APPENDICES

San Mateo **Bicycle Master Plan**

APRIL 2020 FINAL

PUBLIC WORKS
City of San Mateo

Appendix A. Public Outreach Overview

Throughout the development process for the 2020 San Mateo Bicycle Master Plan (BMP), the City of San Mateo used a variety of outreach and engagement strategies to publicize the Bicycle Master Plan process and gather input from residents and community members on existing and desired bicycle conditions.

Input was solicited during four rounds of engagement – project kick-off in December 2018, a bike tour in March 2019, proposed bicycle network review in June-July 2019, and draft BMP review in December 2019. This input, paired with data-driven analysis of existing conditions, formed the basis of Plan's Proposed Bicycle Network and supporting plans and policies.

Kick-off Workshop (December 2018)

On Saturday, December 1, 2018 from 10:00am to 1:00pm, the City of San Mateo, with support from Toole Design, hosted a Community Workshop for the BMP. The Workshop was held at the San Mateo Downtown Public Library and included both an Open House in the Laurel Room with informational posters and input-gathering activities as well as a pop-up table in the library lobby with informational flyers, an existing conditions map, and staff to direct interested community members to the Open House (see Figures A.1 and A.2).

Figure A.1. Community Members Participating in Open House Activities

Figure A.2. Pop-Up Table with Project Information

The goals of the BMP Workshop included the following:

- Publicize the Bicycle Master Plan process
- Familiarize the community with different types of bicycle facilities and treatments
- Gather public input on existing and desired bicycling conditions in San Mateo

The Workshop began with 30 minutes set aside for attendees to circulate among the various activities. From approximately 10:30am to 10:45am, Toole Design staff gave a brief presentation that provided an overview of the project, discussed the project schedule, provided information on different types of bicycle facilities, and shared

ways for community members to participate in the BMP process. The remaining time was designed for attendees to once again circulate among the various activities. In all, there were approximately 40 participants at the Workshop.

Key Takeaways

Several key themes emerged from Workshop participants:

- The existing bicycle network is not comfortable for most residents, who mostly self-identify as Interested but Concerned or Somewhat Confident bicyclists.
- The existing network feels unsafe, and it is not well-connected to destinations.
- Bicycle facilities are not continuous and vary widely throughout San Mateo.
- Barriers such as freeways and the Caltrain railroad tracks result in circuitous or high-stress bike routes.
- The existing network is confusing to navigate due to few wayfinding signs.
- The most popular existing routes are off-street or located on streets with low-speed, low-volume traffic.
- Expanded bicyclist infrastructure and support facilities (e.g., bike racks) are needed.
- Additional awareness and education is needed between drivers and bicyclists.

Informational Materials And Activites

Project Flyer

A flyer was distributed at the pop-up table and during the Open House to provide community members with general project information (see Figure A.3). The flyer included the project purpose, stages and schedule, and a link to the project's online interactive map.

Figure A.3. Project Informational Flyer

Workshop Posters

The Workshop included two informational posters for Open House participants. The first poster included a schedule, providing information on the project timeline and next steps in the BMP process (see Figure A.4). The poster also included a small pop-out box that listed the elements included in the BMP. The second poster listed different types of bicycle facilities, ranging from those with little separation from motor vehicles (e.g., shared lanes and bicycle boulevards) to those with robust separation (e.g., parking protected separated bicycle lanes and off-street shared-use paths). It also provided examples of intersection treatments including signage, pavement markings, and signals (see Figure A.5). The intent of the poster was to help Workshop participants learn about different bicycle facility types as well as better understand and discuss concerns with existing and preferred bicycle facilities throughout San Mateo.

Figure A.4. San Mateo BMP Schedule Poster

Figure A.5. Bicycle Network Facilities Poster

Input Activities

The Workshop also included several interactive input activities for participants to provide their feedback. The first activity, "What Type of Rider are You?", informed attendees about the spectrum of bicyclists, based on their level of comfort in riding with vehicular traffic. This activity was conducted in both English and Spanish (see Figure A.6). Participants were asked to classify themselves as one of four types of bicyclists:

- **Interested but Concerned:** I enjoy riding my bike, especially on trails and shared-use paths, but biking on roads makes me uncomfortable.
- **Somewhat Confident:** I feel comfortable riding on quieter streets with bike lanes.
- **Highly confident:** I feel comfortable biking on any street.
- **No Interested or Able:** I am not interested in riding a bike or am physically unable to ride a bike.

Most participants (15) classified themselves as Interested but Concerned bicycle riders, followed by Somewhat Confident (11), and Highly Confident (9). Only two participants identified themselves as Not Interested or Able.

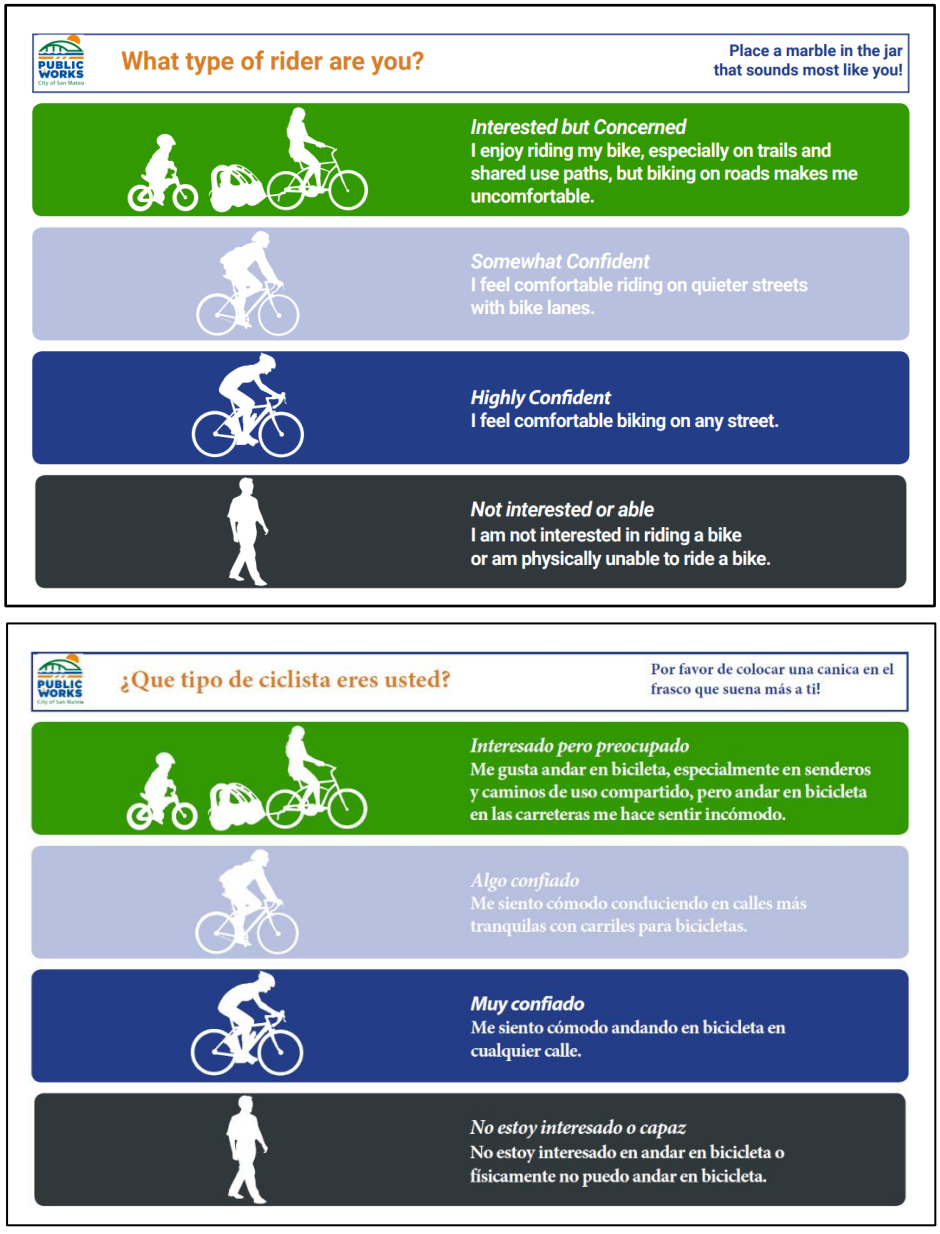
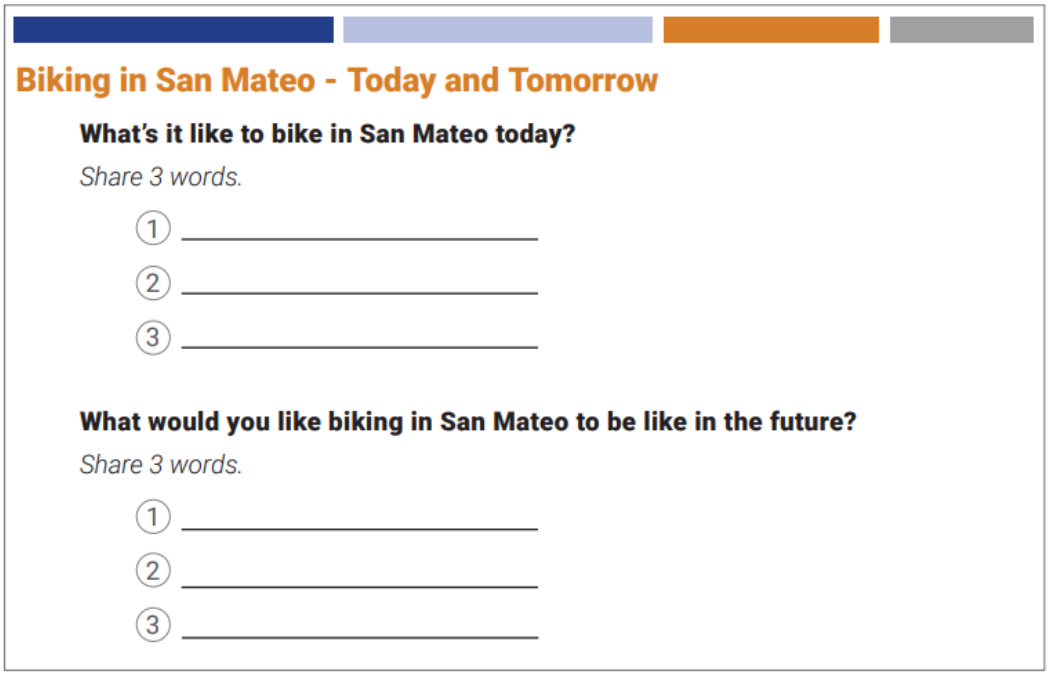


Figure A.6.
"What Type of Rider are You?" Posters (with results above)

The second activity, “Biking in San Mateo – Today and Tomorrow”, asked participants to describe their experience bicycling in San Mateo today as well as what they hope it will be like in the future, using three words for each scenario. Input from this exercise informed a draft vision and goals for the Plan. This activity was also conducted in both English and Spanish (see Figure A.7).



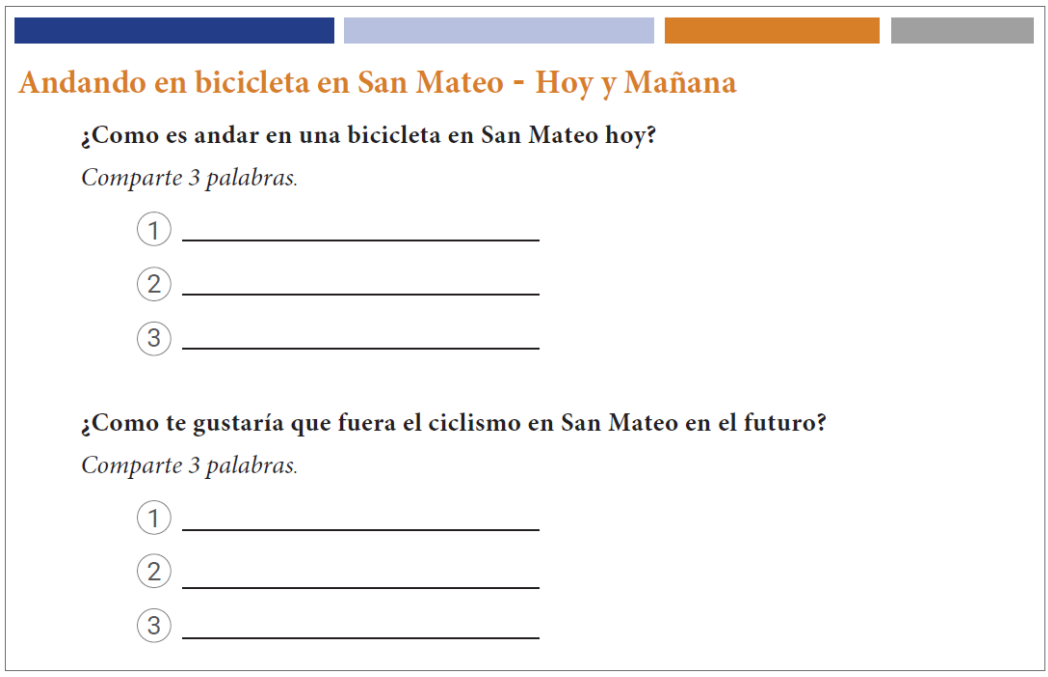


Figure A.7. "Biking in San Mateo – Today and Tomorrow” Posters

Common themes emerged in this exercise. In general, bicycling in San Mateo today was described as unsafe, unconnected, dangerous, variable, and inadequate (see Figure A.8). Participants want bicycling in San Mateo in the future to be safe, connected, informative, comfortable, and commonplace (see Figure A.9).

Figure A.8. "What's it like to bike in San Mateo today?" Results

Figure A.9. "What would you like biking in San Mateo to be like in the future?" Results

The final input activity involved participants annotating maps of San Mateo with stickers, sticky notes, and markers to indicate locations where they currently enjoy biking and why, where they do not currently like to ride and why, and barriers to bicycling in San Mateo (see Figure A.10). Comments input on the maps at the Workshop was input into the online interactive WikiMap and informed draft recommendations for the San Mateo bicycle network. Generally, comments focused on the following:

- Current on-street bicycle infrastructure is disconnected, feels unsafe, and serves few destinations
- There are physical barriers (e.g., U.S. 101) to the existing bicycle network
- Intersections are dangerous and stressful
- Existing bicycle parking is inadequate
- Awareness and respect is lacking between drivers and bicyclists
- It is difficult to navigate the existing bicycle network due to gaps in facilities and a lack of wayfinding
- The Bay Trail and low-volume streets Downtown and in various neighborhoods are the most popular bike routes in San Mateo today

Figure A.10. Community Member Map Input on Existing Bike Network in San Mateo

Index Card Comments

The following comments were provided by participants on index cards during the kick-off workshop.

Hacienda Street has a lot of traffic and is a good candidate for a bike lane because is it a route to school.	Show planned projects on existing conditions map.	A lot of back-out angled parking Downtown, which is unnerving for bicyclists.
The first thing I would need before riding my bike is to get it fixed.	Importance of education for motorists and bicyclists on sharing the roads.	Want to be able to bike to the Bay Trail with my kids, but currently we drive there.
Third Avenue Overpass: • Needs bike repositioning lane on both sides. • New bike lane by shopping center is extremely confusing for bicyclists and drivers.	Micromobility (e.g., e-bikes, e-scooters) needs to be built into the Plan so that these users of existing bicycle facilities are taken into account.	Messy at 31st Avenue/RAB, near miss: • Ped guards • Two cities missing RAB yield • Chris work order • Talk to developer • Clean up area
Lime Bikes should be a city account so there is no cost to riders.	Make the Steering Committee open to the public.	That is the biggest challenge in San Mateo. It's a long, skinny city and there are multiple freeway on/off ramps.
Strava app that shows bicycle use in heat map should be used to give City bicycle riding data.	I wish bike lanes extended on Delaware Street north of 5th Avenue.	90% of the connections are there, but there are barriers at the end.
Ignorance/education: after dooring incident, lady [driver] came out and yelled that it was his [bicyclist] fault.	San Mateo Drive could be good parallel alternative to El Camino Real.	Map of planned bike projects.
Protected intersection education: cars encroach into bicyclist space, bicyclists don't think they need to stop.	Connection across CA-92 could work really well.	"I hate biking through here."

Community Bike Tour (March 2019)

On Saturday, March 23, 2019, the City of San Mateo, with support from Toole Design, hosted a Community Bike Tour as part of the outreach effort for the BMP. The Bike Tour was held from 10:00am to 1:00pm, starting and finishing at Central Park at the corner of 5th Avenue and Laurel Avenue. The event included:

- Informational and interactive activities and posters at the Bike Tour check-in station (see Figure A.11);
- A pop-up protected bike lane for Bike Tour participants and passersby to ride in (see Figure A.12); and
- An eight-mile Bike Tour loop of the city (see Figure A.13).

Figure A.11. Community member interacting with informational tables at check-in station

Figure A.12. Young resident riding in demonstration protected bike lane

Figure A.13. Tour participants riding along Bay Trail

The goals of the BMP Bike Tour were to:

- Publicize the Bicycle Master Plan process
- Provide residents with first-hand experience riding San Mateo's existing bicycle network
- Familiarize the community with different types of bicycle facilities and treatments
- Gather public input on existing and desired bicycling conditions in San Mateo

In all, there were approximately 40 participants at the tour, 35 participants and five City and consultant staff. Before and after the ride, participants were invited to circulate among the various informational posters and activities to share their input on existing bicycle facilities throughout the city and their confidence level when bicycling. Community members also stopped by the outreach tables at Central Park during the Bike Tour. Approximately 20 people engaged with the tables during the tour.

Key Takeaways

Several key themes emerged from tour participants:

- The existing bicycle network is not comfortable for most residents, including those who self-identify as "Highly Confident" bicyclists.
- The existing network feels unsafe and is not well-connected to destinations.
- Bikeways are not continuous throughout San Mateo.
- Barriers such as freeways and the Caltrain tracks result in circuitous or high-stress bike routes.
- The existing network is confusing to navigate due to few wayfinding signs.
- The most popular existing routes are off-street or located on streets with low-speed, low-volume traffic.
- Additional awareness and education are needed between drivers and bicyclists.

Informational Materials and Activites

Project Flyer

A flyer was distributed at the tour check-in station to provide community members with general project information and to direct them to the BMP website (see Figure A.14). This was the same flyer used during the December workshop.

Figure A.14. Informational flyer for Bicycle Master Plan

Informational Material

The check-in station included informational material that highlighted different bicycle facility types and provided an overall project schedule.

- The **project schedule** was placed on tables adjacent to the check-in station. The schedule provided information on the project timeline and elements to be included in the BMP (see Figure A.15).
- **Bicycle network facilities** sheets shared information about different types of bicycle facilities, including bikeway types and intersection treatments (see Figure A.16). The purpose of the poster was to help participants learn about different facility types and better understand and discuss concerns about existing and preferred bicycle facilities.

Figure A.15. Poster of Plan Schedule

Figure A.16. Poster of Bicycle Network Facilities

Input Activities

What Type of Rider Are You?

The check-in station also included several interactive activities. The first activity, "What Type of Rider are You?", informed attendees about the spectrum of bicyclists, based on their level of comfort in riding with vehicular traffic. This activity was conducted in both English and Spanish (see Figure A.17). Participants, including both Bike Tour riders and passersby, were asked place a marble in the jar that corresponded to how they classified themselves.

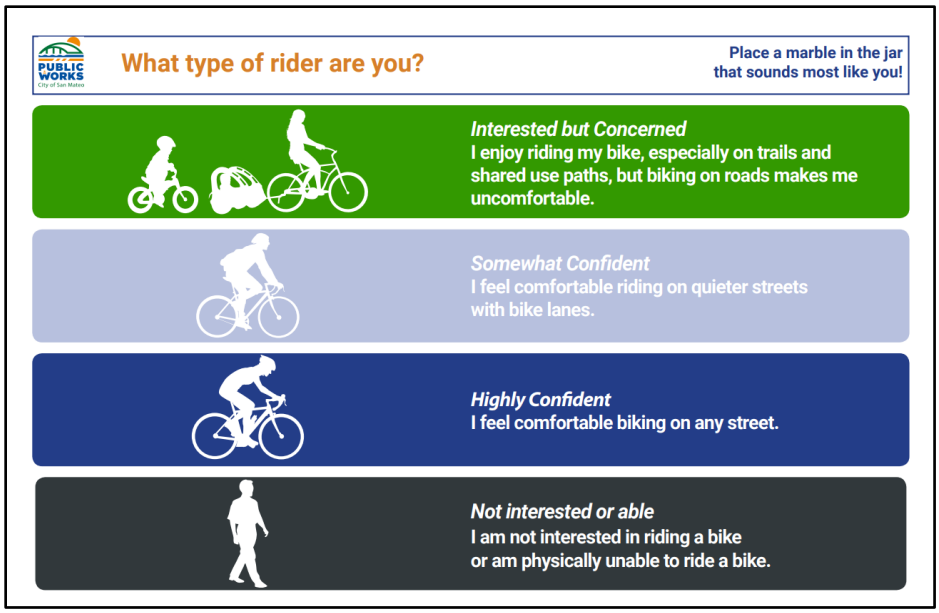


Figure A.17.
"What Type of Rider are You?" Posters (with results above)

Existing Conditions Map

Participants were also asked to share their input on the existing bicycle network in San Mateo (see Figure A.18). City and Toole Design staff asked participants to write their comments on sticky notes and place them on the map. Comments included:

- Where they currently enjoy biking and why
- Where they do not currently like to ride and why
- Barriers to bicycling in San Mateo

Generally, comments focused on the following:

- Current on-street bicycle infrastructure is disconnected, feels unsafe, and serves few destinations
- There are physical barriers (e.g., U.S. 101 and the Caltrain tracks) to the existing bicycle network
- Intersections are dangerous and stressful (especially freeway on/off-ramps and intersections on El Camino Real)
- It is difficult to navigate the existing bicycle network due to gaps in facilities and a lack of wayfinding
- The Bay Trail and low-volume streets in Downtown and in various neighborhoods are the most popular bike routes in San Mateo today

Toole Design staff added the comments shared at the Tour to the WikiMap so that all comments reside in one location. These comments informed the draft recommendations for the San Mateo bicycle network.

Figure A.18. Map comments on the existing bike network in San Mateo

Pop-Up Protected Bike Lane

The Bike Tour also included a demonstration protected bike lane to help participants and passersby better visualize and experience what protected bicycle infrastructure looks and feels like. The pop-up protected bike lane was set up in an existing parking lane in the southbound direction on Laurel Avenue on the block between 5th Avenue and 6th Avenue. A three-foot buffer between the bike lane and travel lane was installed by adding a temporary lane line in chalk offset from the existing parking lane line. Vertical separation was provided with moveable construction bollards. The demonstration bike lane was augmented with a "Try Out a Protected Bike Lane!" poster at the start to increase its visibility (see Figure A.19). In addition, an informational poster showing a protected bike lane cross section and describing its operations and appropriate usage was placed near the pop-up (see Figure A.20).

Figure A.19. Pop-up protected bike lane on Laurel Avenue adjacent to Central Park

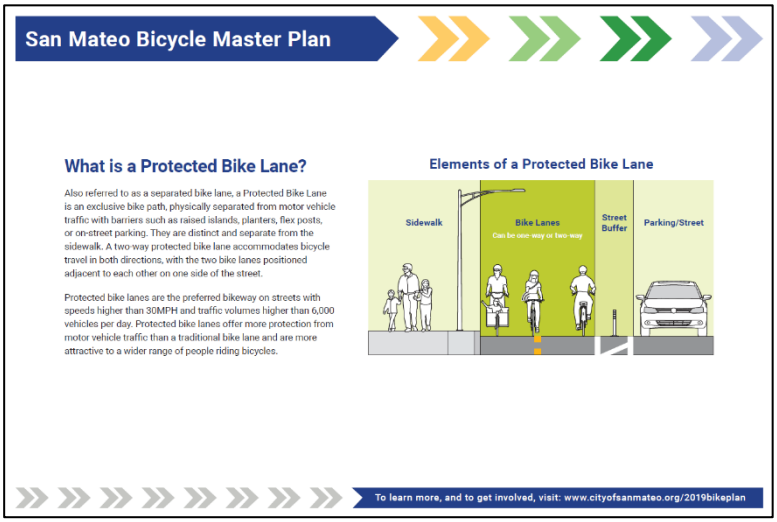


Figure A.20. "What is a Protected Bike Lane?" Informational Poster

Toole Design and City staff working at the check-in station encouraged Bike Tour participants to try out the demonstration protected bike lane before the start of the tour. While the bike ride was occurring elsewhere in the city, staff encouraged passersby to check out the pop-up. The final leg of the Bike Tour included riding through the demonstration protected bike lane (see Figure A.21).

Figure A.21. Bike Tour participants finishing the ride in the pop-up protected bike lane

Bike Tour

The main activity, the Bike Tour, started at 10:30am (30 minutes after the announced event start time) to give participants time to sign in, check out the interactive activities and informational posters, and try out the demonstration protected bike lane before the ride. The Tour was an eight-mile loop of San Mateo, starting and ending at the intersection of Laurel Avenue and 5th Avenue in the northeast corner of Central Park. Participants were given postcards with a map of the route, emergency contact information, and a link to the project website (see Figure A.22).

The Tour featured both low-stress and higher-stress existing bicycle infrastructure, including:

- The bicycle route on low-speed and low-volume Monte Diablo Avenue
- The pedestrian and bicycle bridge over US-101 at Monte Diablo Avenue
- The Bay Trail
- The bike path located in the median of the 3rd Avenue overpass of US-101
- The bike lanes on Delaware Street
- The shared lanes on Alameda de las Pulgas

Several stops were made along the tour route to make observations about the segment just ridden and discuss the next leg of the route. For example, participants noted the comfort of riding on the low-speed and low-volume Monte Diablo Avenue neighborhood bike route and the Bay Trail, compared to the discomfort of riding adjacent to high-speed and high-volume vehicle traffic on the 3rd Avenue Overpass, Delaware Street, and Alameda de las Pulgas. In all, the Tour took approximately 90 minutes to complete. Participants ranged from 3 years old to 70 years old and included residents, Councilmembers, and the Mayor. Many participants used the Tour as inspiration to provide feedback on the existing bicycle network map located at the check-in station.

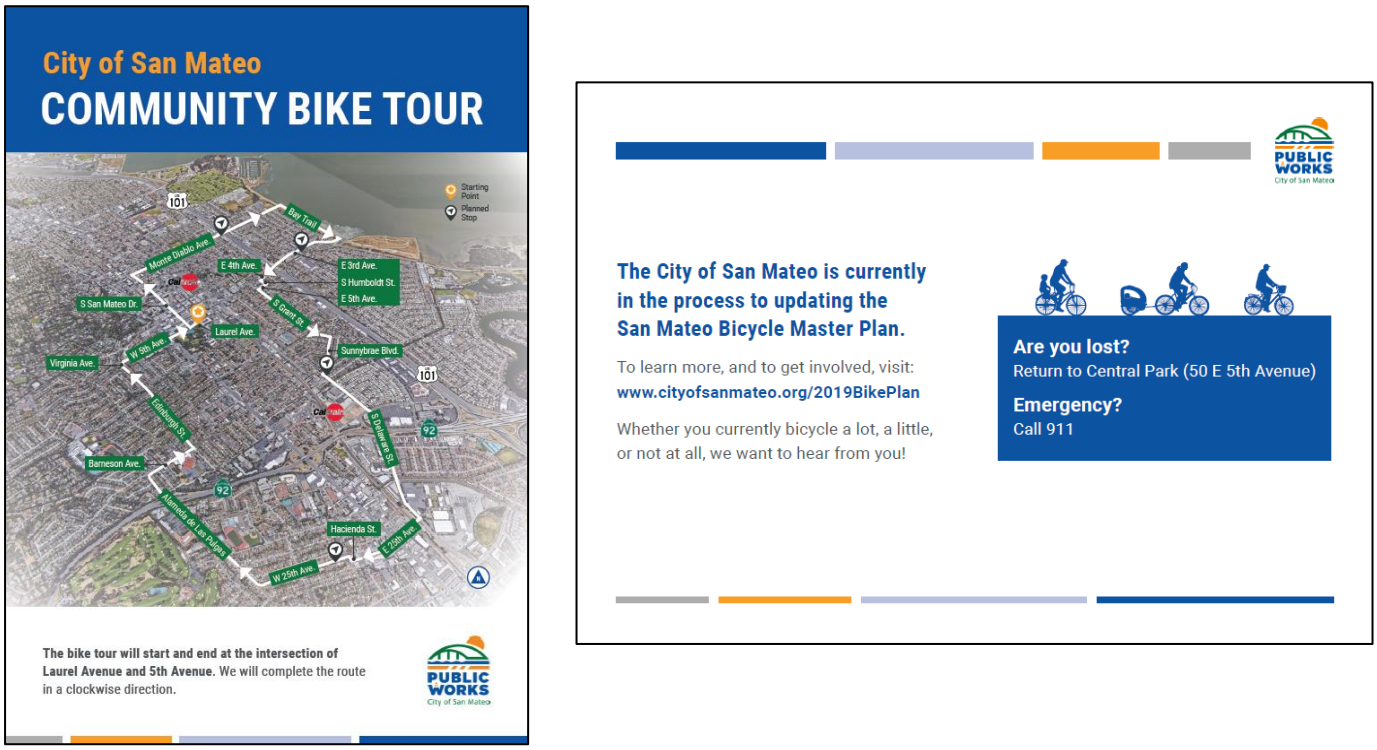


Figure A.22. Bike Tour postcard distributed to ride participants

Draft Bicycle Network Review (June–July 2019)

Throughout June and early July, the City of San Mateo, with support from Toole Design, hosted six pop-up community outreach events in various locations in San Mateo to obtain feedback on the San Mateo BMP Draft Bicycle Network created in April and May (see Table A.1 and Figure A.23 through Figure A.28). A "pop-up" strategy was used for this phase of community outreach to meet residents where they already are, at existing events or locations amid their regular routines. This generally results in feedback from a greater number of people and a more representative group of people, compared to "workshop" style events where community members attend a standalone meeting to provide their input.

The project team engaged approximately 250 community members, with the College of San Mateo Farmer's Market and the 4th of July Event and Central Park Music Series having the most participants. The range of pop-up events and locations ensured engagement with a variety of people, including:

- San Mateo residents and workers
- People who visit San Mateo for recreation
- Families
- People who do not speak English as their first language
- Homeless people
- Bicyclists without other transportation alternatives
- Caltrain commuters
- Recreational bike riders
- People who would like to bike more often but do not because of uncomfortable existing conditions

This was the third round of outreach for the San Mateo BMP. The first round of outreach occurred in December 2018 and worked to publicize the BMP process, familiarize the community with different types of bicycle facilities and treatments, and gather input on existing and desired bicycling conditions in San Mateo. The project team returned to the community for a second round of outreach in March 2019. The March outreach included a community bike tour of the city and a demonstration protected bike lane to help participants better understand the range of bicycle facilities that can be included in the updated bike network.

Table A.1. Outreach events in June and July

Event	Date	Time	Approximate Number of Participants
College of San Mateo Farmer's Market	Saturday June 8, 2019	9:00am – 1:00pm	90
Central Park Music Series	Thursday June 20, 2019	6:00pm – 8:00pm	40
Pop-Up at King Community Center	Wednesday June 26, 2019	4:30pm – 6:30pm	20
Pop-Up at Hillsdale Caltrain Station	Thursday June 27, 2019	7:00am – 9:00am	20
Pop-Up at Seal Point Park	Saturday June 29, 2019	9:00am – 11:00am	30
4th of July Event and Central Park Music Series	Thursday July 4, 2019	11:00am – 2:00pm	60

Figure A.23. Toole Design and City staff interacting with a community member at the June 8 College of San Mateo Farmer's Market

Figure A.24. San Mateo BMP table at the June 20 Central Park Music Series

Figure A.25. Participants at the June 26 King Community Center pop-up

Figure A.26. Community member completing the BYO Bikeways activity at the June 27 Hillsdale Caltrain

Figure A.27. Table set up along the Bay Trail at the June 29 Seal Point Park pop-up

Figure A.28. Participants at the July 4 Central Park Music Series event

Each of the outreach events involved City and Toole Design staff at a table with informational materials and activities. Materials and activities included:

- A welcome poster to solicit feedback from passersby
- A project flyer providing a brief overview of the project as well as a link to the project website
- A project schedule providing a basic timeline of work completed to date and upcoming work
- Sign-in sheets for participants to sign up for project notifications via email
- A 24-inch by 36-inch map of the Draft Bicycle Network for participants to comment on
- A "Build Your Own Bikeways" activity for participants to prioritize bikeways to be implemented in the short-term and indicate generally what should be prioritized in the bike network
- Coloring books, crayons, and stickers for kids

The goals of the June and July outreach included:

- Publicize the Bicycle Master Plan process
- Familiarize the community with different types of bicycle facilities and treatments
- Gather public input on the Draft Bicycle Network and prioritization of bikeways

Key Takeaways

Several key themes emerged from outreach participants:

- Recommendations for separated bike lanes are popular, especially those proposed on 3rd Avenue, 4th Avenue, Hillsdale Boulevard, Fashion Island Boulevard, and Delaware Street
- Participants generally preferred consistent bikeway facilities to those customized to each street segment. In practice, this supports a backbone network of continuous facilities, even if those facilities are overbuilt for certain roadways.
- There is support for bicycle facilities and alternatives to driving in general in the area around the Hayward Park station, since new developments have led to major congestion
- Additional or alternative corridors were proposed, especially in the Hillsdale neighborhood
- There is interest in additional north-south corridors (e.g. along the Caltrain tracks)
- Some participants were concerned about bicycle boulevard or other facility recommendations on certain streets, where traffic speeds may exceed posted speeds and volumes may be higher than estimated
- There is interest in additional bikeways that serve Caltrain stations, parks, and schools
- Participants prioritized safety projects that address bicycle collisions
- Participants prioritized bikeways that serve schools, parks, trails, Caltrain stations, and commercial areas

Figure A.29. Welcome poster soliciting feedback

Informational Materials and Activities

Welcome Poster

A 24-inch by 36-inch welcome poster soliciting feedback on the Draft Bicycle Network from passersby was prominently displayed at all events to call attention to the outreach table and encourage participation (see Figure A.29).

Project Flyer and Schedule

A flyer was distributed at the outreach table to provide community members with general project information and to direct them to the BMP website (see Figure A.30). This was the same flyer used during the first two phases of outreach in December 2018 and March 2019. In addition, a project schedule was included on the table and provided information on the project timeline – including work completed to date and future work – and elements to be included in the BMP (see Figure A.31).

Figure A.30. Informational flyer

Figure A.31. Project schedule

Draft Bicycle Network Map

The focus of this phase of outreach was to obtain public feedback on the Draft Bicycle Network, which was developed in April and May based on input received during previous phases of outreach with the community and stakeholder groups, guidance from City of San Mateo staff, and analysis of existing conditions data. A 24x36 map of the Draft Bicycle Network was displayed during outreach for public comment. Colored lines representing different bicycle facility types were overlaid on a basemap showing the San Mateo street network. Existing bicycle facilities were depicted with solid lines, and proposed facilities were shown with dashed lines. Facility types shown on the map included: bike routes, bicycle boulevards, bike lanes, buffered bike lanes, separated bike lanes, and shared use paths. Small graphics visually depicting bicycle facility types were included in the bottom right corner of the map to help participants better understand existing and proposed facilities as well as the differences between facilities (see Figure A.32).

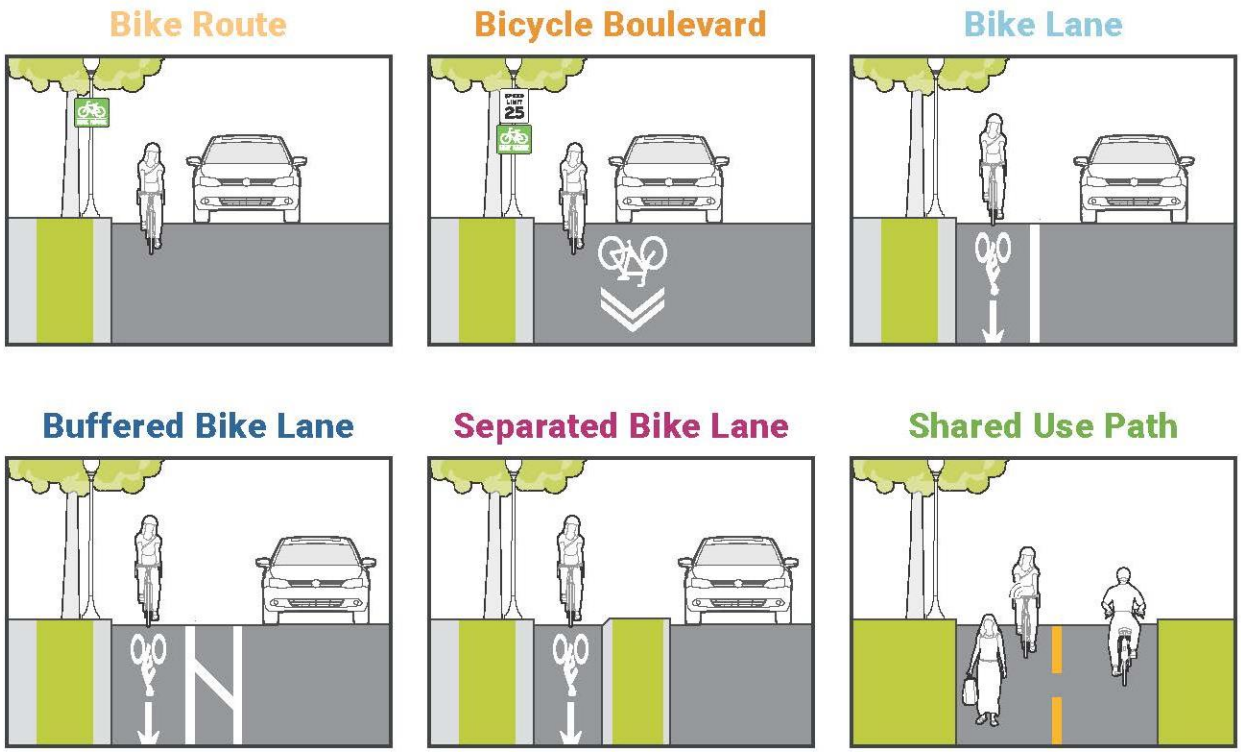


Figure A.32. Bicycle facilities legend included on 24" x 36" Draft Bicycle Network map

To provide feedback, participants were asked to place green "thumbs up" and red "thumbs down" dot stickers on the map. "Thumbs up" stickers indicated bike facilities that participants supported and wished to prioritize when implementing the bike network. Conversely, "thumbs down" stickers were placed on facilities that participants did not support. These might be locations that participants felt should not have bikeways or where the wrong type of bikeway was recommended. Participants could write additional narrative description on sticky notes adjacent to the stickers or directly on the map (see Figure A.33). Support for facilities greatly outnumbered lack of support, with approximately 200 "thumbs up" stickers and approximately 15 "thumbs down" stickers placed on maps over the course of the six outreach events. A fresh, unmarked map was provided for each of the pop-up events.

