FEHR PEERS

MEMORANDUM

Date: March 13, 2012

To: Linda Heineck, City of Menlo Park
Thomas Rogers, City of Menlo Park

Copy to: Mark Hoffheimer, Perkins + Will

From: Ian Moore, AICP and Carrie Nielson

Subject: ***Menlo Park El Camino Real/Downtown Specific Plan Bicycle–Related Comments – Tasks O, P, and Q***

SJ09-1089

PURPOSE

This draft memorandum responds to the City of Menlo Park's comments dated October 20, 2011 on the *Menlo Park El Camino Real/Downtown Specific Plan* regarding bicycle facilities. Based on the comments, Fehr & Peers analyzed roadway segments for potential bicycle lanes and other bicycle related facilities/considerations:

- ***Protected Bicycle Network (Comment O):*** Protected bicycle network between Roble Avenue and Cambridge Avenue to connect with the planned Middle Avenue bicycle/pedestrian grade-separated crossing.
- ***Ravenswood Avenue east of El Camino Real (Comment P):*** Bicycle improvements (signage, lanes, etc.) to extend westbound bicycle facilities to El Camino Real.
- ***Menlo Avenue west of El Camino Real (Comment P):*** Bicycle improvements (signage, lanes, etc.) to provide bicycle lanes on Menlo Avenue, including the approach to El Camino Real.
- ***El Camino Real (Comment Q):*** Bicycle lanes within City limits and/or possibility of paths, lanes, or routes.
- ***University Drive (Comment Q):*** Feasibility of bicycle lanes.
- ***Middle Avenue (Comment Q):*** Bicycle improvements (e.g., bicycle lanes, buffered bicycle lanes, and sharrows) as a route to local schools.
- ***Encinal Avenue (Comment Q):*** Bicycle improvements as a route to local schools.
- ***Valparaiso Avenue (Comment Q):*** Bicycle improvements as a route to local schools.
- ***Bicycle Parking (Comment Q):*** Bicycle parking as a public benefit.
- ***Signage (Comment Q):*** Signage as a public benefit.
- ***Bicycle Sharing (Comment Q):*** Bicycle sharing as a public benefit.
- ***Environmental considerations*** for new bicycle facility designation.

The Specific Plan includes two new pedestrian/bicycle grade-separated crossings – a currently planned one across the Caltrain tracks near Middle Avenue and a proposed one across the Caltrain tracks (after a grade separation) near Santa Cruz Avenue. Bicycle improvements at intersections are addressed as part of the bicycle lane feasibility discussions for individual streets.

KEY FINDINGS

The key findings are:

- ***Protected Bicycle Facility***: A separated bikeway for the segment of El Camino Real from Roble Avenue to Cambridge Avenue was analyzed and is not recommended. Instead, bicycle lanes on El Camino Real along this segment and connecting to the planned Middle Avenue grade-separated crossing are recommended. There are several locations with insufficient curb-to-curb width to accommodate bicycle lanes. Therefore it is recommended that this portion of El Camino Real be designated a "Future Class II/Minimum Class III" bikeway, to allow for the Class III designation in the short-term and the goal of adding bicycle lanes in the future.

- ***Ravenswood Avenue East of El Camino Real***: A westbound bicycle lane may be feasible on Ravenswood Avenue from El Camino Real to the railroad right-of-way with the removal of a portion of the center median and adjustment to the northern curb line west of Merrill Street. The adjustment of the northern curb line would need to ensure that it would not conflict with the existing underground parking nor impact the existing pedestrian walkway. These actions may be cost prohibitive and/or have other negative effects. With this bicycle lane, this segment of Ravenswood Avenue would be designated as "Future Class II/Minimum Class III" in the Specific Plan. Additionally, Ravenswood Avenue from Alma Street to Noel Drive should be classified as Class III facility. The preferred bicyclist alignment through the Ravenswood Avenue/Alma Street intersection should also be striped. The design strategy must be considered in conjunction with the Draft EIR Mitigation Measure TR-7b specifying various changes to the southbound, northbound and eastbound travel directions to ensure its feasibility.

- ***Menlo Avenue West of El Camino Real***: A westbound bicycle lane can be added to the existing lane configuration on the Menlo Avenue approach to El Camino Real through restriping. An eastbound bicycle lane cannot be accommodated within the existing curb-to-curb distance. Possibly a combined bicycle lane/right-turn lane could be incorporated. The ultimate design of this approach must be considered in conjunction with the Specific Plan's Draft EIR Mitigation Measure TR-7b if it were to be implemented. The mitigation measure calls for the eastbound approach to be widened to accommodate a left-turn lane, two through lanes, and a right-turn lane. Adding bicycle lanes on the rest of Menlo Avenue would entail the removal of one parking lane. The south side of the street is recommended for parking removal (34 spaces). Modifications would also be needed at its intersection with University Drive. Menlo Avenue would be designated as "Future Class II/Minimum Class III" with the short-term designation as a bicycle route in the Specific Plan.

