

# SOUTH PALO ALTO BIKE/PED CONNECTIVITY EXISTING CONDITIONS REPORT

April 2, 2025  
(Updated April 22, 2025)



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# South Palo Alto Bike/Ped Connectivity Existing Conditions Report

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**City of Palo Alto**

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Project Number 30555

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# Section 1

## Introduction

# Introduction

The City of Palo Alto is conducting the South Palo Alto Bike/Ped Connectivity Project (“Project”) to assess ways to improve bicycle and pedestrian access across the rail corridor in the southern portion of the City. The purpose of this Project is to develop community-supported locations and design concepts for two new grade-separated bicycle and pedestrian crossings of the Caltrain corridor and Alma Street in south Palo Alto (i.e., south of Oregon Expressway/Page Mill Road). The Project will also identify context-sensitive bicycle and pedestrian enhancements that link the proposed grade-separated crossing sites to the existing/future bicycle and pedestrian networks within the neighborhoods adjacent to the railroad tracks. The Project will engage the community to select preferred crossing locations, designs, and network improvements, and develop an implementation plan and funding strategy for future construction.

This Project is initiating the Project Identification, Project Initiation and Conceptual Planning phases of the *Caltrain Corridor Crossings Delivery Guide (2024)*<sup>1</sup>, during which alternatives will be developed and refined based on feedback from the community. The goal is to complete 15 percent of designs for two locally preferred alternatives, develop an implementation plan and funding strategy, and secure funding for Preliminary Design, Final Design and Construction phases.

This Existing Conditions Report establishes a detailed baseline condition for the Project using a combination of quantitative and qualitative data from various sources. The technical information presented in this Report will be used to identify opportunities, inform design options, and evaluate alternatives for potential grade-separated bicycle and pedestrian crossings of the rail corridor in south Palo Alto.

## SIGNIFICANCE OF THE PROJECT

Located along the San Francisco Peninsula within Santa Clara County, south Palo Alto is generally defined as the area within the City of Palo Alto limits south of Oregon Expressway/Page Mill Road. It is adjacent to the cities of Mountain View and Los Altos and is well-connected to the greater Bay Area through US Route 101, El Camino Real, and Caltrain’s Peninsula Corridor. This location places south Palo Alto at the heart of a major innovation and technology hub, with easy access to Stanford University, downtown Palo Alto, and major employment centers in Silicon Valley. As of the 2020 Census, the south Palo Alto area has a population of approximately 36,600 residents, which represents around 54% of the City of Palo Alto’s total residential population of approximately 69,000.<sup>2</sup>

The Caltrain corridor runs north-south parallel to Alma Street through the City of Palo Alto and serves as a vital transportation mode for the Bay Area. However, the rail line also creates a physical divide and barrier for east-west travel by all modes within the community. Currently, there are two at-grade crossings for pedestrians and cyclists in the southern portion of the City at Charleston Road and Meadow Drive. There is also the California Avenue Bike/Ped Tunnel located to the north of Oregon Expressway/Page Mill Road and San Antonio Caltrain Station Bike/Ped Underpass (near Mayfield Avenue) located to the south in the

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<sup>1</sup> Caltrain Corridor Crossings Delivery Guide (2024): <https://www.caltrain.com/media/34937>

<sup>2</sup> This represents the southern Palo Alto area which is bigger than the Study Area discussed in the later sections.

City of Mountain View. The Oregon Expressway/Page Mill Road undercrossing and San Antonio Road overcrossing do not contain dedicated bike or pedestrian facilities. Distances between existing bike and pedestrian crossings of the Caltrain corridor in south Palo Alto are as follows:

- 1.3 mile between the California Avenue Bike/Ped Tunnel and Meadow Drive;
- 0.3 mile between Meadow Drive and Charleston Road; and
- 0.8 mile between Charleston Road and the San Antonio Caltrain Station Bike/Ped Underpass.

The *City of Palo Alto Comprehensive Plan 2030* (2022), *City of Palo Alto 2012 Bicycle and Pedestrian Transportation Plan* (“BPTP”) (2012), and *Palo Alto Rail Corridor Study* (2013) have identified a critical need for additional grade-separated bicycle and pedestrian crossings, particularly in the southern portion of the City. This Project seeks to advance previously identified needs of the community and will identify locations and design concepts where two new grade-separated bicycle and pedestrian pathways across the Caltrain railroad tracks may be constructed in south Palo Alto. Creating a path above or below the tracks will improve bicycle and pedestrian connectivity in support of the mobility and sustainability goals of the City.

The City is in the process of updating the Bicycle and Pedestrian Transportation Plan (“BPTP Update”), which began in 2023 and will be finalized by the end of 2025. The BPTP Update addresses the citywide bicycle and pedestrian network, including in the southern portions of Palo Alto. This Project will implement recommendations of the current BPTP and will advance designs and provide connections to the citywide bike and pedestrian network to be identified in the BPTP Update. As a result, this Project is being completed in close collaboration with the ongoing BPTP Update.

The City of Palo Alto has also been actively pursuing rail grade separation projects to separate the Caltrain railroad tracks from vehicles, bikes, and pedestrians at three major crossings: Churchill Avenue, Meadow Drive, and Charleston Road.<sup>3</sup> It’s important to note that the Project will focus on locations and design concepts for two new grade-separated bicycle and pedestrian crossings, which are in addition to the rail grade separation projects at Meadow Drive and Charleston Road.

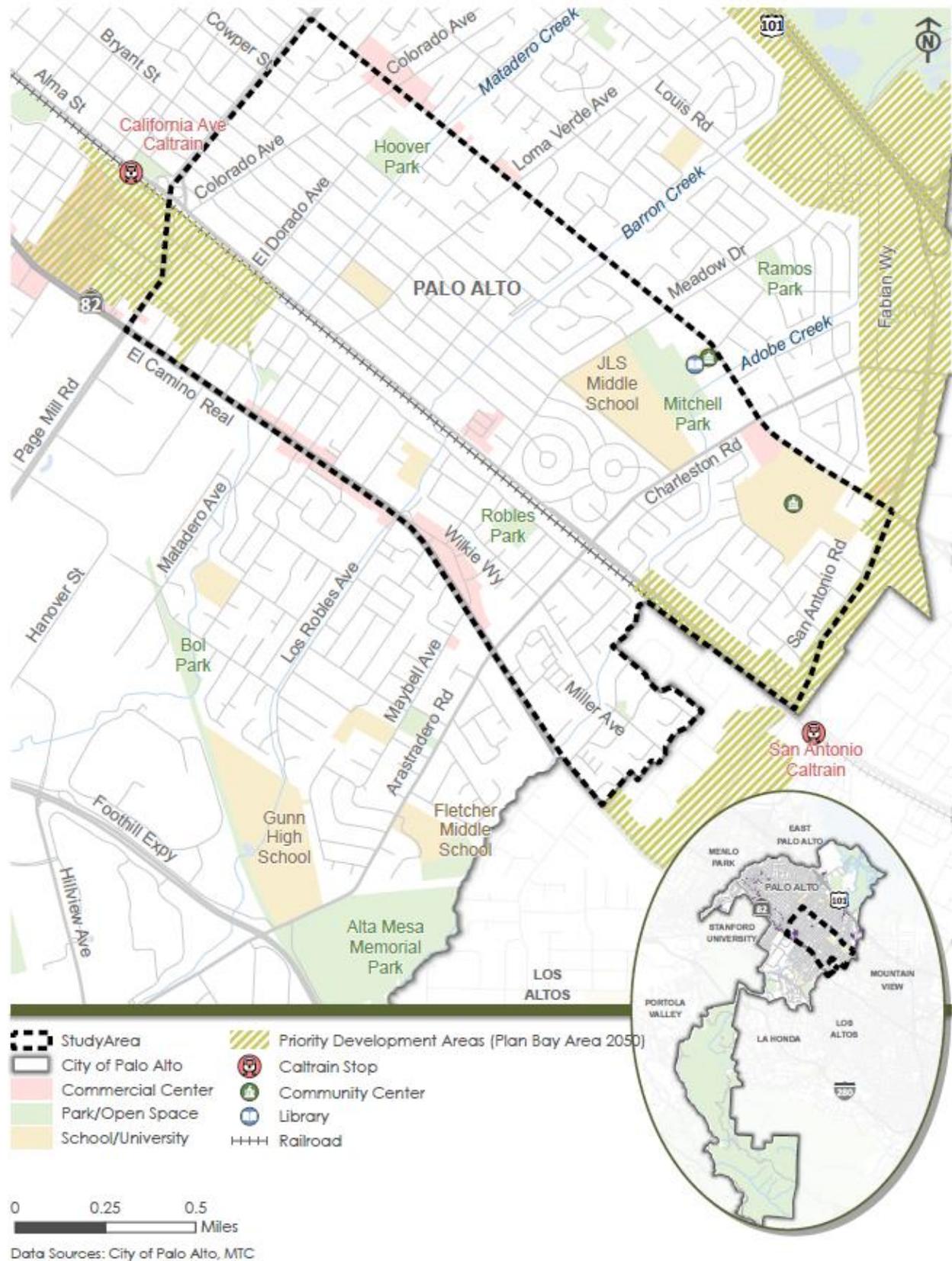
## STUDY AREA

Figure 1 shows the Study Area limits as well as the surrounding area, roadway network, and points of interest. The Study Area extends between Oregon Expressway/Page Mill Road to the north, San Antonio Road to the south, Middlefield Road to the east, and El Camino Real to the west. While the Project focuses primarily on selecting preferred rail crossing locations and developing design concepts, the Study Area extends beyond the Caltrain corridor to assess the bike and pedestrian connections to/from the future railroad crossings. Data from outside the Study Area has been incorporated into the existing conditions review in recognition that future railroad crossings have the potential to impact travel citywide.

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<sup>3</sup> Connecting Palo Alto. For more information, visit: <https://connectingpaloalto.com/>

Figure 1: Study Area



## LOCAL DESTINATIONS

The Study Area includes a variety of destinations such as parks, community centers, libraries, bus lines, residential areas, shopping centers, after-school destinations, and schools that may be served by additional rail crossings. Key destinations within the Study Area include, but are not limited to, Mitchell Park, Robles Park, Hoover Park, Cubberley Community Center, El Carmelo Elementary School, Jane L. Stanford Middle School, and Herbert Hoover Elementary School. Other major destinations outside the Study Area include Stanford University, Stanford Research Park, downtown and commercial corridors, and Caltrain stations. These destinations are described in the following sections.

### PARKS, COMMUNITY CENTERS, AND LIBRARIES

The Study Area includes several parks, community centers, and libraries that provide recreational spaces, cultural programs, and public services for residents. These facilities serve as key destinations for families, students, and community members, many of whom rely on walking or biking.

#### Mitchell Park Library and Community Center

Located along Middlefield Road, Mitchell Park is one of the largest community parks in south Palo Alto. It offers multiple recreational facilities, including sports fields, playgrounds, picnic areas, and a dog park. It serves as a central gathering space with public library services, meeting rooms, and community programs. Mitchell Park Library and Community Center are located approximately 2,000 feet east of the Caltrain corridor, and many community members walk or bike to access it.

#### Robles Park

Robles Park is located approximately 200 feet west of the Caltrain corridor. It is a neighborhood park that offers open green space, a playground, and picnic areas. The park serves as a popular destination for families and is used for outdoor activities and community gatherings.

#### Hoover Park

Adjacent to residential neighborhoods, Hoover Park is a recreational facility that features sports fields, tennis courts, and a playground. The park is a key destination for organized sports, casual recreation, and social gatherings, supporting an active lifestyle for the surrounding community. It is located approximately 2,500 feet east of the Caltrain corridor.

#### Cubberley Community Center

Located near Middlefield Road, Cubberley Community Center serves as a key public facility offering a wide range of recreational, educational, and cultural programs. The center houses community meeting spaces, art studios, and athletic facilities, making it a vital resource for residents. It is a frequent destination for pedestrians and cyclists in the Study Area. It is located approximately 1,700 feet east of the Caltrain corridor.

#### Ventura Community Center

Located at 3990 Ventura Court, Ventura Community Center Park is a key recreational space in Palo Alto's Ventura neighborhood. The park was renovated with new play structures, accessible swings, improved irrigation, and a fenced community garden. The community center serves as the

headquarters for the Palo Alto Community Child Care (PACCC) and the Sojourner Truth Infant-Toddler Program. The centrality of the community center attracts many neighborhood locals, who take advantage of the park's amenities throughout the day.

## SCHOOLS

There are many schools surrounding the Study Area that generate significant bicycle and pedestrian activity. Many students, faculty and staff rely on active transportation and transit options to access these schools:

### Henry M. Gunn High School

Henry M. Gunn High School is located along Arastradero Road. It is approximately 1.3 miles from the Caltrain corridor. For the period between 2019 and 2024, approximately 68% of the students used green transportation (walk, bike scooter, bus, or carpool) to commute to school, while the remaining students used family cars.

### Jane L. Stanford Middle School

Jane L. Stanford (JLS) Middle School is one of the largest middle schools in Palo Alto. It is located along East Meadow Drive, approximately 1,700 feet from the Caltrain corridor. For the period between 2019 and 2024, approximately 75% of the students used green transportation to commute to school, while the remaining students used family cars.

### El Carmelo Elementary School

Located along Bryant Street near Loma Verde Avenue, El Carmelo Elementary School serves as a key educational institution within the Study Area. The school is approximately 900 feet from the Caltrain corridor and is surrounded by residential neighborhoods. For the period between 2019 and 2024, approximately 60% of the students used green transportation to commute to school, while the remaining students used family cars.

### Herbert Hoover Elementary School

Located along East Charleston Road, Herbert Hoover Elementary School is a neighborhood school serving families in south Palo Alto. The school is surrounded by residential areas, with many students walking or biking daily. It is located approximately 1,700 feet from the Caltrain corridor. For the period between 2019 and 2024, approximately 34% of the students used green transportation to commute to school, while the remaining students used family cars.<sup>4</sup>

### Other Nearby Schools

There are other schools surrounding the Study Area that generate significant bicycle and pedestrian activity. Many students, faculty and staff rely on active transportation and transit options to access these schools as well. The Study Area is surrounded by multiple elementary and middle schools, including Keys School – Elementary Campus, Keys School – Middle Campus, Challenger School, Imagination Lab School, and Athena Academy. Additionally, several preschools in the vicinity

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<sup>4</sup> Office of Transportation, Safe Routes to School. For more information, visit:  
<https://www.cityofpaloalto.org/Departments/Transportation/Safe-Routes-to-School>

provide early childhood education and contribute to local pedestrian activity, including Edgewood House Preschool, Learning Links Preschool, Children's Preschool Center, Acme Children's Center, Mi Casita de Espanol Preschool, Ellen Thacher Children's Center, Heffalump School, and Sojourner Truth Child Development Center.

## STANFORD UNIVERSITY

Stanford University, located northwest of the Study Area, is a private research university and a major educational and employment hub. The university attracts students, faculty, staff, and visitors from across the region, influencing transportation patterns and economic activity within the Study Area. Its presence contributes to the high level of pedestrian and bicycle traffic in nearby communities.

## STANFORD RESEARCH PARK

Located west of the Study Area, Stanford Research Park is a major employment center that hosts numerous technology and research firms. The park spans 700 acres and is home to over 150 companies, including those in biotechnology, clean energy, and information technology. It influences travel patterns within the Study Area, as many employees rely on bicycle and pedestrian infrastructure to access transit and surrounding neighborhoods.

## COMMERCIAL CORRIDORS SURROUNDING THE STUDY AREA

Several major arterials in south Palo Alto serve as commercial corridors that provide essential services, retail, and dining options for residents, employees, and visitors. El Camino Real is a key corridor with a mix of shopping centers, restaurants, and office spaces, attracting both local and regional traffic. As a high-volume roadway, it presents challenges for bicycle and pedestrian accessibility. San Antonio Road, another significant corridor, connects Palo Alto with Mountain View and features a range of commercial establishments, including grocery stores, retail centers, and business offices. Middlefield Road functions as a neighborhood-serving corridor with small businesses, cafés, and essential services that cater to nearby residents. These commercial areas are important destinations that generate pedestrian and bicycle activity in the Study Area.

## DOWNTOWN PALO ALTO AND CALIFORNIA AVENUE BUSINESS DISTRICT

While located outside of south Palo Alto, Downtown Palo Alto and the California Avenue Business District serve as major commercial and employment centers within the City. They provide a mix of retail, restaurants, office spaces, shopping, and professional services.

## CALTRAIN STATIONS

South Palo Alto is served by two Caltrain stations that provide regional transit connections:

### California Avenue Station

Located north of the Study Area, this station serves the California Avenue Business District and provides connections to downtown Palo Alto. It is a frequent destination for pedestrians and bicyclists.

## San Antonio Station

Located near the southern boundary of the Study Area, this station provides access to major commercial and residential developments in Palo Alto and Mountain View. It is a key transit hub for local and regional commuters.

## BUS TRANSIT LINES

The Study Area is served by several bus routes that provide connectivity to key destinations. Key routes operating in or near the Study Area include VTA Routes 21, 22, 89, 101, 102, 103, 104, and 522, as well as school shuttle services. Routes 22 and 522 provide frequent all-day service along El Camino Real. Route 89 connects California Avenue Caltrain Station to the Palo Alto VA Hospital. Additionally, a school shuttle service operates within the Study Area, VTA Route 288. Additional details are provided in the Transit Facilities section of this report.

## KEY FINDINGS

Key findings from the remainder of this Existing Conditions Report are summarized below:

- *City of Palo Alto Comprehensive Plan (2022)*, Program T1.19.3 aims to "increase the number of east-west pedestrian and bicycle crossings across Alma Street and the Caltrain corridor, particularly south of Oregon Expressway."
- *City of Palo Alto Bicycle and Pedestrian Transportation Plan (BPTP) (2012)* identifies the 1.3-mile distance between the California Avenue Bike/Ped Tunnel and Meadow Drive as the longest stretch of track barrier in Palo Alto. The Plan recommends a grade-separated pedestrian and bicycle crossing of the Caltrain corridor and Alma Street in the vicinity of Matadero Creek/Park Boulevard or between Margarita Avenue and Loma Verde Avenue.
- *City of Palo Alto Rail Corridor Study (2013)* and *Midtown Connector Feasibility Study (2016)* identify bicycle and pedestrian rail crossing opportunities and potential crossing alignments.
- Approximately 19,700 residents live in the Study Area, representing roughly 29 percent of the City of Palo Alto's total population.
- Key growth areas within the City of Palo Alto include the Midtown and Ventura neighborhoods, San Antonio Road corridor, and along El Camino Real within and near the Study Area.
- Dedicated bicycle and pedestrian crossings of the railroad in and near the Study Area include:
  - California Avenue Bike/Ped Tunnel
  - Meadow Drive
  - Charleston Road
  - San Antonio Caltrain Station Bike/Ped Underpass
- Existing pedestrian facilities are largely continuous in the Study Area and include sidewalks, crosswalks, Pedestrian Hybrid Beacons, and bridges. However, several notable gaps exist in the pedestrian network at certain locations, such as along Alma Street where a sidewalk is only present on the east side. Oregon Expressway/Page Mill Road and the San Antonio Road interchange features a high-speed vehicle environment and limited pedestrian facilities for crossing the tracks.
- Existing bicycle facilities support active travel in the Study Area with key routes providing access across the railroad tracks, including along Meadow Drive and Charleston Avenue. However, there are currently no continuous bike facilities across the railroad tracks on Oregon Expressway and

San Antonio Road. The Study Area includes several low-to-moderate traffic stress level bikeways. However, several notable roadways in the Study Area are considered to have high traffic stress for cyclists, including along Alma Street, Oregon Expressway/Page Mill Road, San Antonio Road, and El Camino Real.

- Several VTA bus routes and two Caltrain stations (California Avenue and San Antonio) provide public transit access to the Study Area.
- The City's Safe Routes to School (SRTS) program offers suggested routes to and from schools within and near the Study Area through Walk and Roll Maps.
- Several notable on-going and upcoming transportation improvement projects in the Study Area include the rail grade separation projects for vehicles, bicyclists, and pedestrians at Meadow Drive and Charleston Road, and the El Camino Real bikeway currently being installed by Caltrans in Palo Alto, Mountain View and Los Altos.
- Around 59% of workers living in the Study Area commute by car (drive-alone and carpool combined), which is more than 56% of total residents citywide that commute by car.
- On weekdays, pedestrian activity is highest in the afternoon hours between 3 PM and 6 PM. On weekends, pedestrian activity is more variable, with the highest activity levels in the morning and early afternoon. On weekdays, bicycle activity peaks during the morning and afternoon peak periods (7-9 AM and 4-6 PM), with a jump in activity around 8 AM on Meadow Drive westbound. On weekends, bicycle activity remains relatively steady throughout the day. Similar to pedestrian activity, there is higher bicycle activity on Meadow Drive than Charleston Road.
- Pedestrians using the existing rail crossings in and near the Study Area must travel further to access destinations near Park Boulevard, Margarita Avenue and Loma Verde Avenue.
- Bicyclists using existing rail crossings in and near the Study Area are generally able to travel anywhere throughout the Study Area in less than 30 minutes (round trip).
- Approximately 30% of all trips using the existing rail crossing in and near the Study Area are less than five miles in length.
- Origins and destinations of shorter distance trips (under five miles) for all travel modes currently using the existing rail crossings in and near the Study Area are more concentrated near the California Avenue Caltrain Station, California Avenue, Ventura Neighborhood, and San Antonio Center in Mountain View.
- The Draft Safety Action Plan designates Oregon Expressway, Meadow Drive, Charleston Road, Middlefield Road, and El Camino Real as High-Injury Corridors due to their disproportionately high number of crashes.
- Several creeks flow through the Study Area, classified as a Moderate Risk zone for flooding.

Based on the information presented in this Existing Conditions Report, the following crossing opportunity locations have been identified for further exploration:

- A. Near Colorado Avenue and Page Mill Road
- B. Around Matadero Creek (El Dorado Avenue to Loma Verde Avenue)
- C. Near Barron Creek
- D. Between Meadow Drive and Charleston Road
- E. Near Adobe Creek
- F. Near San Antonio Road

The City plans to gather feedback on these locations to help determine the preferred crossing sites.



## Section 2

### Literature Review

# Literature Review

A review of 35 relevant planning documents, programs, and policies was conducted to understand the current planning context for walking and biking in south Palo Alto as well as prior efforts completed in the Study Area. The detailed literature review is presented in Appendix A, which includes policies and programs, common themes related to needs and challenges, relevant projects and planning studies recommended in prior and ongoing plans, and community feedback and public input.

There is strong alignment in the visions and goals across the documents reviewed, particularly surrounding sustainability, climate action, and enhancing active transportation (people walking and biking) in Palo Alto. This Project aims to build comfortable and convenient connections for people walking and biking across the rail corridor in south Palo Alto.

For instance, the *City of Palo Alto Comprehensive Plan (2022)* establishes long-term policies to enhance mobility, safety, and connectivity while addressing the impacts of rail operations. Key transportation policies focus on pursuing grade separation at rail crossings (Policy T-3.15), maintaining pedestrian and bicycle access at-grade crossings with safety studies (Policy T-3.16), and improving existing crossings for safety and accessibility (Policy T-3.17). The plan also prioritizes Safe Routes to School programs (Policy T-6.4) and supports regional bicycle and pedestrian connectivity projects, such as the Bay Trail and Santa Clara Countywide Bicycle System (Policy T-8.8). This project advances Program T1.19.3 from the Comprehensive Plan, Program T1.19.3 aims to "increase the number of east-west pedestrian and bicycle crossings across Alma Street and the Caltrain corridor, particularly south of Oregon Expressway."

The *Bicycle and Pedestrian Transportation Plan (BPTP) (2012)* proposes a network of bikeways, pedestrian paths, and crossings to close system gaps and promote active transportation. Key recommendations included maintaining and expanding Class I trails, improving substandard Class II bike lanes for safety and visibility, and adding sharrows and signage on Class III shared roadways. The Plan also focuses on enhancing bicycle connections with neighboring jurisdictions, removing unnecessary stop signs on bicycle boulevards, and implementing intersection improvements such as curb extensions, markings, and signalization changes to improve safety for bicyclists and pedestrians. Additionally, it prioritizes across-barrier connections to enhance access to key destinations while addressing implementation challenges. The Plan recommends the City study potential pedestrian and bicycle undercrossing or overcrossing alternatives of the Caltrain corridor and Alma Street in the vicinity of Matadero Creek/Park Boulevard or between Margarita Avenue and Loma Verde Avenue to close a 1.3 mile gap between existing crossings at California Avenue and Meadow Drive, greatly improving east-west connectivity in conjunction with other improvements.

The *Sustainability and Climate Action Plan (S/CAP) (2022)* aligns with these efforts by integrating transportation safety and sustainability goals. Goal T-6 aims to provide a safe environment for all road users, including motorists, pedestrians, and bicyclists, and supports measures such as adult crossing guards at warranted school crossings. While Goal T-8 focuses on influencing regional transportation policies to reduce congestion and greenhouse gas emissions, improve bicycle connections between Palo Alto and neighboring communities in Santa Clara and San Mateo counties, and reduce barriers to bicycling and walking at freeway interchanges, expressway intersections, and railroad grade crossings.

The *City of Palo Alto Rail Corridor Study* (2013) envisions a vibrant, safe, and transit-rich corridor that enhances connectivity between the east and west portions of the City while promoting walkable, bicycle-friendly environments. The study goals include constructing rail improvements in a below-grade trench; ensuring the highest possible safety at all rail crossings and mitigate rail impacts on neighborhoods, public facilities, schools and mixed-use centers; connecting the east and west portions of the City through an improved circulation network that binds the City together in all directions; providing improved access to parks, recreation facilities and schools and assess future needs for these facilities; and ensuring that infrastructure development keeps pace with the City's growth.

The *Midtown Connector Feasibility Study* (2016) evaluates three viable alignments to enhance bicycle and pedestrian connectivity in Palo Alto including the Matadero Creek Shared-Use, the Matadero Creek Pedestrian-Only Path, and the Loma Verde Avenue Class IV Protected Bikeway. The study further explores how a trail facility along Matadero Creek could connect to existing bicycle and pedestrian networks, despite significant barriers such as US 101 and the Caltrain corridor. Potential solutions include utilizing existing and proposed crossings, building a new undercrossing or overcrossing of Alma Street and the Caltrain tracks, or enhancing the current US 101 undercrossing.

The *Caltrain Business Plan* (2022) outlines a strategic vision for the railroad's evolution over the next two decades. Central to this plan is the 2040 Long Range Service Vision, which aims to transform Caltrain into a modern, electrified transit system offering frequent, all-day service. This vision includes infrastructure enhancements, expanded service schedules, and improved access to accommodate a broader range of travelers. The plan also emphasizes organizational growth to effectively deliver major capital projects and expanded operations throughout the corridor.

Additionally, major needs and challenges identified in the literature review are summarized below:

- **Improving Safety and Connectivity:** Addressing east-west bicycle connections, pedestrian and bicycle crossings at major barriers, and optimizing at-grade railroad crossings for safety and accessibility, particularly for students and commuters.
- **Mitigating Congestion and Train Noise Impacts:** Reducing traffic stress and congestion caused by increased train frequencies from Caltrain electrification and future High-Speed Rail integration.
- **Design and Maintenance Challenges:** Balancing 24-hour path access with safety and maintenance, enhancing surface conditions for bicyclists, and addressing operational and state-of-repair needs.
- **Community and Funding Barriers:** Finding community-supported solutions for grade separation while overcoming funding, regulatory, and design hurdles.
- **Behavioral and Security Concerns:** Tackling issues like failure to yield to pedestrians, bicycle theft, and trail safety at night.

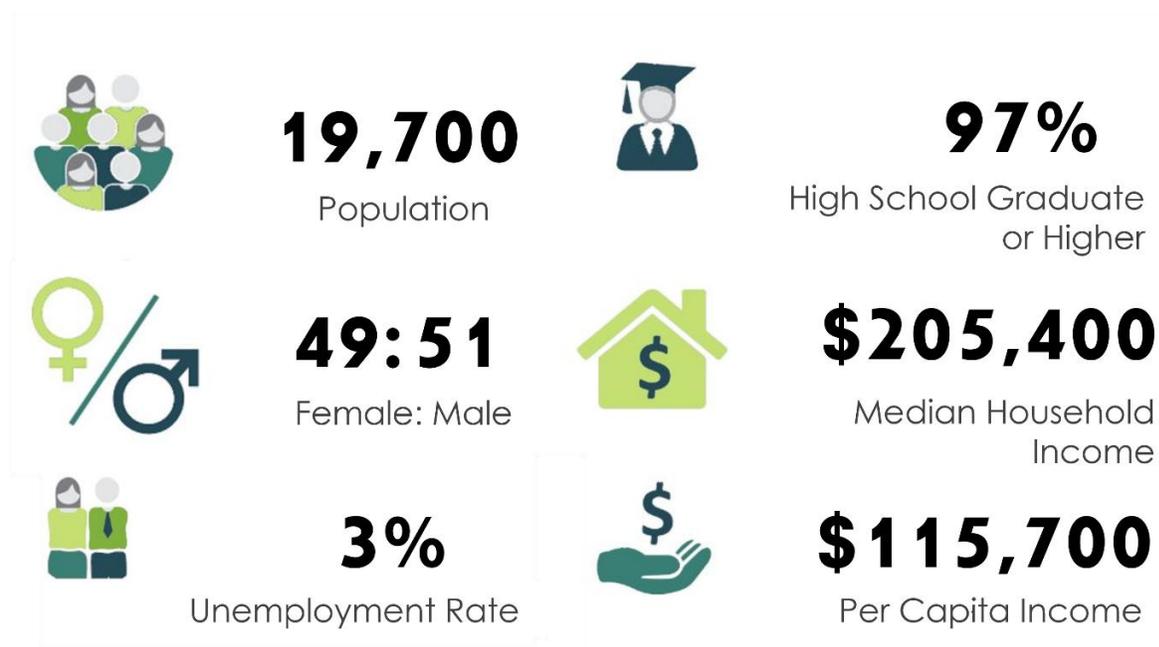


Section 3  
Demographics

# Demographics

The Study Area has a population of about 19,700 according to the American Community Survey (ACS) Year 2022 estimates, representing roughly 29 percent of the City of Palo Alto’s total population.<sup>5</sup> The working age population cohort (ages 20 to 64) represents the largest population segment at 62 percent of the total population. Almost all (97 percent) of the Study Area residents aged 25 years or older have at least a high school diploma. Figure 2 shows key demographic data.