Input received on the map was recorded in a spreadsheet and informed revisions to the Draft Bicycle Network, along with feedback from City of San Mateo staff and stakeholder groups. Common themes from the map comments included:

Proposed separated bike lanes and shared use paths are widely supported, especially those located on: • Fashion Island Boulevard, • Mariners Island Boulevard, • 3rd and 4th Avenues leading into downtown, • Peninsula Avenue, • Delaware Street, • Hillsdale Boulevard, and • Saratoga Drive.	There is interest in changing the east-west recommendations in the Hillsdale neighborhood: • Shift the 37th Avenue bike boulevard to 36th Avenue. • Add a new bike boulevard on 39th Avenue that crosses over/under the railroad tracks. • Remove the proposed bike boulevard on 42nd Avenue because this corridor is too hilly to bike.
Several bike boulevard routes are very popular, especially 28th Avenue, Claremont Street, Monte Diablo Avenue, and Newbridge Avenue.	There is interest in an additional north-south bikeway that parallels the Caltrain tracks (especially connecting the area north of Hillsdale Caltrain to Pacific Boulevard and along Railroad Avenue in downtown).
Proposed bike lanes and buffered bike lanes on Alameda de las Pulgas are popular.	There is interest in additional bike connections to Caltrain stations.
Connections to the Bay Trail are important to residents.	There is interest in connecting all schools and parks to the bike network.
Participants felt that bike facilities should not end in the middle of neighborhoods; they should connect to adjacent facilities or destinations like parks and schools.	There is general interest in more separated facilities.
	There is interest in upgrading existing bike routes.

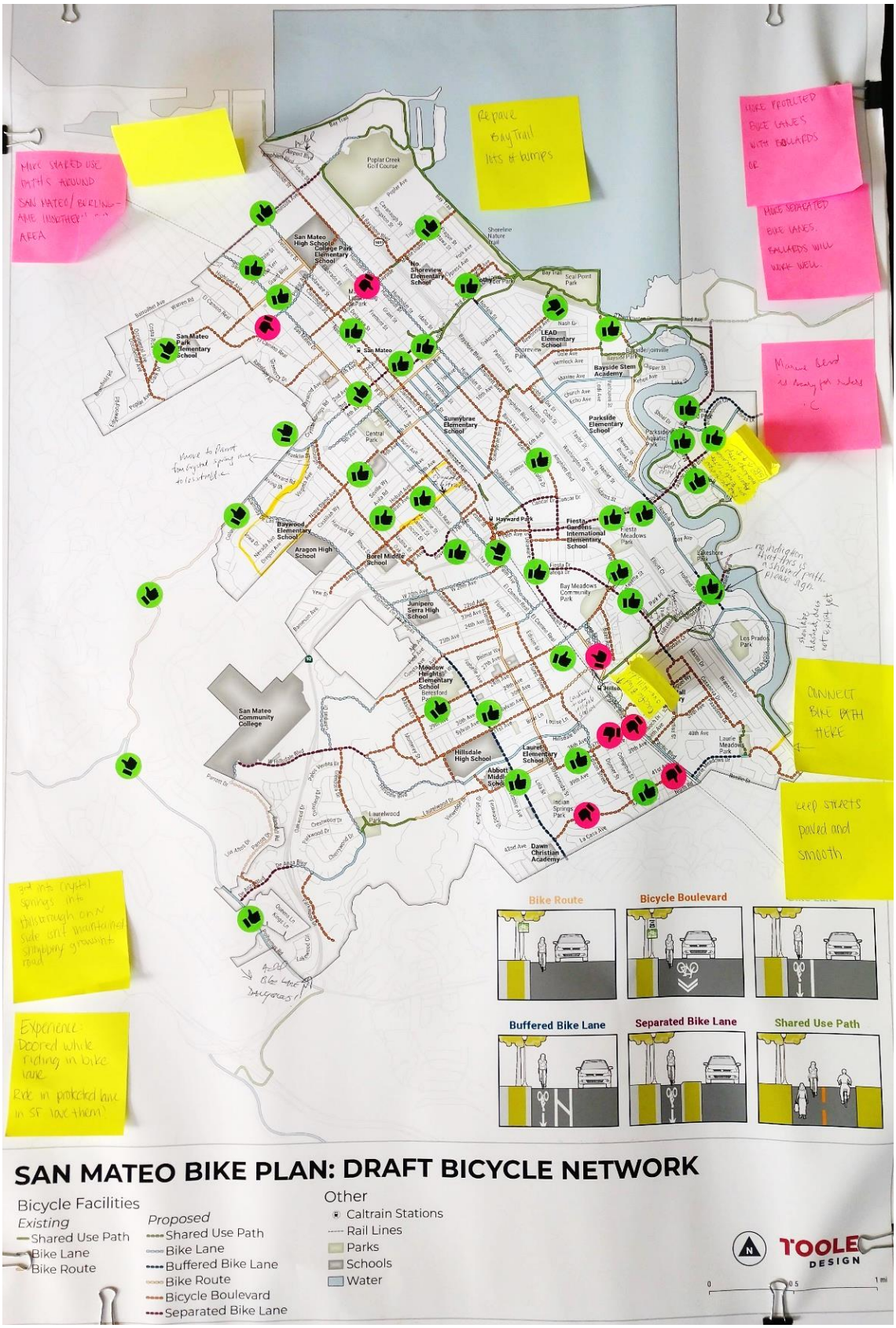


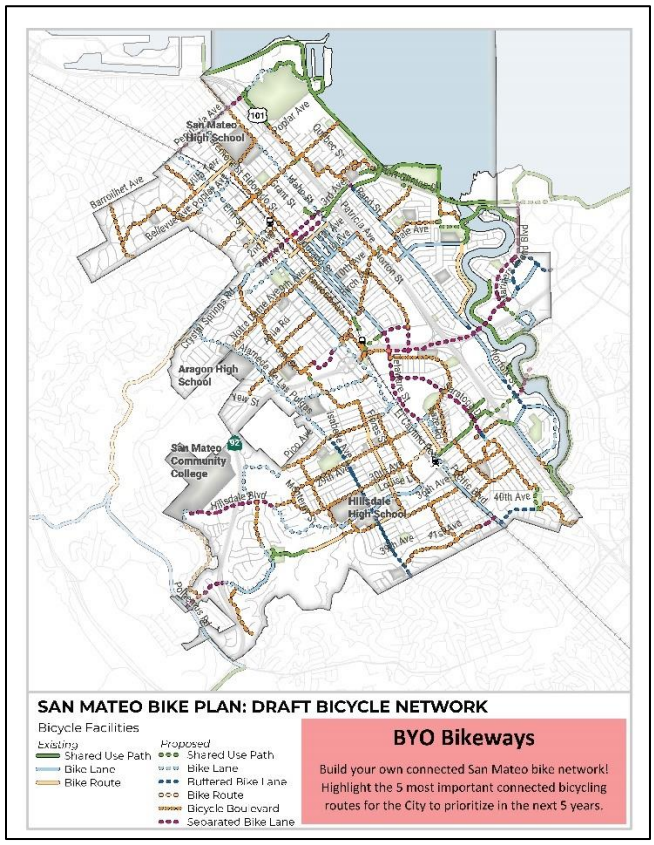
Figure A.33. Draft Bicycle Network map with feedback from June 29 Seal Point Park outreach

Build Your Own Bikeways

A second activity, Build Your Own Bikeways (BYO Bikeways), was included in addition to the 24-inch by 36-inch Draft Bicycle Network map (see Figure A.34). This activity focused on the prioritization of corridors within the network as a whole. The BYO Bikeways activity included 8.5x11 maps of the Draft Bicycle Network where participants highlighted five connected routes that they would like to prioritize in the next five years.

This activity also included a secondary activity on the reverse side of the map in which participants were asked "What's Most Important to You for the San Mateo Bike Network?" For this exercise, participants were asked to highlight the top three items from the following list to prioritize in San Mateo's updated bicycle network:

- High-Quality and High-Comfort Bikeways
- Quick and Low-Cost Projects
- Safety Projects that Address Bicycle Collisions
- Recreational Bikeways
- Bikeways in Neighborhoods
- Bikeways that Connect to Commercial Areas
- Bikeways that Connect to Schools, Parks, and Trails
- Support Infrastructure (e.g., Bike Parking)
- Support Programs (e.g., Bike Safety Workshops)
- Other (Please Explain)



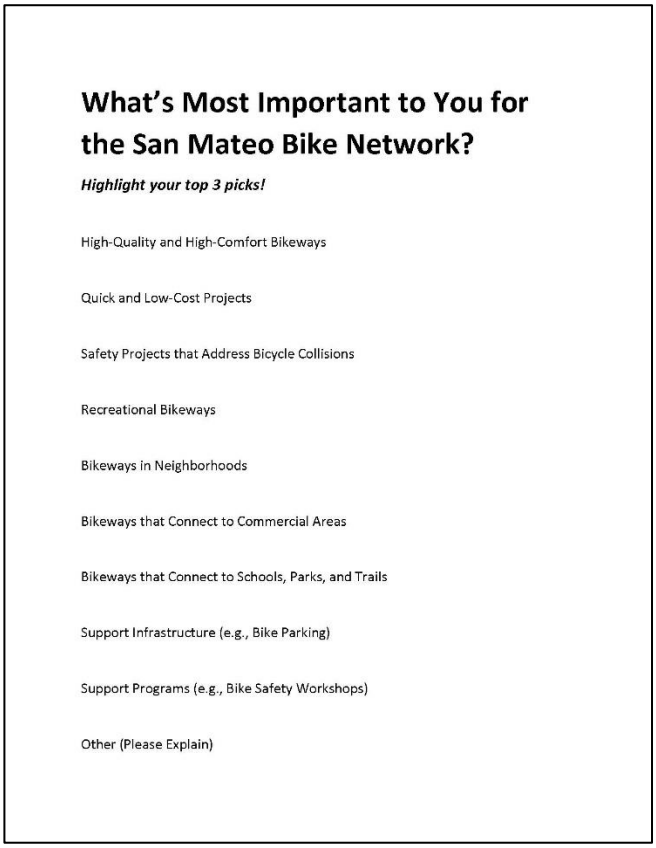


Figure A.34. BYO Bikeways activity

The BYO Bikeways activity informed project prioritization. Input from the maps was used to develop a heatmap showing which corridors participants highlighted most frequently (see Figure A.35). Participants identified east-west routes connecting to the Bay Trail and north-south routes connecting to downtown as highest priorities. Routes accessing the three Caltrain stations within San Mateo were also highlighted frequently.

This activity informed project prioritization, along with criteria developed as part of the prioritization framework, which identifies metrics to evaluate and score projects within the project list. In general, corridors highlighted more frequently were prioritized and ranked higher on the project list than those highlighted less frequently or not at all.

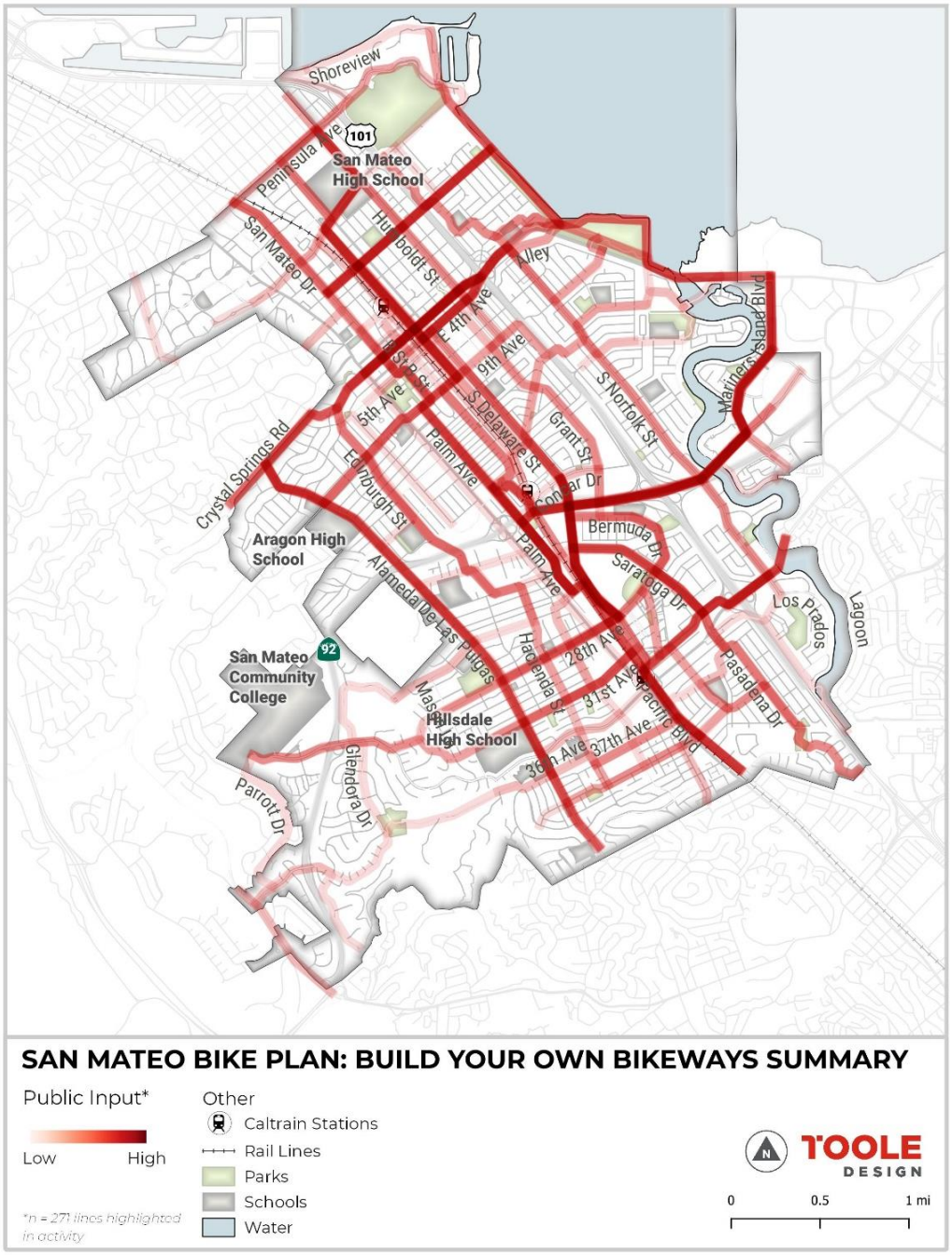


Figure A.35. Heatmap summarizing Build Your Own Bikeways activity responses

The themes highlighted on the backside informed the development of the project prioritization framework, along with project goals and policies finalized in the spring. Themes were tallied and ranked based on the number of times they were highlighted (see Table A.2). The results of the second activity reflected those of the map highlighting activity, with interest in bikeways connecting to parks and trails, commercials areas, and Caltrain stations. The top-ranked items were included in the prioritization framework.

Table A.2. Ranks and tallies of BYO Bikeways general prioritization categories

Rank	Prioritization Category	Count
1	Bikeways that Connect to Schools, Parks, and Trails	56
2	Safety Projects that Address Bicycle Collisions	50
3	Bikeways that Connect to Commercial Areas	41
4	Recreational Bikeways	35
5	Bikeways in Neighborhoods	26
6	High Quality and High Comfort Bikeways	26
7	Support Infrastructure (e.g., Bike Parking)	10
8	Support Programs (e.g., Bike Safety Workshops)	9
9	Quick and Low-Cost Projects	4
10	Other (Please Explain)	2 (Caltrain connections)

Conclusion

The third phase of community outreach was extremely successful. Over 250 individuals participated in the six pop-up events, and these participants came from a variety of backgrounds. The results obtained from the 24x36 Draft Bicycle Network map and Build Your Own Bikeways activities were used – along with extensive feedback received from City staff and during meetings with the Technical Advisory Group, Citizen Advisory Group, and Sustainability and Infrastructure Commission – to inform modifications to the Draft Bicycle Network, create a project prioritization framework, and prioritize the project list.

Draft Plan Open House (December 2019)

The Draft Plan Open House was held on December 7, 2019. During the Open House, participants were invited to share their input on the prioritized bicycle network, draft support programs and policies, and overall draft Plan. Participants were also invited to share why they are most excited about the Plan (see Figure A.36). Feedback from the community on the Draft Plan was used when creating the Final Plan.

Figure A.36. Participants shared why they are most excited about this Plan

Online Engagement and WikiMap

In order to maximize the Plan's publicity, there was an online outreach component throughout the planning process. A project-specific webpage was created on the City of San Mateo website. The project page provided an overview of the project purpose and schedule, informed community members of upcoming outreach events, and included a section for the public to

sign up for email notifications and leave comments for project staff. Furthermore, an online interactive map, called a "WikiMap", was linked on the website during the initial portion of the project (November 2018 to March 2019) to collect site-specific information on where participants experience bike-related issues, where they typically ride a bike, and where they would like to ride a bike in the future.

The WikiMap is an online outreach tool that collects site-specific information on where participants experience bike-related issues, where they typically ride a bike, and where they would like to ride a bike in the future. The feedback received from the survey respondents helps to inform recommendations for policies, programs, and the locations and types of infrastructure recommended in the San Mateo Bicycle Master Plan. The WikiMap was open for comments from November 30, 2018 until March 4, 2019. Forty-eight unique individuals contributed to the WikiMap.

Survey Responses

Participants were asked for the following information:

- Demographic information such as their age, gender, and their comfort level riding a bicycle
- Areas where they currently ride a bike
- Streets and specific locations that need bicycling improvements
- Streets and specific locations that are enjoyable for bicycling

Demographics

In addition to summarizing the feedback that respondents gave on the map, the demographics of the respondents were analyzed to assess whether they are representative of San Mateo's population. There were 35 WikiMap participants who completed some or all of the demographic survey (out of 48 individuals who contributed to the map). It was found that there is large variation between those who responded versus the City's overall population. This should be considered when drawing conclusions about the respondents' feedback, as it may not fully represent all views or experiences from residents of San Mateo.

Demographic data collected indicates males are heavily overrepresented in the survey. Of respondents that specified their gender, nearly 70% are male in contrast to the nearly even split between male and female residents in San Mateo as a whole (see Figure A.37).[1]

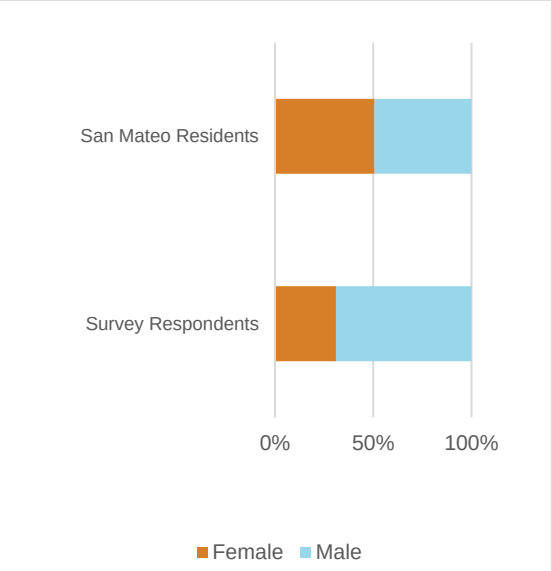


Figure A.37. Gender breakdown of survey respondents in comparison to San Mateo residents

Those between the ages of 35-44 are the most heavily represented of the respondents (approximately 30%), followed by those 25-34 and 45-54 (approximately 25% each). Compared to the overall population of San Mateo, those 18-24 and 65+ are largely underrepresented, and those 35-44 are the most overrepresented. Figure A.38 shows the age demographics of respondents compared to those of residents of San Mateo as a whole.

Respondents were also asked what race or ethnicity they most closely identify with (see Figure A.39). Of the 26 respondents that answered this question, 18 (70%) identify as Caucasian, four identify as Asian or Pacific Islander, and two each identify as

[1] Demographic comparisons were taken from the U.S. Census' 2013-2017 American Community Survey's 5-Year Estimates.

Latino or Hispanic and “Other.” In San Mateo, 44% of residents identify as Caucasian, with a much higher percentage of residents identifying as Latino or Hispanic than in the survey.

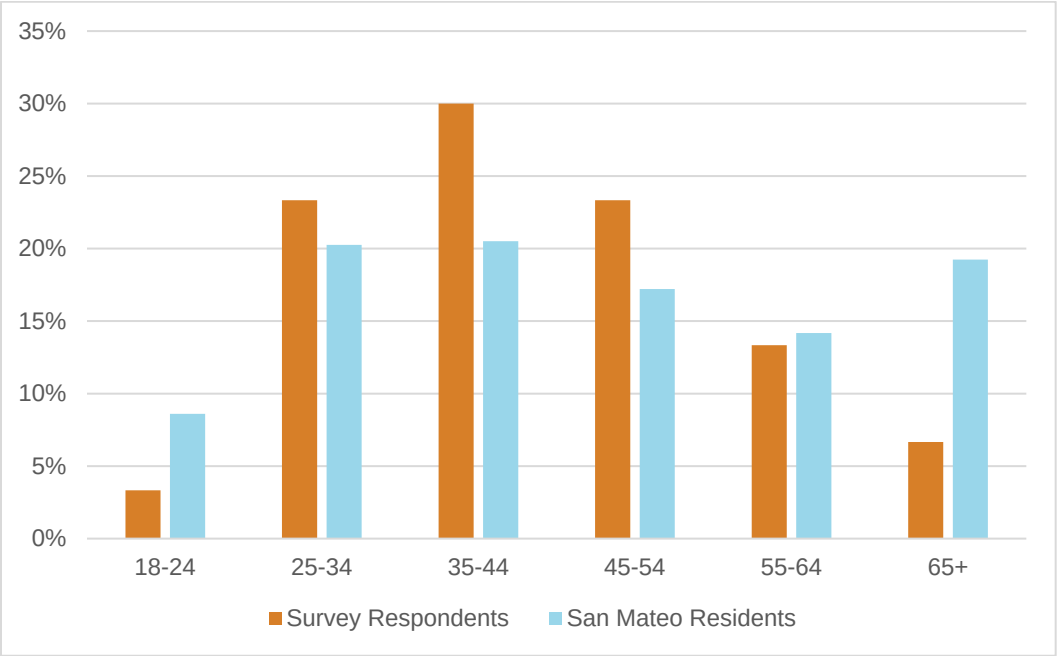


Figure A.38. Age breakdown of survey respondents versus San Mateo residents

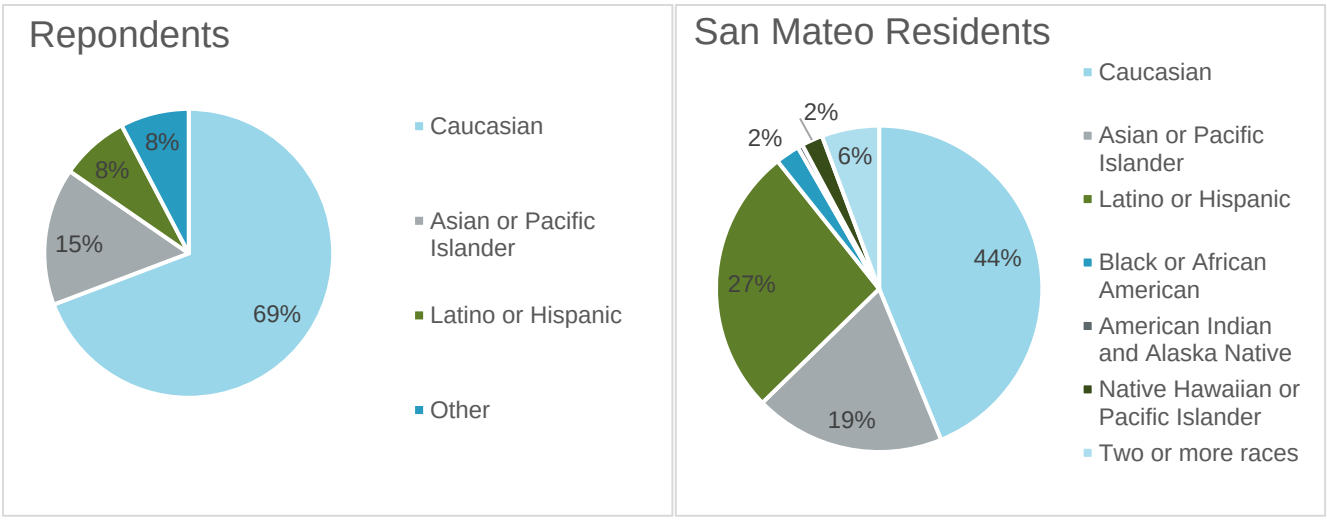


Figure A.39. Comparison of survey respondents' and residents' race and ethnicity

Lastly, the survey asked respondents to identify the neighborhood where they live. Many neighborhoods have zero respondents, and North Central has the most with eight respondents. The breakdown of where survey respondents live can be seen in Figure A.40.

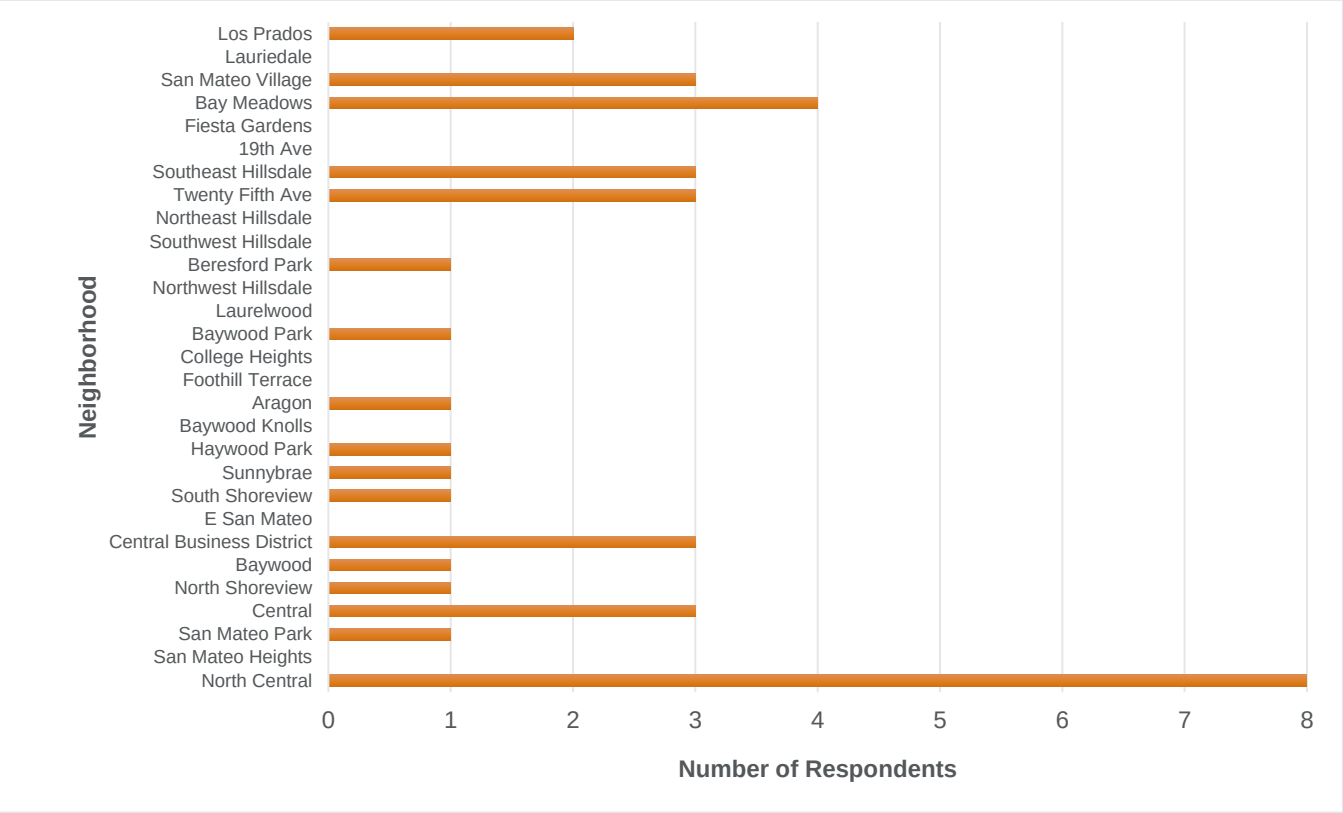
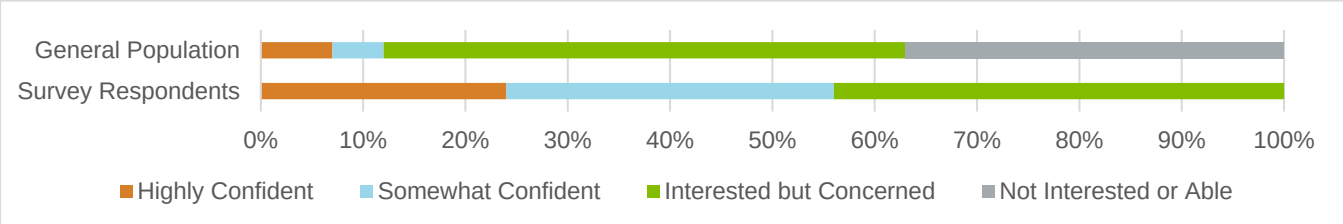


Figure A.40. Neighborhoods where respondents live

Types of Bicyclists

Survey respondents were asked to describe their comfort level bicycling. For this question, some participants chose more than one option. For these respondents, their "lowest" comfort level is used in the analysis in order to be conservative. The most respondents categorized themselves as "Highly Confident" riders, who feel comfortable riding on any street. Figure A.41 shows the respondents' comfort levels compared to the levels generally documented in wider populations.[2] As shown, the survey respondents are heavily overrepresented in "Highly Confident" riders and dramatically underrepresented in "Not Interested or Able" riders.

Figure A.41. Respondents' comfort bicycling versus the respondents from the 50 largest metro areas in the US



[2] Dill, J., & McNeil, N. (2016). Revisiting the Four Types of Cyclists: Findings from a National Survey. *Transportation Research Record*, *2587*(1), 90–99. https://journals.sagepub.com/doi/10.3141/2587-11

Current Bike Routes

When asked to document where they currently bike, respondents' routes are consistent with two themes: (1) within the central city and along major roadways where there are existing bicycle facilities (e.g., bike paths, bike lanes, and bike routes); and (2) along minor roadways, typically in residential areas, without existing bicycle facilities. This second theme is especially present west of El Camino Real, where there are fewer bike lanes and paths. Figure A.42 shows the routes that survey respondents identified.

Along with where they ride, survey respondents also noted why they ride certain routes. Most of the routes drawn are for getting to/from work or school. These routes, unsurprisingly, are focused around downtown and getting to and from transit stations. Routes used for recreation or fitness tend to either use local streets, bike routes, or bike paths, showing that respondents' recreation and fitness rides are not taking place on streets with bike lanes, perhaps to avoid traffic, frequent stops, and the higher levels of interaction with vehicles. Routes used for entertainment and dining form a network linking residential neighborhoods to the central city, mostly using existing bicycle facilities.

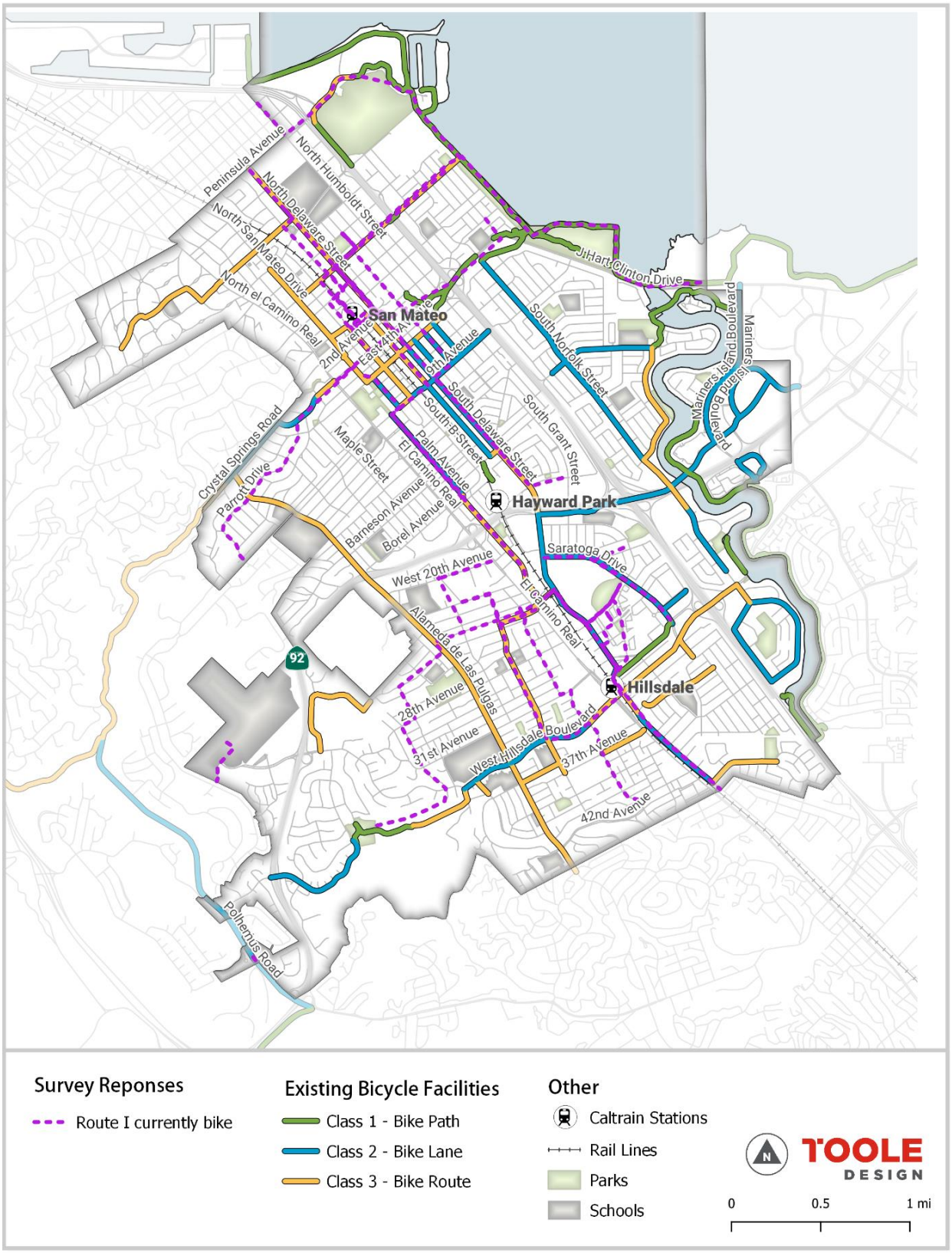


Figure A.42. Survey respondents' current bike routes

Barriers to Bicycling

Survey respondents were asked to identify sites, both individual locations and street segments, where bicycling improvements are needed. In general, survey respondents highlighted needs on major roads including El Camino Real, Saratoga Drive, Alameda de Las Pulgas, and Hillside Boulevard. Most of the recommended spot improvements are also along these routes. In total, there were 84 segments and 198 individual locations identified as needing improvements; respondents could select more than one issue per segment or location. Figure A.43 and Figure A.44 categorize the issues respondents cited, and Figure A.45 shows their geographic distribution throughout San Mateo. The most frequently cited issues are lack of separation from traffic, no space available for bicycling, vehicle conflicts, street design, and intersection design.

