

How Menlo Park Can Build A State-of-the Art East-West Bike Corridor



2-way protected bike lanes can be installed where conventional, 1-way bike lanes cannot fit.

This proposal illustrates how Menlo Park could transform Ravenswood and Menlo Avenues into a state-of-the-art, east-west bike corridor that offers bicyclists a much safer way to ride to popular Menlo Park destinations on both sides of El Camino Real, a route more attractive, convenient and comfortable than existing and potential alternatives.

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Safe, Convenient, Stress-Free...



... and Beautiful.

“Together Ravenswood and Menlo Avenues already serve as the most popular bike corridor for crossing El Camino. State-of-the art bike facilities would not only provide current users a much safer and less stressful environment, these improvements would also attract many more bicyclists, especially middle and high school age youth, who want to reach destinations on opposite sides of Menlo Park but now either use less convenient routes or travel in vehicles. This existing bike corridor is clearly the most natural place for boosting the service level quality of our community bike network.”*

But Is It Really Possible?

Some Menlo Park residents believe it is impossible to make the Ravenswood-Menlo bike corridor safe and cite as reasons too much traffic, the El Camino Real intersection and an apparent lack of room to install safe bike lanes on these streets.

This belief is likely untrue. No bike network consultant has actually tackled these issues, and while I am not one, I believe an innovative solution like the promising one outlined in this proposal warrants a comprehensive study and evaluation by the City of Menlo Park.

Yes, With Leading-Edge Bike Network Facilities

The proposed innovative solution combines an off-street bike path and 2-way protected bike lanes.

Dedicated bike paths physically separate bicyclists from motorists and pedestrians and remain the gold standard for safe and stress-free urban bike facilities.

“96 percent of people using protected bike lanes believe they increased safety on the street and they reduce bike-related intersection injuries by about 75 percent compared to comparable crossings without infrastructure. “

“New York City's protected bike lane on 9th Avenue led to a 56 percent reduction in injuries to all street users, including a 57 percent reduction in injuries to people on bikes and a 29 percent reduction in injuries to people walking, as well as an 84 percent reduction in sidewalk riding.”

“Streets with protected bike lanes saw 90 percent fewer injuries per mile than those with no bike infrastructure. “

About a third of all protected bike lanes are, like bike paths, 2-directional.

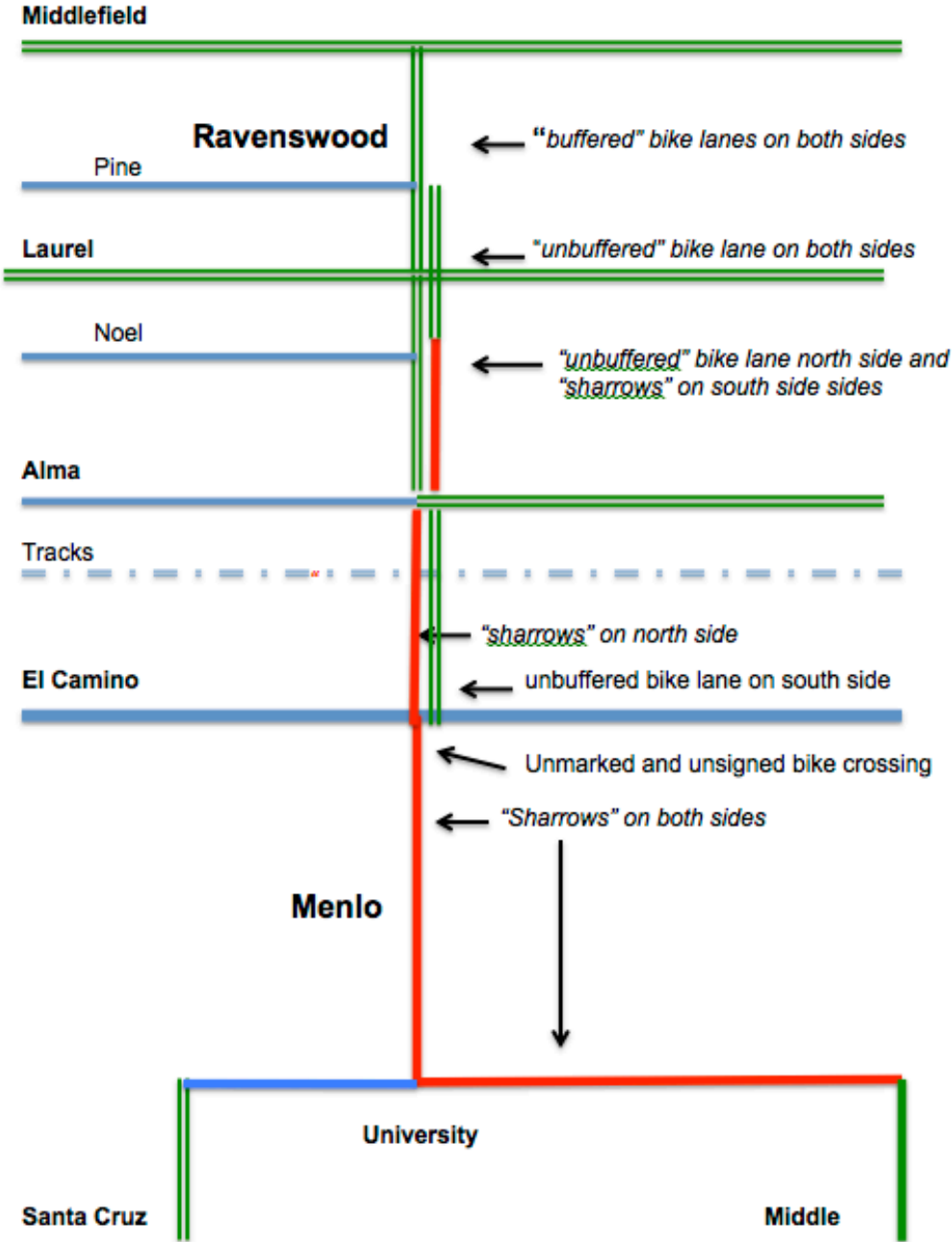
* About twice more riders cross El Camino here than at other intersections in Menlo Park.
See page 20. Source: Menlo Park El Camino Corridor Study (2015)

Table Of Contents

<u>Page</u>	<u>Title</u>
6	Existing Menlo-Ravenswood Bike Corridor
7	A State-of-the-Art East-West Bike Corridor
8	Bike Paths
9	Protected Bike Lanes
10	Bike Crossing On El Camino
11	Convenient Access To Popular Destinations
12	Convenience – Detour Avoidance
13 - 14	Bike Safety And Comfort
15	Summary Of Primary Benefits
16	Design Overview
17	Summary of New Facilities By Street
18	A Closer Look At The Proposed Design
19	Primary Street Modifications
20	Appendix