Figure 2: Study Area Key Demographic Data



Source: American Community Survey (ACS) 2022-year estimates

Note: Values are rounded to the nearest 10 or 100. Percentages are rounded to the nearest whole number.

Table 1 presents the racial and ethnic composition of the Study Area. Forty-six percent of the Study Area population is White, around eight percent of the population identify as Hispanic or Latino, forty-one percent Asian, and three percent some other race. Chinese, Asian Indian and Korean constitute the major Asian groups in the City.

Table 2 shows the language spoken at home for the population five years of age and older. Approximately 50 percent of the population exclusively speaks English at home. Asian and Pacific Island languages are spoken by about 28 percent of the population, with around 35 percent of this group not speaking English proficiently. Other Indo-European languages account for 13 percent, of which roughly 12 percent do not speak English very well.

<sup>5</sup> A portion of the Study Area includes Mountain View, and the demographics data includes the portion of Mountain View east of El Camino Real and north of San Antonio Road.

**Table 1: Race and Ethnicity**

Race and Hispanic Origin	Study Area Population	Percentage of Study Area
White	9,100	46%
Black or African American	240	2%
American Indian and Alaska Native	80	1%
Asian	8,000	41%
Asian Indian	1,400	7%
Chinese	5,200	27%
Filipino	190	1%
Japanese	230	1%
Korean	630	3%
Vietnamese	150	1%
Other Asian	250	1%
Native Hawaiian and Other Pacific Islander	0	0%
Two or more races	1,620	8%
Hispanic or Latino (of any race)	1,500	8%
Not Hispanic or Latino	18,200	92%
Total Population	19,700	

Source: U.S. Census Bureau, 2022 ACS 5-Year Estimates, Table DP05

Note: Values are rounded to the nearest 10 or 100. Percentages are rounded to the nearest whole number.

**Table 2: Language Spoken at Home**

Language	Study Area Population	Percentage	Percentage who speak English less than "very well"
Speak only English	9,800	52%	Not Applicable
Speak a language other than English	9,130	48%	29%
Spanish	1,050	5%	32%
Other Indo-European languages	2,500	13%	12%
Asian and Pacific Island languages	5,320	28%	35%
Other languages	280	2%	9%
Total Study Area Population 5 years and over	18,900		14%

Source: U.S. Census Bureau, 2022 ACS 5-Year Estimates, Table S1601

Note: Values are rounded to the nearest 10 or 100. Percentages are rounded to the nearest whole number.

The Metropolitan Transportation Commission (MTC) measures equity including income, race, English proficiency, age, disability, and car-ownership to develop Equity Priority Communities (EPC), or designated Census tracts with a significant concentration of underserved populations. While Palo Alto

does not have designated EPCs, adjacent communities that include Stanford University and Census blocks in Mountain View bounded by Rengstorff Avenue, Crisanto Avenue, Escuela Avenue, and El Camino Real, located 0.7 mile from south of San Antonio Road, are designated as EPCs per Plan Bay Area 2050+. <sup>6</sup> The Study Area includes some Census blocks where between 10%-20% of the population lives below the poverty line. These are located near the Alma Street, East Meadow Drive, and Charleston Road areas. <sup>7</sup>

Disadvantaged Communities (DAC) represent Census tracts that experience high levels of pollution and/or Census tracts that are federally recognized as tribal areas. Similar to EPCs, there are no DACs in the City of Palo Alto.

The California Communities Environmental Health Screening Tool (CalEnviroScreen 4.0) <sup>8</sup> developed by the California Office of Environmental Health Hazard Assessment (OEHHA) to help identify California communities disproportionately burdened by multiple sources of pollution. The tool utilizes existing environmental, health, and socioeconomic data to rank Census tracts based on 20 distinct indicators. It provides an assessment of environmental burdens such as air quality, toxic releases, hazardous waste, and drinking water, as well as health-related burdens including asthma, low birth weight, and cardiovascular disease across Census tracts statewide.

In general, the higher the score, the more impacted a community is by pollution burdens and population vulnerabilities. Designated disadvantaged communities are those communities that scored within the highest 25 percent of Census tracts across California. Census tracts at the 75<sup>th</sup> percentile and above are considered to experience high burdens. For the Study Area, Census tracts located east of Alma Street are below the 10<sup>th</sup> percentile overall, which indicates relatively low cumulative environmental and health impacts. Census tracts west of Alma Street are at the 14<sup>th</sup> percentile overall. For asthma burdens, the Census tracts in the Study Area are at the 5<sup>th</sup> percentile. Table 3 depicts the percentile rankings for the Census tracts within the Study Area. Midtown (Census Tract 5109) percentiles indicate low cumulative environmental and health burdens. It has a pollution burden percentile of 30 and an asthma burden percentile of 3. Similarly, Fairmeadow (Census Tract 5108.02) and South of Midtown (Census Tract 5108.03) also have low CalEnviroScreen percentiles, with pollution burden percentiles of 28 and 7, respectively, and asthma burden percentiles of 5.

In contrast, Ventura (Census Tract 5107) and Charleston Meadows (Census Tract 5094.01) rank in the 14<sup>th</sup> percentile overall, which indicates slightly higher environmental burdens compared to other areas within the Study Area. Ventura has a pollution burden percentile of 50, the highest among the listed Census tracts, while Charleston Meadows has a pollution burden percentile of 33. However, both Census tracts maintain relatively low asthma burdens at 3 and 2 percentiles, respectively.

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<sup>6</sup> Plan Bay Area 2050 Plus: [7aiii 24 1232 Attachment B 2024 Equity Priority Communities Map.pdf](#)

<sup>7</sup> Palo Alto Safety Action Plan: <https://www.cityofpaloalto.org/Departments/Transportation/Transportation-Projects/Safety-Action-Plan>

<sup>8</sup> CalEnviroScreen 4.0: <https://experience.arcgis.com/experience/11d2f52282a54ceebcac7428e6184203/page/CalEnviroScreen-4-0/>

**Table 3: CalEnviroScreen 4.0 Percentile Ranking per Census Tract**

Census Tract	Neighborhood	CalEnviroScreen 4.0 Percentile <sup>1</sup>	Pollution Burden Percentile <sup>2</sup>	Asthma <sup>3</sup>	Traffic Impacts <sup>4</sup>
5109	Midtown	1	30	3	38
5108.03	South of Midtown	6	7	5	24
5108.02	Fairmeadow	4	28	5	55
5107	Ventura	14	50	3	71
5094.01	Charleston Meadows	14	33	2	72

Source: CalEnviroScreen 4.0

1. CalEnviroScreen 4.0 is the latest iteration of the California Communities Environmental Health Screening Tool.
2. Pollution Burden Percentile represents the average of exposure indicators such as pm2.5 and ozone and environmental indicators such as cleanup sites and groundwater threats.
3. Exposure to traffic and outdoor air pollutants, including particulate matter, ozone, and diesel exhaust, can trigger asthma attacks.
4. Traffic impacts represent the vehicles in a specified area, resulting in human exposures to chemicals that are released into the air by vehicle exhaust.

Note: Values represent the percentile ranking of Census tract



## Section 4 Land Use and Population Growth

# Land Use and Population Growth

The Study Area includes several diverse neighborhoods including Ventura, Midtown, St. Claire Gardens, South of Midtown, Greendell, San Alma, Greenmeadow, Walnut Grove, Fairmeadow, Charleston Meadows, and Monroe Park. Land use varies across these areas, with a mix of single-family and multi-family residential, commercial, office, and service uses. Midtown contains the Midtown Shopping Center, Hoover Park, and El Carmelo Elementary School, while Fairmeadow and Greenmeadow near Alma Street are primarily low-density residential with some multi-family units. North Ventura, west of the railroad tracks, features a combination of residential, office, and retail uses, with commercial activity concentrated along El Camino Real, Lambert Avenue, Park Boulevard and Oregon Expressway/Page Mill Road. Office uses are mainly located along Page Mill Road and Park Boulevard, while the area south of Lambert Avenue transitions back to low-density residential and includes Robles Park.

The *City of Palo Alto 2023-2031 Housing Element (2024)*<sup>9</sup> identified several sites within the Study Area for future housing development. Most of these sites are located in the Ventura Neighborhood, San Antonio Road and along the El Camino Real as shown in Figure 3. Figure 4 illustrates the projected population growth approved by the *City of Palo Alto 2023-2031 Housing Element*. Key growth areas include the areas surrounding San Antonio Road, Ventura Neighborhood, and Midtown.

City Council adopted the *North Ventura Coordinated Area Plan (NVCAP)* in 2024 which aims to add to the City's supply of multi-family housing, including market rate, affordable, "missing middle" and senior housing in a walkable, mixed-use, transit-accessible neighborhood, with retail and commercial services.<sup>10</sup>

Furthermore, the City will be conducting the San Antonio Road Area Plan over the next three years, which will establish the goals, policies, and implementation programs for land use, transportation, critical infrastructure, and other improvements to support the increase the capacity for development along San Antonio Road.

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<sup>9</sup> City of Palo Alto *2023-2031 Housing Element (2024)*. Retrieved from <https://paloaltohousingelement.com/wp-content/uploads/2024/08/Palo-Alto-Housing-Element.pdf>

<sup>10</sup> City of Palo Alto *North Ventura Coordinated Area Plan (NVCAP) (2024)*. Retrieved from <https://www.cityofpaloalto.org/Departments/Planning-Development-Services/Housing-Policies-Projects/NVCAP>

Figure 3: Existing Zoning and Future Housing Sites

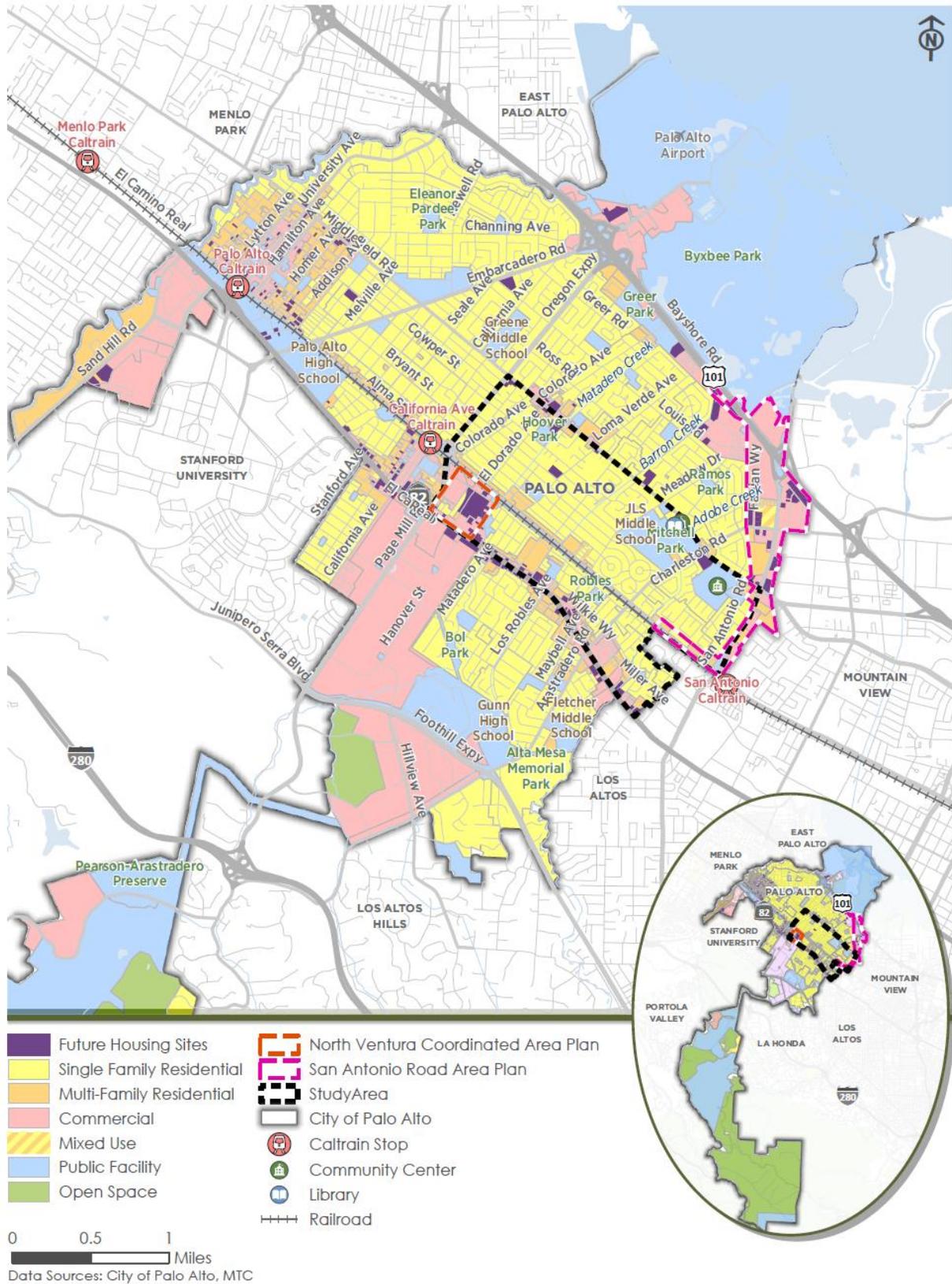
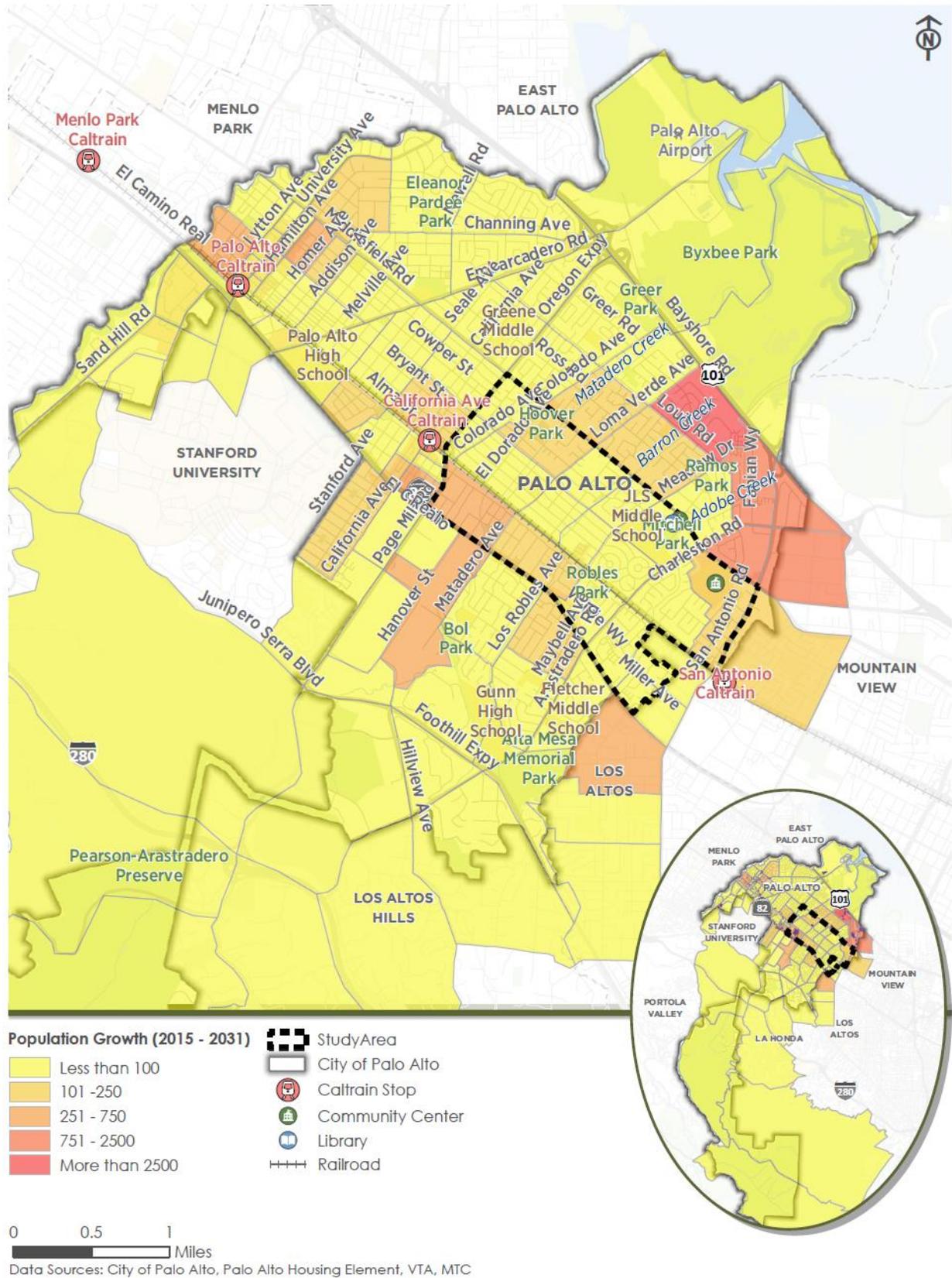


Figure 4: Population Growth





## Section 5 Transportation Network

# Transportation Network

The transportation network within the Study Area consists of roadways, pedestrian facilities, bicycle facilities, and transit facilities, as well as the suggested walk and roll routes from the City's Safe Routes to School Program. Future transportation network improvements relevant to the Study Area are also summarized in this section.

## ROADWAY NETWORK

The Study Area roadway network consists of various street types, each with specific posted speed limits ranging from less than 25 mph to 45 mph. The Study Area includes a mix of signal-controlled intersections, stop-controlled intersections, and Pedestrian Hybrid Beacons<sup>11</sup> for traffic control. Figure 5 and Figure 6 depict the existing roadway network, including speed limits and the number of lanes for both directions, while Figure 7 illustrates the pavement conditions within the Study Area. The pavement conditions within the Study Area are generally good to excellent. However, some segments along local and collector roads show fair to poor conditions, particularly, Loma Verde Avenue east of Alma Street and the local and collector roads surrounding Park Boulevard west of Alma Street.

As documented in the City of Palo Alto Truck Route Map<sup>12</sup>, the Study Area includes a network of designated truck routes that facilitate freight movement while managing impacts on local streets. Alma Street, San Antonio Road, and El Camino Real are designated as through truck routes, which allow continuous truck travel across the City. Oregon Expressway/Page Mill Road is considered a local truck route, which operates between 7:00 AM and 7:00 PM. It has limited-access routes for deliveries and commercial vehicle traffic within the City.

**El Camino Real (State Route 82)** is the western border of the Study Area and runs parallel to the Caltrain rail corridor. The roadway is classified by the *City of Palo Alto Comprehensive Plan 2030 (2022)*<sup>13</sup> (or Comp Plan) as a north-south arterial extending from Interstate 880 (I-880) in San Jose to Interstate 280 (I-280) in San Francisco. Within the Study Area, it runs from Embarcadero Road to Oregon Expressway/Page Mill Road and features a six-lane cross-section. The posted speed limit along El Camino Real ranges from 25 to 40 mph, with a 35-mph speed limit within the Study Area.

**Middlefield Road** runs parallel to the Caltrain rail corridor. The roadway is classified by the City's Comp Plan as a north-south residential arterial. It extends from San Antonio Road in Palo Alto to Veterans Boulevard in Redwood City. It is primarily a four-lane undivided roadway with a posted speed limit of 25 mph.

**Alma Street** is classified by the City's Comp Plan as a north-south arterial which extends from the San Antonio Road at the border of Mountain View (where it changes name to Central Expressway in Mountain View) to Palo Alto Avenue at the border of Menlo Park. Alma Street is primarily a four-lane undivided

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<sup>11</sup>Pedestrian Hybrid Beacon (PHB) is a traffic control device designed to help pedestrians safely cross higher-speed roadways

<sup>12</sup> City of Palo Alto Truck Route Map: <https://www.cityofpaloalto.org/files/assets/public/v/2/transportation/wide-load-permits/truck-route-map-city-of-palo-alto.pdf>

<sup>13</sup> City of Palo Alto Comprehensive Plan 2030 (2022): [https://www.cityofpaloalto.org/files/assets/public/v/4/planning-amp-development-services/3.-comprehensive-plan/comprehensive-plan/full-comp-plan-2030\\_with-dec19\\_22-amendments.pdf](https://www.cityofpaloalto.org/files/assets/public/v/4/planning-amp-development-services/3.-comprehensive-plan/comprehensive-plan/full-comp-plan-2030_with-dec19_22-amendments.pdf)

roadway with the speed limit within the Study Area ranging from 25-35 mph. Alma Street also runs adjacent and parallel to Caltrain's right-of-way.

**San Antonio Road** serves as a key connection between Mountain View and Los Altos. It forms the southern border of the Study Area. The roadway is classified by the City's Comp Plan as an east-west arterial which extends from US 101 in Palo Alto to Foothill Expressway in Los Altos. It features a four-lane cross-section throughout the Study Area.

**Oregon Expressway/Page Mill Road** is classified by the City's Comp Plan as an east-west expressway that runs from Middlefield Road and El Camino Real within the Study Area. This expressway also connects residents to US 101 in the east and I-280 in the west. Oregon Expressway/Page Mill Road is a four-lane divided roadway with a posted speed limit of 35 mph. Oregon Expressway/Page Mill Road is currently a grade-separated crossing primarily for vehicles.

**Meadow Drive** is classified by the City's Comp Plan as an east-west local/collector which runs from Fabian Way to El Camino Way and features a two-lane cross-section throughout the Study Area.

**Charleston Road** is classified by the City's Comp Plan as a residential arterial from El Camino Real to Fabian Way and as an arterial from Fabian Way to U.S. 101. Charleston Road features a four-lane cross-section from El Camino Real to Wright Place, transitioning to a two-lane cross-section from Wright Place to U.S. 101. The posted speed limit along Charleston Road within the Study Area is 25 miles per hour.

Figure 5. Existing Roadway Network Speed Limits

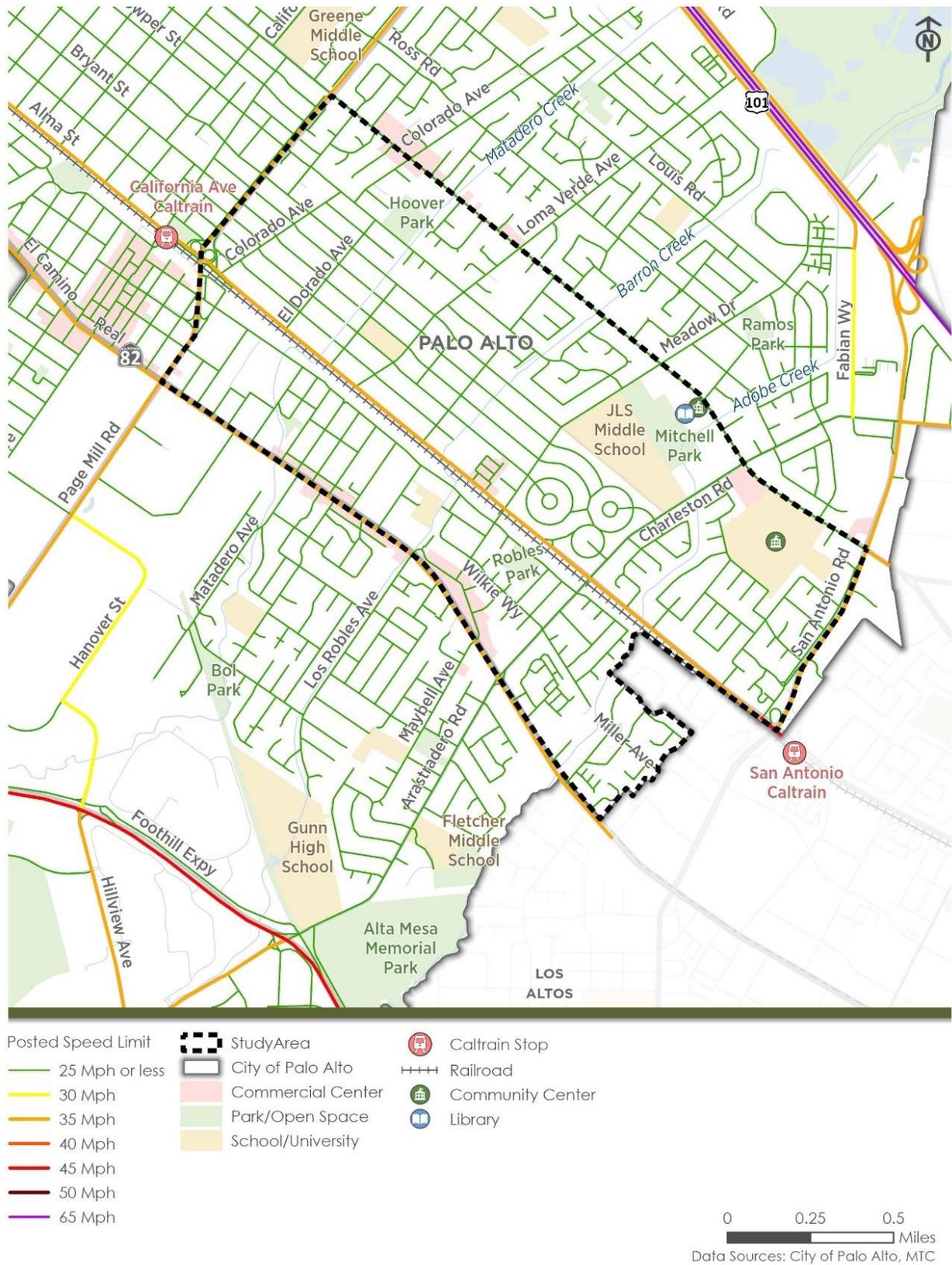


Figure 6. Existing Roadway Network Number of Lanes (Both Directions)

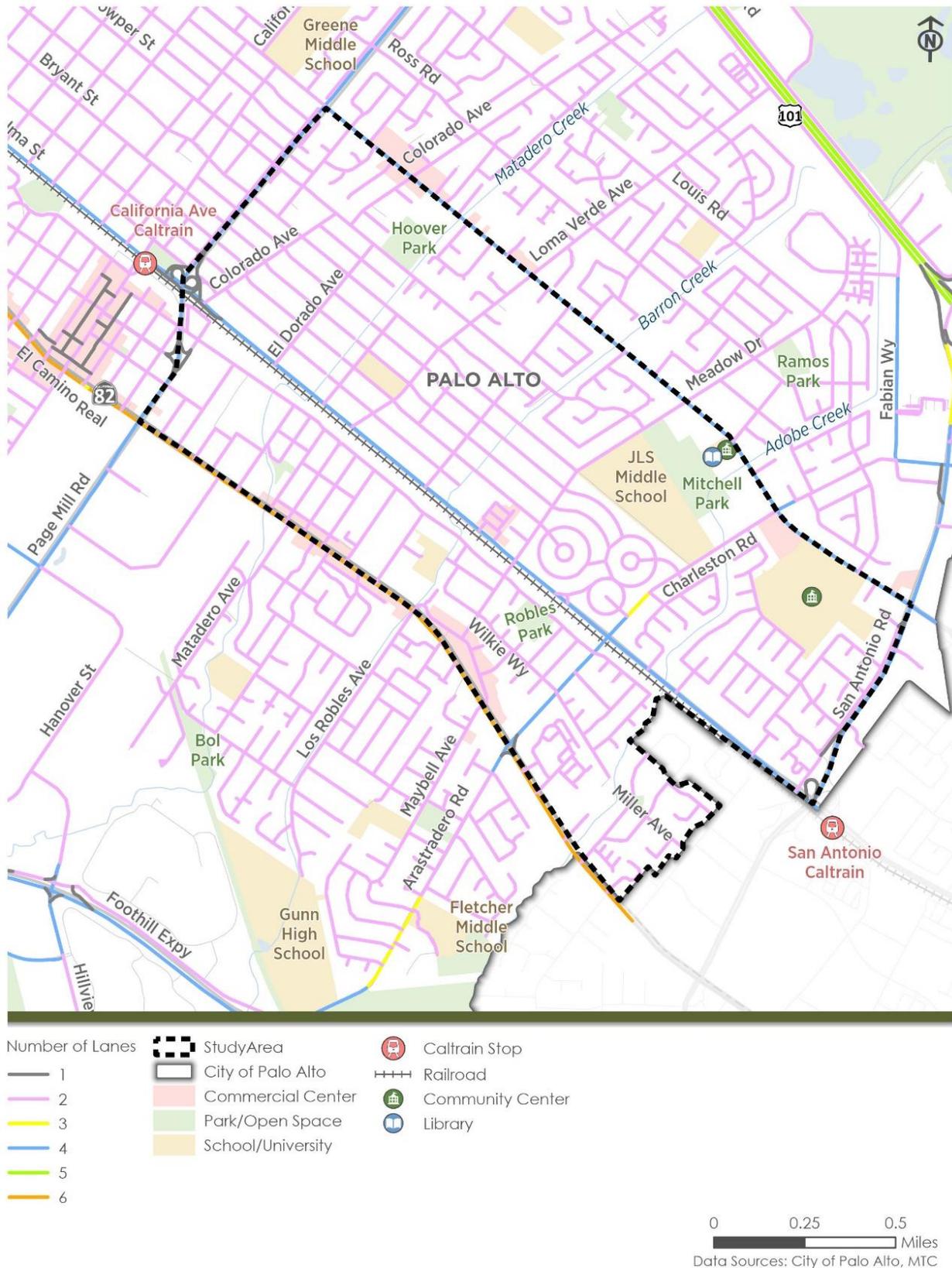
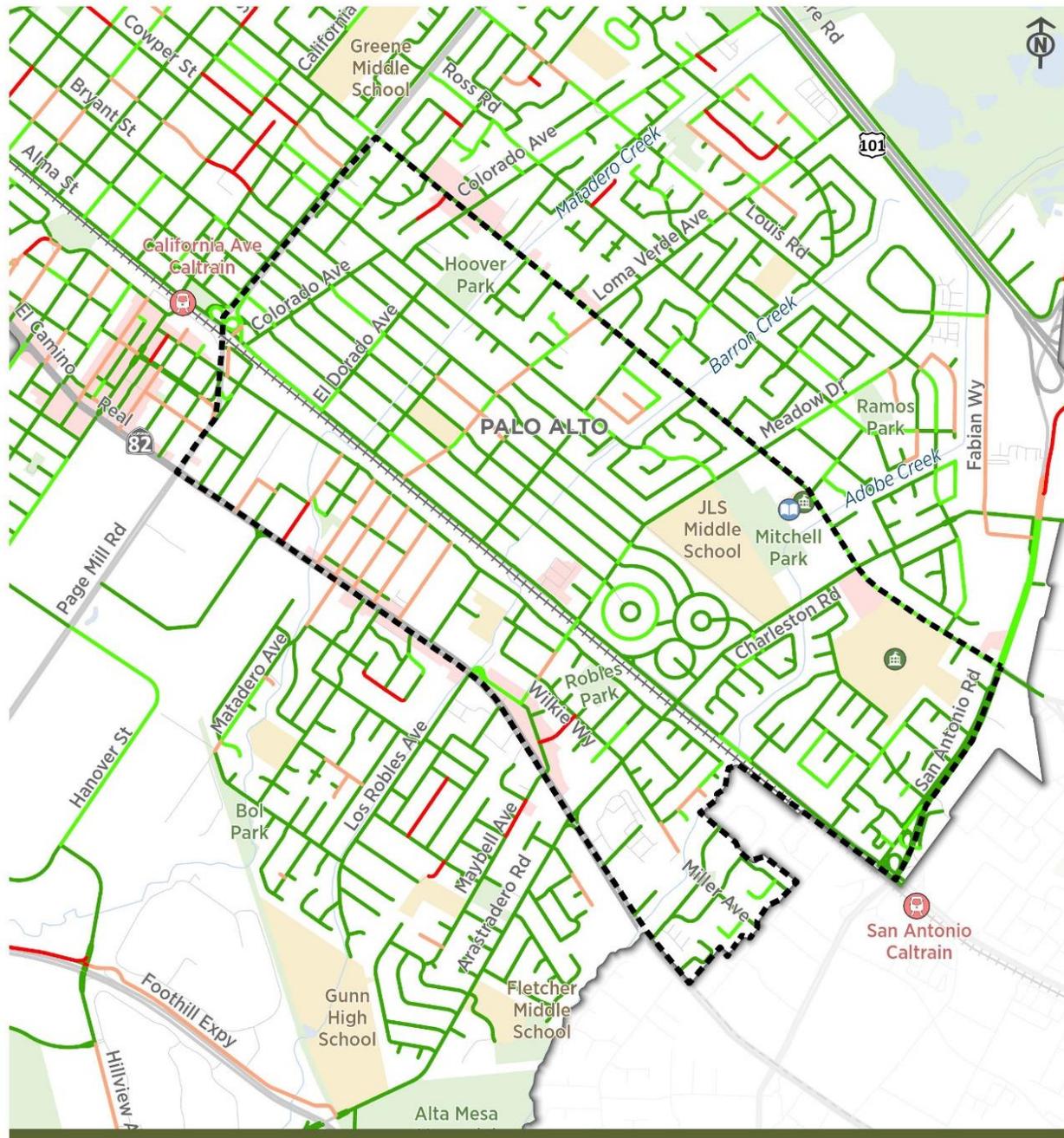


Figure 7. Existing Pavement Conditions



## PEDESTRIAN FACILITIES

Figure 8 depicts the existing pedestrian facilities including sidewalks, crosswalks, Pedestrian Hybrid Beacons, and bridges in the Study Area. Sidewalks within the Study Area are largely continuous, and most streets feature at least four- to five-foot wide sidewalks on both sides of the roadway. However, notable gaps exist in certain locations. On Alma Street, sidewalks are present only on the east side of the road. Additionally, gaps are also observed along Miller Avenue and its adjacent residential streets. Several local/collector roads, particularly near Miller Avenue in the southwest part of the Study Area have no sidewalks on both sides of the road. In limited locations, sidewalks have landscape strips separating the sidewalk from the roadway; however, in most locations there is no landscaping or trees in the public right-of-way.