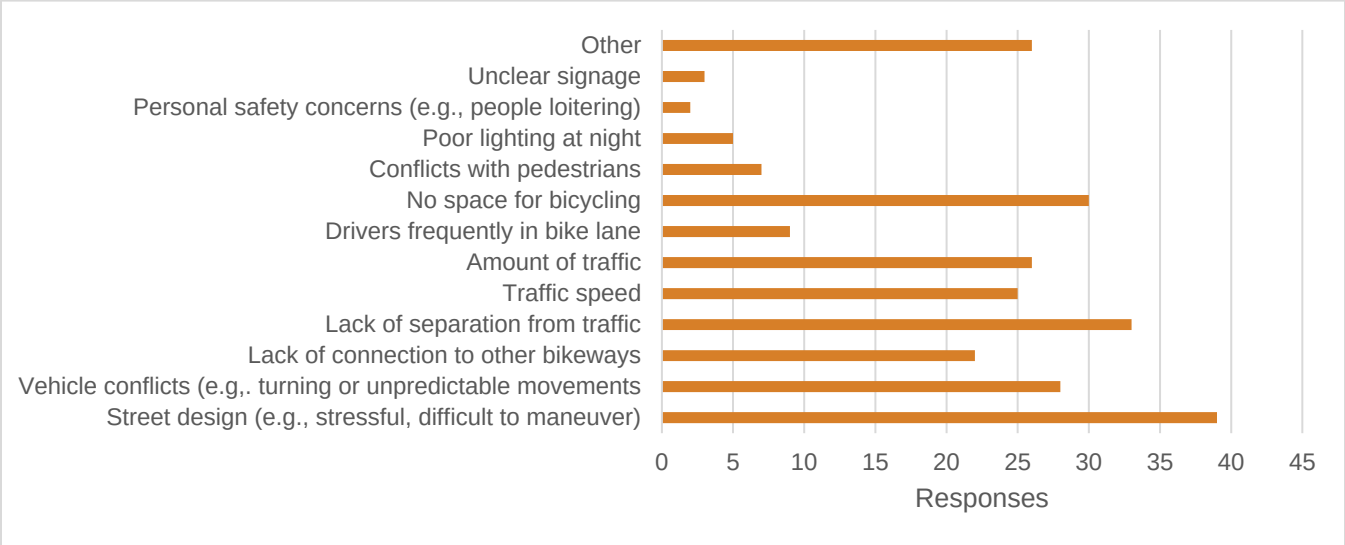


Figure A.43. Issues identified along street segments

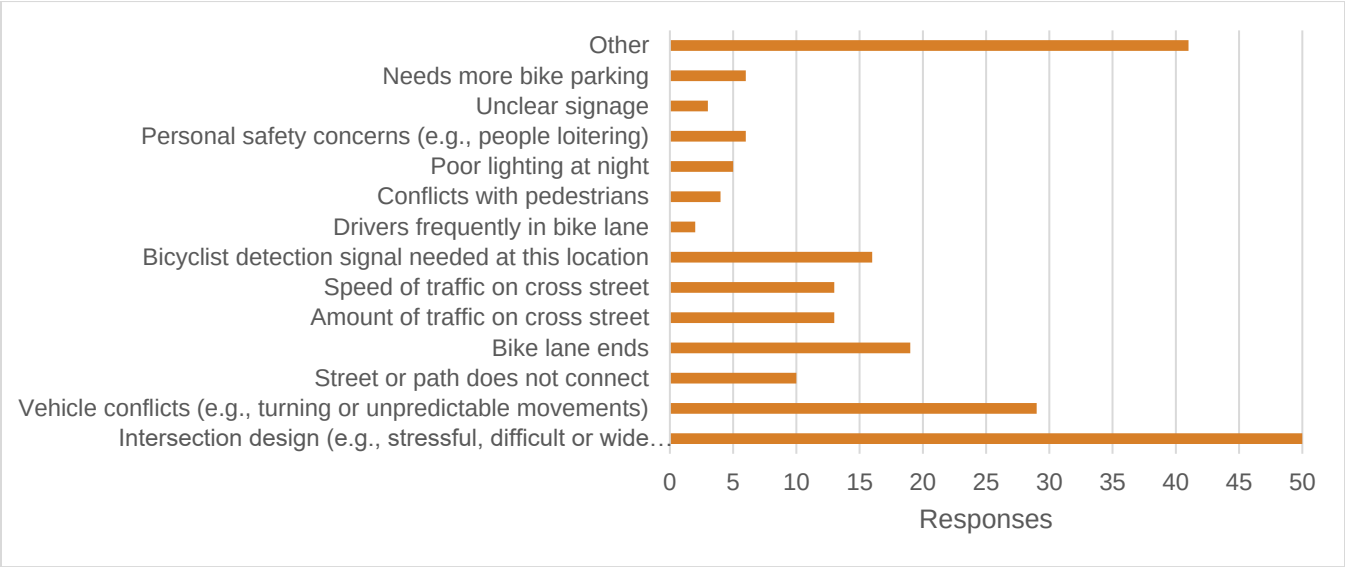


Figure A.44. Issues identified at individual locations

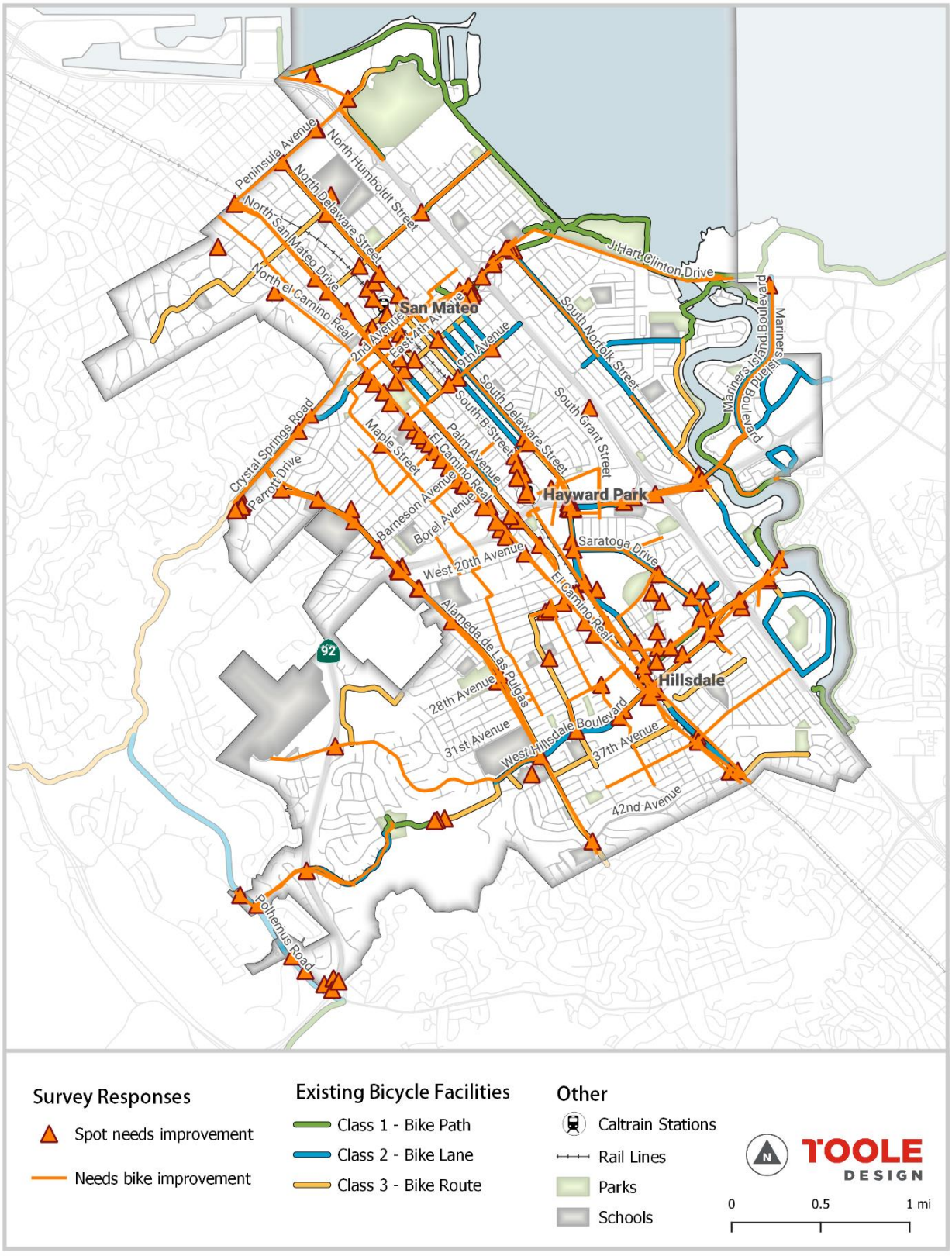


Figure A.45. Sites where respondents would like to see bicycle improvements

The following is a summary of survey respondents' comments and recommendations along the major routes in San Mateo.

El Camino Real

Most of the comments along El Camino Real focus on the interchange with CA-92. Respondents feel unsafe at the interchange, with vehicles that "merge through" the bicycle lanes to get on and off highway access ramps. In addition, there are few locations to cross El Camino Real comfortably between 9th Avenue and the CA-92 interchange, making east/west crossings difficult for respondents.

Crystal Springs Road

Respondents feel that the lack of separation in combination with higher speed traffic make this route feel unsafe.

Alameda de Las Pulgas

Along Alameda de Las Pulgas, respondents noted a variety of intersections that needed improvements to facilitate east-west crossings. They also identified spot improvements at intersections with major roadways, including West Hillsdale Boulevard and CA-92.

San Mateo Drive

San Mateo Drive received a wide variety of comments, including that there are street design issues, vehicle conflicts, lack of connection to other bikeways, lack of separation from vehicles, conflicts with pedestrians, and poor lighting at night. Spot improvement needs are spread throughout San Mateo Drive, but focus primarily at intersections, especially with East 25th Avenue and the CA-92 interchange.

Transition from Median Bike Path on 3rd Avenue Overcrossing of US-101 to East 3rd and East 4th Avenues

Respondents feel that the transition between the 3rd Avenue bike path over US-101 and East 3rd Avenue/East 4th Avenue to the west of US-101 needs improvements. Respondents mentioned needing bicycle detectors at the signals, experiencing conflicts with pedestrians, and a lack of general connectivity to the greater network as issues in this area.

Hillsdale Boulevard

Respondents that recommended improvements on Hillsdale Boulevard focused on the intersections with Alameda de Las Pulgas and El Camino Real. The respondents noted the same issues at both the intersections and along the roadway, including lack of separation from traffic, stressful street design, and indicating that there is not enough space for bicycling.

Bicycle Access Needs

Respondents were also asked to identify areas that need better bike access (see Figure A.46). Most of these points are along major roads or at entry/exit points of the City's current trail network. Individuals that identified these locations often recommended building overpasses and cut-through paths or creating more intentional connections between existing bicycle facilities and destinations.

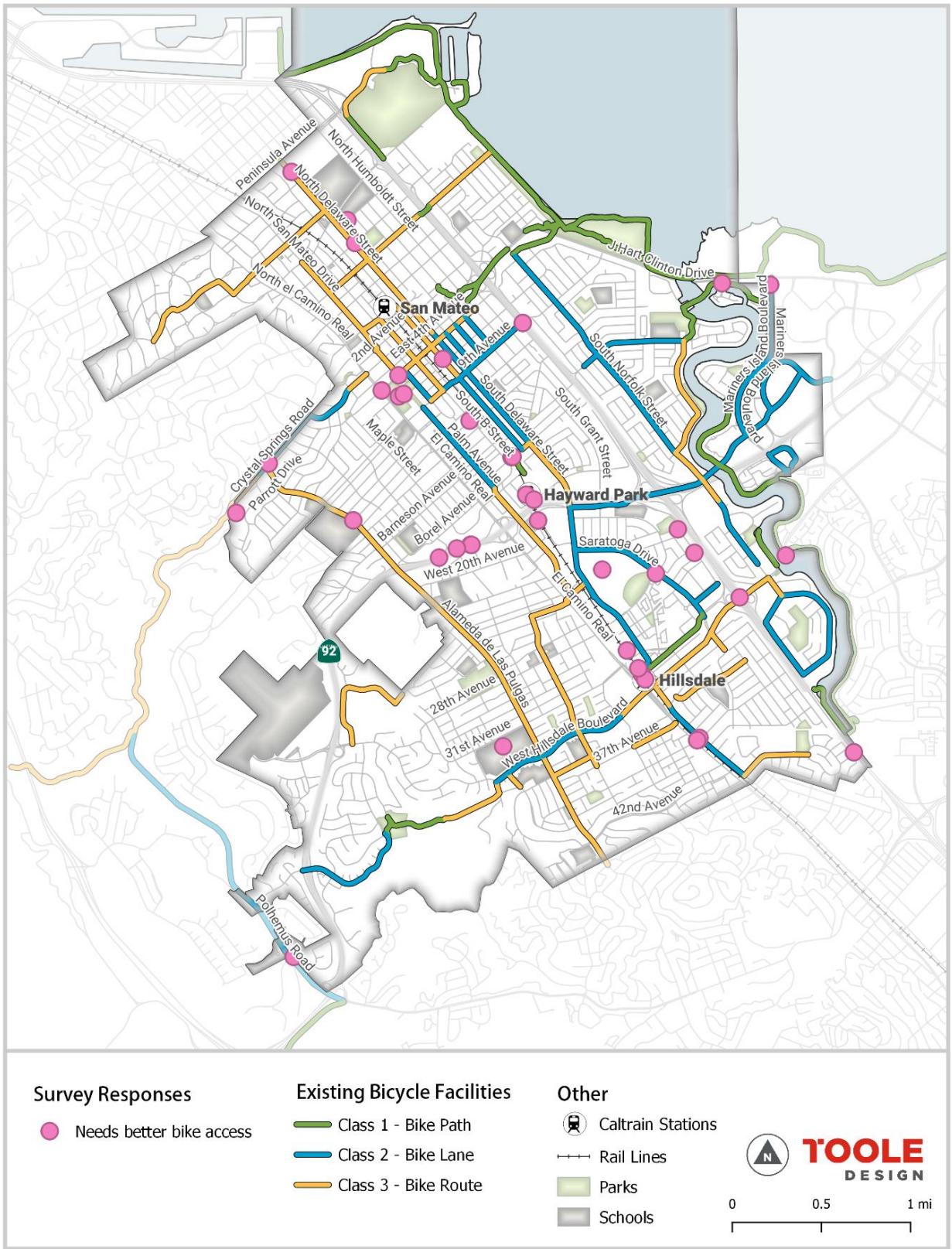


Figure A.46. Locations where respondents would like to see improved bicycle access

Great Places to Bike

In addition to identifying areas that need improvement, respondents identified areas where they currently enjoy bicycling. Respondents identified 57 sites and 32 street segments as "great." Very few respondents detailed why they labeled a particular location great; however, more respondents offered feedback about why they identified street segments as great (see Figure A.47). Low vehicle volumes and slow vehicle speeds are the most frequently cited reasons for a street or location to be deemed great by respondents. It should be noted that while "No on-street car parking" was offered as an option, no respondents chose it as a reason why they considered a location or street segment great.

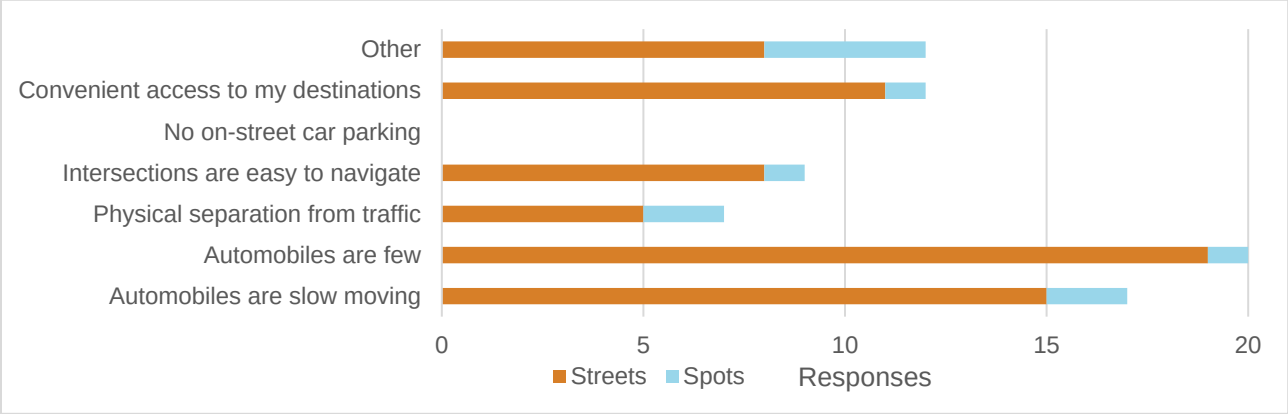


Figure A.47. Characteristics of "great" locations and streets for bicycling

While many of the "great" streets and sites currently have bicycle facilities, many do not (e.g., San Mateo Drive and 39th Avenue). Most of these locations are on lower-traffic residential streets that are parallel to higher traffic streets and provide access to existing bicycle facilities. All the areas highlighted by respondents are shown in Figure A.48. Some of the notable "great" locations include:

- Edinburgh Street
- Parrott Drive
- Claremont Street
- Grant Street
- 31st Avenue
- 39th Avenue

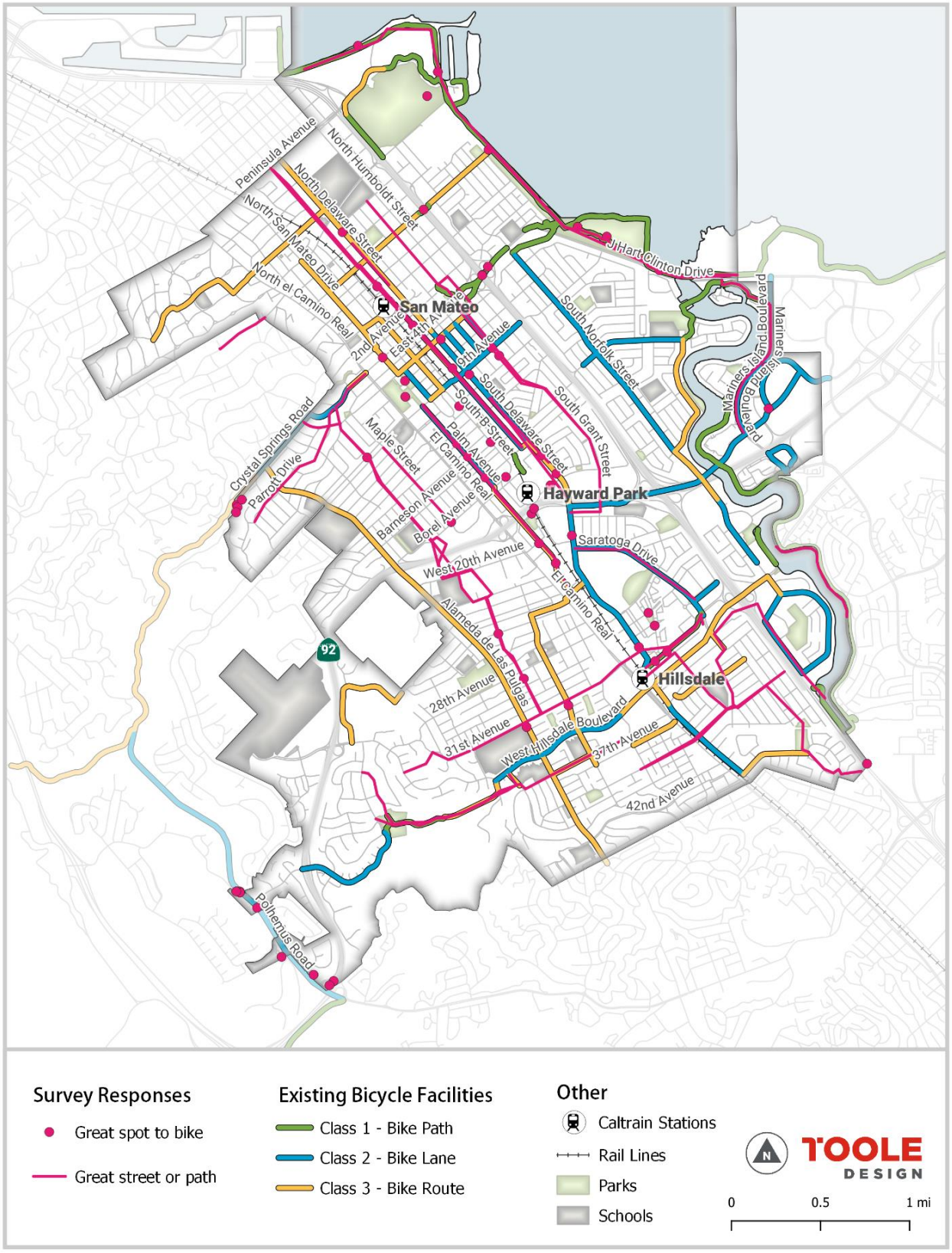


Figure A.48. Great bicycling locations and streets identified by survey respondents

Conclusion

The results of the WikiMap effort, along with the feedback received on the physical map provided at the December outreach kickoff event at the San Mateo Downtown Public Library, indicate great potential to enhance bicycling in San Mateo. In order to realize this goal and make bicycling a safer and more attractive transportation option, opportunities to improve and expand the existing bicycling network were addressed during bicycle network development. Programmatic and design recommendations augment the recommended bicycle network and further address areas of concern identified by the respondents.

It should be noted that, while useful, the WikiMap results only reflect the experiences and opinions of 48 people, less than 0.1% of San Mateo's population. As such, the WikiMap results should be used in tandem with other outreach and data gathering efforts to create a holistic picture of where people are biking in San Mateo, the challenges they face, and the opportunities they see. Other outreach efforts included in the project are a Community Bike Tour of the city in March as well as a series of pop-up events over the summer to obtain feedback on the Draft Bicycle Network.

Advisory Groups

In addition to input from community members, the development of the Plan was guided by strategic input from several stakeholder groups.

Citizen Advisory Group

The Citizen Advisory Group (CAG) was comprised of residents from neighborhoods throughout San Mateo and representatives from local organizations. The CAG provided feedback to ensure that recommendations made as part of the Bicycle Master Plan coincide with the differing needs of San Mateo's diverse neighborhoods, businesses, and community groups. The CAG met four times over the course of the project, coinciding with each of the outreach events outlined previously.

Technical Advisory Group

The Technical Advisory Group (TAG) included key representatives from City of San Mateo departments, such as Public Works, Community Development, Police, Fire, and Parks and Recreation. TAG feedback ensured that the Plan corresponds with and supports other City-led efforts and services. Like the CAG, the TAG met four times throughout the project.

Sustainability and Infrastructure Commission

The Sustainability and Infrastructure Commission (SIC) is a city commission that advises City Council on policies and programs related to environmental sustainability, transportation, and infrastructure. SIC input ensured that the Bicycle Master Plan works towards the same sustainability and environmental goals as other city efforts. The project team attended four SIC meetings over the course of the project.

Appendix B. Goals, Plans, and Policies Review

Introduction

The purpose of this Goals and Policies Review is to provide recommendations for proposed goals, objectives, and policies for the 2020 San Mateo Bicycle Master Plan ("BMP"). These recommendations are based on a review of existing plans and policies from the City of San Mateo, the County of San Mateo, and other sources as well as research into five peer cities. In addition, recommendations are built off of feedback received from the Technical Advisory Group, Sustainability and Infrastructure Committee, and Citizen Advisory Group (formerly the Neighborhood Steering Committee) stakeholder groups.

Goals and Objectives

2011 Bicycle Master Plan Goals and Objectives

The following chart outlines the goals/objectives included in the 2011 San Mateo Bicycle Master Plan and how these are addressed in the updated 2020 BMP.

Table B.1. Relationship between 2011 Bicycle Master Plan Goals and Objectives and the 2020 Bicycle Master Plan

2011 Goal/Objective	How this is addressed by the 2020 Plan
Goal 1: Develop and maintain a comprehensive bicycle and pedestrian circulation network which provides safe recreation opportunities and an alternative to automobile travel. (GP Goal C4)	Addressed by the following goals: Connectivity; Safety and Comfort.
Objective 1.1: Develop a bicycle master plan and prioritized capital improvement program that creates and maintains a safe and logical bikeways system; supports the City's Sustainable Initiatives Plan; and is coordinated with the countywide bikeway network. (GP Policy 4.1, SIP T1.3)	This is being accomplished through the development of the 2020 BMP.
Objective 1.2: Where the planned city route system interfaces with adjacent cities, the routes should be coordinated with those cities.	Included as an objective under Connectivity.
Objective 1.3: Encourage additional bicycle capacity on Caltrain and SamTrans (particularly to the College of San Mateo). Provide an adequate supply of secure covered bicycle parking at Caltrain stations. (GP Policy C 4.2)	Bicycle parking included as an objective under Connectivity; will also be included in the Support Programs chapter.
Objective 1.4: Require dedication of necessary rights-of-way for bike lanes and paths shown on Figure C5 (of the General Plan), which are deficient in land area. Dedication shall be required where the development project contributes to the need for the bikeways improvement and where the cost of dedication is not so disproportionate to the size of the project to make it unreasonable. (GP Policy 4.3)	-
Objective 1.5: Pedestrian and Bicycle Mobility Needs. Balance pedestrian mobility and bicycle accessibility and safety with vehicular congestion when considering intersection improvements to address level of service degradation. (GP Policy 4.8)	-

2011 Goal/Objective	How this is addressed by the 2020 Plan
Objective 1.6: Construct a bicycle and pedestrian overcrossing in the vicinity of Hillsdale Boulevard over US 101. (GP Policy 4.12)	Crossings over US 101 along Hillsdale Boulevard are included in the draft study network and will be addressed by the proposed bicycle network.
Goal 2: Increase mode share for pedestrian and bicycle travel to 30% for trips of one mile or less by 2020. (SIP Recommendation T.1).	Addressed by the Ridership goal.
Objective 2.1: Work with private and public schools to increase the number of students walking or bicycling to school. (SIP Recommendation T.1 Potential Supportive Action 7)	Safe Routes to School is included as an objective under Ridership. This will also be included in the Support Programs chapter.
Objective 2.2: Reduce single purpose school trips made by private automobile by 50% by 2020. (SIP Recommendation T.3)	-
Objective 2.3: Develop workshops and organized activities to encourage biking among seniors.	Included in the Support Programs chapter.
Goal 3: Increase mode share of bicycle travel to schools.	Safe Routes to School addressed by the Ridership goal.
Objective 3.1: Support Safe Routes to School and other related efforts, including educational and incentive programs to encourage more students to bicycle or walk to school through a partnership with the school district and other interested parties.	Safe Routes to School is included as an objective under Ridership. This will also be included in the Support Programs chapter.
Goal 4: Ensure plentiful, high quality support facilities to complement the bicycle network.	Included as an objective under Connectivity.
Objective 4.1: Amend bicycle parking requirements for public and private buildings to provide greater clarity on required rates, design, and location.	-
Objective 4.2: Develop and adopt a Downtown Bicycle Parking Plan.	-
Objective 4.3: Develop and implement an informative bicycle wayfinding signage program.	This will be developed as a part of this BMP.
Objective 4.4: Encourage large commercial property development to include shower and locker facilities as part of a Transportation Demand Management Strategy.	-
Goal 5: Maintain the bikeway network.	*Included in the Support Program chapter.*
Objective 5.1: Establish routine maintenance schedule and standards for sweeping, surface repair, litter removal, repainting of striping, signage and signal actuation devices.	-
Goal 6: Supplement bikeways with education, encouragement, evaluation and enforcement programs.	Addressed by the Safety and Comfort goal. Will also be further fleshed out in the Support Program chapter.
Objective 6.1: Develop and implement educational opportunities for bicyclists, pedestrians and motorists to learn about their rights and responsibilities.	Included in the Support Program chapter.
Objective 6.2: Develop and implement encouragement programs to promote bicycling as a viable travel choice.	Addressed by the Safety and Comfort goal. Will also be further fleshed out in the Support Program chapter.

2011 Goal/Objective	How this is addressed by the 2020 Plan
Objective 6.3: Develop and implement an annual evaluation program to count and survey the community on bikeway facilities and programs.	Included in the Support Program chapter.
Objective 6.4: Develop and implement an enforcement program to encourage safe travel behavior and to reduce aggressive and/or negligent behavior of drivers, bicyclists and pedestrians.	Addressed by the Community goal. Will also be further fleshed out in the Support Program chapter.
Goal 7: Ensure timely and efficient implementation of the bikeway network.	Toole Design recommends addressing this in the Implementation Strategy section of the 2020 BMP.
Objective 7.1: Designate a City Bicycle Coordinator responsible for coordinating bicycle transportation within the City and externally. The Bicycle Coordinator's role could include: • Reviewing development proposals to ensure bike requirements are incorporated • Developing and implementing educational and promotional programs • Researching sources of funding and writing project proposals • Conducting annual bicycling counts • Serving as the City contact for bicycling inquiries and complaints • Staffing the Bicycle Pedestrian Advisory Committee • Coordinating with neighboring cities, the County, and other agencies to implement policies, programs, and projects	Toole Design recommends including this in the Implementation Strategy.
Objective 7.2: Update the Bicycle Master Plan every five years to identify new facility improvements and programmatic opportunities as the bicycle network develops, assess their feasibility, gauge public support, identify funding sources and develop implementation strategies.	Toole Design recommends addressing this in the Implementation Strategy section of the 2020 BMP.
Objective 7.3: Identify and pursue reliable sources of revenue to implement projects identified in the Bicycle Master Plan.	Included as an objective under the Connectivity goal; will also be addressed by the Funding Strategy section.

Plans and Policies: Review and Recommendations

This section summarizes the planning and policy context in which the BMP is being developed. It provides a brief overview of the existing plans and policies that influence bicycle planning in San Mateo, followed by more detailed descriptions of these plans and policies. It also includes a review of peer city practices related to various infrastructure and non-infrastructure programs, a list of priority policy recommendations for the BMP, and a summary of micromobility policy considerations.

Summary of Adopted Plans and Policies

The City of San Mateo has many adopted plans and policies that will influence the development of the 2020 San Mateo Bicycle Master Plan and the recommended bicycle projects, investments, and programs. By being developed with consideration of the context created by the existing plans and policies, the BMP will:

- Provide consistency and coordination across relevant programs and projects
- Help to align priorities
- Improve efficiency in the implementation of the bicycle network and individual projects

The project team reviewed applicable City, County, and transit agency plans and policies, with an emphasis on guidance that is applicable to the BMP, including policy and programming recommendations and specific bikeway and facilities recommendations. Existing City, County, and regional plans all present a consistent message: **Strong support for improving bicycling conditions in San Mateo.**

The plans tell a collective story of aiming to increase multimodal access to existing city amenities and regional transportation facilities. They acknowledge that San Mateo's current bicycle network has gaps, limited low-stress bicycle infrastructure, and challenges due to limited rights-of-way and barriers such as busy intersections and highways. The plans identify a variety of bicycle projects to increase access to transit, complete network gaps, and improve the safety of existing facilities and crossings.

Among San Mateo's local and regional planning documents, the most commonly discussed themes are:

1. Connectivity to key areas, such as transit stations, Downtown, and schools
2. Increased bicycle ridership
3. Safety
4. Environmental conservation
5. Funding
6. Education

Table B.2 shows the list of plans reviewed and common themes across the plans. The following section includes a more detailed overview of each plan listed in Table B.2, including an overview of each plan's goals and the key takeaways for bicycling.

Table B.2. Themes among San Mateo's Bicycling-related Planning Documents

Plan	Year Adopted	Connectivity to key areas	Increase ridership	Safety	Environmental Conservation	Funding	Education
San Mateo Countywide Transportation Plan 2040	2017	X	X	X		X	X
San Mateo County Safe Routes to School Annual Report	2017	X	X	X			X
SamTrans Short-Range Transit Plan	2017	X			X		
Caltrain Bicycle Parking Management Plan	2017	X				X	
Plan Bay Area 2040	2017	X	X		X	X	
Traffic Action Plans	2016	X		X			
San Mateo Sustainable Streets Plan	2015				X		
Silicon Valley Vision Zero Toolkit	2015		X	X			X
Caltrain Bicycle Access and Parking Implementation Plan	2015	X				X	
San Mateo Climate Action Plan	2015		X		X		
San Mateo Bicycle Master Plan	2011	X	X	X	X	X	X
San Mateo County Comprehensive Bicycle and Pedestrian Plan	2011	X	X	X			
San Mateo 2030 General Plan – Chapter 3: Circulation	2010		X				
San Mateo Downtown Area Plan	2009	X					
Rail Corridor Transit-Oriented Development Plan - Circulation	2005	X		X			
San Mateo County Trails Plan	2001	X					

Detailed Review of Adopted Plans and Policies

Table B.3 provides an overview of the goals and key takeaways from bicycling-related plans and policies from the City of San Mateo, San Mateo County, and other agencies.

Table B.3. Adopted Plans and Policies Review

Plan	Goals	Key Takeaways
San Mateo 2030 General Plan – Chapter 3: Circulation *(City of San Mateo, 2010)*	• Design and regulate use of city streets according to their classification and intended function. • Maintain a street and highway system which accommodates future growth while maintaining acceptable levels of service. • Support the provision of public transit services adequate to provide a viable alternative to automobile travel for all citizens and to provide a convenient means of transportation to the "transit dependent" population. • Maintain a comprehensive bicycle and pedestrian circulation network which provides safe recreation opportunities and an alternative to automobile travel. • Provide an adequate parking supply for new development. • Implement the transportation objectives of the Climate Action Plan.	• Presents a level of service (LOS) model that measures roadway capacity using vehicle delay. • Presents policies that emphasize maintaining an LOS no worse than LOS D. • Traffic into the City and local traffic are expected to increase over the next decade. • Supports an increase in transit ridership. • Supports the implementation of the 2011 Bicycle Master Plan. • Supports use of bicycles on transit and development of secure, covered bike parking at Caltrain stations. • Supports dedication of needed right-of-way for bikeways. • Proposes balancing pedestrian bicycle mobility and safety with vehicular congestion when considering intersection improvements to address level of service degradation. • Supports construction of bicycle and pedestrian overcrossing near Hillsdale Blvd over US 101. • Supports goals of Climate Action Plan, including increasing non-automobile mode share, reducing single occupancy vehicle trips, and promoting walking/biking/carpooling to school.
San Mateo Bicycle Master Plan *(City of San Mateo, 2011)*	• Develop and maintain a comprehensive bicycle and pedestrian circulation network which provides safe recreation opportunities and an alternative to automobile travel. • Increase mode share for pedestrian and bicycle travel to 30% for trips of one mile or less by 2020. • Increase mode share of bicycle travel to schools. • Ensure plentiful, high quality support facilities to complement the bicycle network. • Maintain the bikeway network. • Supplement bikeways with education, encouragement, evaluation and enforcement programs. • Ensure timely and efficient implementation of the bikeway network.	• Summarizes benefits of bicycling; existing bikeways and programs; and funding sources for bikeway projects. • Identifies programmatic improvements to increase bicycling based on the four E's (encouragement, education, enforcement, and evaluation). • Recommends improvements to the bikeway network and specific site improvements, including 4 miles of Class I bikeways, 3 miles of Class II bikeways, 22 miles of Class III bikeways, 10 miles of Class III bikeways and shared lane markings, and • Prioritizes proposed projects and provides cost estimates. • Presents bicycle wayfinding guidance.
San Mateo Downtown Area Plan *(City of San Mateo, 2009)*	• Enhance Downtown's role as the city center and maintain its unique sense of place. • Enhance the vitality and activity of Downtown by incorporating an overall good mix and diversity of uses. • Enhance the Downtown's pedestrian environment and enhance the safety and attractiveness of Downtown.	• Provides support for specific development and right-of-way projects including a public plaza, pedestrian improvements, and the creation of a transit-oriented development zone. • Provides a series of policies to support sustainable initiatives Downtown; improve access without impacting character; improve the pedestrian environment and safety of Downtown; and enhance vitality and activity in Downtown.

Plan	Goals	Key Takeaways
	• Protect key landmarks and the historic character that exists in parts of downtown. • Ensure adequate parking to meet expected needs, enhance the quality of the parking environment, and improve public perceptions about parking availability. • Facilitate ease of access without impacting Downtown's character and sense of place. • Enhance the fiscal importance of Downtown to the city as a whole through public and private Investment. • Support sustainable initiatives in Downtown.	• Discusses sustainable transportation initiatives and specifically states that Downtown Area Plan policies should be implemented to reduce vehicle trips and promote alternative modes. • Presents analyses of a lane reduction project for Fourth Avenue and parking availability in Downtown. • Emphasizes importance of a pedestrian-friendly Downtown. • Identifies the need for a Downtown Transportation Management Agency to support residential and commercial transportation opportunities and enhance the use of transit and/or bicycles to reduce the use of single-occupant vehicles.
San Mateo Downtown Specific Plan *(City of San Mateo, Ongoing)*	*This plan has not been finalized or adopted; information presented is based on community input at public workshops.*	• Discusses public feedback which shows strong support for increased bike facilities in Downtown, including Class IV bikeways, bikeshare, and more bike parking. • Highlights that safety is a concern for many residents considering bicycling or letting their children bike. • Indicates that specific streets, such as 3rd Ave, El Camino Real, and 9th were highlighted as streets needing bike infrastructure. • Supports the creation of more bike connections to existing trails, including the Bay Trail. • Shows tension between residents when it comes to prioritizing bike infrastructure. Some folks think cars should always take priority, while others would like to see pedestrian and bicyclist safety given a higher priority.
San Mateo Sustainable Streets Plan *(City of San Mateo, 2015, not yet adopted)*	• To ensure that human life and health are paramount and take priority over mobility and other road traffic system objectives, improve safety through the design and maintenance of sidewalks, streets, intersections, and other roadway improvements such as signage, lighting, and landscaping, as well as best practice programs to enhance and improve the overall safety. • Increase and improve multimodal access to employment centers, residential neighborhoods, community destinations, and recreation opportunities across the City of San Mateo for people of all ages and abilities. • Maintain and improve the quality, operation, and integrity of multimodal transportation network infrastructure that allows for convenient and direct connections throughout San Mateo. Enhance streets' role in creating public environments that are attractive, functional, and accessible to all people, and ensure that streets incorporate design features that support environmental goals. • Increase awareness of the value of pedestrian, bicycle, and transit travel for commute and non-commute trips through encouragement, education, enforcement, and evaluation programs. • Improve pedestrian and bicycle accessibility for all residents through equitable public engagement, service delivery, and capital investments.	• Discusses environmental, public health, sustainability, and economic benefits of Complete Streets. • Provides general street design guidelines. • Recommends projects, programs, and performance metrics for the City to implement moving forward. • Emphasizes goals and objectives to support Complete Streets, Green Streets, and Vision Zero. • Presents a new street classification framework which includes the following new street types: El Camino Real, major connectors, minor connectors, access, alley, and paths. Each street type corresponds to five context areas, including downtown, commercial/mixed-use, neighborhood, industrial, and parks. • Recommends Per Capita Vehicle Miles Traveled as a new transportation system performance metric. • Provides incentive and low-cost program ideas for use as part of transportation demand management efforts. • Discusses North San Mateo Drive road diet, South Grant Street Class III Bikeway project, and bike facility improvements to El Camino Real. • Recommends a new development review process and fee based around transportation performance metrics.

