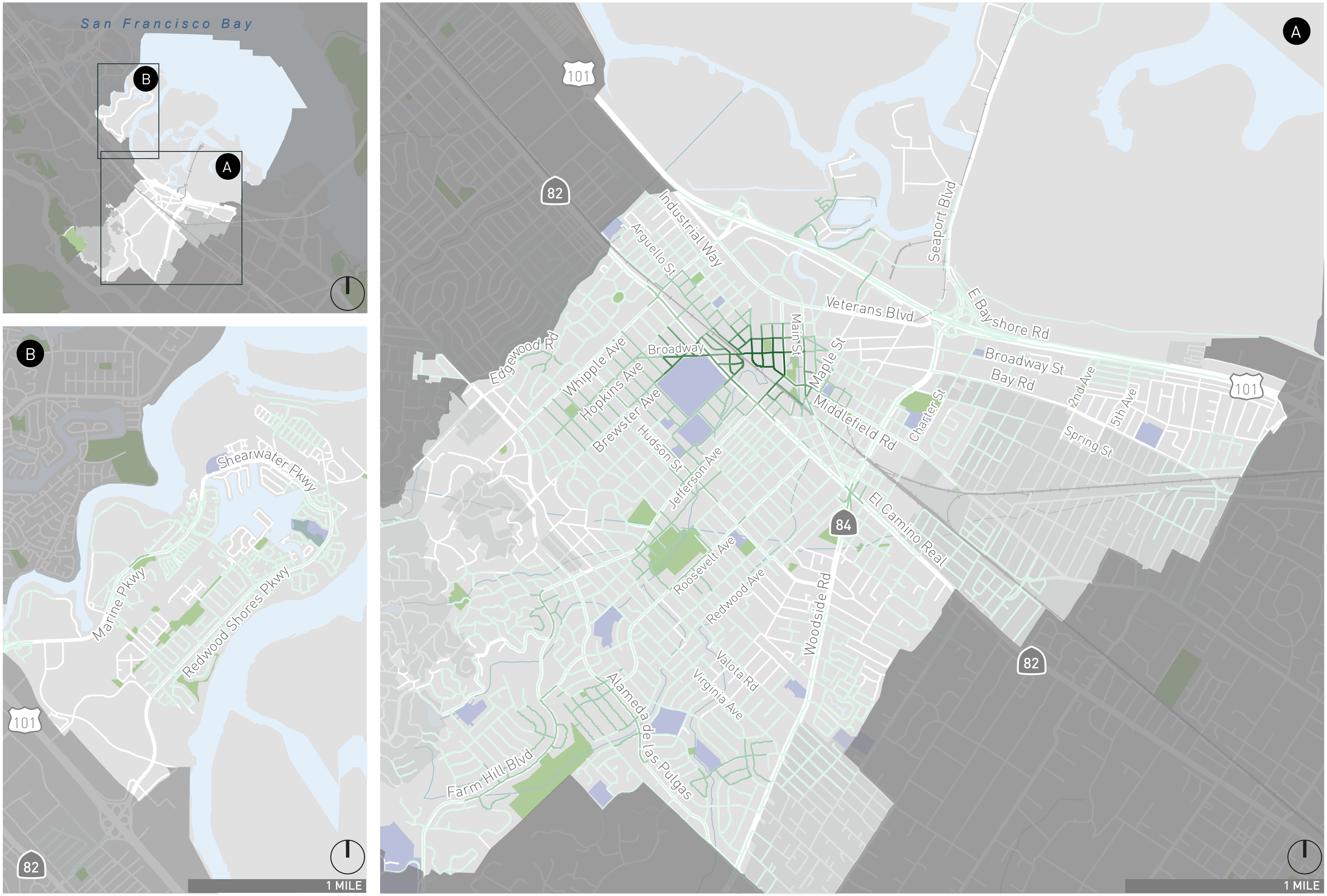


Figure A-3

Issue/Challenge Responses - Web Map Survey

Figure A-4 shows the locations of all positive pins placed by respondents on the web map survey. More than 800 people placed just over 500 positive pins by travel mode on the web map. Overall, there were fewer positive pins were placed on the web map compared to the total number of issue/challenge pins. Some locations received more positive responses than others did, such as near the downtown area, Red Morton Community Park, and areas surrounding Farm Hill Boulevard. The most frequently placed positive pins were for pedestrians (240) followed by bikes (110), trains (50), cars (45), and buses (30).



Redwood City Limits
Sphere of Influence
Parks
Schools
Railroad

Positive Responses
Low
High

Figure A-4

Positive Responses - Web Map Survey

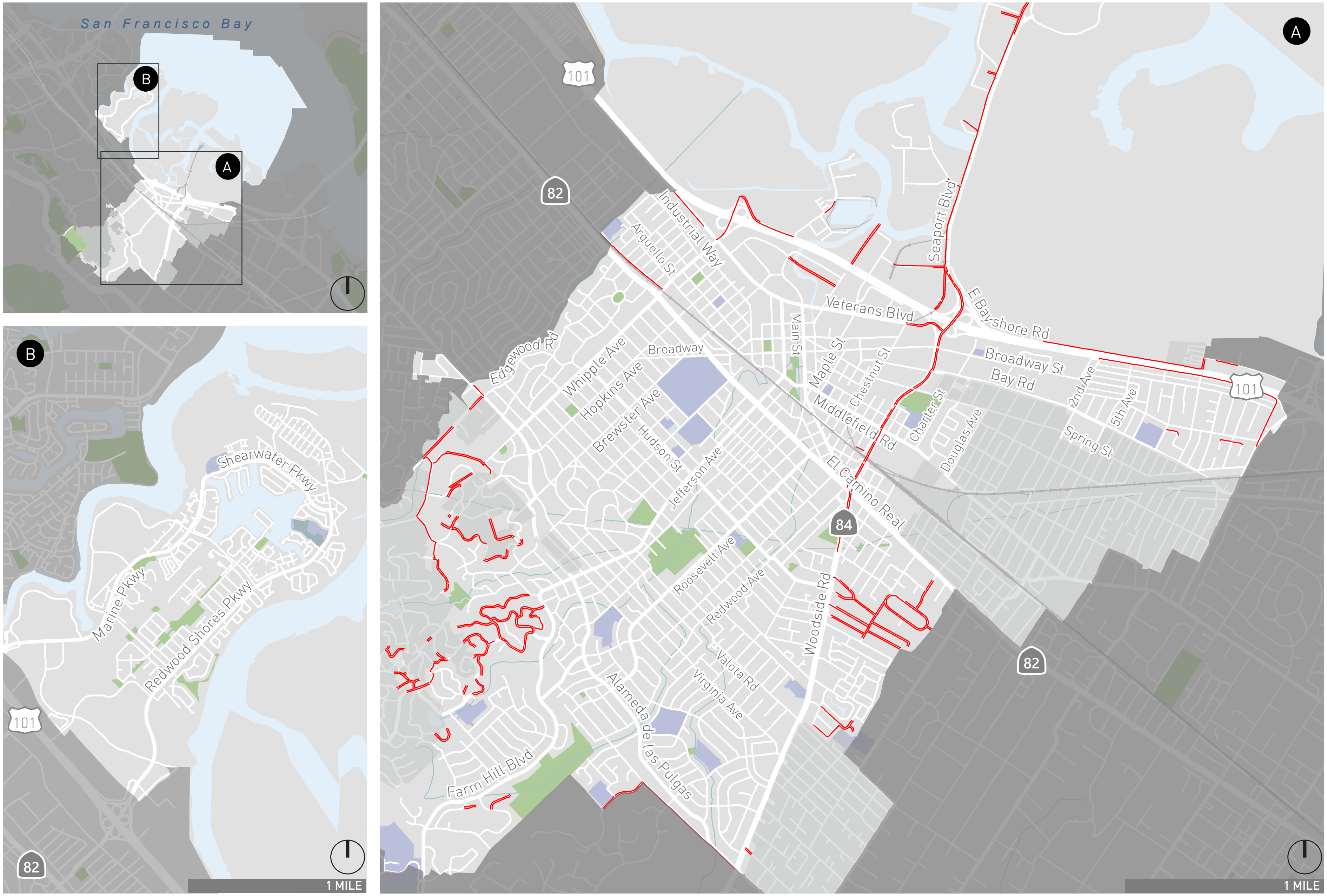
Multimodal Transportation Networks

Redwood City is served by a wide variety of transportation services and facilities creating a truly multi-modal transportation network. While roadways form the backbone of the system, this discussion focuses on the existing walking, bicycling, transit facilities as these modes offer the greatest potential for increased usage. Employer shuttles are another key mode that is discussed. Maps have been developed for each key travel mode using existing data presented in the City's General Plan, and other City documents.

Pedestrian Network

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. These destinations are connected by a system of on-street sidewalks and pedestrian crossings provided along all major streets in Redwood City as shown on **Figure A-5**. Only a few segments along streets designated in the General Plan as arterials, commercial/industrial collectors, and residential collectors lack sidewalks.

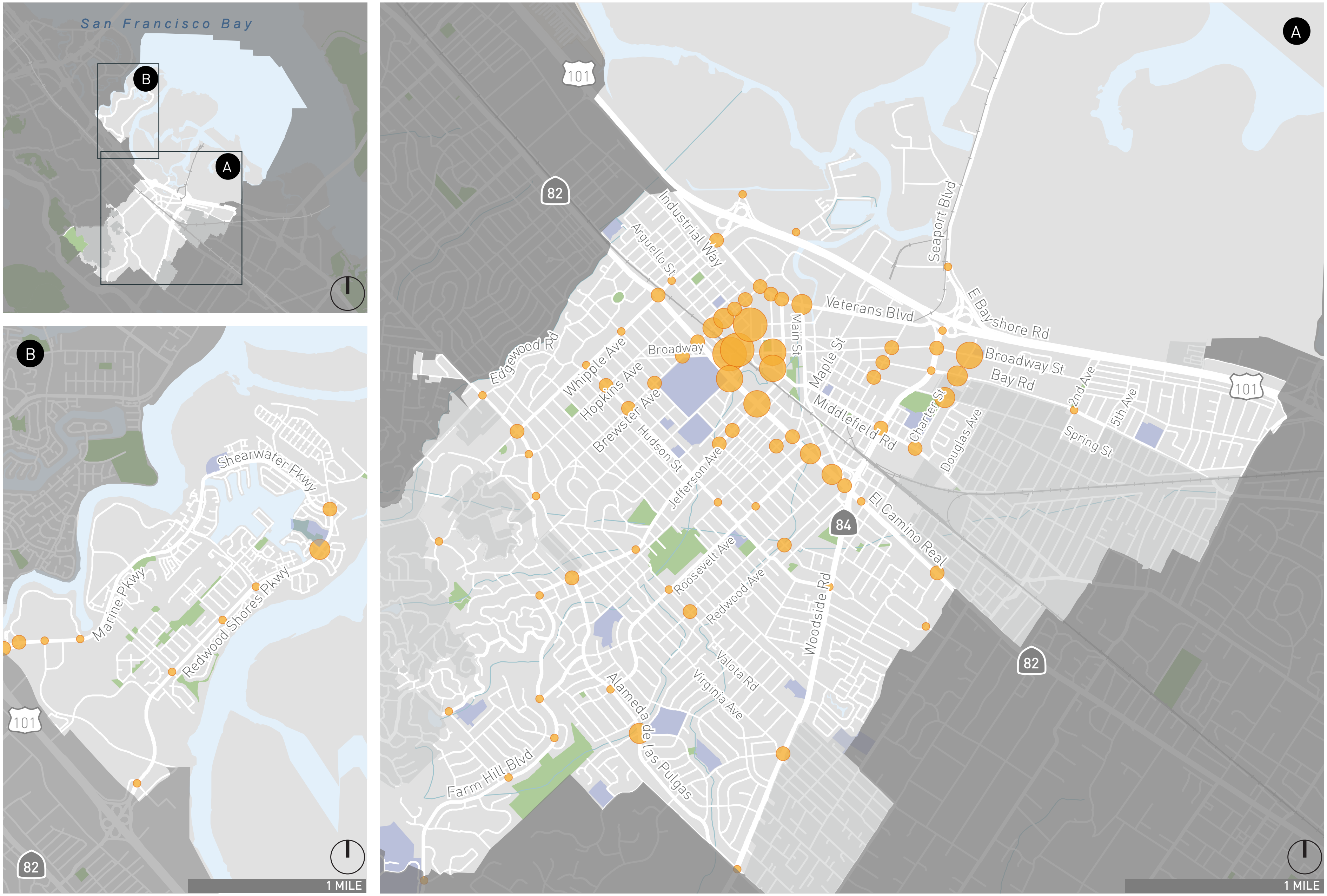
Figure A-6 shows total pedestrian volumes at available count locations. The largest number of pedestrian activity is mostly located along Broadway in the Downtown. Redwood City's downtown is a particularly attractive destination for pedestrians, with many dining and retail businesses.



Redwood City Limits
Sphere of Influence
Parks
Schools
Railroad
Sidewalk Gap

Figure A-5

Redwood City
Existing Pedestrian Network



Redwood City Limits
Sphere of Influence
Parks
Schools
Railroad

Pedestrian Volume

0 - 50
51 - 150
151 - 300
301 - 600
601 - 1,400

* Volumes shown in locations with data

Figure A-6

Total Pedestrian Volumes: Morning (7-9 AM) and Evening (4-6 PM) Peak Periods

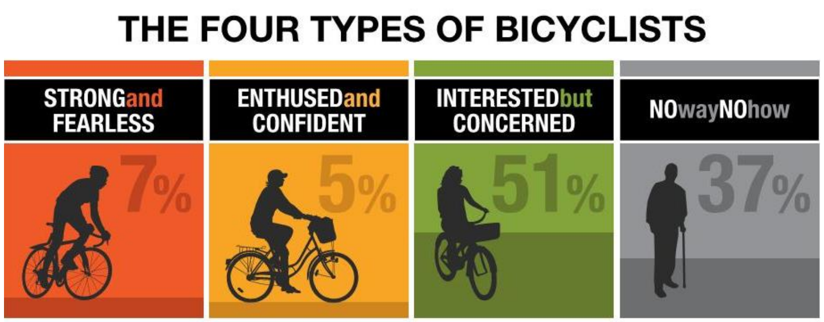
Bicycle Network

Redwood City has a bicycle facilities network that provides dedicated and shared street space for bicycling. Information on the types of bicyclists and types of bicycle facilities is presented below followed by an overview of the bicycle facilities within Redwood City and how well they serve the bicycling population.

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 readiness 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 primarily on the basis of their comfort level and interest with cycling on a variety of facility types:

- ***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 make 5 to 10 percent of the adult population;
- ***Enthused 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. Enthused and confident riders make up approximately five to ten 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 fifty to sixty percent of the population; and
- ***No Way, No How***: These people are not willing, not able, or very uncomfortable to ride bicycles for transportation, even on a completely separated bike path. They make up approximately one-third of the population.



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

A national survey of the 50 largest metro areas was conducted in 2015 to identify how the general adult population identifies with each of the four types of bicyclist (Dill and McNeil, 2016). About a third of adults would not consider riding a bike, just over are interested but concerned, and just over ten percent are either strong/fearless or enthused/confident.

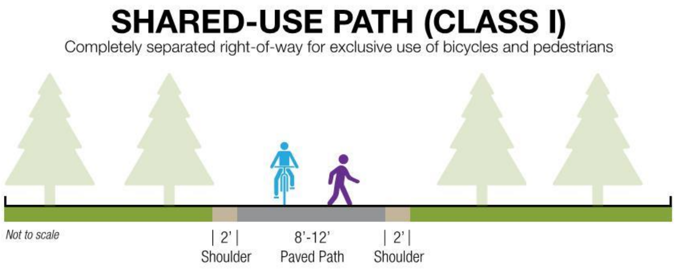
The City's existing bicycle commute mode share is two percent, which indicates that the streets in Redwood City and in adjacent cities currently are not comfortable for the majority of the population. Improvements to bicycle facilities and traffic calming may help encourage a larger share of the population 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 (such as bike paths, protected bike lanes, or cycle tracks) provided connection to and from schools, downtown Redwood City, neighborhoods, and job centers.

Types of Bicycle Facilities

Bikeway planning and design in California relies on guidelines and design standards established by California Department of Transportation (Caltrans) in the Highway Design Manual (Chapter 1000: Bikeway Planning and Design). Caltrans provides for four distinct types of bikeway facilities, as described below and shown in the accompanying figures.

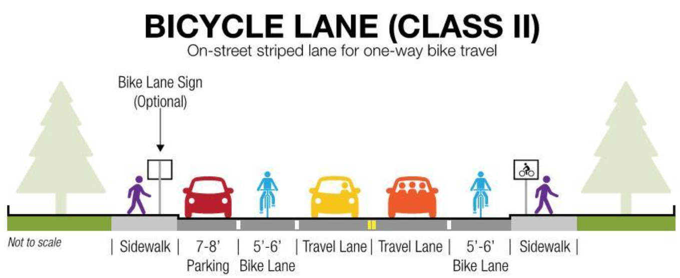
Shared-Use Path (Class I)

Shared-use bike paths 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. The Bay Trail around Belmont Slough in Redwood Shores is a shared-use path.



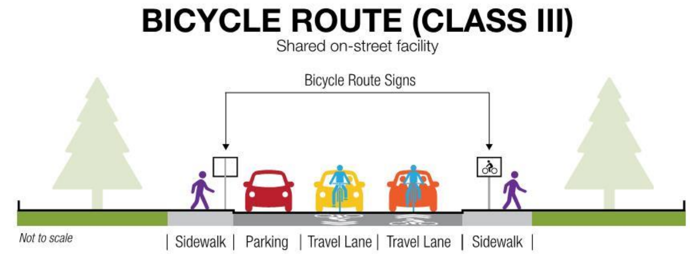
Bicycle Lane (Class II)

Bike lanes 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. For example, there are bike lanes on Massachusetts Avenue, between Fernside Street and Virginia Avenue.



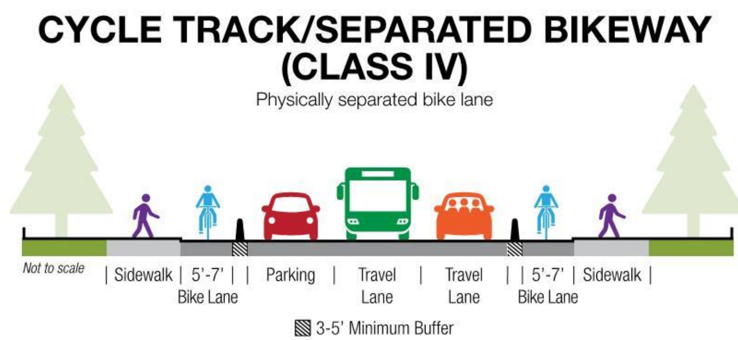
Bicycle Route (Class III)

Bike routes 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. For example, Charter Street, between Middlefield Road and Broadway, is a designated bike route.



Cycle Track/Protected Bikeway (Class IV)

Cycle tracks or protected bikeways 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. Bair Island Road between East Bayshore Road and Sea Anchor Drive has a cycletrack.



Bikeway Design Guidelines

Bicycle facilities are typically designed according to the *Manual on Uniform Traffic Control Devices* (MUTCD), which provides engineering design standards for roadways in the United States. California has adopted a modified version of the national MUTCD for use within the state (*California MUTCD,* 2014). Caltrans also provides guidance for locating and designing bicycle facilities on state highways in its *Highway Design Manua*l (2016). Since Caltrans issued its most recent guidance on bikeway design, the National Association of City Transportation Officials (NACTO) has released guidance that is widely recognized as providing best practices for bikeway design (*Urban Street Design Guide,* 2013 and *Urban Bikeway Design Guide*, *2nd edition,* 2014).

While *Highway Design Manual* provides guidance for shared use paths, bike lanes, and sharrows, they do not provide detailed guidance for the design of cycle tracks and other recent bikeway design innovations. The NACTO guide provides guidance on cycle track design and on treatments that can enhance bicyclist visibility and safety at intersections and other areas with potential vehicle conflicts. These treatments are still considered experimental per Caltrans standards, and cities that wish to implement them while remaining in compliance with Caltrans standards are required to submit an experimentation request to the California Traffic Control Devices Committee.

Existing and Pilot Bicycle Facilities

Existing Bicycle Facilities

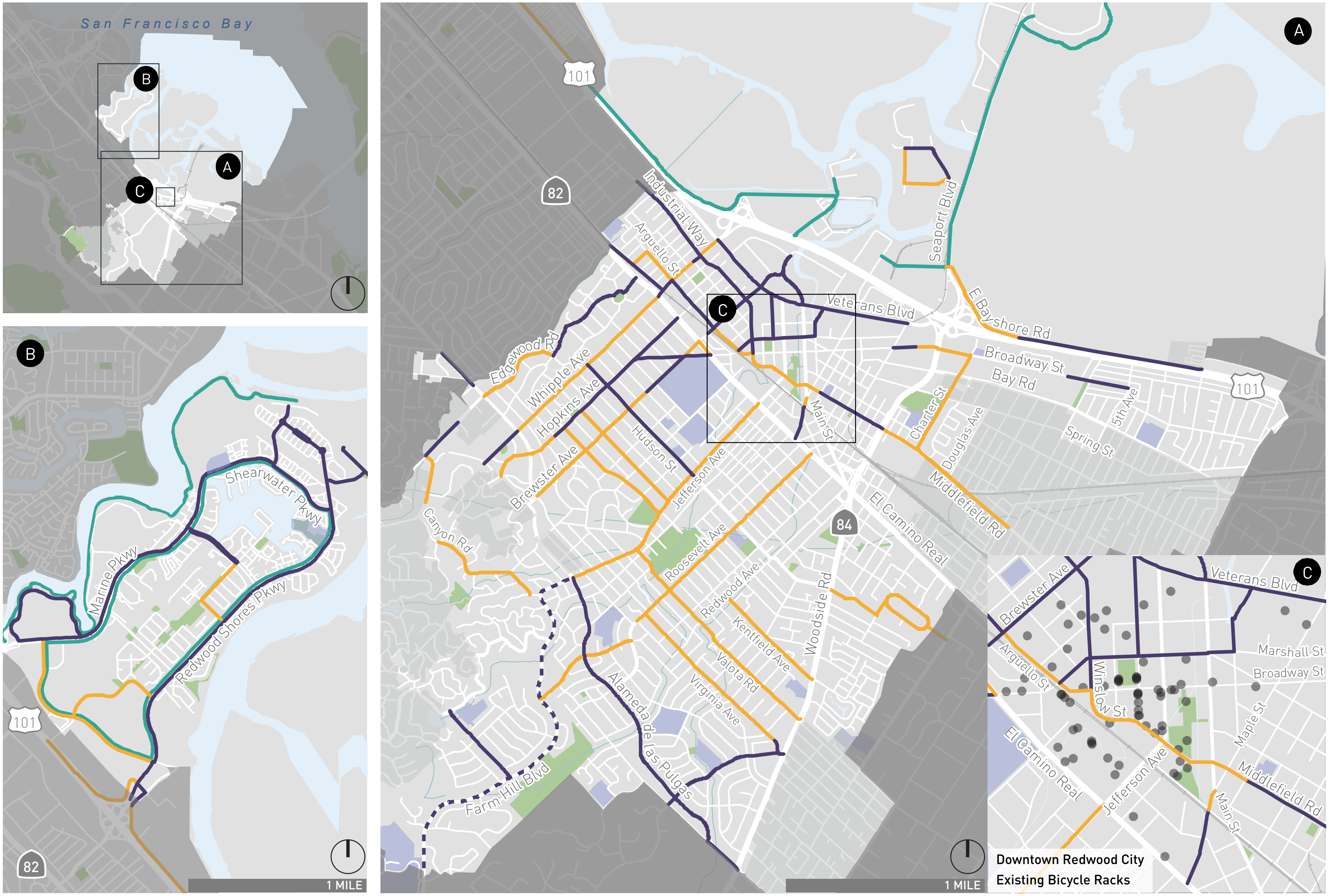
Figure A-7 presents existing bicycle facilities in Redwood City and **Figure A-8** presents existing bicycle counts. Areas with largest number of bicycle trips are mostly in Downtown Redwood City and along Broadway, Brewster Avenue, and Alameda de las Pulgas.

