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Where Are We Starting From (Existing Conditions)

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

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

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



Source: American Community Survey 2011-2015

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

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

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

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

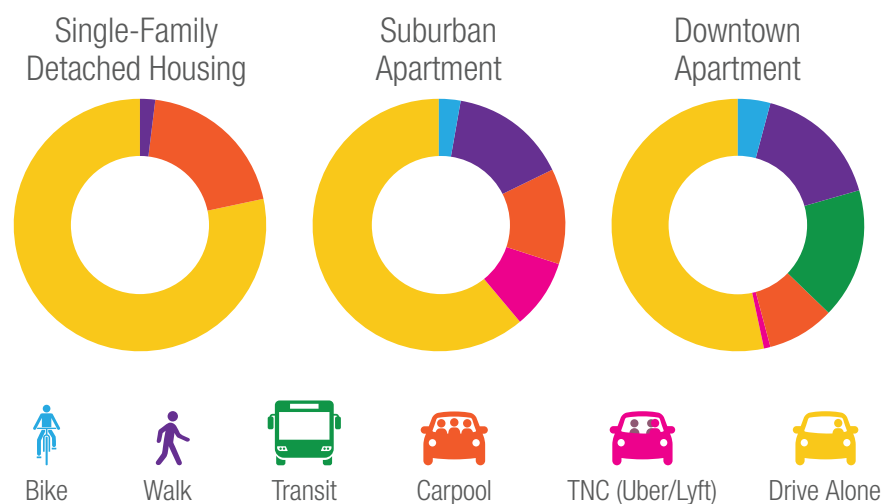
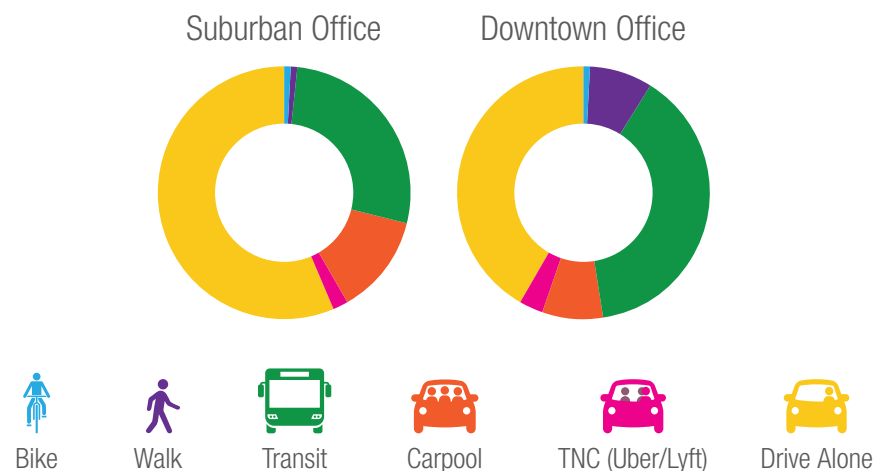