Plan	Goals	Key Takeaways
	• Implement the Sustainable Streets Plan over the next 20 years.	• Recommends a new citywide Transportation Demand Management Plan, requiring new development to include trip reduction programs and incentives. • Recommends revisions to the Residential Parking Permit Program and Neighborhood Traffic Management Program.
San Mateo County Comprehensive Bicycle and Pedestrian Plan *(San Mateo County, 2011)*	• A Comprehensive Countywide System of Facilities for Bicyclists and Pedestrians. • More People Riding and Walking for Transportation and Recreation. • Improved Safety for Bicyclists and Pedestrians. • Complete Streets and Routine Accommodation of Bicyclists and Pedestrians. • Strong Local Support for Non-Motorized Transportation.	• Presents a 'general preferences and needs analysis' for bicyclists and pedestrians, including a discussion of different types of Bicyclists. • Presents a crash analysis, pedestrian demand model, and estimate of the existing bicycle mode share. From 2004 to 2008 the City of San Mateo had the largest share of countywide bicycle and pedestrian crashes compared to any other city in the county. • Presents the existing countywide bikeway network and a list of planned bikeway network projects and their associated cost estimates.
San Mateo Countywide Transportation Plan 2040 *(San Mateo County, 2017)*	• Integrate transportation and land use plans and decisions in support of a more livable and sustainable San Mateo County. • Enhance safety and efficiency on the countywide roadway network to foster comfortable, convenient, and multimodal mobility. • Provide people with viable travel choices and encourage use of healthy, active transportation through a safe, continuous, convenient and comprehensive bicycling network that reduces reliance on the automobile for short trips. • Promote safe, convenient, and attractive pedestrian travel that promotes healthy, active communities while reducing reliance on the automobile for short trips. • Develop and maintain a seamless, safe and convenient public transportation system in San Mateo County focused on the customer. • Manage travel efficiently through supply-side measures, including low-cost traffic operations improvements and use of technologies that reduce or eliminate the need for increases in physical capacity. • Reduce and manage travel efficiently through demand-side measures, including land use planning and transportation demand management efforts at work sites. • Encourage innovations in parking policy and programs, including incentives for reduced parking requirements, and a comprehensive approach to parking management and pricing. • Integrate the roadway, public transit, and non-motorized transportation networks to advance system efficiency, effectiveness, and convenience.	• Presents a brief summary of best practices for bikeways in places with high rates of bicycling. • Discusses major barriers to bicycling in San Mateo, including lack of bikeways and crossings for major roadways. • Presents a series of policies to increase access to bicycling and encourage residents to bicycle more often. • Six bicycling objectives are presented to as guidelines to increase bicycling in the county. These objectives cover topics such as increasing the number of miles of bikeways, bike parking, bike safety education and training, and bicycle mode share.
2001 Trails Plan *(San Mateo County, 2001)*	• Provide an updated Trails Plan with the latest general alignments. • Provide connection between municipal trail systems and County trails and other jurisdictions trail systems.	• Lists existing and proposed trails that allow bicycles, including the Cañada Trail the Lower Alpine Trail, and the San Mateo Creek Trail.

Plan	Goals	Key Takeaways
	• Link urban area residents with rural public lands of San Mateo County. • Develop a set of policies and guidelines that can be used during detailed trails planning. • Define environmental issues and mitigation measures to consider for trail planning, design, construction, and management. • Streamline future environmental review of specific trail proposals. • Provide access for recreation, transportation, and education benefits. • Improve access to and along the coast, San Francisco Bay and Ridgelines. • Provide trail-related recreation opportunities to County residents. • Provide an inventory of existing trails.	• Discusses the objective of allowing as many uses of trails as possible, including bicycling. Design standards presented integrate bicyclists' operating space. • Presents a series of guidelines to promote safety and ease of access for all users on trails.
San Mateo County Safe Routes to School 2016-2017 Annual Report *(San Mateo County, 2017)*	• Encourage children and their parents to carpool or to take an active mode of transportation to school to reduce traffic congestion and improve air quality.	• Presents summary of countywide Safe Routes to School ("SRTS") programming, including education, encouragement, engineering, enforcement, equity, and evaluation efforts. • Discusses walk and bike audits conducted to help assess walkability and bikeability of schools and their surrounding areas. • Highlights that a few schools were able to use SRTS funding to complete engineering projects. • Highlights SRTS events from 2016-2017 school year, including participation in national SRTS-related events. • Shows that approximately 23% of students walk to school, 5% bike, and 4% take transit. • Discusses the most common concerns among parents that limit their children's abilities to walk or bike to school, including speeding, high traffic volumes, and unsafe intersections. At least 50% of all parents who participated in the survey indicated that these three barriers were a problem. • Lists program goals for future SRTS program. The goals relate to equity, awareness, sustainability, safety, and promoting a walking school bus culture.
Silicon Valley Vision Zero Toolkit *(Silicon Valley Bicycle Coalition, 2015)*	N/A	• Lists short- and long-term goals to reduce fatalities and serious injuries in the region. Goals relates to evaluation and planning, engineering, enforcement, education, and encouragement. • Discusses need for integration of equity concerns into Vision Zero planning. • Presents list of available project funding sources. • Highlights the City of San Mateo's Vision Zero policy goals.
SamTrans Short-Range Transit Plan *(San Mateo County, 2017)*	• Increase weekday fixed-route ridership by 15 percent. • Increase fixed-route farebox revenue by 20 percent. • Reduce debt service by $1.5 million annually. • Improve organizational performance. • Manage workforce change.	• Describes SamTrans services and service area. • Describes fare structure and results of policy study. • Describes existing facilities, including bike facilities and bikeshare.

Plan	Goals	Key Takeaways
		• All buses can hold two bicycles, up to two bicycles are allow inside the bus if passenger volumes allow. Some SamTrans vehicles can hold three bicycles. • San Mateo's SamTrans Park and Ride has parking spaces for up to 10 bicycles. • Summarizes history of bikeshare in the region. San Mateo had a smart bike bikeshare pilot program in 2016.
Rail Corridor Transit-Oriented Development Plan – Circulation *(City of San Mateo, 2005)*	• Encourage well-planned, compact development with a range of land uses, including housing, commercial, recreation and open space uses, in proximity to train stations. • Improve pedestrian, bicycle, shuttle, and vehicular access by creating direct connections to the train stations and other transportation facilities and local destinations. • Identify needed transportation and public improvements including train station enhancements. • Create opportunities for land use change that are compatible with and add value to surrounding neighborhoods. • Enhance economic development opportunities consistent with the City's Economic Development Strategy. • Improve local traffic conditions in study area. • Protect and improve neighborhood quality of life. • Create opportunities for land use change that are balanced with the circulation system.	• Presents conceptual street design cross-sections, illustrating the desired number and configuration of travel and parking lanes, location of sidewalks and bicycle lanes, and planting areas. • Presents a series of policies and projects to increase multimodal access to rail stations. The relevant policies include: establishing a hierarchical, interconnected, and cohesive street system in the plan area; improving intersection safety for all modes, developing an areawide pedestrian and bicycle circulation network; and reducing multimodal network barriers.
Caltrain Bicycle Access and Parking Implementation Plan *(Caltrain, 2015)*	N/A	• Summarizes use of bicycles on Caltrain's trains. • Summarizes progress on 2008 BAPP. Progress has been made towards only one project in San Mateo, the installation of electronic bike storage lockers. • Presents projects to develop a bike parking business plan, bike wayfinding and signage program, bike marketing and information program, and station-level bike needs audits. • Discusses plans for partnership with San Mateo and assessment of whether the management of bike lockers at all stations should be taken over by Caltrain. • Proposes to add bike parking and increase bicycle access to San Mateo station.
Caltrain Bicycle Parking Management Plan *(Caltrain, 2017)*	• Enhance the customer experience for Caltrain passengers. • Provide a viable alternative to bringing a bicycle on board for Caltrain passengers. • Make efficient use of Caltrain's resources.	• Summarizes Caltrain's bicycle programming and planning efforts, including bikes on board and wayside facilities. • Presents overview of bike parking system, current use, and potential market. • Presents plan to improve quality of bike parking, including goals, performance measures, and a recommendation to improve the management of Caltrain's bike parking system.
San Mateo Climate Action Plan *(City of San Mateo, 2015)*	• 15% reduction in GHG emissions below 2005 emissions levels by 2020.	• Discusses the importance of increasing bicycle mode share and provides current estimate of bike mode share.

Plan	Goals	Key Takeaways
		• Recommends increasing bike mode share by hosting bike safety and awareness efforts; expanding bike-to school commutes; expanding Bay Area Bike Share stations to include San Mateo; installing new bike racks and long-term storage; secure funding for full implementation of 2011 Bike Master Plan.
Traffic Action Plans *(City of San Mateo, 2016)*	• Improve traffic safety and quality of life in every neighborhood.	• At least 12 neighborhoods have a traffic action plan. • Five areas of concern common to all neighborhoods are speeding, cut-through traffic/congestion, school issues, roadway conduct, and parking. • More than 30 projects have already been completed to address neighborhood traffic concerns. Most treatments include engineering measures such as installations of signs, speed cushions, and rectangular rapid flashing beacons. • The City has installed Class II or Class III bikeways and additional bike parking at city facilities. • San Mateo's SRTS Program has conducted educational workshops and bike rodeos at more than eight schools.
Plan Bay Area *(Association of Bay Area Governments and Metropolitan Transportation Commission, 2017)*	• Reduce CO_2 emissions. • Improve air quality. • Increase non-auto mode share. • Reduce congestion.	• Discusses the planned expansion of regional transit services, including a new high-speed rail line and commuter rail line improvements. • Discusses plans for adding Bus Rapid Transit to El Camino Real. • Explains that there is funding for SRTS and Bike/Pedestrian projects through One Bay Area Grant program from the MTC. • Provides support for TDM strategies including the use of bike and pedestrian network development to reduce CO_2 emissions and support MTC's Climate Initiatives Program.

Best Practice Review

This section presents a review of bicycling-related best practices that San Mateo's peer cities have implemented. The cities chosen for review were selected based on their size, bicycle mode share, and political commitment to bicycling. Table B.4 lists characteristics of the peer cities in relation to San Mateo.

Table B.4. Peer Cities Included in Best Practice Review

City, State	Approximate Population	Bike-Friendly Community Rating	Bike mode share (ACS)
San Mateo, CA	105,000	Bronze	1.1%
Redwood City, CA	85,000	Bronze	2.4%
Mountain View, CA	80,000	Silver	6.4%
Beaverton, OR	95,000	Silver	0.8%
Bellevue, WA	130,000	Bronze	0.5%
Fort Collins, CO	160,000	Platinum	6.4%

Table B.5 presents a variety of best practices for bicycle planning that have been implemented in San Mateo and its peer cities. **Based on this comparison to its peer cities, San Mateo has made notable progress with its bicycle planning and is performing relatively well in many planning areas.** However, there are several opportunities for San Mateo to improve its efforts, especially related to encouragement programs and integrating equity considerations into planning decisions.

Table B.5. Bicycling Best Practices in San Mateo and Peer Cities

Best Practices	San Mateo, CA	Redwood City, CA	Mountain View, CA	Beaverton, OR	Bellevue, WA	Fort Collins, CO
Engineering						
Bicycle-specific design standards*	X		X	X	X**	X
Rapid implementation and demonstration projects					X	X
Education						
Active and content-rich bicycling webpage(s) on City website			X		X	X
Education programs offered for different audiences			X			X
Enforcement						
Conducts targeted enforcement in areas with high numbers of crashes			X			X
Encouragement						
Encouragement programs offered for different audiences		X	X			X
Prioritization of low-stress bikeways			X	X		X
Evaluation and Planning						
Bicycle Master Plan (or Active Transportation Plan)	X		X	X	X	X
Support for bicycle facilities and safety in other plans and policies	X	X	X	X	X	X
Comprehensive bicycle wayfinding strategy				X		X
Active Bicycle (or Active Transportation) Advisory Committee			X	X		X
Planning emphasizes network connectivity	X		X	X	X	X
Bicycle planning documents focus on 'interested but concerned' or 'all ages and abilities' user groups			X	X	X	X
Data collection and use of performance metrics			X	X		X
Interagency coordination	X	X	X			X
Facility maintenance strategy	X					X
Equity						
Equity considerations integrated into bicycle planning efforts		X		X		X

*Includes intersection and conflict area treatments for bicyclists

**Endorses NACTO guides

Case Study Findings

As previously mentioned, the City of San Mateo is performing relatively well in many bicycle-related areas when compared to the peer cities; however, there is always room for improvement. The following section highlights opportunity areas, based on the "6 E's" of bicycle planning – Engineering, Education, Enforcement, Encouragement, Evaluation, and Equity.

Key Takeaways

This best practice review highlighted several opportunities for the City of San Mateo to consider during the development and implementation of the 2020 San Mateo Bicycle Master Plan. Key takeaways from this review include:

- Focus on building a bicycle network for "Interested but Concerned" bicyclists.
- Use the "quick build" method to construct priority sections of the bicycle network in a short timeframe by taking advantage of low-cost facilities and intersection improvements.
- Actively integrate equity considerations into project planning and prioritization efforts.
- Partner with City Departments, businesses, and community organizations to provide more bicycle education and encouragement events/programs that target specific communities, such as families, older adults, and women.

Engineering

In the context of the "6 E's," engineering refers to the planning, design, construction, and maintenance of infrastructure. When considering how to plan and design bikeways, many cities are recognizing that most bicyclists (approximately 50 to 60 percent) have little tolerance for interacting with motor vehicle traffic unless volumes and speeds are very low. [1] This group of riders is referred to as "Interested but Concerned," reflecting both their interest in bicycling for transportation as well as concerns about safety and comfort when interacting with motor vehicle traffic. Cities are beginning to develop bicycle networks that serve this rider type and provides bikeways for people of all ages and abilities.

Case Study: Beaverton, OR[2]

A goal of the City of Beaverton's 2017 Active Transportation Plan is to create a network of low-stress bikeways that is comfortable for all users. The Plan includes a design toolkit which details how to develop low stress facilities, such as separated bicycle lanes. The toolkit also includes a facility selection chart which helps determine which types of bikeways are suitable for different road environments, based on traffic volume and posted speeds. Based on this facility selection chart, the City has developed a policy that separated bike lanes will be considered on all streets with speed limits over 25 mph where bikeways are planned.

Rapid Implementation Projects

Many lauded bicycling cities across the country are working to build better connected bicycle networks. When using conventional public outreach methods and construction materials, demonstrating the impact of a project, gaining public support, approving the design, and identifying funding for construction can take years, even decades. Cities that want to build their bicycle networks and quickly increase ridership have started taking a

[1] Dill, Jennifer and Nathan McNeil. Revisiting the Four Types of Cyclists: Findings from a National Survey. In Transportation Research Record: Journal of the Transportation Research Board, Issue 2587, Washington, DC, 2016.
[2] City of Beaverton. Active Transportation Plan. 2017. Accessed February 7, 2019. https://www.beavertonoregon.gov/1852/Active-Transportation-Plan

"rapid implementation approach" in which cities use demonstration or low-cost projects to build bicycle infrastructure.

Examples of rapid implementation include:

- **Demonstration or pop-up infrastructure projects** that expose motorists, bicyclists, and pedestrians to new bicycle facilities using temporary materials. These projects may last from a few days to a few months and can build support among the public for bicycling projects; provide a temporary, highly-visible place for bicycling; build support for installing projects quickly; and be used to collect data on operational impacts. Demonstration projects can help convince skeptics, both internal and external, that a given bicycle facility could exist in a particular location without feared impacts on other modes.
- **Using low-cost materials to repurpose underutilized roadway space** can be a highly effective way to rapidly implement a network of low-stress bikeways, even on arterial streets. By repurposing an underutilized on-street parking lane or a motor vehicle travel lane when the street's traffic volume is below its capacity, bike lanes and separated bike lanes can be implemented through pavement markings and relatively inexpensive vertical separators (such as flexible plastic bollards).
- **Installing neighborhood bikeways** on local streets with low travel speeds and low vehicle volumes. These neighborhood bikeways can help build a low-stress bicycling network at a low cost.

Case Study: Bellevue, WA[3,4]

The City of Bellevue recently began the rapid development of its bicycle network. In 2015, the Bellevue City Council established the Pedestrian Bicycle Implementation Initiative which worked with the community to identify over 50 project ideas and conceptual layouts to create a connected and protected bicycle network that could be installed quickly. To implement these projects on a short timeline, Bellevue is focusing on projects that can be easily approved and installed, such as projects that:

- Use low-cost materials
- Can be installed within existing roadway widths
- Create new facilities or upgrade existing facilities to provide greater separation between motorists and bicyclists

One of the projects to come out of this process is the City's first separated bike lane. This bikeway is located along a major arterial that runs through downtown Bellevue and will be constructed using funds from the City's Neighborhood Safety, Connectivity, and Congestion Levy. The City hosted a demonstration project to acquaint motorists and bicyclists with the design and collected community feedback through an online survey and an open house. The City plans to leverage this process and project to support the implementation of similar projects.

Engineering Best Practices

The following list summarizes best practices in engineering and reflects policy recommendations included in the City of San Mateo's Sustainable Streets Plan (2015).

- Build a more comfortable and connected bicycle network by installing protected bikeways and facilities, improving intersections, and integrating bikes with transit.

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[3] City of Bellevue. Bicycle Rapid Implementation Program. 2016. Accessed February 7, 2019. https://transportation.bellevuewa.gov/planning/pedestrian-and-bicycle-planning/pedestrian-bicycle-implementation-initiative/rapid-implementation-plan

[4] City of Bellevue. Downtown Demonstration Bikeway. Accessed January 28, 2019. https://transportation.bellevuewa.gov/planning/pedestrian-and-bicycle-planning/pedestrian-bicycle-implementation-initiative/downtown-demo-bikeway

- Accommodate the needs of bicyclists of all ages and abilities, and all users of the roadway including pedestrians, transit riders, and motorists, through a Complete Streets approach.
- Continually explore the use of new infrastructure treatments and designs by using the latest design guidance from the National Association of City Transportation Officials (NACTO), Federal Highways Administration (FHWA), and the American Association of State Highway and Transportation Officials (AASHTO).
- Identify gaps in the bicycle network and needed improvements to and within key activity centers and community areas. Define priorities for eliminating these gaps and make the necessary improvements.
- Require the construction of pedestrian and bicycle facilities and amenities, where warranted, as a condition of approval of new development and major redevelopment projects.
- Facilitate safe bicycle travel through public and private construction zones.
- Develop and implement a clear and informative bicycle wayfinding program.

Enforcement

Enforcement efforts can help reinforce legal and safe bicycling and driving behaviors. Effective bicycle enforcement and safety activities often include:

- Collaboration and coordination among multiple departments within a jurisdiction.
- Officer trainings on local laws pertaining to bicyclists and bicycle facilities, and local goals and policies.
- Integration of bicycle safety operations into routine enforcement activities.
- Appropriate integration of enforcement officers at education and encouragement events.

With enforcement efforts, it is critical that municipalities take steps to mitigate the disproportionate impacts of enforcement activities on disadvantaged communities and to educate officers about enforcement-related tensions among different populations.

Case Study: Mountain View, CA[5]

The City of Mountain View Police Department has a special unit that rides Police Department-issued bicycles while on patrol and during special events and festivals. Officers in this unit participate in specialized training about conducting their duties via bicycle. The bicycle-patrol officers also host bicycle safety and education workshops, and this unit has been an effective way to share bicycle-related education and enforcement messages.

The Mountain View Police Department also has an active social media presence, where they post podcasts and articles about bicycle safety, theft prevention, and more. The Police Department also plans to conduct targeted enforcement operations at locations known for noncompliance with traffic laws and at high conflict or high bicycle-related crash areas.

Case Study: Fort Collins, CO[6]

In Fort Collins, the Police Department has bicycle units that offer a bicycle registration program and provide targeted enforcement at areas with high rates of bicycle-involved crashes. The following objectives were

[5] City of Mountain View. Bicycle Transportation Plan. 2015. Accessed February 7, 2019. https://www.mountainview.gov/depts/pw/transport/gettingaround/bike_plan.asp

[6] City of Fort Collins. Bicycle Master Plan. 2014. Accessed February 7, 2019. https://www.fcgov.com/bicycling/bike-plan.php

identified in the 2014 Fort Collins Bicycle Master Plan to support enforcement efforts and achieve the community's bicycling goals.

- Conduct annual workshops with Police Services and other community stakeholders to collaborate on key messages and safety priorities and develop a mutual awareness of bicycle-related laws.
- Conduct annual community safety discussions.
- Partner with Police Services to distribute safety items as part of an overall bicycle enforcement strategy (e.g., lights).
- Communicate enforcement campaigns to the public through website and social media.
- Work with Police Services and Traffic Operations annually to develop high-priority enforcement and education locations based on crash data (for all modes).

Enforcement Best Practices

The following list summarizes best practices in enforcement and reflects policy recommendations included in the City of San Mateo's Sustainable Streets Plan (2015).

- Focus enforcement activities around behaviors that are clearly demonstrated to be factors that contribute to crashes and loss of life.
- Develop and implement an enforcement program to encourage safe travel behavior and to reduce aggressive and/or negligent behavior among drivers, bicyclists, and pedestrians.
- Review law enforcement training programs to educate officers on the key safety issues and contributing factors most likely to result in crashes. The training should include information on what, when, where, and how law enforcement should occur to maximize behavior change and to reduce the number of crashes involving bicyclists.
- Raise awareness of increased enforcement activities before increased enforcement begins. This should include raising awareness and informing people of the problem and why enforcement action is needed. The public next needs to be told what the enforcement activities will be and when they will start. This will generate public support and help to offset any complaints from those who are caught breaking the law.

Education

Bicycle education campaigns can help community members gain skills needed to be safe bicyclists, pedestrians, and motorists. Education programming can provide information through multi-media efforts and experiential learning opportunities. Educational programs are most effective when they target specific audiences, such as youth, adults, and seniors.

Educational campaigns can come in many forms, such as City webpages that serve as resources for bicycling education efforts and include tips or downloadable brochures or YouTube videos. Other educational efforts can take the form of demonstration projects and educational messaging around how to use new infrastructure elements, such as bike boxes.

Case Study: Fort Collins, CO[7]

The City of Fort Collins has an established Bicycle Ambassadors Program which provides bicycle education to bicyclists and motorists. The ambassadors program compliments the City's Safe Routes to School efforts by providing educational programming to adults. This program has become so successful that the City has extend the program into high schools.

The City has also developed a strong brand for their bicycling program, called "FC Bikes" with a dedicated website[8] that includes:

- Notices about upcoming trail/road closures
- Bicycle network maps
- Safety videos from bicycle ambassadors and additional information about the Bicycle Ambassadors Program
- Bicycle-friendly driver program
- Fort Collins bicycle-specific newsletter
- Rules of the road
- Event updates
- Links to the City's Bicycle Advisory Committee so that residents can get involved

Case Study: Mountain View, CA[9]

Each month, the Mountain View Public Library offers bike-repair clinic. The clinics are open to people of all ages, and attendees learn tips on maintaining their bike properly and have access to bicycle repair tools. Permanently stationed outside the library is a bicycle fix-it station with a pump and repair tools.

Education Best Practices

The following list summarizes best practices in enforcement and reflects policy recommendations included in the City of San Mateo's Sustainable Streets Plan (2015).

- Identify and develop an education program that builds bicyclists' confidence and knowledge around bicycling. The program should also inform residents, employers, and employees of the environmental, health, and economic benefits of bicycling.
- Enhance the Safe Routes to Schools program to encourage more students to walk and bicycle to school.
- Provide safety education programs for both people driving and biking that encourage safe behaviors. To effectively reduce crashes and loss of life, public relations (PR) campaigns should focus on humanizing bicyclists and combating distracted and aggressive driving.
- Implement short-term, high visibility bicycle demonstration projects to serve as models that can be applied throughout the city.

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[7] City of Fort Collins. FC Bikes. Accessed January 29, 2019. https://www.fcgov.com/bicycling/
[8] City of Fort Collins. FC Bikes. Accessed January 29, 2019. https://www.fcgov.com/bicycling/
[9] City of Mountain View. Bicycle Transportation Plan. 2015. Accessed February 7, 2019. https://www.mountainview.gov/depts/pw/transport/gettingaround/bike_plan.asp

Encouragement

Encouragement Programs and Events

While bicycle infrastructure is critical to developing a comprehensive bicycle network, cities and communities should also provide encouragement programs to build bicyclists' confidence and increase ridership. **American communities that have achieved relatively high rates of bicycle ridership have invested in both infrastructure and encouragement programs.**

Encouragement programs and marketing campaigns come in a variety of shapes and sizes. Some communities, such as Fort Collins, create campaigns and programs that target the entire community and also create specialized campaigns for specific populations, such as youth, women, and beginner bicyclists. Other successful campaigns highlight a variety of reasons why a person might choose to bicycle (e.g., recreation, commuting, or running errands). Other programs focus on overcoming barriers that prevent communities from bicycling.

Many communities combine both educational programs and encouragement events to build support for a bicycling culture and increase ridership. The target audience are often "Interested but Concerned" bicyclists or beginner bicyclists. The most successful programs create promotional materials that emphasize that bicycling is an accessible activity for everyone; events can help break the misconception that bicycling is only for the spandex-clad.

Open Streets events (also called Sunday Parkways or Sunday Streets) are popular bicycling events which can be held annually either in the same place or rotate locations to ensure all residents have easy access to the event. During these events, a specific route or corridor is closed to vehicle traffic, and the events are marketed as a fun, safe, family-friendly activity that provides an opportunity to practice bicycling, get exercise, and experience streets in a new way.

Other popular events include:

- Bike to work/school days (or weeks/months)
- Bike art tours
- Bike neighborhood tours
- Bicycling training courses (for youth and adults)
- Helmet fittings and distributions
- Summer youth bike camps
- Bike clubs
- Holiday lights bike tours
- Traffic skills 101 classes
- In-the-field bike infrastructure education

Events can be large or small and do not necessarily need to be hosted by local government. In some communities, the municipality provides institutional support and facilitates the permitting process (as needed), and community organizations provide staff or volunteers. The most successful events are also paired with a marketing campaign that includes media coverage, has a strong internet presence, and are promoted by a variety of partners.

Internal and External Partnerships

Successful campaigns and events are often the outcome of strong partnerships between municipalities and local community organizations. Community partners can assist municipalities through programmatic support, incentives, promotions, and funding. Partners can be invited to co-sponsor events or marketing campaigns and

may also be interested in co-sponsoring facilities, like bike parking or bikeshare stations. Marketing and promotional efforts often reach a larger audience when promoted through a variety of agencies and partners.

Partners can come in many different forms and do not need to be confined to players within the transportation or recreation fields. Partners could include:

- Public health organizations or departments
- Public safety organizations
- Environmental groups
- Community health groups (particularly those focused on physical activity and obesity)
- Economic development and tourism agencies
- Businesses and Chambers of Commerce

A number of cities partner with local, health-focused organizations to host the events. For example, the City of Portland, Oregon's Sunday Parkways events are supported by Kaiser Permanente who provides a "Passport to Health" activity during the event. Local and national food markets and producers supply healthy snacks and provide information on healthy eating. AARP provides pedestrian safety education.

Case Study: Redwood City, CA[10]
The City of Redwood City supports and promotes a variety of encouragement programs, including the SPOKES Program which is a bike safety and maintenance program for 5th and 6th graders. The program operated through a partnership between the Redwood City Parks, Recreation, and Community Services Department and Redwood City 2020, a non-profit organization working for a healthy Redwood City, and is funded by a grant from the San Mateo County Safe Routes to School Program, SIMS Metal Management, and the Seaport Industrial Association.
The City also promotes the annual Bike to Work Day event in May. On Sundays, a segment of Cañada Road is closed to motorized vehicles and becomes an Open Streets event.

Interagency Coordination

Interagency, or interdepartmental, coordination can be incredibly beneficial when implementing a bicycle plan. Coordination with cross-departmental colleagues can lead to creative, cost efficient solutions and strategic partnerships. Coordination also ensures that bicycle infrastructure recommendations are cross-referenced in the course of other agency work. Many on-street bikeways are implemented as opportunistic projects through street reconstruction or street repaving projects.

Important aspects of interagency coordination include open communication channels, agency-wide and inter-agency communication, awareness, and cooperation. This type of coordination is common element in municipalities that have high rates of bicycle ridership.

Bicycle Advisory Committees

Many municipalities have bicycle advisory committees which support City staff's bicycle planning efforts. Typically, committee members review bicycle projects and discuss community bicycling-related issues, such as safety. Bicycle advisory committees also make recommendations to city councils and planning and engineering

[10] Redwood City Parks Recreation and Community Services. Accessed January 28, 2019. https://www.redwoodcity.org/departments/parks-recreation-and-community-services/after-school-programs/spokes

departments. Active bicycle advisory committees should meet at least quarterly, in some communities these committees meet monthly. Meetings are open to the public and should be publicized to residents since these committees can serve as a conduit between residents and local government efforts. In smaller communities, bicycle advisory committees are often combined with pedestrian advisory committees to form active transportation or Complete Streets advisory committees.

Case Study: Redwood City, CA[11]
In 2015, the City of Redwood City formed a Complete Streets Advisory Committee. The committee helps promote multi-modal transportation options that are safe, attractive, and comfortable for bicyclists and pedestrians. The committee serves as a vehicle for community input and provides recommendations to City staff. Committee members are appointed by the City Council, and the committee meets on a quarterly basis.

Encouragement Best Practices

The following list summarizes best practices in encouragement and reflects policy recommendations included in the City of San Mateo's Sustainable Streets Plan (2015).

- Identify and develop a Safe Routes for Seniors program education and encouragement program.
- Develop marketing materials to promote San Mateo's existing bikeways.
- Support programs that encourage and promote bicycle travel. These programs could include a social media campaign, safety programs for adults and youth, and events to highlight new and existing low-stress bikeways.
- Provide financial incentives for City employees to bike to work; this program could be a model for San Mateo's private businesses.
- Host at least one annual Open Streets-type event.
- Explore partnerships with private and public organizations (e.g., the County of San Mateo Health Department) to fund incentive programs and events that encourage multimodal transportation.

Evaluation

Performance Metrics and Data Collection

Many communities are working with limited budget when implementing bicycle master plans; therefore, local agencies want to ensure that limited dollars are spent on worthwhile projects. Developing performance metrics and evaluating these metrics based on data is a way to evaluate projects and invest in programs and policies that have proven to be successful.

Performance Metrics

Performance metrics help stakeholders and decisionmakers assess the impacts of proposed or existing projects and monitor trends over time. In addition, including performance metrics in a bicycle master plan establishes a way to evaluate whether a plan's goals are being met. Performance metrics can be short- or long-term and may target different aspects of bicycling, such as safety, network connectivity, or ridership.

[11] City of Redwood City. Accessed January 29, 2019. https://www.redwoodcity.org/city-hall/advisory-bodies-and-committees/regulatory-and-advisory-boards-commissions-and-committees/complete-streets-advisory-committee

Data Collection

Collecting and analyzing data is a critical component of tracking progress towards goals or performance measures. As an example, increasing bicycle ridership is a common goal for many communities. In order to track ridership levels, an agency could establish a bicycle count program that gathers data over time about the number of bicyclists riding on a bikeway or roadway. This data can be used to support the addition or improvement of bikeways, help prioritize where to build new bikeways, and provide context for bicycle crash analysis.

There are a number of different ways to collect data, including manual counts, mobile phone applications, and use of third-party databases from activity tracking applications.

- **Manual counts** provides an opportunity to collect data on user behaviors or attributes, including wearing helmets, gender, using lights, and riding on sidewalks. Manual counts are also important for calibrating automatic counters.

- **Mobile phone applications** like Ride Report tracks users' routes and allows users to rate the comfort level of routes. This information is mapped to create a level of traffic stress map. Currently, Atlanta, Austin, Beaverton, Portland, Oakland, and Raleigh are participating in Ride Report; however, it is unclear how each city is taking advantage of this data at this time.

- **Activity tracking applications**, like Strava, are used to view ridership and estimate demand. Currently, free Strava data does not provide a detailed picture of ridership. Strava's Metro dataset provides a high level of detail, down to the number of recorded trips per 15-minute increments on block-length street segments, but obtaining the data is costly for many jurisdictions, and many practitioners question its usefulness given the limited slice of the population who uses the Strava app.

- **Automated counters** include permanent and short-duration counting devices that automatically sense and count bicyclists on an hourly or 15-minute basis. Devices are available that can discern between a bicyclist and pedestrians, motor vehicles, and other road users, and some can count all users categorized by type. The ability to identify micromobility users separately from bicyclists and pedestrians is emerging. Some devices can also include electric displays that show the total number of bicyclists that have passed the detector that day, which may help support encouragement efforts.

Case Study: Fort Collins, CO[12]

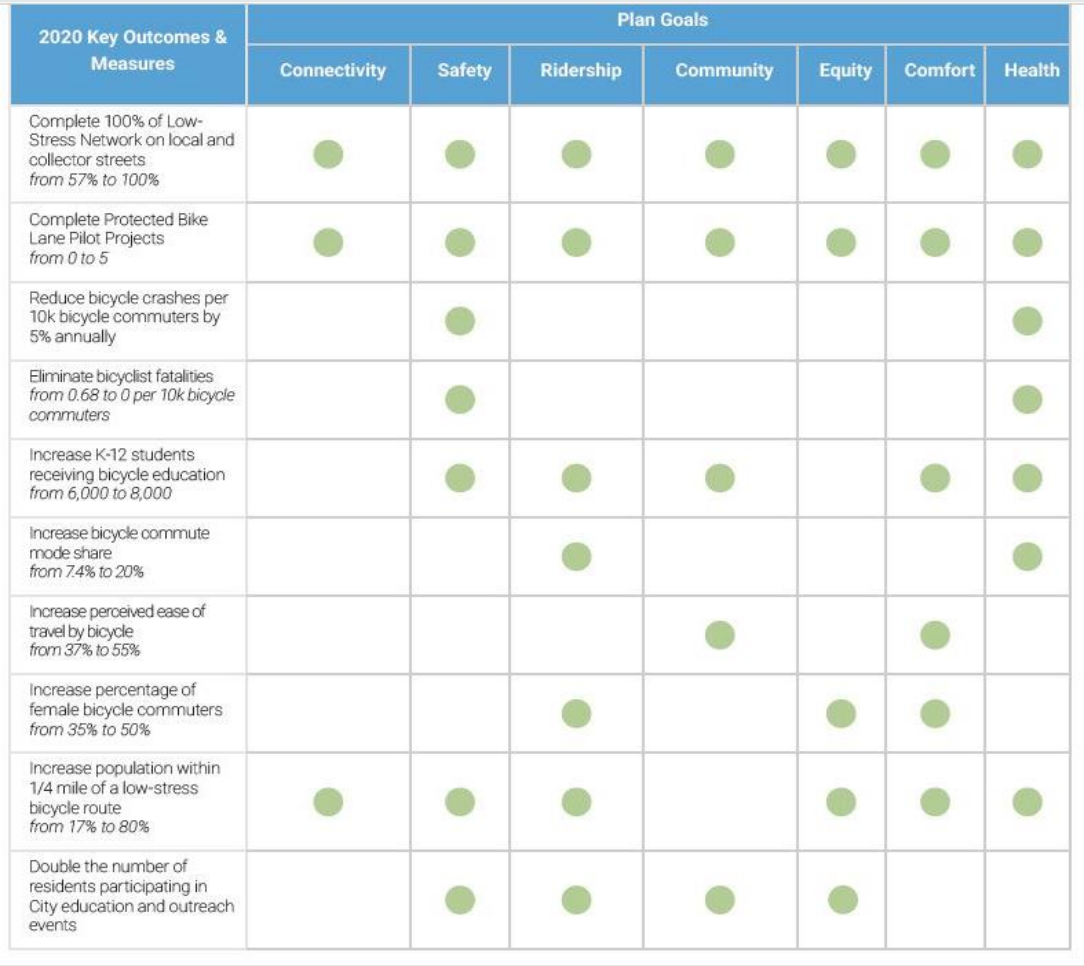
The 2014 Fort Collins Bicycle Master Plan discusses the importance of performance metrics and lists four characteristics that create effective performance measures, as shown in Table B.6.

Table B.6. Characteristics of Effective Performance Metrics

Metric	Characteristic
Available Data	Measures are often influenced by the availability of data and the ease of obtaining the data on a regular basis. Discussion of measures may lead to new data collection that enables assessment and tracking.
Trackable over Time	Measures should be based on consistently tracked data that can be compared on an annual or semi-annual basis.
Relation to Goals	In performance-based planning, performance measures should track progress toward stated goals and objectives.
Storytelling Potential	Measures should be meaningful and help to weave a story about the Plan's success. Stories can be an effective communication tool for requesting funds and garnering public support.

The Plan also includes specific performance metrics and clearly illustrates how each performance measure will help the City achieve the Plan's goals (see Figure B.1).

Figure B.1. Fort Collins Bicycle Master Plan Goals and Performance Metrics



Evaluation Best Practices

The following list summarizes best practices in evaluation and reflects policy recommendations included in the City of San Mateo's Sustainable Streets Plan (2015).

- Develop and implement an annual evaluation program to conduct bicycle counts. Determine the method of counting that works best for the City and acquire devices as necessary.
- Identify performance measures that are measurable, meaningful, and outcome-specific. In other words, performance measures should be based on data that the City is able to collect consistently and that relates to specific goals for biking, such as increased safety or increased ridership.

Equity

Many cities are becoming increasingly aware that bikeways and bicycle facilities have historically been unevenly distributed in their communities. In response, cities are beginning to incorporate equity considerations into their bicycle master plans and other bicycle planning efforts. A review of 38 bicycle master plans conducted by the League of American Bicyclists found that equity was discussed in many of the nation's well-known bicycle master plans, including Seattle, Fort Collins, Portland, and Minneapolis.

Equity can be defined by both geographic and demographic equity. **Geographic equity** is the distribution of biking and/or walking facilities and programs within a community. **Social or demographic equity** is the characteristics of populations served by biking and/or walking facilities and programs.[13]

Existing bicycle master plans incorporate equity in different ways; some make it a goal, others incorporate it into an implementation strategy and use it as a framework for prioritizing projects. Still others include it in performance measures. A few communities have completed analyses of the distribution and density of bicycle facilities and the distribution of disadvantaged populations.