- ***El Camino Real – Class II Bicycle Lanes***: In addition to the proposed/planned bicycle lanes from the Menlo Park/Atherton city boundary to Encinal Avenue identified in the City's *Comprehensive Bicycle Development Plan* and forwarded into the Draft Specific Plan that may require widening the existing paved shoulder in the southbound direction and reducing the width of the east side parking lane (northbound direction) and some parking space removal, Class II bicycle lanes may be feasible on El Camino Real from Encinal Avenue to Valparaiso Avenue through the reduction of outside lane widths and paving the existing dirt shoulder, pending future design review. Bicycle lanes also may be feasible on El Camino Real between Valparaiso/Glenwood Avenues and Ravenswood/Menlo Avenues as discussed in the memorandum *Task A – El Camino Real Street Sections Revisions*, which would require reducing the width of the outside travel lane in the southbound direction and removing 16 parking spaces on the east side of the street (northbound direction). South of Menlo/Ravenswood Avenues, there is insufficient curb-to-curb width to accommodate bicycle lanes on several segments. As properties redevelop, additional right-of-way (as needed) should be acquired/dedicated to ultimately provide Class II bicycle lanes. Therefore it is recommended that El Camino Real south of Encinal Avenue be designated as a "Future Class II/Minimum Class III" bikeway, to allow for the Class III designation in the short-term and the goal of adding bicycle lanes in the future.

- ***University Drive***: Bicycle lanes are not feasible between Santa Cruz Avenue and Menlo Avenue. A southbound combined bicycle/left-turn lane at Menlo Avenue would support observed bicycle and auto activity in this area. Bicycle lanes are feasible to the north and south of this area through the removal of one lane of parking (38-40 spaces from Santa Cruz Avenue to Valparaiso Avenue and 40-44 spaces Menlo Avenue to Middle Avenue). University Drive north of Santa Cruz Avenue and south of Menlo Avenue would be designated as "Future Class II/Minimum Class III".

- ***Middle Avenue***: In order to accommodate 5' bicycle lanes on Middle Avenue, a lane of parking would need to be removed. The selection of the parking lane to be removed would be dependent on the results of a parking utilization survey. There are 4 southside spaces that would need to be removed to accommodate bicycle lanes at the intersection of Middle Avenue and University Drive in addition to 12 northside or 13 southside parking spaces that would need to be removed to accommodate bike lanes for the remainder of the segment. Middle Avenue from University Drive to El Camino Real would be designated a "Future Class II/Minimum Class III" bikeway in the plan.

  When bicycle lanes are striped, a combined bicycle lane/right-turn lane at the intersection of Middle Avenue and El Camino Real should be striped to facilitate bicycle traffic across El Camino Real to access the Middle Avenue grade-separated crossing. Should automobiles be allowed to make a through movement onto the Middle Avenue extension once the area is redeveloped, the left-turn lane could become a shared left- and through-lane, with the right-turn pocket remaining a combined bicycle lane/right-turn only lane to prevent right-hook auto/bicyclist collisions. The westbound bicycle lane would be created by narrowing the westbound through lane. The proposed mitigation measure at this

intersection identified in the Draft EIR is to add a second northbound left-turn lane which would require two receiving lanes on westbound Middle Avenue. A detailed design would need to be conducted to determine the feasibility of a bicycle lane in this segment.

- **Encinal Avenue**: Just outside the Specific Plan area, Encinal Avenue was found to have adequate safe routes to school transportation support facilities. Consideration may be given to sidewalk improvements east of the Study Area under a separate planning/grant effort.

- ***Valparaiso Avenue***: Within the Specific Plan area, striping the unmarked crossing on Hoover Street at Valparaiso Avenue would support safe routes to school. Additional measures are feasible west of the Specific Plan area.

- ***Bicycle Parking***: Section F.5 of the Specific Plan, which discusses bicycle parking standards and guidelines, should be updated with land use-based guidance from the Association of Bicycle and Pedestrian Professional's *Bicycle Parking Guidelines, 2nd Edition* with modifications for residential uses.

- ***Signage***: The Specific Plan should include references to bicycle wayfinding signage.

- ***Bicycle Sharing***: While factors such as employment and population density and tourism may be challenging to a successful bicycle sharing program in Menlo Park today, this topic should be reexamined as lessons are learned from Peninsula cities included the BAAQMD Bicycle Share Pilot Program.