Generally, Redwood City has a limited number of bike lanes, which are primarily focused around the downtown and north of the downtown along Brewster Avenue, Veterans Boulevard, Industrial Way, and Broadway. Within the residential neighborhoods to the west of El Camino Real, bicycle access is primarily provided via bike routes. Separated bike paths are primarily provided in the Redwood Shores area of the City, with some additional, but relatively short segments of bike paths east of US 101.

In terms of connectivity, the residential areas west of El Camino Real and south of Jefferson Avenue mainly have designated north-south bicycle connections, but limited east-west facilities that provide connections between El Camino Real and Alameda de las Pulgas. North of Jefferson Avenue, the residential neighborhoods have better east-west connectivity and good north-south connectivity. East of El Camino Real, the area north of Jefferson Avenue has overall good connectivity, while bicycle facilities are limited in the areas south of Jefferson Avenue.

Pilot Bicycle Facilities

A pilot bicycle lane is in place on Farm Hill Boulevard. This pilot bike lane currently provides connection through Redwood City neighborhoods from I-280 to Jefferson Avenue.



Redwood City Limits

Sphere of Influence

Parks

Schools

Railroad

Bicycle Facilities

Existing Shared-Use Path (Class I)

Existing Bicycle Lane (Class II)

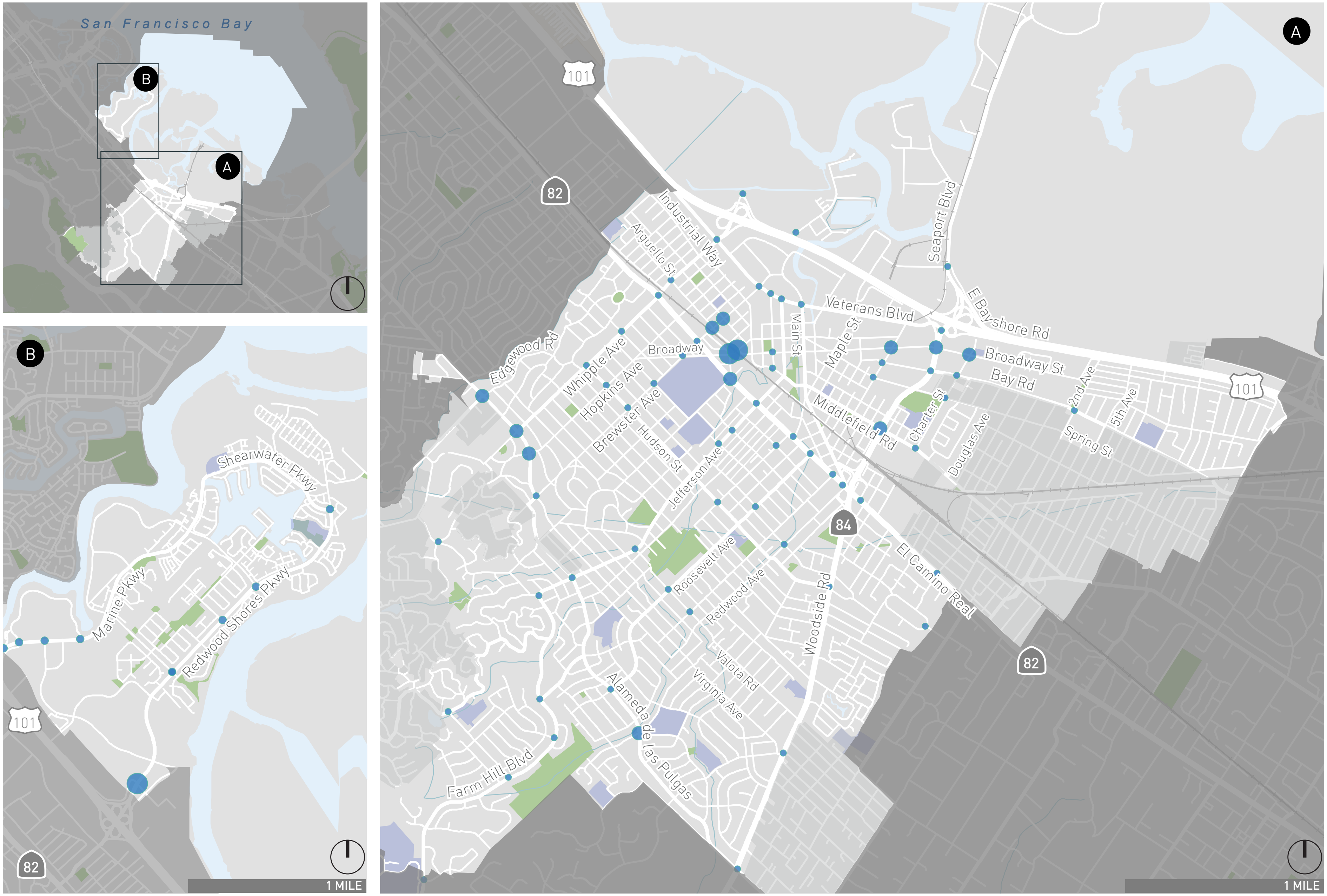
Pilot Bicycle Lane (Class II)

Existing Bicycle Route (Class III)

Existing Bicycle Racks

Figure A-7

Redwood City Existing Bicycle Network



Redwood City Limits

Sphere of Influence

Parks

Schools

Railroad

Bicycle Volume

- 0 - 50
- 51 - 150
- 151 - 300

* Volumes shown in locations with data

Figure A-8

Total Bicycle Volumes: Morning (7-9 AM) and Evening (4-6 PM) Peak Periods

Transit Network

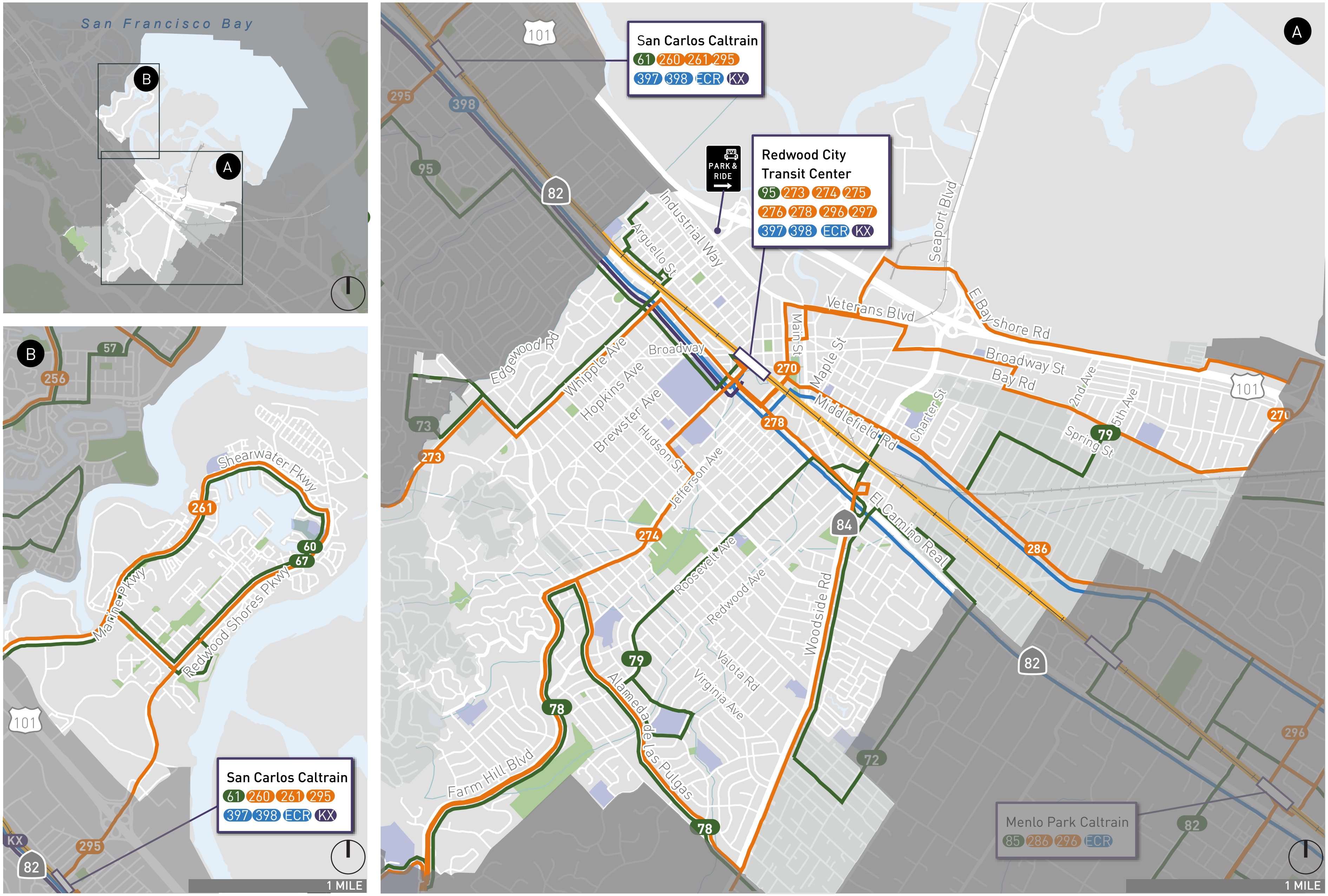
Transit service in Redwood City and surrounding communities is provided by Caltrain and SamTrans. A transit (bus) facility is located adjacent to Redwood City's Caltrain Station. A map of the bus routes, Caltrain tracks, and Caltrain station is shown in **Figure A-9**.

Caltrain

Caltrain provides passenger rail service between San Francisco and San Jose with extended service to Gilroy during peak weekday commute periods. Within the City, the rail line is parallel to and north of El Camino Real. The Redwood City Station is located Downtown, between Jefferson Avenue and Broadway (and is sometimes referred to locally as the "Sequoia Station," a name currently used by a retail shopping center adjacent to the Caltrain facility). The Redwood City Caltrain station is convenient for riders, since it is not only served by limited-stop and local trains, but baby bullet (express) service, which travels between San Francisco and San Jose in about an hour, stopping at a few popular stations. In the morning, there are approximately 15 trains each in the northbound and southbound directions and approximately, 20 trains per direction in the evening. In 2017 it had 3,870 boardings each weekday and in 2016 it had on average 3,810 boardings each weekday, the fifth highest of all of the station in the Caltrain system. Ridership increased 1.5 percent between 2016 and 2017. In 2015 that station had about 3,200 boardings, thus ridership increased by nearly 20 percent between 2015 and 2016.

SamTrans

San Mateo County Transit District (SamTrans) provides bus service to Redwood City and other communities in San Mateo County. It operates four school-day bus routes, ten bus routes to Caltrain stations, three bus routes to BART/Caltrain stations, and one express bus route serving Redwood City.



Redwood City Limits

Sphere of Influence

Parks

Schools

Railroad

SamTrans Express Route

SamTrans School-day Only Routes

Caltrain Lines and Stations

SamTrans Routes connecting to Caltrain Stations

SamTrans Routes connecting to BART and Caltrain Stations

Park & Ride Lot

Figure A-9

Redwood City Existing Transit Network

Private Shuttle Network

Private shuttles play an important role in the Redwood City transit story as they provide "first mile/last mile" connections between employment centers and the Redwood City, Belmont, and San Carlos Caltrain stations. The private shuttle network is shown on **Figure A-10**.

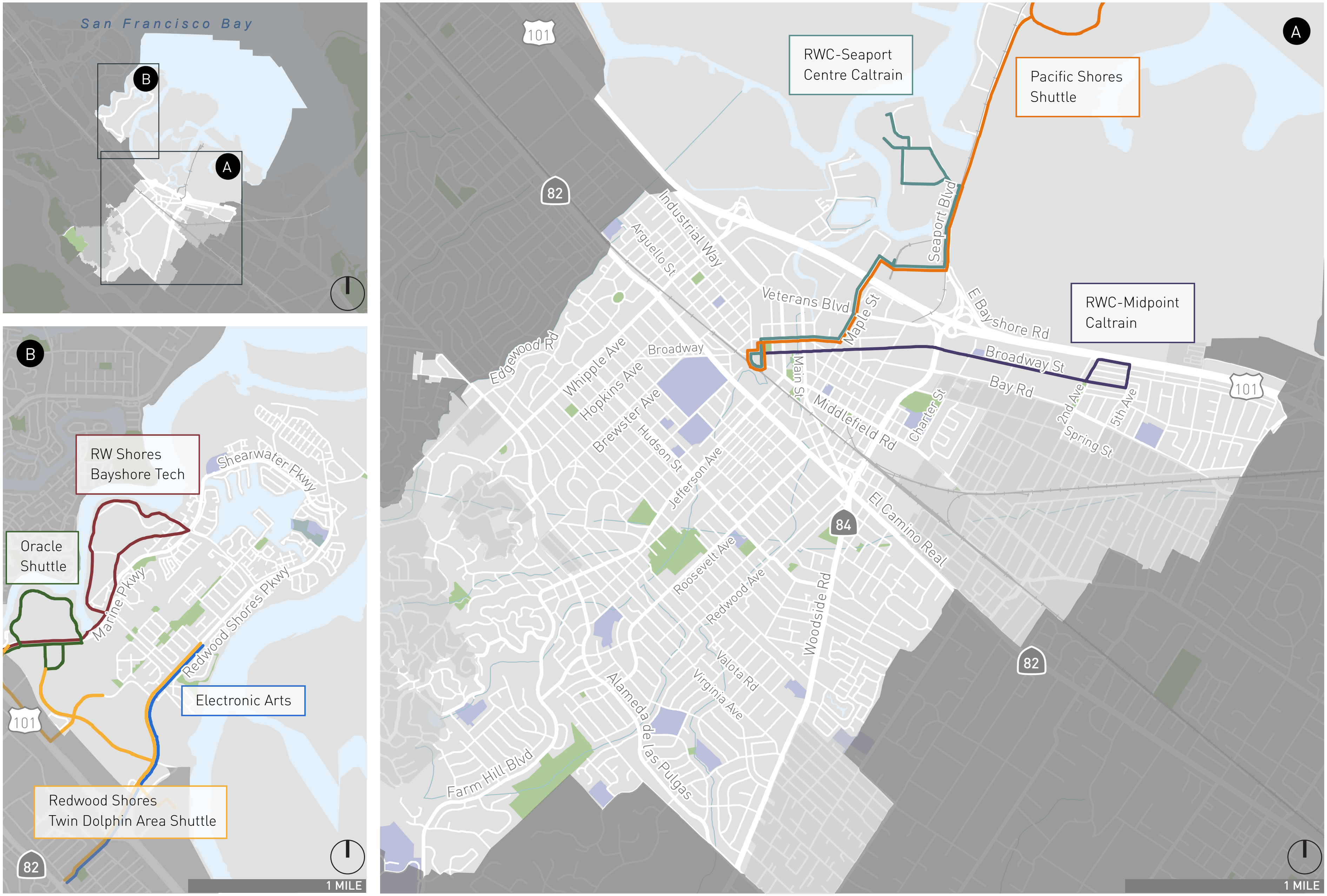
Caltrain operates shuttles to Pacific Shores and to major employers including Electronic Arts, Oracle, and Clipper in Redwood Shores. Monthly ridership for each of these shuttles is approximately 800 to 4,000 riders. (The Pacific Shores shuttle has the highest ridership.) Other Transportation Authority funded shuttles include the Bayshore Technology Park shuttle, Mid Point Caltrain shuttle, and Seaport Centre Caltrain shuttle. Monthly ridership for each of these shuttles is approximately 2,500 to 2,700 riders.

Senior Transportation

Transportation for seniors in Redwood City is provided by the Senior Center shuttle.

The Senior Center shuttle offers rides to and from the Veterans Memorial Senior Center several days per week and to Downtown Redwood City events several times per year. Approximately 1,100 riders use the Senior Center shuttle on a weekly basis (approximately 600 riders on Tuesdays, 200 on Wednesdays, and 300 on Thursdays).

In addition, Sequoia Healthcare is planning to partner with Lyft so that seniors living within Sequoia Healthcare District can use Lyft and the Lyft Concierge program. Lyft Concierge would provide rides to and from member's homes to select destinations.



Redwood City Limits

Sphere of Influence

Parks

Schools

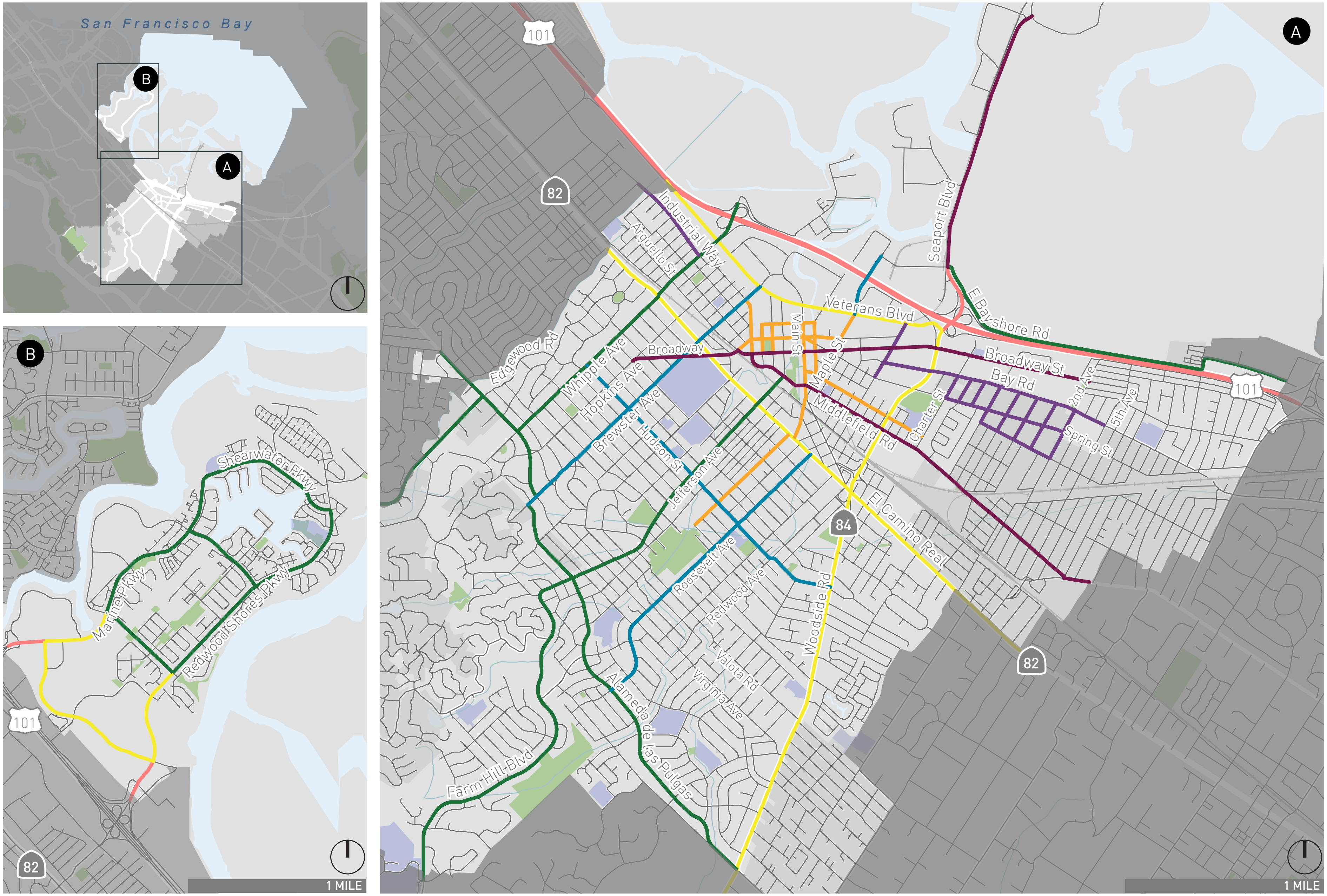
Railroad

Figure A-10

Redwood City
Existing Private Shuttle Network

Automobile Network

Redwood City has a complete automobile network which provides local and regional roadway connections. Regional access is provided by I-280, US 101, El Camino Real (State Route 82), and Woodside Road (State Route 84). Local access is provided by Whipple Avenue, Brewster Avenue, Jefferson Avenue, Roosevelt Avenue, and Edgewood Road, as well as Alameda de las Pulgas, Middlefield Road, and Veterans Boulevard. Although some of Redwood City's street network is in a grid-pattern, vehicular traffic often is channelized to these specific streets because many streets are discontinuous due to creeks, parks, and railroad tracks. **Figure A-11** illustrates the City's existing street network.



Redwood City Limits
Sphere of Influence
Parks
Schools
Railroad

Existing Street Network

- Transit Street
- Bicycle Boulevard
- Pedestrian Street
- Connector Street
- Industrial Street
- Boulevard
- Auto Dominant Higway
- Local Street

Figure A-11

Redwood City Existing Street Network

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. Uber and Lyft are two of the key players in the TNC industry. Though some expect TNCs to 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 limits on package weights, overcrowding of sidewalk space, and potential conflicts with pedestrians, especially people with low vision. RWCmoves seeks to identify how these and other new technologies will affect goods movements in the City and includes actions the City can employ to maximize 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 the Plan provides the initial steps for how Redwood City can start proactively preparing for AVs.

Vehicle Circulation and Traffic Volumes

Residents of Redwood City have expressed concerns with vehicular circulation, specifically congested corridors and cut-through traffic through residential neighborhoods. The following sections provide a brief description of regional and local roadway conditions and neighborhood cut-through traffic as it relates to Redwood City. Vehicle travel conditions were initially assessed based on information presented in previous studies, which ultimately informed locations where additional count data was collected to ensure a comprehensive assessment of the primary roadways in Redwood City.

Regional Roadways

Vehicular volumes along US 101, I-280, El Camino Real (SR 82) and Woodside Road (SR 84) represent the broader regional travel conditions that interact with Redwood City. These roadways serve as the major travel corridors for the City, as well as the surrounding region, and often experience high levels of congestion during peak travel times. US 101, I-280, El Camino Real and Woodside Road are under purview of the California Department of Transportation (Caltrans), which is responsible for planning, maintaining, and overseeing operations of these roadways.

US 101 is typically congested in the southbound direction from approximately 8:00 am to 10:00 am throughout the workweek as commuters access the regions south of Redwood City. At approximately 3:00 pm, US 101 becomes congested in the northbound direction around the Holly Street/Redwood Shores Parkway and Whipple Avenue interchanges until roughly 7:00 pm when traffic moves more quickly. US 101 is a major north-south regional route that runs directly through Redwood City, and serves as the primary commute route for the San Francisco Peninsula. Interchanges at Whipple Avenue, Woodside Road and Marsh Road (Menlo Park) connect various parts of Redwood City with US 101. Located further north, interchanges at Marine Parkway/Ralston Avenue and Holly Street/Redwood Shores Parkway link US 101 to the Redwood Shores area.

From approximately 8:00 am to 9:00 am, I-280 is slightly congested in the southbound direction throughout the workweek as commuters travel to regions south of Redwood City. During the afternoon/evening peak period from approximately 3:00 pm to 6:30 pm, I-280 is congested in the northbound direction around the Woodside Road interchange. Slight congestion is typically observed along I-280 at the Farm Hill Boulevard interchange. I-280 is located along the western edge of the city and serves as a more scenic north-south commute route compared to US 101. Interchanges at Farm Hill Boulevard, Woodside Road, and Edgewood Road provide the most direct connection between I-280 and Redwood City.