The League of American Bicyclists has published the Bicycle Equity Index as a report along with a GIS-based methodology for identifying areas within a community that have concentrations of historically-underserved populations. This data can be used to guide planning decisions and prioritization of projects.

Federal Mandates

Equity-related federal mandates that can impact the creation and implementation of a bicycle master plan include Title VI, Executive Order 12898, Executive Order 13166, and the American Disability Act. These mandates dictate that no person in the U.S. can be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity that receives Federal financial assistance. These mandates stem from the American Civil Rights Act of 1964. Each of these acts and executive orders refers to the protection of a specific population group. For example, Title VI classes include race, color, sex, age, religion, and national origin. Executive Order 12898 recognizes the importance of environmental justice, and states that federally funded programs or activities cannot disproportionately impact a minority or low-income community. Executive Order 13166 states that people with limited English proficiency cannot be discriminated against and must be given access to services. The American Disabilities Act prohibits discrimination against people with disabilities.

In the context of bicycle master planning, these equity-related federal mandates are used to ensure that there is equal access to opportunities for input, input is received from a diverse representation of communities, and any

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[12] City of Fort Collins. Fort Collins Bicycle Master Plan. 2014. Accessed February 7, 2019. https://www.fcgov.com/bicycling/bike-plan.php

[13] City of Portland. Portland Bicycle Plan for 2030. Accessed February 7, 2019. https://www.portlandoregon.gov/transportation/44597

implementation actions or programs association with the bicycle plan do not intentionally discriminate against, or disproportionately impact a community based on age, color, sex, race, language, national origin, religion, income, or physical ability in a negative way.

Case Study: Fort Collins, CO[14]
In the 2014 Fort Collins Bicycle Master Plan, equity is identified as one of seven goals of the plan. The City integrated equity into both infrastructure and programmatic recommendations and documented whether key elements in the plan, such as recommendations, network development, and performance measures, supported equity as a goal.

Case Study: Beaverton, OR[15]
The City of Beaverton's Bicycle Master Plan includes equity as a primary goal and as a performance metric. In the City's prioritization methodology, equity is given the same weight as the other metrics of safety, demand, and connectivity. The Bicycle Master Plan assessed the anticipated equity outcomes of a project based on a Transportation Equity Index which integrates the following datasets:

- Low-income households
- People of color
- People under 18 and over 64 years of age
- People with disabilities
- Populations with limited English proficiency
- Households with no vehicle access

Equity Best Practices

The following list summarizes best practices in equity and reflects policy recommendations included in the City of San Mateo's Sustainable Streets Plan (2015).

- Change public involvement practices to prioritize outreach to historically-underserved populations and modify outreach methods to the needs of these populations (e.g., time of day, location, childcare provided, etc.). Refer to Untokening 1.0 — Principles of Mobility Justice[16] when designing public engagement.
- Improve non-motorized access to destinations for low-income and transit-dependent community members.
- Work with older adults to identify and address barriers to increased walking, bicycling, and transit use.

[14] City of Fort Collins. Bicycle Master Plan. 2014. Accessed February 7, 2019. https://www.fcgov.com/bicycling/bike-plan.php
[15] City of Beaverton. Active Transportation Plan. 2017. Accessed February 7, 2019. https://www.beavertonoregon.gov/1852/Active-Transportation-Plan
[16] Untokening 1.0 – Principles of Mobility Justice. 2017. Accessed February 7, 2019. http://www.untokening.org/updates/2017/11/11/untokening-10-principles-of-mobility-justice

Micromobility Considerations

Micromobility devices are becoming increasingly popular as a way for people to travel, especially across short distances. These devices can complement a city's existing transit network, as people can ride or scoot to their final destination after travelling partially to their destinations with transit.

Micromobility devices include human-powered and electric-assist (e-assist) bicycles, scooters, and other small, lightweight transportation devices that are on-demand, open to the public, and accessed through a membership or pre-trip rental fee.

Since micromobility devices are a new transportation option and are most often provided by third parties, many cities are currently developing policies to ensure that these programs operate within existing laws and without sacrificing the safety and well-being of users and non-users.

State of California

The State of California recently passed legislation stipulating a number of restrictions for e-scooter users. The California Vehicle Code (CVC) Section §407.5(a) defines e-scooters as "any two-wheeled device that has handlebars, has a floorboard that is designed to be stood upon when riding, and is powered by an electric motor." Similarly, CVC §21235 describes operations that are prohibited by motorized scooter users:

a) Operate a motorized scooter unless it is equipped with a brake that will enable the operator to make a braked wheel skid on dry, level, clean pavement.

b) Operate a motorized scooter on a highway with a speed limit in excess of 25 miles per hour unless the motorized scooter is operated within a Class II or Class IV bikeway, except that a local authority may, by ordinance or resolution, authorize the operation of a motorized scooter outside of a Class II or Class IV bikeway on a highway with a speed limit of up to 35 miles per hour. The 15 mile per hour maximum speed limit for the operation of a motorized scooter specified in Section 22411 applies to the operation of a motorized scooter on all highways, including bikeways, regardless of a higher speed limit applicable to the highway.

c) Operate a motorized scooter without wearing a properly fitted and fastened bicycle helmet that meets the standards described in Section 21212, if the operator is under 18 years of age.

d) Operate a motorized scooter without a valid driver's license or instruction permit.

e) Operate a motorized scooter with any passengers in addition to the operator.

f) Operate a motorized scooter carrying any package, bundle, or article that prevents the operator from keeping at least one hand upon the handlebars.

g) Operate a motorized scooter upon a sidewalk, except as may be necessary to enter or leave adjacent property.

h) Operate a motorized scooter on the highway with the handlebars raised so that the operator must elevate his or her hands above the level of his or her shoulders in order to grasp the normal steering grip area.

i) Leave a motorized scooter lying on its side on any sidewalk, or park a motorized scooter on a sidewalk in any other position, so that there is not an adequate path for pedestrian traffic.

j) Attach the motorized scooter or himself or herself while on the roadway, by any means, to any other vehicle on the roadway.

Micromobility Current Practice Review

The following is a summary of micromobility policy trends for shared micromobility systems.

- Most cities have taken a reactive, rather than proactive approach to policy development due to the unregulated arrival of e-scooters.
- The type of policy used to regulate micromobility programs varies depending on the city and often includes the creation of new ordinances, resolutions, permit programs, license agreements, or contracts.
- Almost all micromobility programs are set up as pilot programs with varying lengths from 4 months (to avoid inclement weather conditions) to 12 months. There are some cities with no term limits.
- Policies can be worded to deal only with e-scooters or to deal with micromobility devices in general.
- In terms of content, almost all e-scooter policies address the following issues:
    - **Fleet size**: establishes minimum and maximum numbers of vehicles as well as criteria for when the program can be expanded and by how much.
    - **Service area**: establishes the area within with the micromobility system may operate. Most often, this is within City limits, or the area under the jurisdiction of the regulating agency.
    - **Permit fees**: these vary greatly, but typically include a one-time permit fee plus some form of annual fee per vehicle.
    - **Parking regulations**: almost all policies include stipulations about where dockless vehicles can and cannot be parked (see Figure B.2). Typically, e-scooters are required to be parked on the sidewalk with adequate sidewalk clearances, in an upright position, and cannot obstruct the path of pedestrians or sidewalk amenities. This section often sets time limits for companies to relocate non-compliant vehicles (typically within 2 hours).
    - **Data sharing**: all policies request that real-time data be shared in either GBFS or API format and that (typically) monthly reports be provided to detail usage, number of devices in service, reported crashes, repair information, illegal parking instances, rebalancing, customer complaints, theft and vandalism, etc. Many policies require companies to distribute user surveys developed by the cities.
    - **Insurance and indemnity**: all policies reviewed include these requirements that must be fulfilled by the permit applicant.

Figure B.2. The City of Long Beach, CA has designated areas for e-scooter parking. These parking pads are removable and can be relocated based on changes in demand.

- Several policies also address the following issues:
    - **Allowable operations**: whether e-scooters can be ridden on the street or the sidewalk or both depends on how they are defined in local vehicle codes.
    - **Helmets**: most policies either "encourage" users wear helmets or requires users to wear a helmet, when e-scooters are defined as a motor-powered vehicle.
    - **Vehicle speeds**: the maximum speed is typically set at 15 mph or lower.
    - **Education and Outreach**: either specifically outlines education and outreach resources that need to be provided by the company or requests that the company provides a plan to outline its strategy.
    - **Equity**: a number of policies explicitly require that a certain number of scooters or a percentage (typically 20%) be available in underserved areas. This is typically required through a once daily rebalancing of the e-scooters. Some policies also require the companies to provide an equity plan and/or a plan for how they will provide payment options for non-smart phone and credit card users.
    - **Removal and impoundment**: several policies explicitly call out that the City can remove and/or impound scooters in violation of the parking requirements. Some specify impound and storage fees that could be charged to the company and in other cases, e.g., in Denver, CO and Columbia, MO, these cities collect a performance bond ($30 per vehicle) that is collected upfront and then can be used towards auditing, removing, and storing improperly parked vehicles.

Appendix C. Existing Conditions Report

Introduction

San Mateo is a growing, vibrant community located on the San Francisco Peninsula in the San Francisco Bay Area. The City's planning efforts demonstrate that it is committed to improving local infrastructure to better support active transportation, including bicycling and use of micromobility devices. As the City continues to develop and enhance its bicycle network, it also continues to support its residents with opportunities to increase quality of life, improve health outcomes, and more easily access opportunities for recreation and human-powered transportation.

Micromobility devices, such as bikeshare and electric scooters ("e-scooters"), are becoming increasingly popular ways for people to travel. San Mateo currently has dockless bikeshare in the form of LimeBike. While the city does not currently have scooters, it is important to plan for future use of these devices since they offer increased mobility to residents.

This appendix provides an overview of current bicycling conditions in San Mateo as well as efforts to support bicycling through policies and programs. The 2020 Bicycle Master Plan's recommendations for the bicycle network and support programs draw from the information presented in this report.

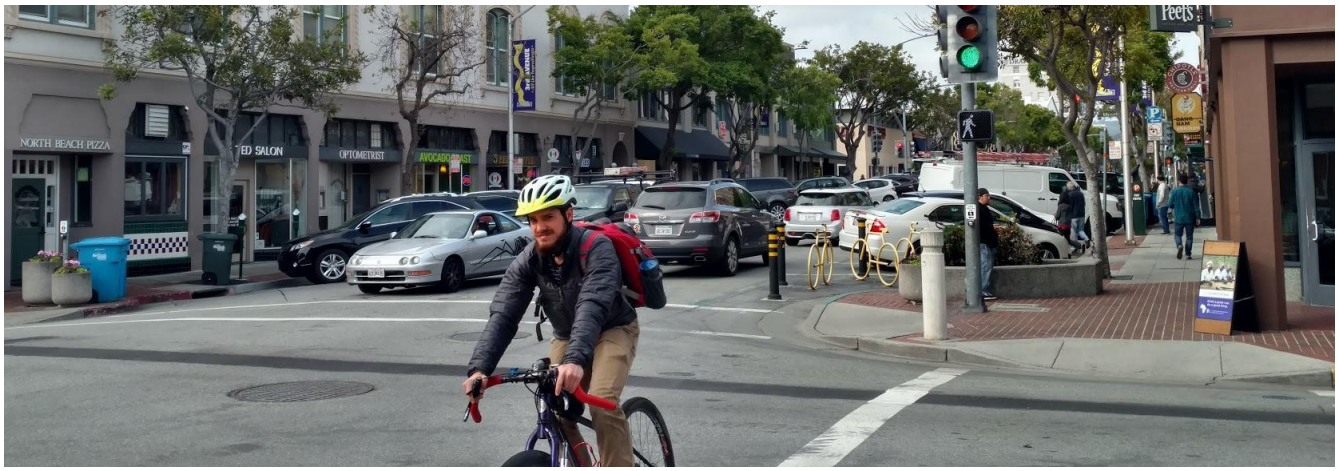

Figure C.1. Bicyclist in Downtown San Mateo

Land Use and Character

Comprising 16 square miles, San Mateo is located in northeastern San Mateo County, on the west side of the San Francisco Bay. San Mateo has a dense and vibrant downtown core surrounded by mostly residential neighborhoods (see Figure C.1). This, in conjunction with its mostly grid-like street network, makes San Mateo well-positioned for active transportation.

Despite the growing downtown core, the city's overall land use and workforce patterns have resulted in primarily auto-centric development and transportation patterns. This type of development, which often does not focus on well-designed connections between land uses (such as residential and commercial), has resulted in a limited number of existing bicycle facilities that are comfortable for people of all ages and abilities.

San Mateo's mild temperatures and generally dry weather make for an optimal climate for bicycling. The city's topography is relatively flat, which can make bicycling to school or work, or to run errands, more attractive. The city is also adjacent to regional bikeways such as along Cañada Road. However, some of the bordering geography and roadway network makes intra-city and -county bicycling difficult. Highways 101, 92, and 82 divide parts of the city and do not include crossings suitable for bicyclists of all ages and abilities. The 2020 Bicycle Master Plan is an important opportunity to better understand what the community wants and helps to identify projects that can comprehensively increase the bike and micromobility mode split.

Transit Connections

San Mateo is well-connected to the regional transit network through three Caltrain stations, including the San Mateo station in downtown, the Hayward Park station, and the Hillsdale station near the Hillsdale Mall. The Hillsdale Mall station includes a stop for AC Transit's Transbay bus service, which allows residents and visitors to travel directly to the Hayward BART station in the East Bay. The city also has local bus services provided by SamTrans. SamTrans offers more than 10 routes operating in and through San Mateo, all of which help riders travel both north-south and east-west. All bus routes operate Monday through Friday and some operate on weekends as well.

Improved bicycle connections to transit stations can make bicycling a more attractive option for people who travel outside of San Mateo for commute or leisure trips, especially with the growing availability of bike- and scooter-share programs throughout the region.

Demographics

San Mateo's population has been steadily growing, increasing from 94,751 to just over 102,224 between 2010 and 2016.[1] A little over 20 percent of these residents are school-age children, and 15 percent are 65 or older (see Figure C.2). More than half of all residents are between ages 18 and 54 (53 percent), suggesting that a large share of the local population may be interested in and capable of riding a bike.

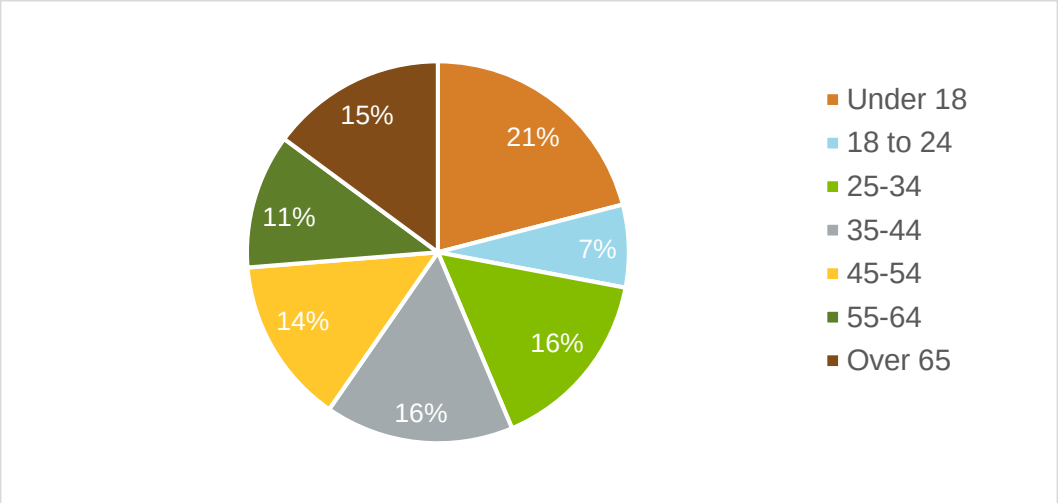

Figure C.2. Age of Residents in San Mateo (Data Source: American Community Survey)

Given San Mateo's suburban land use patterns, only a small number of households (5 percent) do not own a vehicle. Most households own two or more vehicles (see Figure C.3). A notable percentage of residents have only one vehicle per household - members of these households may be interested in bicycling or micromobility options in order to increase their mobility options when a vehicle is unavailable.

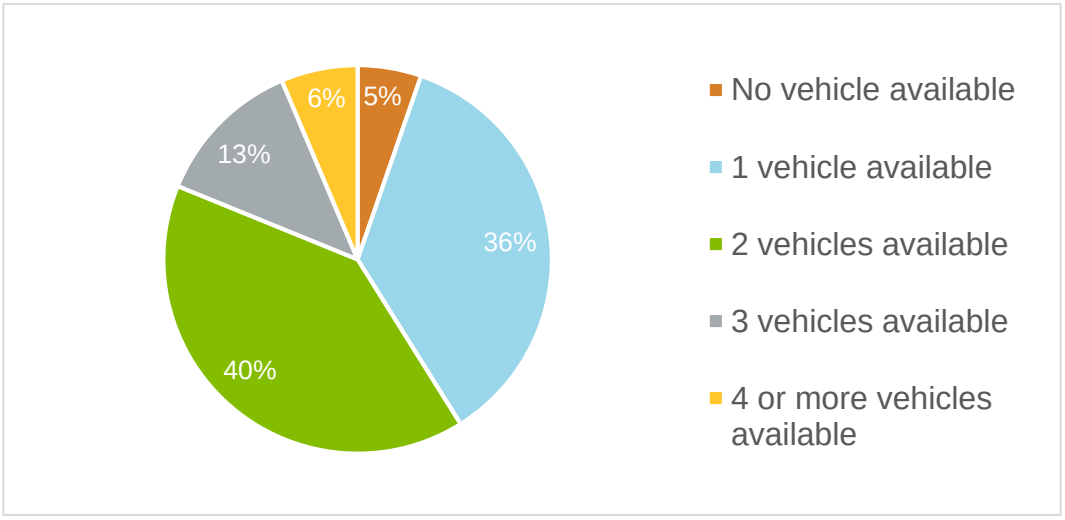

Figure C.3. Vehicle Ownership (Data Source: American Community Survey)

[1] American Community Survey, 2012-2016, Five-year estimates

Mode Share

Most available travel data in San Mateo relates to commute trips. All data presented should be interpreted with the understanding that work-related trips generally only account for 10 to 15 percent of all trips.[2] Other trip purposes include visiting friends and family, errands, entertainment, outings, and recreation. Bicycling may be more common for these non-work-related trip types in San Mateo because they often entail shorter trip distances. For instance, someone may drive to work because their job is located in another city, whereas a social visit to a friend may be taken by bike because that friend lives in the same neighborhood. Another consideration is the importance for many people of arriving "office-ready" at work, whereas running errands in cool, comfortable clothing and perspiring is more socially-acceptable.

A majority of San Mateo residents drive alone to work, as shown in Table C.1. Commuting by bike is relatively rare in San Mateo (less than two percent do so[3]). These trends are generally consistent with the county as a whole and are fairly similar to those of nearby cities.

Table C.1. San Mateo Commute Modes (Data Source: American Community Survey)

Mode	San Mateo	Redwood City	Daly City	San Mateo County	California
Drove alone	69.6%	72.2%	62.1%	69.4%	73.5%
Carpooled	10.2%	9.8%	12.5%	10.5%	10.6%
Public transportation	10.1%	5.6%	20.0%	10.1%	5.2%
Walked	2.8%	3.2%	2.0%	2.5%	2.7%
Bicycle	1.4%	2.2%	0.2%	1.3%	1.1%
Other	1.0	1.4%	0.7%	1.2%	1.4%
Worked at home	4.8%	5.6%	2.3%	5.0%	5.4%

In general, most residents of San Mateo have a fairly long commute; nearly half commute for more than 25 minutes and 20 percent commute for more than 45 minutes.[4] These commute times are consistent with the relatively small share of San Mateo residents that also work in the city (14 percent). Many of San Mateo's residents work in nearby cities such as San Francisco, Redwood City, Burlingame, and Palo Alto.[5] Those who work locally are mostly employed by Sony, public health institutions, local school districts, and Franklin Templeton Investments.[6]

While the length of some residents' commutes may make biking a challenge or a less attractive option, about 10 percent of residents have commutes of less than 10 minutes, and an additional 30 percent have commutes under 20 minutes. These shorter commute trips, which represent **40 percent** of all commute trips, should be considered as opportunities for biking, if the infrastructure for and safety of bicyclists were improved from current conditions.

[2] Range references the National Household Travel Survey (15 percent) and California Household Travel Survey (9.9 percent).
[3] American Community Survey, 2012-2016, Five-year estimates
[4] American Community Survey, 2012-2016, Five-year estimates
[5] U.S. Census Bureau, Center for Economic Studies
[6] City of San Mateo, Comprehensive Annual Financial Report, 2017

Existing Bicycle Network

Currently, the City of San Mateo's bicycle network includes approximately 57 miles of bike lanes, bike routes, and shared use paths. Some facilities, such as the regional San Francisco Bay Trail, are a pleasure for all to use. Other facilities, such as bike lanes and bike routes along major arterials with high traffic volumes and speeds, provide access for some bicyclists, but can be stressful for even the most intrepid riders.

Through the 2020 Bicycle Master Plan, the City of San Mateo seeks to enhance the existing network and create a low-stress bike network that can serve people of all ages and abilities, create stronger connections to community destinations, and better link neighborhoods throughout the city.

Who are we serving?

Many factors contribute to people choosing to ride a bicycle, with a major factor being safety. Research has found that a large percentage of the American population is interested in bicycling for transportation but does not currently do so because they believe the routes they would need to travel are unsafe or uncomfortable. Many people feel safer and more comfortable riding on low-traffic, low-speed streets or on separate paths or other facilities that provide protection or physical separation from fast-moving traffic.[7]

Most people in the U.S.—between 50 and 60 percent—have little tolerance for interacting with motor vehicle traffic unless volumes and speeds are very low (see Figure C.4).[8] This group of riders is referred to as "Interested but Concerned," reflecting both their interest in bicycling for transportation as well as concerns about safety and comfort when interacting with motor vehicle traffic.

This framework of rider types was used to assess the existing bicycle network and to select recommended facility types for the 2020 Bicycle Master Plan. Bicycle planners and designers use Level of Traffic Stress (LTS) as the measure of a street's suitability for Interested but Concerned riders and potential riders.

Comfort Typology of Bicyclists

Design User Profile	Not Interested or Able	Interested but Concerned	Somewhat Confident	Highly Confident
Percent of General Public	31-37%	51-56%	5-9%	4-7%

Figure C.4. Level of Traffic Stress and Bicycle Riders

[7] Source: Dill, J. McNeil, N. "Revisiting the Four Types of Cyclists: Findings from a National Survey" Transportation Research Board 95th Annual Meeting, 2016.
[8] Studies, such as the one referenced above, show that approximately one third of the adult population is not currently interested in bicycling or able to bicycle.

Bicycle Facilities

Currently, existing bicycle facilities are sprinkled throughout San Mateo, but do not provide a fully connected network. Most bicycle facilities, especially the shared use paths, are located to the east of Highway 101. The City's network offers multiple choices for north-south connections, such as Delaware Street/Pacific Boulevard, Norfolk Street, and Alameda De Las Pulgas. San Mateo has few east-west connections; currently, the longest continuous bicycle facility is located on Hillsdale Boulevard, which mainly consists of bike routes and bike lanes. Most bicycle facilities are located on main roads, and a few branch onto slower streets within neighborhoods.

The citywide bicycle network comprises approximately 57 miles of existing facilities (see Table C.2). A map of the existing network is illustrated in Figure C.6.

Table C.2. Length of Existing Facilities

Existing Facility	Approximate Length (in miles)
Shared Use Paths (Class I)	16.1
Bike Lanes (Class II)	20.0
Bike Routes (Class III)	20.5
Total Network	**56.6**

Throughout the city, bike lanes frequently end in advance of intersections, driveways, and interchanges. These points are where bicyclists and motorists most often come into conflict. Providing safe and comfortable transitions through intersections and at driveways and interchanges is a consideration of this Plan.

As a part of this Plan, the City is interested in creating a network that serves community destinations and neighborhoods. Currently, most schools are not served by bicycle facilities, with a few exceptions, including San

Figure C.5. Bicyclist waiting at the San Mateo Caltrain station. Many bicyclists take their bikes on Caltrain.

Mateo High School (served by a bike route), Hillsdale High School (served by a bike lane), and Sunnybrae Elementary School (served by a bike lane).

Regarding connections to transit, the three Caltrain stations in San Mateo have the following bicycle connections:

- San Mateo station (see Figure C.5) – adjacent to a bike lane at the southeast corner of the station that provides access to a bicycle route on Claremont Street
- Hayward Park station – not directly served by bicycle facilities
- Hillsdale station – adjacent to a shared use path and bicycle route

Overall, the bicycle network lacks protected facilities and only serves somewhat confident and highly confident riders.

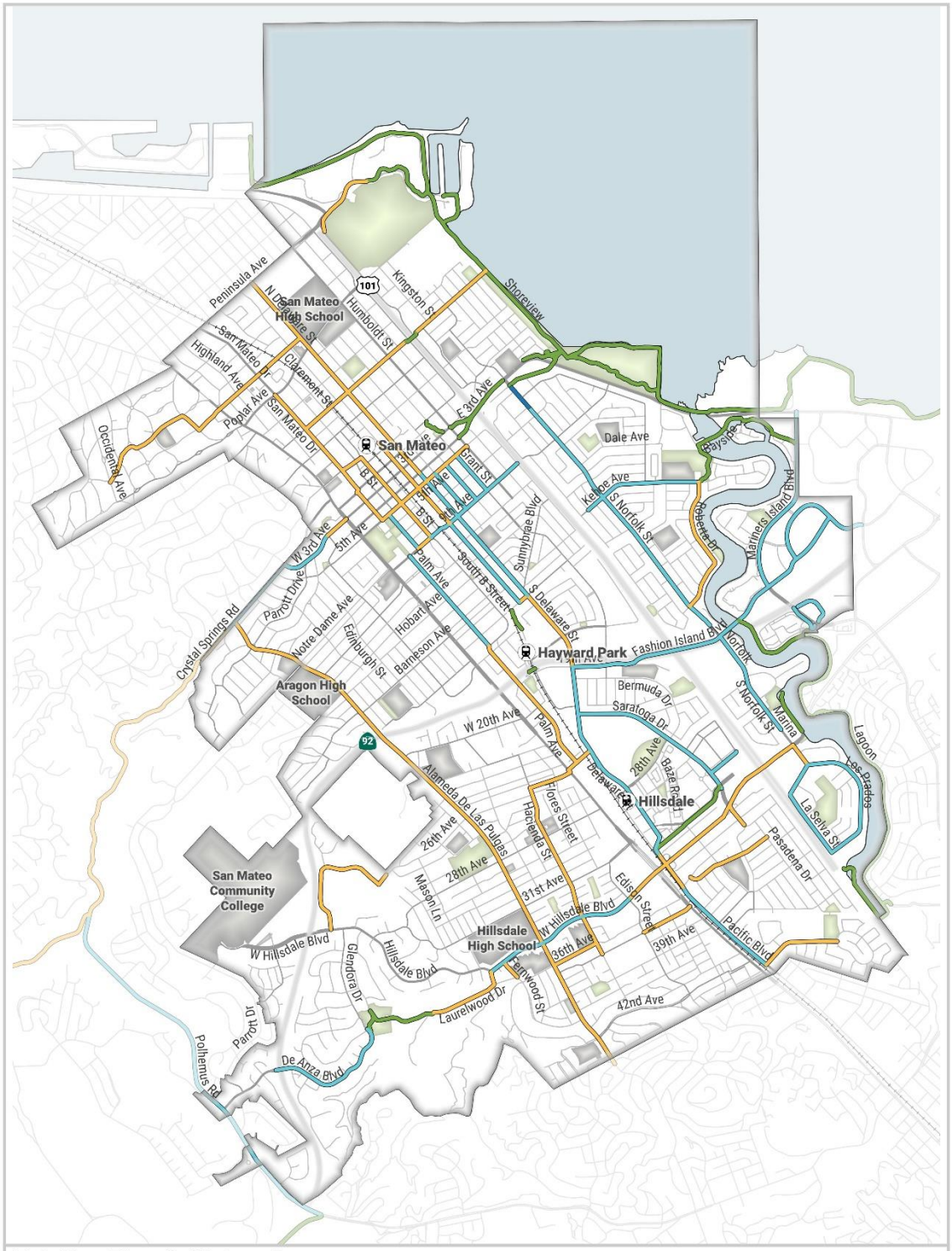

Figure C.6. Existing Bikeways in San Mateo

The existing bicycle network in San Mateo consists of the following facilities.

Shared Use Paths (Class I)

Class I shared use paths are a two-way facility physically separated from motor vehicle traffic and used by bicyclists, pedestrians, and other non-motorized users. Shared use paths provide low-stress facilities for bicyclists; however, bicyclists and pedestrians many have increased interactions with motor vehicles at driveways and intersections on these paths/trails.

The longest shared use path in San Mateo is the San Francisco Bay Trail, which wraps along the western City limits along the San Francisco Bay (see Figure C.7). This regional trail serves both recreational and utilitarian riders and provides north-south connections to Burlingame to the north and Foster City to the south as well as destinations throughout the Bay Area. While the trail itself is suitable for bicyclists of all ages and abilities, stronger connections to the trail are needed so that riders have safe and comfortable access to this amenity.

Figure C.7. Bicyclist along the San Francisco Bay Trail in San Mateo

An additional shared use path, called the Foster City Levee Pedway/Bikeway, is located along the western shore of the Seal Slough tidal marsh channel. This shared use path connects to apartments and houses, parks, and the City of Foster City.

In addition to the Bay Trail and the Foster City Levee Pedway/Bikeway, segments of shared use paths are located throughout the city. These paths are connected to Class II bike lanes in some locations and to Class III bike routes in other locations. For example, the shared use path on Pacific Boulevard connects to a Class II bike lane to the north and a Class III bike route to the south. Another recently implemented shared use path exists in the Bay Meadows development at 28th Street and Franklin Parkway. Providing stronger connections to other bikeways and ensuring proper signage along existing and future Class I bikeways will strengthen the existing shared use path network in San Mateo.

Bicyclist and Pedestrian Bridges

Two bicycle and pedestrian bridges are located in the City of San Mateo; both provide a protected, separate facility for bicyclists and pedestrians from motor vehicle traffic.

The 3rd Avenue Bicyclist and Pedestrian Bridge, from S Humboldt Street to S Norfolk Street, is a grade-separated bridge that runs between the east- and west-bound 3rd Avenue travel lanes. While the bridge provides a protected way for bicyclists and pedestrians to navigate this area, smoother transitions are needed for bicyclists and pedestrians who are trying to get on and off the bridge (see Figure C.8).

Figure C.8. Beginning and end of the 3rd Avenue Pedestrian and Bicycle Bridge at S Humboldt Street.

Another bicyclist and pedestrian bridge spans Highway 101 and connects eastern Monte Diablo Avenue to western Monte Diablo Avenue. This overcrossing provides a low-stress connection over Highway 101, which creates a barrier to comfortable east-west bicyclist and pedestrian connections in San Mateo. The Monte Diablo Avenue bridge would benefit from additional signage to guide bicyclists to the bridge.

Bicycle Lanes (Class II)

Class II bicycle lanes provide an exclusive space for bicyclists in the roadway (see Figure C.9). Bicycle lanes are established by painting lines and symbols on the roadway surface and often include posted signs. Bicycle lanes, such as those recently installed on Crystal Springs Road, may also be painted green. Bicycle lanes are for one-way travel and are normally provided in both directions on two-way streets and/or on one side of a one-way street. Bicycle lanes may only be used temporarily by vehicles accessing parking spaces, entering and exiting driveways and alleys, and making right turns at intersections.

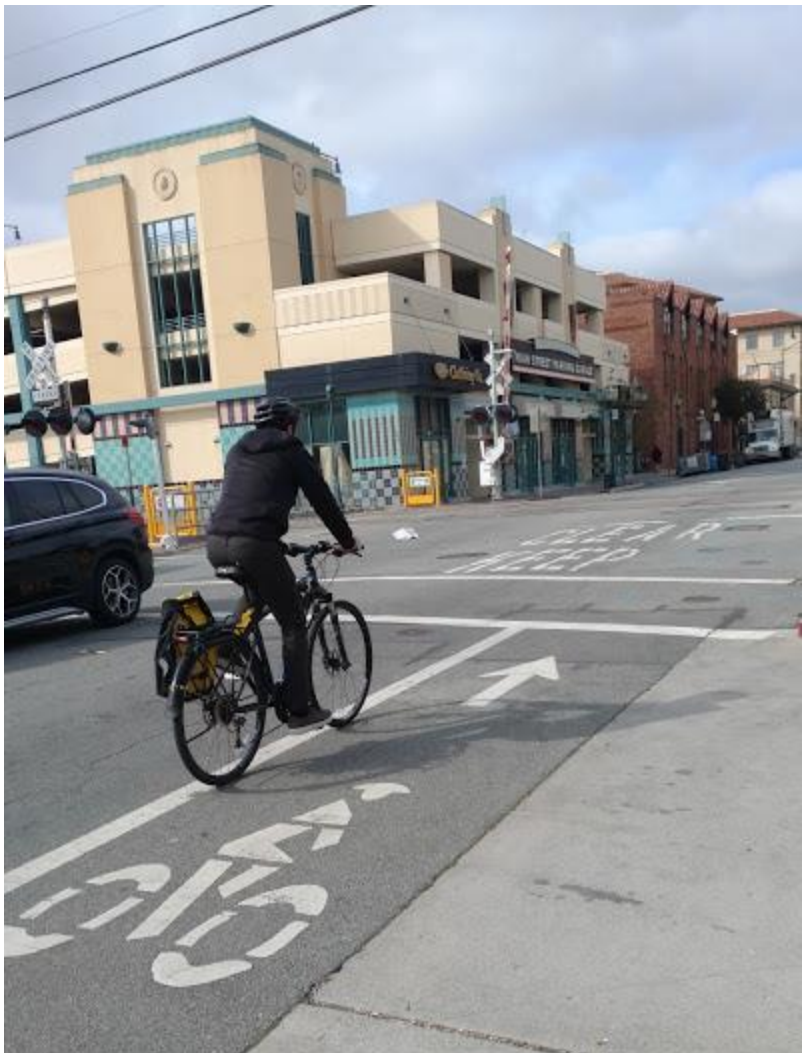

Figure C.9. Bicyclist riding in a bike lane in Downtown San

Bicycle lanes are recommended for streets that are 30 miles per hour or slower and that have traffic volumes fewer than 6,000 vehicles per day. Some bicycle lanes in San Mateo are located on streets with speeds limits and traffic volumes that are higher than the recommended limits for bicycle lanes, such as the bike lanes on Fashion Island Boulevard and Saratoga Avenue.

Many bicycle lanes also end prior to intersections, which is where the greatest conflicts exist between bicyclists and motorists. In addition, some bicycle lanes share space with on-street parking spaces. The separation between bicycle lanes and parking spaces is unclear, potentially creating conflicts between the two vehicles. Examples include Norfolk Street, Delaware Street, and Hillsdale Boulevard. Other bicycle lanes are for the most confident riders and do not strengthen the all ages, all abilities bicycle network. For example, the bicycle lanes on the windy, rural Polhemus Road are not comfortable for “Interested but Concerned” bicyclists.

Bike Routes (Class III)

Class III bike routes, also called "bicycle boulevards," are applied on quiet streets, often through residential neighborhoods. Bike route/boulevard treatments are designed to prioritize bicycle through-travel, while calming motor vehicle traffic and maintaining relatively low motor vehicle volumes. Treatments vary depending on context, but often include elements of traffic calming, including traffic diverters, speed attenuators such as speed humps or chicanes, pavement markings, and signs. To be most effective, intersection improvements are also needed to guide bicyclists through these conflict points.

Bicycle boulevards can generally be considered on any road with one or more of the following characteristics:

- Maximum average daily traffic: 3,000
- Preferred average daily traffic: 1,000
- Target speeds for motor vehicle traffic are typically around 20 miles per hour; there should be a maximum 15-mile-per-hour speed differential between bicyclists and motorists.

Most bicycle routes in San Mateo are located on streets with speeds and traffic volumes that are higher than recommended for bicycle routes/bicycle boulevards. Existing bicycle routes often only provide shared lane markings and/or signage to designate the road as a "Bike Route" and are rarely coupled with traffic calming elements (see Figure C.10). Examples include Alameda De Las Pulgas and Hillsdale Boulevard. While these streets are signed as bike routes, they provide little to no protection for bicyclists and are unlikely to encourage Interested but Concerned bicyclists to ride. Monte Diablo Avenue is appropriately designated as a bicycle route and provides an east-west link for the neighborhoods in the northwest; this bicycle route could benefit from additional traffic calming elements to enhance the comfort of this route.

Figure C.10. Bike route in San Mateo

Spot Treatments

In addition to linear bikeways, spot improvements and provisions are important to accommodate or encourage bicycling. Examples include bicycle detection, shared lane markings, wayfinding signage, and parking and storage facilities.

In addition to both public and private bicycle parking, the City of San Mateo also has examples of other bicycle facilities including painted conflict area markings and a bike box.

Painted Conflict Area Markings

Painted conflict area markings are designed to improve visibility, alert all roadway users of expected behaviors, and reduce bicyclists' conflicts with turning motor vehicles. They can be either solid or dashed lines. Per the Manual on Traffic Control Devices (MUTCD), conflict area markings must be used in tandem with Class II bike lanes or Class IV separated bike lanes.

Painted conflict area markings are located on Crystal Springs Road (see Figure C.11), Norfolk Street, and El Camino Real at the intersection of the California 92 on-ramps and off-ramps. The markings on El Camino Real were installed by Caltrans who owns and maintains El Camino Real.

Figure C.11. Painted conflict area markings on Crystal Springs Road

Painted Bicycle Lanes

The City has recently installed green painted bicycle lanes along portions of Crystal Springs Road.

In general, painted bicycle lanes are recommended for conflict areas and other areas where improving visibility of bicyclists by motorists is needed.