RECOMMENDATIONS FOR SPECIFIC PLAN REVISIONS

Based on the analysis of the feasibility of Class I and Class II bikeways and assessment of other bicycle-related issues presented in this memorandum, Fehr & Peers recommends updating the following sections of the Specific Plan:

- Figure B6 Bicycle Facilities in Plan Area from Field Observations and the *Menlo Park Comprehensive Bicycle Development Plan*, 2005

- Section F.4 Bicycle Facilities

- Section F.4 Recommended Bicycle Facilities

- Figure F3 Bicycle Facilities

- Section F.5 Bicycle Storage Standards and Guidelines

Plus a discussion of bicycle wayfinding should be added to Section F.4.

Figure B6

Figure B6 *Bicycle Facilities in Plan Area from Field Observations and the Menlo Park Comprehensive Bicycle Development Plan, 2005* should be updated with the same legend as Figure F3. "Class II Bike Path" should be changed to "Class II Bike Lane."

Section F.4 Bicycle Facilities Types – New "Future Class II/Minimum Class III" Bikeway Designation

A fourth bikeway category "Future Class II/Minimum Class III" will be added to the in-text discussion of proposed bicycle facilities in Section F.4 as well as Figure F3 *Bicycle Facilities*. This new bikeway category would address locations where bicycle lanes are desirable but where existing constraints, such as on-street parking and insufficient right-of-way may currently prevent the striping of bicycle lanes. These facilities would be designated Class III facilities in the short-term, which may include the striping of shared use pavement markings (sharrows) as appropriate, but would have the long-term goal of Class II bicycle lanes.

The new "Future Class II/Minimum Class III" category may be coupled with thresholds/triggers for future implementation through the City's Capital Improvement Program such as:

- Bicycle lanes in proximity to Downtown may be considered for implementation after development of a parking garage.
- Construction of the Middle Avenue grade-separated railroad crossing may be considered a trigger for implementation of the Middle Avenue bicycle lanes.
- Redevelopment of a significant continuous stretch of private property may justify implementing lanes along that stretch.

The development allowed by the Specific Plan will increase the volume of vehicles, pedestrians and bicyclists in the area which could lead to an increase in the number of conflicts. However, an increase in the number of conflicts is different than an increase in the rate of conflicts due to design features. An increase in the rate of conflicts would be a safety concern. This is the basis for the City's adopted significance criteria for pedestrian and bicycle impacts that are based on project design aspects, not increased traffic volumes. The recommended enhancements of bicycle facilities will not introduce design features that could increase the conflict rate. Additionally, the proposed Class II lanes include design features that would help to reduce the conflict rate, thus enhancing the bicycle environment. Detailed designs, additional studies, such as parking occupancy surveys, and detailed environmental review, would need to be completed before bicycle lanes would be implemented.

Update Recommended Bicycle Facilities

The Recommended Bicycle Facilities portion of Section F.4 and Figure F3 should be updated. The following street segments should be identified as "Future Class II/Minimum Class III":

- Menlo Avenue from University Drive to El Camino Real;
- University Drive from Valparaiso Avenue to Santa Cruz Avenue and from Menlo Avenue to Middle Avenue;
- Middle Avenue from University Drive to El Camino Real.
- Westbound Ravenswood Avenue from Alma Street to El Camino Real
- El Camino Real from Encinal Avenue to the Palo Alto border

Additionally, Ravenswood Avenue from Alma Street to Noel Drive should be classified as Class III facility.

The updated contents of Figure F3 are attached at the end of this memorandum. It will need to be incorporated into the Specific Plan figure format.

Bicycle Wayfinding

A section on bicycle wayfinding will be added to Section F.4.

Update Bicycle Parking Guidelines

Section F.5 Bicycle Storage Standards and Guidelines addresses bicycle parking in the Specific Plan. This section should be updated to change the LEED-ND-based bicycle parking guidelines and add the land use-based short-term and long-term bicycle parking guidelines from the Association of Bicycle and Pedestrian Professional's Bicycle Parking Guidelines: A Set of Recommendations, 2nd Edition as presented in Table 1 of this report.

METHODOLOGY

Fehr & Peers conducted a field review of the segments listed in the City's comments in order to establish the feasibility of Class I and II bicycle facilities, as appropriate, on Wednesday January 4, 2012. For each segment, the memorandum presents a summary of the existing conditions, potential design solutions, and a feasibility assessment.