El Camino Real is a major north-south roadway that travels parallel to the nearby Caltrain tracks and US 101 through Redwood City. Regional commuters tend to use the nearby US 101 and I-280, which serves as a faster alternative than El Camino Real during peak travel hours. In Redwood City, US 101 and I-280 accommodate around 225,000 and 110,000 vehicles per day, respectively, while anywhere from 26,000 to 40,000 vehicles travel along the different segments of El Camino Real daily. El Camino Real experiences some typical slowdown due to commute traffic, the worst of which tends to occur in the afternoon. From about 8:00 am to 9:00 am, the southbound direction slows from north of Whipple Avenue to Roosevelt Avenue. In the northbound direction, El Camino Real is somewhat congested in the mornings near Jefferson Avenue. In addition, El Camino Real is slightly congested in both the northbound and southbound directions during typical lunch hours, or from about 12:00 pm to 1:30 pm. At around 2:30 pm, peak afternoon congestion builds in both directions until approximately 7:00 pm when vehicles are able to travel more freely.

Woodside Road runs in the east-west direction through Redwood City, providing connection with I-280, El Camino Real and US 101, as well as other local roadways. In Redwood City, approximately 26,000 to 34,000 vehicles use Woodside Road daily. Woodside Road experiences typical slowdown during morning, mid-day and evening travel hours, most of which is concentrated around the Alameda de las Pulgas intersection, El Camino Real interchange, and the US 101 interchange.

Local Roadways

This section provides an overview of travel patterns within the City, and identifies specific intersections and corridors where high levels of traffic congestion currently exists. **Figure A-12** shows the percentages of traffic entering and exiting Redwood City along major roadways, which are based on the existing vehicular volumes in **Figure A-13**.

El Camino Real, Woodside Road, and Whipple Avenue are the primary gateways in and out of Redwood City. These roadways and Jefferson Avenue/Farm Hill Boulevard, Edgewood Road, Veterans Boulevard, and the other roadways that connect with US 101 and I-280, serve regional as well as local trips throughout Redwood City. These roadways tend to carry the largest number of vehicles since they provide users with the fastest route to and from regional facilities and/or their final destinations.

Several local roadways offer east-west connections to various locations within Redwood City. Some of these roadways include Whipple Avenue, Brewster Avenue, Jefferson Avenue/Farm Hill Boulevard, Roosevelt Avenue, Chestnut Street, and Maple Street. From a vehicular perspective, these roadways experience some typical slowdown due to commute or school related time periods, the worst of which tends to occur in the afternoon and at the intersections with El Camino Real. Jefferson Avenue/Farm Hill Boulevard, which links the downtown area with the western-most portion of the City, carries up to 19,000 vehicles per day compared to other local east-west connections. In addition, Whipple Avenue east of El Camino Real also is observed to carry between 17,000 to 28,000 vehicles daily, and experiences the worst slowdown during the morning and afternoon peaks near the connection with US 101. Brewster Avenue, which is parallel to Whipple Avenue and travels adjacent to Sequoia High School, accommodates up to 12,000 vehicles per day along certain segments. Roosevelt Avenue, which also links Alameda de las Pulgas with El Camino Real, generally experiences 5,000 to 7,000 vehicles per day. These roadways help establish a grid-like pattern in Redwood City, and serve an important role in connecting the eastern and western portions of the City.

Several local roadways offer north-south connections to various locations within Redwood City. Alameda de las Pulgas, which links Edgewood Road and Woodside Road in the City, intersects with many of the east-west roadways discussed in this section. In Redwood City, Alameda de las Pulgas carries up to 16,000 vehicles daily north of Hopkins Avenue and about 7,000 daily vehicles south of Hopkins Avenue. At the Edgewood Road and Alameda de las Pulgas intersection, vehicular congestion is observed to build in the morning and afternoon peak hours. Hudson Street provides north-south connectivity between Whipple Avenue and Woodside Road, and serves up to 8,000 vehicles along certain segments per day. These roadways help establish a grid-like pattern in Redwood City, and serve an important role in connecting the northern and southern portions of the City.

Redwood Shores is located north of the main part of Redwood City and is accessible via US 101, Industrial Road, and El Camino Real. It features two main roadways, Redwood Shores Parkway and Marine Parkway, that eventually intersect and form the loop that serves as the primary travel way for the area. Due to the large employers in Redwood Shores, such as Electronic Arts and Oracle, vehicular congestion tends to occur in the morning, midday and evening peak periods, most of which is concentrated near the interchanges with US 101. The segments of Redwood Shores Parkway and Marine Parkway nearest to US 101 will typically experience 32,000 to 39,000 vehicles daily; the volumes subside as you go east into Redwood Shores as travelers reach their destinations.

Drive Alone Rates

To provide insight on the community's tendencies to drive based on where they live in Redwood City, **Figure A-14** shows the existing drive alone rates by census block groups. Generally, drive alone rates are lowest in areas near major transit routes, such as along El Camino Real, and near the Redwood City Transit Center, but also where population density are higher and incomes are lower, as well as within Communities of Concern (see **Appendix D**). 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.

In Redwood Shores the drive alone rates is relatively high, with the exception of the residential area to the far east; though there is no apparent reason why there would be such differences within residential neighborhoods of Redwood Shores.

Due to the high percentages of residents that choose to drive, Redwood City will likely be concerned with automobile travel patterns and the resulting roadway congestion for many years to come.

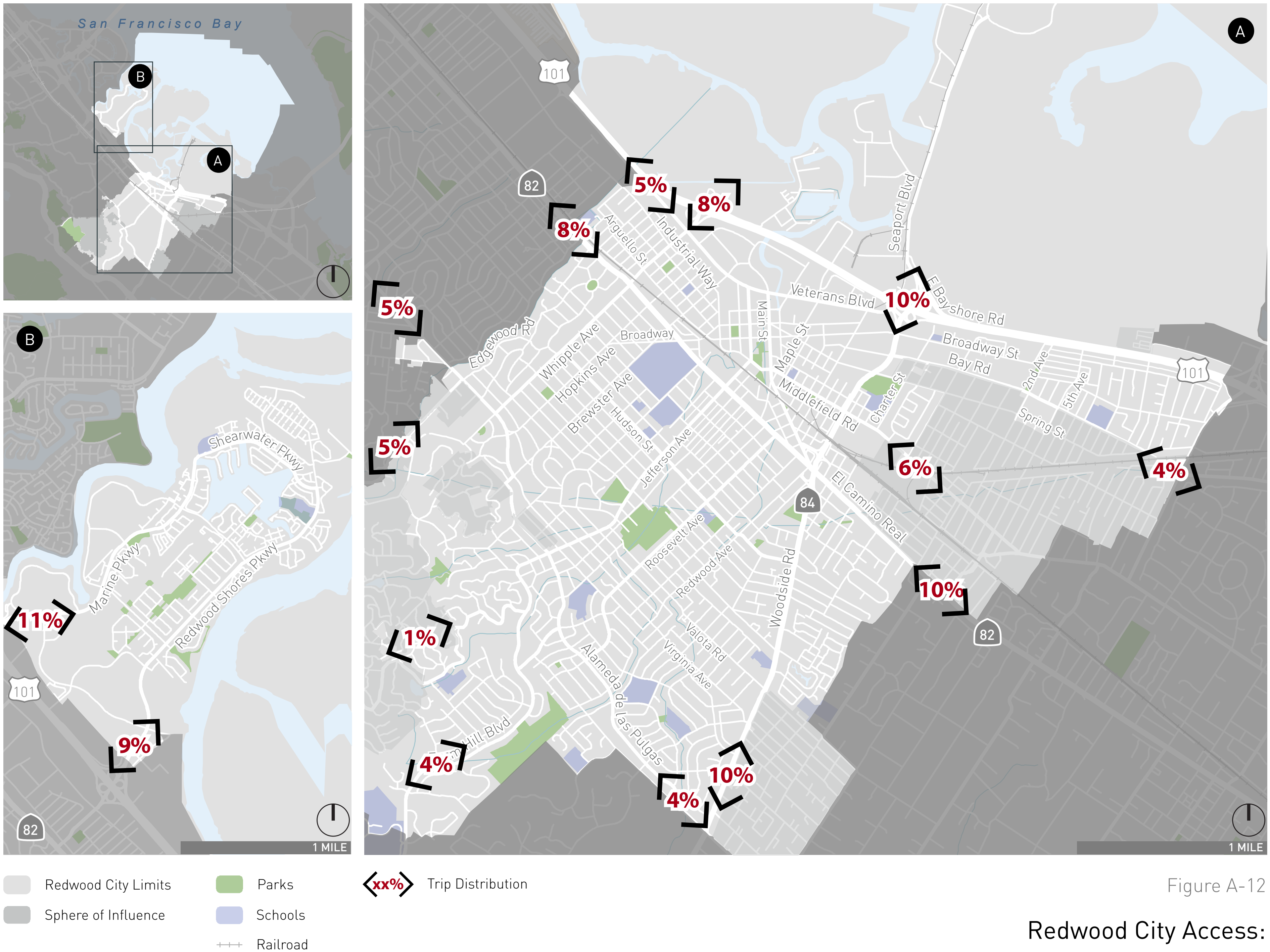
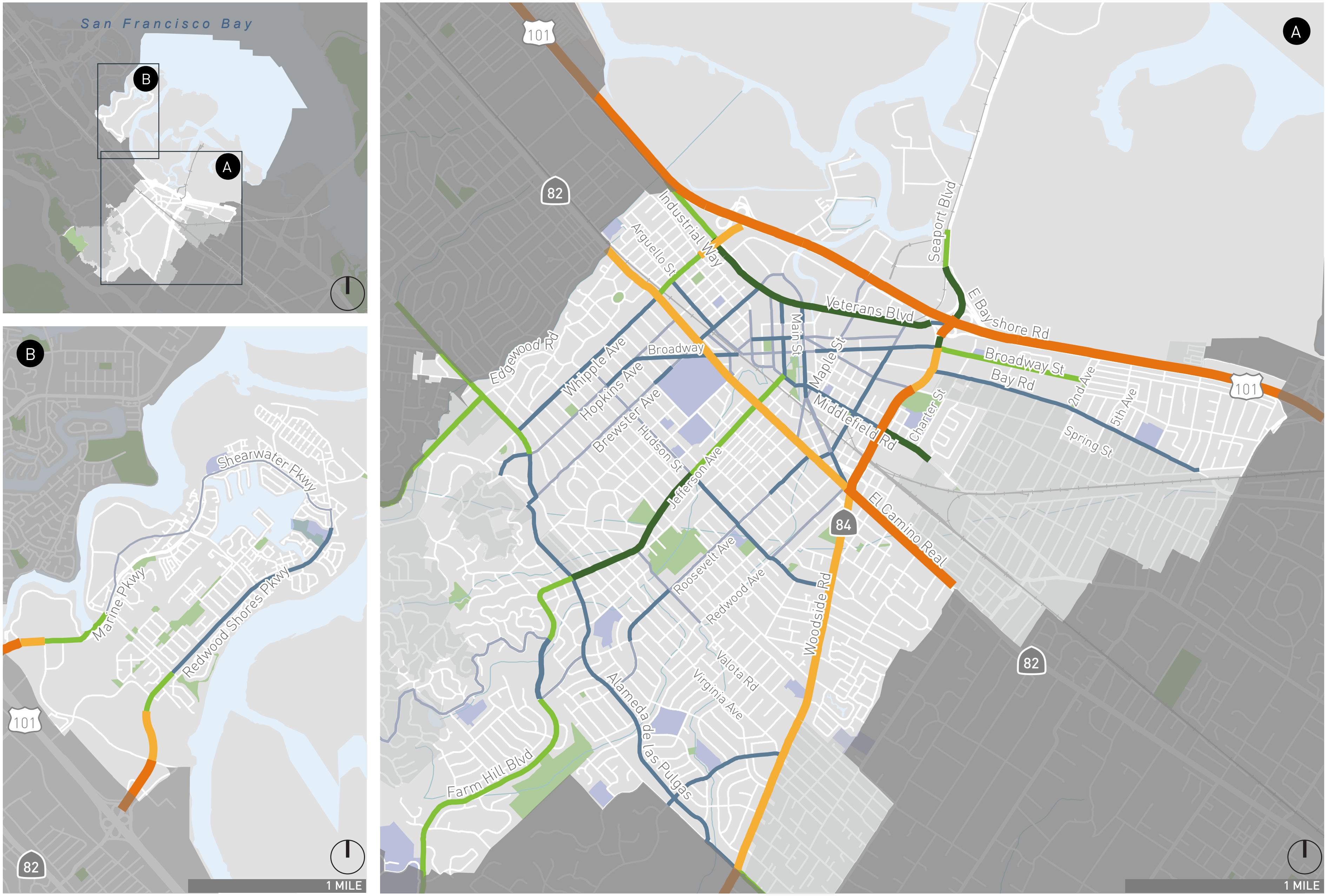


Figure A-12

Redwood City Access:
How Vehicles Travel To/From Redwood City

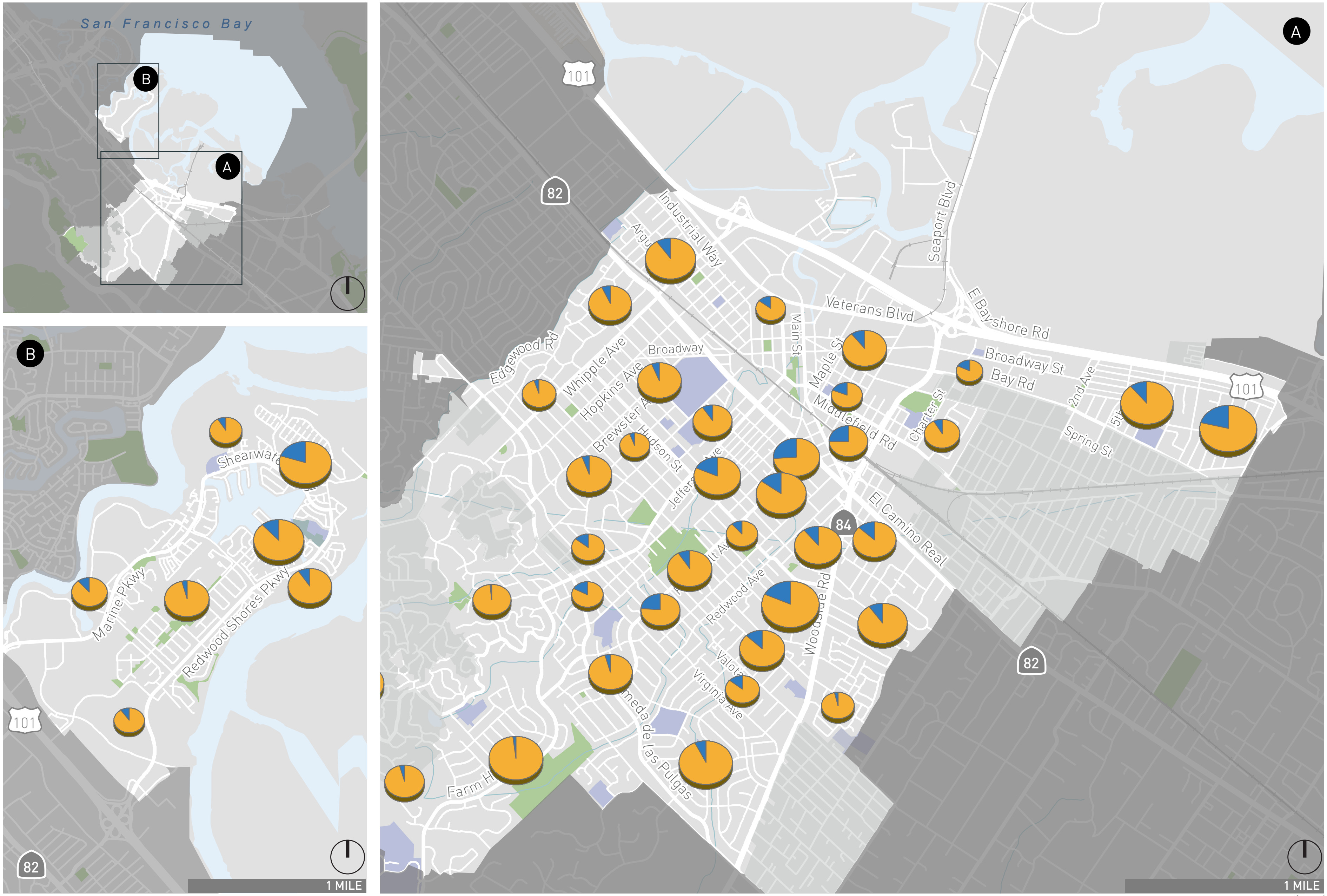


Redwood City Limits
Sphere of Influence
Parks
Schools
Railroad

Existing Traffic Volumes
- 0 - 6,000
- 6,001 - 12,000
- 12,001 - 18,000
- 18,001 - 24,000
- 24,001 - 30,000
- > 30,001

Figure A-13

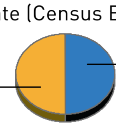
Redwood City Existing Traffic Volumes



Source: US Census, 2011-2015 American Community Survey (ACS)

Redwood City Limits	Parks
Sphere of Influence	Schools
	Railroad

Drive Alone Rate (Census Block Group)



* Pie chart size varies by the total number of residents of each Census Block Group

Figure A-14

Existing Drive Alone Rates in Redwood City Census Block Groups

Downtown Access and Circulation

Figure A-15 shows the trip distribution of vehicles entering and exiting Downtown Redwood City along the primary roadways. Jefferson Avenue, Broadway Street and Middlefield Road carry the majority of vehicle traffic. **Figure A-16** illustrates the existing vehicular volumes along key corridors within the Downtown.

As observed along other major streets in Redwood City, several downtown roadways experience some slowdowns in the mornings and afternoons due to commute traffic, as well as slight congestion during lunch time hours. Main Street, Broadway, and Jefferson Avenue serve as the primary roadways that connect the downtown area with the surrounding roadways in Redwood City, and carry around 7,000, 8,000, and 16,000 vehicles per day, respectively. Middlefield Road serves as a primary connection to the downtown area, and carries upwards of 11,500 vehicles daily. Veterans Boulevard serves as the southbound off-ramp for the Whipple Avenue/US 101 interchange and travels parallel to US 101 before connecting with the Woodside/US 101 interchange. Due to its proximity to US 101 and downtown Redwood City, approximately 18,000 to 24,000 vehicles use Veterans Boulevard per day, connecting downtown via Middlefield Road, Jefferson Avenue, Maple Street and Main Street.

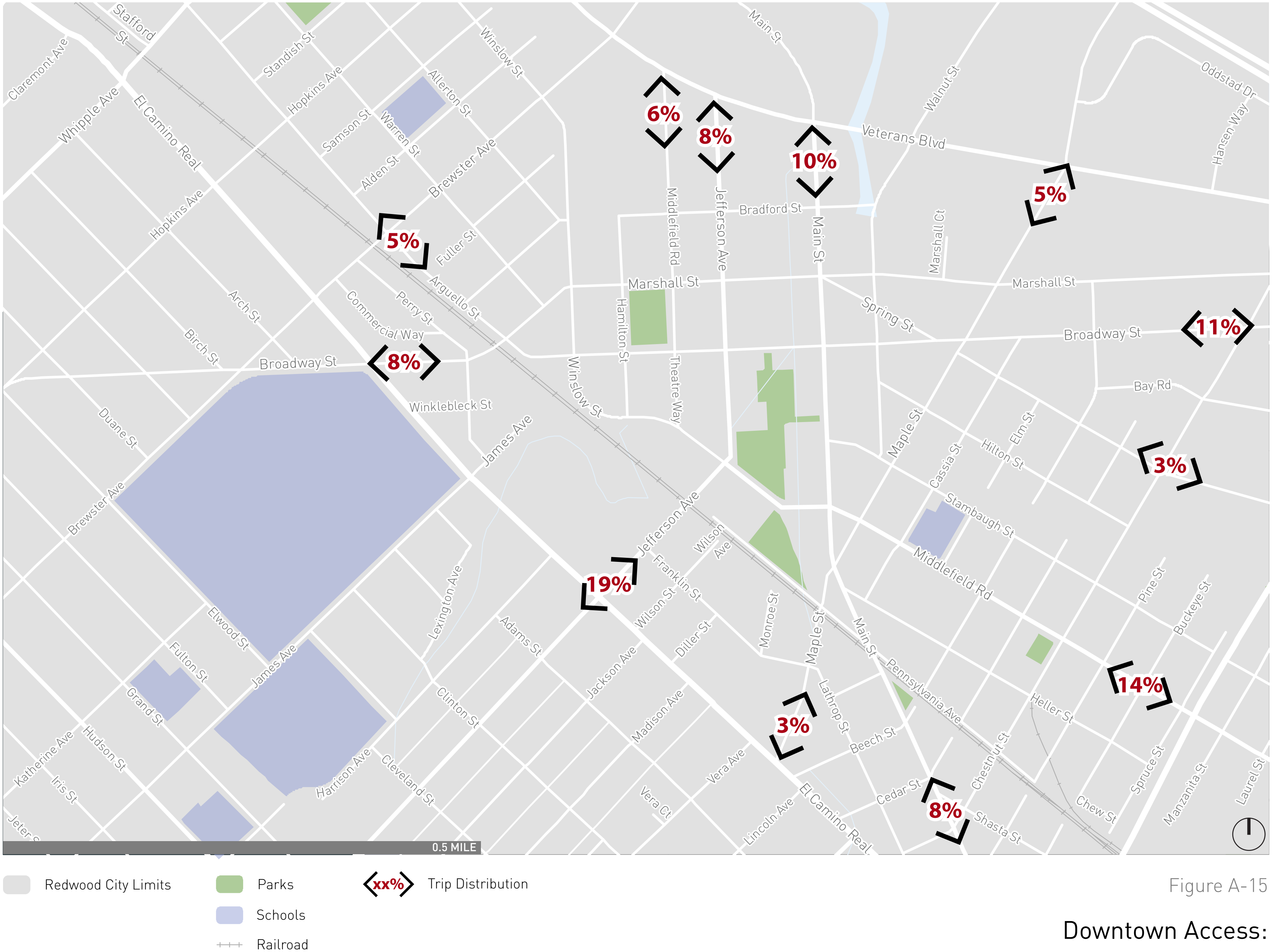
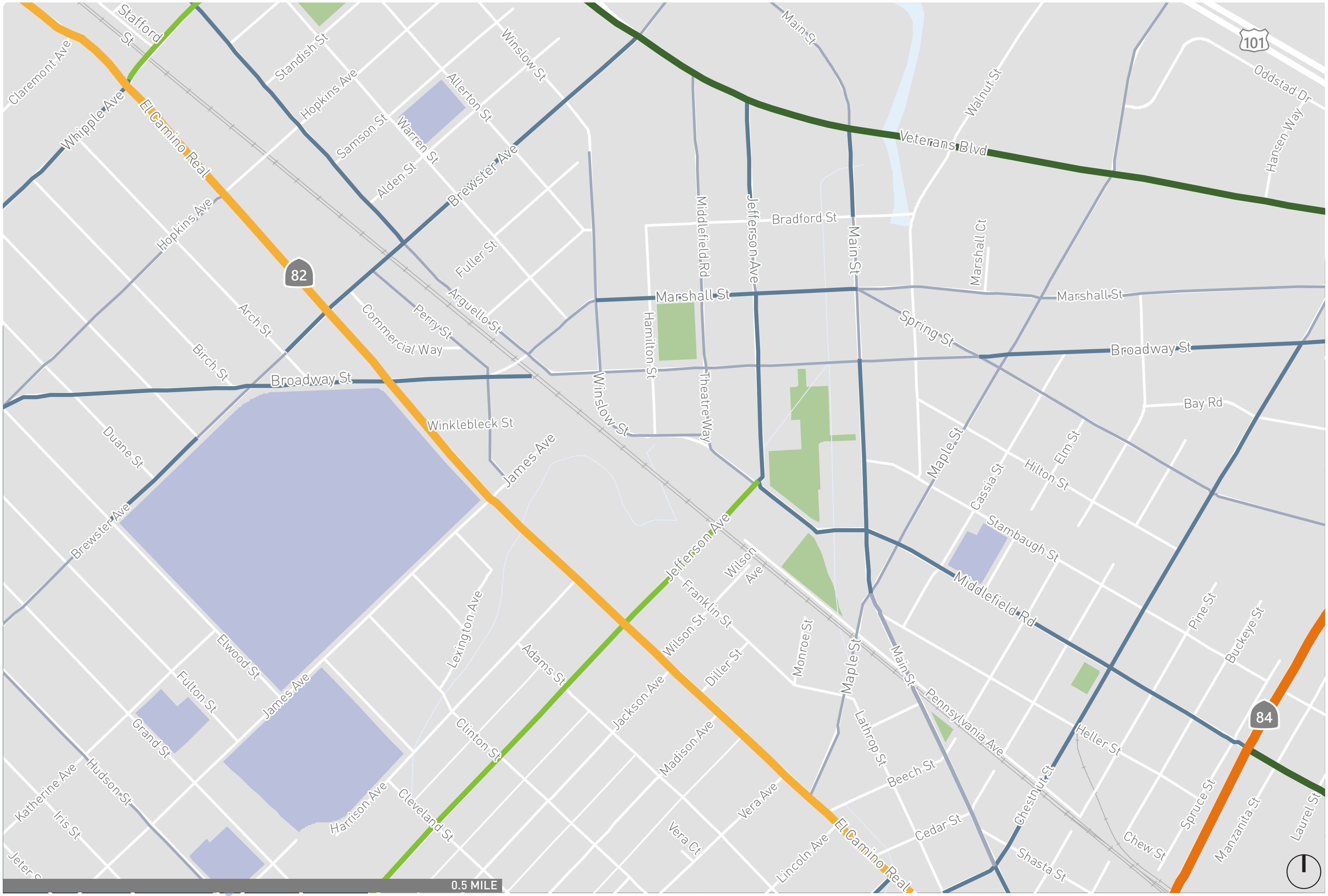


Figure A-15

Downtown Access:
How Vehicle Travel To/From Downtown Redwood City



Redwood City Limits

Parks

Schools

Railroad

Existing Traffic Volumes

- 0 - 6,000
- 6,001 - 12,000
- 12,001 - 18,000
- 18,001 - 24,000
- 24,001 - 30,000
- > 30,001

Figure A-16

Redwood City
Existing Downtown Traffic Volumes

Neighborhood Cut-Through Traffic

The residents of Redwood City have had recurring concerns with residential streets being used as "cut-through" routes, shortcuts or bypasses used by some regional traffic to avoid congested, higher volume streets. Increases in vehicle congestion can lead to cut-through traffic as travelers seeking less congested travel paths through residential neighborhoods. To discourage cut-through behavior, Redwood City has implemented strategies in traffic calming to encourage safer and more responsible driving, reduced travel speeds, reduced traffic flow, and increased travel times through residential neighborhoods.