Figure 2: Mode Split Counts of Redwood City Office Developments



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

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

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

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

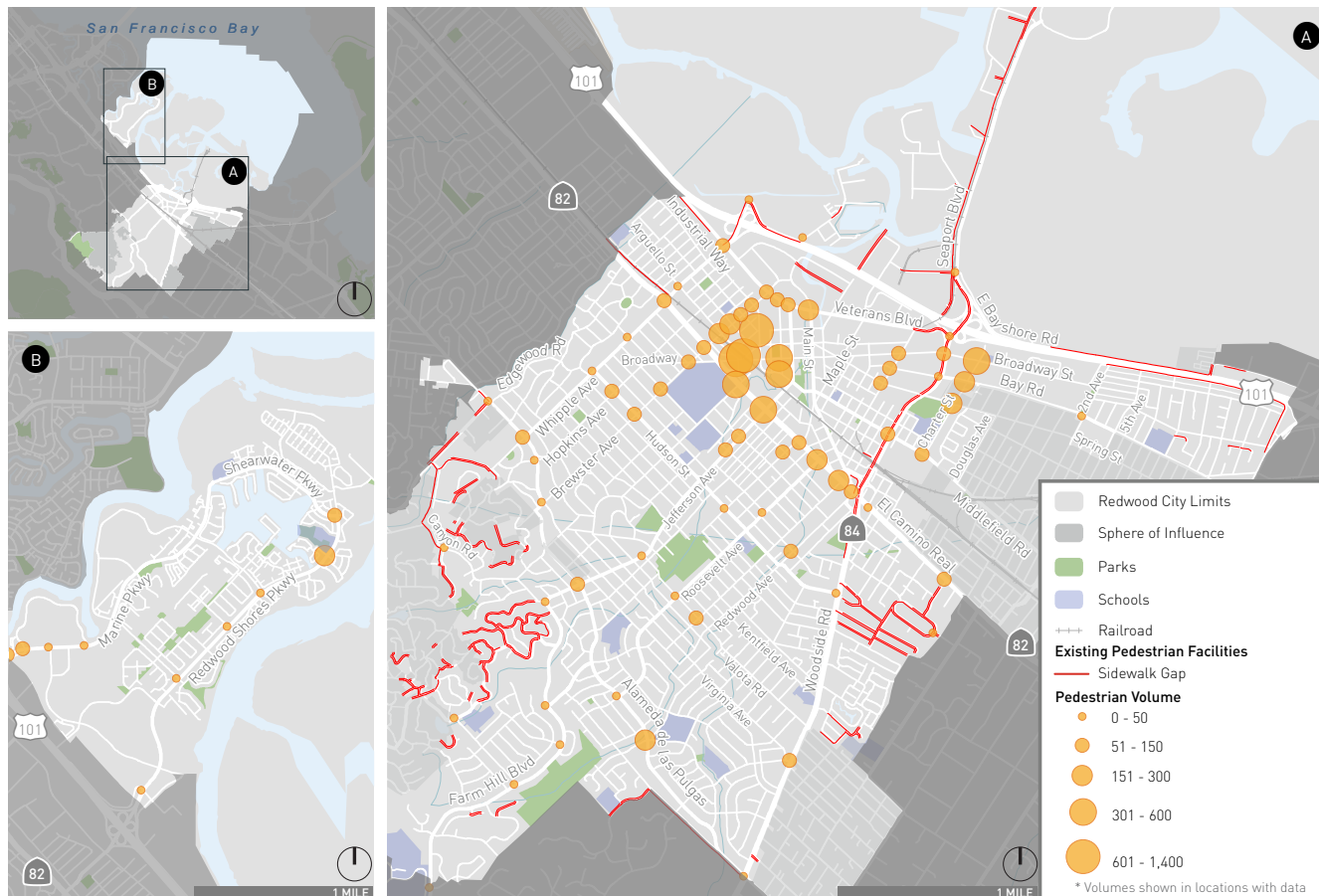
Walking in Redwood City

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

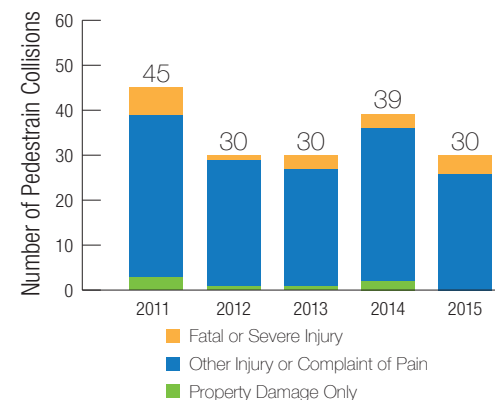
Though Redwood City has a fairly robust sidewalk network, there are opportunities to improve the walking experience, in terms of comfort, convenience, and safety. Potential opportunities to support walking in the City include enhancing crosswalk treatments near schools, in Downtown Redwood City, and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