The identified bicycle facility design solutions are presented with consideration of the existing right-of-way constraints as well as planned and observed critical bicycle connections. Major opportunities and constraints relative to the installation of Class II bicycle lanes, buffered bicycle lanes, and Class I separated bikeways are identified in the supporting graphics, with alternatives illustrated and additional recommendations made as appropriate. The installation of a Class I bicycle facility was only considered along El Camino Real between Roble Avenue and Cambridge Avenue, with the remainder of segments analyzed for the application of Class II bicycle facilities.

Generally, Class I paths substantially separated from the auto travel lanes are appropriate in an urban context only under certain conditions including:

- limited driveway crossings and intersection conflicts
- sufficient right-of-way to buffer the pathway from parallel moving traffic
- separation from adjacent buildings to limit potential bicyclist conflict with pedestrians entering and exiting buildings, and
- available right-of-way to provide for lower speed pedestrian behavior common to urban environments as well as local and through bicycle travel.

For this reason, Class I facilities are not explored elsewhere in the Specific Plan Area. Furthermore, Class I paths should be distinguished from street-level cycletracks or separated bikeways (synonymous terms). Separated bikeways are examined in this study for the protected bicycle network between the Middle Avenue pedestrian/bicycle grade-separated crossing and both Roble and Cambridge Avenues.

Other bicycle-related issues are addressed by incorporating the results of recent research. A detailed parking inventory table is included at the end of the memorandum.

DISCUSSION OF FINDINGS

Protected Bicycle Facility from Roble Avenue to Cambridge Avenue

In response to the proposed bicycle and pedestrian grade-separated crossing at Middle Avenue, protected bicycle facilities (Class I bicycle path or Class II bicycle lanes) connecting the crossing to Roble Avenue and Cambridge Avenue within the El Camino Real corridor were analyzed.

Existing Conditions

There are no existing bicycle facilities in the immediate area. The existing structures east of El Camino Real are currently auto-oriented with parking located behind the building or are unoccupied.

Design Solution – Separated Bikeway

An urban, sidewalk level Class I bicycle path, commonly known as a separated bikeway, is a potential option along El Camino Real between Roble Avenue and Cambridge Avenue. Illustrations, including an excerpt from the *Grand Boulevard Multimodal Transportation Corridor Study* are presented to the right.

A separated bikeway in this context would be designed as follows:

Vassar Street Cycle track (Cambridge, MA)
Source: calmstreetsboston.blogspot.com

- Located between the outside travel lane and pedestrian sidewalk; with the pedestrian sidewalk clearly defined by a different paving material, striping, or other design strategy.

- Include a minimum 5-foot horizontal separation/buffer from the adjacent travel lane per Caltrans Highway Design Manual (HDM) Ch. 1000 requirements. This horizontal separation may be reduced to a lesser distance with the addition of a continuous barrier, which might consist of landscaping and street trees, decorative rail and bollards, etc.

- Accommodate two-way bicycle travel with a minimum of 12' in width.

- Have carefully designed transitions at either end to connect to the on-street bicycle facilities regardless of facility type, which may include treatments such as bicycle boxes, special signage, and/or bicycle signals. Future consideration for how the Class I facility integrates with signal phasing at signalized intersections would be needed.

Given the setbacks identified in the Specific Plan as well as the planning guidance set forth in the *Grand Boulevard Initiative*, the space for a separated bikeway would come from the proposed building setbacks, rather than the existing El Camino Real right-of-way. Increasing the setbacks would significantly reduce the developable area on the adjacent sites. Plus, the transitions at each end and its short length (it would only span a few blocks) diminish its attractiveness as a useful bicycle facility. Therefore Class II bicycle lanes were considered.

Design Solutions – Bicycle Lanes

Class II bicycle lanes could ultimately provide a continuous separated on-street bicycle facility through Menlo Park connecting with planned future bicycle lanes in Atherton to the north and Palo Alto to the south. Therefore bicycle lanes are recommended as the ultimate solution. However, there are several segments south of the downtown where there is insufficient curb-to-curb width to accommodate bicycle lanes and additional right-of-way would be needed through property acquisition or dedication as the adjacent properties redevelop. Since bicycle lanes cannot be implemented in the near-term due to right-of-way constraints, it is recommended that this section of El Camino Real be designated a "Future Class II/Minimum Class III" bikeway, to allow for the Class III designation in the short-term and the goal of adding bicycle lanes in the future.