The Hopkins Avenue Traffic Safety Project was developed in response to concerns raised by residents about the speed and volume of traffic on Hopkins Avenue. As of June 2017, the Project is using a community process to define the preferred design of Hopkins Avenue. In addition, the City is working on approvals to install speed humps on Fernside Street between McGarvey and Roosevelt Avenues in response to a request/petition from residents. The residents reported concerns with speeding, pedestrian safety, and cut-through traffic along Fernside Street, which they believed increased following the reconfiguration of Farm Hill Boulevard and Jefferson Avenue. The proposed speed humps would continue the traffic calming measures (speed humps) used on Fernside Street below Roosevelt Avenue.

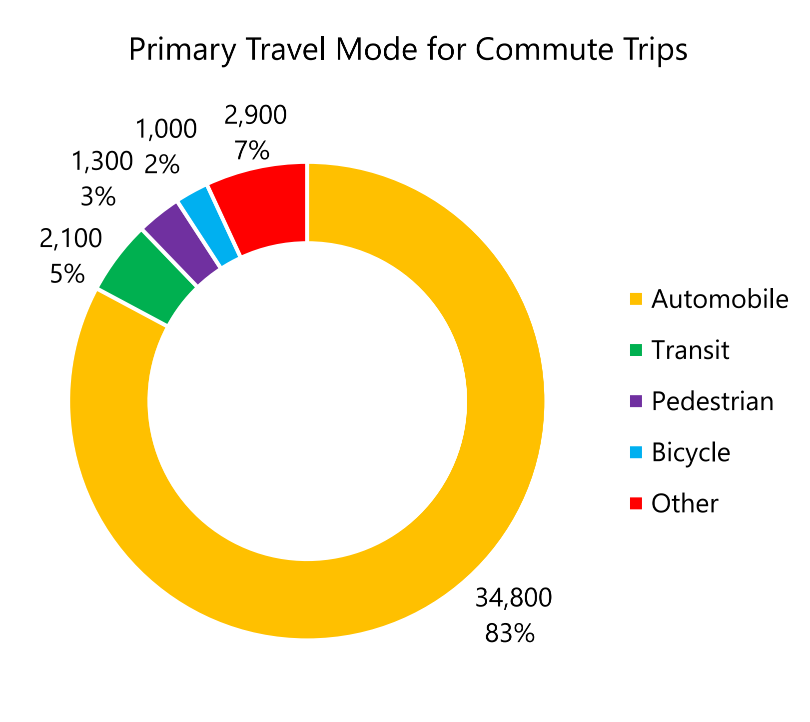
Redwood City is actively responding to requests for traffic calming improvements throughout the City. As part of this response, the City has developed a prioritization process that evaluates locations based on vehicle speeds and volumes, amount of cut-through traffic, collision history, nearby pedestrian generators, public support and any unique conditions also worth considering. Redwood City is currently evaluating over 20 potential locations for traffic calming improvements, and is committed to pursue new programs that reduce vehicle speeds and cut-through traffic on local streets.

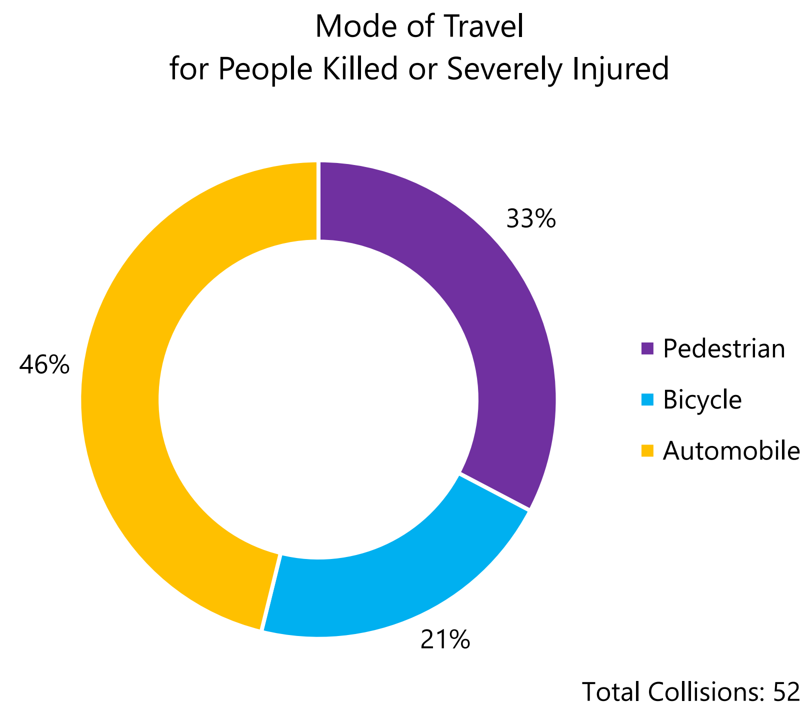
Collision Trends and Locations (2011 through 2015)

Collision data between January 2011 and December 2015 (the most recently available five-year period) were classified and analyzed by mode of travel to inform trends in pedestrian, bicycle, and vehicle safety[1]. **Figure A-17** shows a comparison between the percentage of all commute trips and all reported serious injuries or deaths in Redwood City by mode. Compared to Redwood City mode split, pedestrians and bicyclists are overrepresented in severe and fatal crashes. In terms of how people travel, those who walk and ride bicyclists are at the greatest risk to be seriously injured or killed in a traffic collision. As shown in **Figure A-18,** pedestrians and bicyclists are involved in only nine percent of all collisions, but account for half of all traffic deaths. Redwood City has implemented a variety of improvements and programs intended to reduce the number of roadway users severely injured or killed in collisions, such as projects designed to reduce vehicle speeds, safe routes to school programs, and complete street projects. In spite of this, the number of cyclists and pedestrians killed or injured in traffic collisions has remained relatively the same over the last five years. The City is considering implementing a Vision Zero Plan, which would develop strategies and measures to help reduce collisions in Redwood City.

[1] This analysis is intended to serve as a high-level review to identify general collision trends in Redwood City. Additional collision analyses would be needed to establish appropriate countermeasures.

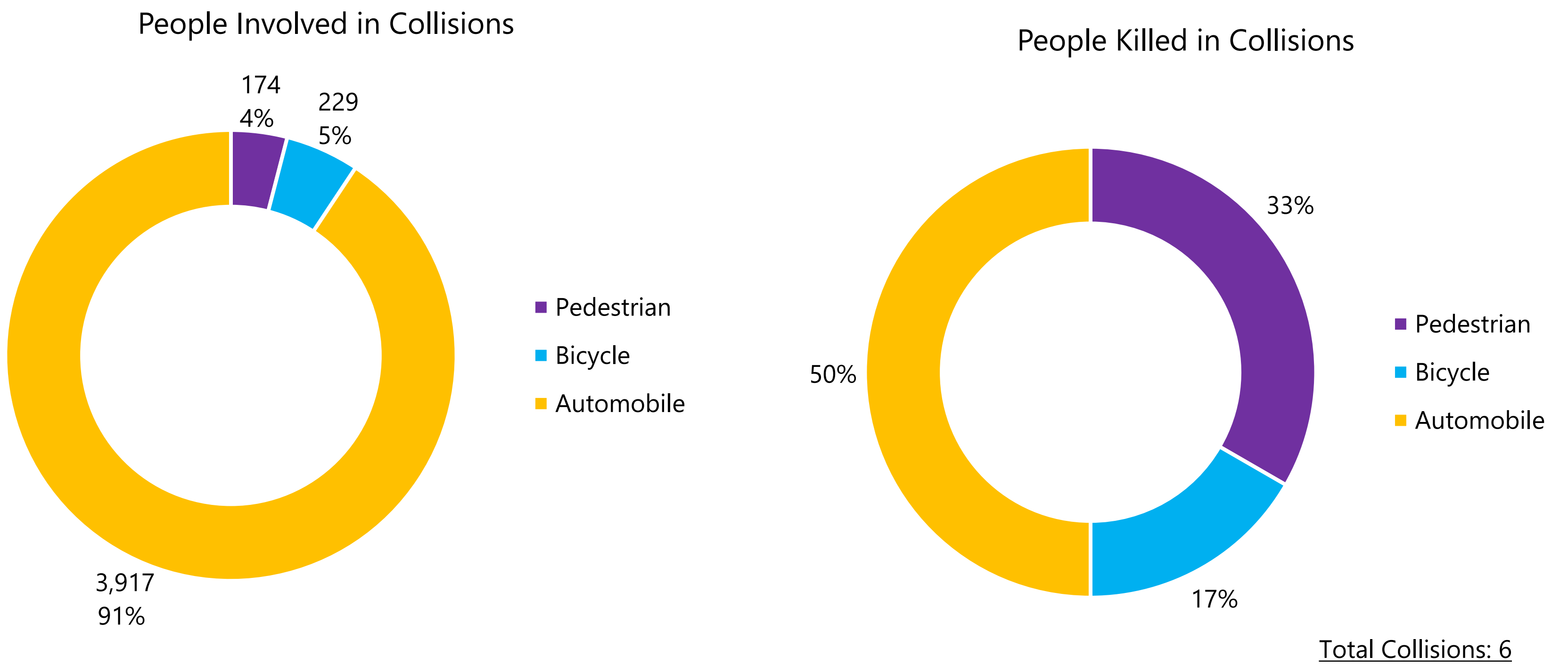
Figure A-17: Primary Travel Mode versus Mode of People Killed or Severely Injured





Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates; Statewide Integrated Traffic System (SWITRS) database, January 1, 2011-December 31, 2015.

Figure A-18: Collisions by Mode versus Mode of People Killed



Source: Statewide Integrated Traffic System (SWITRS) database, January 1, 2011-December 31, 2015.

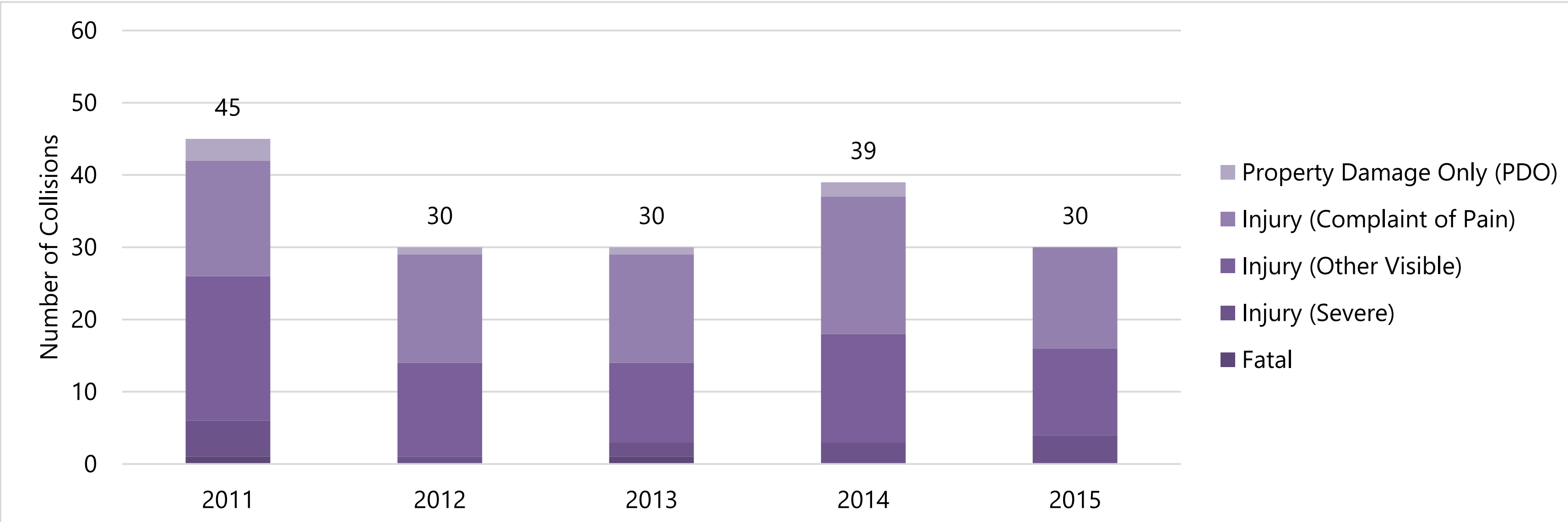
From 2011 to 2015, there were 4,320 total collisions reported in Redwood City, with an annual average of 864 collisions. Of this total, nearly a quarter were primarily the result of unsafe speeds, while about 20 percent occurred because of improper turning movements, and 15 percent were the result of automobiles not yielding to the right of way of others.

This section summarizes the collision analysis findings, which includes collision trends and locations by travel mode and factors that contributed to the likelihood and severity of collisions.

Pedestrian Collisions

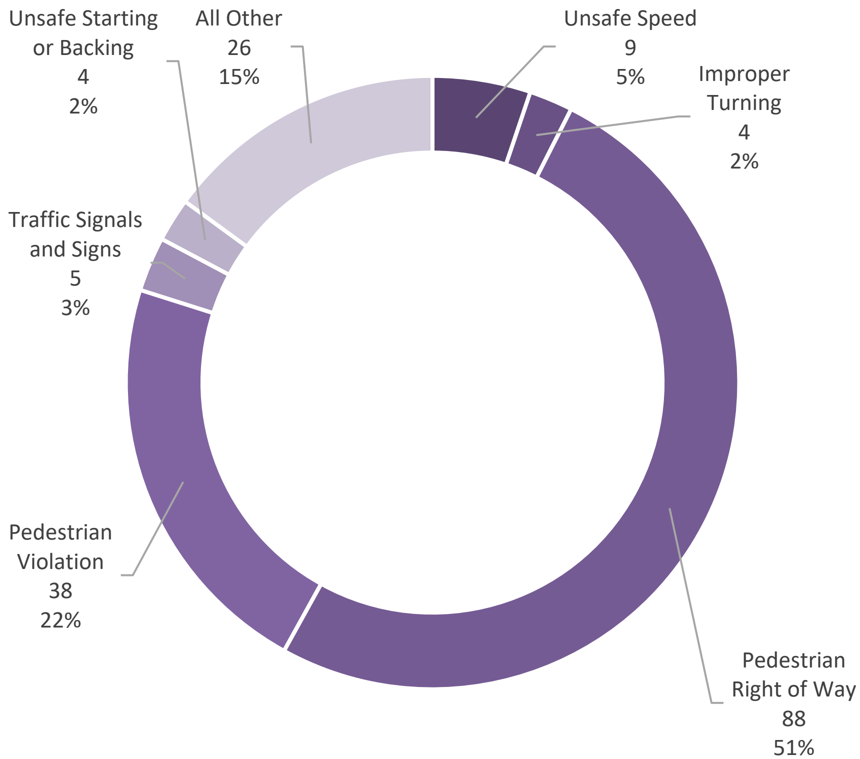
Figure A-19 shows the pedestrian collision trends between 2011 and 2015 presented by year and collision severity. On average, there were 35 collisions involving a pedestrian each year, which is about 5 percent of all reported collisions in Redwood City. Of the pedestrian collisions, approximately 10 percent resulted in a severe or fatal injury; two fatalities occurred over the five-year study period. The total number of reported collisions involving a pedestrian varied by year.

Figure A-19: Pedestrian Collision Trends (2011 – 2015)



Source: Statewide Integrated Traffic System (SWITRS) database, January 1, 2011- December 31, 2015.

Figure A-20: Primary Pedestrian Collision Factors



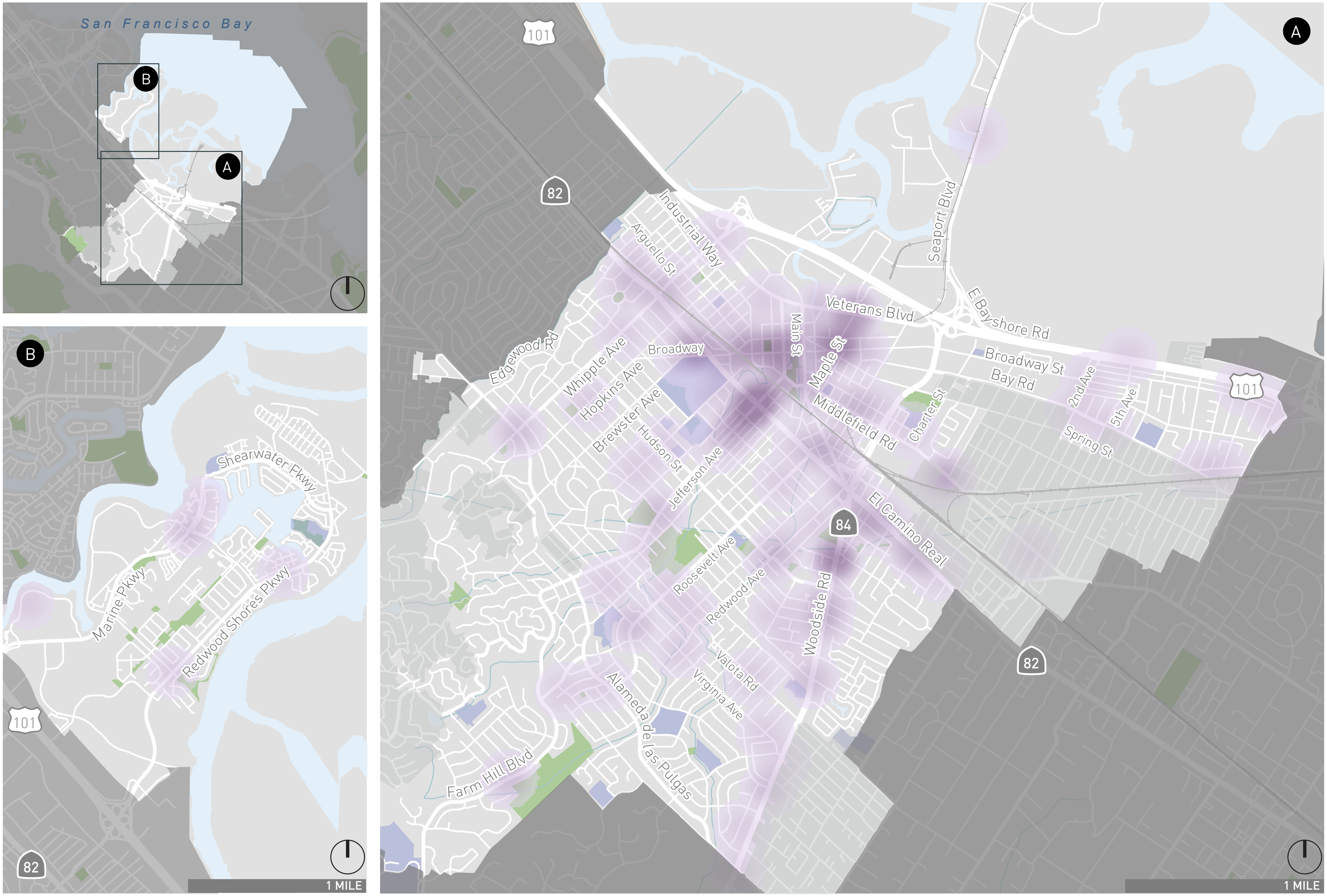
Source: Statewide Integrated Traffic System (SWITRS) database, January 1, 2011-December 31, 2015.

Failing to yield to the pedestrian right of way was the most common factor in just over half of all collisions involving a pedestrian (see **Figure A-20**). Pedestrians failing to yield to others was the next most common primary factor in just under a quarter of reported collisions.

When evaluating the location of collision, the majority (55 percent) of pedestrian collisions occurred in a marked crosswalk at an intersection, while few (three percent) occurred at a marked mid-block crossing (i.e. in a crosswalk not at an intersection). Thirty-seven percent (37 percent) of collisions involving pedestrians occurred because the pedestrian was in the road or not within a crosswalk while crossing. The remaining 5 percent of pedestrian collisions generally occurred on the sidewalk.

Weekdays accounted for 85 percent of all collisions and the majority of pedestrian collisions (60 percent) occurred during daylight hours. Of the collisions occurring at night, approximately 20 percent occurred on roadways that do not have streetlights.

Figure A-21 shows the frequency of reported collisions involving a pedestrian in Redwood City. One would expect to see more pedestrian involved collisions in areas with high pedestrian activity. In Redwood City, segments of Maple Street, Jefferson Street, Woodside Road, and El Camino Real, as well as the intersections of Maple Street/Marshall Street and Woodside Road/Hess Road, standout as having the highest frequencies of pedestrian injuries compared to the rest of the City.