Marked crosswalks exist at signalized intersections along major roads including Middlefield Road, Alma Street, Meadow Drive, Charleston Road, Oregon Expressway/Page Mill Road, San Antonio Road, and El Camino Real. These signalized intersections are marked with standard crosswalks and have pedestrian-activated countdown signal heads. Each intersection provides at least one crosswalk and pedestrian signal head. Unsignalized intersections throughout the Study Area are primarily side-street two-way or all-way stop-controlled and most do not have marked crosswalks. Figure 9 shows the existing intersection control in the Study Area.

Within the Study Area, Oregon Expressway/Page Mill Road features a high-speed vehicle environment and limited pedestrian facilities, which makes it challenging for pedestrians to cross the tracks. Meadow Drive and Charleston Road are signalized intersections with marked crosswalks and pedestrian crossing phases, which provide controlled crossings at the intersections. However, they feature at-grade railroad crossings with pedestrian gates and warning signals.

Outside the Study Area, the California Avenue Bike/Ped Tunnel is a dedicated grade separated crossing beneath the rail tracks located adjacent to the California Avenue Caltrain Station. San Antonio Road does not provide direct pedestrian or bicycle crossings over the Caltrain tracks and Central Expressway, despite its proximity to the San Antonio Caltrain Station, shopping areas, and higher-density housing. As a result, pedestrians and cyclists rely on alternative routes to navigate across the tracks and the expressway. Pedestrians and cyclists familiar with the area typically use one of three options:

- San Antonio Caltrain Station Bike/Ped Underpass (located 0.1 mile south of San Antonio Road) and either the signalized crossing of the expressway at Mayfield Avenue in Mountain View or at San Antonio Avenue in Palo Alto.
- Dirt track and pedestrian pathway from the west side of San Antonio Road (west of the Caltrain tracks) and the flight of stairs north of the Caltrain station to get to the signalized intersection across Central Expressway at San Antonio Road.
- Some cyclists choose to use the San Antonio Caltrain Station Bike/Ped Underpass in combination with the underpass across San Antonio Road near the entrance of the Waymo campus.

Figure 8. Existing Pedestrian Facilities

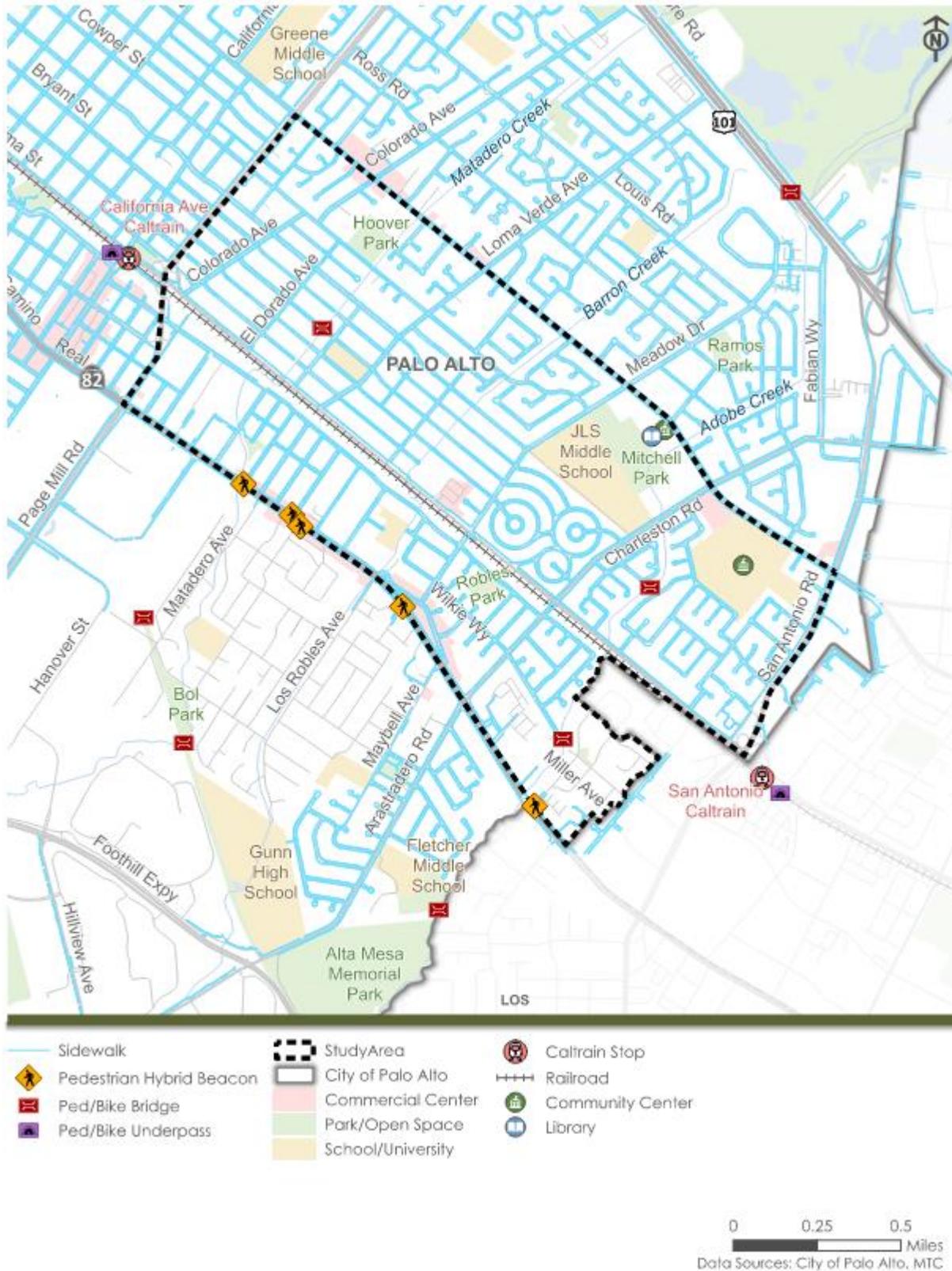
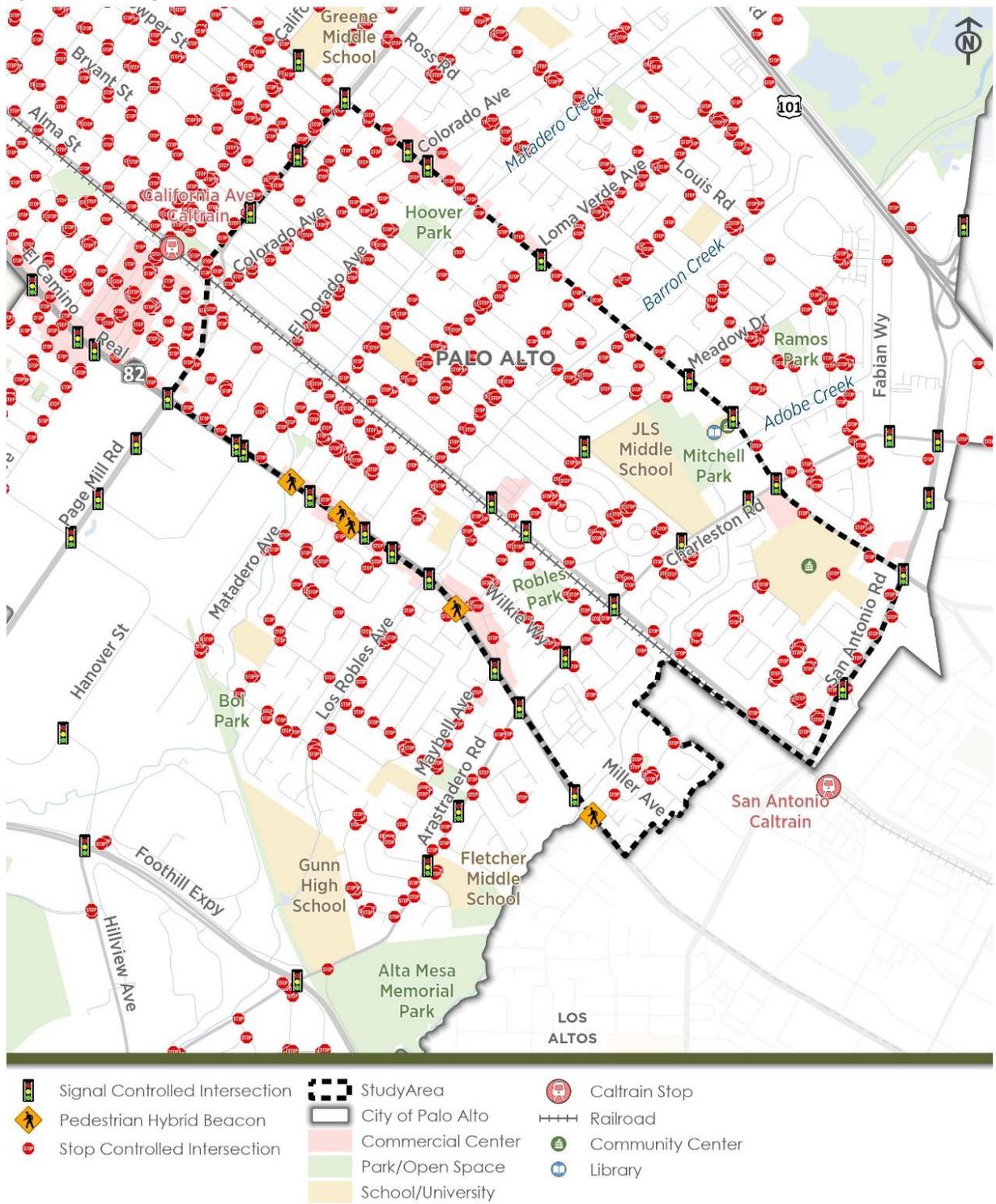


Figure 9. Existing Intersection Control



0 0.25 0.5  
 Miles  
 Data Sources: City of Palo Alto, MTC

## BICYCLE FACILITIES

The City of Palo Alto has made significant progress in developing a robust bicycle network. Figure 10 shows existing bicycle facilities. The existing bicycle network includes a variety of facility types including:

- **Class I Bikeways (Shared Use Paths):** A path physically separated from motor vehicle traffic by an open space or barrier, used by bicyclists, pedestrians, joggers, skaters, and other non-motorized travelers.
- **Class II Bikeways (Bike Lanes):** A travel lane on a roadway that has been set aside by striping and pavement markings for the preferential or exclusive use of bicyclists.
  - **Class IIa (Standard Bike Lane):** A conventional one-way striped bicycle lane.
  - **Class IIb (Buffered Bike Lane):** An enhanced bike lane that includes a painted buffer zone, providing additional space between bicyclists and adjacent vehicle lanes or parked cars.
- **Class III Bikeways (Bike Routes):** are designated by signage where bicyclists share travel lanes with motor vehicle traffic.
  - **Class IIIa (Bike Routes):** A shared roadway where bicyclists and motor vehicles coexist, identified solely by signage without additional pavement markings.
  - **Class IIIb (Bike Boulevard):** A shared roadway optimized for bicycle travel through traffic calming measures and signage, creating a safer and more comfortable environment for cyclists.
- **Class IV Bikeways (Separated Bikeway)** is for the exclusive use of bicycles and includes a separation between the bikeways and adjacent vehicle traffic. The physical separation may include flexible posts, grade separation, inflexible physical barriers, or on-street parking.

The Study Area includes a bicycle network that supports active transportation, with key routes providing access across major corridors. Meadow Drive and Charleston Road have Class II bike lanes on both sides of the roadway and serve as the primary east-west bicycle connections across the Caltrain corridor in the Study Area. There are currently no continuous bike facilities on Oregon Expressway and San Antonio Road. San Antonio Road has a partial Class III shared roadway (sharrows) in certain segments; however, it does not provide a strong east-west bicycle connection due to its limited dedicated bike facilities and high vehicle speeds, which create a challenging environment for cyclists.

Loma Verde Avenue, Colorado Avenue, and Margarita Avenue are additional east-west bicycle routes in the Study Area. Loma Verde Avenue has Class II bike lanes and Colorado Avenue has a combination of Class II bike lanes and Class III bike routes. Margarita Avenue is a Class III bike route.

There are currently no continuous bike facilities on Alma Street and El Camino Real. However, several north-south bikeways are provided within the Study Area. Middlefield Road has a Class II bike lane from Montrose Avenue to Loma Verde Avenue. Bryant Street consists of a combination of Class IIIa bike routes and Class III bike boulevards, while Cowper Street features a Class III bike route. Park Boulevard has a combination of Class II bike lane and Class III bike routes north of Matadero Avenue. Additionally, the Caltrans El Camino Real Bikeway Project is currently under construction and is expected to include a combination of Class II and Class IV bike facilities along El Camino Real throughout Mountain View, Los Altos, and Palo Alto.

Within the Study Area, Oregon Expressway/Page Mill Road presents a significant challenge for cyclists due to high-speed vehicle traffic and the lack of dedicated bicycle infrastructure. Additionally, at Meadow Drive and Charleston Road, cyclists must navigate at-grade railroad crossings equipped with pedestrian gates and warning signals. However, without dedicated bicycle treatments, they are required to cross alongside vehicular traffic.

## Bicyclist Comfort

Bicycle Level of Traffic Stress (LTS) is an evaluation that quantifies the amount of discomfort that people feel when bicycling near motor vehicle traffic. It assigns a numeric stress level to roadway segments, trails, and intersections based on attributes such as motor vehicle speed, volume, number of lanes, lane blockage, on-street parking, and ease of intersection crossing. The higher the LTS, the higher the expected discomfort for the rider traveling along the facility. The four LTS ratings are as follows:

- **LTS 1 - Very Low Traffic Stress:** Most children feel comfortable bicycling.
- **LTS 2 - Low Traffic Stress:** The mainstream adult population feels comfortable bicycling.
- **LTS 3 - Moderate Traffic Stress:** Bicyclists who are considered "enthused and confident" but still prefer having their own dedicated space feel comfortable while bicycling.
- **LTS 4 - High Traffic Stress:** Only "strong and fearless" bicyclists feel comfortable while bicycling. These routes have high-speed limits, multiple travel lanes, limited or non-existent bicycle lanes and signage, and large distances to cross at intersections.

Figure 11 illustrates the results of the Segment Bicycle LTS analysis from the BPTP Update. Based on this analysis, the most stressful segments in the Study Area are located along Alma Street, Oregon Expressway/Page Mill Road, San Antonio Road, Middlefield Road, Meadow Drive, Charleston Road, El Camino Real, Lambert Avenue, and parts of Park Boulevard.

Bicycle LTS at intersections results are depicted in Figure 12. Among the 975 intersections in the Study Area, 129 are signalized and are assigned LTS 1 as traffic signals help manage traffic flow and provide safer crossings for cyclists. The remaining low stress intersections are generally located on residential streets characterized by low speeds and minimal vehicular activity. Many high-stress intersections are associated with El Camino Real, Alma Street, San Antonio Road, Middlefield Road, Charleston Road, Loma Verde Avenue, Lambert Avenue, Oregon Expressway/Page Mill Road, and parts of Park Boulevard, which are also high-stress corridors as stated above.

## MAJOR BARRIERS

The BPTP Update examined the effects of five linear barriers in the Study Area (Oregon Expressway/Page Mill Road, Adobe Creek, Barron Creek, Matadero Canal, and Caltrain rail lines).

- **Oregon Expressway/Page Mill Road:** The Oregon Expressway/Page Mill Road does not result in significantly longer pedestrian crossing paths due to the presence of crossing facilities. Crossings are generally located every quarter mile, with facilities such as curb ramps, crosswalks, and traffic signals.
- **Adobe Creek:** Pedestrians may need to walk longer paths (often more than twice the straight-line crossing distance) to pass around Adobe Creek, especially to the south. Opportunities to cross Adobe Creek in the Study Area include Middlefield Road, Charleston Road, Alma Street, and El Camino Real. There is also a walking- and bicycling-only connection: a walkway connecting the Miller Avenue cul-de-sac to Wilkie Way.
- **Barron Creek:** While some paths across Barron Creek are longer than the straight-line crossing distance, they are usually less than double that distance due to the availability of closely spaced crossing facilities. Crossing opportunities are generally located every 1,100 feet north of Waverly Street and every 300 feet to the south; sidewalks are provided on streets crossing the creek.
- **Matadero Creek:** People may need to take detours of up to 1.75 times the straight-line crossing distance to cross Matadero Creek. However, the presence of the rail line along the southern tip of the creek's above-ground alignment further increases the crossing distance in that area.
- **Rail Line:** Crossing distances varies along the length of the rail line in Palo Alto. Distances between existing bike and pedestrian crossings of the Caltrain corridor in south Palo Alto are as follows:
  - 1.3 mile between the California Avenue Bike/Ped Tunnel and Meadow Drive;
  - 0.3 mile between Meadow Drive and Charleston Road; and
  - 0.8 mile between Charleston Road and the San Antonio Caltrain Station Bike/Ped Underpass.

The 1.3 mile distance between the existing California Avenue Bike/Ped Tunnel and the at-grade crossing at Meadow Drive represents the longest stretch of track barrier in Palo Alto.

Figure 10. Existing Bicycle Facilities

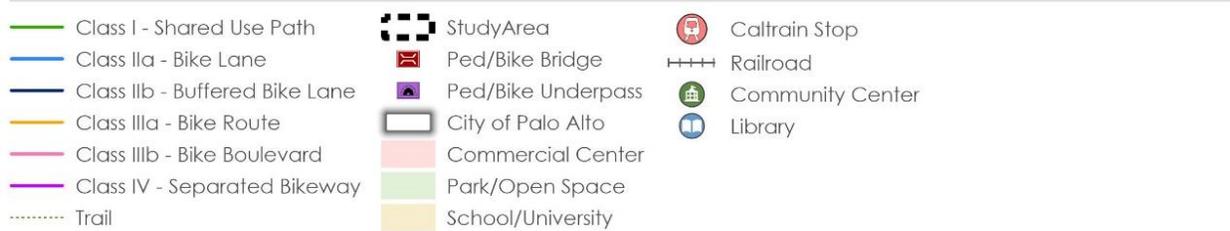
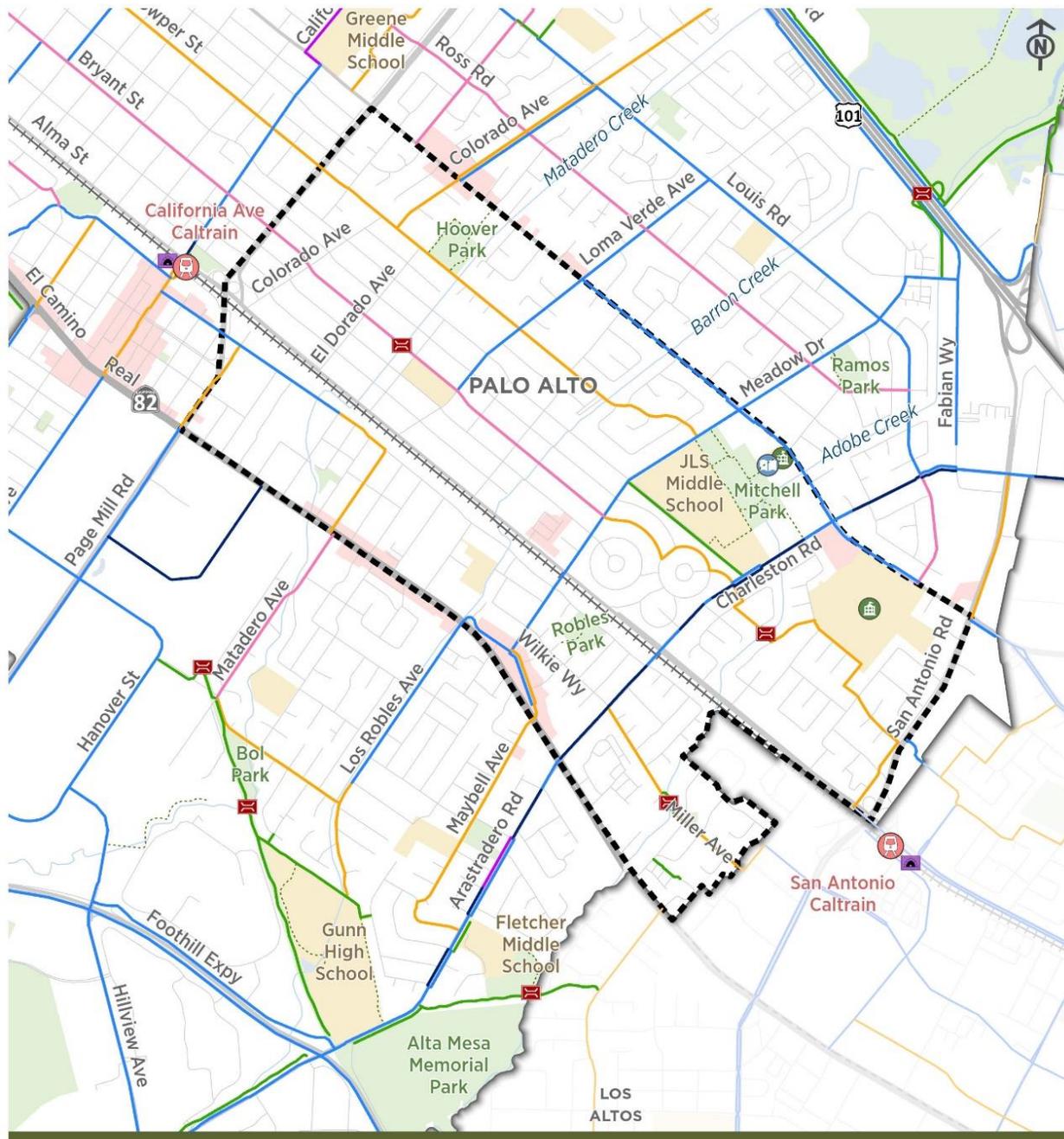


Figure 11: Bicyclist Level of Traffic Stress – Roadway Segments

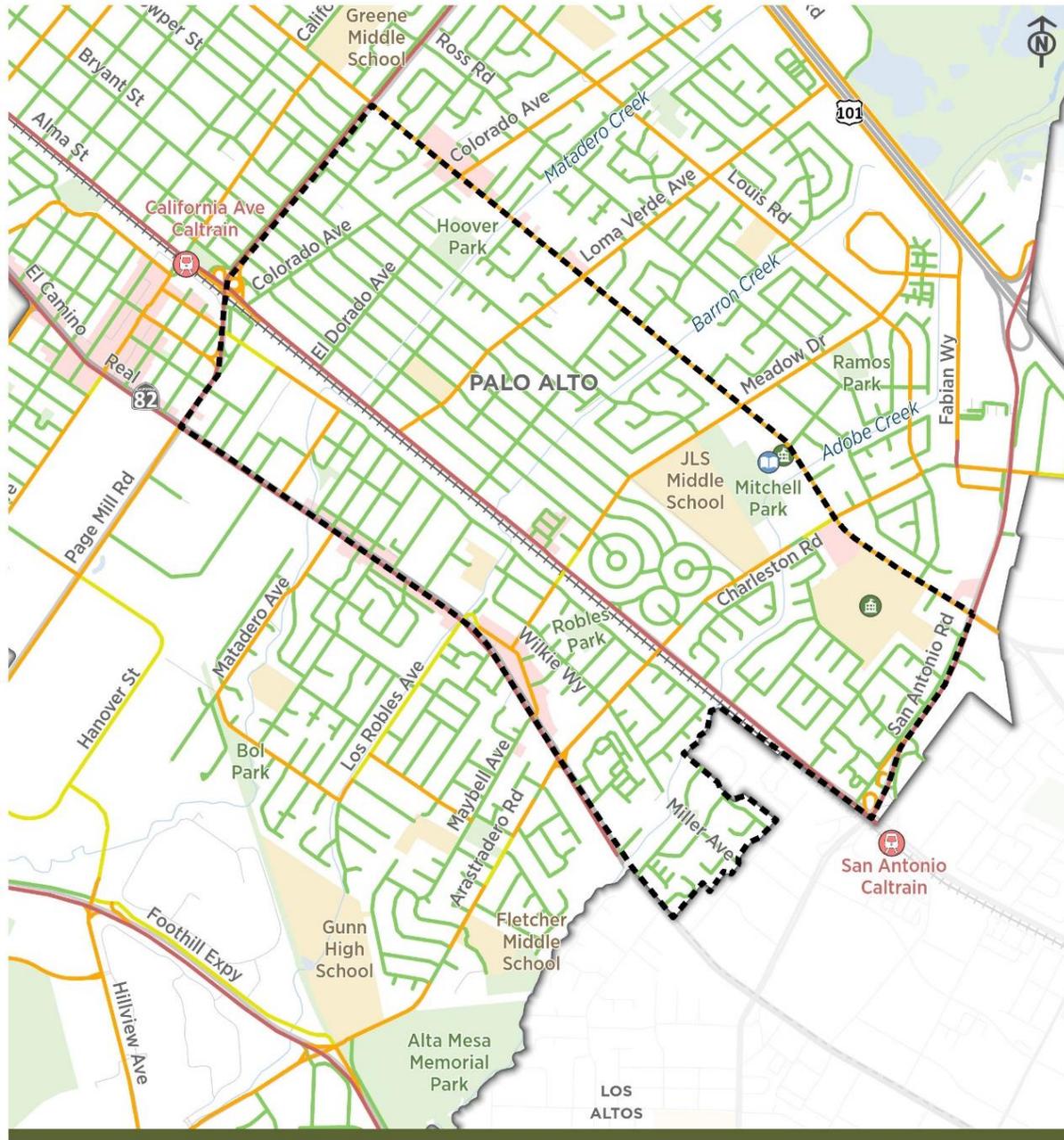
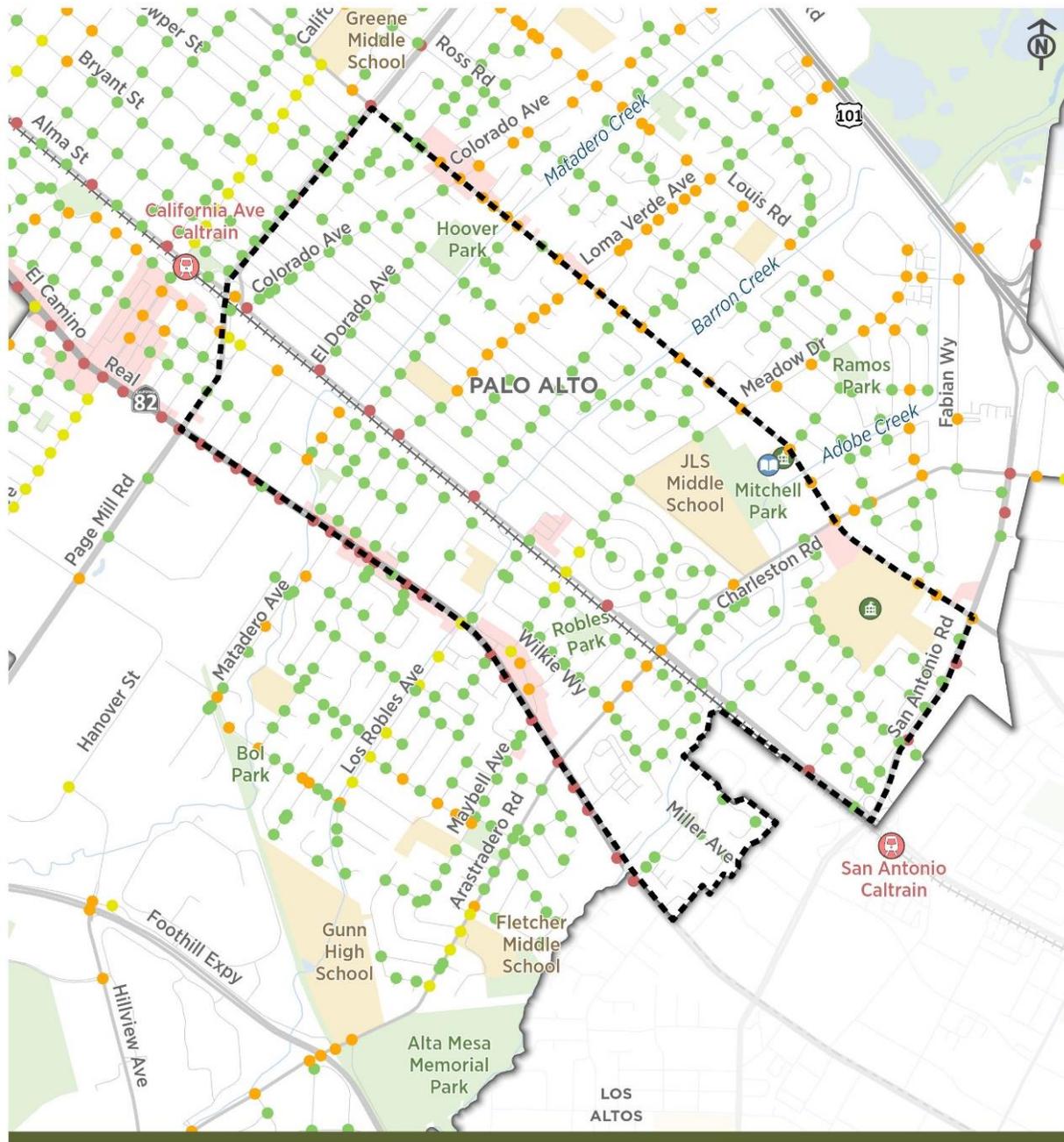


Figure 12: Bicyclist Level of Traffic Stress - Intersections



## TRANSIT FACILITIES

The Santa Clara Valley Transportation Authority (VTA) operates bus services in Palo Alto. Within the Study Area, there are currently 18 bus stops along El Camino Real, 10 bus stops along Meadow Drive, 18 bus stops along Middlefield Road, three bus stops along Loma Verde Avenue, and three bus stops along San Antonio Road. School routes operate on Charleston Road, Meadow Drive, Loma Verde Avenue, Middlefield Road, and Waverly Street, while no shuttle routes operate in the Study Area. Additionally, Palo Alto Link is an on-demand rideshare service that allows users to book rides within most areas of the City.