Other Considered Solutions

A conceptual alignment alternative at the rear of the envisioned buildings for these parcels was also considered but is not recommended. This alignment would have several negative consequences including:

- Potentially exposing cyclists to vehicles pulling into and out of parking spaces.
- Directing bicyclists to the backdoor of buildings rather than to the front entrances.
- Increasing personal safety and law enforcement concerns from an "eyes on the street" standpoint, by separating bicyclists from the active street life on El Camino Real that is envisioned under the Plan.
- Creating the need for additional property dedication or placing the pathway on private property thereby limiting maintenance access and creating management challenges

Ravenswood Avenue

Existing Conditions

The installation of a westbound bicycle lane on Ravenswood Avenue from Alma Street to El Camino Real was studied. East of Alma Street, Ravenswood Avenue has bicycle lanes in both directions that begin at Noel Drive. Within the Specific Plan area, an eastbound bicycle lane currently exists on Ravenswood Avenue from El Camino Real to the train tracks. Ravenswood Avenue has a 48' cross-section, with two travel lanes in each direction and a median with mature trees, opening up to a six-lane cross-section (totaling 68') at its intersection with El Camino Real. The travel lanes are 10 to 12' wide.

A 10'-wide sidewalk is present on the south side of the street. On the north side, there is no sidewalk from the Caltrain access road to El Camino Real; instead, pedestrian access is provided through the public plaza and walkways surrounding Menlo Center. A vegetated area separates the outside travel lane from the public walkway, with structured parking underneath it.

Design Solutions

The proposed roadway modifications and striping to accommodate a westbound bicycle facility is shown on **Figure 1**. Because of the narrow travel lanes east of the railroad right-of-way, a bicycle lane cannot be accommodated. Fehr & Peers recommends the portion from Alma Street to Noel Drive should be classified as Class III facility. A striping pattern consisting of either a 5'-wide green colored area with dashed white lines or "staccato" sharrows, which consists of closely spaced sharrow markings, could be provided through the Ravenswood Avenue/Alma Street intersection to identify where bicyclists should ride.

The bicycle lane would begin at the western extent of the railroad right-of-way and continue to El Camino Real. After the intersection at Merrill Street, the bicycle lane would shift away from the

curb, with a green "conflict zone" treatment and dashed white striping, and be located between the through lane and the right-turn pocket to El Camino Real.

In order to accommodate a 5′ westbound bicycle lane, the northern curb line would need to be moved back between El Camino Real and the railroad right-of-way and the median would need minor modifications. The adjustments to the median would preserve the existing mature trees located mid-block. The adjustment of the northern curb line would need to ensure that it would not conflict with the existing underground parking nor impact the existing pedestrian walkway.

Intersection vehicle lane additions and modifications to the southbound, northbound and eastbound travel directions at the intersection of El Camino Real and Ravenswood/Menlo Avenues have been recommended in Draft EIR Mitigation Measure TR-7b. Changes to the westbound approach/receiving lane are not included in the mitigation measure. The proposed modifications on **Figure 1** should be incorporated into the final design of the intersection improvements. Further detailed design would be needed to ensure the bicycle lane feasibility.

Since a westbound bicycle lane cannot be implemented in the near-term due to right-of-way constraints, and these actions may be cost prohibitive and/or have other negative effects, it is recommended that this section of Ravenswood Avenue be designated a "Future Class II/Minimum Class III" bikeway, to allow for the Class III designation in the short-term and the goal of adding a bicycle lane in the future.

Menlo Avenue

Existing Conditions

The Specific Plan area includes all of Menlo Avenue, from University Drive to El Camino Real. Over most of this area, Menlo Avenue is 40′ wide curb-to-curb with an 8′ parking lane and 12′ travel lane in each direction. Menlo Avenue has retail and commercial uses associated with the Downtown on its northern side and commercial uses and apartments on the southern side. At El Camino Real, Menlo Avenue widens to a 50′ cross section, with an 18′ westbound travel lane, 4′ painted median, 11′ eastbound shared left-turn and through lane, and a 17′ shared through and right-turn lane. The intersection of Menlo Avenue and El Camino Real is an active truck access point to downtown grocery stores and other businesses. Menlo Avenue continues across El Camino Real to become Ravenswood Avenue. Ravenswood Avenue has an existing eastbound bicycle lane from El Camino Real to Alma Street, where it drops. East of Noel Drive, Ravenswood Avenue has bicycle lanes in both directions. With these existing facilities, Menlo Avenue is a heavily-used bicycle route from points east of the railroad tracks through Downtown.

At the western end, cyclists were observed turning north on to/off of University Drive to jog north to the existing bicycle lanes on Santa Cruz Avenue west of University Drive. At the stop-sign controlled intersection with University Drive, Menlo Avenue's geometry comprises a 13′ right-turn lane, 11′ left-turn pocket, and a 14′ eastbound travel lane.