Bike Box

There is a bike box at the intersection of southbound S Norfolk Street and Fashion Island Boulevard.

A bike box provides dedicated space between the crosswalk and motor vehicle stop line where bicyclists can wait during the red light at signalized intersections. The bike box allows a bicyclist to take a position in front of motor vehicles at the intersection, which improves visibility and motorist awareness, and allows bicyclists to "claim the lane," if desired. Bike boxes aid bicyclists in making left turning maneuvers at the intersection and provide more queuing space for multiple bicyclists than is provided by a typical bike lane.

Implementation of the 2011 Bicycle Master Plan

Prior to this 2020 Plan update, the most recent bicycle plan for the City of San Mateo was the 2011 Bicycle Master Plan. The 2011 Plan was based on best practices at that time and includes a vision; goals and policies; existing conditions section; proposed bicycle network and programmatic improvements; and an implementation and funding plan.

Since the adoption of the 2011 Plan, some infrastructure projects have been constructed, as detailed in Table C.3.

Table C.3. Bicycle Improvements Since 2011

	Project Name (Street/Location)	Neighborhood	Bicycle Improvement
1	Alameda de las Pulgas	Baywood	Class III Bicycle Route
2	Norfolk St	N/A	Class II Bike Lanes
3	Delaware St	Central	Class II Bike Lanes
4	Ginnever St	Fiesta Gardens	Class II Bike Lanes
5	Corp Yard	Fiesta Gardens	Bicycle rack installation
6	King Center	N. Central	Bicycle rack installation
7	Ryder Park	N. Shoreview	Bicycle rack installation

Planned Bikeways and Facilities

The City of San Mateo is currently in the planning phase for many bikeways and facilities. Table C.4 provides an overview of the projects that are in the pipeline for design and construction. The projects are organized alphabetically by project improvement type (corridor, intersection, or bridge/overcrossing).

Table C.4. Planned Bikeways and Facilities

	Project Name (Street)	Cross Street A	Cross Street B	Project Improvement Type	Planned Improvement
1	28th Avenue	Mason Ln	El Camino Real	Corridor	Convert 28th Avenue into a bicycle boulevard; includes changes to traffic signals. Will serve the Caltrain station which is being relocated near 28th Street
2	Pacific Boulevard	San Mateo City limit	Hillsdale Caltrain Station	Corridor	Possible construction of a Class I or Class IV bikeway
3	San Mateo Drive	5th Ave	Burlingame City limits	Corridor	Complete Streets project
4	5th Avenue	San Mateo Ave	N/A	Intersection	Install a raised intersection
5	Concar Drive	S Delaware St	N/A	Intersection	Possible installation of a raised intersection
6[9]	Bicycle/ pedestrian bridge parallel to E Hillsdale Boulevard	E Hillsdale Ct	Norfolk St / La Selva St	Bridge	Bridge will span Highway 101

[9] This is the same project as project #4 in the District 4 Bike Plan (Table C.5).

In 2018, Caltrans adopted the Caltrans District 4 Bike Plan, which includes linear and spot bikeway facility recommendations for the City of San Mateo. Table C.5 includes an overview of the bikeway projects recommended in the District 4 Bike Plan.[10] The projects are organized alphabetically by project improvement type (corridor, intersection, or bridge/overcrossing).

Table C.5. Recommended Bikeways in the District 4 Bike Plan

	Project Name (Street)	Cross Street A	Cross Street B	Project Improvement Type	Recommendation
1	41st Ave	Edison St	SR 82	Corridor	Install Class II bike lanes
2	De Anza Blvd	SR 92	Polhemus Road	Corridor	Install Class III bike route
3	El Camino Real	Baldwin Ave	9th St	Corridor	Road diet removing a travel lane and converting to a Class IV separated bicycle facility, per the City's 2015 City Sustainable Streets Plan
4[11]	E Hillsdale Blvd	Norfolk St	Franklin Pkwy	Corridor	Install overcrossing
5	Peninsula Ave	Bayshore Blvd	Dwight Rd/Delaware St	Corridor	Install Class IV separated bike lane
6	3rd and 4th Avenues	Highway 101	N/A	Intersection	Improve crossing at 3rd and 4th Aves and Highway 101 interchange
7	5th Ave	3rd Ave	SR 82	Intersection	Install Class III bike boulevards
8	25th Ave	SR 82	N/A	Intersection	Improve crossing
9	28th Ave	At Hillsdale Multimodal Transit Center	N/A	Intersection	Improve bicycle access and install new signalized intersection at entrance to transit center
10	Alameda de Las Pulgas	SR 92	N/A	Intersection	Improve crossing
11	El Cerrito Ave	SR 82	N/A	Intersection	Improve crossing
12	Borel Pl	Spuraway Dr	N/A	Overcrossing	Construct overcrossing over SR 92

[10] These projects are listed in the Appendix of the Caltrans District 4 Bike Plan which can be found here: http://www.dot.ca.gov/d4/bikeplan/docs/CaltransD4BikePlan_Appendicegiss.pdf

[11] This is the same project as project #6 in the Planned Bikeways and Facilities table (Table C.4).

Existing Policies, Programs, and Practices

The City of San Mateo has a variety of existing policies and programs to support bicycling in the community. This section presents a summary of the City's existing bicycle policies, programs, and practices. This section was completed using information gathered from an interview with City staff in November 2018 using the *Technical Guide for Conducting Bicycle Safety Assessments for California Communities*[12] from UC Berkeley's Institute of Transportation Studies. A summary of the information collected is provided in Table C.6.

This interview with the City and the summary below provides a basis for developing support programs and policies that will partner with the recommendations for bikeways and bicycle facilities to create a complete bicycle system in San Mateo.

Table C.6. Summary of San Mateo's Bicycle Policies, Programs, and Practices

	Policy, Program, or Practice	City's Current Practice
City Procedures and Programs		
1	Bike count practices	The City conducts counts on an ad hoc basis (e.g., for specific development or roadway projects).
2	Bicycle collision history and collision reporting	The City conducts collision analyses on an ad hoc basis (e.g., for specific projects or grant applications).
3	Maintenance of inventory of bicycle-related signs, markings, and signals	The City follows CA MUTCD guidance.
		Currently, the City does not have a citywide wayfinding program for bicyclists except near the Hillsdale Caltrain Station as identified in the 2012 Hillsdale Station Integration Plan.
4	Maintenance of bicycle-related traffic control devices	The City does not conduct regular assessments of traffic-control devices for bicyclists.
		The City has an internal work order tracking system for issues that have been identified.
5	Collection of speed data and speed limit evaluations	Every five years, the City collects speed data and reviews speed limits. The last collection occurred in 2017.
6	Implementation of bicycle-oriented traffic control	The City does not have standard implementation practices.
		The City reviews bicycle-related issues at intersections on a case-by-case basis.
		The City is considering protected intersections at a few locations and recently installed a roundabout near the Hillsdale Shopping Center.
7		The City maintains a GIS inventory of bikeways.

[12] https://center.uoregon.edu/NCBW/uploads/PWPB2014/HANDOUTS/KEY_106988/BSAGuidebook10302013.pdf

	Policy, Program, or Practice	City's Current Practice
	Bikeway development	The City includes bikeway projects in its Capital Improvement Project funding and as a part of grant applications and resurfacing projects. Since grant funding is available for bicycle projects, these projects are not always prioritized as a part of the CIP.
8	Bicycle coordinator and advisory committee	There is no official bicycle or pedestrian coordinator; the City Parking Manager currently fulfills this role.
		The Sustainability and Infrastructure Committee serves as bicycle and pedestrian committee.
9	Public involvement and feedback process for bicycle and pedestrian issues	The City has a comment box on its website where the public can provide comments.
		In many cases, community members call and email Public Works to report issues.
10	Traffic calming program	The City's Neighborhood Traffic Management Program has been in effect since its adoption by the City Council in 2009.
		The first step in requesting traffic calming in their neighborhood is for a resident to make a request. In the second step, the City collects data, such as speed surveys and traffic counts, and holds a neighborhood meeting.
		If the City determines that traffic calming is needed, two types of changes can be made. "Step 1 improvements" include easy, quick changes, such as restriping to reduce roadway widths and adding signage. If speed survey results indicate that the 85th percentile speed exceeds the posted speed limit by 7 MPH or more, then "Step 2 improvements" are implemented which include permanent, physical changes such as the installation of speed cushions.
		The Police Department may also conduct targeted enforcement, if needed.
11	Transportation Demand Management (TDM) Program	Currently, there is no citywide TDM program.
		TDM plans are required only for projects in downtown and the areas specified in the Rail Corridor TOD Plan (½-mile radius around Hillsdale and Hayward Park Caltrain stations). The City Parking Manager reviews TDM plans.
		New developments with 100 or more net new trips in the evening peak hour on the Congestion Management Program roadway network (e.g., state highways and select principal arterials) are subject to the City/County Association of Governments of San Mateo County (CCAG) TDM policy.
		CCAG's TDM policy applies to land use changes and new developments that require an Environmental Impact Report or negative declaration. The policy requires that TDM plans include strategies that can fully reduce demand for new peak-hour trips. The policy includes guidelines for TDM measures and trip reduction credits.
City Plans and Ordinances		
12	Complete Streets Policy	The City's 2015 Sustainable Streets Plan includes a Complete Streets Policy, but the Plan has not been formally adopted.

	Policy, Program, or Practice	City's Current Practice
		Currently, the Complete Streets Policy serves as informational only and has no specific application to project planning, design, review, or construction.
13	Street cross sections and design standards	There are no City-specific guidelines for bikeways; the City refers to the CA MUTCD, Caltrans guide, and NACTO guidance.
14	General Plan: Densities and mixed-use zones	The City residential zones are R1-R4 (R4 is most dense).
		The City has mixed-use zones only in the overlay district.
		The City does not use form-based zoning.
15	General Plan: Parking requirements	The City's parking requirements are listed in the Municipal Code Section 27.64.160.
		Parking for residential and commercial uses can be unbundled - shared parking is allowed with an agreement.
16	Specific plans and overlay zones	There are no bike-related overlay zones.
		Specific plans include the Downtown Specific Plan and the Rail Corridor TOD Plan for the ½-mile radius around Hillsdale and Hayward Park Caltrain stations.
17	Development standards, site plan review, traffic impact studies	In Downtown, curb cuts for new driveways are not allowed.
		City considers bike circulation and access when reviewing development proposals.
		The City advocates for bike parking at ground level, instead of underground.
18	Traffic Impact Fees for Sustainable Transportation	The Transportation Impact Fee (TIF) applies to projects with a net addition of trips to the roadway network based on the number of housing units or office space. No fee is assessed if result is a negative or net neutral number of trips.
		The TIF amount goes into a fund which the City can use for local transportation projects, including bikeways. Currently, most TIF funds are used for the local match for the Caltrain grade separation project and are not dedicated to bicycle projects.
19	Bike parking	The zoning code requires short- and long-term bike parking.
		The City's requirements for new commercial developments to provide showers, changing rooms, and other facilities are typically included in a TDM plan. Multifamily housing developments are required to provide secure bike parking for residents.
		The City has no design standards for bike parking.
		The City has a partial inventory of bike parking which includes parking in downtown, at parks, and near transit stations.
		The City's E-lockers near the local Caltrain stations are well-used.

	Policy, Program, or Practice	City's Current Practice
		The City has no design standards for bike parking.
20	Sidewalk riding	Bicyclists can ride on sidewalks.
City Planning and Maintenance		
21	Bicycle Master Plan	This Plan revises the existing plan which was last updated in 2011.
22	Off-street bikeway maintenance and implementation practices	Public Works maintains shared-use paths that are within the City right-of-way.
		The City does not have a nighttime lighting standard for bike paths; the City follows national standards for lighting roadways.
City Departmental Coordination		
23	Bicycle safety education and school coordination	The City's most recent Safe Routes to School (SRTS) grant ended in May 2018.
		SRTS programs at elementary and middle schools have included bike rodeos and in-class presentations, but these programs are not offered on a consistent basis.
		School safety officers are assigned to each school.
		The City does not provide bike safety or traffic education materials at community destinations like libraries or senior centers.
		SRTS brochures were developed as part of the Street Smarts Program. The Street Smarts Program provides driver education, promotes safe roadway behavior, and distributes outreach materials that can be used to facilitate discussions and promote safe driving behavior both with students and the community at large.
		Bicycle safety education campaigns are rarely conducted; however, the City led a social media campaign during Pedestrian Safety Month.
		The City holds bike rodeos on an annual basis, they may also occur at specific school sites when funding allows.
		The City works with the County Office of Education's SRTS program and the school district's Wellness Coordinator to facilitate biking access to schools.
24	Interagency and interdepartmental coordination	Barriers to improving the bicycle network include Fire Department requirements for emergency vehicle travel and public concerns about reducing travel and parking lanes.
		The Police and Fire Departments are involved in some bikeway planning processes.
		Public health agencies are occasionally engaged during SRTS projects. These agencies collect bike crash data and promote active transportation.
25	Bike safety enforcement	The Police Department has traffic safety officers that occasionally conduct patrols by bike.
		Bicycle-oriented enforcement activities are conducted occasionally and occur more often when grant funding is available to fund the activities.

	Policy, Program, or Practice	City's Current Practice
26	Business improvement districts and vehicle parking	There are no longer any business improvement districts in retail zones in San Mateo.
		Downtown parking policies are hourly or monthly paid parking, with core and perimeter pricing.
		Current parking policies do not effectively encourage non-auto access.
		The City does not use variable market-based pricing.

Appendix D. Data Analysis Report

Key Takeaways

As a part of the 2020 San Mateo Bicycle Master Plan, Toole Design conducted a needs and demand analysis that included:

- Bicycle Network Analysis, including a Level of Traffic Stress analysis and Connectivity analysis
- Potential Demand Analysis
- Collision Analysis

The following are the key findings from the analyses:

1. Today, San Mateo's bicycle network is mainly comprised of high-stress bikeways due to a lack of comfortable, connected north-south and east-west connections; bicycle crossings over Highway 101, State Route 92, and arterials; and low-stress connections to trails.
2. The areas of highest potential demand for bicycling are around Downtown San Mateo, the Hillsdale Caltrain station, and the Hayward Park Caltrain station.
3. Most bicycle-vehicular collisions in San Mateo occur on arterial roadways with collision hotspots near San Mateo High School, Downtown San Mateo, between the Hillsdale and Hayward Park Caltrain stations, and at the Highway 101 and Hillsdale Boulevard junction.

Bicycle Network Analysis

Overall, the purpose of the Bicycle Network Analysis (BNA) is to identify the areas of San Mateo that are not currently well-served by a low-stress bicycle network.

What is a Low-Stress Network?

Comfort Typology of Bicyclists

Design User Profile	Not Interested or Able	Interested but Concerned	Somewhat Confident	Highly Confident
Percent of General Public	31-37%	51-56%	5-9%	4-7%

Figure D.1. Level of Traffic Stress and Bicycle Riders

Most people in the U.S.—between 50 and 60 percent—have little tolerance for interacting with motor vehicle traffic while bicycling unless volumes and speeds are low (see Figure D.1).[1] This group of riders is referred to as "Interested but Concerned," reflecting both their interest in bicycling for transportation as well as concerns about safety and comfort when interacting with motor vehicle traffic.[2]

This framework of rider types is used to assess the existing bicycle network and is used to select recommended facility types for the 2020 Bicycle Master Plan.

Bicycle Network Analysis Process

The BNA is a two-step process:

1. **Level of Traffic Stress (LTS) analysis** –The LTS analysis is used to categorize roadways and streets according to perceived stress level for cyclists, from low stress to high stress. In practical terms, the low-stress network is intended to correspond with what is comfortable for a typical adult with an interest in riding a bicycle but who is concerned about interactions with vehicular traffic (i.e., the Interested but Concerned bicyclist). This analysis was performed based on the City's existing street and bicycle network conditions as of December 2018.
2. **Connectivity analysis** – This Connectivity analysis identifies the level of connectivity provided by the low-stress network. This includes analyzing how connected each census block is to a variety of

[1] Source: Dill, J. McNeil, N. "Revisiting the Four Types of Cyclists: Findings from a National Survey" Transportation Research Board 95th Annual Meeting, 2016.
[2] Studies, such as the Dill et al., referenced above, show that approximately one-third of the adult population is not currently interested in bicycling or able to bicycle.

destinations[3] in the community, and how connected each census block is to other census blocks on an unbroken low-stress connection.

The results of this analysis was used to identify major barriers, to develop the proposed bicycle network, and subsequently to prioritize the bicycle project list.

Bicycle Network Analysis: Level of Traffic Stress

Methodology

For bicyclists, the degree of traffic stress when riding on streets is influenced by numerous factors. Level of traffic stress (LTS), as developed by researchers at the Mineta Transportation Institute, is the industry standard for assessing comfort and connectivity. Toole Design updated those methods to include traffic volumes and presence of street parking for vehicles as additional factors that impact level of traffic stress. The six factors used to determine if a roadway is high or low stress in this methodology are:

- Traffic speed
- Traffic volume (using estimated volumes or number of lanes as a proxy)
- Number of through lanes
- Presence of street parking for automobiles (including parking width)
- Type of bicycle facility
- Presence of a centerline

The project team used these factors to evaluate the LTS of three different facility categories for the entire street network in San Mateo:

1. Separated facilities (such as trails or shared use paths)
2. Mixed traffic (including bike facilities like sharrows, or bike routes, as well as no bicycle facility)
3. Bike lanes

The project team gave trails a default low-stress score, since by their nature trails are separated from the roadway and thus have lower degrees of traffic stress.

LTS also evaluates the intersection stress. Wider, high speed streets create high-stress barriers when there is no intersection control. Intersection stress is important because a high-stress crossing can be a barrier to an otherwise low stress segment. The four factors used to determine is an intersection is high or low stress in this methodology are:

- Intersection control (none/yield, rectangular rapid flash beacon, and signalized, HAWK, four way stop, or priority)
- Number of crossing lanes
- Crossing speed limit
- Median island

The assumptions used for this analysis are shown in Table D.1.

[3] Destinations are taken from Open Street Map (OSM) data and include population, jobs, schools, colleges, universities, doctors, dentists, hospitals, pharmacies, supermarkets, social services, parks, community centers, retail, transit.

Table D.1. Roadway Classification Assumptions

	Speed (mph)	Travel Lanes per Direction	Average Daily Traffic	Parking Presence	Parking Width	Bike Lane Width	Centerline
Arterial	35	2	25,000	No	n/a	5	Yes
Collector	30	1	8,000	Yes	8	5	Yes
Local	25	1	1,000	Yes	8	5	No

Results

For this analysis, the project team grouped streets into two categories:

- Low stress (LTS 1 and LTS 2)
- High stress (LTS 3 and LTS 4)

The LTS results for San Mateo show that the City is comprised primarily of high-stress bicycle facilities bikeways (see Table D.2 and Table D.3).

San Mateo has 42 miles of bicycle facilities that are high-stress, and 38 miles of bicycle facilities that are low-stress, of which 19 miles are Class I paths. This slight majority of high stress bicycle facilities (53%) indicates that the majority of the bicycle facilities are not comfortable for all users.

While 59 percent of streets are designated as low-stress, most of these are neighborhood streets without an existing bicycle facility (see Figure D.2) that are not typically utilized by bicyclists. These neighborhood streets often have low-speed, low-volume vehicular traffic, but they often do not connect to one another or require crossing large high stress barriers to connect with other areas of the city.

The remaining 41 percent of streets, which include many frequently used by people bicycling, are considered high stress for bicyclists based on this analysis. The streets designated high-stress may or may not currently have bicycle facilities – 30 percent of the high-stress network has existing bicycle facilities, but these facilities do not provide adequate separation from vehicular traffic. Lack of separation creates a network that is not comfortable for bicyclists of all ages and abilities. For example, Alameda de las Pulgas is designated as a Class III bike route; however, Alameda de las Pulgas is an arterial road which creates a high-stress segment due to volume and speeds of vehicles.

The LTS results indicate that while many residents have a low-stress street outside their front door, most people would not feel comfortable bicycling beyond the limits of their immediate neighborhood because it is either:

- Surrounded by high-stress streets, or
- Separated from nearby neighborhoods by a high-stress crossing at a major street

Furthermore, many key destinations including the Hillsdale Shopping Center, Aragon High School, San Mateo Central Park and all three Caltrain stations are located on high-stress streets.

Table D.2. Existing High- and Low-Stress Street Network

Low-Stress Network	Miles	Percentage
Streets with No Bicycle Facility	166 miles	82% of low-stress streets
Streets with a Bicycle Facility	38 miles	18% of low-stress streets
Total Low-Stress Network	204 miles	

High-Stress Network	Miles	Percentage
Streets with No Bicycle Facility	101 miles	70% of high-stress streets
Streets with a Bicycle Facility	42 miles	30% of high-stress streets
Total High-Stress Network	143 miles	

Table D.3. Overall Street Network

	Miles	Percentage
Low Stress	204 miles	59% of high-stress streets
High Stress	143 miles	41% of high-stress streets
Total Network	347 miles	

Street Network

The San Mateo bicycle network has significant high-stress barriers (see Figure D.3).

Major Network Barriers

While bicyclists do not expect motorways such as Highway 101 or State Route 92 to be low-stress or used by bicyclists, these roadways still present barriers when crossing and break up the low-stress network. There are currently four crossing along Highway 101: two Class III facilities, one Class II facility and one Class I facility. The existing crossings are not evenly dispersed along the length of the highway, and most are high-stress experiences. The low-stress crossings (3rd Avenue Class I path and Monte Diablo Ave bridge) have their own access challenges for bicyclists as well.

State Route 92 also has limited crossings between the Peninsula Golf and Country Club and Highway 101. Currently there are two existing Class III facilities One of these crossings is at Delaware Street, but this intersection is a Class III bike route, offering no additional infrastructure for cyclists. This is one of the most direct north-south connectors, but this intersection is a high stress crossing and could be a barrier to cyclists using that route. Other major barriers include the Caltrain tracks, El Camino Real, and Alameda de las Pulgas.

Downtown San Mateo

Downtown San Mateo, especially south of the San Mateo Caltrain station, is a “high-stress island” that is contains many high-stress streets and is surrounded by high-stress streets. Downtown is one of the few areas in San Mateo that lacks access to a low-stress bikeway.

Waterways

Water bodies also act as barriers. The Seal Slough has only two low-stress crossings, which limits connectivity to the trail network in the east of the city.

Existing Bicycle Network

To understand the existing network, the level of traffic stress is first analyzed along the bicycle network. This helps provide a broad picture of what it is like to bike on the existing bicycle network in San Mateo.

Lack of North-South and East-West Connections

Currently, San Mateo has no continuous north-south or east-west low-stress bicycle connections; the cross-town bikeways that do exist are high-stress. Therefore, bicyclists cannot ride across the city without riding on a high-stress street at some point during their trip (see Figure D.3).

For example, Delaware Street/Pacific Boulevard is the north-to-south corridor that connects to the three Caltrain stations in San Mateo. Delaware Street/Pacific Boulevard from Peninsula Avenue to 42nd Avenue has segments of both Class II bike lanes and Class III bike routes, and some segments are low-stress; however, most of the corridor is high-stress which creates a lack comfortable, low-stress connections to the Caltrain stations. In the east-west direction, there are a limited number of streets that are not bisected by State Route 92 or Highway 101. Hillsdale Boulevard offers a direction connection across the city but is high-stress.

Arterial Intersections

Another barrier for bicyclists is crossing arterial roadways because these are often points of conflict between bicyclists and motorists. Intersections often lack separated bicycle facilities, and particularly on arterials, the number of travel lanes can result in long exposure times. For example, Hillsdale Boulevard from Glendora Drive to S Norfolk Street has Class II bike lanes on some segments and is designated as a Class III bike route on other segments. This bikeway also crosses two high-stress arterials (Alameda de las Pulgas and El Camino Real) which creates a high-stress environment for riders, and the lack of protection on the Class III bike route segment is considered high-stress for Interested but Concerned riders.

Trails

As mentioned earlier, trails are considered low-stress because they are off-street and separated from motor vehicle traffic. Within San Mateo, trail access is located along the San Francisco Bay to regional trails such as the Bay Trail. While the trail segments themselves are low-stress, connections to the trails from the existing bicycle network are limited and often high-stress, especially at intersections, such as at J Hart Clinton Drive. This may limit a bicyclist's ability to access the trails by bike, therefore encouraging people to drive to trailheads.

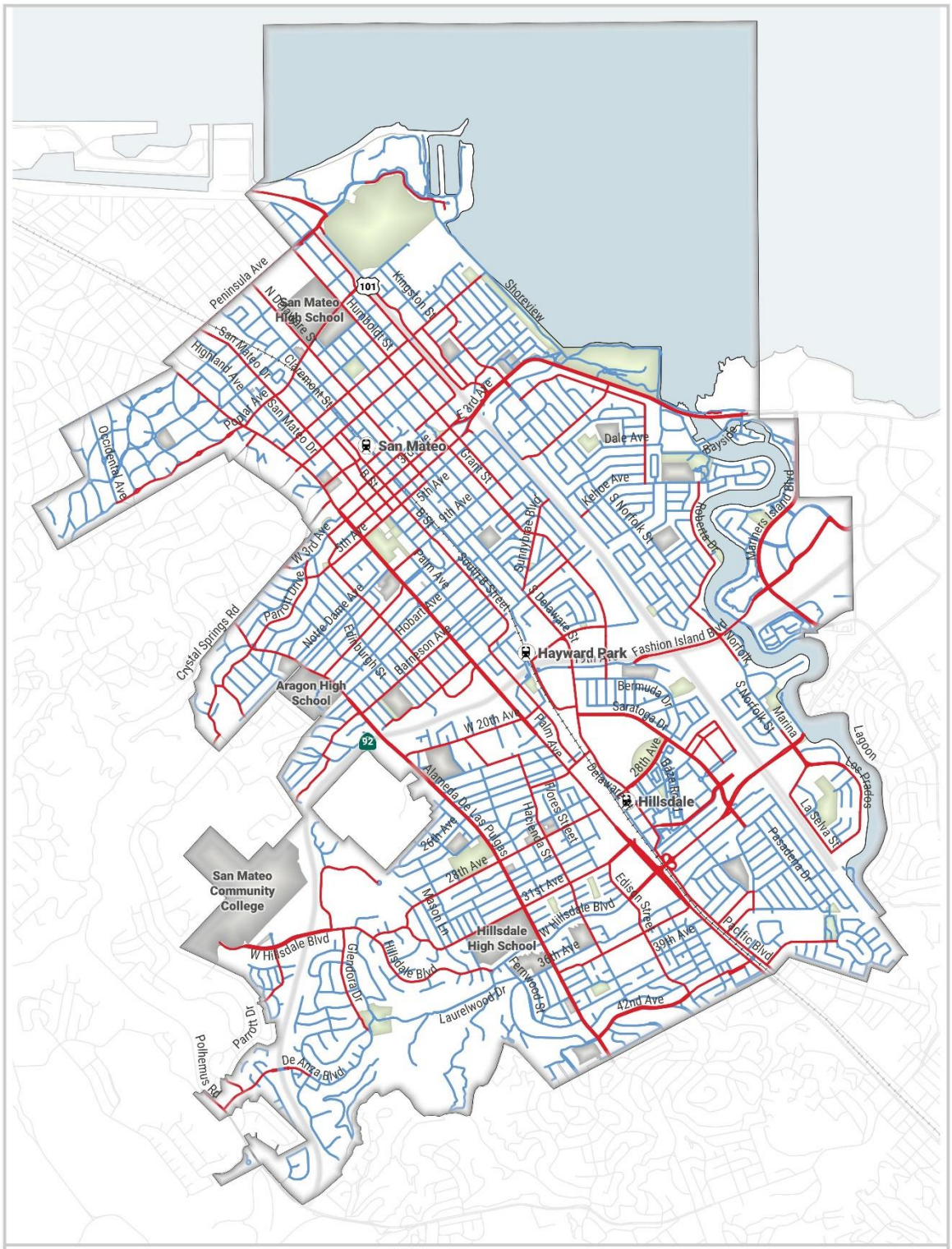

Figure D.2. Level of Bicycle Traffic Stress – Street Network

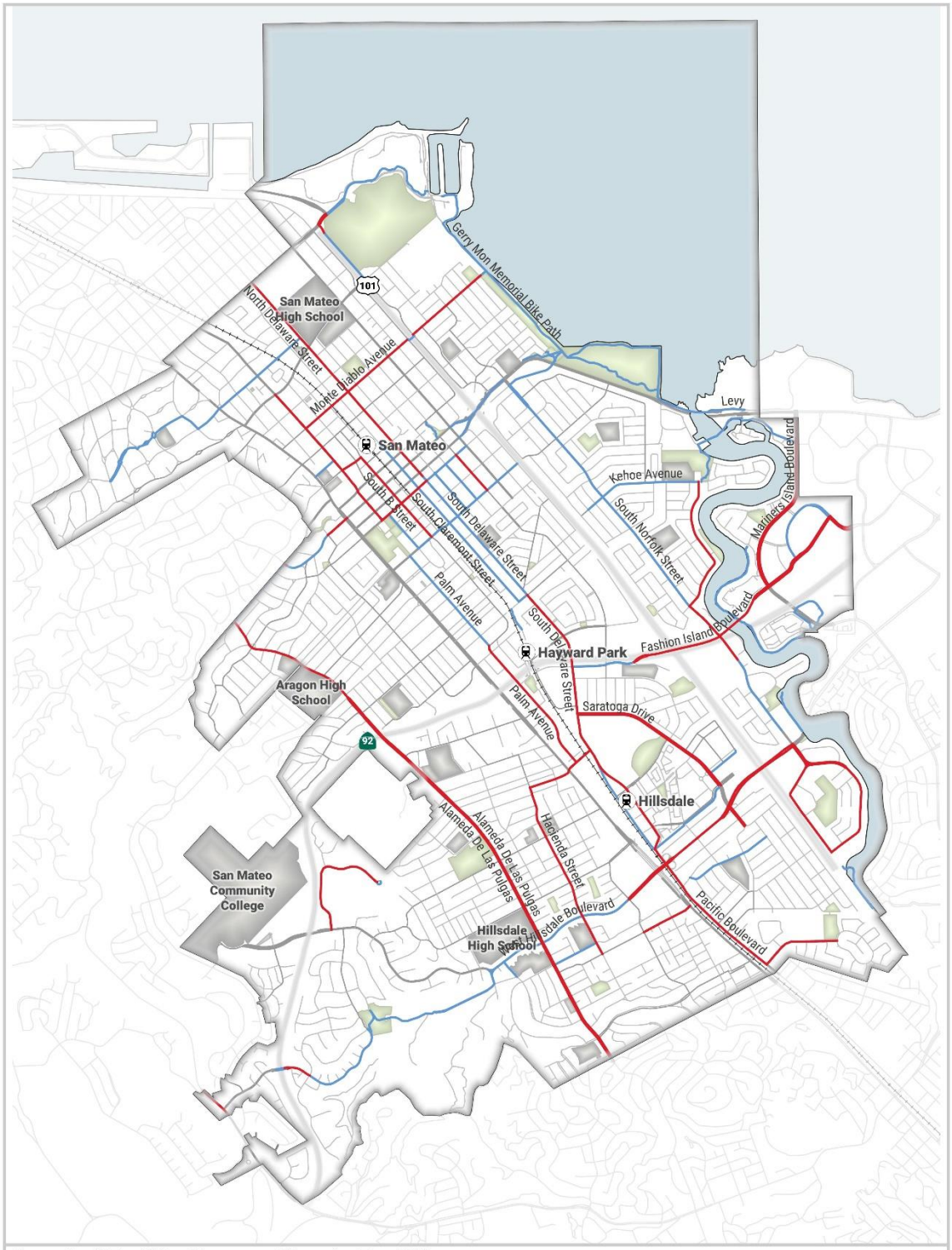

Figure D.3. Level of Bicycle Traffic Stress – Bicycle Facilities

Bicycle Network Analysis: Connectivity

Methodology

The BNA approach provides an understanding of where connectivity challenges exist. The BNA evaluates the connectivity of each census block to other census blocks within biking distance (which correlates to 1.67 miles, the distance an average rider would travel in ten minutes biking ten miles per hour). The BNA then assesses the number and types of destinations available within each of those blocks.[4]

Defining Connectivity

The BNA assumes a census block connects to any street that either follows its perimeter or serves its interior. Two census blocks are only considered "connected" if an unbroken low-stress street connects them; therefore, even a short high-stress segment or high-stress intersection can negate a potential connection.

The BNA also considers detours; if a low-stress route deviates more than 25 percent when compared to the shortest potential direct route, then a low-stress route is not considered to be available.

Based on the information about which census blocks are connected, the BNA calculates the total number of destinations accessible on the low-stress network. Then, the BNA compares this with the total number of destinations that are within biking distance, regardless of whether they are accessible via the low-stress network.

Assigning Points

Points are assigned on a scale of 0-100 for each destination type based on the number of destinations available on the low-stress network and the ratio of low-stress destinations to all destinations within biking distance. The scoring places higher value on the first three low-stress destinations by assigning points on a stepped scale, and then are prorated for additional destinations. After the first few low-stress destinations, points are prorated up to 100.

For example, a census block encompasses five parks; however, low-stress connections are available to only one park. The scoring takes into account the ratio of low-stress accessible destinations to all destinations of that type within an area. Within each destination type, the first destination counts for the most points, and the remaining destinations count for a proportion of the remaining points.

Destination Categories

The BNA looks at six categories for assessing connectivity:

1. Population
2. Opportunity[5] (i.e. jobs and education)
3. Core Services[6]
4. Recreation[7]
5. Retail
6. Transit

For categories that include more than one destination types, the category score is calculated by combining the scores of each destination type. For census blocks where a destination type is not reachable by either high- or

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[4] For the BNA, destination data is pulled from Open Street Map and population data is pulled from the US Census.
[5] Includes employment, K-12 education, technical/vocational schools, and higher education.
[6] Includes doctor offices/clinics, dentist offices, hospitals, pharmacies, supermarkets, and social services.
[7] Includes parks, recreational trails, and community centers.

low-stress routes, that destination type is not included in the calculations. For example, if a city has no institute of higher education, the "opportunity score" excludes the higher education destination type so the score is unaffected by its absence. This means that areas of a city with a denser concentration of destinations are not scored more highly than those with more dispersed destinations.

Results

The LTS analysis is a key input into network connectivity. Areas with low connectivity often have high-stress streets bounding the census blocks. This limits how many destinations are accessible via the low-stress network (see Figure D.5).

Overall, San Mateo has many areas with low-connectivity due to the presence of major barriers, such as Highway 101, State Route 92, arterials such as El Camino Real, collector roads, the Seal Slough, the Caltrain tracks, and other barriers (see Figure D.4). For example, the shopping center at the junction of 92 and El Camino Real has very low connectivity because the freeway and the arterial separate the shopping center from the low-stress bicycle network.

Street networks also influence connectivity—areas within the city that have a traditional street grid (such as south of 4th Avenue and Delaware Street, and north of 10th Avenue and Delaware Street) have more permeability in the network and are inherently better connected.