Redwood City Limits

Sphere of Influence

Parks

Schools

Railroad

Collisions per 1/4 Mile

High (27)

Low (0)

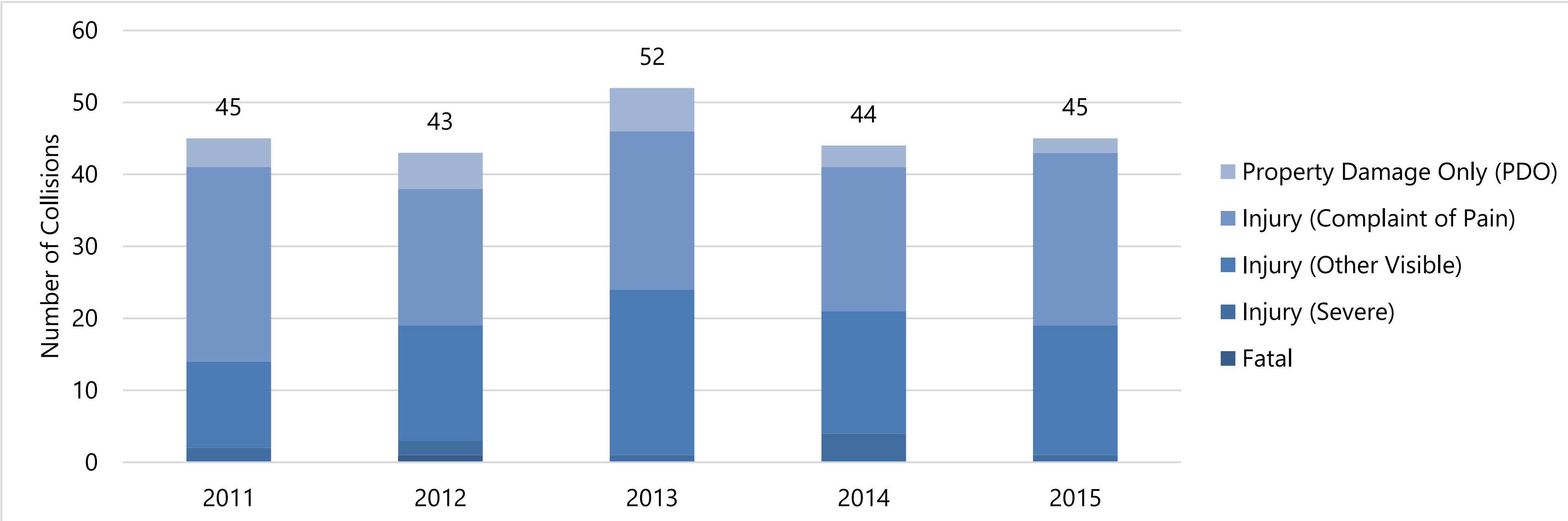
Figure A-21

Vehicle – Pedestrian Collisions (2011 – 2015)

Bicycle Collisions

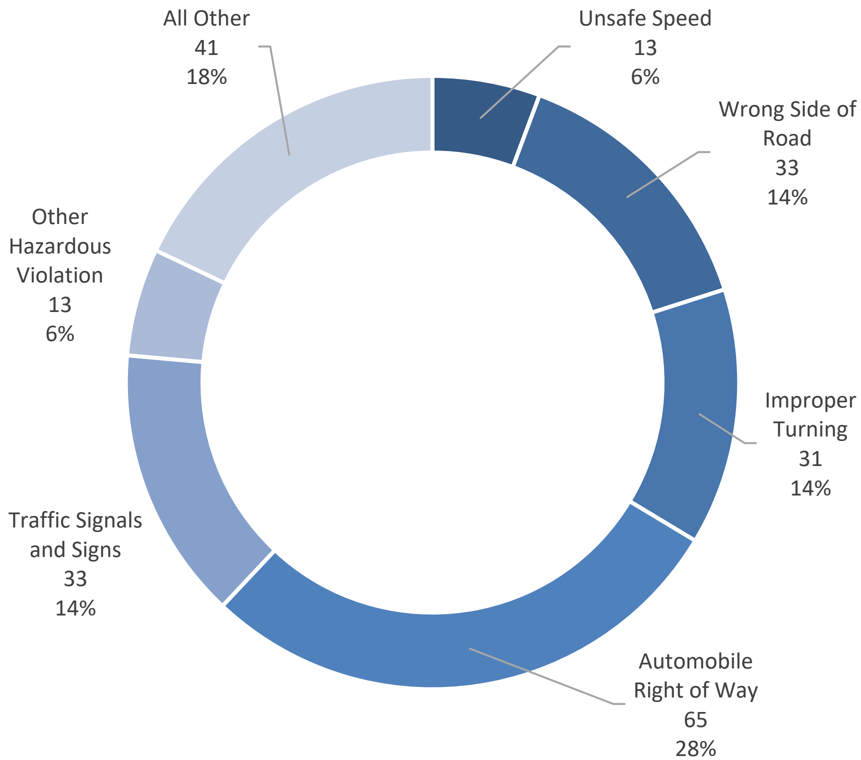
Figure A-22 shows the bicycle collision trends between 2011 and 2015 presented by year and collision severity. On average, there were 46 collisions involving a bicyclist each year, which is just over five percent of all reported collisions in Redwood City. Of the collisions involving a cyclist, approximately five percent resulted in a severe or fatal injury; one fatality occurred over the five-year study period. The remaining 95 percent of bicycle collisions resulted in other visible injuries, complaint of pain, or property damage only. There are slightly more annual reported bicycle collisions than reported pedestrian collisions. Over the five-year period, the total number of reported collisions involving a bicyclist ranged between 43 and 52 collisions.

Figure A-22: Bicycle Collision Trends (2011 – 2015)



Source: Statewide Integrated Traffic System (SWITRS) database, January 1, 2011-December 31, 2015.

Figure A-23: Primary Bicycle Collision Factors



Source: Statewide Integrated Traffic System (SWITRS) database, January 1, 2011-December 31, 2015.

When evaluating the cause of the bicycle collisions (see **Figure A-23**), cyclists not yielding to automobile right of way was the primary collision factor in over a quarter of reported collisions involving a cyclist. The other most common primary collision factors involving a bicyclist were traveling on the wrong side of the road, traffic signals/signs violations, and improper turning movements.

In terms of when bicycle collisions occurred, a majority bicycle collisions occurred on weekdays (80 percent) and during daylight hours (70 percent). Of the collisions occurring at night, less than 15 percent occurred on roadways without streetlights.

Figure A-24 shows the frequency of reported collisions involving a bicyclist in Redwood City. One would expect to see more bicycle involved collisions in areas with high bicycle activity. In Redwood City, segments of Middlefield Road, El Camino Real, and Woodside Road, as well as the intersections of Hopkins Avenue/El Camino Real, Woodside Road/Broadway Street, and Farm Hill Boulevard/McGarvey Avenue, standout as having the highest frequencies of bicycle injuries compared to the rest of the City.

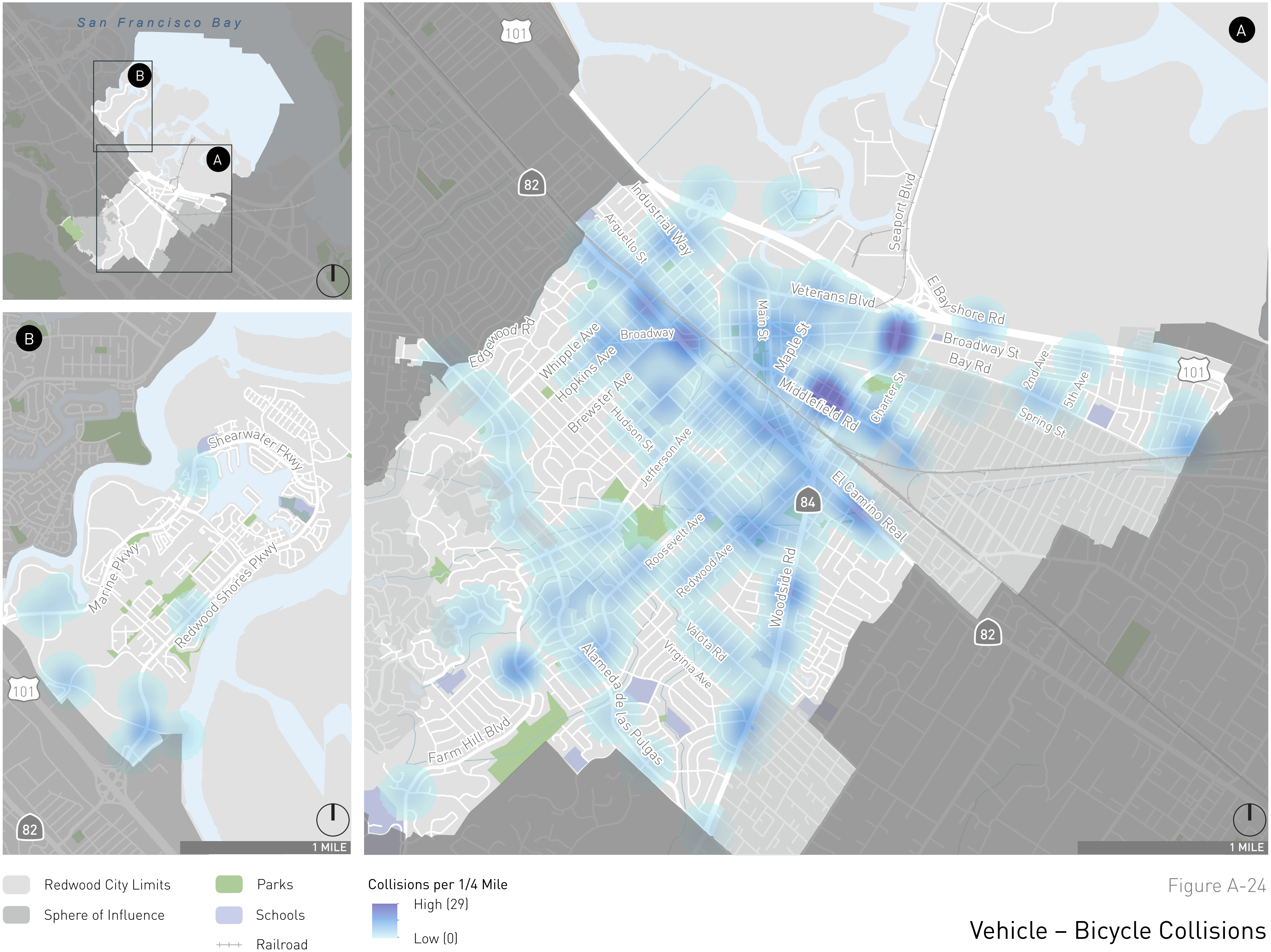


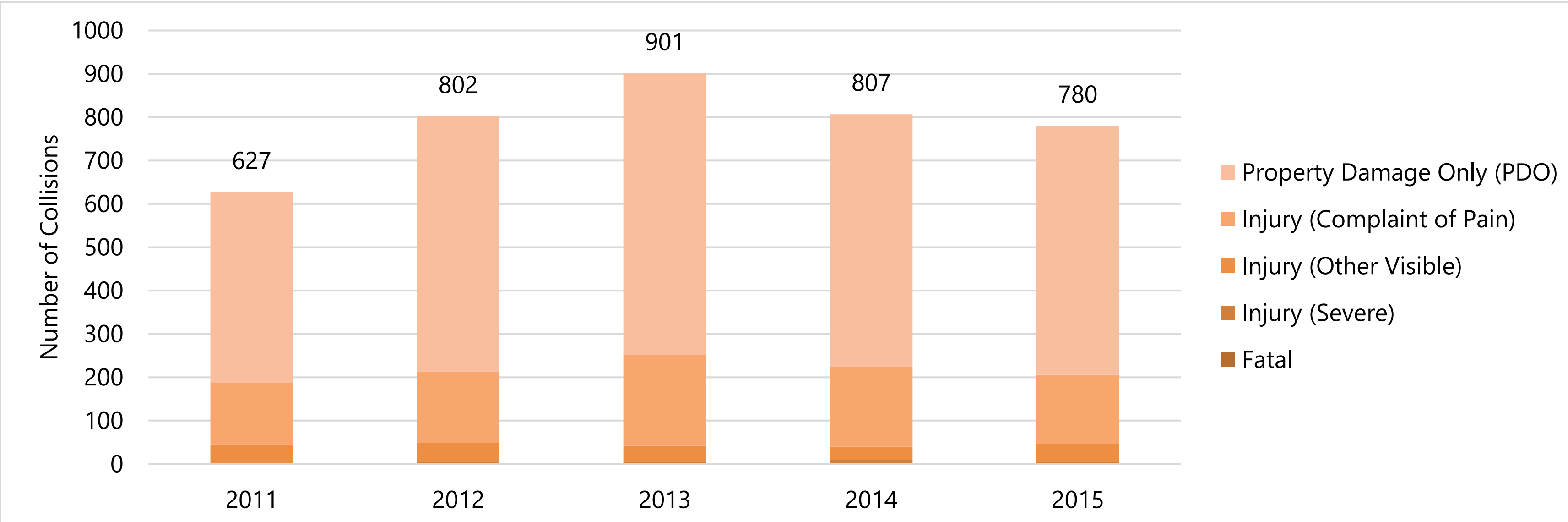
Figure A-24

Vehicle – Bicycle Collisions (2011 – 2015)

Automobile Collisions

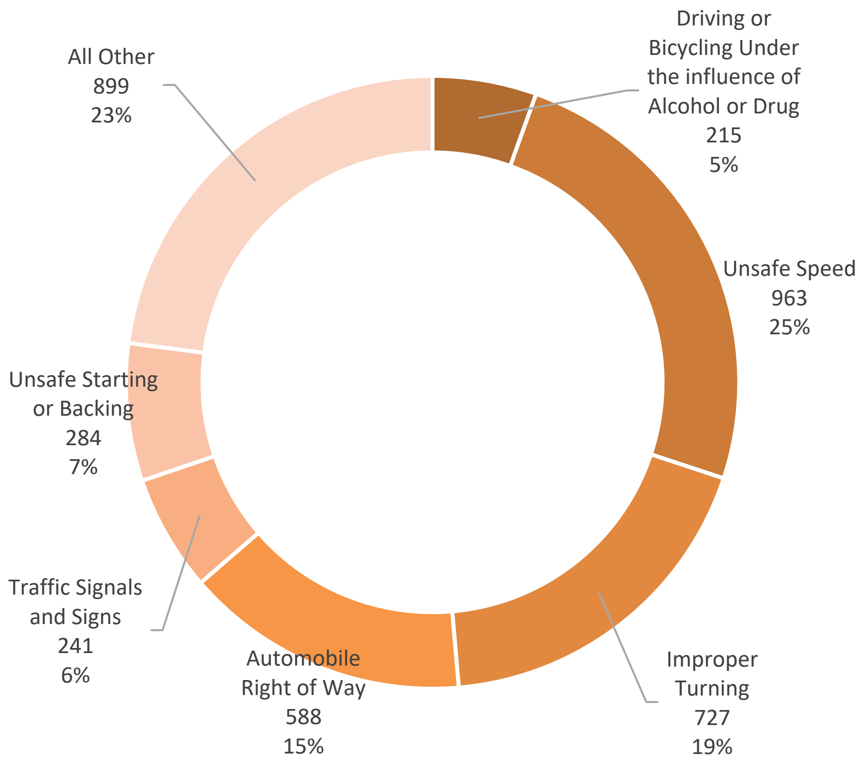
Figure A-25 shows the auto-only collision trends between 2011 and 2015 presented by year and collision severity. On average, approximately 780 auto-only collisions were reported each year, which is just over 90 percent of all reported collisions in Redwood City. Of the collisions only involving an automobile, less than 1 percent resulted in a severe or fatal injury; three fatalities occurred over the five-year study period. As expected, there are more annual reported auto-only collisions than reported pedestrian and bicycle collisions combined. The total number of auto-only collisions increased from about 630 to 900 collisions between 2011 and 2013, then reduced to about 810 and 780 collisions in 2014 and 2015, respectively.

Figure A-25: Vehicle Collision Trends (2011 – 2015)



Source: Statewide Integrated Traffic System (SWITRS) database, January 1, 2011-December 31, 2015.

Figure A-26: Primary Automobile Collision Factors

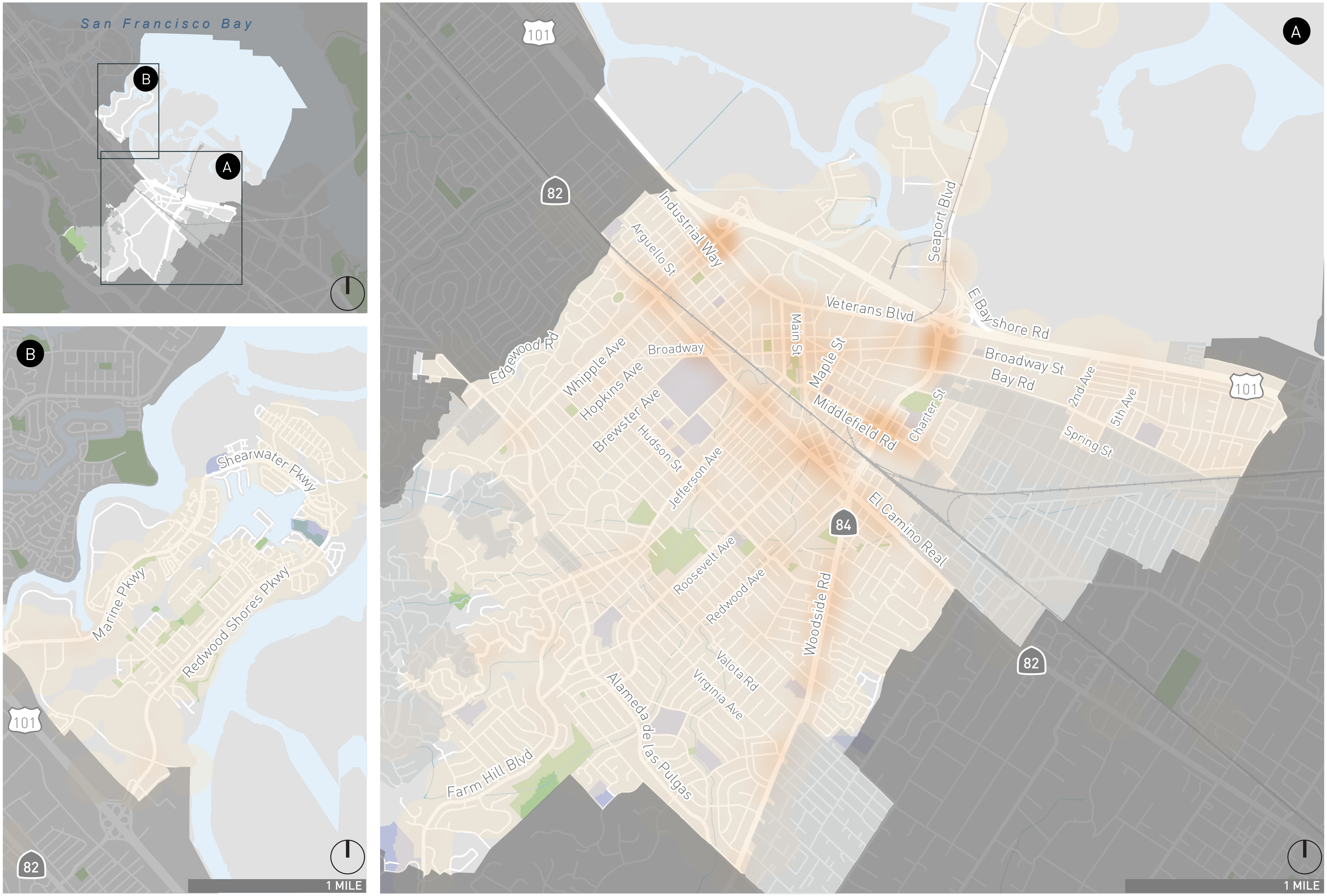


Source: Statewide Integrated Traffic System (SWITRS) database, January 1, 2011-December 31, 2015.

Unsafe travel speed was the primary collision factor in 25 percent of reported auto-only collisions (see **Figure A-26**). Improper turning movements, failure to yield to automobile right of way, and unsafe starting or reversing followed as the most common primary collision factors involving vehicles in Redwood City.

In Redwood City, 75 percent of all auto-only collisions occurred on weekdays and the majority (70 percent) occurred during daylight hours. Of the collisions occurring at night, 15 percent occurred on roadways without streetlights.

Figure A-27 shows the frequency of reported auto-only collisions in Redwood City. In Redwood City, segments of Whipple Avenue, Hopkins Avenue, Brewster Avenue, Jefferson Avenue, Woodside Road, and El Camino Real, as well as the Whipple Avenue/Veterans Boulevard, Whipple Avenue/El Camino Real, Woodside Road/Broadway Street, and Woodside Road/Middlefield Road intersections stand out as having the highest number of auto-only collisions compared to the rest of the City.



Redwood City Limits
Sphere of Influence
Parks
Schools
Railroad

Collisions per 1/4 Mile
High (365)
Low (0)

Figure A-27

Vehicle – Vehicle Collisions (2011 – 2015)

Trip Generation Characteristics

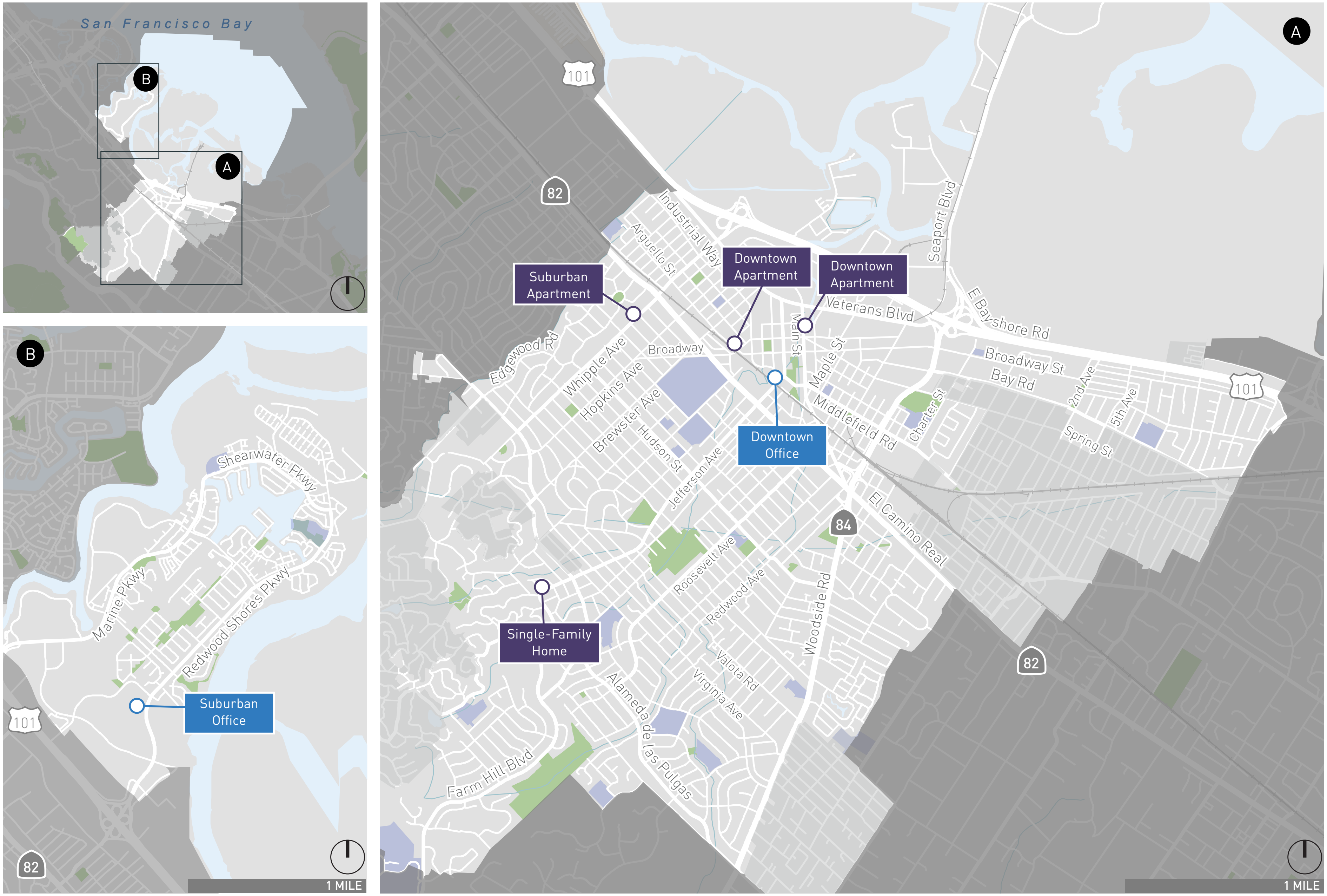
Trip generation and mode split for residential and office uses in Redwood City was determined through counts at existing developments in Redwood City, to understand how employees and residents travel. Peak period surveys of six representative sites were conducted; their locations are shown on **Figure A-28**.