Table 4 describes the services and frequency during the week and weekend for buses that operate within the Study Area. Figure 13 illustrates the existing VTA transit routes and bus stop locations and Figure 14 shows the VTA's 2024 average weekday ridership activity (boardings and alightings) by stop/station in the Study Area<sup>14</sup>. Bus stops along El Camino Real and Middlefield Road have the highest ridership activity in the Study Area. The highest average weekday ridership activity in the Study Area occurs along El Camino Real at the Arastradero Road and Charleston Road bus stops. These bus stops have ridership activity exceeding 100 passengers per day and are served by both Route 22 and Route 522.

Caltrain, a regional commuter rail system, provides service from San Francisco to Gilroy by the Peninsula Joint Powers Board. Two Caltrain stations are located near the Study Area: (1) California Avenue Station located approximately 650 feet north of Oregon Expressway/Page Mill Road and (2) San Antonio Caltrain Station located approximately 450 feet south of San Antonio Road. Caltrain recently electrified its right-of-way between San Francisco and San Jose, installing an overhead wire (catenary) system on the tracks. Additionally, future California High-Speed Rail trains require a new four-track section in Palo Alto<sup>15</sup>, which will extend between Churchill Avenue and Meadow Drive to bypass Caltrain trains.

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<sup>14</sup> VTA's 2024 Ridership by Stop & Station: <https://data.vta.org/pages/ridership-by-stop>

<sup>15</sup> Caltrain Business Plan Summary Report: <https://www.caltrain.com/media/24042/download?inline>

**Table 4. VTA Bus Routes Summary**

Route Number	From	To	Weekdays		Weekends	
			Operating Hours	Headway (minutes)	Operating Hours	Headway (minutes)
21	Stanford Shopping Center	Santa Clara Transit Center	5:30 am – 10:00 pm	varies	7:40 am - 9:20 pm	varies
22	Palo Alto Transit Center	Eastridge	All Day	15	All Day	15
89	California Ave Caltrain	Palo Alto VA Hospital	6:30 am - 6:10 pm	varies	No Service	No Service
522	Palo Alto Transit Center	Eastridge	5:00 am – 11:30 pm	10-20 (varies)	6:00 am – 11:50 pm	10-20 (varies)
School Shuttle 288	Veterans Hospital	Middlefield and Colorado	3:40 pm – 4:50 pm	20	No Service	No Service
School Shuttle 288	Middlefield and Colorado	Gunn High School	8:10 am – 8:50 am	--	No Service	No Service
School Shuttle 288L	Veterans Hospital	Louis and Fielding	3:40 pm – 4:50 pm	20	No Service	No Service
School Shuttle 288	Louis and Elbridge	Gunn High School	8:10 am – 8:50 am	--	No Service	No Service

Source: VTA Schedule, 2024; VTA School Trippers 2024

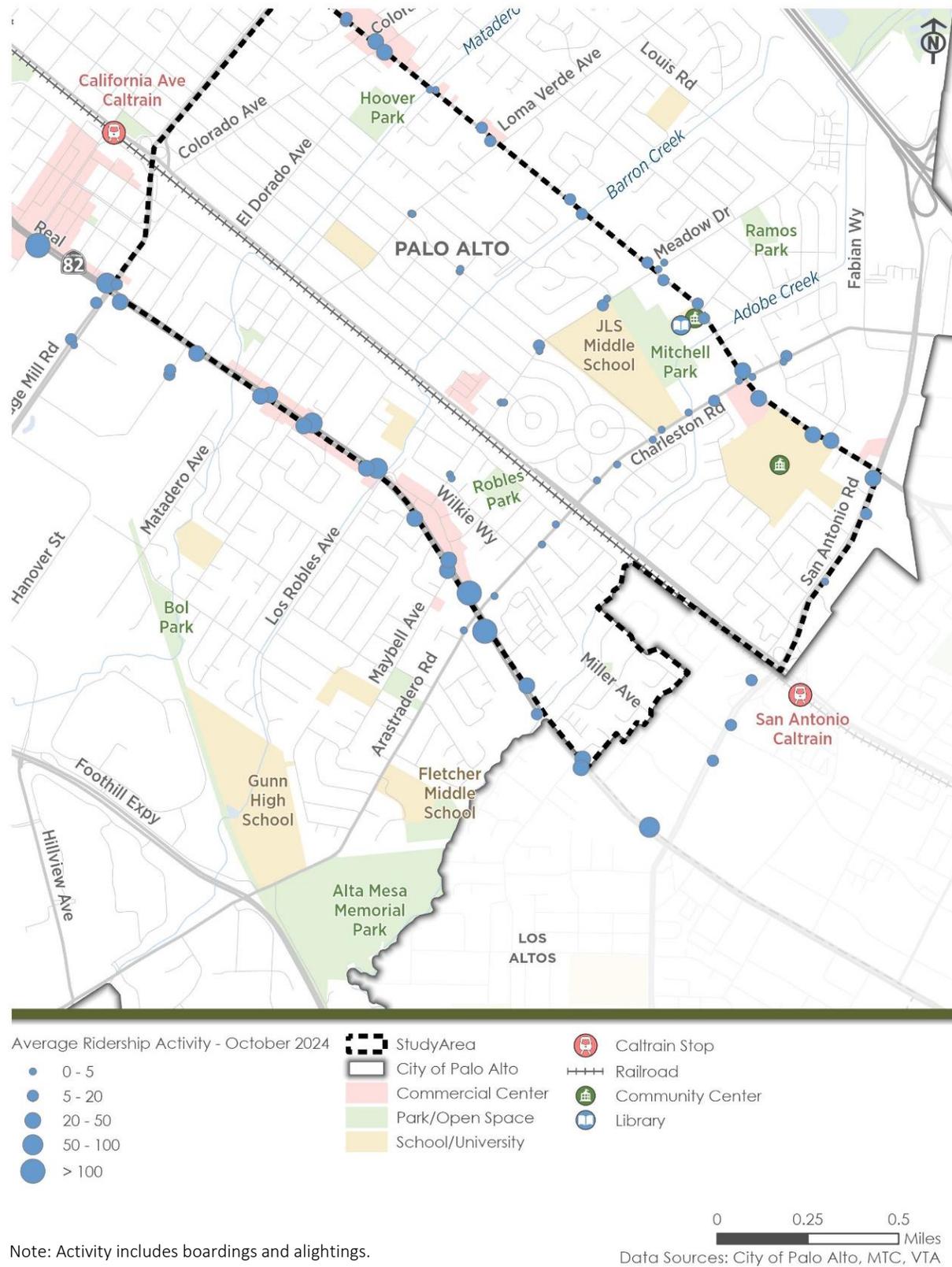
Notes:

1. Operating hours are rounded to the nearest ten minutes.
2. Route 288M is scheduled to be discontinued, but Route 288 will be extended from Middlefield & Colorado to Loma Verde & Waverly to cover some of the former 288M route.

Figure 13. Existing Transit Facilities



Figure 14. Existing Bus Ridership Activity



Note: Activity includes boardings and alightings.

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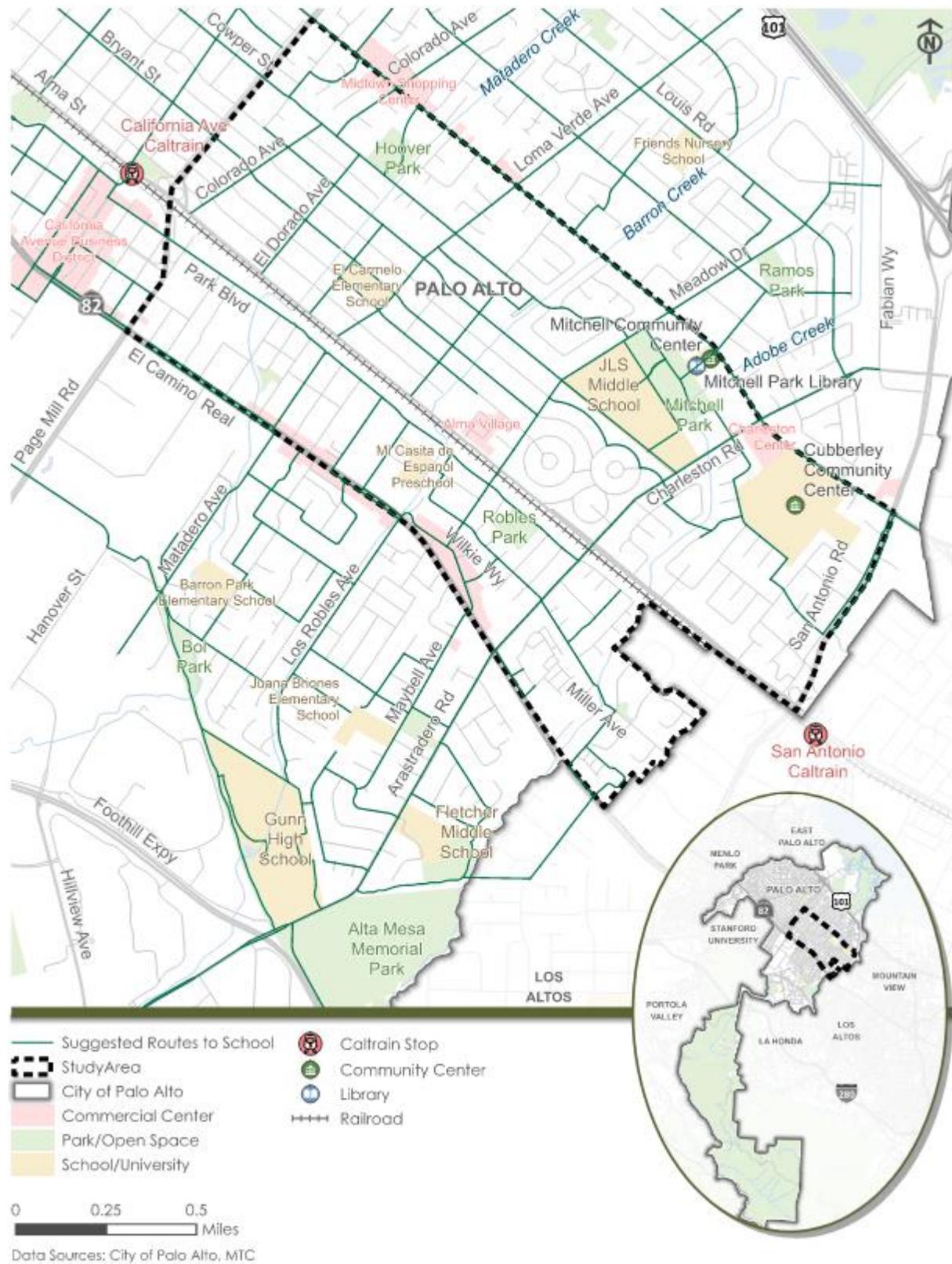
## SAFE ROUTES TO SCHOOL

The local Safe Routes to School (SRTS) Partnership between the City, the Palo Alto Unified School District (PAUSD), and the Palo Alto Council of PTAs (PTAC) works to reduce risk to students in route to and from school and encourages more families to choose alternatives to driving solo more often.<sup>16</sup> Within the Study Area, several schools benefit from the SRTS program including JLS Middle School, El Carmelo Elementary School, and Herbert Hoover Elementary School. The SRTS program offers Walk and Roll Maps for each school to highlight the suggested routes that prioritize safety and convenience. These maps are designed to assist parents and students in exploring healthy, active commute options. Figure 15 shows the suggested routes to school in the Study Area.

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<sup>16</sup> Office of Transportation, Safe Routes to School. For more information, visit:  
<https://www.cityofpaloalto.org/Departments/Transportation/Safe-Routes-to-School>

Figure 15. Suggested Routes to Schools



## FUTURE TRANSPORTATION NETWORK IMPROVEMENTS

This section summarizes on-going/upcoming transportation improvement projects within the Study Area.

- **Rail Grade Separation Projects:** The City of Palo Alto has been actively working on rail grade separation projects along the Caltrain corridor at the existing at-grade crossings. Over the past several years, conceptual plans have been developed to evaluate various alternatives for grade separations at three key crossings: Churchill Avenue, Meadow Drive, and Charleston Road. Considering input and feedback from the community, the project alternatives were reviewed by the Community Advisory Panel and the City’s Rail Committee to identify a preferred solution for each crossing. In June 2024, following community feedback and recommendations from the rail committee, the City Council advanced the Partial Underpass Alternative with a bicycle-pedestrian crossing at Seale Avenue as the preferred alternative for Churchill Avenue, with the Closure Alternative as a backup. For the Meadow Drive and Charleston Road crossings, the Hybrid Alternative (a mixed wall-column design approach) and the Underpass Alternative were selected. These alternatives are designed to accommodate all modes of traffic, including bicycles and pedestrians. The project is now progressing to the Preliminary Engineering and Environmental phase, during which selected alternatives will be further evaluated to confirm the preferred alternatives. The goal is to complete 35% of the design for the preferred alternative at each crossing during this phase of the project.
- **Caltrans El Camino Real Pavement Rehabilitation and ADA Improvements:** State Route 82 (SR 82) Pavement Rehabilitation and ADA Improvements<sup>17</sup> project along El Camino Real spanning several communities including Palo Alto, will improve the state highway and support safety, access, and mobility of pedestrians and bicyclists. The project will repair pavement, upgrade existing non-standard ADA curb ramps, add complete street elements such as enhanced crosswalks, and replace on-street parking with bike lanes. Construction is on-going and expected to complete fall 2025.
- **County of Santa Clara Page Mill Road and El Camino Real Intersection Improvements:** The County of Santa Clara plans to install intersection improvements<sup>18</sup> at Page Mill Road and El Camino Real to improve efficiency and provide bicycle and pedestrian safety improvements. Construction is expected to begin mid-2025.
- **City of Palo Alto Bicycle and Pedestrian Transportation Plan (BPTP) Update:** Palo Alto has been at the forefront of bicycle and pedestrian transportation planning since the early 1980’s, when the City developed the nation’s first bicycle boulevard on Bryant Street. The City’s existing BPTP, adopted in 2012, built upon those extensive planning and design efforts, and the 2025 update will continue the legacy of innovative active transportation planning. The BPTP Update effort will reflect community needs and desires, consider recent trends in cycling and bicycle technology, and address changes in bicycle and pedestrian planning and design. The BPTP Update is expected

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<sup>17</sup> SR-82 – Pavement Rehabilitation and ADA Improvements: <https://dot.ca.gov/caltrans-near-me/district-4/d4-projects/d4-santa-clara-sr82-pavement-rehabilitation-and-ada-improvements>

<sup>18</sup> Page Mill Road intersection improvements at El Camino Real: <https://roads.santaclaracounty.gov/projects-and-studies/capital-projects/page-mill-road-intersection-improvements-el-camino-real>

to recommend enhanced bicycle infrastructure within the Study Area including along, but not limited to, Loma Verde Avenue, Colorado Avenue, Meadow Drive, and San Antonio Road.

- **Caltrain Business Plan:** The Caltrain Business Plan identified that the California Avenue 4-track segment overlaps with planned crossing projects and will necessitate alignment with local and regional planning efforts to preserve this corridor for future infrastructure needs. Additionally, the plan includes future California High-Speed Rail (CA HSR) which will operate on the same tracks as Caltrain along the Peninsula Corridor (San Francisco to San Jose). The Northern California segment of HSR will share tracks with Caltrain, which will drive the need for additional passing track and signal system infrastructure. According to the latest construction timeline, initial HSR operations from Merced to San Francisco are expected to begin in 2029, with the Downtown Extension (DTX) opening and expanded HSR operations by 2033.



## Section 6 Commuting Behavior

# Commuting Behavior

The Study Area has approximately 10,800 workers aged 16 and over, according to the American Community Survey (ACS) 2022 5-Year Estimates. The majority (59%) commute by car, truck, or van, with 54 percent driving alone and five percent carpooling. Public transportation is utilized by four percent of workers, while active transportation modes such as walking and bicycling contribute three and six percent of commuting trips, respectively. Alternative transportation modes, including taxis, motorcycles, and other means, account for two percent of commutes, while 26% work from home. Table 5 presents the commuting characteristics in the Study Area.

**Table 5: Commuting Characteristics in the Study Area**

Commute Mode	Percentage of Total Workers – Study Area <sup>1</sup>	Percentage of Total Workers – City of Palo Alto
Car, truck, or van	59%	56%
- <i>Drove alone</i>	54%	52%
- <i>Carpooled</i>	5%	4%
Public Transportation	4%	2%
Walked	3%	5%
Bicycle	6%	7%
Taxicab, motorcycle or other means	2%	2%
Worked from home	26%	28%
<b>Total workers 16 years and over</b>	<b>100%</b>	<b>100%</b>

Source: U.S. Census Bureau, 2022 ACS 5-Year Estimates, Table S0801.

<sup>1</sup>Based on 2022 ACS estimates, there are approximately 10,800 workers in the Study Area. Percentages are rounded to the nearest whole number.



## Section 7 Traffic Counts

# Traffic Counts

Bicyclist and pedestrian counts were collected by the City at 12 intersections during a typical weekday and weekend day over a 12-hour period (7 AM to 7 PM). These counts are summarized in Table 6; detailed summaries of counts by approach and turn movement are included in Appendix B.

Table 6: Bicycle and Pedestrian 12- Hour Counts (7 AM to 7 PM)

Intersection	Pedestrian		Bicycle	
	Weekday	Weekend	Weekday	Weekend
Alma Street & E. Meadow Drive	497	440	516	243
Alma Street & Charleston Road	345	216	416	228
Bryant Street & El Carmelo Avenue	466	246	510	327
Middlefield Road & Colorado Avenue	841	968	261	111
Middlefield Road & Loma Verde Avenue	350	74	213	64
Middlefield Road & E. Meadow Drive	403	309	629	193
Middlefield Road & Charleston Road	773	559	376	222
Middlefield Road & San Antonio Road	328	379	138	79
El Camino Real & California Avenue	1,520	1,736	322	233
El Camino Real & Los Robles Avenue	268	343	130	36
El Camino Real & Margarita Avenue	379	272	113	31
El Camino Real & Arastradero Road	596	467	319	175

Source: City of Palo Alto, 2024

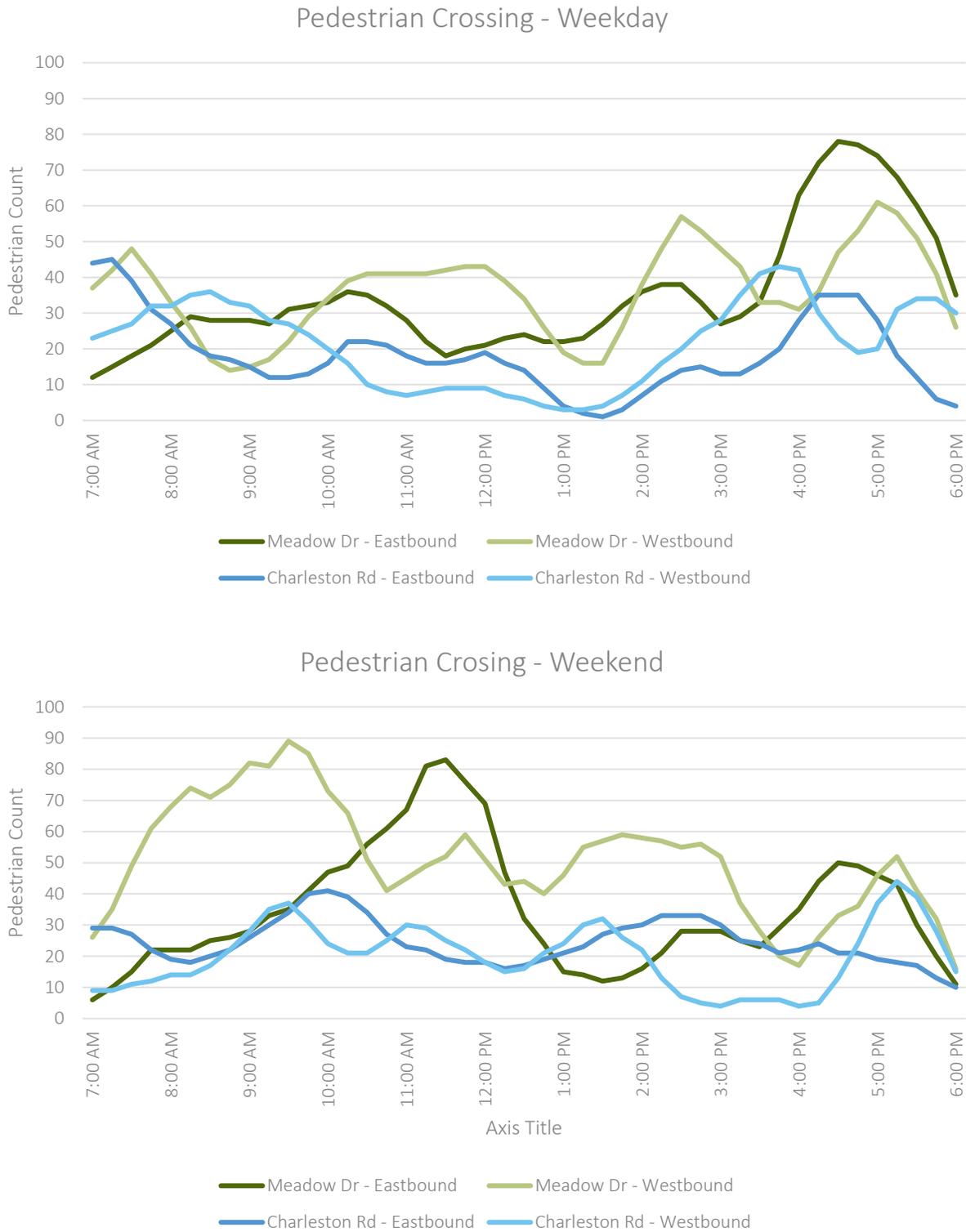
Note: Weekday counts were collected on Thursday, May 16, 2024. Weekend counts were collected on Saturday, May 18, 2024.

Figure 16 summarizes pedestrian activity at existing at-grade crossing locations (Meadow Drive and Charleston Road) on a typical weekday and weekend day from 7 AM to 7 PM. On weekdays, pedestrian activity is generally highest in the afternoon hours between 3 PM and 6 PM. On weekends, pedestrian activity is more variable, with the highest activity levels in the morning and early afternoon. Overall pedestrian crossing activity is higher on weekends compared to weekdays; for both weekdays and weekends, Meadow Drive experiences higher pedestrian activity than Charleston Road.

Figure 17 summarizes bicycle activity at existing at-grade crossing locations. On weekdays, bicycle activity peaks during the morning and afternoon peak periods (7-9 AM and 4-6 PM), with a jump in activity around 8 AM on Meadow Drive. On weekends, bicycle activity remains relatively steady throughout the day. Similar to pedestrian activity, there is higher bicycle activity on Meadow Drive than Charleston Road.

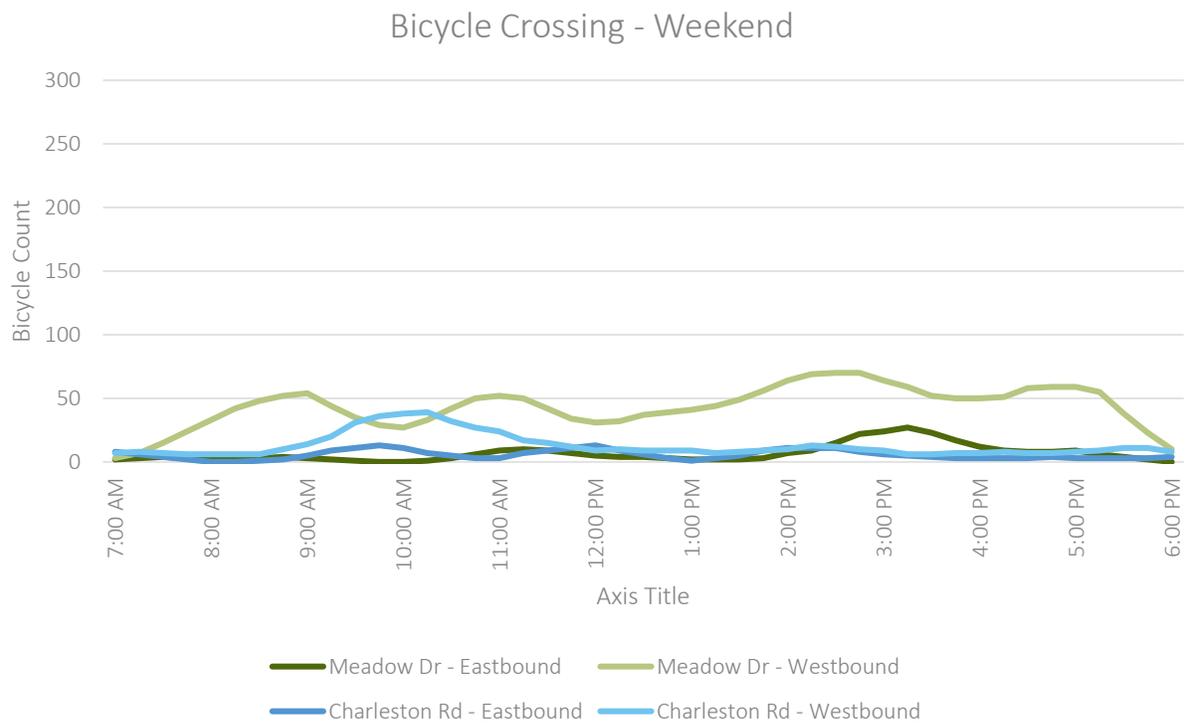
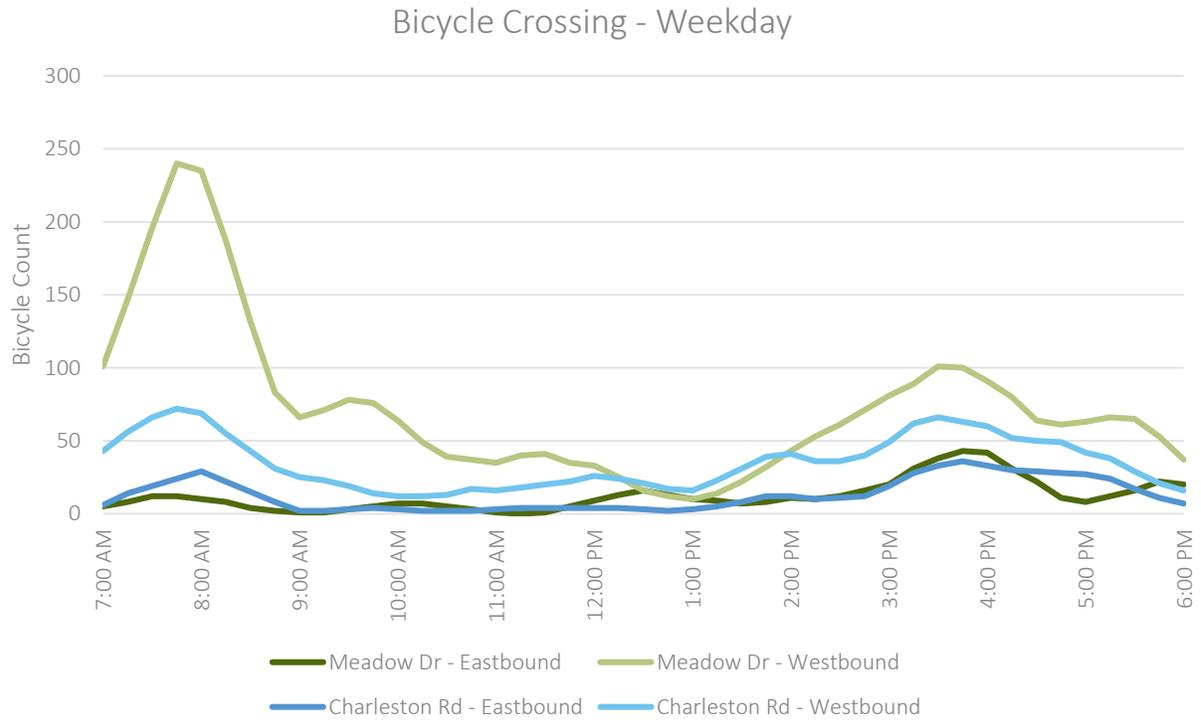
Figure 18 illustrates vehicle activity at the existing crossing locations. On weekdays, peak commute periods typically occur around 8 AM and 5 PM. On weekends, a distinct peak is observed only on Charleston Road in the westbound direction during commute hours, while Meadow Drive experiences a peak in the afternoon. Overall, westbound traffic exceeds eastbound traffic, with Charleston Road carrying the highest vehicle volume.