Design Solutions

On Menlo Avenue, one parking lane would need to be removed in order to accommodate a bicycle lane within the existing right-of-way. An illustration of how bike lanes would be accommodated is presented on **Figure 2**. . Parking removal on the southern side of the street may be more feasible, as the southern side of the street has fewer retail uses and the northern side is closer to downtown. Thirty-four (34) parking spaces would need to be removed.

Between El Camino Real and Johnston Lane, Menlo Avenue widens from a 40' to 50' cross-section. Between Doyle Street and Johnston Lane, an additional eastbound travel lane is added in the 40' cross section. A westbound bicycle lane can be striped in this section. There is insufficient space for an eastbound bicycle lane so sharrows should be considered. Pending future level of service analysis, the City could consider turning the existing shared through and right-turn lane at El Camino Real into a combined right-turn lane/bike lane to avoid right-hook conflicts between cars turning right onto El Camino Real and cyclists traveling straight through the intersection onto Ravenswood Avenue, as shown in **Figure 3.** The intersection approach design scheme is shown on **Figure 1**.

The Draft EIR for the Specific Plan identifies improvements at the intersection of El Camino Real and Ravenswood Avenue/Menlo Avenue to mitigate intersection operational impacts. The improvements include widening the Menlo Avenue approach to accommodate a left-turn lane, two through lanes, and a right-turn lane. These lane additions will likely require right-of-way acquisition. The proposed modifications on **Figure 1** could be incorporated into the final design of the intersection improvements. More detailed design would be needed to assess bicycle lane feasibility.

Many bicyclists travel between Menlo Avenue and Santa Cruz Avenue using a short portion of University Drive. The Menlo Avenue/University Drive intersection is a busy, offset intersection which can make it complex to navigate. Though other striping configurations were considered, dropping the westbound bicycle lane where the turn pocket begins allows bicyclists and motorists enough distance to negotiate their positing correctly prior to the intersection. For eastbound bicycle traffic, the eastbound and westbound outside travel lane widths should be reduced to accommodate a 5' eastbound bicycle lane at the intersection.

In the Specific Plan, Menlo Avenue will be designated as a "Future Class II/Minimum Class III" bikeway, to allow for the Class III designation in the short-term and the goal of striping bicycle lanes in the future.

El Camino Real: Class II Bicycle Lanes

Existing Conditions

Though the alignment and right-of-way shifts throughout the Specific Plan area, El Camino Real in downtown Menlo Park primarily consists of two through lanes in each direction, divided by a landscaped median. Outside of downtown, El Camino Real has three lanes in each direction. In the northern portion of El Camino Real, left- and right-turn pockets are typically added at

intersections. South of downtown, the three-travel lane cross section adds a left-turn pocket only at intersections, allowing shared through/right-turn lanes. In several segments, the outside travel lane is very wide, approximately 16 to 18' in width. On-street parking is present in some segments throughout the Specific Plan area.

Bicycle lanes from the Menlo Park/Atherton boundary to Encinal Avenue are already identified as planned facilities in the Draft Specific Plan. South of Encinal Avenue to the Menlo Park/Palo Alto city boundary, El Camino Real is currently planned as a Class III bicycle route.

Design Solutions

Bicycle lanes are proposed on El Camino Real in Atherton and in Palo Alto. Therefore it would be desirable to provide bicycle lanes on El Camino Real in Menlo Park to provide a continuous Class II bicycle facility throughout the region. Bicycle lanes would also meet Caltrans Complete Street specifications.

The curb-to-curb width varies throughout the corridor. Some segments have sufficient width to stripe bicycle lanes. In many segments on-street parking would need to be removed. In others, additional right-of-way would be needed to provide sufficient curb-to-curb width. Parking removal and right-of-way acquisitions are constraints that may make bicycle lanes infeasible in the near term.

Continuous Class II bicycle lanes are feasible on El Camino Real from the Atherton town limit to Valparaiso Avenue/Glenwood Avenue in the northbound and southbound directions. Bicycle lanes are also feasible between Valparaiso Avenue/Glenwood Avenue and Menlo Avenue/Ravenswood Avenue and are discussed in the *Task A – El Camino Real Street Sections Revision* memorandum to City staff, dated February 27, 2012. South of the downtown area, there are many right-of-way constraints that make continuous bicycle lanes infeasible at present. Fehr & Peers recommends classifying El Camino Real between Encinal Avenue and the Palo Alto border as a "Future Class II/Minimum Class III" facility. In the short-term, these segments would be designated a Class III bicycle route; however, bicycle lanes would be added with parking removal and when additional right-of-way can be acquired/dedicated as properties redevelop in the future. The required changes (reduced lane widths, parking removal, and right-of-way acquisition) to accommodate bicycle lanes on El Camino Real are presented on **Figure 4**.