Data Collection and Methodology

All data for the vehicle trip generation rates and mode split percentages were collected in April and May 2017. Vehicle trip generation rates were determined by collecting data on the number of vehicles entering and exiting the survey sites on weekdays during morning and afternoon peak periods. This data was collected through a combination of automated vehicle counters and manual observations in 15-minute increments. Peak hours for each site were chosen based on the four consecutive 15-minute increments with the highest vehicular volume at that particular site. Vehicles observed included passenger cars/trucks, TNCs (Transportation Network Companies, such as Uber/Lyft) and employee shuttles. Vehicle trip rates were developed by dividing the number of observed vehicles by the site's size (dwelling units, square footage, and/or employees). Developed vehicle trip rates were compared to the average trip rates for applicable land uses presented in the Institute of Transportation Engineers (ITE) *Trip Generation Manual,* 9th Edition (2012).

Mode split data was collected through on manual in-person observations and was supplemented with data from automated counters. Mode split information was estimated for some recent developments in Redwood City through field observations of biking, walking, TNC pick-up and drop-offs, accessing transit, and vehicular counts. Mode split data is presented as the percent of each mode (such as driving, walking, biking, etc.) as compared to the total number of observed trips to and from the site.

Household travel characteristics reported in the American Community Survey (American Community Survey) 2011-2015 were used to verify and/or explain the results of the vehicle trip generation and mode split surveys.



Redwood City Limits

Sphere of Influence

Parks

Schools

Railroad

Locations of Development Surveys (Residential)

Locations of Development Surveys (Office)

Figure A-28

Redwood City

Locations of Trip Generation Surveys

Residential Vehicle Trip Generation Rates

Residential trip generation rates were developed by collecting data at a suburban apartment building, two downtown apartment buildings and a suburban single-family residential street. **Table A-2** below summarizes the characteristics of each surveyed residential site.

Residential Apartments

Figure A-29 compares ITE's apartment (Land Use Code 220) average trip generation rates and Redwood City apartment survey results for both the morning and evening peak hours. The suburban apartment trip generation rates are about the same as ITE's average rate for the morning peak hour and 0.16 trips per dwelling units less than ITE for during the evening. Notably, Redwood City's downtown apartment trip generation rates are almost half of the ITE rates for both peak hours.

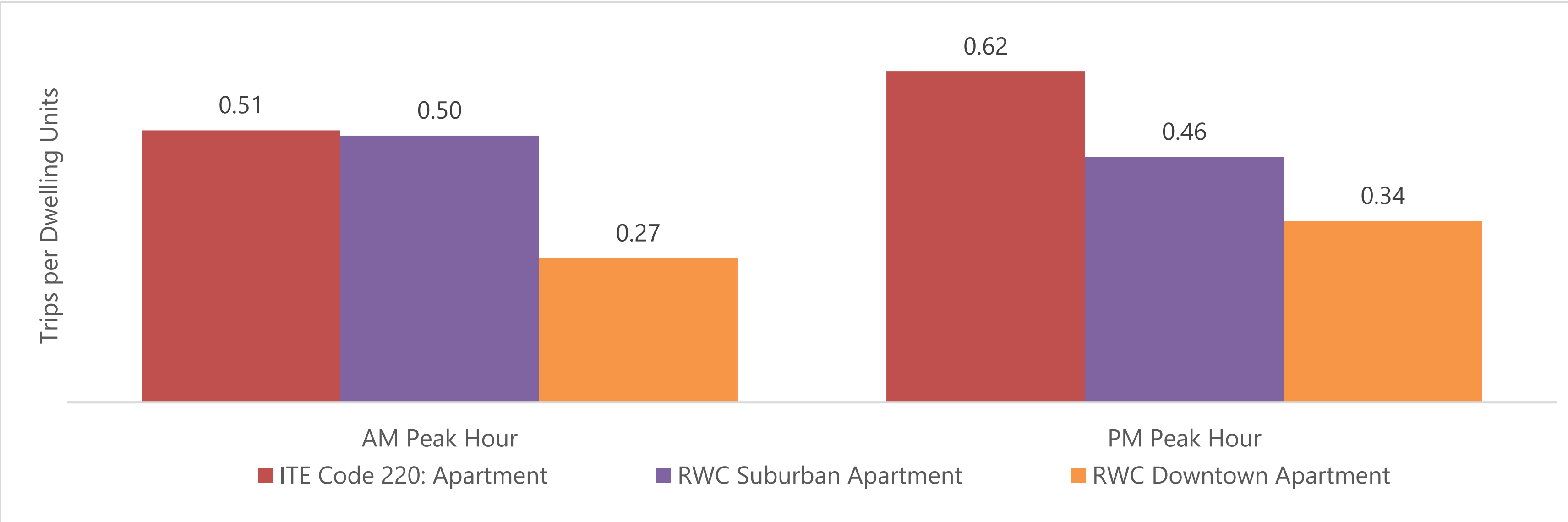
The differences between the downtown and suburban trip generation rates can partially be explained by vehicle ownership. American Community Survey 2011-2015 census data for the study sites show that about 45 percent of suburban households own one vehicle or less, while approximately 70 percent of households in downtown Redwood City apartments own one vehicle or less. There has been a lot of development in the downtown, since the census data was collected, and one can expect that vehicle ownership has also continued to change.

Table A-2: Surveyed Residential Site Characteristics

Residential Type	Location	Size	Date Surveyed	AM Peak Hour	PM Peak Hour
Suburban Apartment	Whipple Avenue	50 dwelling units	May 2017	7:00-8:00	5:45-6:45
Downtown Apartment 1	Downtown RWC	200 dwelling units	April 2017	8:00-9:00	5:30-6:30
Downtown Apartment 2	Downtown RWC	100 dwelling units	April 2017	7:45-8:45	5:30-6:30
Single-Family Detached Homes	Jefferson Avenue	30 dwelling units	May 2017	7:15-8:15	4:45-5:45

Source: Fehr & Peers, May 2017.

Figure A-29: Apartment Trip Generation Rate Comparison

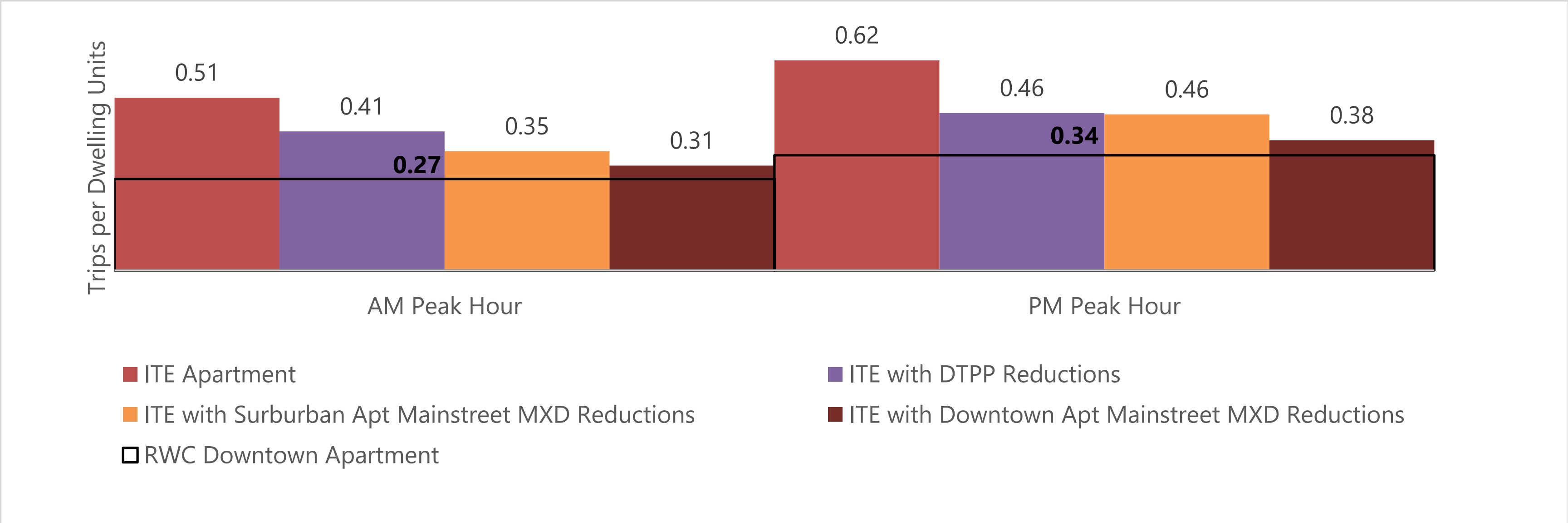


Source: Institute of Transportation Engineers (ITE), 2012; Fehr & Peers, 2017

Figure A-30 shows ITE's apartment average trip generation rate including mixed-use/transit reductions applied in the Downtown Precise Plan (2011) and mixed-use/transit reductions calculated from Fehr & Peers' MainStreet MXD trip generation tool. The DTPP applied a 19.6 percent reduction in the AM peak hour and a 25.1 percent reduction in the PM peak hour. Since the completion of the DTPP, the field of transportation engineering has continued to improve the state of the practice as it relates to more accurately developing trip generation estimates for mixed-use sites. One such tool, is Fehr & Peers' nationally recognized tool MainStreet MXD[2]. Fehr & Peers' MainStreet MXD tool determined a maximum trip reduction due to walking, biking, and transit trips of approximately 40 percent for the downtown apartments and approximately 30 percent for the suburban apartments. ITE rates with DTPP reductions applied are 0.8 (AM peak hour) and 1.2 (PM peak hour) trips per dwelling unit higher, and ITE rates with Mainstreet MXD reductions applied are 0.4 (AM and PM peak hours) trips per dwelling unit higher than observed trip generation rates for the downtown apartments.

[2] MainStreet MXD has been approved for use by the EPA, peer-reviewed in the ASCE *Journal of Urban Planning and Development*, peer-reviewed in a 2012 Transportation Research Board (TRB) paper evaluating various smart growth trip generation methodologies, recommended by SANDAG for use on mixed-use smart growth developments, and has been used successfully in multiple certified Environmental Impact Reports (EIR) in California.

Figure A-30: Apartment Trip Generation Rate (With Reductions) Comparison



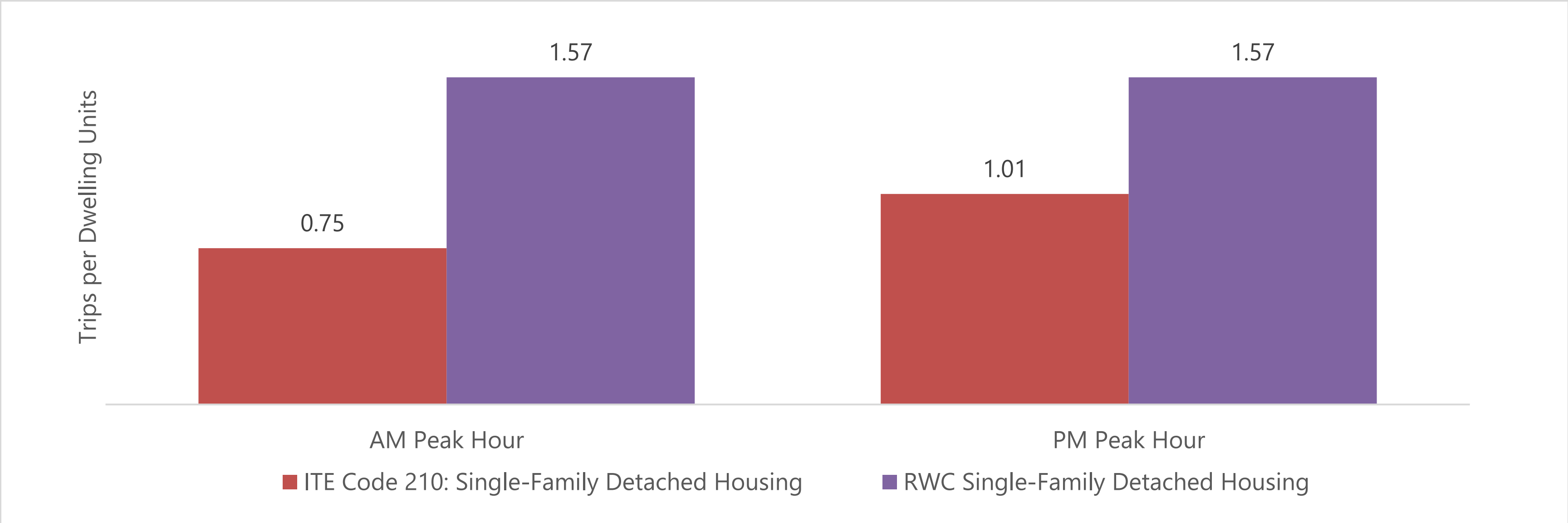
Source: Institute of Transportation Engineers (ITE), 2012; Fehr & Peers, 2017

Single-Family Detached Housing

Figure A-31 compares ITE's Single-Family Detached Housing (Land Use Code 210) average trip generation rates and Redwood City single-family detached homes survey results. Redwood City single-family detached housing trip generation rates are more than double than ITE's average rate for the AM peak hour and approximately one-third higher than ITE rates for the PM peak hour. Data collection and field visits confirmed that the high trip generation rate for the single-family survey results is not the result of cut-through traffic or unusually high number of deliveries.

Data from American Community Survey shows that about a quarter of residents in this census block group owned one vehicle or less, meaning that about 75 percent of households have 2 or more vehicles. For Redwood City as a whole, about 40 percent of households own one vehicle or less, and in the census tract that includes Glenwood Avenue and Highland Avenue (track number 6098), about 25 percent of households own one vehicle or less. The higher trip generation rates observed for the single-family detached housing could be attributed to the higher vehicular ownership rates observed in this census block group of Redwood City. Higher vehicle ownership and higher trip generation rates are likely to occur in other neighborhoods in Redwood City that are more residential and further from downtown.

Figure A-31: Single Family Detached Housing Trip Generation Rate Comparison



Source: Institute of Transportation Engineers (ITE), 2012; Fehr & Peers, 2017

Office Trip Generation Rates

Office trip generation rates were developed by collecting data at a suburban office and a downtown office. **Table A-3** summarizes the characteristics of each surveyed office site.

Both ITE (9th Edition, 2012) land uses for Office (Land Use Code 710) and Research & Development (Land Use Code 760) are comparable land use designations applicable to the office sites surveyed in Redwood City. The office trip generation rates were developed both by building size (per 1,000 s.f.) and number of employees and are discussed below.

Table A-3: Surveyed Office Site Characteristics

Office Type	Location	Size	Date Surveyed	AM Peak Hour	PM Peak Hour
Suburban Office	Redwood Shores	660 ksf 1,500 employees 2.31 employees per ksf	April and May 2017	8:15-9:15	5:45-6:45
Downtown Office	Downtown RWC	295 ksf 1,100 employees 3.73 employees per ksf	April 2017	9:00-10:00	5:45-6:45

Source: Fehr & Peers, 2017.

Office Rates by Building Size

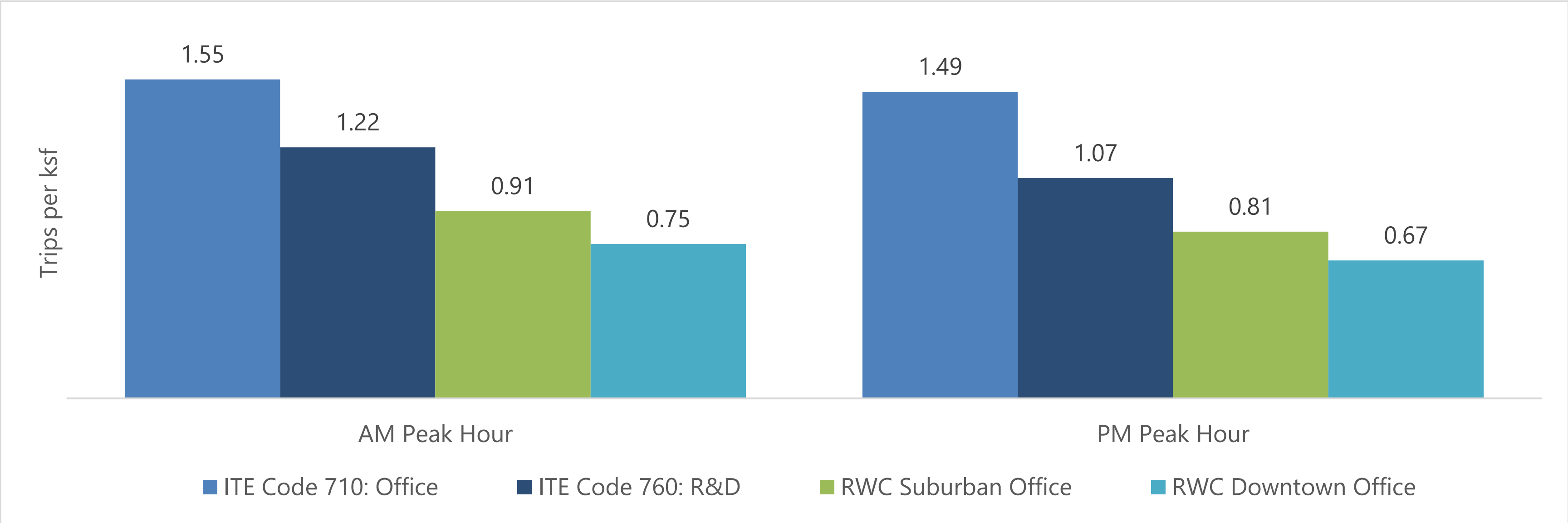
Figure A-32 is a comparison of the average trip generation rates by building square footage for ITE's Office (710) and Research & Development (760) land uses with the Redwood City office survey results. Overall, both the suburban and downtown office sites in Redwood City have lower vehicle trip generation rates by building size than the average Office and R&D rates presented in ITE.

Compared to ITE's office rates, the City's suburban office trip generation rates are 0.64 trips per ksf less in the AM peak hour and 0.68 trips per ksf less in the PM peak hour. Compared to ITE's R&D rates, Redwood City suburban rates are 0.31 trips per ksf less in the AM peak hour and 0.26 trips per ksf less in the PM peak hour. Although the suburban office is not located within immediate walking or biking distance to a Caltrain station, the suburban office has an effective Transportation Demand Management (TDM) program in place; this is likely why the suburban office trip generation rates are lower than ITE office and R&D rates.

The City's downtown office trip generation rates are less than half of ITE's office rates in the AM peak hour (0.8 trips per ksf less) and approximately 55 percent less in the PM peak hour (0.82 trips per ksf less). Compared to ITE's R&D rates, the downtown office trip generation rates are approximately 40 percent less in both the AM (0.47 trips per ksf less) and PM (0.40 trips per ksf less) peak hours.

The percent difference between the City's suburban and downtown office vehicle trip generation rates is 20 percent for both the AM and PM peak hours. The downtown offices' proximity to transit and easy access to walking and biking, are likely contributors to the lower downtown office rates as compared to suburban officer rates.

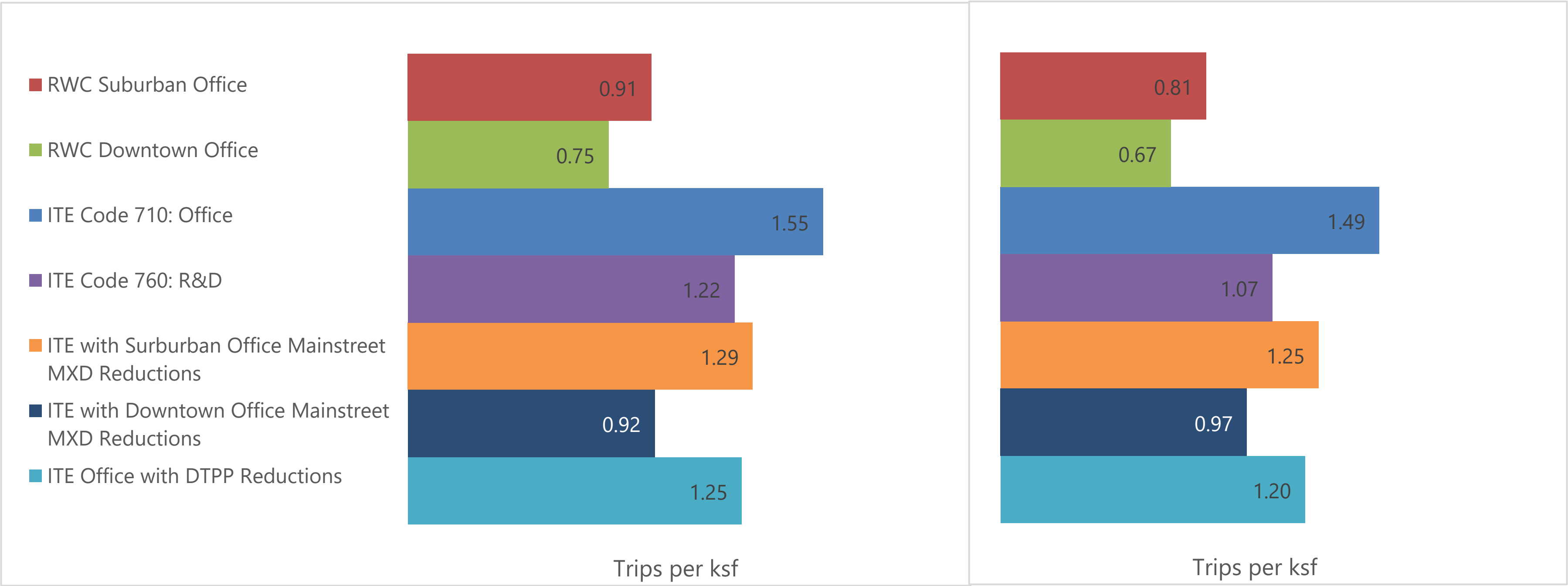
Figure A-32: Office Trip Generation Rate Comparison (Per 1,000 SF)



Source: Institute of Transportation Engineers (ITE), 2012; Fehr & Peers, 2017

Figure A-33 shows ITE's office average trip generation rate per ksf including mixed-use/transit reductions applied in the Downtown Precise Plan (2011) and mixed-use/transit reductions calculated from Fehr & Peers' MainStreet MXD trip generation tool. The DTPP applied a 19.6 percent reduction in the AM peak hour and a 25.1 percent reduction in the PM peak hour. Fehr & Peers' MainStreet MXD tool determined a maximum trip reduction due to walking, biking, and transit trips of about approximately 40 percent for the downtown office building and approximately 15 percent for the suburban office building.