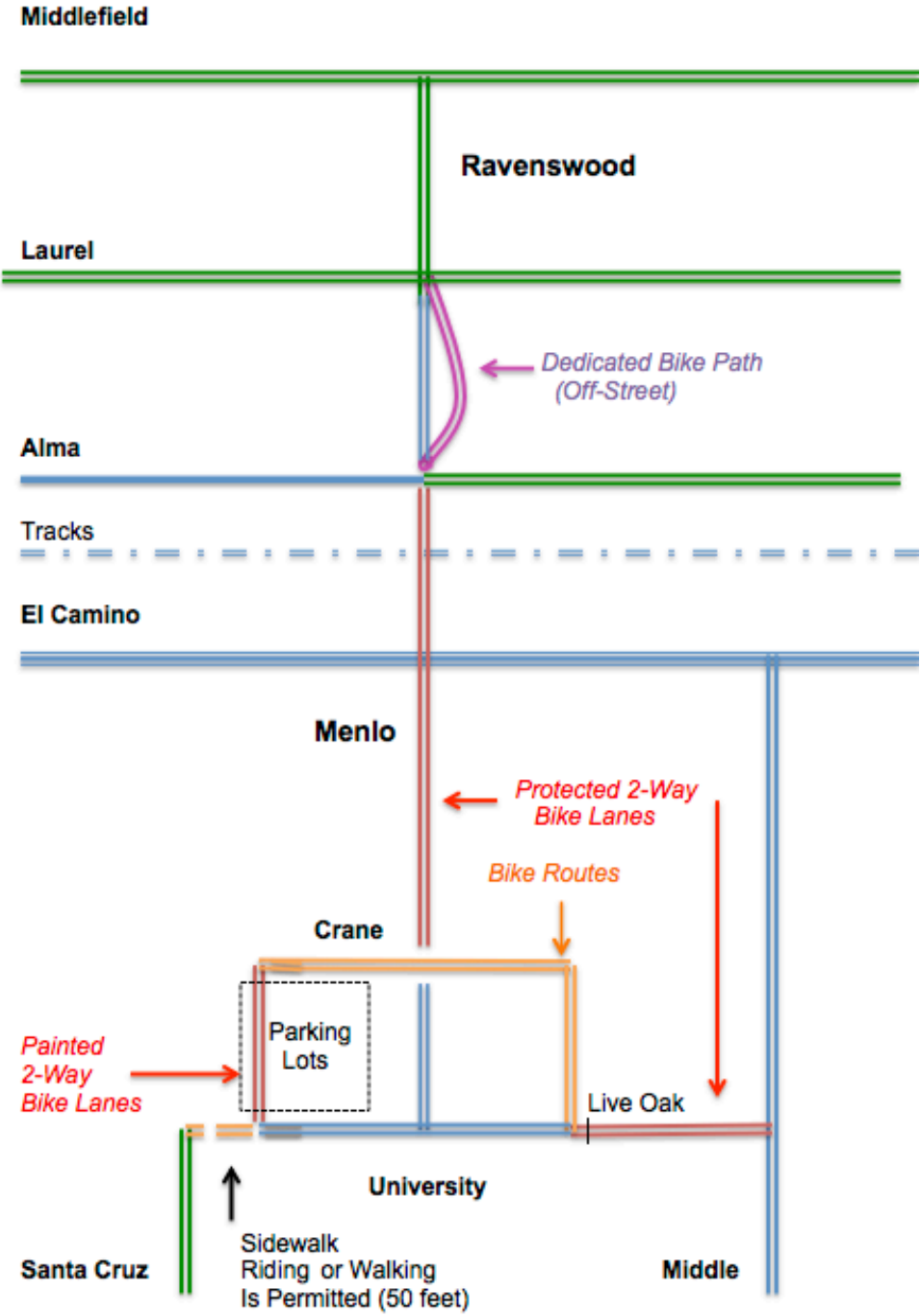
Existing Menlo-Ravenswood Bike Corridor

A piecemeal approach to building bike facilities on this central corridor has produced a confusing, uncomfortable and unsafe hodge-podge of sharrows, unbuffered bike lanes and buffered bike lanes. While this corridor remains popular with the “fit and courageous” other riders are left with less convenient alternatives. (Note that “sharrows” are simply street markings, and motorists and bicyclists still share vehicle lanes without any protection.)



Blue lines = no bike facilities Green lines = existing bike lanes Red lines = “sharrows”

Proposed State-of-the-Art East-West Bike Corridor



Green = Existing bike lanes Purple = New bike lanes Orange = New bike routes

===== Riding on sidewalk is permitted Blue = No bike facilities

Bike Paths ("Trail")

The new Ravenswood bike path would be situated on city property and stretch from the public library sign near Alma, pass through beautiful oaks and by a lovely fountain, and continues behind the Jr. League building and its parking lot before returning to Laurel just south of the intersection with Ravenswood. At this point riders have three options: continue west to Ravenswood, head south on Laurel towards Willow, head north on Laurel towards Oak Grove, Glenwood and Encinal. All have bike lanes.



Red line => new bike path **Green line => new 2-way protected bike lanes**

Protected Bike Lanes



Protected 2-way bike lanes would be installed on the **south side** of Menlo Avenue, on the **south side** of Ravenswood between El Camino Real and Alma, and on the **east side** of University, the primary east-west corridor that approaches Menlo Avenue.

Lane Configuration



Important Bike Safety Notes:

Vehicle-bike accidents often occur at intersections lacking traffic signals and at busy public driveways. No vehicle lanes would cross the bike lanes on either Menlo Avenue between Crane and El Camino or on University between Middle and Live Oak. There is only one busy public driveway, and it is on Menlo near El Camino Real.

Additional information

About protected bike lanes and the cities using them is available at **People for Bikes** at <http://www.peopleforbikes.org/green-lane-project/pages/the-green-lane-projects-style-guide>.

About 2-way cycle tracks in the Urban Bike Design Guide <http://nacto.org/publication/urban-bikeway-design-guide/cycle-tracks/two-way-cycle-tracks/>

Bike Crossing At El Camino Real

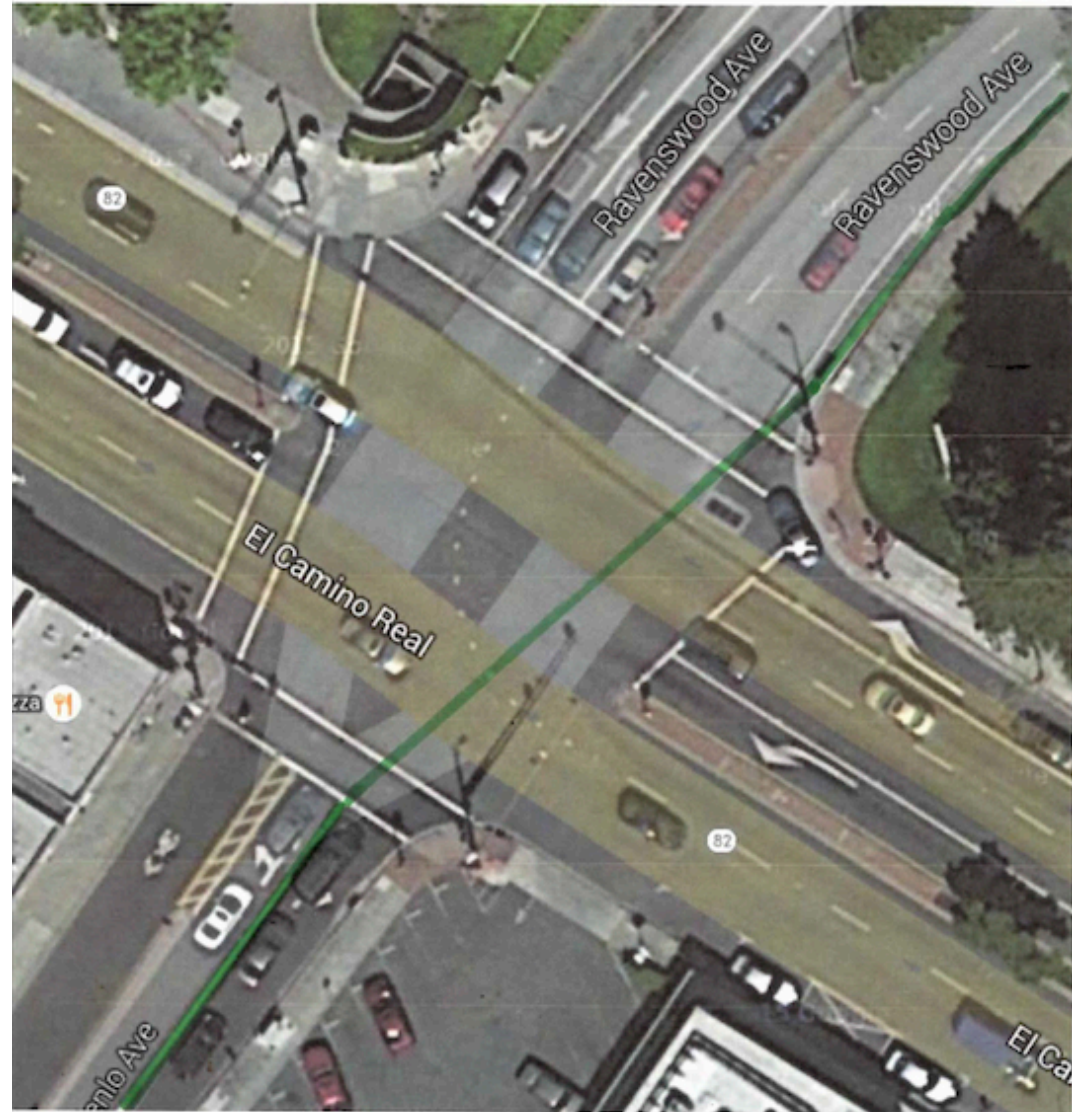
The 2-way bike lanes on Menlo and Ravenswood Avenues would continue across El Camino, this section would be painted green and bike crossing-related signs would be installed on all three streets. Bike-controls would be provided at both ends of the bike crossing lanes.

Additional Safety Features

Two options should be considered for the Menlo intersection with El Camino, a shared right turn lane and a separate bike lane between the through and right turn lanes. In either case, motorists must yield to bicyclists.

The bike and pedestrian crossings are on different sides of El Camino Real.