Source: K_Gradinger/flickr.com

The majority of the Class II bicycle lanes will consist of 5' lanes; however, in some locations, sufficient width may be provided to accommodate buffered bicycle lanes. Buffered bicycle lanes are bicycle lanes that have a designated buffer space, typically striped, between the bicycle lane and the outside travel lane and/or parking lane. They may include additional measures such as soft-hit posts located in the striped buffer. Assuming sidewalk and median curb lines are not moved, the design solution – conventional bicycle lane or buffered

bicycle lane – must be considered on each side of the street on each block segment individually. That is, an 8′ parking lane on the eastern side could be restriped into a 2′ striped buffer and 6′ bicycle lane, while on the west side, a wide outside travel lane may accommodate a 5′ or 6′ bicycle lane with a reduced buffer or no buffer, as space allows.

Intersection Design Solutions

Though wide outside travel lanes and parking removal may allow for bicycle lanes in the mid-block sections, carrying bicycle lanes through the intersections along El Camino Real requires additional design considerations. In its northern portion, El Camino Real has 12′ to 13′ right-turn lanes. Several approaches to accommodate bicycles are possible. To fully accommodate a 5′ bicycle lane, right-turn pockets would have to be removed. Intersection operations would need to be evaluated to determine the implications of the right-turn pocket removal. Other options are striping a combined bicycle lane/turn-lane, as shown in **Figure 3**, or dropping the bicycle lane prior to intersections, which has both pros and cons. The combined bicycle lane/turn-lane would provide a suggested bicycle alignment at the intersection without turn-lane removal; however, it is not currently Caltrans or Manual Uniform Traffic Control Devices (MUTCD) approved though design guidance is provided in the NACTO *Urban Bikeway Guide*. Dropping the bicycle lane at the intersection is not a best practice in bikeway design. Dropping the bicycle lane does not provide guidance to cyclists or drivers in an important conflict zone, as right-turning drivers merge across to enter the turn-pocket.

In the southern section, the outside travel lane is a shared through/right-turn lane. The outside travel lane varies in width, with some intersections allowing the addition of a bicycle lane while other curb-to-curb distances are too narrow. As properties redevelop on both sides of the street, additional right-of-way may need to be acquired to accommodate bicycle lanes at intersections south of downtown. Additionally, a specific design solution would need to be devised for the Sand Hill Road/Alma Street/El Camino Real intersection in order to stripe future bicycle lanes through to the Menlo Park border, connecting to planned El Camino Real bicycle lanes in Palo Alto. The City should work with City of Palo Alto and Caltrans to create continuous bicycle lanes from Menlo Park to Palo Alto in the future.

Mid-Block Design Solutions

Fehr & Peers recommends the following measures to accommodate bicyclists on El Camino Real.

From the **Atherton town boundary to Encinal Avenue**, parking on the east side of the street (northbound direction) between Encinal Avenue and Stone Pine Lane would need to be removed to accommodate a Class II bicycle lane. The parking lane varies in width from 10 to 12′, and would allow for a 5′ bicycle lane with 5 to 7′ of buffer. North of Stone Pine Lane, a bicycle lane could be added with striping and narrowing the wide parking lane. In the southbound direction, the outside travel lane is adjacent to a paved shoulder that ranges from 3-5′ in width. Striping this area as a bicycle lane and widening the shoulder as needed would allow for a 5′ bicycle lane. At the intersection with Encinal Avenue, the southbound outside travel lane is wide and would allow for a 5′ bicycle lane and an 11′ travel lane. Bicycle lanes on this segment are already proposed in the City's *Comprehensive Bicycle Development Plan*.

From **Encinal Avenue to Valparaiso Avenue**, the northbound outside travel lane is approximately 17′ in width. This would allow for a 5′ bicycle lane, preserving the existing parallel parking. The southbound direction has three travel lanes and an unpaved dirt shoulder, approximately 6′ in width. Paving and striping this 6′ strip would allow for a bicycle lane. To accommodate cyclists at the intersection with Valparaiso Avenue, removing the existing curb on the northeast corner of the intersection should be analyzed. Removing that area would allow for a 5′ southbound bicycle lane at the intersection without removing a turn pocket or dropping the bicycle lane.

From **Valparaiso Avenue to Oak Grove Avenue**, 16 parking spaces on the east side of the street (northbound direction) would need to be removed to provide a Class II bicycle lane. Bicycle lanes can be striped within the wide outside travel lane in the southbound direction.