Figure A-33: Office Trip Generation Rate Comparison (Per 1,000 SF) with DTPP and Mainstreet MXD Reductions



Source: Institute of Transportation Engineers (ITE), 2012; Fehr & Peers, 2017

Office Rates by Number of Employees

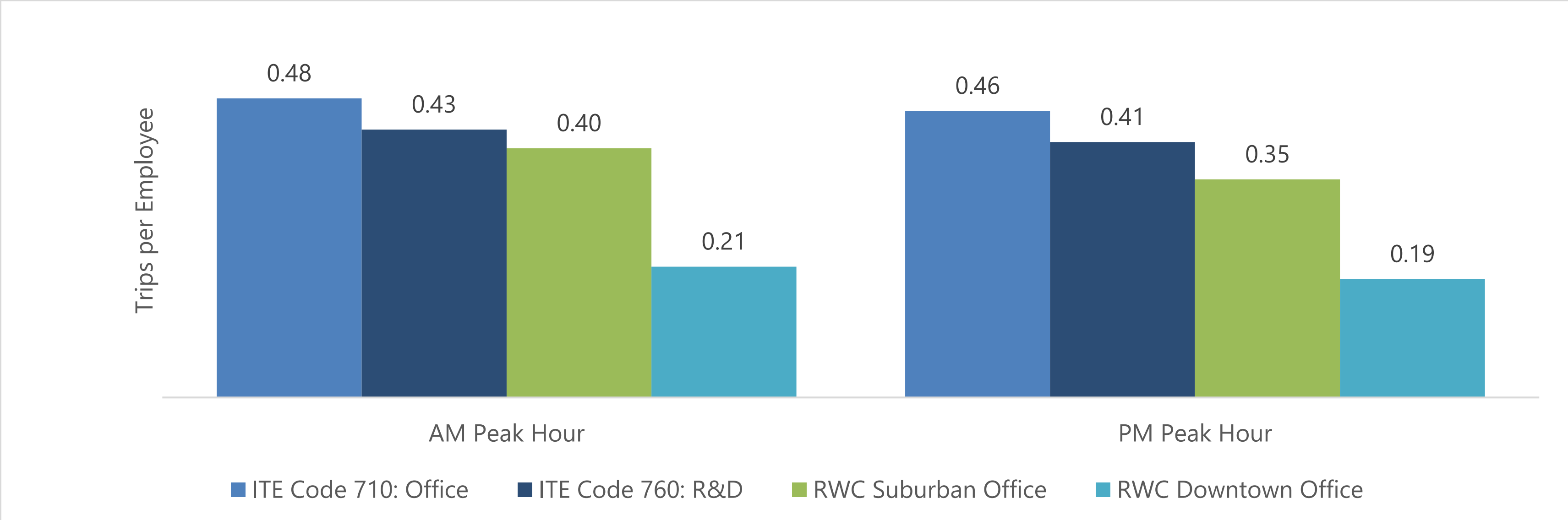
Figure A-34 presents the same data as Figure A-32, but by number of employees instead of building size. Same as the previous discussion, the surveyed suburban and downtown office rates are compared to the average per employee rates presented in ITE for Office (Land Use Code 710) and R&D (Land Use Code 760).

Overall, both the suburban and urban office sites in Redwood City have lower vehicle trip generation rates by number of employees than the average Office and R&D rates presented in ITE. However, when normalizing for number of employees, the differences between the suburban office rates and ITE rates is not as great as with the rates by building size.

The City's suburban office trip generation rates by employee are approximately 20 percent less (0.08 trips per employee less) for the AM peak hour and approximately 25 percent less (0.11 trips per employee less) for the PM peak hour as compared to ITE's Office rates. Compared to ITE's R&D rates, the suburban office trip generation rates are seven percent less (0.03 trips per employee less) in the AM peak hour and about 15 percent less (0.06 trips per employee less) in the PM peak hour.

The downtown office trip generation rates by number of employees is approximately 65 percent less for the AM peak hour and 60 percent less for PM peak hour when compared to the suburban office rates.

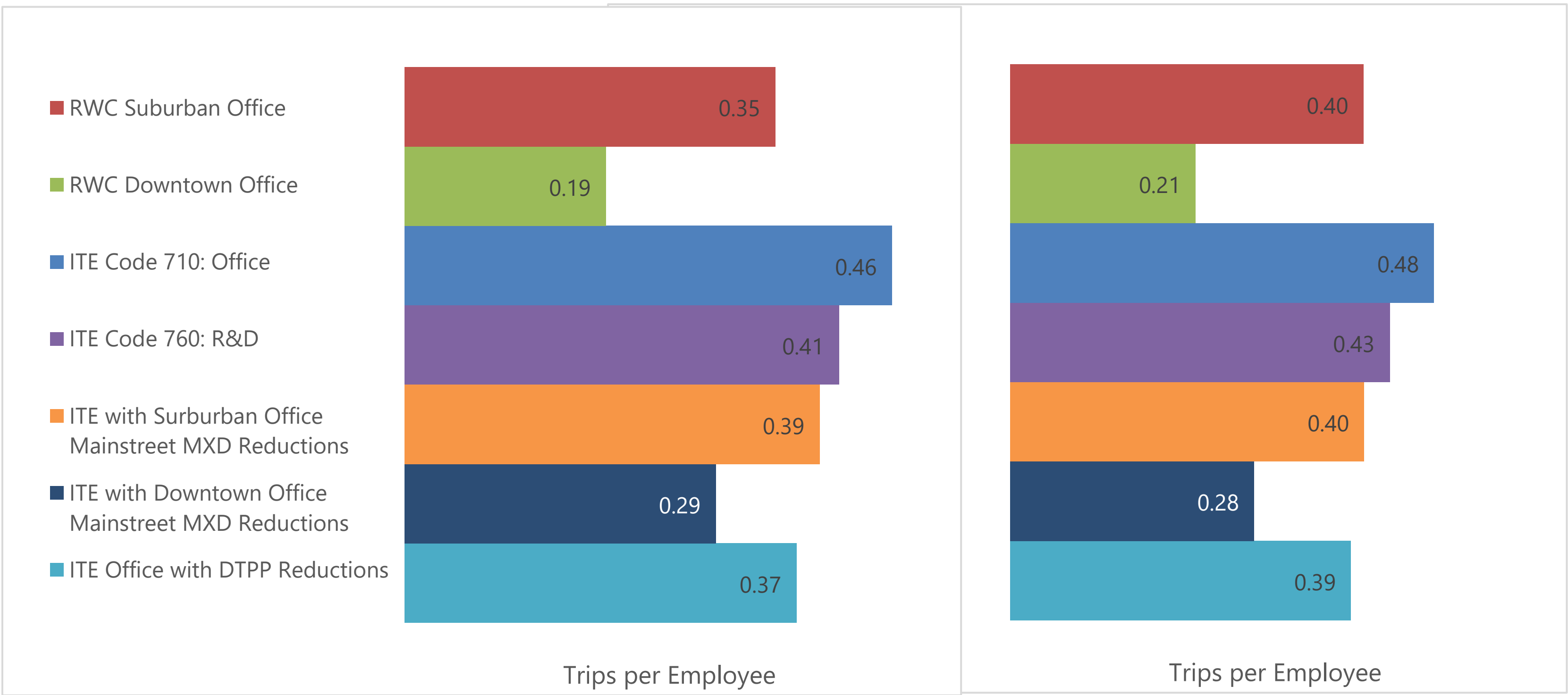
Figure A-34: Office Trip Generation Rate Comparison (Per Employee)



Source: Institute of Transportation Engineers (ITE), 2012; Fehr & Peers, 2017

Figure A-35 shows ITE's office average trip generation rate per employee including mixed-use/transit reductions applied in the Downtown Precise Plan (2011) and mixed-use/transit reductions calculated from Fehr & Peers' MainStreet MXD trip generation tool. The DTPP applied a 19.6 percent reduction in the AM peak hour and a 25.1 percent reduction in the PM peak hour. Similarly as with office trip generation rate per ksf, Fehr & Peers' MainStreet MXD tool determined a maximum trip reduction due to walking, biking, and transit trips of about approximately 40 percent for the downtown office building and approximately 15 percent for the suburban office building.

Figure A-35: Office Trip Generation Rate Comparison (Per Employee) with DTPP and Mainstreet MXD Reductions



Source: Institute of Transportation Engineers (ITE), 2012; Fehr & Peers, 2017

Residential Mode Split

Figure A-36 shows mode split for the surveyed suburban and downtown apartments and the single-family detached housing neighborhood in Redwood City. Redwood City mode split data from American Community Survey 2011-2015 is included for comparison.[3] For the suburban apartment, 71 percent of residents drive alone, 7 percent carpool, 12 percent walk, 6 percent bike, and 6 percent use TNCs (Uber/Lyft) in the AM peak period. In the PM peak period, approximately 61 percent of residents drive alone, 12 percent carpool, 15 percent walk, 3 percent bike, and 9 percent use TNCs (Uber/Lyft).

For the downtown apartment, 46 percent of residents drive alone, 7 percent carpool, 21 percent walk, 5 percent bike, 21 percent use transit, and 1 percent use TNCs (Uber/Lyft) in the AM peak period. In the PM peak period, 53 percent of residents drive alone, 9 percent carpool, 17 percent walk, 4 percent bike, and 17 percent use transit in the PM peak period.

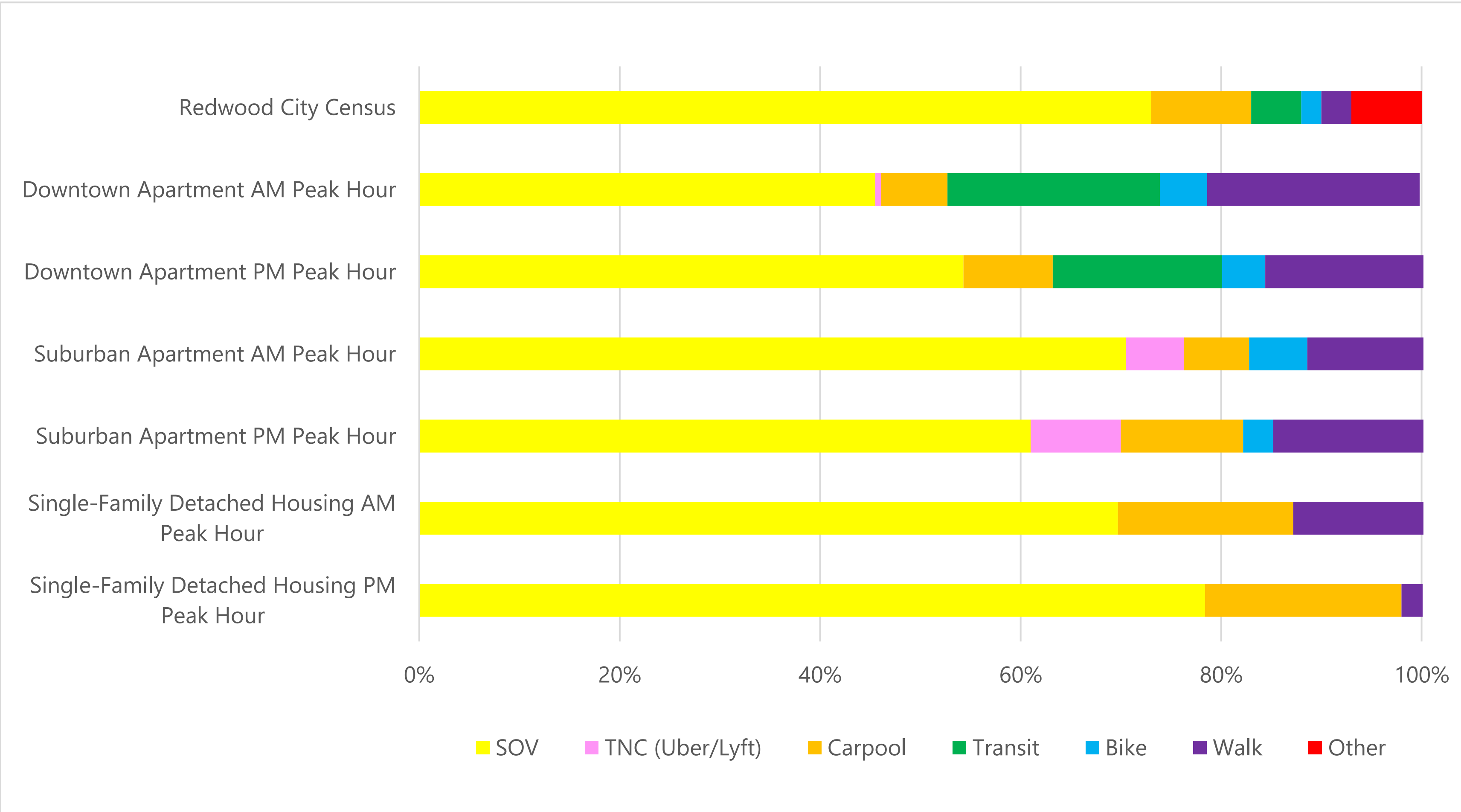
For the single-family detached housing neighborhood, 70 percent of residents drive alone, 18 percent carpool, and 13 percent walk in the AM peak period. In the PM peak period, 78 percent of residents drive alone, 20 percent carpool, and just 2 percent walk.

Overall, the single-family residential uses have the highest combined percentage of drive alone and carpool mode access, with approximately 90 to 95 percent of trips completed via car. Interestingly, for the suburban apartments, there was a noticeable percentage of trips made by TNC. This can likely be attributed to lower car-ownership in apartments as compared to single-family residential properties. It is also likely that some of these TNC trips were taken to access the downtown transit station, though no data was collected to verify this assumption. Downtown apartments had the lowest combined percentage of drive alone and carpool mode access and the highest percentage of transit access and bike access.

It is important to note that it is possible that residents changed modes outside the range of sight of the surveyed apartments – i.e. it is possible that walking, biking or TNC trips could have become transit trips or the driver of a carpool could have been counted as a single-occupancy driver.

[3] American Community Survey data “other” presumably includes TNC (Uber/Lyft).

Figure A-36: Suburban and Downtown Apartment and Single Family Homes Mode Split



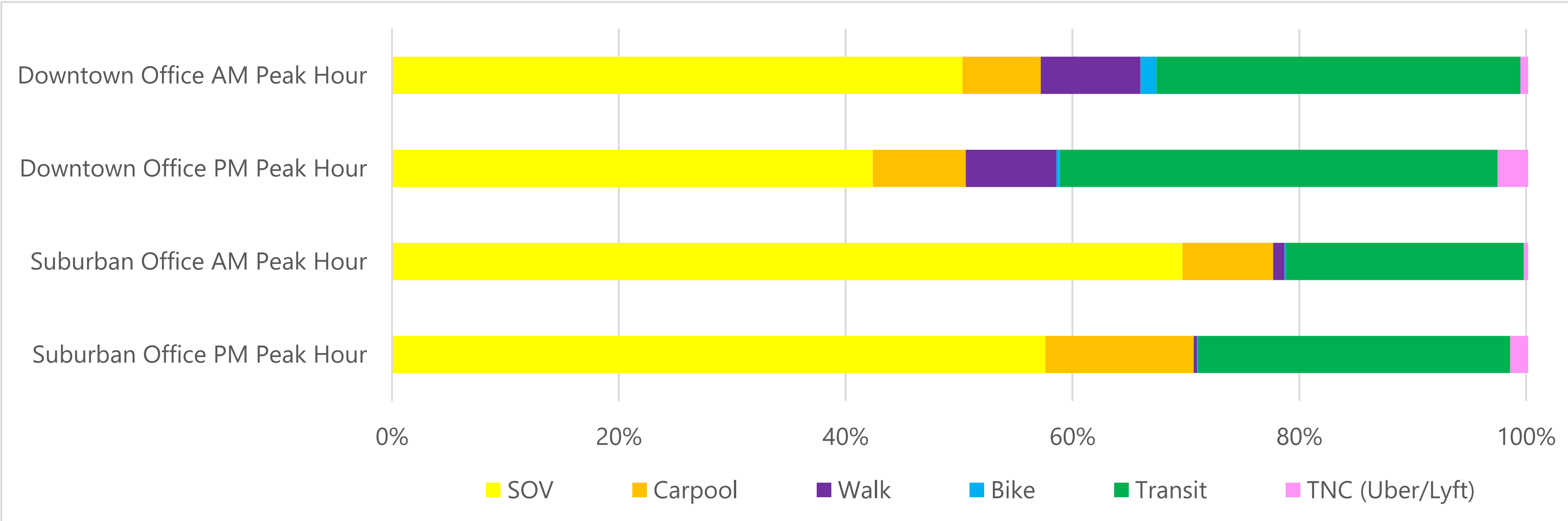
Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates; Fehr & Peers, 2017.

Office Mode Split

Figure A-37 shows mode split for the surveyed suburban and downtown offices in Redwood City. For the suburban office location, 70 percent of employees drive alone, 8 percent carpool, 21 percent take the employee shuttle, 0.5 percent use TNCs (Uber/Lyft), 1 percent walk, and 0.1 percent bike in the AM peak period. In the PM peak period, 58 percent of employees drive alone, 13 percent carpool, 28 percent use transit, 2 percent use TNCs (Uber/Lyft), 0.5 percent walk, and 0.1 percent bike in the PM peak period.

For the downtown office, approximately 50 percent of employees drive alone, 7 percent carpool, 32 percent use transit, 9 percent walk, 1.5 percent bike, and 1 percent use TNCs (Uber/Lyft) in the AM peak period. In the PM peak period, 42 percent of employees drive alone, 8 percent carpool, 39 percent use transit, 8 percent walk, 0.5 percent bike, and 3 percent use TNCs (Uber/Lyft).

Figure A-37: Suburban and Downtown Office Mode Split



Source: Fehr & Peers, 2017

Overall, the downtown office drive alone mode split is about 20 percent lower than the suburban office during the AM peak hour and 15 percent lower in the evening. Even when accounting for carpool, the number of cars that access the downtown office is about 20 percent lower than for the suburban office in the AM and PM peak hours. The difference is primarily attributed to the increase in mode split of transit, bike, and walk in downtown offices. Given the proximity to transit, the downtown office does not have employee shuttles; thus downtown offices overall, have significantly less cars and busses accessing their sites than suburban locations.

Parking

This section of the report summarizes the City's parking supply and demand, along with the parking fee structure in the downtown, areas with residential parking permits, and City parking revenues. In 2015 the City completed a parking study, which evaluated parking conditions in the downtown area, including a detailed parking occupancy and duration analysis. This section provides a limited update to this analysis, using recently collected data to identify changes to parking conditions since 2015. Because occupancy data was not collected for this report, parking sensor and garage transaction data from 2016 and 2017.

Downtown Parking Supply and Demand

Parking demand is highly concentrated in the downtown area, spurred by new development and job growth. 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.

Parking Facilities and Inventory

In Downtown Redwood City, on-street parking is available on most blocks, and public parking is available in several garages and lots. On-street parking is categorized into two areas: (1) the core, with 397 spaces in the central downtown area and near the Caltrain station, and (2) the outer or periphery area, with 660 parking spaces north-west of Marshall Street and north-east of Main Street. The extents of these two parking categories are shown in **Figure A-38**. Off-street parking includes the Jefferson and Marshall garages, with 585 and 387 spaces, respectively. There are seven City-owned lots with a total of 472 spaces. Along with a privately-owned garage and facilities owned by the County and Caltrain, there are nearly 4,000, publicly available parking spaces in downtown. **Table A-4** summarizes the downtown parking supply.

Figure A-38: Downtown Parking Facilities and Prices

RWCmoves

Table A-4: Inventory by Facility

Facility/Area[1]	Total Spaces	Owner	Type
Core On-Street	397	City	On-Street
Periphery On-Street	660	City	On-Street
Jefferson Garage	585	City	Garage
Marshall Garage	387	City	Garage
Main Street Lot	149	City	Surface Lot
Perry Lot	52	City	Surface Lot
City Hall Lot	15	City	Surface Lot
Library Lot A	51	City	Surface Lot
Library Lot B	98	City	Surface Lot
Lib Lot C / Penn Ave	62	City	Surface Lot
Crossing 900	900[2]	Private	Garage
County Garage	797	County	Garage
Caltrain Garage	309	Caltrain	Garage
Caltrain Perry Lot	160	Caltrain	Surface Lot
Total	**4,622**		

Notes:
1. All spaces in all lots except Crossing 900 are publicly available all day. Paid parking is in effect on-street from 10 AM to 6 PM.
2. Spaces in Crossing 900 are available to the public in the evenings and on weekends.

Parking Fees and Regulations

On-street parking is metered in the downtown area, bordered by Brewster Avenue, Veterans Boulevard, Walnut Street, and Middlefield Road. There is also metered parking between Arguello Street and El Camino Real, north of the Caltrain Station. The two areas within downtown, the core and the outer/periphery, each have distinct treatment of on-street parking and payment, described below:

- In the core area, lunchtime/daytime visitor parking is $1 per hour Monday through Saturday 10 AM to 6 PM. The Main Street, City Hall, Library, and Perry Street Lots are included in this parking pricing structure.
- In the outer/periphery area, commuter parking is $0.25 per hour Monday through Saturday 10 AM to 6 PM. This parking is in the outskirts of downtown, north of Marshall Street and east of Main Street.
- The garages have a slightly different pricing structure. The Marshall Garage is designated for commuter parking, and costs $1 per hour to park during the day (the Jefferson Garage costs $0.25 per hour). In the evenings, parking in both of these garages costs $2.50 per hour, as does parking in the private Crossing 900 garage. All three of these garages provide 1.5 hours of free parking and up to 4 hours of free parking with validation from the Century Theater. Additional facilities are available in the evenings and on weekends.

The Marshall Garage, the Main Street Lot, and the Sequoia Station Garage have monthly permits available for downtown employees, residents, or other regular visitors. Permits range from $40 to $100 per month, with more expensive permits allowing parking at nights and on weekends in addition to weekdays. The permit program manages the number of permits issued for each.

Parking Occupancy

This section of the report describes on-street and off-street occupancy data to identify parking trends and patterns. Occupancy data was collected for on-street facilities and parking lots in 2015 for the Downtown Parking Occupancy Study completed in November of 2016 ("2015 study"). This data is supplemented with parking sensor data and garage transaction data to provide more detailed and/or recent information. The occupancy data collected for the 2015 study found that there were two occupancy peaks during the day, one at midday and one in the evening. **Table A-5** below shows the percentage occupancies for on-street parking during the peak periods on the days observed for this study. Overall occupancy in the core on-street facilities was 80 to 90 percent during the midday periods and around 90 percent during the evenings, with slightly lower occupancies on the weekend compared to the observed weekdays. Occupancies in the periphery were lower than in the core, with midday occupancies of around 80 percent on the observed weekdays, and 40 percent on the weekend, and evening occupancies around 50 percent on Wednesday and Saturday, and 91 percent on Friday evenings.

Table A-5: 2015 Downtown On-Street Parking Occupancies

Day	Total Spaces	Peak Period	Wednesday	Friday	Saturday
Core	485	Midday	90%	87%	80%
		Evening	90%	88%	92%
Periphery	1246	Midday	79%	78%	39%
		Evening	54%	91%	53%
Total	1731	Midday	87%	82%	63%
		Evening	74%	87%	67%

Notes:
___ = occupancy level >84 percent
___ = occupancy level >94 percent
Source: City of Redwood City Downtown Parking Occupancy Study, TJKM 2016.

More detailed parking occupancy data is available for a subset of the on-street spaces in downtown which had occupancies collected by sensors between 2013 and 2016. The City use Streetline sensors, which detect whether or not a parking space is occupied, to provide real-time on-street parking space occupancy on two streets in downtown. These sensors are installed on Broadway between Marshall Street and Main Street and on Jefferson Avenue between Marshall Street and Middlefield Road. **Figure A-39** shows the locations of the parking sensors. These locations are within the core downtown parking area.

Figure A-39: Parking Sensor Locations

Table A-6 and **Table A-7** below show average hourly occupancy by block collected by the Streetline sensors for the third quarter in 2013 and 2016, respectively. These two time-periods had a similar overall pattern of occupancy, with a midday peak at 12 PM and an evening peak between 6 PM and 7 PM. Occupancies generally increased between 2013 and 2016, with blocks above the 84 percent practical capacity level for longer periods during the afternoon.

In 2016, midday occupancies on the busiest blocks were slightly higher than in 2013, and PM peak occupancies were similar or slightly lower than in 2013. In 2013, the 2000 and 2050 blocks of Broadway had high occupancies for most of the afternoon, with a dip below the 85 percent practical capacity threshold at 2 PM and 3 PM. Between 2013 and 2016, a parklet was installed on this block, removing one parking space. Near the end of 2016, a second parklet was installed, reducing the number of spaces on this block to 6. This was likely installed during the collection of the below parking occupancies, but the parking capacity used to calculate occupancy does not reflect this. Thus, the actual percent occupancy on this block in 2016 was likely higher than shown below.

The 2050 block of Broadway remained above the 85 percent practical capacity level for the entire afternoon in 2016, possibly indicating a shift of some of the parking demand from the 2000 block where a space was removed. Occupancies on the 2300 and 2400 blocks of Broadway increased and in 2016 were close to or above practical capacity for most of the afternoon. Higher occupancies in the evening hours may be due to the fact that on-street parking is free throughout downtown after 6 PM, while the price to park in the garages increases in the evening.