There is no need for bike lanes on the north side of either Menlo or Ravenswood Avenues.

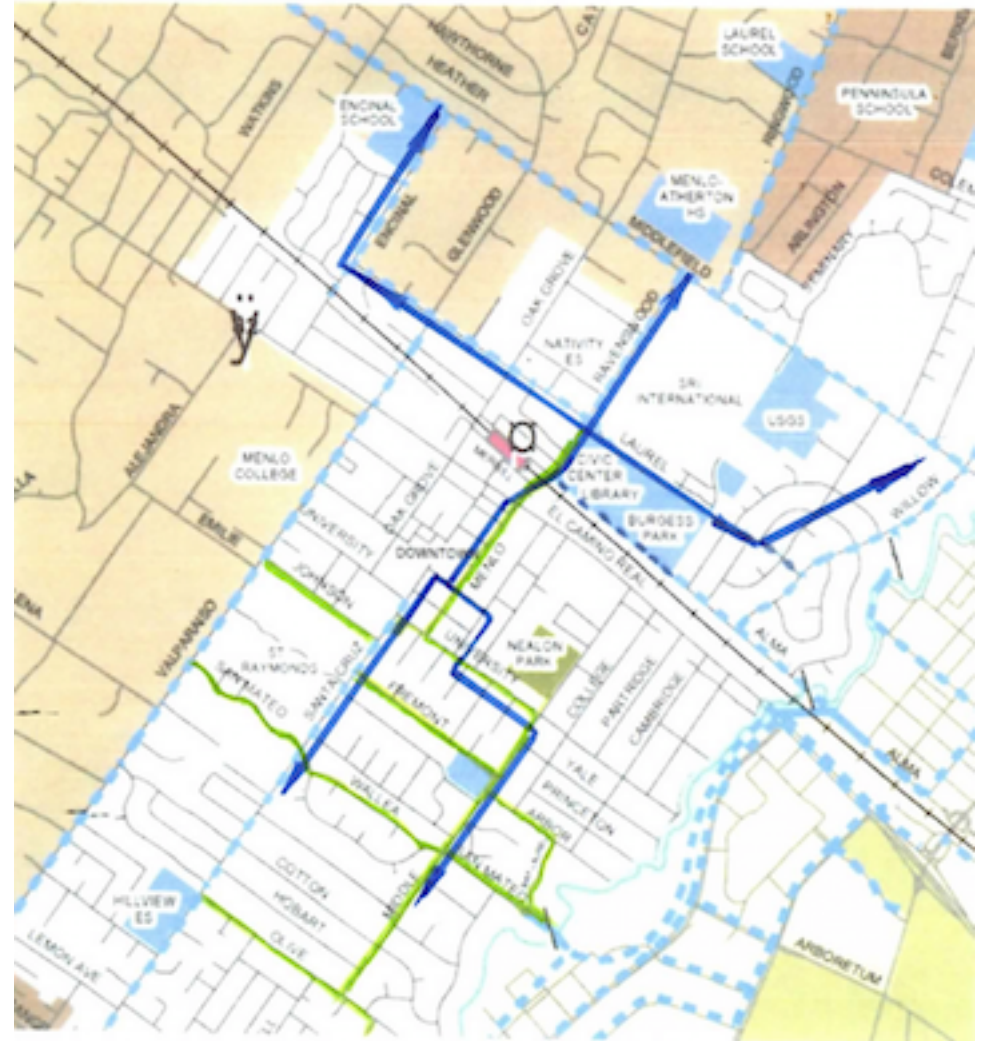


Convenient Access To Popular Destinations

The centrally located Ravenswood-Menlo Bike Corridor is close to popular destinations on both sides of El Camino and many confident bicyclists already use this route. However, bicyclists who are uncomfortable riding on the Ravenswood-Menlo bike corridor experience many inconvenient detours.

Bicyclists generally gauge convenience in terms of the **additional distance** required to avoid an undesirable street or sequence of streets. *A common rule-of-thumb used in bike network design is that the length of the lower-stress path should not exceed the length of the most direct route by more than 25 percent or, for short trips, 0.33 miles.*

- **Blue Solid Lines** illustrate expected primary east-west bike circulation patterns
- **Blue dashed lines** indicate existing bike lanes
- **Green lines** indicate streets popular with bicyclists that do not have bike lanes. Middle, Menlo and University Avenues are heavily used by BOTH bikes and vehicles.



Convenience – Detour Avoidance

Oak Grove is the only other option for crossing El Camino south of the Valparaiso. The map below illustrates the shortest detour Oak Grove would introduce between the **Menlo and Crane** intersection and the intersection of **Alma and Ravenswood**.

Oak Drove Detour: 0.7 miles; 5 street segments; 4 turns; and 3 crossings of vehicle lanes on the return trip

Ravenswood – Menlo Alternative: 0.3 miles, 1 streets; 0 turns; 1 crossings of vehicle lanes

Detour: additional 0.4 miles; 3 street segments; 3 turns; 2 crossings of vehicle lanes

Ride increases from 0.3 miles to 0.7 miles => doubles

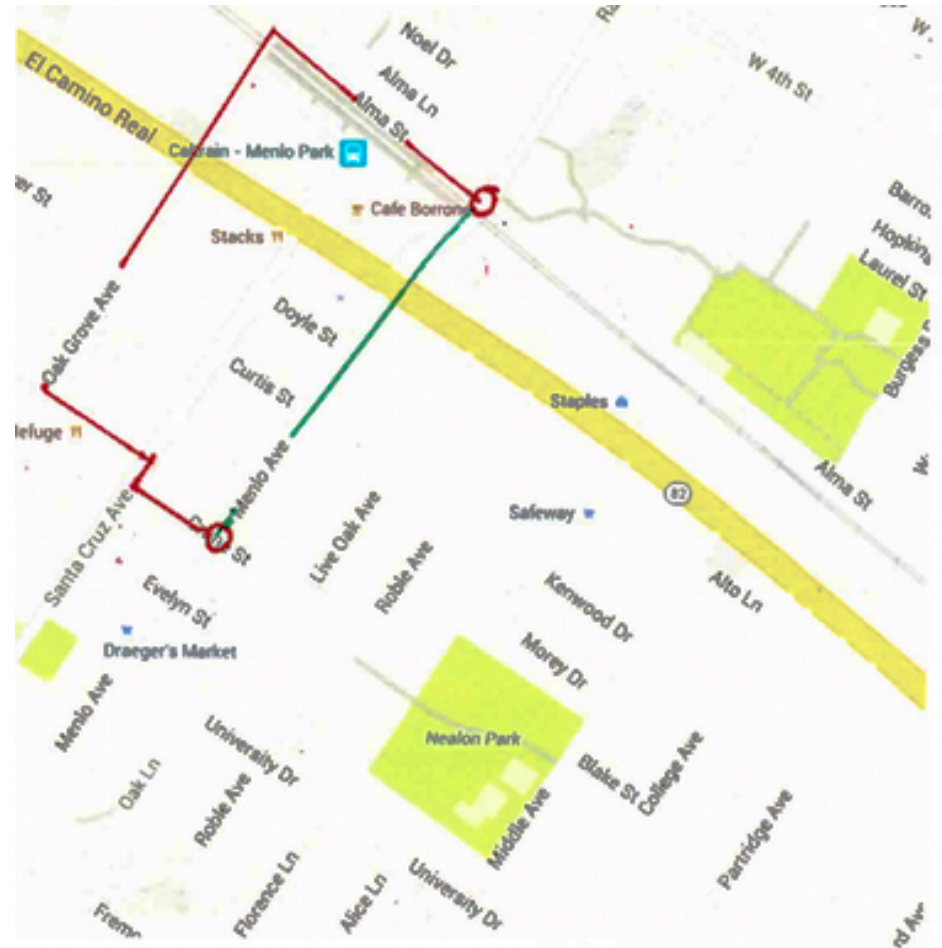
Green Line => Direct Route
Red Line => Detour

Example #1

This detour would impact bike riders who travel to many east side destinations like the [library](#), [civic center](#), [swimming pool](#), [gym](#), [playing fields](#), [tennis courts](#), [train station](#), [Willow Road](#) and the [Middlefield border with Palo Alto](#) after traveling thru either the Middle-University or Santa Cruz-University intersections.

Example #2

This detour would impact riders who travel to west side destinations like [Hillview School](#), [Nealon Park](#), and the [Safeway shopping center](#) after passing through the Alma-Ravenswood intersection.