SUMMARY FACT SHEET: Walking in Redwood City

Figure 3: Walking in Redwood City



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



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



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



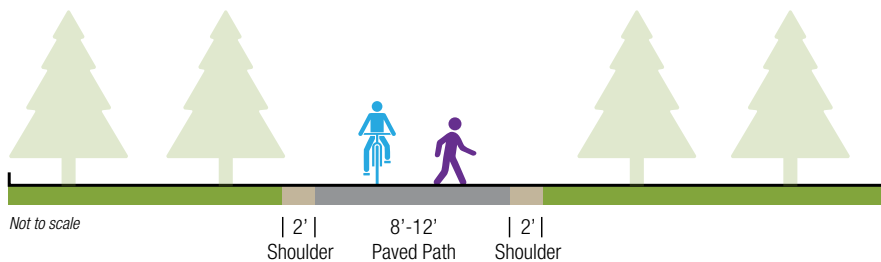
A **key solution** identified through analysis of existing conditions is to enhance pedestrian crossings

Bicycling in Redwood City

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

SHARED-USE PATH (CLASS I)

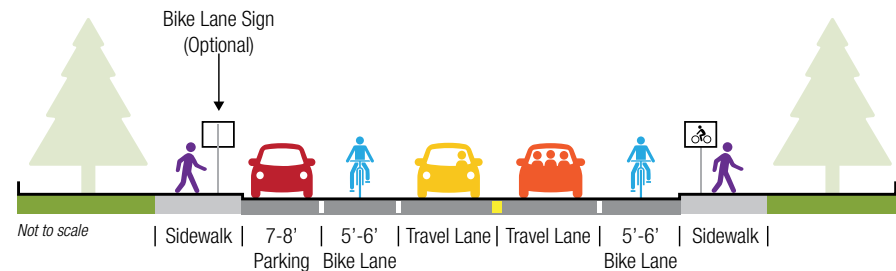
Completely separated right-of-way for exclusive use of bicycles and pedestrians



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

BICYCLE LANE (CLASS II)

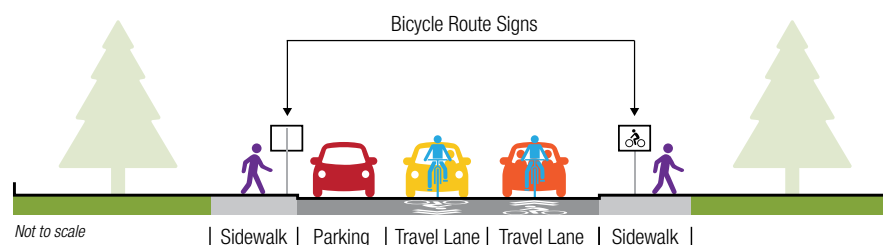
On-street striped lane for one-way bike travel



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

BICYCLE ROUTE (CLASS III)

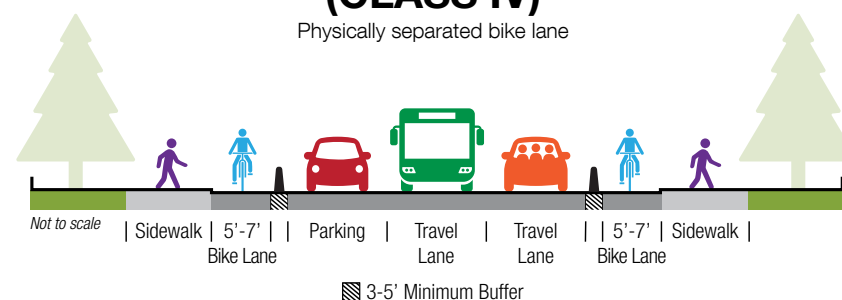
Shared on-street facility



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

CYCLE TRACK/SEPARATED BIKEWAY (CLASS IV)