Areas of low or high connectivity throughout San Mateo are not evenly distributed. The two areas of highest connectivity are:

- San Mateo Park neighborhood – *Mainly local, low-stress bikeways with few high-stress barriers.*
- Mariners Point – *Well-connected to the trail network with a low-stress crossing over the Seal Slough. This area is an important recreational destination that has good internal connectivity.*

The areas of lowest connectivity are:

- Borel Square, strip mall and development next to Peninsula Temple Beth El, and existing Concar Drive shopping center – *Limited crossings of Highway 101 and SR 92, which makes these roadways barriers to connectivity.*
- Hillsdale Shopping Center and San Mateo Medical Center – *Limited crossings exist over the Caltrain tracks and Highway 101.*

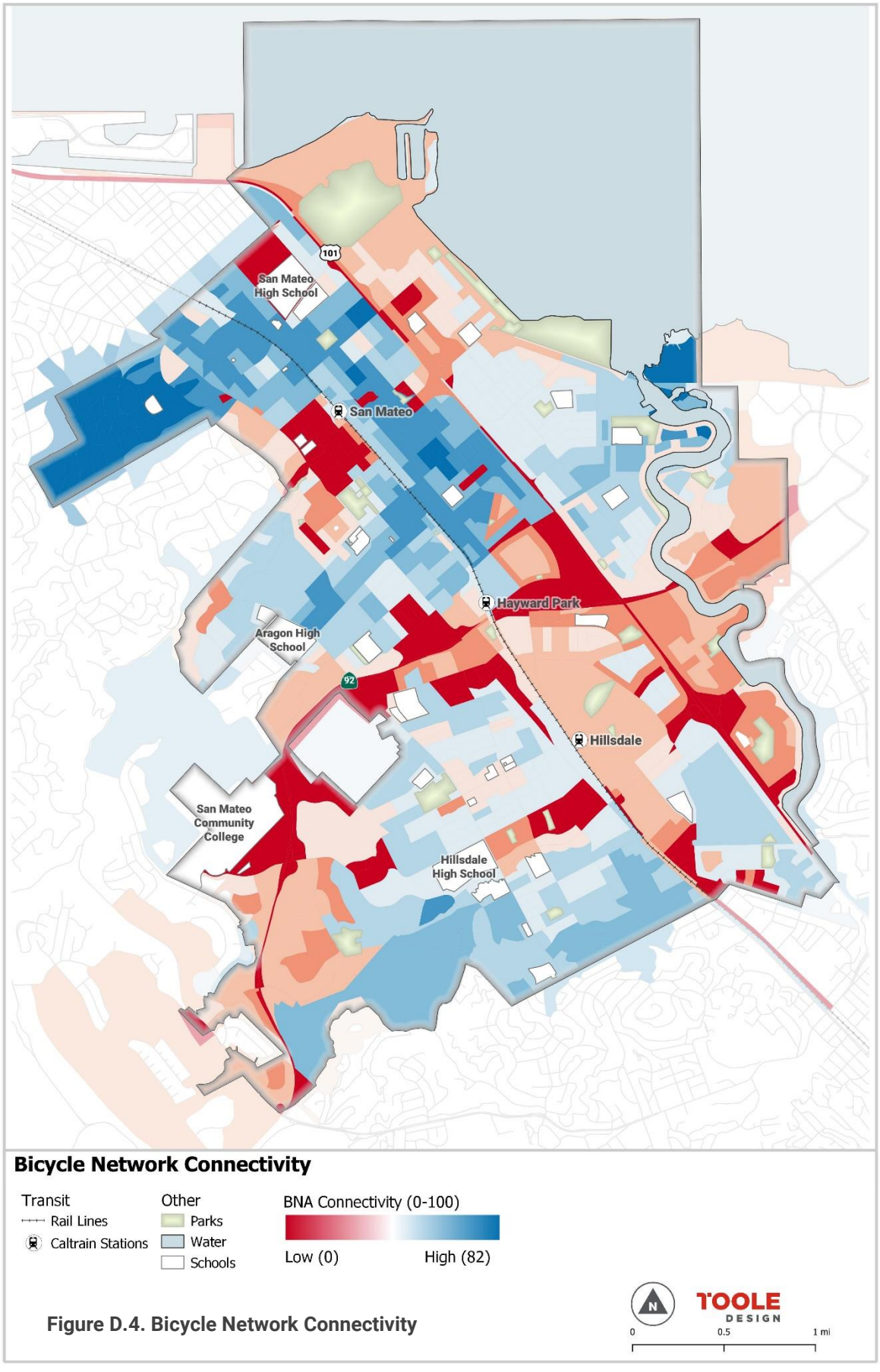

Figure D.4. Bicycle Network Connectivity

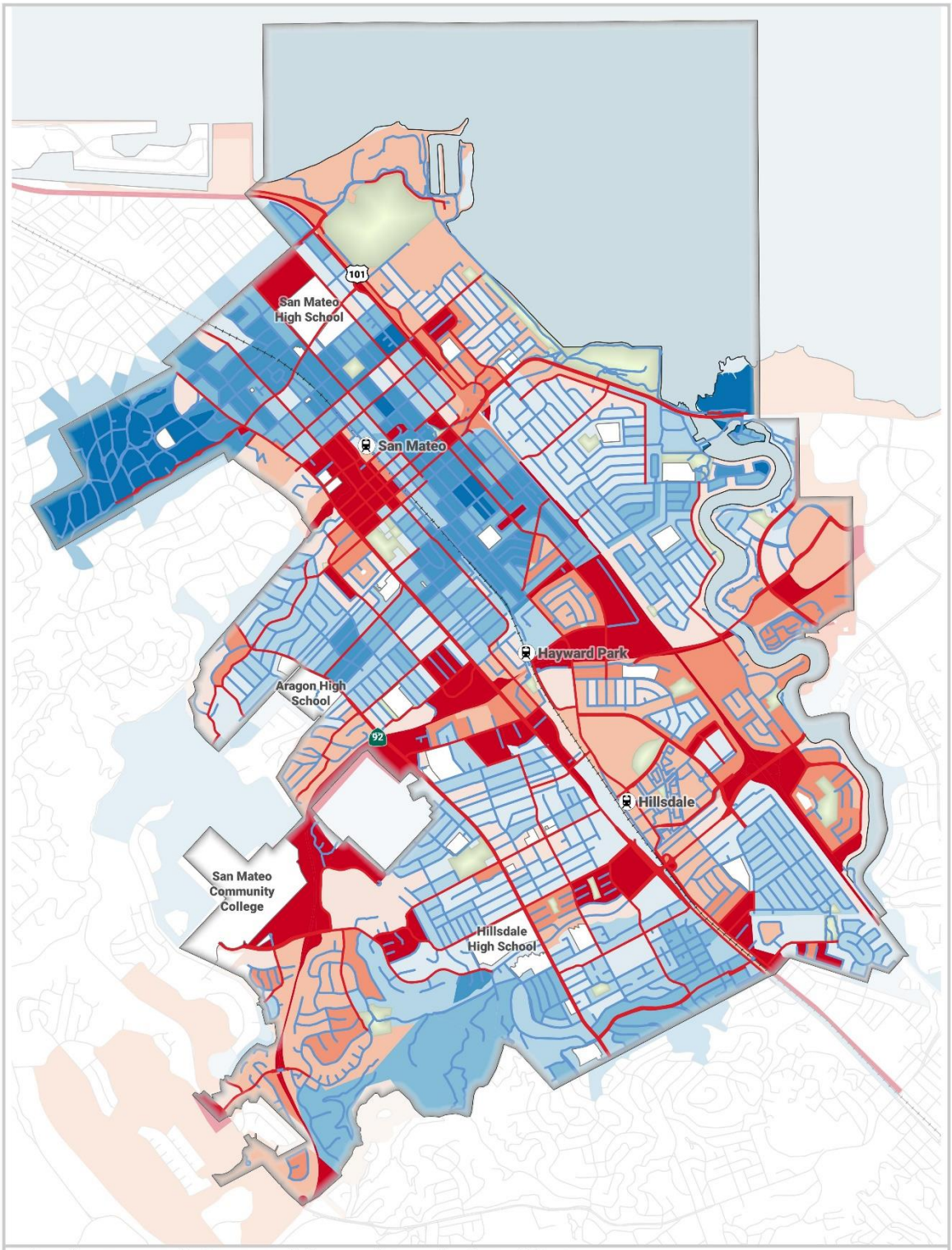

Figure D.5. Bicycle Network Connectivity and Level of Traffic Stress

Potential Demand Analysis

Potential Demand Analysis is used to determine where there is a high potential for people to bicycle.

Methodology

The analysis is based on a number of assumptions and professional judgement, and results in a composite score of these assumptions. The goal of the Potential Demand Analysis is to use these factors to identify patterns and areas with high potential for bicycle demand based on development patterns and demographic factors. However, the analysis is not meant to be predictive of actual bicycle activity. Key destinations are considered in the BNA rather than in the Potential Demand Analysis.

A potential demand score is calculated by weighing the following factors:

- Intersection density
- Population density
- Transit access
- Job density
- Percent of households below the poverty line
- Population under 18 density

The potential demand is calculated at the census block geography. Each factor is calculated separately and then the factors are weighed individually to create a composite score. Table D..4 provides a description of factor calculations, data source, and weight.

Table D.4. Potential Demand Factors

Factor	Calculation	Data Source	Weight
Intersection Density	# intersections with > 3 legs	OSM street network	26%
Population Density	Total population/census block area	2016 ACS 5-year estimates	18%
Transit Access	Located within ¼ mile of a train station	CalTrans	18%
Job Density	Total employment/census block area	2014 Origin-Destination Employment Statistics (LODES), from the Longitudinal Employer-Household Dynamics (LEHD)	15%
Percent of **Household**s **Below Poverty Line**	Households below poverty line/total households in census block group	2016 ACS 5-year estimates	15%
Population Under 18 Density	Population under 18/census block group	2016 ACS 5-year estimates	8%
		Total	100%

Results

The high-demand areas for bicycling are illustrated in Figure D.6 and include three general areas:

- Downtown San Mateo
- Hillsdale Caltrain station
- Hayward Park Caltrain station

The Potential Demand factors are distributed unevenly throughout San Mateo per the following:

- **Intersection density.** Since most of the San Mateo street network is based on a grid pattern, there is a high intersection density throughout the city.
- **Population density.** Population levels are highest in north San Mateo and near Downtown. With some peaks, population density is otherwise fairly level in the area south of SR 92.
- **Transit access.** San Mateo has three transit stations, which are spaced approximately 1 mile apart through the middle of the city.
- **Job density.** Generally, employment locations are located along SR 92 and El Camino Real. High employment density is located around Downtown, at the Bridgepointe Shopping Center (near SR 92 and Foster City), San Mateo Community College, and the Hillsdale Shopping Center.
- **Percent of households below the poverty line.** A high percentage of households below the poverty line are located in north San Mateo with other areas of concentration in the area around Hillsdale and Hayward Park Caltrain stations.
- **Population below 18 density.** The locations with high populations under 18 are concentrated near schools. The highest concentration is located in the neighborhoods within a half mile of San Mateo High School.

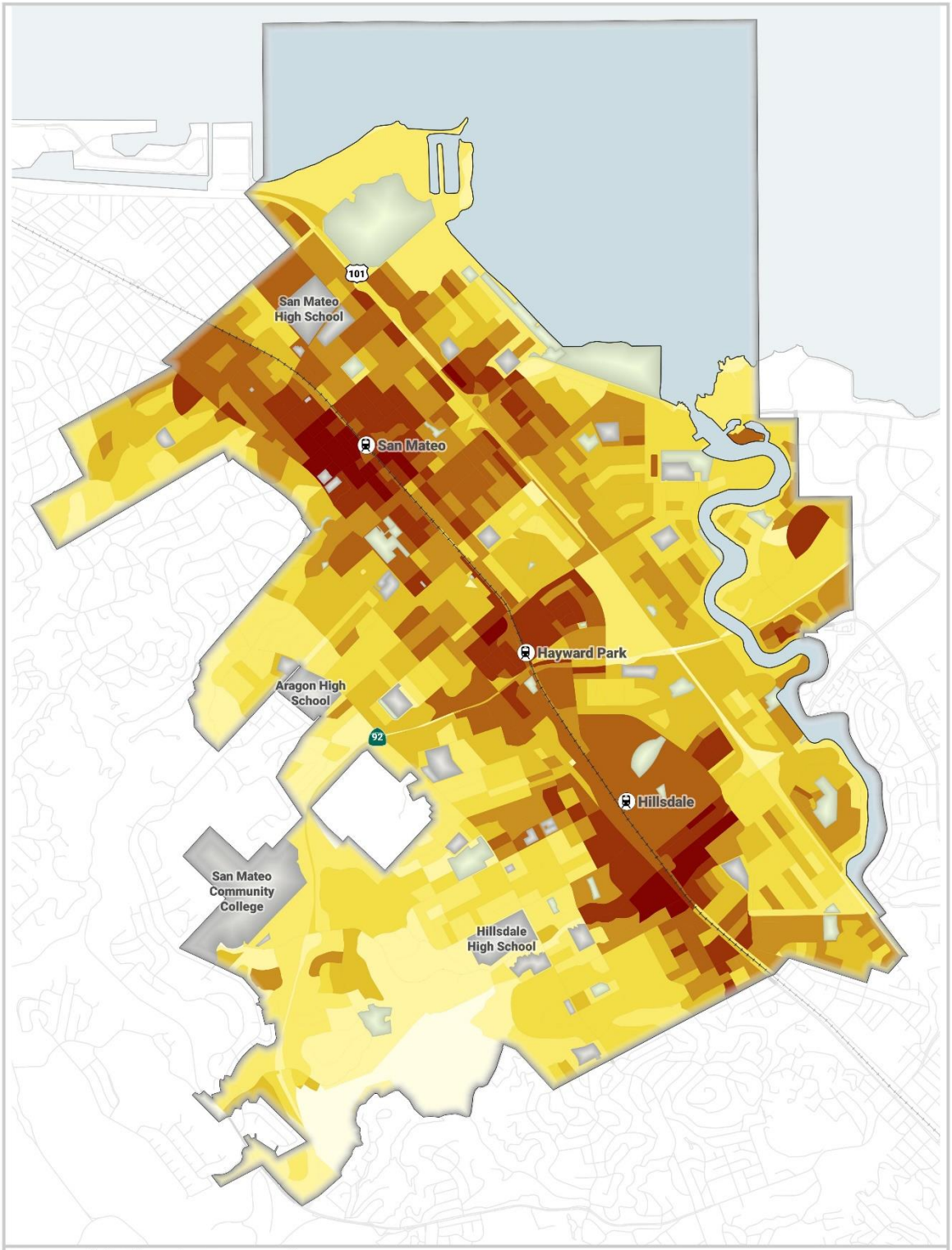

Figure D.6. Map of Potential Demand

Collision Analysis

Bicycle master plans have many functions, one of which is identifying projects and methods for reducing and eliminating bicycle-vehicle collisions. The first step to reducing and eliminating collisions is understanding the current environment – the who, when, what, and how of bike collisions.

To better understand San Mateo's current collision environment, data was obtained from the City of San Mateo.[8] The project team reviewed five years of collision data (from 2013-2017). The data is from police reports, so an unreported collision would not appear in the data. Near misses are also not included in this data, but certainly impact how comfortable a person feels biking and subsequently how likely they are to bike.

For a map of the collision locations, see Figure D.7.

[8] Typically, collision data is pulled from the University of California-Berkeley's Safe Transportation Research and Education Center which maintains the Transportation Injury Mapping System (TIMS); however, San Mateo collision data was unavailable from TIMS for 2013, 2015, and 2016.

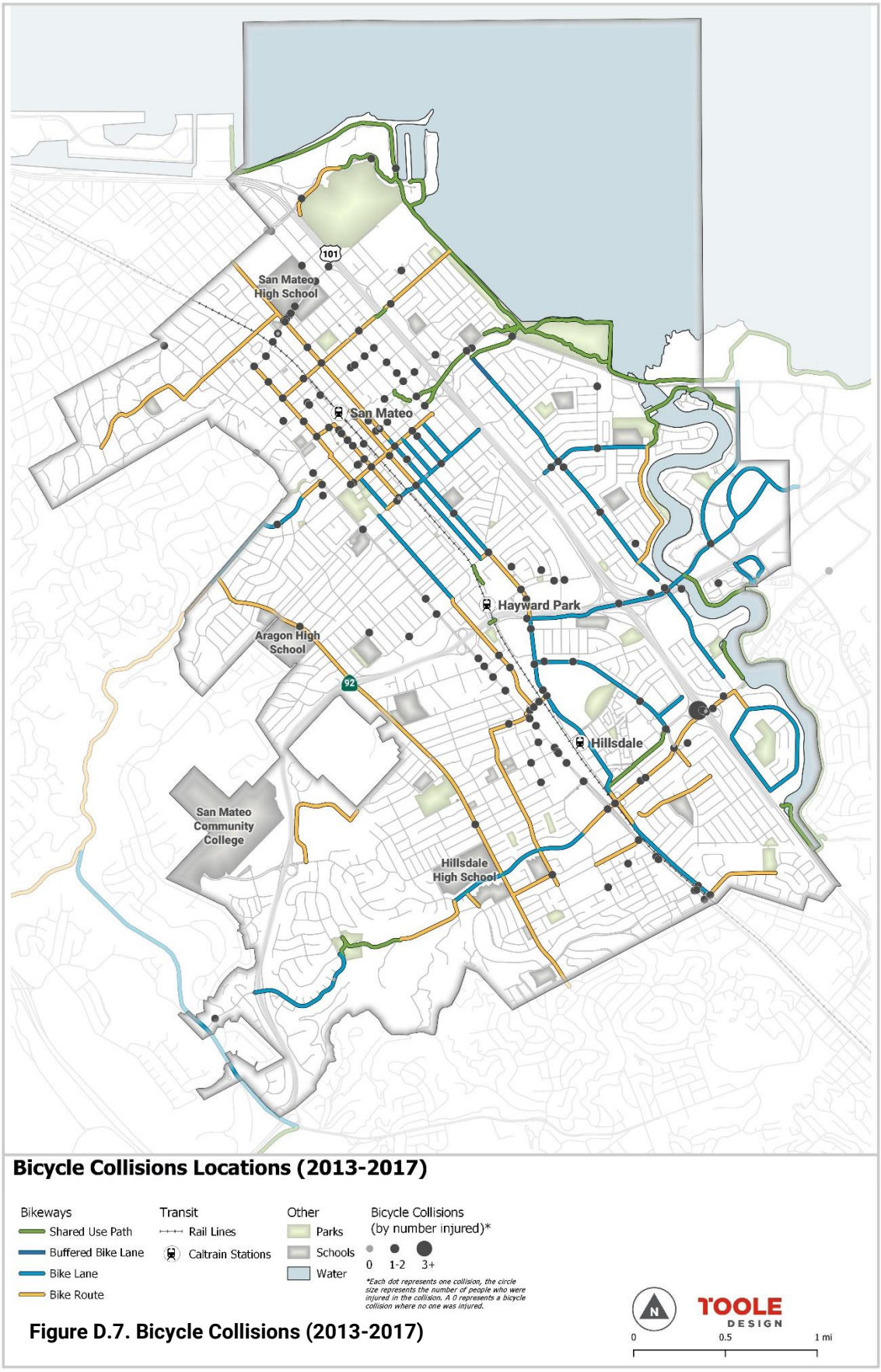

Figure D.7. Bicycle Collisions (2013-2017)

To better under San Mateo's bicycle collision history, the following section provides an overview of collision severity, seasonality, geographic distribution, and primary collision factors.

Collision Severity

In general, bicycle collisions are more likely to be severe than collisions involving only motor vehicles since bicyclists are more exposed than occupants of motor vehicles. In San Mateo from 2013-2017, 205 bicycle collisions occurred, none of which were fatal. Of the collisions, 90 resulted in visible injuries, seven had severe injuries, and 21 were property damage-only (see Figure D.8).

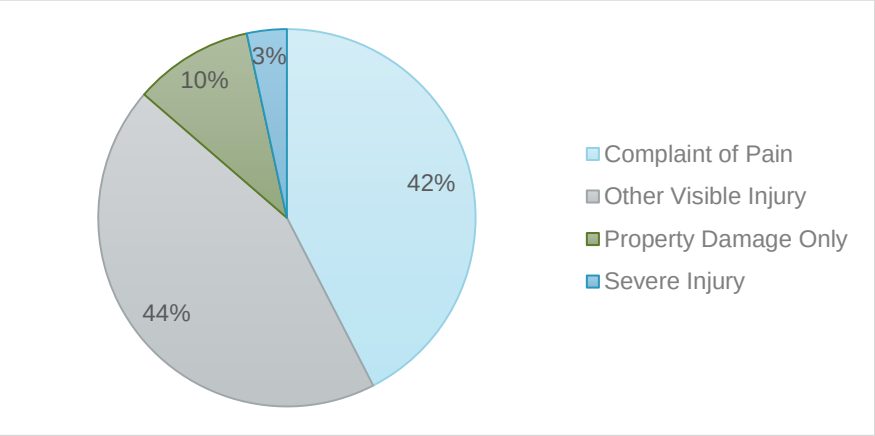

Figure D.8. Collision Severity for Bicycle Collisions

Seasonality

Most collisions in San Mateo occur between late spring and fall, with a slight peak in October and May (see Figure D.9). This could be related to recreational bicycling that occurs in the summer and in the temperate spring and fall months. A slight increase in October and November could be due to daylights savings and shorter days.

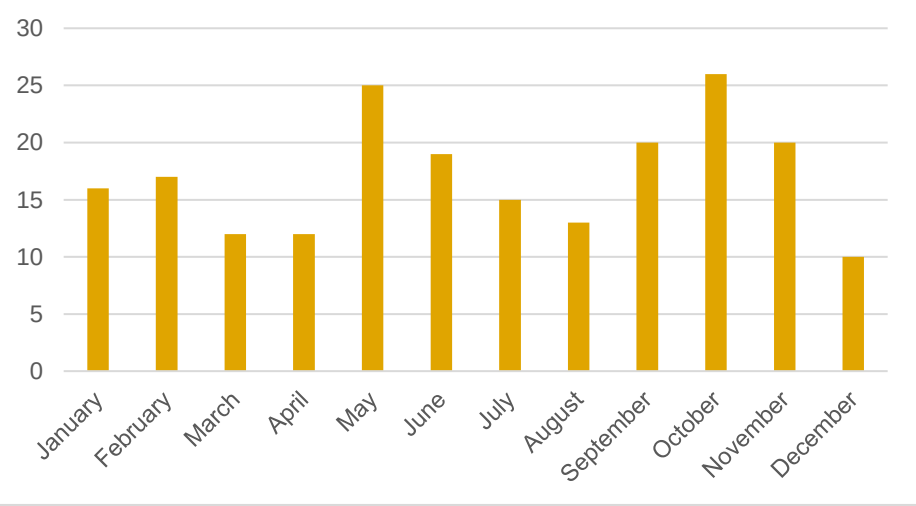

Figure D.9. Bicycle Collisions by Month 2013-2017

Geographic Distribution

Geographically, bicycle collisions are not evenly distributed throughout San Mateo. As shown in Figure D.10, San Mateo has four collision hotspots which include:

- **San Mateo High School.** Collisions near San Mateo High School are concentrated along Poplar Avenue and near the intersection of East Poplar Avenue and Delaware Street.
- **Downtown San Mateo.** Downtown has a high number of collisions, with the majority of bicycle collisions are located on existing Class III bike routes.
- **Between Hillsdale and Hayward Park Caltrain Stations.** Collisions between Hayward Park and Hillsdale Caltrain stations are located along El Camino Real and at 25th Avenue. 25th Avenue connects to Delaware, a low-stress, north-south bicycle connection and alternative to Alameda de las Pulgas.
- **Junction between Highway 101 and Hillsdale Boulevard.** A large number of collisions are seen along Hillsdale Boulevard leading up to, and crossing, Highway 101.

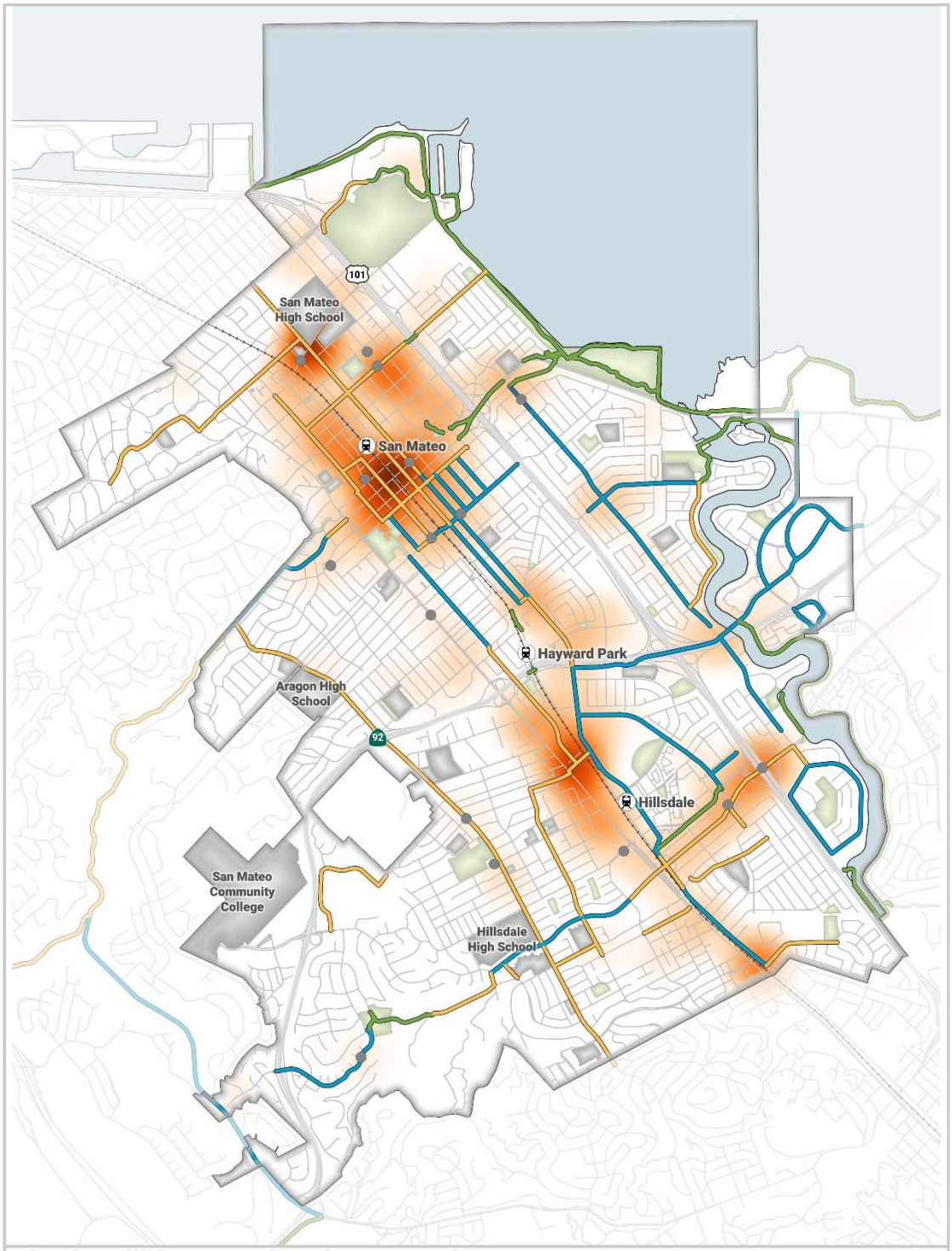

Figure D.10. Bicycle Collisions (2013-2017) Heatmap

Bikeways and Street Types

Identifying the locations of collisions on streets with bikeways can help assess whether a facility type is the right choice for the street. However, it is expected that bicycle collisions may occur on streets with bikeways because bicyclists are more likely to ride on streets with bikeways. Without bicycle volume data, it is not possible to normalize collisions by bicycle volumes on each street.

The presence of bikeways also affects how bicyclists and motorists interact since some facilities (such as Class IV separated bike lanes) provide more separation between bicycles and motor vehicles. Other facilities, such as Class III bike routes offer no separation.

Between 2013-2017, over 30 percent of the collisions in San Mateo occurred on streets with bikeways (see Table D.5). The collision analysis indicates that Class III bike routes have the highest percentage of collisions for streets with bikeways; however, Class III bike routes are the most common bikeway in San Mateo, and they have the highest number of lane miles.

The collisions on trails were at junctions of the trail and the on-street network.

Table D.5. Bicycle Collisions by Bikeway Type

Bicycle Facility Type	Number of Bicycle Collisions	Percent of Total Bicycle Collisions	Percent of Road network
Trails (Class I)	3	1%	0.5%
Bike Lanes (Class II)	24	12%	1.0%
Bike Routes (Class III)	44	21%	8.5%
Streets without Bikeways	134	66%	90%
Total	205	100%	100%

Additionally, arterials have the highest number of bicycle collisions (see Table D.6). These facilities are typified by higher speeds, higher traffic volumes, and more travel lanes. This aligns with research that shows that bicycle collision rates rise significantly with higher vehicle speeds.[9,10,11] As noted earlier, arterials are also where many destinations, such as retail and job centers, are located, so a higher number of bicycle riders is not surprising.

Table D.6. Bicycle Collisions by Road Type

Road Facility Type	Number of Bicycle Collisions	Percent of Total Bicycle Collisions	Percent of Road Network
Arterial	115	56%	8%
Collector	38	19%	5%
Local	33	16%	18%
Other[12]	19	9%	69%
Total	205	100%	100%

[9] Kim, J.-K. et al., Bicyclist injury severities in bicycle–motor vehicle accidents, Accid. Anal. Prev. (2006), doi:10.1016/j.aap.2006.07.002

[10] Stone, M., Broughton, J., 2003. Getting off your bike: cycling accidents in Great Britain in 1990–1999. Acc. Anal. Prev. 35 (4), 549–556

[11] Garder, P., Leden, L., Pulkkinen, U., 1998. Measuring the safety effect of raised bicycle crossings using a new research methodology. Transport. Res. Rec. 1636, 64–70.

[12] Other includes some crashes that were not within 20 feet of a road, or crashes that were on freeways or ramps.

Primary Collision Factors

Primary collision factors define the main cause of collisions. In San Mateo, six primary collision factors accounted for over 70 percent of the bicycle collisions (see Table D.7). These primary factors included:

- Automobile right of way violation
- Other hazardous movement
- Improper turning
- Wrong side of road
- Traffic signals and signs
- Unsafe speed

The hierarchy of factors in San Mateo varies slightly from those typically seen in California. In California, the typical top three primary collision factors—regardless of whether the collisions involve bicyclists—are "unsafe speeds," "automobile right of way," and "improper turning." The "wrong side of road" violation is a top factor unique to bike collisions.

The following is a description of the most common collision types in San Mateo:

- **Automobile Right of Way** refers to when another mode (bike or pedestrian) is in the ROW/path of an oncoming vehicle because of not yielding correctly. An example collision might be a bicyclist not stopping at a stop sign and getting hit by a driver proceeding straight through the intersection.
- **Other Hazardous Movement** encompasses other movements not specified by other primary collision factor categories.
- **Improper Turning** refers to making a turn without the necessary cautions. An example of a collision caused by improper turning is the "right hook," in which a driver turns right without checking and/or yielding for a bicyclist in the bike lane to the right of their vehicle.
- **Wrong Side of Road** indicates that one of the users was going the incorrect direction for the lane. In most bike collisions, this means that the bicyclist was riding in the opposite direction of travel. The most likely collision scenario is if the driver is making a right turn, they look to the left to check for vehicle traffic and then start turning right, not seeing a bicyclist coming from the right.

Table D.7. Primary Collison Factors

Primary Collision Factor	Number of Collisions
Auto R/W Violation	34
Other Hazardous Movement	29
Improper Turning	24
Wrong Side of Road	23
Traffic Signals and Signs	21
Unsafe Speed	19
Unknown	12
Unsafe Starting or Backing	7
Unsafe Lane Change	5
Other	5
Not Stated	5
Improper Passing	5
Driving Under Influence	4
Other Than Driver	3
Ped R/W Violation	3
Other Improper Driving	2
Ped or Other Under Influence	1
Following Too Closely	1
Impeding Traffic	1
Pedestrian Violation	1

Conclusion

The data presented in Appendix D was used to develop the proposed bicycle network recommendations and the support program recommendations. The City of San Mateo can also use these findings to support the implementation of new projects and use of City funds on bicycle infrastructure.

Appendix E. Project List and Cost Estimates

The following table includes the project list for the Recommended Bicycle Network, which is comprised of 70 individual projects. The table includes project numbers, limits, proposed facility types, scores from the prioritization analysis, whether projects are part of the Rapid Implementation Network, and project-level cost estimates. Projects including segments with separated bike lanes have cost estimates for two scenarios: lower cost separated bike lanes with paint/flexible delineator buffers (level 1 separated bike lanes) and higher cost separated bike lanes with curb/landscaping buffers (level 2 separated bike lanes).

Project Number	Street	Northern/ Western Limit	Southern/ Eastern Limit	Proposed Facility	Prioritization Score	Rapid Implementation Network	Cost Estimate
High Priority Projects							
2	Peninsula Av Peninsula Av	Highland Av San Mateo Dr	San Mateo Dr Bayshore Bl	Bike Lane Separated BL	High	No	$330,000 (level 1 separated bike lanes) $1,410,000 (level 2 separated bike lanes)
3	Humboldt St Humboldt St	City Limit Poplar Av	Poplar Av 9th Av	Bike Blvd Bike Lane	High	Partial: 3rd-5th	$320,000
5	San Mateo Dr	City Limit	Catalpa St	Bike Lane	High	Yes	$70,000
6	Poplar Av Delaware St Indian Av	El Camino Real Poplar Av Delaware St	Delaware St Indian Av Humboldt St	Bike Lane Bike Lane Bike Blvd	High	No	$130,000
7	Delaware St State St Claremont St	Peninsula Av Delaware St State St	State St Claremont St 9th Av	Bike Lane Bike Blvd Bike Blvd	High	Partial: Claremont	$480,000
8	Monte Diablo Av Monte Diablo Av	San Mateo Dr US-101	US-101 Bay Trail	Bike Blvd Bike Blvd	High	Yes	$360,000
9	Tilton Av	City Limit	Ellsworth Av	Bike Lane	High	No	$30,000
12	Railroad Av (East) Railroad Av (West) Railroad Av (West) 4th Av	Monte Diablo Av 3rd Av 4th Av Railroad Av (West)	4th Av 4th Av 5th Av Railroad Av (East)	Bike Blvd Bike Blvd Shared-Use Path Bike Lane	High	No	$290,000

Project Number	Street	Northern/ Western Limit	Southern/ Eastern Limit	Proposed Facility	Prioritization Score	Rapid Implementation Network	Cost Estimate
13	Baywood Av	City Limit	El Camino Real	Bike Blvd	High	No	$310,000
	Baldwin Av	El Camino Real	San Mateo Dr	Bike Blvd			
	Ellsworth Av	Monte Diablo Av	Baldwin Av	Bike Blvd			
	Railroad Av (West)	Monte Diablo Av	B St	Bike Blvd			
	B St	Railroad Av (West)	Baldwin Av	Bike Blvd			
	Baldwin Av	San Mateo Dr	B St	Bike Lane			
	1st Av	B St	Railroad Av (East)	Bike Lane			
14	B St	Baldwin Av	5th Av	Separated BL	High	No	$260,000 (level 1 separated bike lanes) $680,000 (level 2 separated bike lanes)
	B St	5th Av	16th Av	Buffered BL			
	South Bl	16th Av	Palm Av	Buffered BL			
15	3rd Av	Dartmouth Rd	El Camino Real	Bike Lane	High	No	$430,000 (level 1 separated bike lanes) $1,830,000 (level 2 separated bike lanes)
	3rd Av	El Camino Real	Humboldt St	Separated BL			
	Delaware St	3rd Av	4th Av	Separated BL			
	4th Av	Delaware St	Humboldt St	Separated BL			
16	5th Av	Virginia Av	Delaware St	Bike Lane	High	Partial: 5th	$190,000
	5th Av	Delaware St	Amphlett Bl	Bike Blvd			
	San Mateo Dr	2nd Av	5th Av	Bike Route			
26	20th Av	Alameda de las Pulgas	El Camino Real	Bike Lane	High	No	$90,000
	20th Av	El Camino Real	Palm Av	Bike Blvd			
27	Palm Av	South Bl	25th Av	Bike Lane	High	Partial: Palm (South-19th)	$90,000
	25th Av	Flores St	Delaware St	Bike Lane			
28	Isabelle Av	20th Av	22nd Av	Bike Blvd	High	No	$490,000
	22nd Av	Isabelle Av	Hacienda St	Bike Blvd			
	Hacienda St	22nd Av	39th Av	Bike Blvd			
45	Flores St	25th Av	31st Av	Bike Blvd	High	No	$410,000
	Edison St	31st Av	42nd Av	Bike Blvd			

Project Number	Street	Northern/ Western Limit	Southern/ Eastern Limit	Proposed Facility	Prioritization Score	Rapid Implementation Network	Cost Estimate
46	31st Av 28th Av 28th Av 28th Av	Hillsdale Bl 31st Av Mason Ln Edison St	28th Av Mason Ln Edison St El Camino Real	Bike Blvd Bike Blvd Bike Blvd Separated BL	High	Partial: 28th (Mason-El Camino Real)	$430,000 (level 1 separated bike lanes) $530,000 (level 2 separated bike lanes)
55	Delaware St Delaware St Delaware St Pacific Bl	5th Av Concar Dr 28th Av Delaware St	Concar Dr 28th Av Pacific Bl Otay Av	Buffered BL Separated BL Bike Blvd Buffered BL	High	Partial: Delaware (Charles-Pacific), Pacific	$640,000 (level 1 separated bike lanes) $1,820,000 (level 2 separated bike lanes)
56	Saratoga Dr Saratoga Dr	Delaware St Hillsdale Bl	Hillsdale Bl Santa Clara Wy	Separated BL Buffered BL	High	Partial: Delaware-Hillsdale	$410,000 (level 1 separated bike lanes) $1,720,000 (level 2 separated bike lanes)
58	Concar Dr Concar Dr	Pacific Bl Delaware St	Delaware St Grant St	Shared-Use Path Separated BL	High	No	$430,000 (level 1 separated bike lanes) $740,000 (level 2 separated bike lanes)
Medium-High Priority Projects							
10	Kingston St Cypress Av Norfolk St Norfolk St Norfolk St	Monte Diablo Av Kingston St Cypress Av Dolan Av 3rd Av	Cypress Av Norfolk St Dolan Av 3rd Av San Mateo Creek Path	Bike Blvd Bike Blvd Bike Blvd Bike Lane Separated BL	Med-High	No	$200,000 (level 1 separated bike lanes) $250,000 (level 2 separated bike lanes)
19	SR-92 Overcrossing O'Farrell St	Bovet Rd SR-92 Overcrossing	O'Farrell St 20th Av	Shared-Use Path Bike Blvd	Med-High	No	$250,000
20	Borel Av Bovet Rd 17th Av	Edinburgh St Borel Av El Camino Real	Bovet Rd El Camino Real Palm Av	Bike Blvd Separated BL Bike Lane	Med-High	No	$170,000 (level 1 separated bike lanes) $560,000 (level 2 separated bike lanes)
23	Murphy Dr Ashwood Dr Barneson Av	City Limit Barneson Av Ashwood Dr	Ashwood Dr Murphy Dr B St	Bike Blvd Bike Blvd Bike Blvd	Med-High	No	$470,000

Project Number	Street	Northern/ Western Limit	Southern/ Eastern Limit	Proposed Facility	Prioritization Score	Rapid Implementation Network	Cost Estimate
24	Notre Dame Av 9th Av	Alameda de las Pulgas El Camino Real	El Camino Real B St	Bike Blvd Bike Lane	Med-High	Yes	$230,000
25	Alameda de las Pulgas Alameda de las Pulgas	Crystal Springs Rd 26th Av	26th Av City Limit	Bike Lane Buffered BL	Med-High	Partial: Notre Dame-City Limit	$340,000
33	Glendora Dr Glendora Dr	Hillsdale Bl Cedarwood Dr	Cedarwood Dr Cherrywood Dr	Bike Blvd Bike Lane	Med-High	No	$130,000
40	39th Av	Pacific Bl	Orinda Dr	Bike Blvd	Med-High	No	$80,000
42	Laurie Meadows Dr	Pacific Bl	Woodbridge Ci	Buffered BL	Med-High	No	$60,000
47	28th Av	El Camino Real	Delaware St	Shared-Use Path	Med-High	Yes	$260,000
48	28th Av 28th Av	Delaware St Kyne St	Kyne St Saratoga Dr	Bike Lane Bike Blvd	Med-High	No	$90,000
49	31st Av	28th Av	Delaware St	Bike Blvd	Med-High	No	$460,000
53	Hillsdale Bl	Franklin Pk	City Limit	Separated BL	Med-High	Yes	$220,000 (level 1 separated bike lanes) $980,000 (level 2 separated bike lanes)
54	Norfolk St	Ciro Av	La Selva St	Buffered BL	Med-High	Yes	$40,000
60	19th Av Fashion Island Bl Norfolk St	Pacific Bl 19th Av Parkside Plaza Midblock Xing	Fashion Island Bl Baker Wy Fashion Island Bl	Separated BL Separated BL Buffered BL	Med-High	Partial: Norfolk	$610,000 (level 1 separated bike lanes) $2,610,000 (level 2 separated bike lanes)
61	Mariners Island Bl Mariners Island Bl	3rd Av Fashion Island Bl	Fashion Island Bl Winward Wy	Separated BL Shared-Use Path	Med-High	No	$670,000 (level 1 separated bike lanes) $1,990,000 (level 2 separated bike lanes)
63	Grant St Grant St	9th Av Concar Dr	Concar Dr Bermuda Dr	Bike Blvd Separated BL	Med-High	No	$400,000 (level 1 separated bike lanes) $770,000 (level 2 separated bike lanes)
67	Roberta Dr	Kehoe Av	Norfolk St	Bike Blvd	Med-High	No	$220,000