Figure 16: Pedestrian Activity at Existing At-Grade Crossing Locations



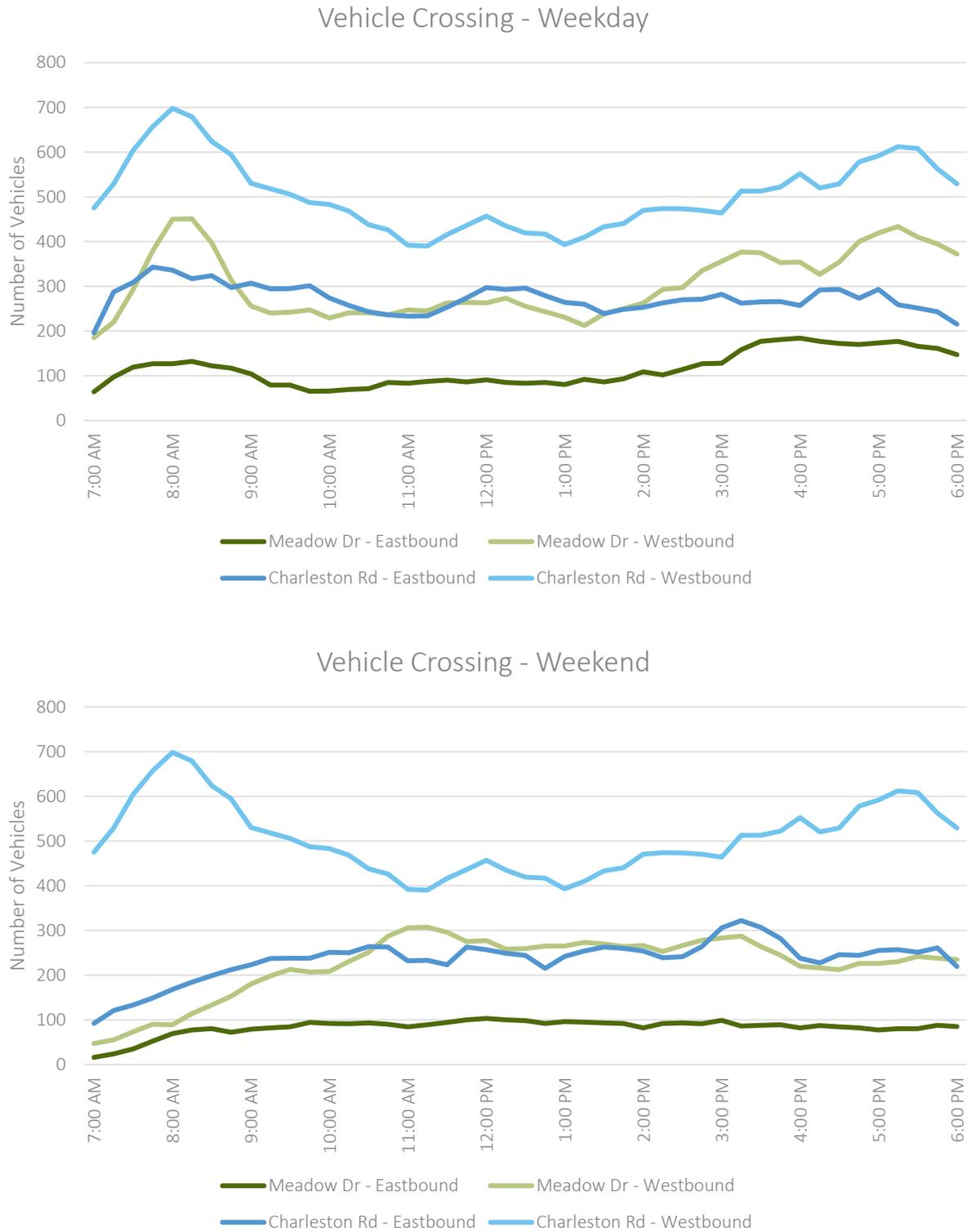
Source: City of Palo Alto, 2024; Compiled by Kittelson & Associates, Inc. 2025

Figure 17: Bicycle Activity at Existing At-Grade Crossing Locations



Source: City of Palo Alto, 2024; Compiled by Kittelson & Associates, Inc. 2025

Figure 18: Vehicle Activity at Existing At-Grade Crossing Locations



Source: City of Palo Alto, 2024; Compiled by Kittelson & Associates, Inc. 2025



Section 8  
Bicycle and Pedestrian Accessibility

# Bicycle and Pedestrian Accessibility

A network accessibility analysis was completed to evaluate existing levels of access for bicyclists and pedestrians at existing rail crossings. This analysis focuses on the rail crossing locations with paths and sidewalks in and near the Study Area: California Avenue Bike/Ped Tunnel, Meadow Drive, Charleston Road, and San Antonio Caltrain Station Bike/Ped Underpass. This analysis shows locations in the Study Area that are either not able to access a crossing or relatively further from an existing bicycle or pedestrian crossing. These findings will be used in later phases of the Project to identify how different alternatives would reduce how far people must travel to/from destinations.

Two evaluations were conducted, one for walking and one for biking. For each evaluation, network buffer distances were calculated for 5-, 10-, and 15-minute travel times from each rail crossing mentioned above. The network buffers were then overlapped to identify the nearest crossing from a given location. For walking, a travel speed of 3 miles per hour is assumed and for biking a travel speed of 10 miles per hour is assumed. The bicycle evaluation includes existing bicycle facilities and excludes sidewalks. The network evaluation for biking limits access along the roadways and intersections identified as high traffic stress (LTS 4) earlier in the report.

Note that the analysis does not consider the relative comfort of routes except to prevent access along LTS 4 roadways and at intersections that are LTS 4 (i.e., the shortest route may require biking on a street without designated bike facilities). The analysis highlights locations that require longer travel times for bicyclists and pedestrians in the Study Area.

Figure 19 shows the network accessibility analysis for walking and Figure 20 shows the network accessibility analysis for biking. The analysis shows that pedestrian access to existing rail crossings are greatest in the western part of the Study Area between California Avenue Bike/Ped Tunnel and Meadow Drive. The impact of the gap is clearest in looking at El Carmelo Elementary School and Hoover Park, which are a quarter mile and half-a-mile from the rail line but are each more than 15-minute walk from a crossing. For bike accessibility, access is limited by El Camino Real and Alma Street on either side of the Caltrain tracks. In contrast, the figure shows how the separated tunnel at the California Avenue Bike/Ped Tunnel which crosses under the Caltrain tracks and Alma Street allows for a larger access area to the east and west.

Figure 19: 5-, 10-, and 15-Minute Walking Access to Closest Rail Crossing

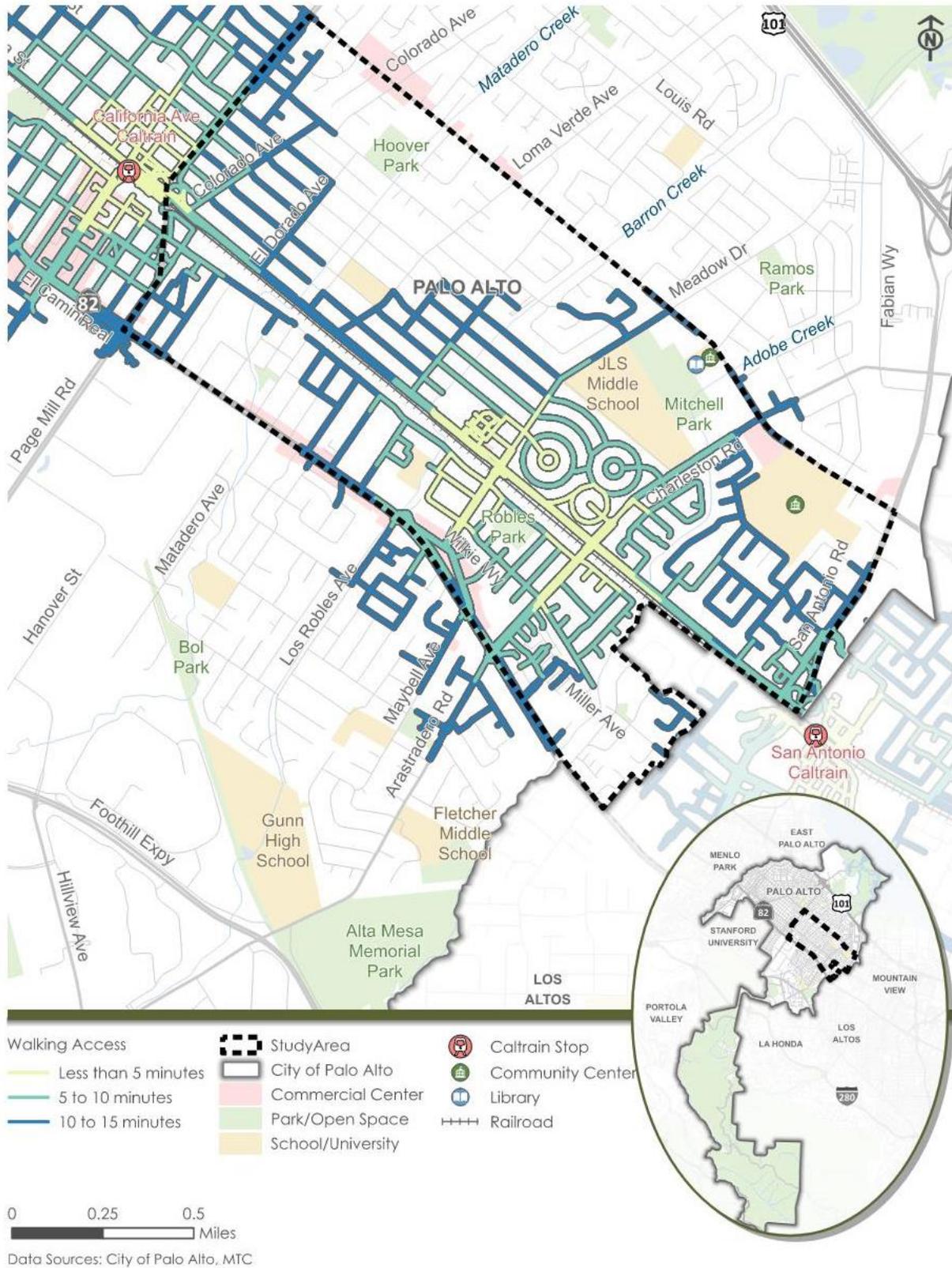
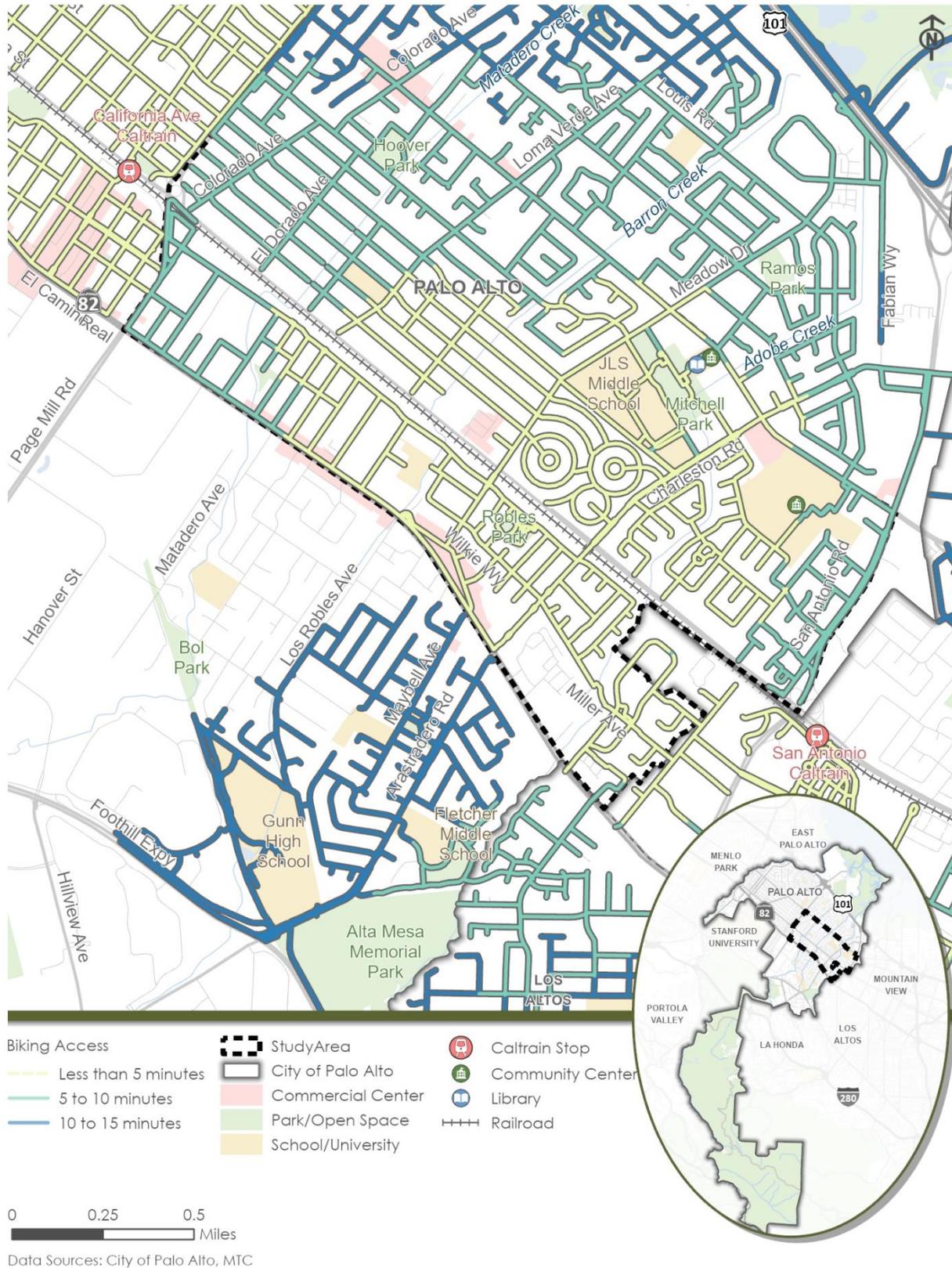


Figure 20: 5-, 10-, and 15-Minute Bike Access to Closest Rail Crossing





## Section 9

### Big Data Analysis

# Big Data Analysis

This section describes person trips that cross the Caltrain corridor at the existing roadway crossings in and near the Study Area as well as the walking and biking trips crossing at the bike and pedestrian tunnels located at the California Avenue and San Antonio Caltrain Stations. The analysis provides a basic understanding of where person trip origins and destinations are concentrated, as well as trip length, travel mode, and trip purpose. The goal of the analysis is to understand the potential to encourage new walking and biking trips or better serve existing walking biking trips with a shorter route.

For example, some trip purposes such as school and recreational trips are common for children who are unable to drive and therefore are more likely to occur by walking and biking. Additionally, distance is one of the primary factors influencing individual decisions to walk or bike for a given person trip. In particular, trips less than five miles have the greatest potential for being completed by walking or biking. For this reason, the Big Data analysis presented in this section focuses on person trips that are five miles or less.

Big Data provides the opportunity to study detailed travel characteristics for people crossing the railroad tracks in the Study Area. Historically, data collection and analysis related to trip origins and destinations, trip length, travel mode, and trip purpose has been very difficult and expensive, but the recent increase in available Big Data has made these analyses easier. As a result, Big Data is becoming more widely used throughout the transportation planning industry. As with any data source, Big Data has its limitations, but it is useful as one of multiple sources of information that can be used to inform the Project.

## DATA SOURCE

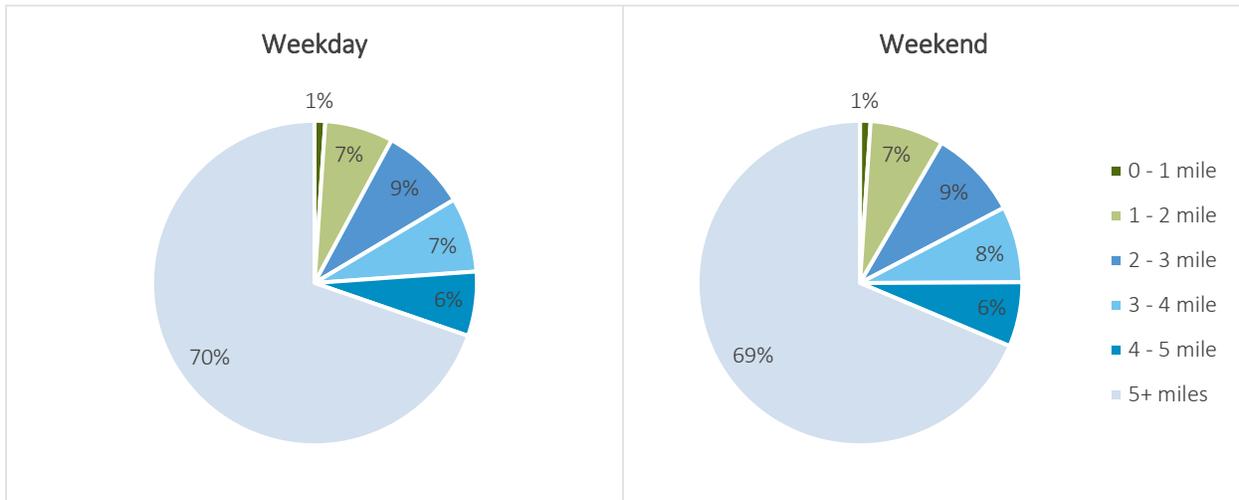
The analysis was conducted using person trip models created by Replica to represent average weekday and weekend conditions in Spring 2024. Replica is a transportation data company that models travel patterns based on multiple data sources, including data collected by vehicles, land use and Census data, and public transportation data sets. Replica presents data by person trips versus vehicle trips in order to analyze existing mode share conditions and potential changes. Details regarding Replica are provided in Appendix C.

## TRIPS DISTANCES BY CROSSING LOCATION

Figure 21 presents total person trips for all travel modes combined for the existing Caltrain crossings. The distribution shows that around 30% of crossings are trips that are less than five miles. Then, Figure 22 provides more detail about the location and relative length of person trips under five miles. As noted above, these are the trips on which that the analysis will focus. For average weekday conditions, approximately 57,000 person trips are under five miles; for average weekend conditions, approximately 51,000 person trips are under five miles.

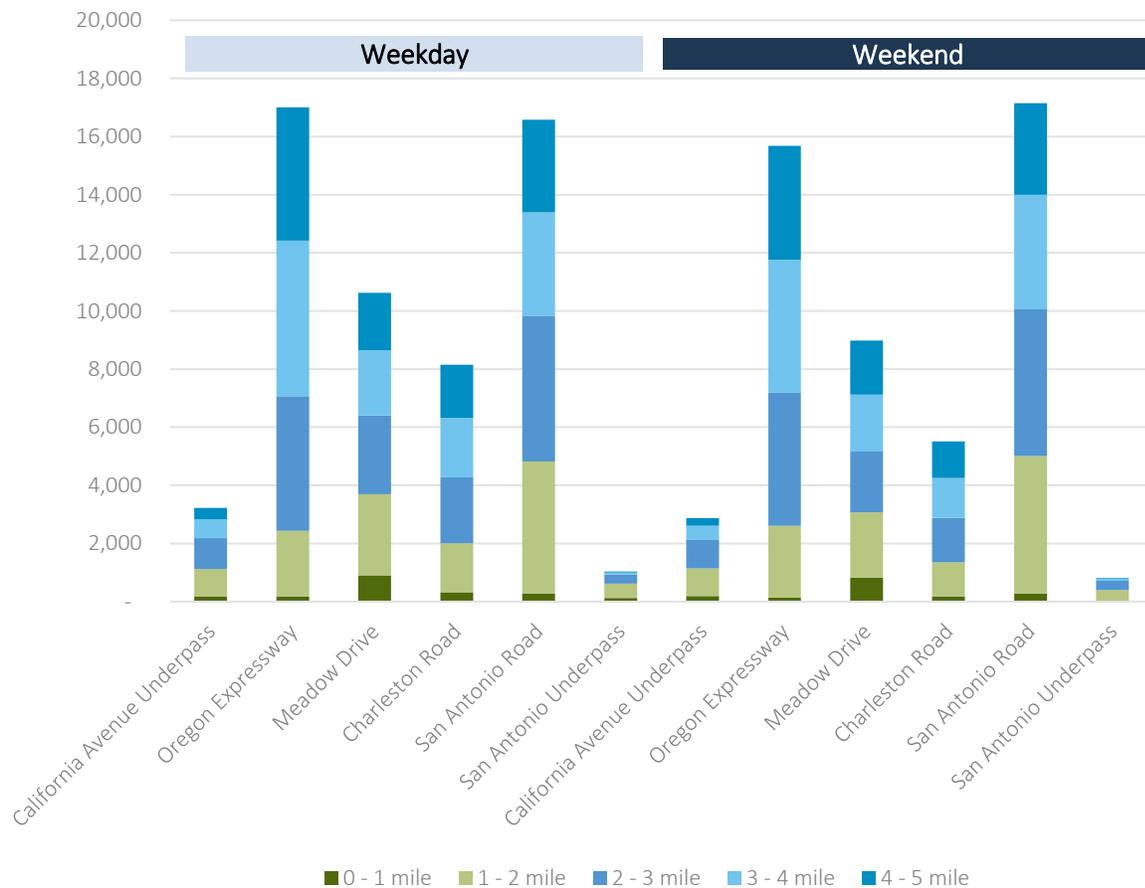
Of the existing crossing locations, Oregon Expressway/Page Mill Road and San Antonio Road serve the greatest numbers of existing person trips under five miles. Meadow Drive has the largest number of person trips under one mile in length.

Figure 21: Length of Person Trips (All Travel Modes) Crossing Caltrain Tracks in/near Study Area



Source: Replica, Spring 2024. Thursday and Saturday represent weekday and weekend conditions, respectively.

Figure 22: Daily Person Trips (All Travel Modes) under Five Miles by Crossing Location



Source: Replica, Spring 2024. Thursday and Saturday represent weekday and weekend conditions, respectively.

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## ORIGIN/DESTINATION PATTERNS

Figure 23 and Figure 24 show origin and destination areas with high concentrations of person trips for all travel modes under five miles that use the California Avenue Bike/Ped Tunnel, Oregon Expressway/Page Mill Road, Meadow Drive, Charleston Road, and San Antonio Caltrain Station Bike/Ped Underpass. This analysis highlights the potential for walking and biking trips by showing locations where shorter trips start and end.

For both weekdays and weekends, the highest concentrations of person trips under five miles are observed around the California Avenue Caltrain Station, along California Avenue, and at the San Antonio Center in Mountain View. Similarly, these areas also have the highest concentrations of shorter person trips for weekends. Within the Study Area limits, the Ventura Neighborhood show the highest concentration of shorter person trips.

Figure 23: Concentration of Person Trips (All Travel Modes) Under Five Miles - Weekday

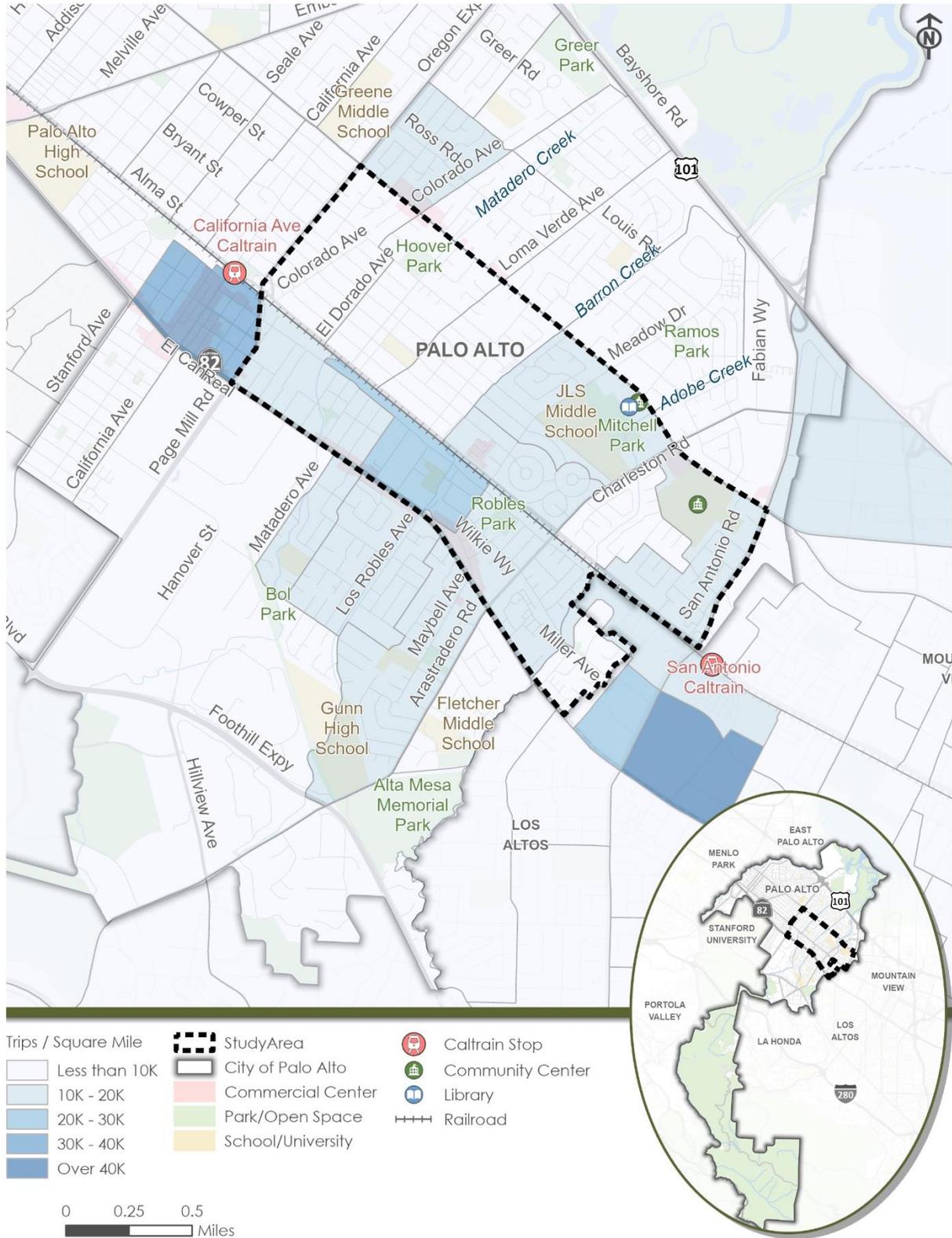
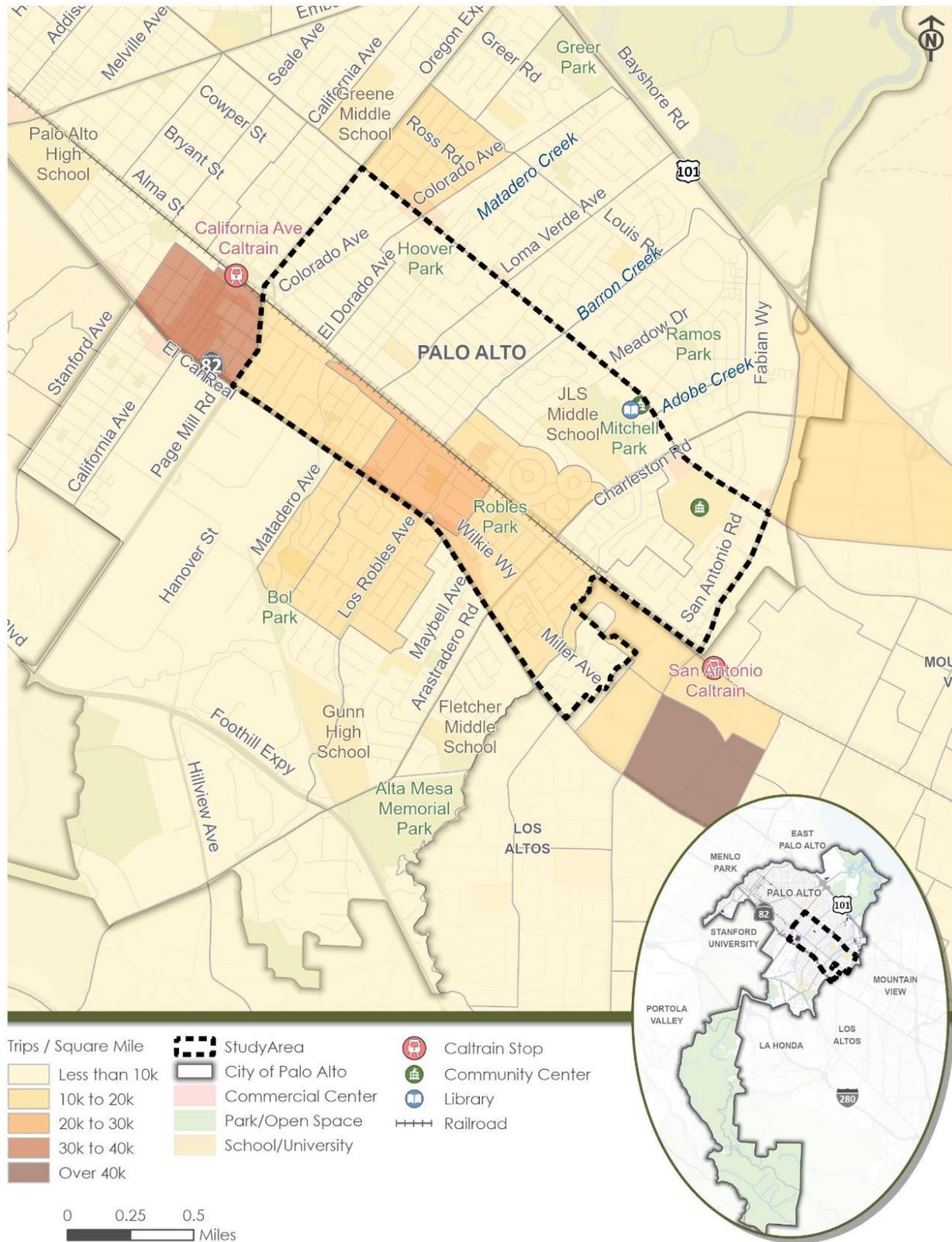


Figure 24: Concentration of Person Trips (All Travel Modes) Under Five Miles - Weekend

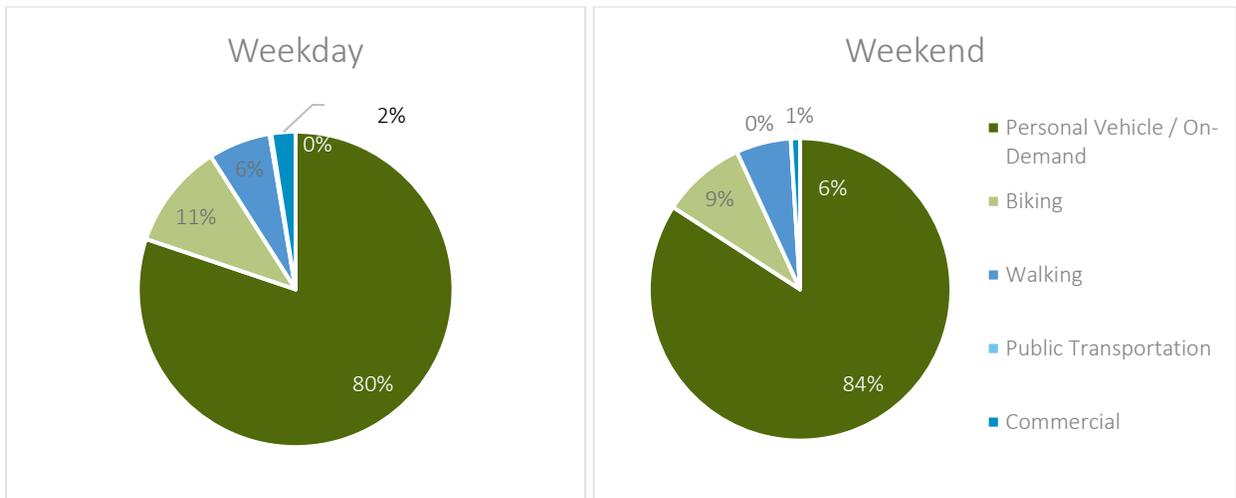


## TRAVEL MODE

Figure 25 summarizes the person trips by primary travel mode for the California Avenue Bike/Ped Tunnel, Oregon Expressway/Page Mill Road, Meadow Drive, Charleston Road, San Antonio Road, or San Antonio Ped/Bike Tunnel focusing on person trips that are less than five miles. This analysis includes all person trips crossing the railroad, including trips that do not begin or end within the Study Area. This analysis differs from Census analyses in that it includes all trip purposes, not just commute trips. The goal of this summary is to understand the relative share of person trips that are currently being completed by personal vehicle and the potential to increase walking and biking with a new rail crossing.