Improved Safety & Comfort – Part 1

This proposal replaces shared vehicle lanes on busy Ravenswood, Menlo and University Avenues with either state-of-the art **protected bike lanes** or the safest possible solution, **separate bike paths**. It also adds to the El Camino intersection visible bike lanes and signage, and leverages existing pedestrian-controlled traffic signals.

	Relative Ranking		Menlo		Ravenswood		ECR Crossing		University	
	Safety	Comfort	Now	New	Now	New	Now	New	Now	New
Bike Facility							Nothing			
Bike Path	1	1				✓				
Bike Lanes										
w/Protected*	3	2								
w/Buffer	3	3		✓				✓		✓
w/ No buffer	3	4			✓					
Bike Aids**										
"Sharrows"	n/a	n/a	✓						✓	
Bike Route	n/a	n/a			✓					
* Curb or Flexible posts										
**Neither sharrows nor bike routes are bike facilities because bicyclists share vehicle lanes with motorists.										

Improved Safety & Comfort – Part 2

The type of bike facility is only one determinant of bike safety and comfort. The number and type of places where vehicles cross the paths of bikes is even more important as most accidents occur at Intersections and busy public driveways.

Example: [Riding from University @ Middle to Ravenswood @ Laurel](#)

Notes: The types of crossings are listed in order of safety & comfort

Type of Vehicle-Bike Crossing	#	Location
Traffic signal - right turn vehicle speed limited to 15 mph	2	Ravenswood & Alma; Laurel & Ravenswood
Traffic Signal - right turn vehicle speed NOT limited to 15 mph	1	Menlo & El Camino
4 - way stop sign	1	Crane & Menlo
No traffic control - intersection	0	
No traffic control - busy public driveway	1	Menlo & X El Camino (shopping center)
No traffic control - mid-block	1	Live Oak & Crane
	6	

Summary of Primary Benefits

1. This centrally located east-west bike corridor would provide the most direct, safe and stress-free bike route to popular Menlo Park destinations on both sides of El Camino.
2. The bike corridor would be suitable for most bike riders including middle school and high school age youth and younger children accompanied by an adult.
3. A large number of confident bicyclists ALREADY ride in heavy vehicle traffic on both Menlo and Ravenswood between El Camino and Laurel. They would no longer be required to share vehicle lanes with motorists.
4. A dedicated bike path running through the Civic Center near Ravenswood and between Alma and Laurel would be attractive and keep bike riders off this busy section of Ravenswood.
5. A painted bike crossing on El Camino and effective signage would reassure bike riders and alert motorists to their presence.
6. Bike riders would no longer need to unsafely travel (a) in vehicle lanes on the section of University between Santa Cruz and Menlo Avenues nor (b) through the busy Menlo/University intersection.
7. The addition of 2-way protected bike lanes on the busy stretch of University between Middle and Live Oak would eliminate lane sharing, provide additional safety, and likely attract more bike riders to downtown and to the improved east-west bike corridor.
8. Expect greater usage of Burgess park facilities, especially by youth who live on the west side of El Camino and currently rely on parents to drive them.
9. The loss of only 28 parking spaces is a reasonable trade-off and these would be only on one side of Menlo Avenue and one side of University between Middle and Live Oak.
10. There would be little or no impact on private property.
11. Caltrans would likely have only a small impact on the implementation schedule for the bike corridor improvements.
12. Together these improvements would send a dramatic, reassuring and highly visible signal that Menlo Park is truly committed to becoming a bike-friendly community, an equal to many neighboring cities, e.g., Palo Alto, Mountain View, San Mateo.

Design Overview

Menlo Park is blessed with a great foundation for building a top-notch community bike network. The City's many neighborhoods have residential streets that generally experience only light vehicle traffic and existing bike corridors are conveniently well located. *North-south bike corridors* include Middlefield, Laurel, and Alma on the east side of El Camino and Alameda de las Pulgas, San Mateo, Wailea and University on the west side. *East-west bike corridors* include Glenwood, Oak Grove and Ravenswood on the east side of El Camino and Middle, Menlo and Santa Cruz on the west side.

Unfortunately, several of these heavily travelled vehicle routes are popular with bike riders despite the lack of safe, low stress bike facilities. These include University, Oak Grove and Ravenswood. All have been identified as needing upgrading in the Menlo Park Specific Plan (Page 24).

The proposed Ravenswood-Menlo Bike Corridor creatively employs well-accepted bike facilities, i.e., 2-way protected bike lanes, separate bike paths, and modern bike crossings that would benefit bicyclists, motorists and pedestrians. And, It requires only minimal modifications to existing sidewalks and vehicle lanes. The recommended cycle path runs through a beautiful and quiet wooded section of the Civic Center near Ravenswood Avenue.

Bike Network Design Objectives

Ideally, a well-designed bike network - and its individual segments - will improve the safety, convenience and comfort of bicyclists without negatively impacting pedestrians and motorists. Bike network designers strive to achieve all these objectives using well-accepted guidelines, tools and methodologies and evaluate both challenges and solutions *from network system perspectives rather than on a piecemeal basis.*

Safety: Careful bicyclists should **be** safe riding in the existing street environment.

Comfort: Adult and young adult cyclists should **feel** little or no stress riding alone. There is a modern methodology for measuring rider comfort.

Convenience: Cyclists can reach most popular destination directly, i.e., with little or no significant detours. There is a modern methodology for gauging rider convenience.

Negative Impacts: Bike riding should not make walking and driving inconvenient, stressful, or unsafe. Bike network designers know how to gauge and minimize these impacts.

(Note: Both convenience and comfort impact where cyclists choose to ride I recommend reading *Low Stress Bicycling And Network Connectivity*, a contemporary bike network design guide that has been widely used by major cities since its introduction in 2012. Simply use google search to find how they have used it.)

Summary of New Bike Facilities

This table provides an overview of proposed bike facilities.

Street	Primary Role (Connectivity)		Bike Facility	
	North-South	East-West	Bike Facility Location	Type
El Camino Real	Yes		Encinal to Creek Drive	
<i>Segment 1</i> Ravenswood		Yes	El Camino to Laurel	Cycle Path
Menlo Avenue			Crane to El Camino	2-Way Buffered or Protected bike lane*
<i>Segment 2</i> Live Oak		Yes	University to Crane	Bike Route or 2-Way Buffered Bike Lane*
Crane			Live Oak to Menlo	Bike Route or 2-Way Buffered Bike Lane*
<i>Segment 3</i>		Yes		
University			Middle to Live Oak	2-Way Buffered or Protected bike lane*
<i>Segment 4</i>		Yes	Parking plazas between University and either Evelyn or Evelyn and Crane	Green 2-Way bike lane

* Protected bike lanes have a curb separating bike and vehicle lanes, in Palo Alto on Homer near Alma intersection.

A Closer Look At The Proposed Design

A combination of 2-way protected bike lanes, a dedicated bike path and standard bike routes could provide a solution that takes advantage of existing community resources but addresses existing street limitations. (See pages 8-9 for descriptions and page X for photos of these types of bike facilities.)

This proposal has four parts and each has value EVEN IF implemented separately.

Segment 1: Menlo and Ravenswood Avenues

Add protected 2-way bike lanes on the south side of Menlo Avenue between Crane and El Camino Real. These are separated from vehicle lanes by either buffers and flexible posts or protective curbs. The bike lanes continue across El Camino Real to Alma where there is a transition to a physically separate cycle paths that pass through the civic center to Laurel Avenue. Riders will transition to existing standard 1-way bike lanes as they travel east towards Middlefield.

Segment 2: Live Oak-Crane Approach To Menlo Avenue

Add bike routes (or bike lanes) to a small section of Live Oak between University and Crane and on Crane between Live Oak and Menlo Avenue. These would serve bike riders traveling between the University-Live Oak intersection and Menlo Avenue, Downtown, and El Camino Real.

Segment 3: Middle-University Approach To Live Oak

Add protected 2-way bike lanes to the east side of University Avenue. These serve riders traveling between the University-Middle intersection and Menlo Avenue, Downtown, and El Camino Real. There are several types of physical dividers that could be used to physically separate vehicle and bike lanes.

Segment 4: Santa Cruz Avenue Connection

Add 2-way green bike lanes to the north side of the parking lots between University and Crane and permit bicyclists to ride on the sidewalk between Santa Cruz-University intersection and the new bike lanes. This route would serve bike riders traveling between Santa Cruz and Menlo Avenues. Signs and street markings would require bike riders to use the bike lanes and yield to pedestrians and motorists to yield to bicyclists. Note: bike riders are already permitted to ride on downtown Santa Cruz sidewalks.