Physically separated bike lane



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

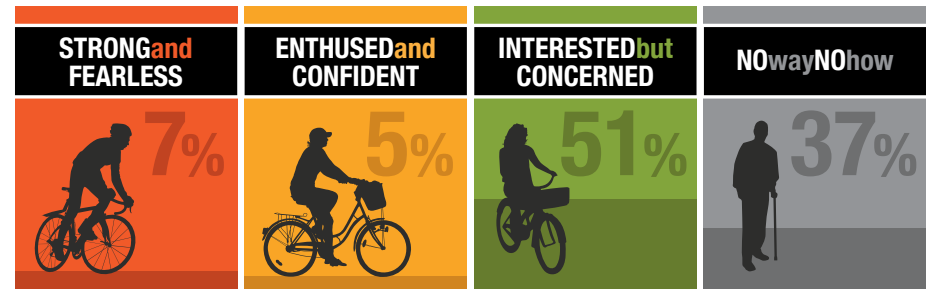
Types of Bicyclists

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

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

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

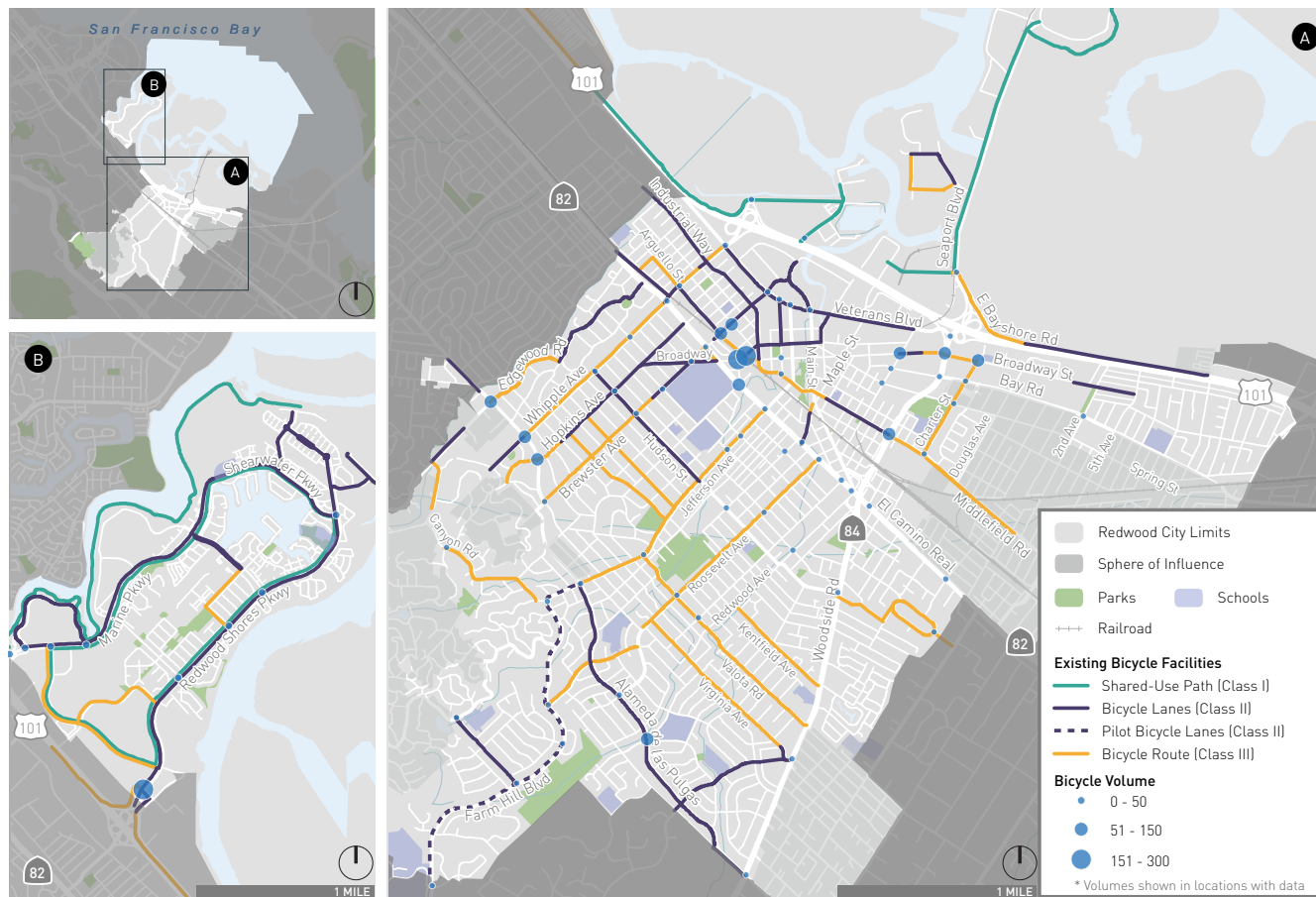
THE FOUR TYPES OF BICYCLISTS



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

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

Figure 4: Biking in Redwood City



2% of residents bike to work today



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



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



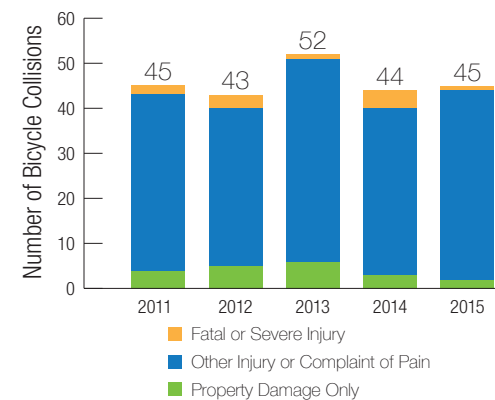