Project Number	Street	Northern/ Western Limit	Southern/ Eastern Limit	Proposed Facility	Prioritization Score	Rapid Implementation Network	Cost Estimate
Medium-Low Priority Projects							
1	Occidental Av	City Limit	City Limit	Bike Blvd	Med-Low	No	$790,000
	Clark Dr	Occidental Av	Crescent Av	Bike Blvd			
	Crescent Av	Clark Dr	Bellevue Av	Bike Blvd			
	Bellevue Av	Crescent Av	Delaware St	Bike Blvd			
	Highland Av	City Limit	Bellevue Av	Bike Blvd			
	Hurlingham Av	Bellevue Av	Poplar Av	Bike Blvd			
	Poplar Av	Hurlingham Av	El Camino Real	Bike Blvd			
4	Coyote Point Dr	Airport Bl	Bay Trail	Bike Lane	Med-Low	No	$950,000
	Peninsula Av	Bayshore Bl	Airport Blvd	Shared-Use Path			
	Bayshore Bl	Peninsula Av	Poplar Av	Shared-Use Path			
	Poplar Av	Bayshore Bl	Kingston St	Bike Blvd			
	Kingston St	Poplar Av	Monte Diablo Av	Bike Blvd			
17	Parrott Dr	Alameda de las Pulgas	3rd Av	Bike Blvd	Med-Low	No	$170,000
21	17th Av	Palm Av	Leslie St	Bike Blvd	Med-Low	Partial: 19th, Hayward Park Connector, Pacific	$710,000
	Leslie St	17th Av	19th Av	Bike Blvd			
	19th Av	Palm Av	Leslie St	Bike Blvd			
	Hayward Park Connector	Existing Path	Concar Dr	Shared-Use Path			
	Pacific Bl	Concar Dr	Delaware St	Bike Blvd			
	Railroad Av	9th Av	16th Av	Bike Blvd			
31	Perimeter Rd	CSM Dr	Hillsdale Bl	Separated BL	Med-Low	No	$330,000 (level 1 separated bike lanes) $1,430,000 (level 2 separated bike lanes)
	Hillsdale Bl	Perimeter Rd	31st Av	Separated BL			
32	De Anza Bl	Polhemus Rd	SR-92	Separated BL	Med-Low	No	$160,000 (level 1 separated bike lanes) $670,000 (level 2 separated bike lanes)
	De Anza Bl	SR-92	Parkwood Dr	Bike Lane			
34	Campus Dr	Hillsdale Bl	26th Av	Bike Lane	Med-Low	No	$330,000
	26th Av	Campus Dr	Hacienda St	Bike Blvd			

Project Number	Street	Northern/ Western Limit	Southern/ Eastern Limit	Proposed Facility	Prioritization Score	Rapid Implementation Network	Cost Estimate
38	39th Av	Fernwood St	El Camino Real	Bike Blvd	Med-Low	No	$320,000
43	42nd Av	Alameda de las Pulgas	Olympic Av	Bike Blvd	Med-Low	No	$240,000
44	42nd Av Pacific Bl	Olympic Av Vista Av	Pacific Bl 42nd Av	Separated BL Bike Lane	Med-Low	No	$70,000 (level 1 separated bike lanes) $280,000 (level 2 separated bike lanes)
51	Hillsdale Bl Spur US-101 Overcrossing	Saratoga Dr Hillsdale Bl Spur	US-101 La Selva St	Bike Blvd Shared-Use Path	Med-Low	No	$270,000
57	Baze Rd	28th Av	Franklin Pk	Bike Blvd	Med-Low	No	$100,000
59	Bermuda Dr	Delaware St	Saratoga Dr	Bike Blvd	Med-Low	No	$230,000
64	16th Av Sunnybrae Bl Amphlett Bl	Railroad Av Delaware St 5th Av	Delaware St Amphlett Bl Sunnybrae Bl	Bike Blvd Bike Blvd Bike Blvd	Med-Low	Partial: 16th	$330,000
68	Newbridge Av J Hart Clinton Dr	Norfolk St Seal Point Park	J Hart Clinton Dr Newbridge Av	Bike Blvd Shared-Use Path	Med-Low	No	$360,000
Low Priority Projects							
11	2nd Av Quebec St Dolan Av Ryder St	Norfolk St 2nd Av ROW Limit Dolan Av	Quebec St Dolan Av Ryder St Bay Trail	Bike Blvd Bike Blvd Bike Blvd Bike Blvd	Low	No	$150,000
18	Virginia Av Edinburgh St	3rd Av Virginia Av	Edinburgh St Borel Av	Bike Blvd Bike Blvd	Low	Partial: Virginia (3rd-5th)	$300,000
22	Hobart Av	Edinburgh St	B St	Bike Blvd	Low	No	$190,000
29	Parkwood Dr	De Anza Bl	Broadview Ct	Bike Blvd	Low	No	$130,000
30	Parrott Dr CSM Dr	CSM Dr Parrott Dr	De Anza Bl Perimeter Rd	Bike Blvd Bike Lane	Low	No	$280,000
35	Hillsdale Bl	31st Av	Hillsdale Pl	Bike Lane	Low	No	$80,000

Project Number	Street	Northern/ Western Limit	Southern/ Eastern Limit	Proposed Facility	Prioritization Score	Rapid Implementation Network	Cost Estimate
36	Mason Ln	26th Av	31st Av	Bike Blvd	Low	No	$200,000
	Del Monte St	31st Av	Hillsdale Bl	Bike Blvd			
	Laurel Creek Dr	Hillsdale Bl	Laurelwood Dr	Bike Blvd			
37	Laurelwood Dr	Tenderfoot Trail	Fernwood St	Bike Blvd	Low	No	$470,000
	Fernwood St	Hillsdale Bl	39th Av	Bike Blvd			
	36th Av	Fernwood St	Edison St	Bike Blvd			
39	Caltrain Crossing	El Camino Real	Pacific Bl	Shared-Use Path	Low	No	$60,000
41	Otay Av	Pacific Bl	San Miguel Wy	Bike Blvd	Low	No	$1,090,000
	San Miguel Wy	Otay Av	Pasadena Dr	Bike Blvd			
	Curtiss St	Franklin Pk	39th Av	Bike Blvd			
	Santa Clara Wy	Orinda Dr	Pasadena Dr	Bike Blvd			
	Orinda Dr	Santa Clara Wy	San Miguel Wy	Bike Blvd			
	Pasadena Dr	Santa Clara Wy	40th Av	Bike Blvd			
	40th Av	Pasadena Dr	Casanova Dr	Bike Blvd			
	Casanova Dr	40th Av	Casanova Park	Bike Blvd			
	39th Av	Orinda Dr	Pasadena Dr	Bike Blvd			
	Casanova Park Connector	Casanova Dr	Laurie Meadows Dr	Shared-Use Path			
	Woodbridge Ci	Laurie Meadows Dr	Seagate Dr	Bike Blvd			
	Seagate Dr	Woodbridge Ci	City Limit	Bike Blvd			
50	La Selva St	Los Prados St	City Limit	Bike Blvd	Low	No	$30,000
52	Bahia St	Los Prados Park	Los Prados St	Bike Blvd	Low	No	$40,000
62	Armada Wy	Mariners Island Bl	Bridgepointe Ci	Bike Lane	Low	No	$100,000
	Bridgepointe Ci	Bridgepointe Pk	Chess Dr	Buffered BL			
	Chess Dr	Bridgepointe Pk	City Limit	Buffered BL			
65	US-101 Overcrossing	Amphlett Bl	Norton St	Shared-Use Path	Low	No	$120,000

Project Number	Street	Northern/ Western Limit	Southern/ Eastern Limit	Proposed Facility	Prioritization Score	Rapid Implementation Network	Cost Estimate
66	Norton St	US-101 Overcrossing	Royal Av	Bike Blvd	Low	No	$110,000
	Royal Av	Norton St	Norfolk St	Bike Blvd			
	Cobb St	Royal Av	Kehoe Av	Bike Blvd			
69	Dale Av	Norfolk St	Wastewater Treatment Path	Bike Blvd	Low	No	$860,000
	Detroit Dr	J Hart Clinton Dr	John Lee Dog Park	Bike Blvd			
	Wastewater Treatment Path	Detroit Dr	John Lee Dog Park	Shared-Use Path			
70	3rd Av	Mariners Island Bl	Bay Trail	Shared-Use Path	Low	No	$520,000
				Total Cost of Recommended Network (Level 1 Separated Bike Lanes)			**$21,200,000**
				Total Cost of Recommended Network (Level 2 Separated Bike Lanes)			**$33,700,000**

Appendix F. Wayfinding Guidance

The City of San Mateo has developed bicycle wayfinding guidance as part of the Hillsdale Station Implementation Plan and the 2011 Bicycle Master Plan. The guidance presented below is meant to *supplement* this existing guidance and provide wayfinding guidance for users of micromobility in addition to bicyclists. All guidance presented below follows the California Manual on Uniform Traffic Control Devices standards.

Wayfinding Theory

The most important principles to consider when developing or implementing a wayfinding strategy are to be consistent and keep it simple. The four basic steps of wayfinding should also be used to guide wayfinding strategy implementation decisions.

1. **Orientation:** determining one's location relative to nearby landmarks and the destination. To improve orientation, wayfinding can rely on landmarks, which provide strong orientation cues. Maps can also help in the orientation step.
2. **Route Decision:** choosing a route to get to the destination. To aid in route decision making, minimize the number of navigational choices and provide signs or prompts at decision points. Maps can help improve route decision making.
3. **Route Monitoring:** confirming the chosen route will lead to the destination. "Breadcrumbs"—visual cues highlighting the path taken—can aid route monitoring, particularly when a wayfinding mistake has been made and backtracking is necessary.
4. **Destination Recognition:** recognizing the destination. To aid users in destination recognition, give destinations along the route clear and consistent markers, such as large gateway signs announcing each destination name.

Sign Types and Placement

Three types of signs are typically used to guide wayfinding: decision, turn, and route confirmation signs. Destination signs typically indicate which direction and/or how far a key destination is. Route confirmation signs let bicyclists and micromobility users know which route they are on. Decision signs can help bicyclists and micromobility users determine which way they should go based on the information on the sign.

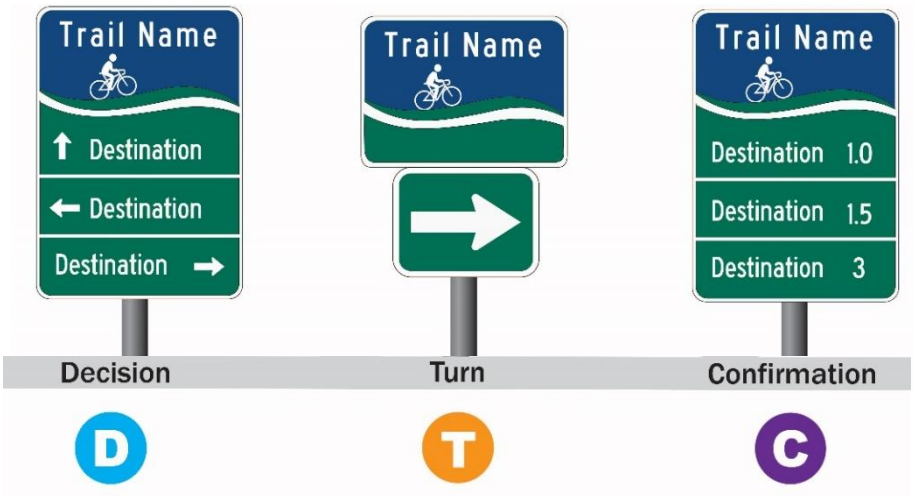

Figure F.1. Wayfinding Sign Types

Decision Signs

A decision sign assembly is used to inform bicyclists and micromobility users of route choices at a junction. They correspond to the Orientation and Route Decision steps in wayfinding.

Decision signs should be used:

- At intersections, to show how to get to destinations that are easily reached from the bikeway or trail.
- Where trails intersect with other trails, to show the name of the intersecting trail and the destinations along it.

Decision signs should be placed:

- On trails, decision signs may be placed within 5-25 feet of an intersection with a road.
- Where a trail intersects with another trail, three decision signs may be mounted to the same post at the trail junction.
- On roads, decision signs should generally be located 25-50 feet in advance of the intersection; the distance may be greater (or less) depending on sight lines, roadway slope, and the number of lanes a bicyclist/micromobility user is expected to cross to make a turn.

Figure F.2. Example decision signs

Turn Signs

Turn sign assemblies include a bicycle (or other trail) route guide or bicycle route sign and a turn plaque that clearly indicates a turn in the main direction of the route. They should be used anywhere trail users may be confused about which direction the bikeway or trail follows. They, like decision signs, correspond to the Route Decision and Route Monitoring steps in wayfinding.

Turn signs should be used:

- On a bikeway or trail, in advance of a turn in the route.
- Where there is a turn in the route, but there are also destinations off the trail or bikeway, use a turn sign combined with fingerboards or "blades" listing the destinations.

Turn signs should be placed:

- On trails, turn signs may be placed within 5-25 feet of an intersection with a road.
- On trails, a turn sign may be mounted to the same post as other signs at the trail junction.
- On roads, turn signs should generally be located 25-50 feet in advance of the intersection; the distance may be greater (or less) depending on sight lines, roadway slope, and the number of lanes a bicyclist/micromobility user is expected to cross to make a turn.

Figure F.3. Example turn signs

Confirmation Signs

Confirmation sign assemblies let bicyclists and micromobility users know they are going the right direction a designated bikeway and alert motorists to the likely presence of bicyclists and micromobility users. They correspond to the Route Monitoring step in wayfinding by providing information along a route or after a decision/turn has been made.

Confirmation signs should be used:

- To mark the start of a route.
- When there are long stretches of a bike route or trail without any turns or other bike route signs, can use placed like "breadcrumbs" to aid in Route Monitoring.

Confirmation signs should be placed:

- Place at the beginning of the route or trail.
- On trails, place every 1/2 to 1 mile (the confirmation sign may take the form of a mileage marker with the trail name on it).
- On roads, place every 1/4 to 1/2 mile if there are no decision or turn signs; in rural areas with few crossings, place every 1 mile.

- Place at the edge of cities or villages when a trail or bikeway will travel more than 2 miles without any services; signs should alert users to the distance to the next developed area or services.

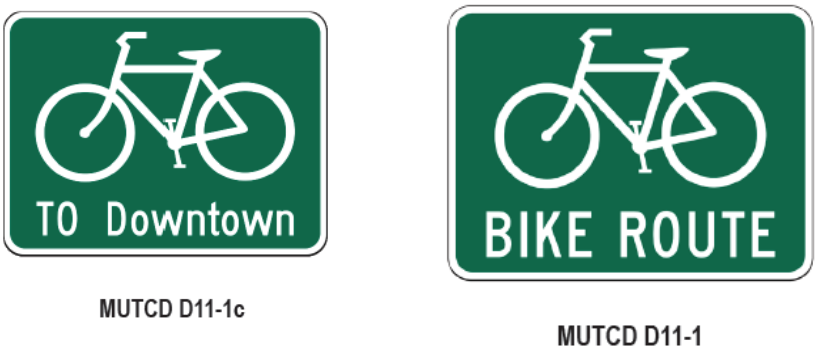

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Figure F.4. Example confirmation signs

Figure F.5 provides guidance on where different types of signs should be placed in relation to turns in bike routes.

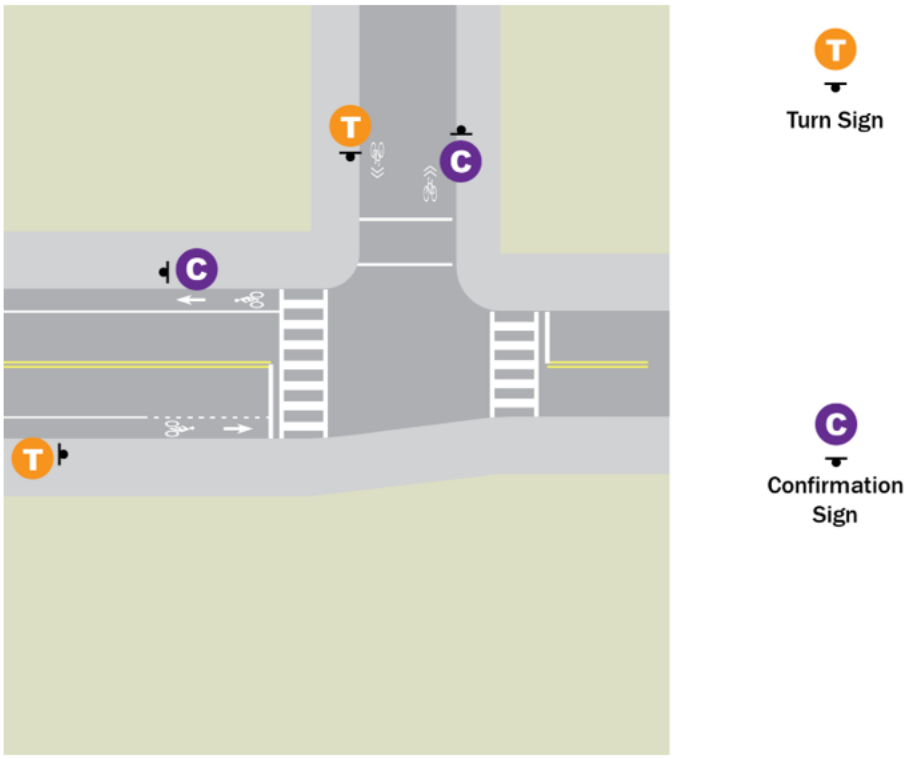

Figure F.5. Sign placement guidance for turns in bike routes

Sign Height

Wayfinding signs should be mounted within a specific height range depending on their location. In rural areas, bicycle and micromobility wayfinding signs should be placed at a minimum height of five feet, seven feet in urban areas, and four feet along shared-use paths. Note that in areas where pedestrians are expected, sign placement must be accessibility standards and not obstruct the pedestrian route.

Selecting Destinations and Measuring Distances

The City should provide wayfinding guidance for key destinations that community members and tourists may be looking for on a regular basis. In many cases, planners will have more possible destinations than could be included in a wayfinding assembly than space available for them. Destinations should be thought of in terms of a hierarchy of three categories. The distance from each destination that signs are placed should be based on the category of the destination (see Table H.1). For example, primary destinations should have wayfinding signs placed up to five miles from the destination, secondary destinations should have signs placed up to two miles from the destination, and tertiary destinations should have signs placed up to one mile from the destination. In practice, the distance at which each destination appears on wayfinding signs will require the judgement of the person or committee who is planning the wayfinding along the bikeway. When a destination is less than 0.2 miles away, it may not need to be included on wayfinding signs. If the bicyclist/micromobility user has already seen the destination it does not need to be included.

Table F.1. Three types of destinations to include in wayfinding signs

Primary	Secondary	Tertiary
• Belmont • Burlingame • Foster City • Hillsborough • Downtown San Mateo	• Caltrain Stations: Hayward Park Hillsdale San Mateo • Districts: Bridgepoint Shopping Center Hillsdale Shopping Center • Major bikeways, especially shared-use paths	City Hall Libraries San Mateo County Event Center Parks Hospitals Colleges High Schools Performing Arts Centers

Appendix G. Funding Sources

The following table provides an overview of Federal, State, Regional and County, and local funds and grant opportunities that can be used for bicycle projects and programs.

Funding Sources	Administering Agency	Availability of Funding	Notes	Eligible Improvements	Weblink
Federal Funding Sources					
Better Utilizing Investments to Leverage Development (BUILD) Transportation Discretionary Grants	U.S. Department of Transportation	Annually	BUILD transportation grants replaced the former Transportation Investment Generating Economic Recovery (TIGER) grant program. BUILD is a nationally competitive grant for capital investments on surface transportation projects that achieve a significant impact for a metropolitan area, region, or the nation. Selection criteria encompass safety, economic competitiveness, quality of life, state of good repair, innovation and partnerships with a broad range of stakeholders.	Roads, bridges, transit, rail, ports or intermodal transportation	https://www.transportation.gov/BUILDgrants
Fixing America's Surface Transportation (FAST) Act	U.S. Department of Transportation	Annually; Local match is required.	The FAST Act funds include several bicycle-related programs, such as the Surface Transportation Block Grant Program; Transportation Alternatives Program; and the Congestion Mitigation and Air Quality Improvement Program.	Bicycle-parking facilities, bicycle-activated control devices, equipment, safe routes to school, trails or transporting bicycles on transit, and roadway infrastructure improvements	https://www.fhwa.dot.gov/fastact/funding.cfm

Funding Sources	Administering Agency	Availability of Funding	Notes	Eligible Improvements	Weblink
State Funding Sources					
California Active Transportation Program	California Transportation Commission	Varies; last call for projects was in Spring 2019	Consolidation of several older grant programs, including State SRTS and Bicycle Transportation Account. Funds a wide range of capital and non-capital projects. Both programs give some preference to projects in disadvantaged communities. The state program is competitive among jurisdictions statewide; the regional program is competitive among Bay Area jurisdictions.	Bikeways, crossing improvements and most programmatic activities (e.g., encouragement, education, and enforcement), and plans (including active transportation plans and Safe Routes to School plans)	www.dot. ca.gov/hq/ LocalPrograms/ atp
California Office of Traffic Safety Grants	California Office of Traffic Safety	Annually; last round was due January 30, 2019	For traffic-safety education, awareness and enforcement programs aimed at drivers, pedestrians and cyclists.	Certain activities under the SRTS, safety/education and enforcement programs.	www.ots.ca.gov/ Grants/default. asp
Highway Safety Improvement Program	Caltrans	Varies; Generally every one to two years	For projects and programs that reduce traffic fatalities and serious injuries by correcting or improving a specific problem. Highly competitive at the state level.	Safety-related pedestrian, bikeway and crossing projects. Certain activities under the SRTS, safety/education and enforcement programs; also, certain spot improvements. Bike lanes, paved shoulders, crosswalks, intersection improvements and signage	www.dot. ca.gov/hq/ LocalPrograms/ hsip.html
Affordable Housing and Sustainable Communities Program	California Strategic Growth Council	Annually; last call for projects was in February 2019	Projects that facilitate compact development, including bicycle infrastructure and amenities, with neighborhood scale impacts. Available to government agencies and institutions (including local government, transit agencies and school districts), developers and non-profit organizations.	Bikeways and crossing improvements, particularly those in the area covered in specific plans	www.sgc.ca.gov/Gran t-Programs /AHSCProgram.html

Funding Sources	Administering Agency	Availability of Funding	Notes	Eligible Improvements	Weblink
Sustainable Transportation Planning Grants	Caltrans	Annually; last round due October 2019	Funds for communities to do planning, studies, and design work to identify and evaluate projects, including conducting outreach or implementing pilot projects.	Planning, community engagement, studies to improve bicycle and pedestrian connections	https://dot.ca.gov/programs/transportation-planning/regional-planning/sustainable-transportation-planning-grants
Recreational Trails Program	California Department of Parks and Recreation	Program is currently being updated; last cycle was in 2016	Funds for recreational trails for active transportation.	Trail maintenance, restoration, trailhead facilities, new trail construction, and maintenance equipment.	http://ohv.parks.ca.gov/?page_id=24881
Urban Greening Grants	California Natural Resources Agency	Annually	A statewide program that allocate cap-and-trade dollars to projects that reduce greenhouse gas emissions	Projects that reduce commute vehicle miles traveled by constructing bicycle paths, bicycle lanes or pedestrian facilities that provide safe routes for travel between residences, workplaces, commercial centers, and schools	http://resources.ca.gov/grants/urban-greening/
State Transportation Improvements Program	California Transportation Commission	Every 2 years	Projects need to be nominated in Regional TIP, but MTC may nominate fund categories.	Any transportation project eligible for State Highway Account or Federal Funds	https://dot.ca.gov/programs/local-assistance/fed-and-state-programs/state-transportation-improvement-program
State Highway Operation and Protection Program	Caltrans	Every 2 years	Projects must be on the State Highway System.	Repair and preservation, emergency repairs, safety improvements, and some highway operational improvements on the State Highway System. Elements include pavement, bridges, culverts, and transportation management systems	http://www.dot.ca.gov/hq/transprog/SHOPP/2018_shopp/2018-shopp-adopted-by-ctc.pdf

Funding Sources	Administering Agency	Availability of Funding	Notes	Eligible Improvements	Weblink
California Gas Tax	California Transportation Commission	Annually	Ineligible expenses include decorative lighting, transit facilities, park features, and new utilities.	Construction, engineering, and maintenance	https://sco.ca.gov/Files-AUD/gas_tax_guidelines31219.pdf
Regional and County Funding Sources					
Regional Active Transportation Program	Metropolitan Transportation Commission	Varies; the last round due in July 2019	Consolidation of several older grant programs, including State SRTS and Bicycle Transportation Account. Funds a wide range of capital and non-capital projects. Gives some preference to projects in disadvantaged communities.	Bikeways, crossing improvements and most programmatic activities	www.mtc.ca.gov/ funding/ATP
Transportation Fund for Clean Air	Bay Area Air Quality Management District	Annually; last round due in April 2019	The Regional Fund is competitive among Bay Area jurisdictions.	Bikeways, bicycle crossing improvements, and bicycle parking	www.baaqmd. gov/grant-funding/public-agencies/ bikeways-roads- lanes-paths
Bicycle Facilities Grant	Bay Area Air Quality Management District	Last round due in September 2019	Funds projects that encourage residents and commuters to bike	Bicycle parking and on-street bikeways	http://www.baaqmd.gov/?sc_itemid=B056735B-74BD-4CD0-A744-936A1CFD05A3
One Bay Area Grant Program	Metropolitan Transportation Commission	Every four years; latest round of funding began in 2017 and ends in 2021	Infrastructure projects that reduce vehicle trips, including pedestrian and bicycle facilities.	Bikeways and crossing improvements, road maintenance, and transportation planning	https:// mtc. ca.gov/our-work/ fund-invest/ investment-strategies-commitments/ focused-growth/ one-bay-area- grants
Transportation Development Act Article 3	City/County Association of Governments of San Mateo County	Annually	Competitive among San Mateo County jurisdictions. Funds plans, safety education, and design and construction of capital projects.	Bikeways, crossing improvements and safety/ education/training programs for school children and the general population	ccag.ca.gov/ opportunities/ call-for-projects

Funding Sources	Administering Agency	Availability of Funding	Notes	Eligible Improvements	Weblink
Measure A Pedestrian and Bicycle Program	San Mateo County Transportation Authority	Every 2–3 years; last call for projects in 2017	Competitive among San Mateo County jurisdictions. Funds capital projects, including planning.	Any capital project	www.smcta.com/Projects/Call_for_Projects.html
Transportation Fund for Clean Air, County Program Manager Fund	City/County Association of Governments of San Mateo County	Annually; in recent years in April (new funding cycle each fiscal year)	Competitive among Bay Area jurisdictions; the County Program Manager Fund is competitive among San Mateo County jurisdictions.	Mostly bicycle capital projects	www.baaqmd.gov/grant-funding/public-agencies/county-program-manager-fund
San Mateo County Safe Routes to School	San Mateo County Office of Education	Annually; in the spring of the previous school year, next call for projects in spring 2020	Available to school districts for education, enforcement and promotion/encouragement activities, evaluation and project coordination; and for small capital projects. Competitive among San Mateo County school districts.	Certain activities under the Safe Routes to School, safety, education, and enforcement programs	https://www.smcoe.org/for-schools/safe-and-supportive-schools/safe-routes-to-school/
San Mateo County Bicycle Parking Reimbursement Program	Commute.org	Ongoing (applications reviewed on a first-come-first-served basis)	Reimburses 50% of the cost of purchasing and installing bicycle parking facilities up to $500 per unit. Available to businesses, public agencies and non-profit organizations in San Mateo County.	Bicycle parking racks and lockers	www.commute.org/employer-services/179-bike-parking-at-half-cost
Measure W Bicycle and Pedestrian Program	San Mateo County Transportation Authority	First call for projects may be in 2020	New program that funds bicycle and pedestrian/active transportation projects.	Highway projects, local street repair, grade separations for Caltrain tracks that intersect local streets, expanded bicycle and pedestrian facilities, and improved transit connections	http://www.smcta.com/about/Measure_W.html

Funding Sources	Administering Agency	Availability of Funding	Notes	Eligible Improvements	Weblink
Measure M Motor Vehicle Registration Fee	City/County Association of Governments of San Mateo County	Ongoing	50% of the net proceeds will be allocated to cities/County for local streets and roads and 50% will be used for countywide transportation programs such as transit operations, regional traffic congestion management, water pollution prevention, and safe routes to school.	Road resurfacing/reconstruction, roadway restriping, signal timing, signage, Safe Routes to School, senior mobility education	http://ccag.ca.gov/funding/measure-m/
Local Funding Sources					
Capital Improvement Projects	City of San Mateo	Every five years	The CIP allocates funds for all major capital improvement projects, regardless of the funding source. Many cities fund bicycle improvements using CIP funds.	Bikeways and crossing improvements	https://www.cityofsanmateo.org/DocumentCenter/View/42380/R-CIP
New Development or redevelopment	City of San Mateo	Ongoing	City can implement a robust review process so that new roads meet the cities' standards and guidelines for the development of bicycle facilities.	Bikeways, crossing improvements, and bike parking	https://bikeleague.org/sites/default/files/PayingForInnovativeInfrastructure.pdf
Repaving	City of San Mateo	Ongoing	Repaving projects present a cost-effective and efficient way to update and install on-street bikeways.	On-street bikeways and routes	https://www.cityofsanmateo.org/2128/Paving-Our-Citys-Roadways
General Fund	City of San Mateo	Annually	A component of local general funds can be dedicated to transportation improvements through allocations to the City's Public Works, Parks and Recreation, or Police Departments. There are generally few restrictions on these funds.	Operating expenses such as staff time, outreach and education materials, facility maintenance and other small capital expenses	https://www.cityofsanmateo.org/DocumentCenter/View/66839/2018-Comprehensive-Annual-Financial-Report

Funding Sources	Administering Agency	Availability of Funding	Notes	Eligible Improvements	Weblink
Parks and Recreation	City of San Mateo	n/a	Parks and recreation funding can be used to install and maintain trails and shared used paths.	Pathway or pathway-related facilities, including bathrooms, pocket parks, lighting, parking, landscaping, and maintenance	https://www.cityofsanmateo.org/324/Parks-and-Recreation
Municipal Bonds	City of San Mateo	n/a	Cities have the authority to issue municipal bonds to finance infrastructure projects.	Bikeways and crossing improvements	https://bikeleague.org/sites/default/files/PayingForInnovativeInfrastructure.pdf
Parking Benefit Districts	City of San Mateo	n/a	Parking Benefit Districts can finance infrastructure improvements in popular employment or commercial centers by dedicating parking fee and ticket revenue to bicycle and pedestrian enhancements. Within a parking benefit district, public parking spaces (on- and off-street) are charged hourly rates to aid turnover of spaces for customers.	Bikeways and crossing improvements	https://www.metro.net/projects/tod-toolkit/parking-benefit-districts/
Measure S	City of San Mateo	n/a	Local oversight committee oversees the receipt and expenditure of the ¼-cent sales tax revenue. Committee meets Third Tuesdays in February, May, August, and November	Any government purpose, including improving city streets	https://www.cityofsanmateo.org/3750/Measure-S-Oversight-Committee

Appendix H. Caltrans Active Transportation Program Requirements

The Caltrans Active Transportation Program (ATP) was created by Senate Bill 99 (Chapter 359, Statutes of 2013) and Assembly Bill 101 (Chapter 354, Statutes of 2013) to encourage increased use of active modes of transportation. The ATP consolidates existing federal and state transportation programs, including the Transportation Alternatives Program, Bicycle Transportation Account, and State Safe Routes to School, into a single program with a focus to make California a national leader in active transportation.

According to 2019 ATP Guidelines, a city, county, county transportation commission, regional transportation planning agency, MPO, school district, or transit district may prepare an active transportation plan (bicycle, pedestrian, safe-routes-to-school, or comprehensive). An active transportation plan prepared by a city or county may be integrated into the circulation element of its general plan or a separate plan which is compliant or will be brought into compliance with the Complete Streets Act, Assembly Bill 1358 (Chapter 657, Statutes of 2008). An active transportation plan must include, but not be limited to, the following components or explain why the component is not applicable.

The 2020 San Mateo Bicycle Master Plan includes the following components:

Item		Description	2020 San Mateo Bicycle Plan
A	**Mode Share**	The estimated number of existing bicycle trips and pedestrian trips in the plan area, both in absolute numbers and as a percentage of all trips, and the estimated increase in the number of bicycle trips and pedestrian trips resulting from implementation of the plan.	Chapter 2: Goals and Objectives
B	**Description of Land Use / Destinations**	A map and description of existing and proposed land use and settlement patterns which must include, but not be limited to, locations of residential neighborhoods, schools, shopping centers, public buildings, major employment centers, major transit hubs, and other destinations. Major transit hubs must include, but are not limited to, rail and transit terminals, and ferry docks and landings.	Chapter 3: Existing Bicycle Network Appendix C: Existing Conditions Report
C	**Pedestrian Facilities**	A map and description of existing and proposed pedestrian facilities, including those at major transit hubs and those that serve public and private schools.	N/A
D	**Bicycle Facilities**	A map and description of existing and proposed bicycle transportation facilities including those at major transit hubs and those that serve public and private schools.	Chapter 4: Proposed Bicycle Network
E	**Bicycle Parking**	A map and description of existing and proposed end-of-trip bicycle parking facilities. Include a description of existing and proposed policies related to bicycle parking in public locations, private parking garages and parking lots and in new commercial and residential developments. Also include a map and description of existing and proposed bicycle	Chapter 5: Support Programs and Policies

Item		Description	2020 San Mateo Bicycle Plan
		transport and parking facilities for connections with and use of other transportation modes. These must include, but not be limited to, bicycle parking facilities at transit stops, rail and transit terminals, ferry docks and landings, park and ride lots, and provisions for transporting bicyclists and bicycles on transit or rail vehicles or ferry vessels.	
F	**Wayfinding**	A description of existing and proposed signage providing wayfinding along bicycle and pedestrian networks to designated destinations.	Appendix F: Wayfinding Guidance
G	**Non-Infrastructure**	A description of existing and proposed bicycle and pedestrian education, encouragement, enforcement, and evaluation programs conducted in the area included within the plan. Include efforts by the law enforcement agency having primary traffic law enforcement responsibility in the area to enforce provisions of the law impacting bicycle and pedestrian safety, and the resulting effect on collisions involving bicyclists and pedestrians.	Chapter 5: Support Programs and Policies
H	**Collision Analysis**	The number and location of collisions, serious injuries, and fatalities suffered by bicyclists and pedestrians in the plan area, both in absolute numbers and as a percentage of all collisions and injuries, and a goal for collision, serious injury, and fatality reduction after implementation of the plan.	Chapter 2: Goals and Objectives Appendix D: Data Analysis Report
I	**Equity Analysis**	Identify census tracts that are considered to be disadvantaged or low-income and identify bicycle and pedestrian needs of those disadvantaged or low-income residents.	Chapter 2: Goals and Objectives Appendix C: Existing Conditions Report
J	**Community Engagement**	A description of the extent of community involvement in development of the plan, including disadvantaged and underserved communities.	Chapter 1: Introduction Appendix A: Public Outreach Overview
K	**Coordination**	A description of how the active transportation plan has been coordinated with neighboring jurisdictions, including school districts within the plan area, and is consistent with other local or regional transportation, air quality, or energy conservation plans, including, but not limited to, general plans and a Sustainable Community Strategy in a Regional Transportation Plan.	Chapter 4: Proposed Bicycle Network
L	**Prioritization**	A description of the projects and programs proposed in the plan and a listing of their priorities for implementation, including the methodology for project prioritization and a proposed timeline for implementation.	Chapter 6: Implementation and Funding
M	**Funding**	A description of future financial needs for projects and programs that improve safety and convenience for bicyclists and pedestrians in the plan area. Include anticipated cost, revenue sources and potential grant funding for bicycle and pedestrian uses.	Chapter 6: Implementation and Funding Appendix G: Funding Sources

Item		Description	2020 San Mateo Bicycle Plan
N	**Implementation**	A description of steps necessary to implement the plan and the reporting process that will be used to keep the adopting agency and community informed of the progress being made in implementing the plan.	Chapter 6: Implementation and Funding
O	**Maintenance**	A description of the policies and procedures for maintaining existing and proposed bicycle and pedestrian facilities, including, but not limited to, the maintenance of smooth pavement, ADA level surfaces, freedom from encroaching vegetation, maintenance of traffic control devices including striping and other pavement markings, and lighting.	Chapter 6: Implementation and Funding
P	**Resolution**	A resolution showing adoption of the plan by the city, county or district. If the active transportation plan was prepared by a county transportation commission, regional transportation planning agency, MPO, school district or transit district, the plan should indicate the support via resolution of the city(s) or county(s) in which the proposed facilities would be located.	City website: https://www.cityofsanmateo.org/3971/Agendas-Minutes-Public-Meeting-Portal