Primary Street Modifications

Segment 1: Menlo and Ravenswood Avenues

Menlo - Eliminate parking on the south side between Crane and Doyle

Menlo - Narrow the sidewalk on the south side between Doyle and El Camino to 5 feet. Install a separate green 2-way bike lane at El Camino between the thru and right turn vehicle lanes on Menlo Avenue.

El Camino Real – Install a separate green 2-way bike crossing on El Camino.

Ravenswood - Narrow existing sidewalk on the south side from 10 to 5 feet. Note: could possibly extend inside edge of sidewalk a few feet into the lawn without impacting redwoods.

Create a bike path between Alma and Laurel that passes thru city land near the library and Junior League Building

Provide appropriate wayfaring signage, markings, signals and controls that require motorists to yield to cyclists at key locations.

Segment 2: Live Oak-Crane Approach To Menlo Avenue

Eliminate parking only on one side IF 2- way buffered bike lanes rather than bike routes are added.

Provide appropriate wayfaring signage, markings, signals and controls that require motorists to yield to cyclists at key locations.

Segment 3: Middle-University Approach To Live Oak

Eliminate parking on the east side of University and add protected 2-way bike lanes.

Provide appropriate wayfaring signage, markings, signals and controls that require motorists to yield to cyclists at key locations.

Segment 4: Santa Cruz Avenue Connection

Add 2-way bike lanes to parking lots. Sidewalk riding permitted on East side of University for about 100 feet.

Provide appropriate wayfaring signage, markings, signals and controls that require motorists yield to cyclists and cyclists yield to pedestrians at key locations.

Appendix

Pass 21	<i>Bike Crossings Volumes On El Camino Real</i>
Page 22-24	<i>Bike Facility Nomenclature & Descriptions</i>
Page 25	<i>Specific Plan Bike Network Recommendations</i>

Segment 1: Menlo and Ravenswood Avenues

Page 26	Map of Location Photos
Page 27	Menlo Avenue at Crane
Page 28	Menlo Avenue at Doyle
Page 29	Ravenswood at El Camino Real
Page 30	Ravenswood at Train Tracks
Page 31	Ravenswood at Alma
Page 32	Ravenswood Bike Path Past Library
Page 33	Ravenswood Bike Path at Fountain
Page 34	Ravenswood Bike Path at Palo Alto Jr. League Parking Lot
Page 35	Ravenswood at Laurel

Segment 2: Live Oak-Crane Approach

Page 36	Live Oak East from University
Page 37	Crane North from Live Oak

Segment 3: Middle-University Approach

Page 38	Looking North from Middle Avenue
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Segment 4: Santa Cruz Avenue Approach

Page 39	University - Evelyn Parking Lot
Page 40	Evelyn – Crane Parking Lot

Additional Information

Page 41	Lane Configuration Impact
Page 42-43	Protected Bike Lanes

Bike Crossings Volumes On El Camino Real

Despite a heavy volume of vehicle traffic, the lack of bike facilities, and the number of left and right turn vehicles lanes at El Camino Real, many confident bicyclists prefer Ravenswood and Menlo Avenues over both Valpariso and Oak Grove Avenues. This is strong evidence that this route is more convenient than alternatives.

**Table 3
Pedestrian and Bicycle Volumes**

Intersection	Pedestrian	Bicycle
ECR/Oak Grove Road	53-88	20-7
ECR/Santa Cruz Ave	96-144	19-13
ECR/Ravenswood-Menlo Ave	35-46	26-25
ECR/Middle Ave	13-28	9-17
ECR/Sand Hill Rd	113-41	201-55

Note: (##-##) represents (morning-afternoon) volumes

Source: Menlo Park El Camino Corridor Study (2015)

Outstanding Questions:

Are these hourly rates? Time window?

Bike Facility Types

Bike Paths



There are no bike paths in the Menlo Park bike network.

Physical Separation: Bike paths are “off-street” pathways that completely separate bikes and vehicles.

Lane Sharing: Dedicated bike paths are designed for only bike riders; shared bike paths can also be used by pedestrians.

Street Markings & Signage: cycle path signage and street markings; speed limit signs

Location: Anywhere other than on or immediately alongside a street.

Protected Bike Lanes



Protected bike lanes do not currently exist in the Menlo Park bike network.

Physical separation: Protected bike lanes have some sort of physical, stationary, vertical separation between moving motor vehicle traffic and the bike lane. Examples of

vertical separation include plastic posts, bollards, curbs, planters, raised bumps or parked cars. Protected bike lanes can be at street level or raised, either to sidewalk level or a level in between street and sidewalk level. Paint alone does not create a protected bike lane.

Lane Sharing: Protected bike lanes must define and allocate space exclusively for people on bikes, not shared with pedestrians or motorized traffic except for brief mixing zones where necessary and at intersections. If the designs are sidewalk level, there must be separate, identified space for people on bikes and people on foot in order for the facility to be considered a protected bike lane.

Street Markings & Signage: Lanes, signs and street markings, physical divider

Location: Protected bike lanes are part of the street grid. In some instances, a protected lane may be separated from the road by landscaping or other features, but it runs parallel and proximate to the roadway. This distinguishes protected bike lanes from off-street pathways that can follow waterways or rail corridors.”

Source: People for Bikes at <http://www.peopleforbikes.org/green-lane-project/pages/the-green-lane-projects-style-guide>

Buffered Bike Lanes



Buffered bike lanes do exist on Santa Cruz and one section of Ravenswood.

Physical separation: A space often 2-feet wide lies between the bike and adjacent vehicle lanes and generally has no vertical separation element, e.g., post.

Lane Sharing: Each user is allocated separate lanes.

Bike Facility Types - continued

Conventional Bike Lanes



Bike lanes exist on Middlefield and Willow Roads.

Physical separation: Only a white line separates bike and vehicle lanes; no vertical physical element.

Lane Sharing: Motorists and bicyclists allocated separate lanes.

Street Markings & Signage: frequent bike lane signs, bike symbol street markings especially near intersections

Location: Part of the street grid.

Biking Aids

Wayfaring Signs



Oakland, CA



Concept



Portland Metro Cities, OR

Not used in Menlo Park.

Bike Routes

Not used in Menlo Park

They designate a signed *route* that tells cyclists what are supposedly the most "bike friendly" ways to travel through areas. Usually a white stripe defines a separate space for bikes and street parking.

Sharrows



Used in Menlo Park on Menlo, Ravenswood, University and Oak Avenues.

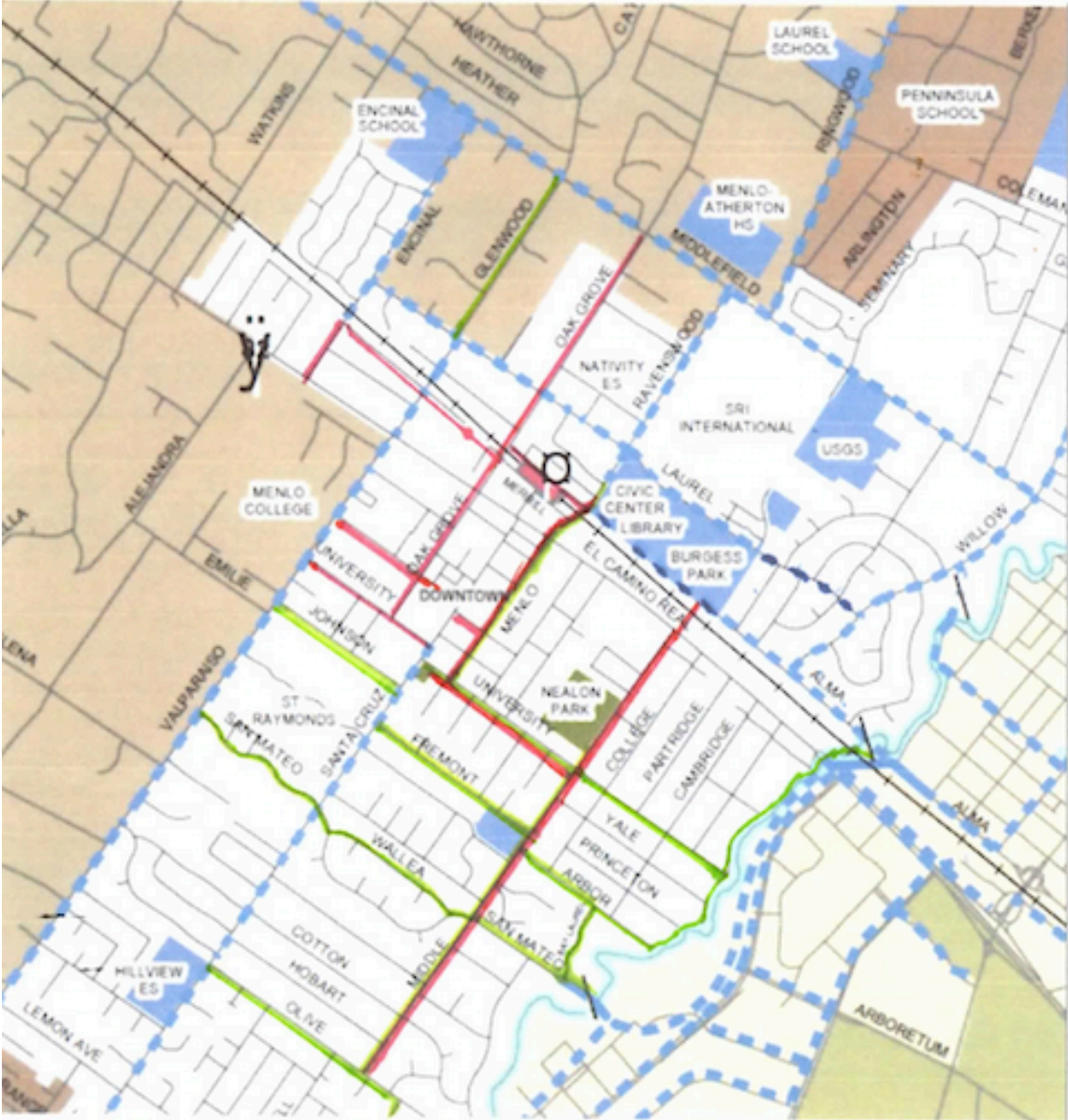
Sharrows are simply street markings that remind motorists and bicyclists that they must share a single vehicle lane. Usually, these are used on busy streets where there is no room for bike lanes and there is on-street parking.