For person trips under five miles that cross the Caltrain corridor, over 80 percent are made by personal vehicle or on-demand services like Palo Alto Link, Uber, and Lyft. Walking and biking make up 17 percent and 15 percent of weekday and weekend person trips, respectively. This suggests there may be an opportunity to increase walking and biking activity if the City built an additional railroad crossing.

Figure 25: Person Trips under Five Miles by Travel Mode (Trip Percent)



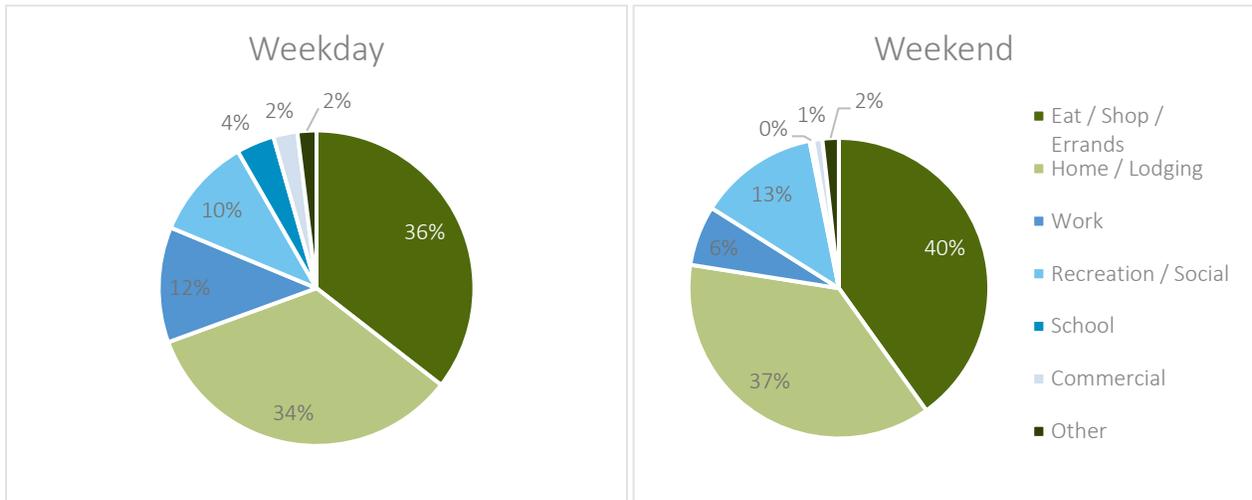
Source: Replica, Spring 2024. Thursday and Saturday represent weekday and weekend conditions, respectively.

Note: Commercial trips are those where delivery vehicles are used to carry freight goods.

## TRIP PURPOSE

Figure 26 summarizes the trip purpose for person trips for all travel modes under five miles that cross at the California Avenue Bike/Ped Tunnel, Oregon Expressway/Page Mill Road, Meadow Drive, Charleston Road, San Antonio Road, or San Antonio Ped/Bike Tunnel. The trip purpose is based on the activity completed at the end of the trip (e.g., a trip from home to school is classified as a “School” trip purpose). Person trips to eating/shopping/errand locations and person trips to home/lodging locations each account for over a third of person trips for weekdays and weekend periods. As expected, work and school person trips are lower on weekends versus weekdays. This analysis suggests that a new rail crossing may benefit a wide variety of person trip types beyond recreation and school trips.

Figure 26: Person Trips under Five Miles by Trip Purpose (Trip Percent)



Source: Replica Data, Spring 2024. Weekday representative of Thursday and Weekend representative of Saturday.  
Note: Commercial trips are trips where vehicles deliver freight goods. Includes large and small delivery vehicles.



## Section 10 Safety

# Safety

Collision data for the Study Area was evaluated to identify collision trends or locations with multiple collisions. Data was obtained through the Transportation Injury Mapping System (TIMS). TIMS reports injury collisions from the Statewide Integrated Traffic Records System (SWITRS) but excludes collisions that cause property damage only (PDO) and no injuries. It is important to note the limitations of the collision data. Not every collision is reported, and collision records are only as reliable as the person filling them out. Data like party race, party at fault, or the primary collision factor (PCF) are determined by the reporting officer.

The collisions analyzed occurred between January 1, 2018, and December 31, 2022. Injuries suffered by involved parties are categorized into four types:

- **Fatal:** This category refers to collisions where individuals involved in the incident sustained injuries that resulted in death.
- **Severe Injury:** This category includes collisions where individuals suffered significant injuries such as broken bones, severe lacerations, or injuries beyond what are classified as "visible injuries" according to the reporting officer's assessment.
- **Moderate Injury (Visible Injury):** This category encompasses collisions where individuals sustained injuries that are evident to observers at the collision scene, such as bruises or minor lacerations. These injuries are considered less severe than those in the severe injury category.
- **Minor Injury (Complaint of Pain):** This category pertains to collisions where individuals report experiencing pain or discomfort, even though there may not be any visible injuries. These injuries are categorized as complaints of pain and do not involve severe physical trauma or visible injuries.

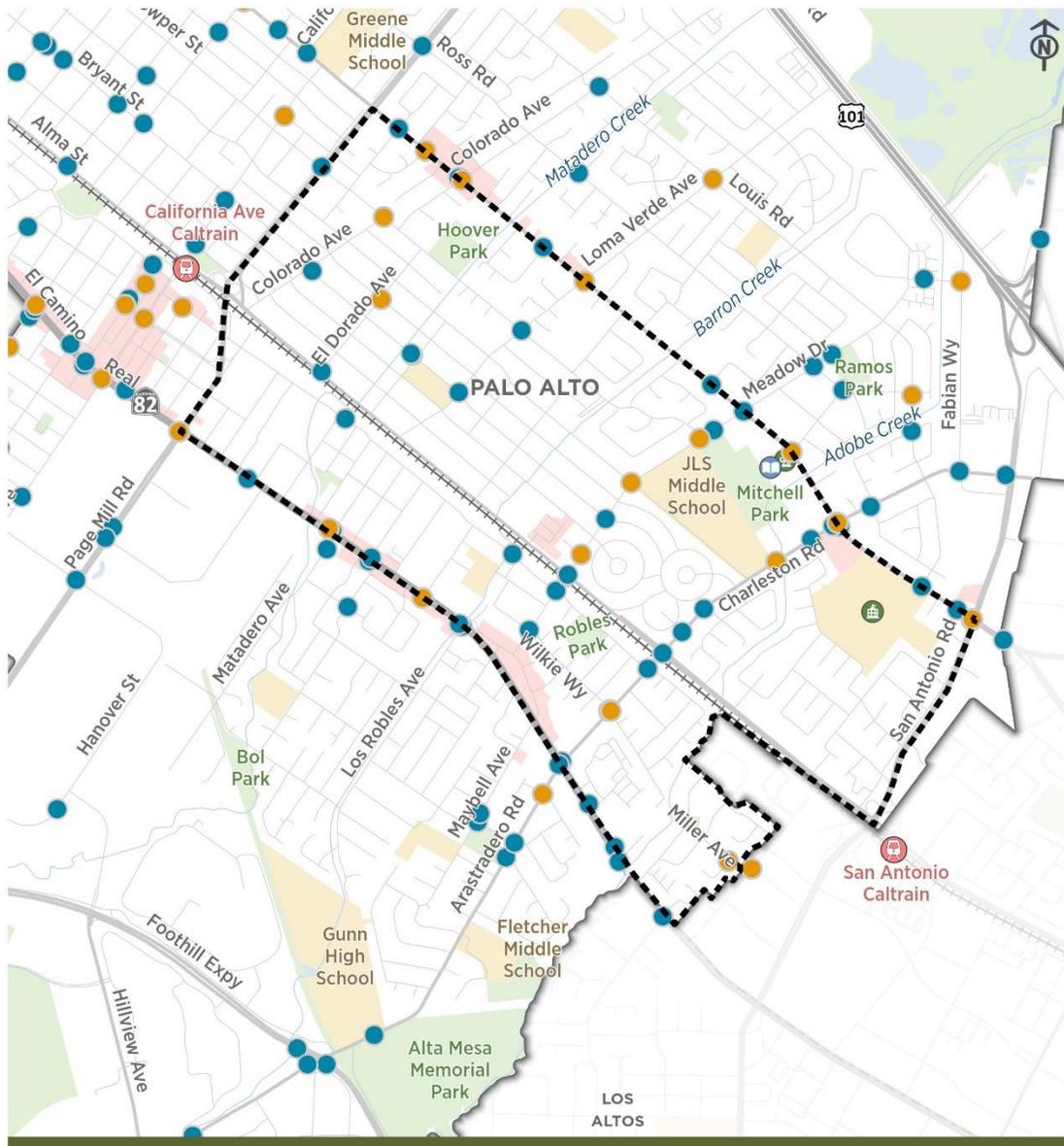
The Draft Safety Action Plan designates Oregon Expressway, Meadow Drive, Charleston Road, Middlefield Road, and El Camino Real as High-Injury Corridors due to their disproportionately high number of crashes.<sup>19</sup>

Figure 27 presents a five-year (2018 - 2022) overview of the pedestrian and bicyclist collision data. Over the five-year period, a total of 25 pedestrian and 61 bicyclist collisions were reported in the Study Area. These collisions represent 24% of pedestrian and bicyclist collisions for the City during the same period. Two fatal collisions and four serious injury collisions were reported. The fatal collisions occurred on Charleston Road near Herbert Hoover Elementary School and on El Dorado Avenue at South Court. For the severe injury collisions, two occurred on El Camino Real at Barron Avenue/Wilton Avenue, one occurred at San Antonio Road and Middlefield, and one occurred at Meadow Drive and Alma Street.

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<sup>19</sup> City of Palo Alto. Safety Action Plan DRAFT. December 2024. Retrieved from <https://www.cityofpaloalto.org/Departments/Transportation/Transportation-Projects/Safety-Action-Plan>

Figure 27: Pedestrian and Bicyclist Collisions (2018 – 2022)



- Pedestrian Collision
- Bicyclist Collision
- Study Area
- City of Palo Alto
- Commercial Center
- Park/Open Space
- School/University
- Caltrain Stop
- Railroad
- Community Center
- Library

0 0.25 0.5 Miles  
 Data Sources: City of Palo Alto, MTC



## Section 11 Environment

# Environment

Environmental and physical factors affecting the Study Area may also affect potential crossing opportunity locations. The following are some of the primary factors that will be considered throughout the Project. Additional evaluation will be completed in later phases of the Project as individual crossing locations are analyzed.

## WATER BODIES AND FLOOD RISK

A series of creeks and streams pass through the Study Area as they drain the local foothills into the San Francisco Bay.

- Matadero Creek runs east-west through the Study Area between Oregon Expressway/Page Mill Road and Loma Verde Avenue, passing Hoover Park.
- Barron Creek runs east-west through the Study Area between Loma Verde Avenue and Meadow Drive.
- Adobe Creek runs east-west through the Study Area between Charleston Road and San Antonio Road before turning north to cross under Charleston Road and continue past Mitchell Park.

The creeks have been heavily engineered over the past decades and now primarily serve a very important role as flood control channels. Partnerships with the Santa Clara Valley Water District (SCVWD) and other organizations will be required to consider any potential improvements to the creeks.

Figure 28 shows flood risk areas using the latest maps available from the Federal Emergency Management Agency (FEMA) portal. These maps categorize areas based on their associated flood risk levels. The Study Area falls within the Moderate Risk zone.

## GEOTECHNICAL HAZARDS

The Safety Element in the *City of Palo Alto Comprehensive Plan (2022)*<sup>20</sup> identifies areas that have a high risk for geotechnical hazards such as earthquake-induced landslides, soil liquefaction, and surface rupture along fault traces. The Study Area does not fall within any of these zones.

## WILDFIRE

Cal Fire maps Fire Hazard Severity Zones<sup>21</sup> for the state of California and has recently updated its maps for the Bay Area. The maps define very high, high, and moderate severity zones. The Study Area does not fall within any of these zones.

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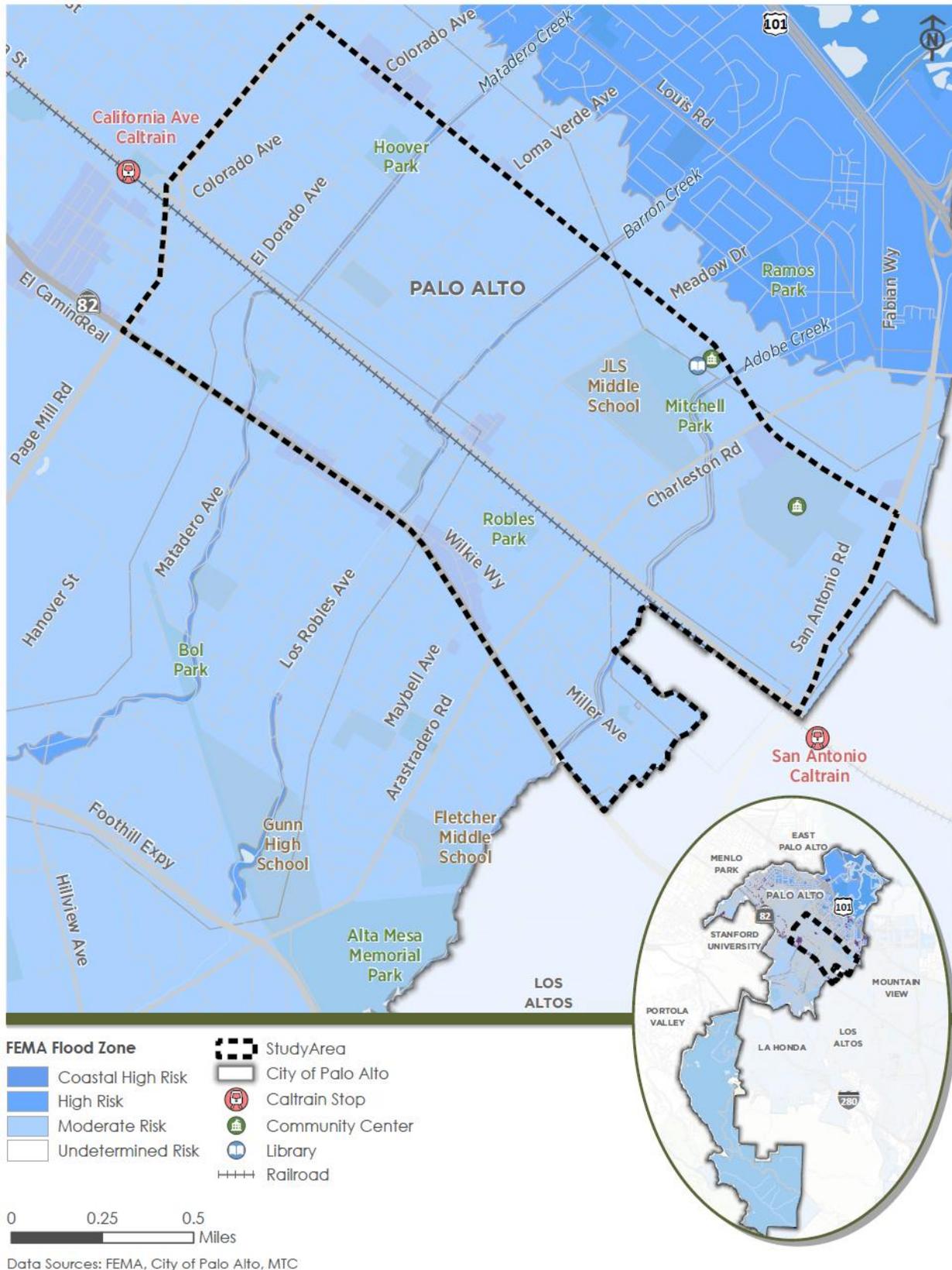
<sup>20</sup> City of Palo Alto Comprehensive Plan 2030: [https://www.cityofpaloalto.org/files/assets/public/v/4/planning-amp-development-services/3.-comprehensive-plan/comprehensive-plan/full-comp-plan-2030\\_with-dec19\\_22-amendments.pdf](https://www.cityofpaloalto.org/files/assets/public/v/4/planning-amp-development-services/3.-comprehensive-plan/comprehensive-plan/full-comp-plan-2030_with-dec19_22-amendments.pdf)

<sup>21</sup> <https://calfire.app.box.com/s/wahuw9ny7cgn89xpxh7092ur50r1pwwj/folder/308443211682>

## OVERHEAD UTILITIES

Based on the field visit conducted by the Project team, overhead utility lines are found along the Caltrain corridor but are not present along most streets in the Study Area. As mentioned earlier, the rail grade separation projects along the Caltrain corridor will further affect the location of utility lines. Any potential overcrossings will require coordination with utility providers to avoid potential conflicts. A more detailed review of utilities data (both above ground and underground) will be completed as part of the evaluation of potential crossing locations.

Figure 28: Flood Risk





## Section 12 Potential Crossing Locations

# Potential Crossing Locations

Based on the information presented in this Existing Conditions Report, the crossing opportunity locations, as shown in Figure 29 and described further below have been identified for further exploration. The crossing opportunity locations were identified based on the review of the following items:

- Previous plans and studies: Based on the literature review, the four locations (Matadero Creek, Loma Verde, El Carmelo Avenue, Adobe Creek and San Antonio Road) are areas where community have expressed interest in additional bike and pedestrian crossings. The *Midtown Connector Feasibility Study* evaluated Matadero Creek, Loma Verde and El Carmelo Avenue. Community feedback on the 2012 *BPTP and Rail Corridor Study* included Adobe Creek and San Antonio Road.
- Preliminary review of right-of-way (ROW) constraints: Figure 30 shows GIS data for the Caltrain ROW and easements, along with parcel boundaries used for an initial review. Since the GIS data may not precisely reflect actual property lines, a field survey will be conducted before the design phase to confirm property boundaries.
- Field review: An on-site assessment to evaluate ROW constraints along the railroad corridor and identify preliminary crossing opportunities was conducted. A summary of observations and key findings from each site visit stop is provided in Appendix D.

Below are several crossing opportunity locations that have been identified for further exploration in this Project.

**A. Near Colorado Avenue and Page Mill Road:** This location is near California Avenue Caltrain Station, making it a strategic point for improving multimodal connectivity. It is also near NVCAP, the planned transit-oriented, mixed-use neighborhood within the North Ventura neighborhood, which is expected to generate increased pedestrian and bicycle activity.



Alma Street at Oregon Expressway

**B. Around Matadero Creek (El Dorado Avenue to Loma Verde Avenue):** Situated equidistant between two existing railroad crossings at California Avenue and Meadow Drive, this location presents an opportunity to significantly reduce travel distances for pedestrians and bicyclists. The presence of Matadero Creek offers potential for integrating a dedicated bicycle and pedestrian path along the creek, creating a seamless connection between residential neighborhoods and key destinations along Park Boulevard.



Matadero Creek

**C. Near Barron Creek:** This location could leverage Barron Creek as a natural corridor for a new bicycle and pedestrian crossing. Exploring options for a pathway along the creek could provide a safe, off-street alternative for non-motorized users. Additionally, on-street parking along El Verano Avenue could be repurposed to accommodate crossing infrastructure, ensuring minimal disruption while maximizing connectivity.



El Verano Avenue at Alma Street

**D. Between Meadow Drive and Charleston Road:** A crossing at this location would provide direct access to Robles Park, benefiting local residents and enhancing recreational connectivity. This area also serves as a gateway to nearby community destinations, such as JLS Middle School and Alma Village.



Lindero Drive at Alma Street

**E. Near Adobe Creek:** A bicycle and pedestrian path could be developed along Adobe Creek, utilizing existing open space to create a scenic and functional crossing. This would connect residential neighborhoods with Park Boulevard and nearby schools, parks, and retail areas.



Adobe Creek

**F. Near San Antonio Road:** This location would utilize the existing San Antonio Road overpass to accommodate bicycle and pedestrian movements. By upgrading the overpass with dedicated bike lanes, widened sidewalks, or improved signage, this crossing could provide a safe and efficient route across the railroad corridor. Given its location near the San Antonio Caltrain Station, this improvement would enhance first- and last-mile connectivity for transit users.



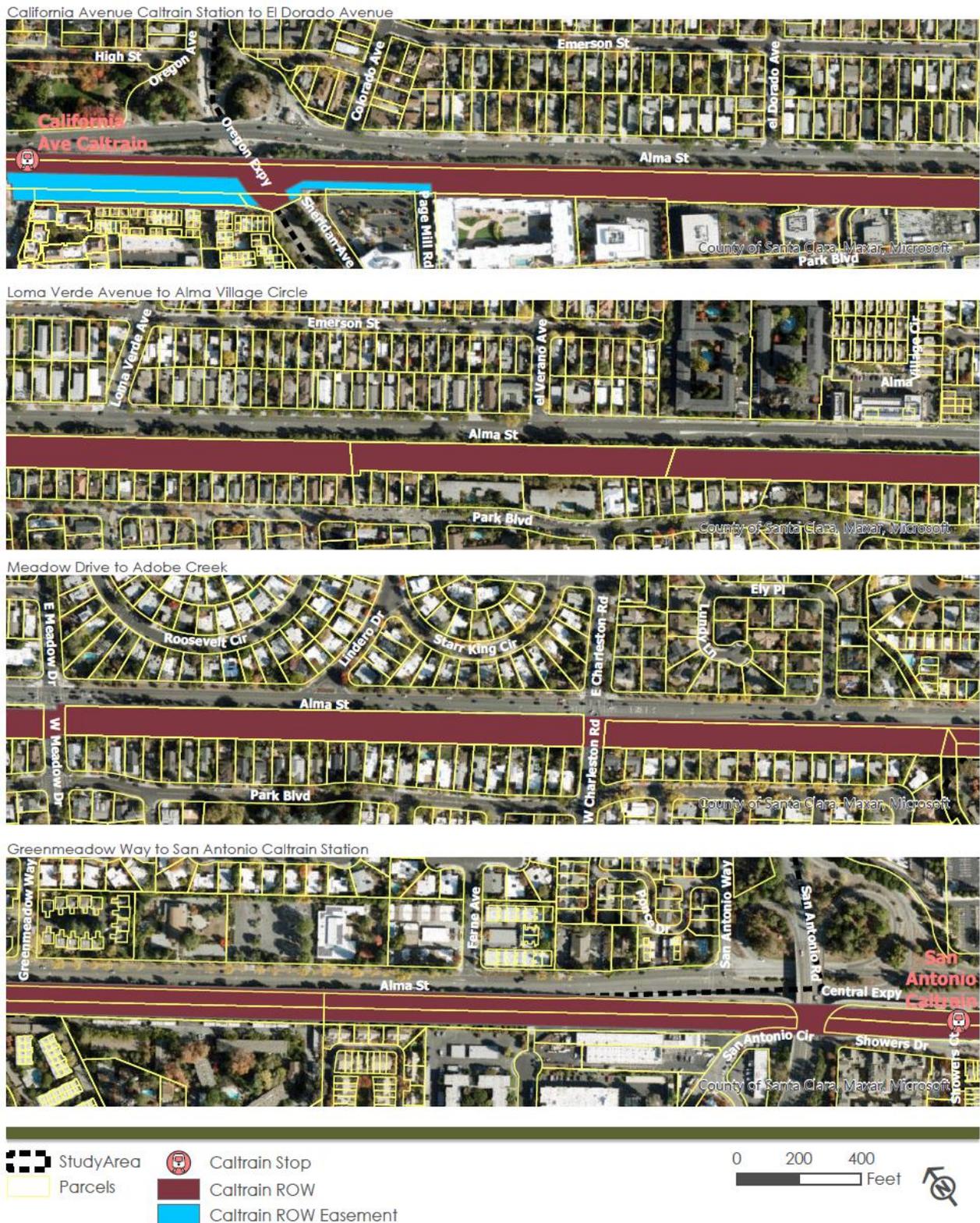
San Antonio Road

Figure 29: Potential Crossing Locations



Source: Circlepoint 2025, Kittelson & Associates, Inc. 2025, City of Palo Alto

Figure 30: Caltrain, Public and Private Right of Way



Data Sources: City of Palo Alto, Caltrain, MTC



Section 13  
Appendices

## Appendix A: Literature Review Memorandum

# TECHNICAL MEMORANDUM

April 1, 2025

Project# 30555

To: Charlie Coles, City of Palo Alto

From: Kittelson & Associates, Inc.

RE: South Palo Alto Bike/Ped Connectivity – Literature Review

## Literature Review

Kittelison reviewed the documents identified to develop an understanding of the planning context and prior efforts completed within the study area. The purpose of this memorandum is to provide a synthesis and summary of existing plans, programs, and policies from recent documents. This will help develop an understanding of the policy and planning environment for walking and biking in Palo Alto.

## Document List

The following Table 1 lists the relevant documents and programs that were reviewed, summarized, and synthesized for this task.