Over 15% of survey respondents stated they would be interested in biking to work if better facilities were available



5% of all collisions in RWC involve bicyclists



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



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



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



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



Using Transit in Redwood City

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

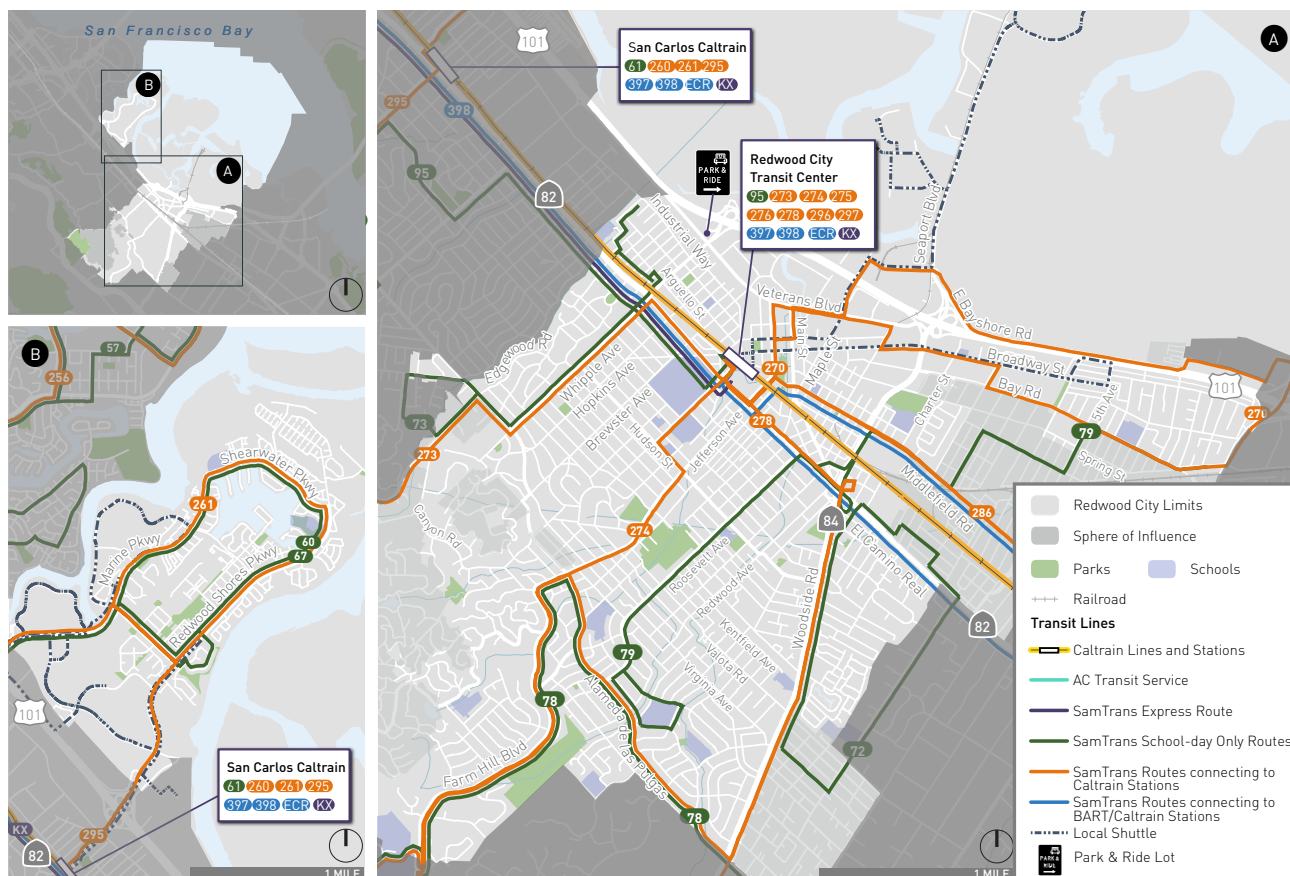
In addition to public bus and rail transit, a local shuttle network provides service from Caltrain to employment centers around Redwood City. A senior shuttle provides seniors with transport through the Veterans Memorial Senior Center from Casa de Redwood, Redwood Plaza Village, and seniors’