“Shared lane markings should not be considered a substitute for bike lanes, cycle tracks (bike paths), or other separation treatments where these types of facilities are otherwise warranted or space permits.”

<http://nacto.org/publication/urban-bikeway-design-guide/bikeway-signing-marking/shared-lane-markings/>

Specific Plan Bike Network Recommendations

Stated Goals: “creating greater east-west connectivity, town-wide” and “an integrated, safe and well-designed pedestrian and bicycle networks”



- **Blue dashed lines** indicate existing bike facilities, mostly bike lanes.
- **Red Lines** indicate streets where bike facilities are recommended in the city's Downtown/El Camino Real Specific Plan. Each project must be evaluated on its own merits.
- **Green lines** indicate streets without bike facilities that now are popular with riders

Only three existing “pairs” of streets could naturally serve as bike connections between east and west side neighborhoods. Someday Middle Avenue might connect to Alma via a tunnel under elevated train tracks behind 500 El Camino Real (Stanford property) but it is impossible to know whether it will happen, or when.

Valparaiso and Glenwood provides a relatively safe and comfortable crossing of El Camino because Valparaiso has bike lanes and Glenwood connects to Alma and Laurel a short distance from El Camino. However, it is at the north end of Menlo Park and therefore inconvenient for most riders who live either southwest of Santa Cruz Avenue or southeast of Ravenswood. Examples are riding to the train station, civic center and Burgess Park from neighborhoods near Middle Avenue and riding to Hillview Middle School and the Safeway from neighborhoods south of Ravenswood.

Oak Grove extends from University to Middlefield and **currently has no bike facilities**. It is a busy street with parking west of El Camino. Unfortunately, it is located only one block south of Valparaiso, and like Valparaiso, bike facilities would primarily serve only riders traveling to and from the north end of Menlo Park.

Together Menlo and Ravenswood Avenues offer the most natural and convenient east-west bike route that lies almost midway between Middle and Valparaiso Avenues. Unfortunately, these streets currently appeal only to bike riders who are comfortable sharing vehicle lanes on Menlo Avenue and sections of Ravenswood and University Avenue. Buffered bike lanes do exist on Ravenswood but only between Pine (near Laurel) and Middlefield Road.

Although they do not connect directly to El Camino both Middle and Santa Cruz are very popular routes for bike riders of all ages and skills and these streets should be viewed as important “links” in any well-designed east- west bike solution. Middle has a wide, well marked parking lane and a few signs that indicate it is a “Shared School Safety Route”. The Specific Plan recommends that Middle be classified as a bike route with frequent appropriate signage, street markings and wayfinding. Santa Cruz has buffered bike lanes between Avy and University.

Map of Location Photos for Proposed Menlo-Ravenswood Bike Facilities

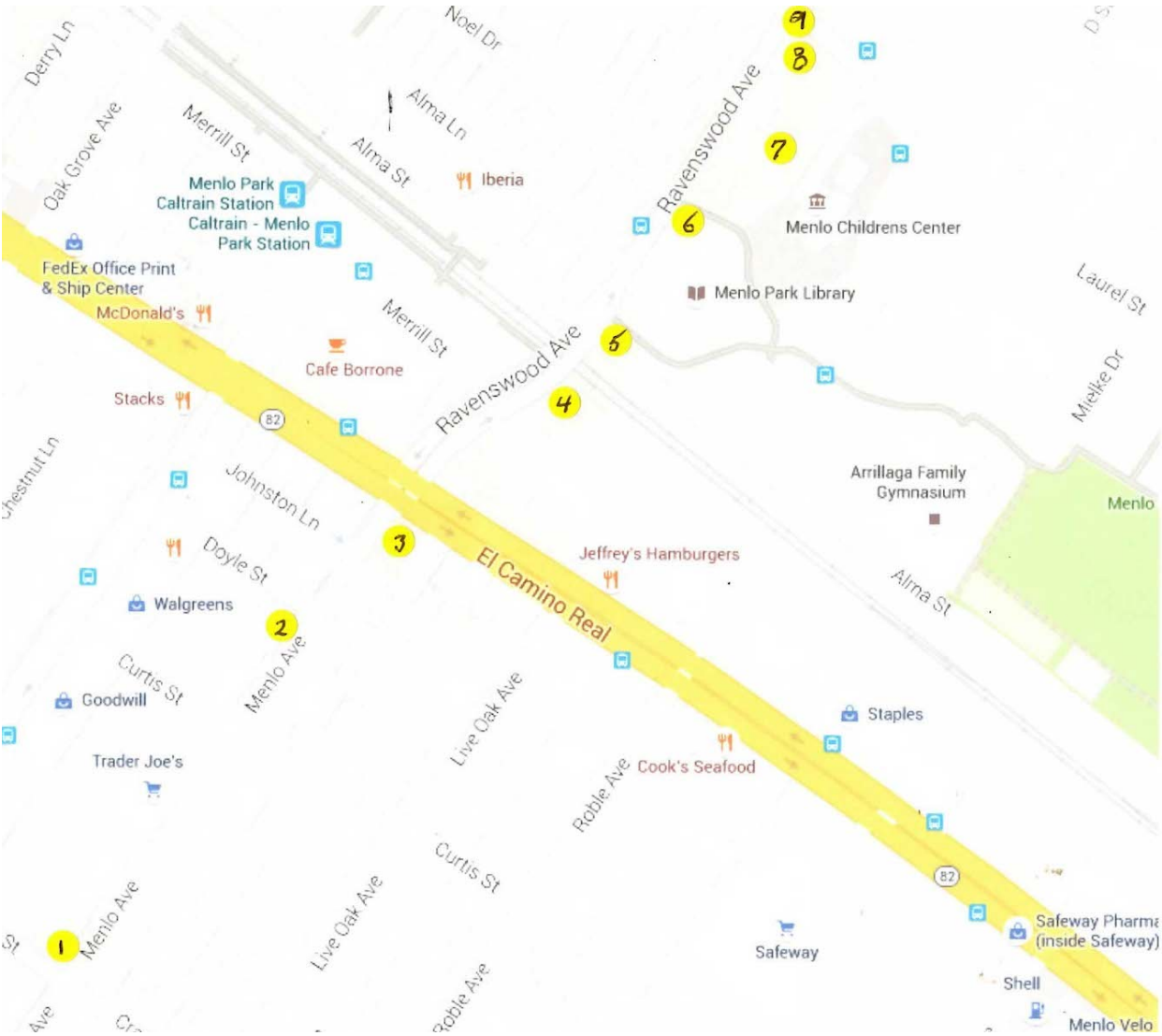


Photo 1: Menlo Avenue At Crane

Photo 2: Menlo Avenue At Doyle

Photo 3: Ravenswood at El Camino Real

Photo 4: Ravenswood at Train Tracks

Photo 5: Ravenswood at Alma and Library

Photo 6: Ravenswood Bike Path Past the Library

Photo 7: Ravenswood Bike Path at Fountain & JR League Building

Photo 8: Palo Alto Jr. League Parking Lot

Photo 9: Ravenswood And Laurel Intersection

Segment 1: Menlo and Ravenswood Avenues

Photo 1: Menlo Avenue – Looking East At Crane



- **Remove Parking on south side (21 spaces)**
- **Add 2-way protected bike lanes.**
- **Bike facility width about 10 feet.**
- **Vehicle lane width narrowed to about 9.5 feet.**