**Table 1. List of Documents Reviewed**

No.	Document Name	Year of Adoption
1.	City of Palo Alto Comprehensive Plan	2017
2.	City of Palo Alto Comprehensive Plan Update	2022
3.	City of Palo Alto Sustainability and Climate Action Plan	2022
4.	City of Palo Alto Housing Element Update	2024
5.	City of Palo Alto Bicycle and Pedestrian Transportation Plan	2012
6.	City of Palo Alto Bicycle and Pedestrian Transportation Plan Update	In progress
7.	City of Palo Alto Safe Streets for All Plan	In progress
8.	City of Palo Alto San Antonio Road Corridor Area Plan	In progress
9.	City of Palo Alto North Venture Coordinated Area Plan	2024
10.	City of Palo Alto Midtown Connector Feasibility Study	2016
11.	City of Palo Alto Parks, Trails, Natural Open Space and Recreation Master Plan	2017
12.	City of Palo Alto El Camino Real Master Planning Study	Public Review Draft 2007
13.	City of Palo Alto Rail Corridor Study	2013
14.	Connecting Palo Alto Website	--

15.	Expanded Community Advisory Panel (XCAP) on Grade Separations Report for Palo Alto	2021
16.	Palo Alto's Local Road Safety Plan by VTA	2022
17.	Santa Clara Countywide Bicycle Plan	2018
18.	2050 Plan Bay Area	2021
19.	VTA Bicycle Technical Guidelines	2022
20.	VTA Bicycle Superhighway Implementation Plan	2021
21.	VTA 2025 Transit Service Plan	2024
22.	Caltrans District 4 Bike Plan	2018
23.	Caltrans District 4 Pedestrian Plan	2021
24.	Grand Boulevard Initiative	2006
25.	California High Speed Rail Website	--
26.	Caltrain Corridor Crossing Delivery Guide	2024
27.	Caltrain Electrification Project Website	--
28.	Californians Advocating for Responsible Rail Design (CARRD)	--
29.	Peninsula Rail Program	--
30.	Palo Alto Intermodal Transit Center	--
31.	Mountain View 2015 Bicycle Transportation Plan	2015
32.	Mountain View 2014 Pedestrian Master Plan	2014
33.	Mountain View 2019 El Camino Real Streetscape Plan	2019
34.	Los Altos Complete Streets Master Plan: Active Transportation Framework	2022
35.	Los Altos Hills Countywide Trails Master Plan Map Update Project	2023

## Topics and Key Themes

The following relevant topics were reviewed and summarized for each document and overall themes within each topic and across all reviewed documents are synthesized in this section.

- Vision and goal statements
- Existing policies and programs related to active transportation
- Established needs, issues, and concerns raised in the study
- Current/planned projects coming from the study
- Community feedback captured in the document

Key themes from this review are presented in this section.

## Vision and Goals

There is strong alignment among the vision and goals established in the documents reviewed, particularly surrounding sustainability and climate action. For example, the 2012 Palo Alto Bicycle and Pedestrian Transportation Plan supports the goals identified in the City of Palo Alto Comprehensive Plan and reflects specific targets mentioned in the 2007 Palo Alto Climate Protection Plan.

Common themes around vision and goals from the review of these plans include:

- Increasing biking and walking trips for all purposes
- Connecting multi-modal networks for walking, biking, and transit
- Developing a network of bikeways, pathways, and traffic-calmed streets that connect various business districts, residential areas, open spaces, parks, and schools
- Constructing and maintaining safe and accessible streets for walking and biking to all modes and people of all ages and abilities
- Reducing the number, rate, and severity of bicycle and pedestrian collisions citywide
- Reducing bicycle and vehicular conflicts at transit stops
- Maintaining a high-quality active transportation system and reducing gaps in pedestrian and bicycle networks
- Improving the aesthetics and quality of walkways, bike paths, and corridors to attract more walking and biking trips
- Increasing active transportation options and reducing the overall vehicle miles traveled
- Reducing barriers to bicycling and walking at freeway interchanges, expressway intersections, and railroad grade crossings
- Enhancing pedestrian and bicycle crossings at key locations across physical barriers
- Ensuring the highest possible safety at rail crossings while mitigating impacts on neighborhoods, schools, and public facilities
- Ensuring access for all ages, abilities, and underserved communities while prioritizing equity areas
- Improving Caltrain system performance to reduce noise, improve air quality, and lower greenhouse gas emissions
- Increasing opportunities for community feedback and implementing a formal feedback process

## **Policies and Programs**

Most of the policies and programs mentioned in each plan aim to promote the goals and vision of that specific plan. They are also in line with the vision of similar plans that promote non-motorized transportation.

For instance, the 2030 City of Palo Alto Comprehensive Plan introduced policies that focus on pursuing grade separation of rail crossings along the rail corridor (Policy T-3.15); keeping existing at-grade rail crossings open for pedestrians and bicyclists with safety studies (Policy T-3.16); improving existing at-grade rail crossings for safety and accessibility (Policy T-3.17); improving safety and minimize adverse noise, vibrations and visual impacts of operations in the Caltrain rail corridor on adjoining districts, public facilities, schools and neighborhoods with or without the addition of High Speed Rail (Policy T-3.18); coordinating proactively with the California High Speed Rail Authority and Caltrain to minimize negative impacts and maximize benefits to Palo Alto from any future high speed rail service through Palo Alto (Policy T-3.19); working with Caltrain

to increase safety at train crossings, including improving gate technology and signal coordination (Policy T-6.3); continuing the Safe Routes to School partnership with PAUSD and the Palo Alto Council of PTAs (Policy T-6.4); supporting regional bicycle and pedestrian plans including development of the Bay Trail, Bay-to-Ridge Trail and the Santa Clara County Countywide Bicycle System (Policy T-8.8); minimizing noise spillover from rail related activities into adjacent residential or noise-sensitive areas (Policy N-6.13).

Some programs directly support these policies, including evaluating the implications of grade separation on bicycle and pedestrian circulation (Program T3.15.2); identifying near-term safety and accessibility improvements at crossings through studies like the Palo Alto Avenue crossing study (Program T3.17.1); working with Caltrain to ensure that the rail tracks are safe and secure with adequate fencing and barriers (Program 13.17.2); providing adult crossing guards at school crossings that meet established warrants (Program T6.4.3); improving pedestrian crossings by creating protected areas, enhancing visibility, and incorporating design tools such as bulb-outs, small curb radii, and high-visibility crosswalks (Program T6.6.6); and reducing barriers to walking and bicycling at railroad grade crossings, freeway interchanges, and expressway intersections (Program T8.8.1); encouraging the Peninsula Corridors Joint Powers Board to pursue technologies and grade separations that would reduce or eliminate the need for train horns/whistles in communities served by rail service (Program N6.13.1); evaluating changing at-grade rail crossings so that they qualify as Quiet Zones based on Federal Railroad Administration (FRA) rules and guidelines in order to mitigate the effects of train horn noise without adversely affecting safety at railroad crossings (Program N6.13.2); participating in future environmental review of the California High-Speed Rail (HSR) Project, planned to utilize existing Caltrain track through Palo Alto, to ensure that it adheres to noise and vibration mitigation measures (Program N6.13.3). These policies and programs are in line with the goals and visions of the Comprehensive Plan.

The 2024 City of Palo Alto North Venture Coordinated Area Plan adopts the Transit-Oriented Communities (TOC) Policy. The Metropolitan Transportation Commission's (MTC's) regional TOC policy update aims to support the region's transit investments by fostering communities around transit stations and along transit corridors. These communities are designed to not only increase transit ridership but also serve as places where Bay Area residents of all abilities, income levels, and racial and ethnic backgrounds can live, work, and access essential services, such as education, childcare, and healthcare. The TOC policies apply to Priority Development Areas (PDAs) served by fixed-guideway transit, such as the California Avenue Station (Caltrain). PDAs that comply with

TOC policies are eligible for grant funding administered by the MTC.

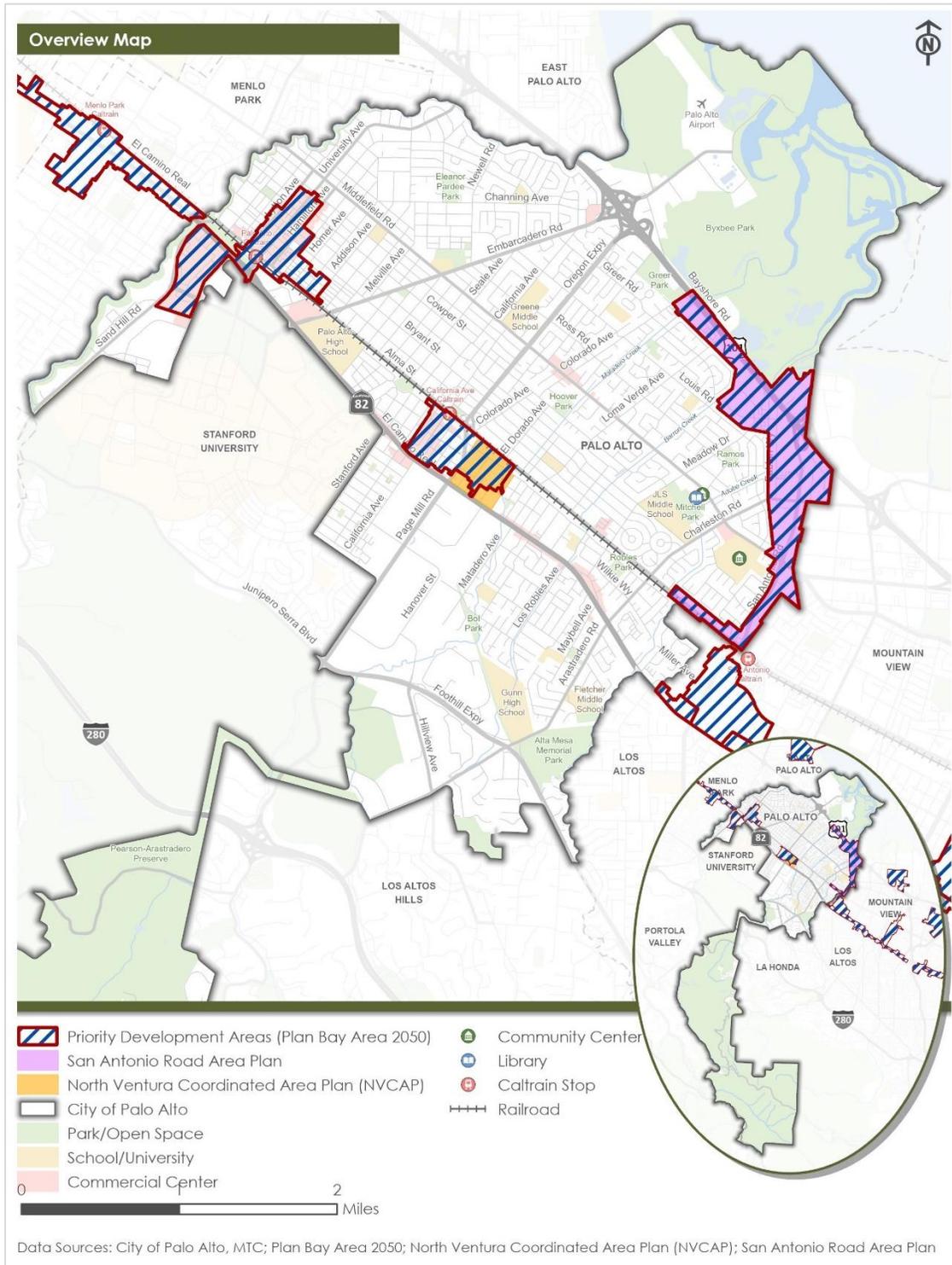
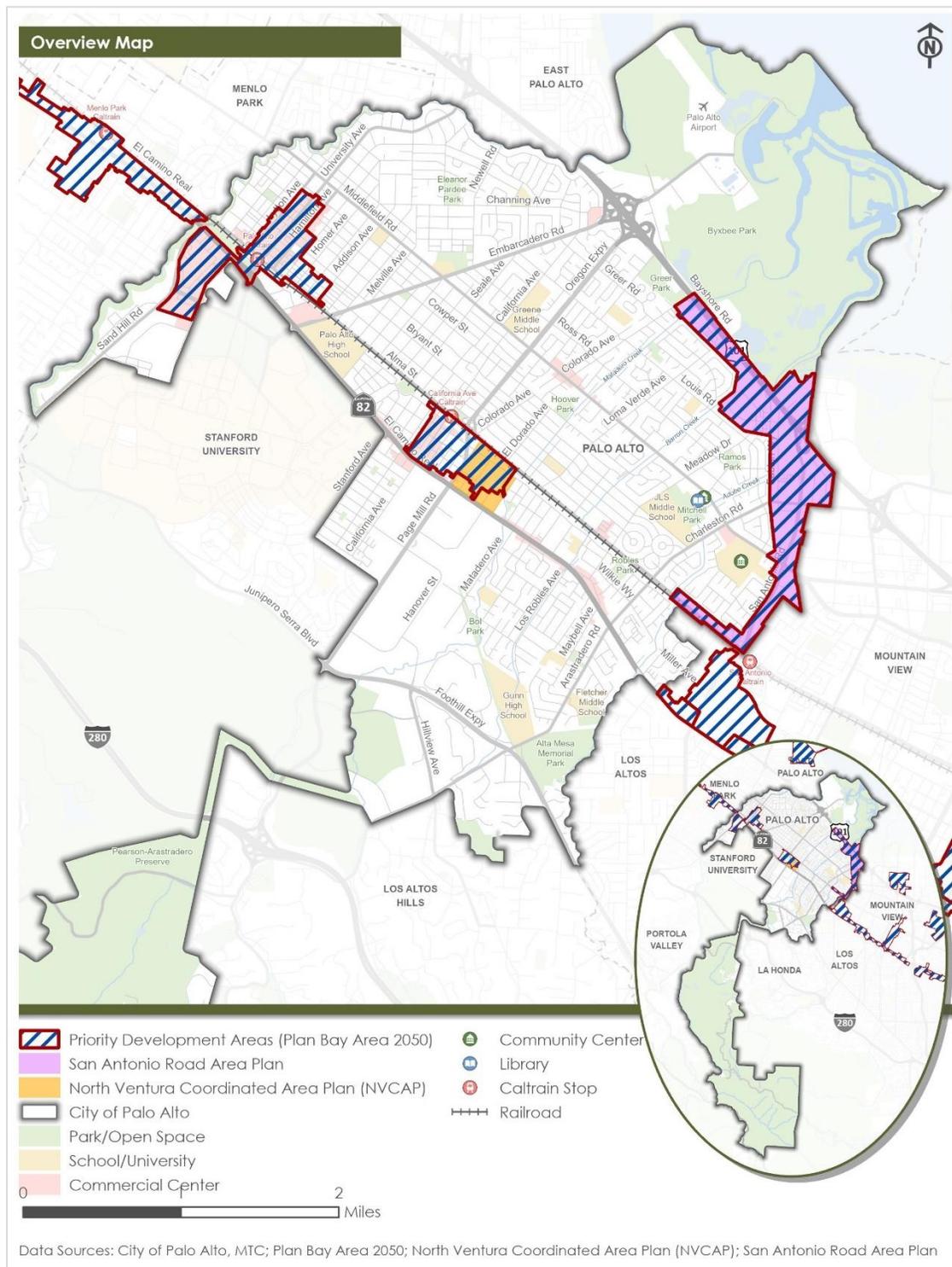


Figure 1 shows the NVCAP area, Palo Alto's priority development areas, and San Antonio Road Area Plan boundary.



**Figure 1. NVCAP area, Palo Alto’s priority development areas, and San Antonio Road Area Plan boundary.**

The rezoning changes adopted as part of the City’s 2023-2031 Housing Element update substantially increase the capacity for development along San Antonio Road with an objective to create cohesive mixed-use neighborhoods with safe access to transportation, employment,

services, and third places (public spaces such as parks, libraries and community centers, and privately owned spaces like churches, cafés, fitness centers and entertainment venues). The San Antonio Road Area Plan (in progress) will establish goals, policies, and implementation programs for land use, transportation, critical infrastructure and other improvements that will support the redevelopment of the PDA surrounding San Antonio Road.

The 2012 Bicycle and Pedestrian Transportation Plan (2012 BPTP) identified a proposed network of bikeways, pedestrian paths, and crossings to address gaps in the existing system and promote active transportation. The recommendations included the following:

- Maintaining Class I trails from the 2003 Plan and adding new projects, including sidepaths along key corridors, supports recent efforts by the San Francisquito Creek Joint Powers Authority to design and build a trail along the Palo Alto side of the creek from Alma Street to Chaucer Road, and modify or replace unnecessary trailhead and barrier crossing obstacles to improve Class I path convenience for larger bicycles and families
- Improving substandard Class II bike lanes by addressing potential “dooring” issues adjacent to parked cars or where gutter pans affect the functionality of curbside bike lanes, adding innovative green colorization and markings for visibility, and proposing new bike lanes on key arterials like Middlefield Road and El Camino Real
- Implementing sharrows and signage for Class III shared roadways for major arterial routes such as Alma Street, El Camino Real, Embarcadero Road, and San Antonio Road, and improve bicycling comfort along San Antonio Road by providing wider shoulders and parking restrictions as part of an upcoming paving and median replacement project
- Removing unnecessary stop signs on bicycle boulevard corridors and upgrading pavement conditions, focusing implementation on specific bicycle boulevard corridors, and interim Bike Route signage on future bicycle boulevards citywide
- Enhancing bicycle connections with neighboring jurisdictions and creating enhanced bikeways and crossings
- Implementing across-barrier connections to improve pedestrian and bicycle access to key destinations while addressing potential implementation challenges and prioritizing alternatives.
- Implementing intersection improvements including a variety of markings, curb extensions, and signalization changes to improve bicyclist and pedestrian visibility in key locations.

Figure 2 and Figure 3 show the proposed bicycle network and the proposed bicycle boulevard in the 2012 BPTP, respectively. The BPTP Update will recommend implementation of the alignments identified in this study.

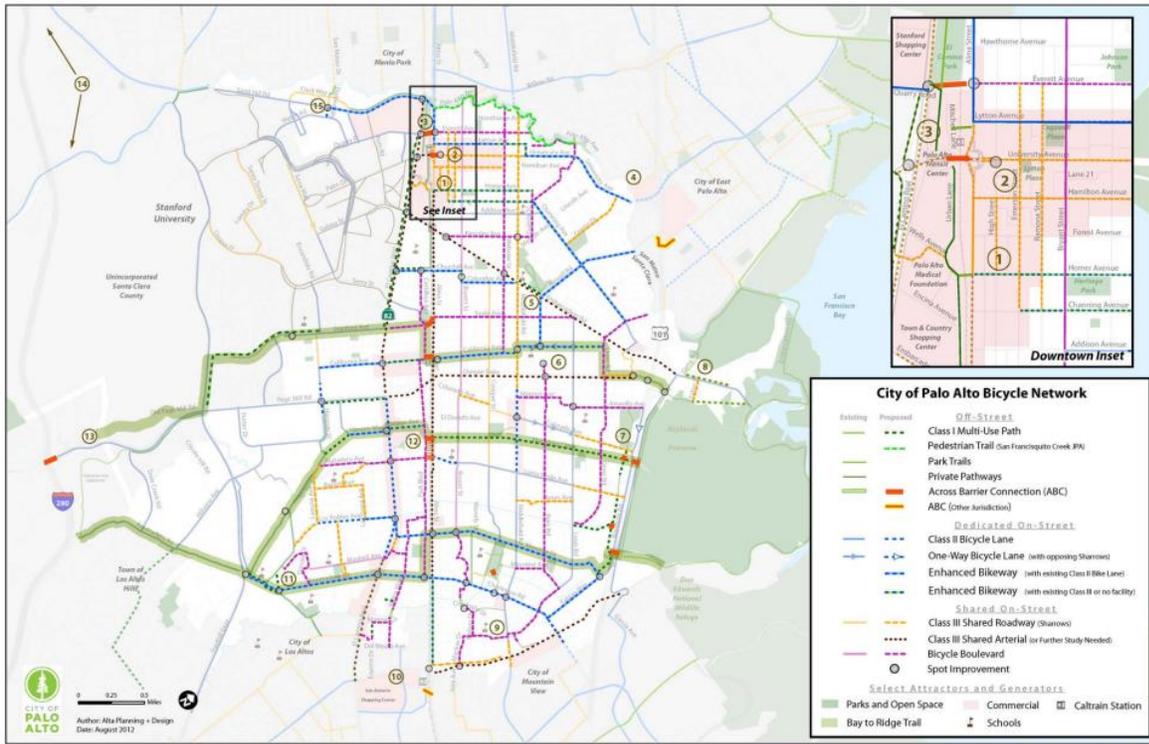


Figure 2. Palo Alto 2012 BPTP Bikeway Network

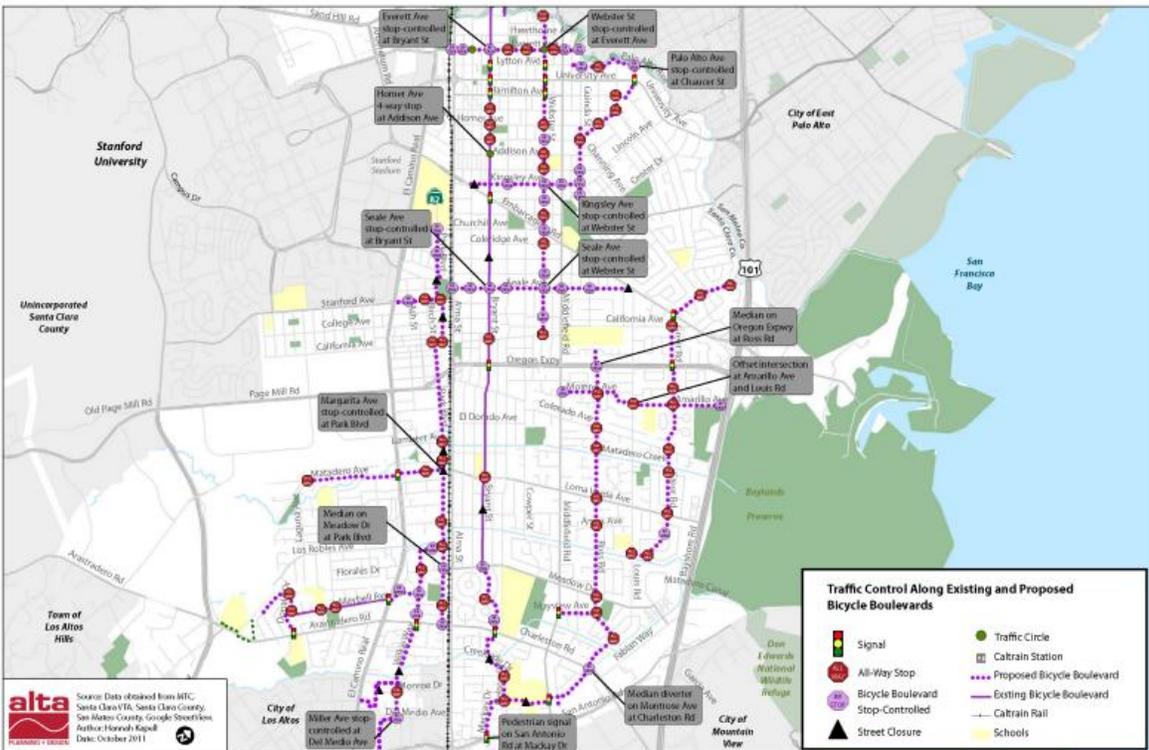


Figure 3. Palo Alto 2012 BPTP Bicycle Boulevard Network

The Midtown Connector Feasibility Study evaluates three viable alignments to enhance bicycle and pedestrian connectivity in Palo Alto including the Matadero Creek Shared-Use, the Matadero

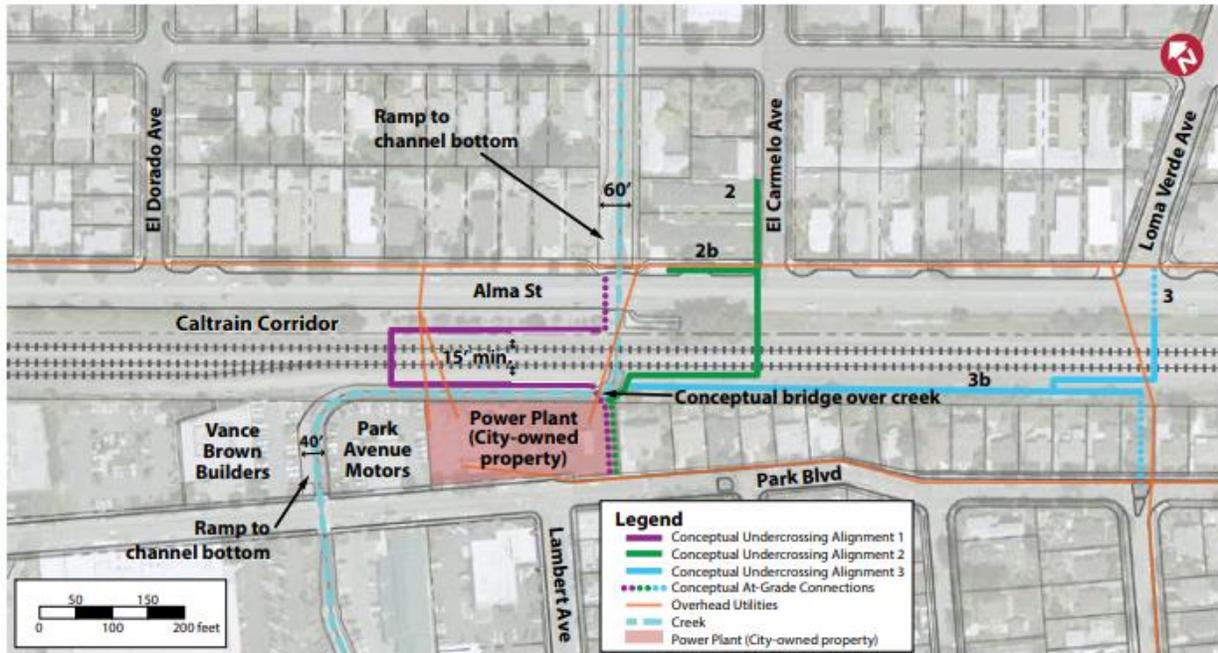
Creek Pedestrian-Only Path, and the Loma Verde Avenue Class IV Protected Bikeway. The study further explores how a trail facility along Matadero Creek could connect to existing bicycle and pedestrian networks, despite significant barriers such as US 101 and the Caltrain corridor. Potential solutions include utilizing existing and proposed crossings (e.g., Oregon Avenue and Adobe Creek), building a new undercrossing or overcrossing of Alma Street and the Caltrain tracks, or enhancing the current US 101 undercrossing. Three alignments for undercrossing were proposed (Figure 4):

1. Alignment 1: An at-grade crossing of Alma Street at Matadero Creek, followed by an undercrossing of just the Caltrain right-of-way. The ramps for this undercrossing would run parallel to the train tracks and the west side could exit through an existing City-owned power transmission property. This alignment is unlikely because of the constraints for developing a trail along Segment A of Matadero Creek. At Alma Street, maintenance access ramps make a creek trail infeasible.
2. Alignment 2: A ramp down from El Carmelo Avenue to a tunnel under the Caltrain tracks, similar to the ramp on N. California Avenue. Similar to Alignment 1, the tunnel would exit at the power plant where an at-grade pedestrian and bicycle connection would be provided. Alternatively, a ramp could be located along Alma Street on the north side between Matadero Creek and El Carmelo Avenue shown as Alignment 2b.
3. Alignment 3: At-grade crossing of Alma Street followed by an undercrossing of the Caltrain right-of-way. It is likely that this alignment would require right-of-way purchase where the tunnel daylights

The conceptual under crossing configuration for the three alignments is shown in Figure 5. The feasibility analysis for three alignments in Midtown Palo Alto identifies varying degrees of feasibility for each option. A shared-use path will accommodate the most user diversity and provide a recreational path that is largely protected from motor vehicle travel, but faces high costs, right-of-way challenges, and public safety and privacy concerns. A pedestrian-only path would be easier to implement at lower cost but shares similar public concerns. A Class IV bikeway on Loma Verde Avenue provides a cost-effective bicycling connection through Midtown Palo Alto without additional right-of-way needs but poses challenges with numerous driveway that must be crossed and limited pedestrian infrastructure improvements.



Figure 4. Midtown Connector Feasibility Study Potential Alignments



**Figure 5. Conceptual Undercrossing Configuration Under Caltrain Corridor In The Vicinity Of Matadero Creek**

The 2018 Santa Clara Countywide Bike Plan proposed policies that focus on leveraging development to build bicycle infrastructure by ensuring existing and new development supports bicycling (Policy 1B); supporting bicyclist safety and traffic laws through equitable enforcement and improved driver education (Policy 2C); improving bicycle access to transit by funding and constructing transit-connected bikeways (Policy 4A); and supporting safe and convenient interactions between bicyclists and transit vehicles, including providing adequate bicycle storage on-board transit vehicles (Policy 4C).

The 2014 Mountain View Pedestrian Master Plan introduced programs and policies such as accommodating all transportation modes in the design and construction of transportation projects to safely meet the needs of all users, including pedestrians, bicyclists, transit riders, motorists, and persons of all abilities (Policy 1.2); promoting pedestrian improvements that increase connectivity, provide placemaking opportunities, and foster a greater sense of community (Policy 1.3); improving universal access within private developments, public transit facilities, programs, and services (Policy 2.1); providing a safe and comfortable pedestrian network (Policy 3.1); increasing connectivity through safe pedestrian connections to public amenities, neighborhoods, and other destinations (Policy 3.2); and enhancing pedestrian crossings at key locations across physical barriers (Policy 3.3).

These existing programs and policies mentioned in the relevant plans are consistent with and will be reflected in the alternatives developed for this study.

## Needs and Challenges

Common themes surrounding needs and challenges per review of the plans include:

- Providing safe and accessible east-west bicycle connections at Charleston Road and Meadow Drive, which are critical for school commuters and community access
- Addressing congestion and safety at at-grade railroad crossings due to increased train frequency from Caltrain electrification and future High-Speed Rail (HSR) integration
- Ensuring railroad crossings are optimized for bicyclists by improving track angles, surface smoothness, gap between the flangeway and roadway, and closing bike paths at night
- Removing railroad tracks at intersections from abandoned rights-of-way, with priority given to streets with higher bicycle volumes
- Balancing 24-hour access on bike paths with safety, enforcement, and maintenance considerations, including inconsistent hours and trail safety at night
- Mitigating traffic congestion and safety impacts caused by frequent train gate closures during peak hours at at-grade crossings
- Enhancing pedestrian and bicycle crossings at major barriers, including railroad tracks, Alma Street, and El Camino Real, to improve safety and connectivity
- Improving safety for students and residents who must cross heavily trafficked streets or the rail corridor to access schools, parks, and other amenities
- Finding community-supported solutions for grade separation while securing funding, regulatory approvals, and addressing design challenges
- Reducing traffic stress for “interested but concerned” bicyclists by providing separated and lower-stress facilities at crossings and throughout the network
- Managing safety risks at rail crossings while balancing increased train frequencies and ensuring the community’s transportation needs are met
- Maintaining transit systems in good condition by addressing operational needs and ensuring state of good repair through fleet and facility upgrades
- Uncertainty of funding opportunities
- Failure to yield to pedestrians on the roadway
- Bicycle theft

## Plans and Projects

Relevant projects and planning studies recommended in the prior and in progress plans reviewed for this study are presented in this section.