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

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

SUMMARY FACT SHEET: Using Transit in Redwood City

Figure 5: Using Transit in Redwood City



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



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



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



5% of residents take transit to work today



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



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



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



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



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



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

DAILY CALTRAIN RIDERS IN RWC



POPULATION GROWTH





Driving in Redwood City

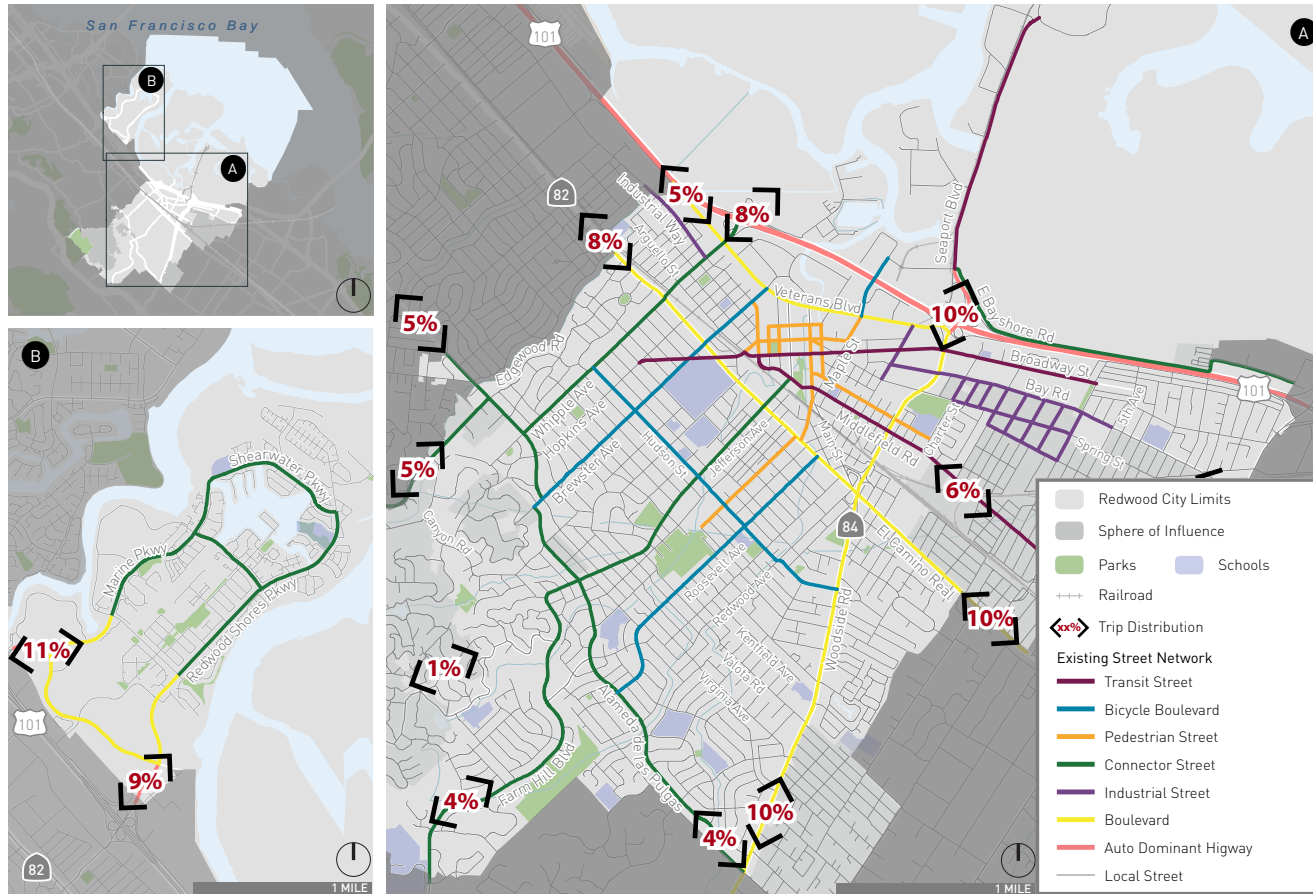
Redwood City has a street network that provides local and regional roadway connections. Streets are classified as transit streets, bicycle boulevards, pedestrian streets, connector streets, industrial streets, boulevards, auto dominated highways, and local streets in the General Plan. Although some of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