Segment 1: Menlo and Ravenswood Avenues

Photo 2: View East on Menlo Avenue at Doyle



- **East side approach to El Camino Real**
- **Thru 2-way bike lanes between thru and right turn vehicle lanes that starts between Doyle and El Camino**
- **Right turning motorists must yield to bike riders.**
- **Eliminate 22 parking spaces**

Segment 1: Menlo and Ravenswood Avenues

Photo 3: Ravenswood East at El Camino Real



- Existing 10-foot wide sidewalk would be extended (a) on south side 3 feet and (b) on the north side 5 feet by replacing the existing bike lane. Total width becomes 18 feet. Dedicate 10 feet to bike lanes and 8 feet to pedestrians.
- Separate bike and pedestrian crossings on El Camino Real.

Segment 1: Menlo and Ravenswood Avenues

Photo 4: Ravenswood East at Train Tracks



- **Bike riders and pedestrian share a 10-foot wide sidewalk on the approaches for a short distance and on crossing; bike riders must yield to walkers; limit bike speed (10 mph?)**
- **Might be possible to expand sidewalk width by moving south edge; this could either be used to separate pedestrians and bike riders or simply provide more space to pass by.**
- **Bike gate opening width is 10 feet.**

Segment 1: Menlo and Ravenswood Avenues

Photo 5: Ravenswood East at Alma and Library



- **2-Way bike path begins just beyond library sign.**

Segment 1: Menlo and Ravenswood Avenues

Photo 6: Ravenswood Bike Path – View East Past Library



- **Bike riders enjoy quiet and beautiful park-like setting.**
- **Bike path runs between Alma and Laurel**

Segment 1: Menlo and Ravenswood Avenues

Photo 7: Ravenswood Bike Path – View East 2



- **An existing path runs from Ravenswood gate past a beautiful fountain...**



- **Past the Jr. League building and continuing to parking lot.**

Segment 1: Menlo and Ravenswood Avenues

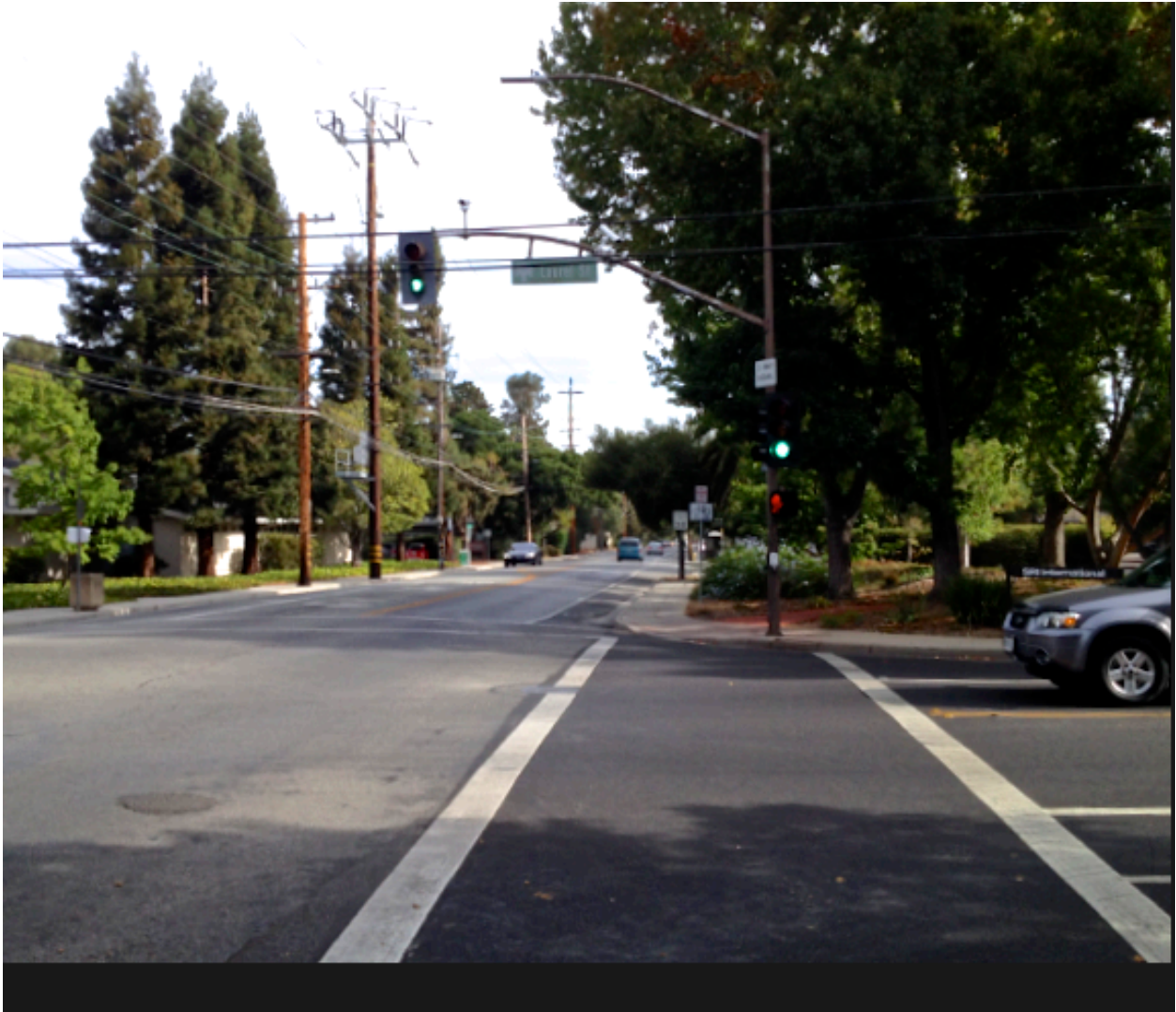
Photo 8: View East at Palo Alto Jr. League Parking Lot



- **Bike path crossing in parking lot**
- **Bike riders must yield to motorists and pedestrians**

Segment 1: Menlo and Ravenswood Avenues

Photo 9: View East at Ravenswood And Laurel



- **Transition to existing 5 –foot wide bike lanes on Ravenswood at intersection.**
- **Separate bike and pedestrian for Ravenswood crossings?**
- **Bike riders must yield to pedestrians.**
- **Traffic signals on Ravenswood favor motorists (?).**
- **Traffic signals on Laurel do not favor bike riders or motorists.**

Segment 2: Live Oak-Crane Approach

Live Oak East from University



- Live Oak is 42 feet wide => plenty of room for a bike route

Segment 2: Live Oak-Crane Approach

Crane North from Live Oak



- **Parking on west side banned during weekdays between 8 and 5 PM.**
- **Permit parking on west side and eliminate parking on east side.**
- **Install 2-way buffered bike lanes on east side.**
- **Connect Crane and Menlo bike lanes.**

Segment 3: Middle-University Approach

Looking North from Middle Avenue



- *Protected 2-Way bike lane replaces seven parking spaces on east side of University from Middle to Live Oak.*
- *Vehicle lanes narrowed to 9.5 feet – the same as existing ones on Middle.*

Segment 4: Santa Cruz Avenue Approach

There are lots of option which combine walking bikes a very short distance between bike facilities. Here are just three.

Option 1: Encourage bike riders to *walk their bikes on University between Santa Cruz and the first aisle of parking lot between University and Evelyn*. Then take 2-way bike lanes to Crane. Motorists would be traveling at a slow speed and would be required to yield to bikes. The bike lanes would be painted green and share signs would appear at both ends of the parking aisle.

Option 2: Encourage bike riders uncomfortable riding on Santa Cruz to *walk their bikes between University and Crane Street* and then use Crane to reach Menlo Avenue.

Option 3: Encourage bike riders to *walk their bikes between University and Evelyn* and then use a 2-way bike lane in the first parking lot aisle to reach Crane and Menlo. Motorists would be traveling at a slow speed and would be required to yield to bikes. The bike lanes would be painted green and share signs would appear at both ends of the parking aisle.