- Roadway and intersection improvements, including full grade separations for automobiles, pedestrians, and bicyclists at Caltrain crossings; retrofitting and improving existing grade-separated crossings for pedestrians and bicyclists at California Avenue and University Avenue; and constructing new pedestrian and bicycle grade-separated crossings in South Palo Alto and North Palo Alto including:

- Churchill Avenue, alternatives included a Viaduct (Figure 6), a closure with traffic mitigations, and two bike/pedestrian tunnel options. A community-generated "Partial Underpass" alternative would depress Churchill on the west side of the tracks, allowing north/south turns onto Alma but restricting crossing. From the east side of Alma, traffic traveling westbound towards Alma could only turn right to head north on Alma



**Figure 6. Churchill Avenue Viaduct on Viaduct Structure (Churchill Avenue and Alma Street Intersection)**

- Churchill Avenue Partial Underpass, it would separate Churchill Avenue from the current Caltrain tracks via an underpass. However, there would no longer through traffic on Churchill Avenue east of Alma; instead, it would form a T-intersection (Figure 7)



**Figure 7. Churchill Avenue Partial Underpass**

- Meadow Drive and Charleston Road, alternatives including a viaduct, a trench, and a hybrid (raised berm) solution (Figure 8)



**a- Proposed Viaduct Solution**



**b- Proposed Hybrid Solution**



**c- Proposed Trench Solution**

**Figure 8. Meadow Drive Proposed Solutions**

- Palo Alto Grade Separation Planning Study: Meadow Drive and Charleston Road underpass plan (Figure 9)

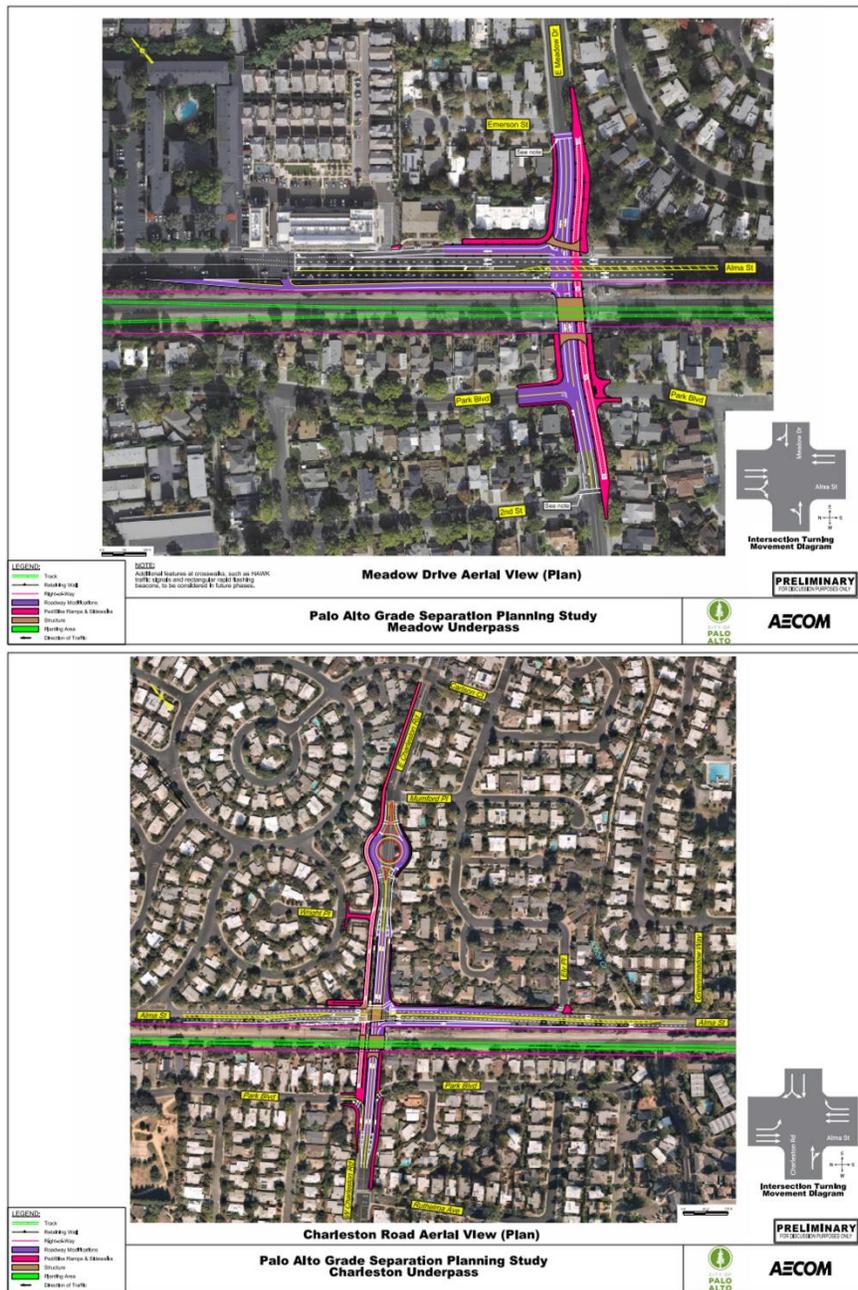
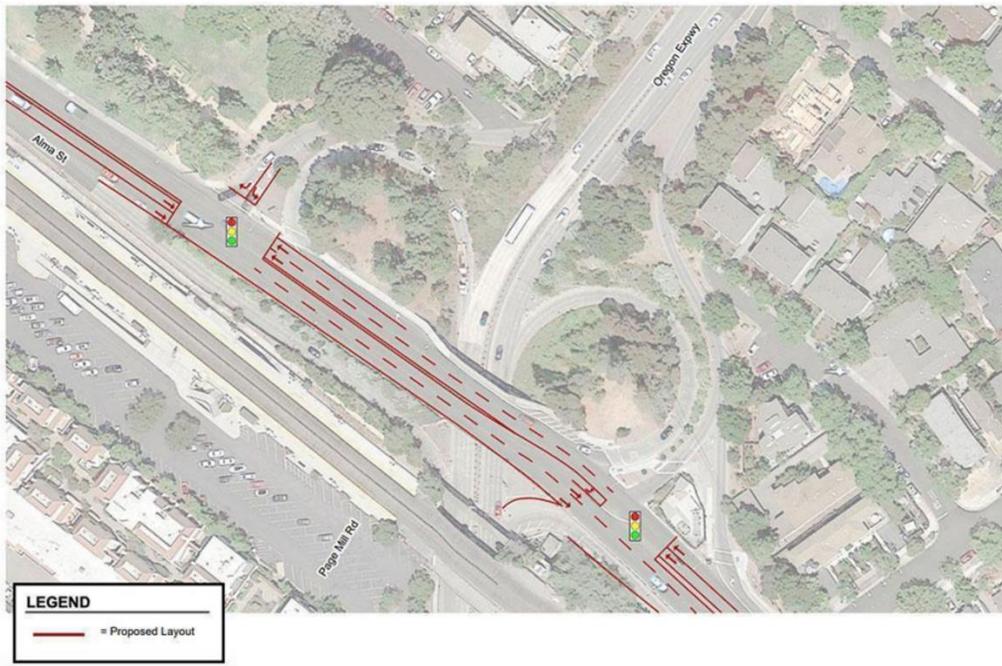


Figure 9. Palo Alto Grade Separation Planning Study

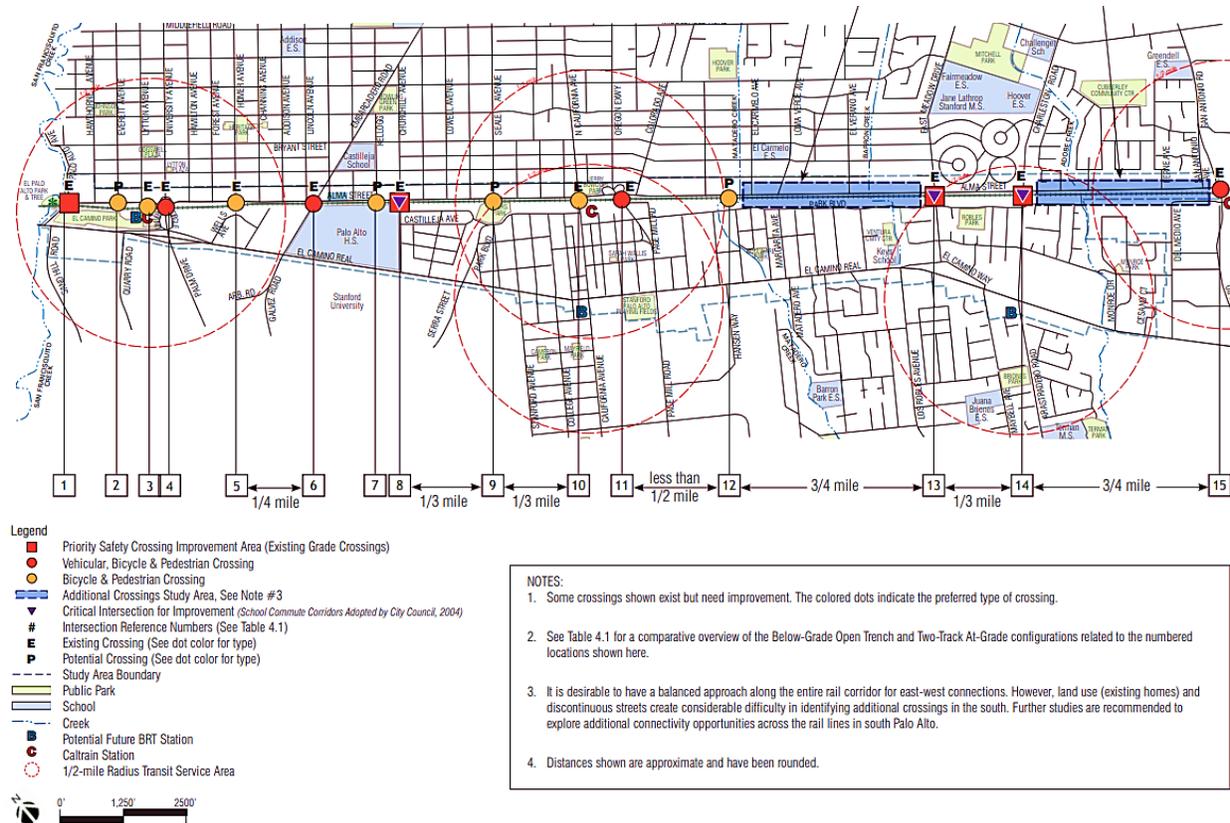
- Alma Street and Oregon Expressway Improvements in traffic signals (Figure 10)



**Figure 10. Alma Street and Oregon Expressway Improvements**

- Caltrain/Highway 101 Crossing, providing connections through a new undercrossing or overcrossing of Alma Street and the Caltrain tracks
- Caltrain/Alma Barrier Crossing at Matadero Creek
- Caltrain Railroad Planned Bike and Pedestrian Crossing at Loma Verde Ave. Crossing and Everett Ave. Crossing
- Caltrain Crossing at Stanford Ave/Seale Avenue (Potential Bike Ped Bridge)
- The Caltrain Business Plan identified that the California Avenue 4-track segment overlaps with planned crossing projects and will necessitate alignment with local and regional planning efforts to preserve this corridor for future infrastructure needs
- The California Avenue 4-track segment overlaps with the City of Palo Alto’s “Connecting Palo Alto” project. The crossings at Churchill Avenue and Meadow Drive are adjacent to the California Avenue 4-track segment and will likely require minor modifications to planning concepts to accommodate the transition between 2-tracks and 4-tracks. Caltrain is actively coordinating this effort
- Safety improvements such as sidewalk extensions, crosswalk improvements, expanded pedestrian refuges and waiting plazas, improved lighting and wayfinding, advance warning signage and signalization for motorists, pedestrians and bicyclists, and landscape enhancements
  - Alma Street/Meadow Drive and Alma Street/Charleston Road intersections and roadways approaches that can be undertaken in the near term by the City of Palo Alto

prior to rail improvements. Include improvements such as sidewalk extensions, crosswalk improvements, expanded pedestrian refuges and waiting plazas, improved lighting and wayfinding, advance warning signage and signalization for motorists, pedestrians and bicyclists, and landscape enhancements. The City of Palo Alto Rail Corridor Study identified potential locations for additional railroad crossing study areas to evaluate opportunities for improving connectivity across the rail lines in southern Palo Alto (Figure 11).



**Figure 11. City of Palo Alto Rail Corridor Study – Priority Rail Crossing Locations**

- Expansion and modernization of the regional rail network to better connect communities, increase frequencies, and advance projects. This expansion will address the increased demand for multimodal connections, enhance safety through grade separations, and support accessibility improvements for last-mile connectivity. Additionally, it will necessitate improved connectivity and upgraded bicycle and pedestrian crossings to ensure safe and efficient multimodal integration in areas impacted by increased rail activity.
  - Link21 new transbay rail crossing
  - BART to Silicon Valley Phase 2
  - Valley Link
  - Caltrain Downtown Rail Extension
  - Caltrain/High-Speed Rail grade separations

- Design, Feasibility, and Planning
  - Middlefield Road "Complete Street" Plan Line Study, located 0.65 miles north of the Caltrain railroad, it includes implementing sidewalk and traffic calming improvements on Middlefield Road to further promote pedestrian safety and reduce vehicle speeds
  - El Camino Real Complete Streets project, located 0.25-0.5 miles south of Caltrain railroad, it integrates bicycle and transit use on the corridor and upgrades crossing treatments at intersections.
  - Bicycle facilities upgrade on East Meadow Drive

## Community Feedback

Community feedback and public input is a crucial factor throughout long-term planning process. It helps to inform and shape the final recommendations of plans. Most plans are significantly invested in conducting public workshops, public surveys, open houses and community engagement events to hear from the public throughout the development of the plan. Common themes and takeaways per the review of the relevant prior and in progress plans are presented in this section.

- Providing accessible and safe active transportation (walking, biking, etc.) routes to natural open space, community centers and parks is a high priority
- Addressing dangerous and difficult crossings due to high vehicle speeds, high vehicle volumes, or lack of bicycle facilities
- Roadways highlighted include El Camino Real, Middlefield Avenue, University Avenue, Churchill Avenue, Meadow Drive, Alma Street, San Antonio Road, California Avenue, and Stanford Avenue
- Requests for improved traffic control, wayfinding signage, and infrastructure for cyclists and pedestrians, with proposals for traffic calming measures
- Improving connections to trails, transit hubs, employment centers, schools, public buildings, and parks
- Enhancing physical and mental well-being is a critical function of parks for people who live, work and play in Palo Alto. Loop trails, bicycle and pedestrian paths to parks and places to relax are top priorities, along with exercise equipment or additional classes
- Low-stress bicycle facilities are desired
- Frequently requested bicycle infrastructure improvements include more trail lighting, better accommodation at signalized intersections, better access and signage to bicycle paths, more frequent maintenance, more space to store bicycles on transit vehicles, secure bicycle parking
- Design safer and more intuitive highway crossings and interchanges
- Streamline and communicate the process for local agencies to engage with Caltrans and for Caltrans to engage with local communities
- Increase investment in bicycle facilities on state highways

- Preference for fully dedicated bike facilities that is separate from traffic and has space for multiple modes
- Bike highways should prioritize access and connection for low-income and disadvantaged communities and people without personal access to vehicles
- Residents prefer current policies that prioritize services and facilities for local residents over regional attractions

## Appendix B: Traffic Counts

South Palo Alto Bike/Ped Connectivity Project

Table 1: Pedestrian Crosswalk Counts at Major Intersections – 12-Hour Total (7:00 am – 7:00 pm)

Intersection	Weekday					Weekend				
	North	South	East	West	Total	North	South	East	West	Total
Alma Street & E. Meadow Drive	364	100	33	0	497	295	108	35	2	440
Alma Street & Charleston Road	144	123	74	4	345	89	98	29	0	216
Bryant Street & El Carmelo Avenue	67	141	61	197	466	51	39	35	121	246
Middlefield Road & Colorado Avenue	172	302	262	105	841	198	294	303	173	968
Middlefield Road & Loma Verde Avenue	110	68	73	99	350	34	18	12	10	74
Middlefield Road & E. Meadow Drive	63	192	63	85	403	53	115	56	85	309
Middlefield Road & Charleston Road	222	151	104	296	773	96	144	73	246	559
Middlefield Road & San Antonio Road	90	126	64	48	328	100	119	87	73	379
El Camino Real & California Avenue	509	573	243	195	1,520	513	635	347	241	1,736
El Camino Real & Los Robles Avenue	96	61	63	48	268	72	44	78	149	343
El Camino Real & Margarita Avenue	89	63	99	128	379	55	42	103	72	272
El Camino Real & Arastradero Road	101	226	129	140	596	94	92	93	188	467

Source: City of Palo Alto, 2024

Table 2: Bicyclist Turning Movement Counts at Major Intersections – Total 12- Hour Counts

Weekday													
Intersection	northbound			southbound			eastbound			westbound			Total
	right	thru	left	right	thru	left	right	thru	left	right	thru	left	
Alma Street & E. Meadow Drive	0	1	0	0	1	0	1	335	4	4	170	0	516
Alma Street & Charleston Road	1	2	5	0	3	0	0	213	1	0	191	0	416
Bryant Street & El Carmelo Avenue	7	211	2	15	239	8	1	2	17	5	1	2	510
Middlefield Road & Colorado Avenue	1	18	5	2	18	2	2	109	4	8	86	6	261
Middlefield Road & Loma Verde Avenue	3	26	1	4	24	1	7	78	1	2	64	2	213
Middlefield Road & E. Meadow Drive	2	20	8	7	29	0	33	218	9	5	290	8	629
Middlefield Road & Charleston Road	2	17	10	12	50	5	36	106	3	1	129	5	376
Middlefield Road & San Antonio Road	0	1	0	0	10	2	1	63	1	0	60	0	138
El Camino Real & California Avenue	1	2	1	4	8	1	4	160	3	3	134	1	322
El Camino Real & Los Robles Avenue	0	2	0	0	3	0	0	51	1	1	72	0	130
El Camino Real & Margarita Avenue	0	4	0	6	8	0	0	50	0	2	43	0	113
El Camino Real & Arastradero Road	0	6	0	0	4	0	0	146	0	1	162	0	319
Weekend													
Intersection	northbound			southbound			eastbound			westbound			Total
	right	thru	left	right	thru	left	right	thru	left	right	thru	left	
Alma Street & E. Meadow Drive	1	1	0	0	1	0	0	139	1	5	95	0	243
Alma Street & Charleston Road	1	1	2	0	1	0	1	102	0	0	120	0	228
Bryant Street & El Carmelo Avenue	8	124	3	9	146	4	3	3	8	11	5	3	327
Middlefield Road & Colorado Avenue	0	16	4	2	11	2	4	36	4	1	30	1	111
Middlefield Road & Loma Verde Avenue	7	6	0	2	6	4	2	14	2	3	16	2	64
Middlefield Road & E. Meadow Drive	3	15	2	0	10	0	15	64	0	0	84	0	193
Middlefield Road & Charleston Road	9	11	18	16	26	3	19	45	8	7	51	9	222
Middlefield Road & San Antonio Road	2	1	2	3	2	1	1	25	1	1	40	0	79
El Camino Real & California Avenue	2	5	1	2	8	5	2	115	8	9	75	1	233
El Camino Real & Los Robles Avenue	0	1	0	0	4	1	1	10	1	1	16	1	36
El Camino Real & Margarita Avenue	1	3	0	1	3	0	0	16	0	0	7	0	31
El Camino Real & Arastradero Road	0	4	0	2	3	0	2	75	2	0	84	3	175

Source: City of Palo Alto, 2024

## VEHICLE COUNTS

Turning movement count data was collected as part of the connecting Palo Alto’s Churchill, Meadow and Charleston Grade Separation Traffic Analysis<sup>1</sup>. The data was collected at two intersections: Alma Street at Meadow Drive and at Charlston Road. Counts were collected during a typical weekday (Tuesday, January 28, 2020) for the AM peak hours (7:00 – 9:00 AM) and PM peak hours (4:00 PM – 6:00 PM). Table 3 illustrates the existing vehicle turning movement counts, respectively:

Table 3: Vehicle Turning Movement Counts – AM and PM Peak Hours

AM Peak													
Intersection	northbound			southbound			eastbound			westbound			Total
	right	thru	left	right	thru	left	right	thru	left	right	thru	left	
Alma Street & Meadow Drive	46	1,174	82	142	511	92	69	145	120	73	207	62	2,723
Alma Street & Charleston Road	33	1131	346	43	517	63	130	376	95	71	245	44	3,094
PM Peak													
Intersection	northbound			southbound			eastbound			westbound			Total
	right	thru	left	right	thru	left	right	thru	left	right	thru	left	
Alma Street & Meadow Drive	61	848	95	182	1,102	109	74	169	88	99	245	55	3,127
Alma Street & Charleston Road	49	806	245	50	1,094	57	216	237	83	83	313	42	3,275

Source: Churchill, Meadow and Charleston Grade Separation Traffic Analysis, January 2024

<sup>1</sup> Churchill, Meadow and Charleston Grade Separation Traffic Analysis: [Traffic-Analysis-Report\\_Churchill-Meadow-and-Charleston-Grade-Separation\\_revised.pdf](#)  
Kittelson & Associates, Inc.

## Appendix C: Replica Data Details

## APPENDIX – REPLICA BACKGROUND AND VALIDATION

This appendix provides additional technical background on the use of Replica for origin/destination analyses. Replica builds on the traditional approaches for traffic models used by transportation agencies in the Bay Area and the United States. Replica differs from traditional transportation models in that it incorporates vehicle probe data (GPS records generated by on-board sensors on vehicles) to produce more granular representations of trip patterns and routes. Additionally, Replica has a greater focus on estimating walking and biking activity compared to traditional transportation models. Since Replica's processes include multiple data sources, it has the potential to capture trip patterns more accurately; however, the blending of multiple datasets results in a more complex dataset to understand.

The Replica data used in the analysis represents Spring 2024 conditions. Thursday data was used to represent weekday conditions and Saturday data was used to represent weekends.

Prior to finalizing the use of Replica, a reasonableness check was completed by comparing Replica's peak hour trip estimates against traffic counts collected in the Study Area. Specifically, the AM and PM peak hour volumes for Meadow Drive and Charleston Street from Replica were compared against peak hour turn counts for those same locations collected as part of the Palo Alto Grade Separation Project.<sup>1</sup> Table 1 summarizes the comparison; as shown in the table, the Replica estimates were found to be 15% higher than observed counts for Meadow Drive and 19% higher than observed counts for Charleston Street.

Table 1: Comparison of Volume Data between Counts and Replica Data

Location	Turn Movement Count <sup>1</sup>	Replica Count <sup>2</sup>	% Difference
Meadow Drive	1,918	2,270	+15%
Charleston Street	2,560	3,140	+19%

1. Peak AM and PM count collected January 28, 2020. Total includes people walking and biking, and motor vehicles.
2. Peak AM and PM count from Replica Data, modeled Spring 2024 Thursday. Total includes person trips for people driving, walking, biking, taking on-demand services, and completing commercial freight deliveries. It excludes driving passenger trips.

A difference of less than 20% is viewed as reasonable given that traffic counts can also exhibit this level of variability on a given day. Based on this comparison, Replica is considered a reasonable data source for analyzing multimodal trip patterns for the Study Area.

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<sup>1</sup> Hexagon Transportation Consultants, Inc. (2020). *Churchill, Meadow, and Charleston Grade Separation Traffic Analysis* from [https://connectingpaloalto.com/wp-content/uploads/2021/02/Traffic-Analysis-Report\\_Churchill-Meadow-and-Charleston-Grade-Separation\\_revised.pdf](https://connectingpaloalto.com/wp-content/uploads/2021/02/Traffic-Analysis-Report_Churchill-Meadow-and-Charleston-Grade-Separation_revised.pdf)

## Appendix D: Field Visit Summary

The field visit took place on Tuesday, November 19, from 9:00 AM to 12:00 PM in sunny weather conditions, with temperatures in the mid-to-high 50s. Table 1 shows the corresponding field visit locations. The route began by traveling south along the Alma Street sidewalk and on-street through the Circles neighborhood. The team then crossed Alma Street, and the railroad tracks at Charleston and continued north along Park Boulevard. The field visit team included a representative from Kittelson, Circlepoint, BKF, City Staff and Safe Routes to School Coordinator.

**Table 1. Field Visit Locations**

Map ID	Stop Location
Start	California Avenue Caltrain Undercrossing
1	Colorado Avenue
2	El Dorado Avenue
3	Matadero Creek & El Carmelo Avenue
4	Loma Verde Avenue & Margarita Avenue
5	El Verano Avenue
6	Lindero Avenue & Robles Park
7	Adobe Creek & Ely Pl

Source: Kittelson & Associates, Inc. 2024

**Start**

- Field observations started at the California Avenue Tunnel at Alma Street
- The existing undercrossing serves pedestrians and bicyclists crossing the railroad tracks and Alma Street
- The tunnel width is narrow and inadequate to accommodate current volumes of two-way pedestrian and bicyclist traffic during peak hours, particularly morning and afternoon school peaks
- The tunnel grades are steep and not ADA-compliant, which requires bicyclists to either dismount and walk or wait for pedestrians to clear the tunnel before biking through
- There are gates at both ends of the tunnel that enforce slower movement through the tunnel and restrict two-way travel
- The tunnel is inadequately lit, which causes visibility and safety concerns

**1: Colorado Avenue**

- Colorado Avenue intersects Alma Street adjacent near the ramps to/from Oregon Expressway
- The sloping exit ramp access creates challenges for tunnel structure, which would need to extend deeper to clear the ramp up to Alma Street
- Alma Street is wider at this location, requiring longer structure to accommodate the roadway and railroad
- This alignment provides access to California Avenue Caltrain Station
- If this alignment is selected, supporting improvements, such as widening or formalizing access from Park Boulevard to the California Avenue Caltrain Station parking lot, should be considered.



**Oregon Expressway on ramp from Alma Street**



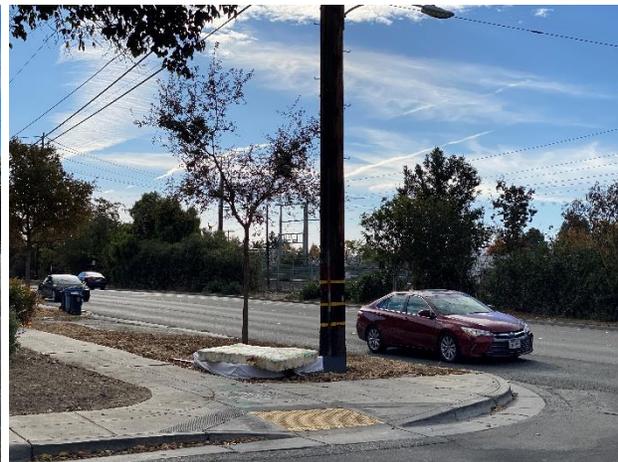
**Alma Street and Colorado Avenue**

## 2: El Dorado Avenue

- El Dorado Ave intersects Alma Street at a wider, three-track railroad segment
- Access to Park Boulevard could be achieved through surface parking lots with property acquisition, easement, or a connection to City-owned switching station
- The Caltrain right-of-way (ROW) is wider at this location, requiring a longer structure to clear the roadway and railroad. A lease agreement or easement may be possible if the third track is not in use.



**Alma Street and El Dorado**



**Alma Street and El Dorado**

## 3: Matadero Creek & El Carmelo Avenue

- The area includes a service road and a narrow-banked channel along Matadero Creek
- The potential for widening Matadero Creek is limited by existing constraints
- Vertical clearance within Matadero Creek tunnel is insufficient
- Opportunities at this location involving the nearby City-owned power transmission property could be explored



**Alma Street and El Carmelo Ave**



**Matadero Creek**

#### **4: Loma Verde Avenue & Margarita Avenue**

- Consider implementing a center-running bicycle/pedestrian ramp on Loma Verde Avenue  
Consider implementing one-way traffic on Loma Verde Avenue may mitigate impacts but could affect residential driveways
- Property(ies) acquisition may be required on Park Boulevard near Margarita Avenue and Loma Verde Avenue near Emerson Street



**Park Blvd at Margarita**



**Loma Verde at Alma Street**

#### **5: El Verano Avenue**

- El Verano Avenue has on-street parking on both sides of the road with rolled curbs
- On-street parking was observed to be over 90% occupied
- The sidewalks on El Verano Avenue are narrow (approximately 5 feet wide) on Alma Street and frequently interrupted by driveway access
- There are potential opportunities to utilize an auxiliary merge lane (a short, additional traffic lane designed to facilitate smooth merging or diverging movements) on Alma Street, this may be challenging due to frequent driveway spacing
- This would require property acquisition or easement to access Park Boulevard

- There are two existing driveways to Boardwalk Apartments that could provide potential future access for a new crossing



**El Verano at Alma Street**



**Boardwalk Apartments on Park Blvd**

## **6. Lindero Ave & Robles Park**

- The connectivity to existing bicycle and pedestrian network is limited and requires crossing major arterials at Meadow Drive and Charleston Road or out-of-direction travel via indirect streets within the Circles neighborhood
- Lindero Avenue at Alma Street is wide, and the landscaped strip along Alma Street provides a potential location for a ramp structure
- Lindero Avenue is located between Meadow Drive and Charleston Road, where future grade separation projects are planned (including future improved pedestrian/bicycle crossings)
- Consider the implications of nearby grade separation project on desirability of this as a pedestrian/bicycle crossing location
- Connecting to Park Boulevard would require property acquisition
- A connection to Robles Park would provide access for multiple school routes
- If this alignment is selected, supporting improvements such as paving and widening paths through Robles Park, should be considered



**Lindero Drive at Alma Street**



**Lindero Drive at Alma Street**

## 7: Adobe Creek & Ely Pl

- The creek channel is narrow, with limited potential for widening
- Access to the creek is constrained, as it abuts private property. It is challenging for pedestrians and bicyclists to navigate from both sides of the railroad tracks
- Installing a crossing at Ely Place may require property acquisition
- The available ROW in this area is constrained/limited



**Adobe Creek**



**Alma Street at Adobe Creek**