Table A-6: 2013 Average Hourly On-Street Occupancies (3rd quarter, July-Sept)

Block	Total Spaces	10a	11a	12p	1p	2p	3p	4p	5p	6p	7p	8p
700 Jefferson Ave	21	38%	48%	75%	72%	56%	47%	51%	74%	93%	93%	87%
800 Jefferson Ave	39	52%	61%	83%	80%	71%	68%	74%	83%	95%	95%	92%
2000 Broadway	9	63%	83%	93%	88%	81%	78%	85%	92%	96%	97%	93%
2050 Broadway	10	75%	86%	92%	88%	83%	78%	84%	92%	96%	96%	94%
2100 Broadway	14	43%	42%	64%	70%	59%	55%	71%	79%	89%	93%	90%
2200 Broadway	5	42%	59%	75%	65%	54%	51%	53%	57%	64%	66%	58%
2300 Broadway	10	82%	87%	91%	88%	84%	80%	78%	79%	87%	88%	78%
2400 Broadway	14	88%	92%	94%	93%	87%	85%	84%	87%	92%	93%	88%
Total	**122**	**62%**	**72%**	**84%**	**81%**	**74%**	**69%**	**74%**	**82%**	**91%**	**92%**	**88%**

Notes:
___ = occupancy level >84 percent
___ = occupancy level >94 percent
Source: Redwood City, Streetline, 2013

Table A-7: 2016 Average Hourly On-Street Occupancies (3rd quarter, July-Sept)

Block	Total Spaces	10a	11a	12p	1p	2p	3p	4p	5p	6p	7p	8p
700 Jefferson Ave	21	63%	75%	89%	85%	76%	68%	69%	84%	95%	95%	88%
800 Jefferson Ave	39	60%	72%	82%	79%	76%	74%	79%	89%	95%	95%	91%
2000 Broadway	8 (6)[1]	64%	77%	83%	80%	78%	74%	78%	84%	86%	84%	83%
2050 Broadway	10	80%	89%	92%	88%	86%	86%	88%	94%	96%	96%	93%
2100 Broadway	14	78%	83%	84%	82%	80%	77%	79%	84%	87%	88%	86%
2200 Broadway	5	65%	70%	69%	69%	64%	64%	63%	71%	78%	76%	61%
2300 Broadway	10	88%	91%	93%	92%	86%	83%	84%	87%	92%	93%	88%
2400 Broadway	14	94%	95%	96%	95%	92%	90%	88%	90%	91%	92%	89%
Total	**121**	**71%**	**79%**	**86%**	**83%**	**79%**	**76%**	**78%**	**86%**	**91%**	**92%**	**87%**

Notes:
= occupancy level >84 percent
= occupancy level >94 percent
1. Between 2013 and 2016, a parklet was installed on this block, removing one parking space. Near the end of 2016, a second parklet was installed, reducing the number of spaces on this block to 6. This likely happened during the collection period, but the capacity used to calculate occupancy was 8 spaces.
Source: Redwood City, Streetline, 2016.

Off-Street

This section discusses off-street parking usage for both city-owned parking garages and parking lots using occupancy data collected in 2013 and transactional data collected for 2013 and 2016.

Parking Garages

The 2015 parking study did not collect occupancy in the Jefferson and Marshall garages. **Table A-8** shows a summary of the occupancies in the garages collected for a previous parking study conducted in 2013. This table is followed by more recent garage transaction data. The Marshall garage had high occupancies during the weekday midday peaks, and the Jefferson garage had high occupancies during the weekend evening peak. During the other times, the garages saw relatively low usage.

Because more recent occupancy data is not available, transaction data (the number of parking events in a given timeframe) for the Marshall and Jefferson Garages is used instead to compare between July 2013 and July 2016. **Table A-9** shows parking counts by type of parker for the Marshall Garage and **Table A-10** shows the same for the Jefferson Garage.

Table A-8: 2013 Downtown Garage Parking Occupancies

Day	Total Spaces	Peak Period	Thursday	Friday	Saturday
Jefferson	591	Midday	30%	61%	76%
		Evening	45%	81%	100%
Marshall	388	Midday	88%	78%	14%
		Evening	45%	36%	56%
Total	979	Midday	53%	68%	51%
		Evening	45%	63%	83%

Notes:
= occupancy level >84 percent
= occupancy level >94 percent

Source: Redwood City Downtown Parking Program – Operational and Programmatic Review, CDM Smith 2013.

Table A-9: Marshall Garage Transactions (July 2013, 2016, and 2017)

Marshall Garage[1]	2013			2016			2017		
	Mon-Thu	Fri	Sat	Mon-Thu	Fri	Sat	Mon-Thu	Fri	Sat
Average daily hourly parkers	384	860	515	500	1,107	658	491	993	643
Average daily validated parking	11	81	63	19	57	94	56	104	117
Average daily monthly permit parkers	292	231	15	324[2]	324[2]	45[2]	374[2]	374[2]	54[2]
Total	688	1,171	594	**843**	**1,488**	**797**	**921**	**1,470**	**814**

Notes:
1. Data is averaged from daily transactions. Mon-Thu is an average of all weekdays excluding Fridays.
2. Daily permit parker counts are not available for 2016 or 2017, these values are the number of issued parking permits.

Source: Redwood City, 2017.

In the Marshall Garage, the total number of weekday and weekend parkers increased between 2013 and 2017. Between 2013 and 2016, there was a large increase in non-validated hourly parking, but a slight decrease in these parkers in 2017. Larger increases in the number of validated parkers and permit parkers resulted in an overall increase in the total number of daily parkers in the Marshall Garage. The actual use of permits was not available in 2016, only the total number of issued permits. The number of permits used on a given day is likely lower than the 324 permits issued, as not all permit parkers will be present every day. Caps on the number of permit parkers were introduced in each facility during this time, along with price increases, but the number of issued permits increased over this time period anyways.

In the Jefferson Garage, the total number of weekday parkers increased between 2013 and 2017. However, the average number of parkers in 2017 was lower than in 2016. Between 2013 and 2016, there was an increase in non-validated hourly parking, but a slight decrease in these parkers in 2017. In each year shown, there are fewer validated parkers in the Jefferson garage on the weekdays compared to weekends, however, the number of parking validations dropped slightly over this period during both the weekdays and weekends. The increase in validated parking in the Marshall Garage may indicate that some validated parkers have shifted to that garage instead of Jefferson. Permits are not issued for the Jefferson garage, but the daily counts in 2013 found some parkers using permits in the garage.

Table A-10: Jefferson Garage Transactions (July 2013, 2016, and 2017)

Jefferson Garage[1]	2013			2016			2017		
	Mon-Thu	Fri	Sat	Mon-Thu	Fri	Sat	Mon-Thu	Fri	Sat
Average daily hourly parkers	1,123	1,877	2,057	1,451	2,331	2,239	1,411	2,209	2,161
Average daily validated parking	749	1,115	1,345	605	975	1,212	547	893	1,134
Average daily monthly permit parkers	18	18	6	N/A	N/A	N/A	N/A	N/A	N/A
Total	**1,889**	**3,010**	**3,407**	**2,079**	**3,306**	**3,451**	**1,958**	**3,102**	**3,295**

Notes:
1. Data is averaged from daily transactions. Mon-Thu is an average of all weekdays excluding Fridays.
Source: Redwood City, 2017.

Parking Lots

For the 2015 study, occupancy data was collected in the off-street lots. **Table A-11** summarizes these occupancies by peak period and day observed. Most lots experienced some periods of high occupancy on both weekdays and weekends, with the highest occupancies in the Main Street Lot, City Hall Lot, and Library Lot A.

Table A-11: 2013 Downtown Lot Parking Occupancies

Lot	Total Spaces	Peak Period	Wednesday	Friday	Saturday
Main Street Lot	150	Midday	67%	89%	85%
		Evening	99%	100%	99%
Perry Lot	54	Midday	67%	67%	57%
		Evening	98%	100%	59%
City Hall Lot	16	Midday	38%	75%	100%
		Evening	88%	100%	100%
Library Lot A	50	Midday	44%	50%	98%
		Evening	100%	100%	96%
Library Lot B	104	Midday	65%	83%	90%
		Evening	67%	95%	90%
Library Lot C	40	Midday	60%	73%	58%
		Evening	73%	98%	100%
Total	**414**	**Midday**	**62%**	**78%**	**82%**
		Evening	**88%**	**99%**	**91%**

Notes:
___ = occupancy level >84 percent
___ = occupancy level >94 percent
Source: City of Redwood City Downtown Parking Occupancy Study, TJKM 2016.

Transactional data is also available for the lots is available for 2017, but is not available prior to this because of a recent change in meter technology. **Table A-12** shows the transaction information for city-owned lots for the most recent month available, April 2017. The Main Street Lot had the most transactions, and has a limited number of parking permits available. This, along with the relatively low number of transactions per space, indicate that spaces are used for longer durations. The Perry Lot and Library Lot A had the most activity per space during this month, indicating that they are used for shorter duration parking.

Table A-12: Transactions (April 2017) for City-Owned Parking Lots

Lot	Spaces	Transactions	Average daily transactions per space
Main Street Lot	149	7,407	2.0
Perry Lot	54	4,823	3.6
City Hall Lot	16	992	2.5
Library Lot A	51	4,567	3.6
Library Lot B	104	4,817	1.9
Library Lot C	62	156	0.1
Total	**482**	**22,762**	**1.9**

Note:
City staff and City vehicles currently park in Library Lots B and C, impacting the number of transactions in each.
Source: Redwood City Parking Lot Transactions, IPS, 2017.

Table A-13: Parking Revenue by Source (2013-2016)

Revenue Source	FY 2012 - 13	FY 2013 - 14	FY 2014 - 15	FY 2015 - 16
On Street Parking Meters	**$879,570**	**$973,392**	**$1,244,829**	**$1,311,909**
Parking Meters (Periphery)	$397,593	$396,099	$392,570	$382,402
Parking Meters (Core)	$481,977	$577,293	$852,259	$929,507
Off-Street Parking Facilities	**$426,646**	**$334,233**	**$766,629**	**$1,088,400**
Jefferson and Marshall Garages	$237,088	$185,330	$457,284	$548,286
Marshall permits	$148,664	$117,053	$264,955	$484,914
Perry/Winslow/Main permits	$40,894	$31,850	$44,390	$55,200
Total Parking Fee Revenue	**$1,306,216**	**$1,307,625**	**$2,011,458**	**$2,400,309**

Source: Redwood City Revenue Statements, 2012 – 2016

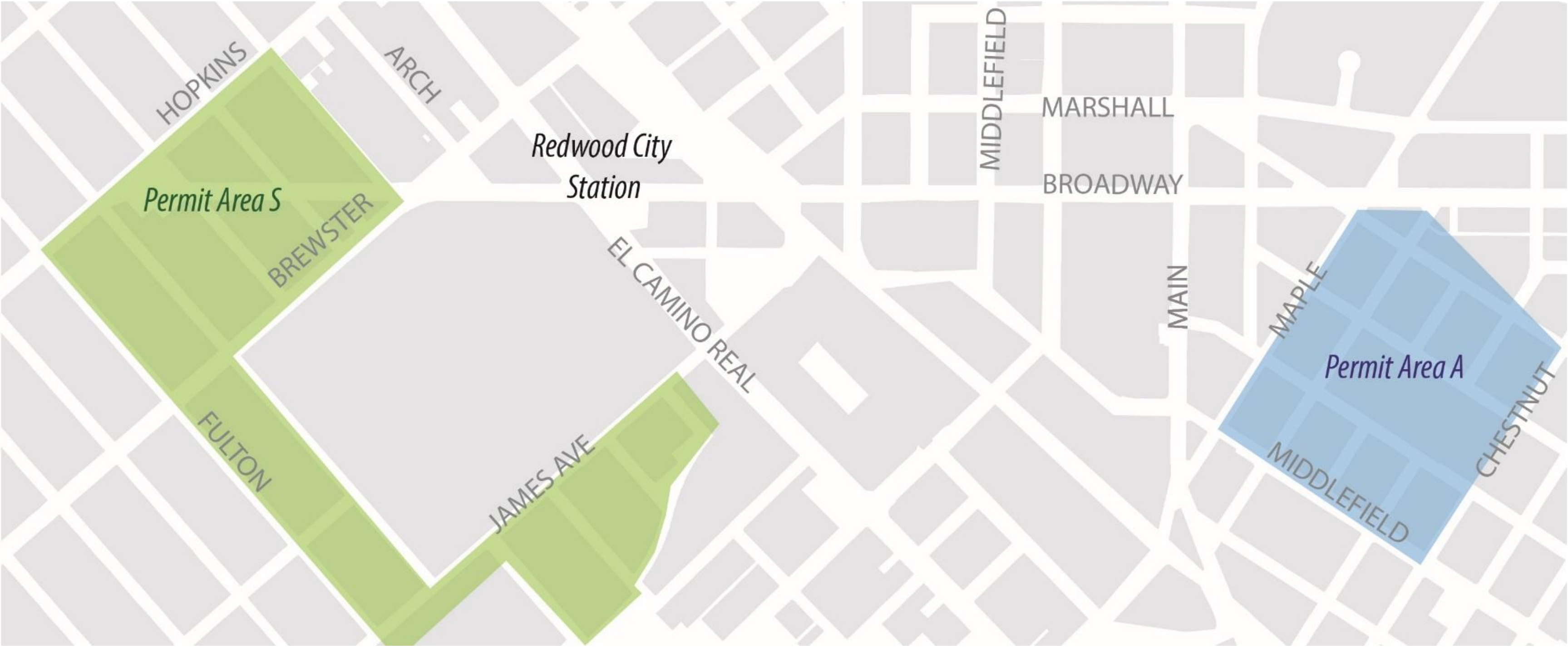
Parking Fund and Revenue

The 2013 downtown parking study found that revenue performance improved steadily between FY 2009-10 and 2012-13. **Table A-13** the revenue for parking meter and garage sources between FY 2012-13 and FY 2015-16. Overall, revenue from parking fees continued to increase over this time period, with the largest year-over-year increases occurring in 2014 through 2016. The categories with the most revenue growth were downtown core parking meters and the Marshall garage. Downtown core parking fees and Marshall permit costs were increased in August 2014, likely accounting for much of the revenue increase in FY 2014-15. Though it should be noted that despite the increases in parking fees that parking in the on-street periphery spaces did not increase. This suggests that the increase in parking rates did not shift where people parked.

Residential Permit Parking

The City also manages a Residential Parking Permit (RPP) Program. There are two active permit areas: Permit Area A located southeast of downtown, and Permit Area S located around Sequoia High School shown in **Figure A-40**. A third area, Area C, is located around Sequoia Hospital, but is currently not used by residents or actively enforced; the parking issue no longer exists due to the hospital redevelopment. No permits are issued in this area, it is not shown in the map below, and it is not considered by staff to be an active permit area. In the 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.

Figure A-40: Residential Parking Permit Areas



Source: Redwood City Residential Permit Program, 2017.

Summary of Findings

This review of recent parking inventory, policies, and occupancies in Redwood City has found the following trends between 2013 and 2016:

- Parking revenues have increased.
- The public parking supply has been increased through the shared parking at Crossing 900, particularly in the evenings and weekends.
- Parking occupancies and garage use have increased overall.
- There are significant areas over 85 percent occupancy during the peaks, suggesting the need for continued pricing adjustment or other policy changes.
- Free on-street parking in the evenings while prices increase in off-street facilities provides an incentive for drivers to search for street parking and results in high demand for on-street parking despite additional parking availability in the garages.

City Comparison Study

Five case studies were evaluated to provide a comparison to Redwood City. The cities selected include Bellevue (Washington), Pasadena (California), Alexandria (Virginia), Mountain View (California), and Boulder (Colorado). Basic demographic characteristics, along with availability of specific transportation programs and commute mode split were compared for each of the comparison cities. **Figure A-41** summarizes the results for five cities and compares it to Redwood City. Cities are sorted by population density (population per square mile). A summary of the comparison cities' land development review policies and transportation system monitoring is provided below.

Bellevue, Washington

Bellevue's land development review process requires using Level of Service (LOS) to identify impacts for developments of 50 or more dwelling units or thousand square feet (KSF). These developments are also required to adhere to trip reduction requirements based on land use and size. Specifically, new developments of 50 or more dwelling units or KSF are required to have an overall reduction of 10 percent in drive-alone rates and 13 percent reduction in Vehicle Miles Traveled (VMT) to key sites. Office buildings of 50 or more KSF are also required to increase performance goals every other year. On the project's tenth year, the single occupancy vehicle (SOV) rate is to be reduced by 35 percent from the baseline year. Bellevue also has enacted a commute reduction plan for companies with 100 or more employees.

Bellevue monitors its transportation system by conducting a mode share survey and monitoring Average Daily Traffic (ADT), vehicular speeds, ADA compliance, transit system ridership, and using counters on loop detectors at signalized intersections.

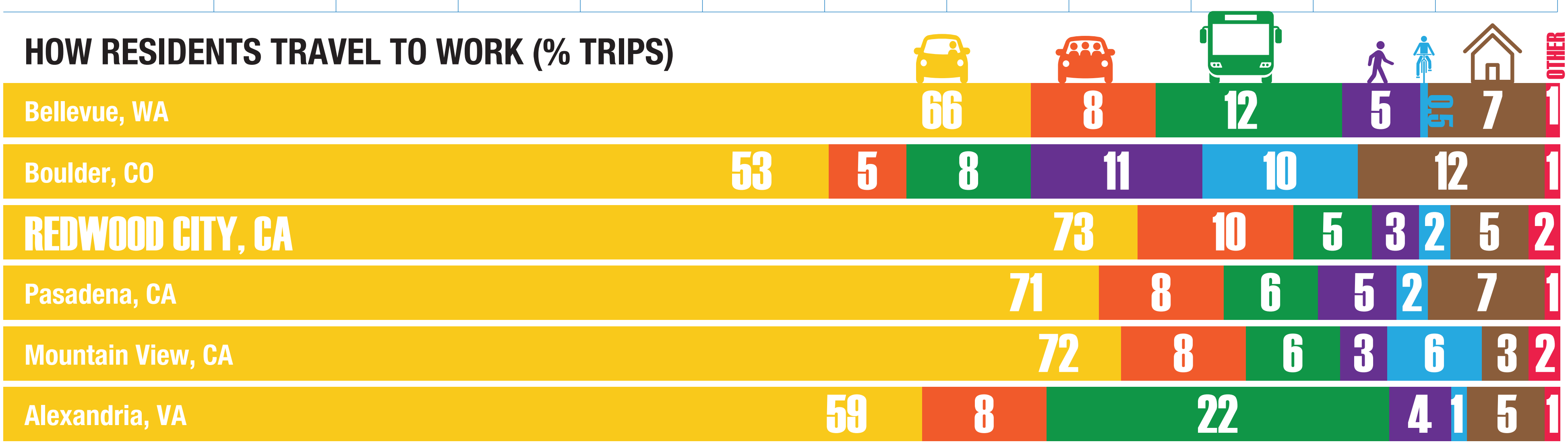
Both the City's Planning and Community Development Department and the Transportation Department carry out Bellevue's transportation work.

RWCmoves

COMPARISON STUDIES

	Population	Population per Square Mile	Percent Change in Population (2010-2016)	Median Household Income in 2015 Dollars	Number of Housing Units	Number of Companies/ Firms	Average Travel Time to Work In Minutes	Transportation Demand Management (TDM) Program	Bike Friendly Community	Walk Friendly Communities	Vision Zero Plan
Bellevue, WA	141,400	3,825	10.6%	94,650	58,200	16,800	22.6	YES	BRONZE	SILVER	YES
Boulder, CO	108,100	3,950	10.6%	58,500	44,600	17,750	19.2	YES	PLATINUM	GOLD	NO
REDWOOD CITY, CA	85,000	3,955	10.6%	85,000	30,200	8,350	24.2	NO	BRONZE	SILVER	NO
Pasadena, CA	142,100	5,970	3.6%	72,400	58,800	19,700	27.2	YES	N/A	N/A	NO
Mountain View, CA	80,500	6,175	8.7%	103,500	34,200	8,850	22.0	YES	SILVER	N/A	NO
Alexandria, VA	155,800	9,315	11.3%	89,150	74,300	17,500	30.8	YES	SILVER	SILVER	NO

HOW RESIDENTS TRAVEL TO WORK (% TRIPS)



Sources: American Community Survey 2011-2015 and 2016, Census 2010, 2012 Economics Census, League of American Bicyclists, Walk Friendly Communities, Vision Zero, Fehr & Peers

Boulder, Colorado

Boulder reviews land development projects through several impact thresholds and goals. One of the City's overall goals is to reduce VMT by 20 percent by 2035. This goal is being carried out in the land development review process by requiring residential projects generating 20 or more peak hour trips or non- residential projects generating 100 or more peak hour trips to complete a full study. A minimum of LOS D is also required for all movements in review of development projects, and all studies are required to submit a Transportation Demand Management (TDM) plan.

Boulder measures the performance of its transportation system through a combination of monitoring mode share through travel surveys of both residents and employees, vehicle and bicycle counts, transit ridership statistics, and travel time throughout the region. The City of Boulder's Transportation Department handles all transportation and land use related work, and is within the Public Works Department.

As seen on the case study summary fact sheet, Boulder has a substantially lower "drive alone" rate than other cities – the University of Colorado Boulder and other local colleges likely contribute to the higher multi-modal access in Boulder.

Pasadena, California

Similar to Bellevue, Pasadena's land development review process has several impact thresholds based on development size. For developments of 50 or more units (dwelling units or thousand square feet), impact thresholds include:

- An increase over the existing Citywide VMT per Capita of 22.6 (CEQA)
- An increase over the existing Citywide Vehicle Trips (VT) per capita of 2.8 (CEQA)
- Any decrease in the percentage of units or employment within ¼ mile of a low stress bike facility or within ¼ mile of transit (CEQA)
- Any decrease in the Citywide Pedestrian Access Score (CEQA)
- Increases of 10-15 percent traffic intrusion on streets with more than 1,500 ADT
- A decrease below LOS D Citywide or LOS E within Transit Oriented Districts (TODs)
- Causing below average conditions with the Pedestrian Environmental Quality Index or the Bicycle Environmental Quality Index

For developments of 11 to 49 dwelling units or between 10 and 50 KSF, projects are required to meet CEQA impact thresholds as well as non-CEQA thresholds as the Director of Transportation sees fit.

Pasadena tracks the performance of its transportation system overall by monitoring average transit passengers per hour, parking availability, traffic volume data, arterial travel time and queueing, travel pattern monitoring and travel time/route guidance, and conducting commute surveys. Transportation and development related work is completed by the City of Pasadena's Planning and Community Development Department and the Transportation Department.

Mountain View, California

Mountain View reviews land development projects specific to the project's location in Mountain View – varying areas of the City have varying requirements. North Bayshore is one of Mountain View's specific areas. Developments in the North Bayshore area are required to meet vehicle trip caps which correlate to a 45 percent SOV mode split goal. Mountain View conducts its transportation system monitoring through vehicle trip caps, ridesharing vehicle parking usage, and an employee mode share survey.

The City of Mountain View transportation work is divided between several departments – the Planning Department is within the Community Development Department, while the Roads and Transportation and Land Development Departments are within the Public Works Department.

Alexandria, Virginia

Alexandria's land development projects use ITE trip generation and LOS to identify impacts. For developments adding 50 or more peak hour trips, a transportation study including an inventory of parking, transit, pedestrian, and vehicles is required. Alexandria monitors its transportation system through a Livability Survey (conducted annually, starting in 2016), their Transportation Management Program, tracking traffic crashes, infrastructure work completed, Capital Bikeshare rides, MetroRail trips, DASH (shuttle) trips, and King Street Trolley trips. It is also notable that Alexandria has a relatively high transit mode split – this can likely be attributed to the City's robust transit system that provides connection to nearby job centers in the Washington D.C. and Northern Virginia region.

Transportation work in the City of Alexandria is carried out by the Transportation & Environmental Service Department, within which is the Transit Services Department, Transportation Planning Department, and the Traffic Engineering Department.