University-Evelyn Parking Lot



- **2-Way bike lane highlighted in green**
- **1-way vehicle traffic**
- **17-foot separation between opposite parking spaces**

Parking Lot Between Evelyn and Crane



- **Green 2-way bike lanes**
- **2-way vehicle traffic**
- **22-foot separation between opposite parking spaces**

Lane Configuration Impact

Streets	Existing Widths							Proposed Widths						
	Parking Lane 1	Vehicle Lane 1	Vehicle Lane 2	Parking Lane 2	Turn Lanes	Bike Lanes	Street	Parking Lane 1	Vehicle Lane 1	Vehicle Lane 2	Parking Lane 2	Turn Lanes	2-Way Bike Facility*	Total Required
Live Oak (University to Crane)	6	15	15	6			42	6	15	15	6			42
Crane (Live Oak to Menlo)	6	16	16	0			38	6	16	16	0			38
Menlo (Crane to Doyle)	6	15	15	6			39	6	10	10	0		10	36
Menlo (Doyle to ECR)**	0	15	11.5	0	11.5		38		9.5	9.5	0	9.5	12	40.5
Ravenswood (ECR to Alma)	0	***				5	?	0	***					n/a
Ravenswood (Alma to Laurel)	0	Narrows to 2 lanes				0 to 5	?	0	Narrows to 2 lanes				****	?
Santa Cruz (Univesrsity to Crane)	6	15	15	6			42	6	13	13	0		10	42
University (Middle to Live Oak)	6	11.5	11.5	6			35	6	9.5	9.5	0		10	35
Middle (Olive to University)	11.5	9.5	9.5	11.5			40	11.5	9.5	9.5	11.5			40

NOTES:

These measurements done with a tape measure and should be accurate within plus/minus 4 inches

* Either a 2-foot wide bike lane buffer or a 1 to 1 1/2 foot protecting curb with or without flexible posts

** Street width on Menlo Between Doyle and El Camino Real can be widened by 3 feet to 41 feet by narrowing sidewalk to 5 feet.

Thru bike lane between Doyle and El Camino includes two 1-foot curbs on each side that separate it from vehicle lanes

*** Westbound: 1 thru and 3 turn lanes; eastbound: 2 lanes

**** Separate cycle path is NOT adjacent to street; it crosses city civic center property

Protected Bike Lanes

Source: People for Bikes at <http://bit.ly/protectedbikelanes>

The number of lanes has quadrupled since 2010.

Types: 1/3 parked cars; 1/3 plastic posts in a buffer lane; 1/3 curbs; a few planters

2/3 are 1-way and 1/3 are 2-way

Average length: 9/10 mile

Safety Benefits

75 percent of Portland and San Francisco residents who own bikes but ride infrequently are "very" or "extremely" concerned about safety while riding.

North research agency, 2013 - Selling Biking: A new report on the swing voters of the street

Protected bike lanes reduce bike-related intersection injuries by about 75 percent compared to comparable crossings without infrastructure.

Harris et al, 2013 - "Comparing the effects of infrastructure on bicycling injury at intersections and non-intersections using a case-crossover design." Injury Prevention

Because they shorten crossing distances, control turning conflicts and reduce traffic weaving, New York City's protected bike lanes reduced injury rates for people walking on their streets by 12 to 52 percent.

NYCDOT, 2013 - It turns out that protected bike lanes are fantastic for walking safety, too

Where protected lanes were installed in New York and Washington D.C., the number of bikes on sidewalks

immediately fell by an average of 56 percent.

NYCDOT and DDOT, 2010-2014 - Tired of Cyclists Riding on the Sidewalk? Build More Bike Lanes

When Chicago added a protected lane and bike-specific traffic signals to Dearborn Street, stoplight compliance on bicycles immediately rose from 31 percent to 81 percent.

Chicago Department of Transportation, 2013 - City says Dearborn bike signals keeping cyclists in line

96 percent of people using protected bike lanes believe they increased safety on the street.

Monsere, C., et al., 2014 - Lessons from the Green Lanes (National Institute for Transportation and Communities)

80 percent of people who live near a protected bike lane project believe it increased safety on the street.

Monsere, C., et al., 2014 - Lessons from the Green Lanes (National Institute for Transportation and Communities)

Ninety percent of users say they feel safer bicycling on Pennsylvania Ave because of the new protected lanes.

District Department of Transportation, 2012 - District Department of Transportation Bicycle Facility Evaluation

New York City's protected bike lane on 9th Avenue led to a 56 percent reduction in injuries to all street users, including a 57 percent reduction in injuries to people on bikes and a 29 percent reduction in injuries to people walking, as well as an 84 percent reduction in sidewalk riding.

NYC DOT, 2012 - Measuring the Street

Streets with protected bike lanes saw 90 percent fewer injuries per mile than those with no bike infrastructure.

Teschke, K., et al., 2012 - Route Infrastructure and the Risk of Injuries to Bicyclists: A Case-Crossover Study

Streets with protected bike lanes saw 28 percent fewer injuries per mile than comparable streets with no bike infrastructure. People were also 2.5 times more likely to bike on the protected lanes than in general travel lanes.

Lusk, A., et al., 2010 - Risk of injury for bicycling on cycle tracks versus in the street, Injury Prevention, December 1, 2010 When protected bike lanes are installed in New York City, injury crashes for all road users (drivers, pedestrians, and cyclists) typically drop by 40 percent and by more than 50 percent in some locations.

Wolfson, H., 2011 - Memorandum on Bike Lanes, City of New York, Office of the Mayor, 21 March 2011 After New York City installed a protected bike lane on Columbus Avenue, bicycling increased 56 percent on weekdays, crashes decreased 34 percent, speeding decreased, sidewalk riding decreased, traffic flow remained similar, and commercial loading hours/space increased 475 percent. *New York City Department of Transportation, 2011 - Columbus Avenue parking-protected bicycle path preliminary assessment*

What People Want

Protected bike lanes are seven times more effective than painted ones. A 2015 survey of adults in the 50 largest U.S. metro areas found that adding a conventional painted bike lane to a four-lane commercial street increases the number of people who feel "very comfortable" biking there from 9 percent to 12 percent. Adding a protected bike lane boosts this to 29 percent. The reported comfort difference between a protected and conventional bike lane is about the same as the difference between a protected bike lane and an off-street path.

Rockefeller Foundation, 2014 - Rockefeller Millennials Survey 75 percent of people who live near a protected bike lane project say they support more in other locations. For those aged 18-34, it's 85 percent; for those aged 18-24, 97 percent.

Monsere, C., et al., 2014 - Lessons from the Green Lanes (National Institute for Transportation and Communities) 10 percent of people who live near a protected bike lane project give a perfect comfort rating to a conventional painted bike lane. 22 percent give a perfect rating to a bike lane buffered by paint. 70 give a perfect comfort rating to a bike lane protected by planters.

Monsere, C., et al., 2014 - Lessons from the Green Lanes (National Institute for Transportation and Communities)
62 percent of people who live near protected lane projects "would be more likely to ride a bicycle if motor vehicles and bicycles were physically separated by a barrier."

Monsere, C., et al., 2014 - Lessons from the Green Lanes (National Institute for Transportation and Communities)
By summer 2014, protected lane projects were on the ground in 53 U.S. cities and 24 states. By the end of the year the country had more than 200, quadruple the number in 2010.

Green Lane Project, 2014 - Inventory of Protected Green Lanes Nearly 3 in 4 residents surveyed near Washington D.C.'s Pennsylvania Ave. protected bike lane support the lanes and believe them to be a valuable asset to the neighborhood.

District Department of Transportation, 2012 - District Department of Transportation Bicycle Facility Evaluation
A survey of Toronto residents found that 72 percent support protected bike lanes.

Rider, D., 2011 - "65% of Torontonians say no to road tolls; 72% want bike lanes," Thestar.com, 3 June 2011
A survey of Portland, Oregon, protected bike lane users found that 70 percent of respondents thought the lane made cycling safer and easier. Motorists generally thought it didn't make driving any less convenient or slower. Only three percent of cyclists didn't use the protected lane, compared to before it was installed, when 12 percent of riders rode in the street instead of in the bike lane.

Monsere, C., et al., 2011 - Evaluation of Innovative Bicycle Facilities: SW Broadway Cycle Track & SW Stark/Oak Street Buffered Bike Lanes Rents along New York City's Times Square pedestrian and bicycle paths increased 71 percent in 2010, the greatest rise in the city and a sign that there is high demand and low supply for human-friendly streets. *NYC DOT, 2011 - Measuring the Street*