Vehicle Circulation, Congestion and Cut-Through Traffic

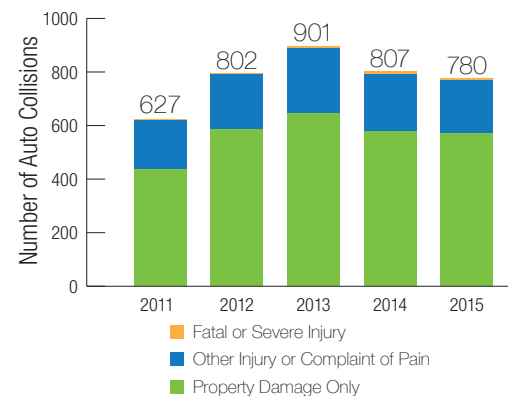
As traffic volumes have increased in the City, so has traffic congestion. Major corridors in the City, including Woodside Road and El Camino Real, regularly experience traffic congestion during weekday peaks. While some congestion is the result of local trips, there are also major regional traffic patterns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

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

Figure 6: Driving in Redwood City



- 73%** of residents drive alone and **10%** of residents carpool to work today
- Some downtown RWC roads have traffic slowdowns in the AM and PM peak hours
- RWC mitigates neighborhood cut-through traffic by actively responding to requests and prioritizing **traffic calming measures**
- Downtown parking supply is able to successfully accommodate the **parking demand** generated by use of downtown business & amenities
- Auto-only collisions make up **over 90%** of all RWC collisions
- Less than 1%** of auto-only collisions resulted in a severe injury or death
- Almost 80%** of RWC auto-only collisions result in property damage only



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



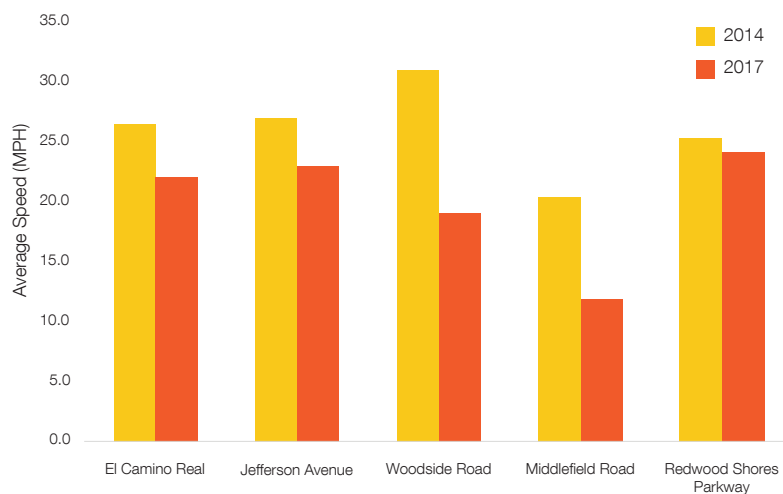
Key issues identified through community outreach are increased congestion and high vehicle speeds along residential streets



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



Figure 7: Average Vehicle Speed



Congestion Trends

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

Parking

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

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

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

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



Advancing Technologies

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

Transportation Network Companies (TNCs)

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



Robot Delivery

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

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

Automated Vehicles (AVs)

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