South of Menlo Avenue/Ravenswood Avenue, several isolated segments provide enough right-of-way to accommodate bicycle lanes; however, continuous bicycle lanes south of Menlo/Ravenswood Avenues are not currently feasible due to right-of-way constraints. This segment of El Camino Real may be able to accommodate bicycle lanes in the future should right-of-way acquisition occur as properties redevelop. Additional right-of-way could be needed in the following locations:

- Northbound from approximately 100′ north of Roble Avenue to Ravenswood Avenue
- Northbound from College Avenue to Middle Avenue
- Southbound from Live Oak Avenue to Middle Avenue
- Southbound from Cambridge Avenue to Harvard Avenue

Several segments of El Camino Real south of Menlo Avenue/Ravenswood Avenue may require parking removal (59 east side, 15 west side). Detailed parking analysis should be done to identify the exact number of spaces.

University Drive

Existing Conditions

The study area includes University Drive from approximately Rose Avenue to Oak Lane. However, in order to provide continuous bicycle lanes in the greater downtown area, University Drive was studied from Valparaiso Avenue to Middle Avenue. At Santa Cruz Avenue, the northern segment of University Drive jogs approximately 150′ to the west. The feasibility of facilities on the one-block section of Santa Cruz was considered in this analysis. The block-long segment of Santa Cruz Avenue consists of a travel lane and left-turn lane in each direction. The south side of the street has on-street parallel parking. The Santa Cruz Avenue bicycle lanes begin just to the west of this segment.

North of Santa Cruz Avenue and south of Menlo Avenue, University Drive has a 40′ cross section with one travel lane in each direction and two lanes of parking. Between Santa Cruz and Menlo Avenues, University Drive has a 35′ cross-section, with many autos and bicyclists making a southbound left on to Menlo Avenue to reach downtown and areas east of El Camino Real. The

cross-section consists of a travel lane in each direction with a two-way center left-turn lane. Additionally, this block-long stretch accesses public off-street parking lots for the Downtown area, including major trip generating uses such as grocery stores.

Design Solutions: Between Santa Cruz and Menlo Avenues and On Santa Cruz Avenue

Design solutions to accommodate bicycle lanes on University Drive are shown on **Figure 5**. University Drive between Santa Cruz and Menlo Avenues has an extremely constrained right-of-way, with no opportunity for lane removal to accommodate Class II facilities. It is recommended that this stretch of University, including the block-long jog at Santa Cruz Avenue, remain a Class III bicycle route with several striping enhancements, also shown on **Figure 5**. Sharrows should be considered on the portion along Santa Cruz Avenue.

At University Drive's intersection with Menlo Avenue, the southbound University Drive lane configuration should shift to allow for dedicated space for cyclists who are making a southbound left-turn onto Menlo Avenue. As shown on **Figure 5**, the southbound approach should be striped with a combined bicycle lane/left-turn lane, allowing for bicyclists and autos to share the turn pocket. The striping consists of a 4' minimum bicycle area inset on the left side of the turn pocket with a 4" dashed stripe between the bicycle area and auto area. This configuration indicates a preferred bicyclist positioning while allowing cars to use the area when cyclists are not present. The combined left-turn lane configuration should be striped on the existing left-turn pocket, breaking at the existing "Keep Clear" stenciling. Additionally, the existing lane widths should be modified so that the southbound through lane is 10' and the combined turn-lane is 12'.

Design Solutions: North of Santa Cruz Avenue and South of Menlo Avenue

Given the narrow right-of-way configuration of University Drive to the north of Santa Cruz Avenue and to the south of Menlo Avenue, one parking lane would need to be removed to accommodate Class II bicycle lanes in both directions as shown on **Figure 5**. From Valparaiso Avenue to Santa Cruz Avenue, 38 spaces on the east side or 40 west side parking spaces would be removed. From Menlo Avenue to Middle Avenue, 44 east side or 40 west side spaces would need to be removed. Because parking removal may be challenging in the short-term, it is recommended that University Drive north of Santa Cruz Avenue and south of Menlo Avenue be designated as a "Future Class II/Minimum Class III" facility.

Middle Avenue

Existing Conditions

The Specific Plan area encompasses Middle Avenue from El Camino Real to just east of Kenwood Drive. Middle Avenue is 42' curb-to-curb, with a 20' westbound travel lane, 12' left-turn lane, and a 10' right-turn lane. Within the Specific Plan area, the adjacent land uses consist of a shopping center and a gas station, transitioning to single family housing, with no parking allowed on the north side of the street during all times of the day and from 7:00 am to 7:00 pm on the south side of the street. West of the Specific Plan area, Middle Avenue has a travel lane and parking lane in each direction with single family housing on both sides of the street. In the residential area,

posted parking restrictions consist of 2-hour parking from 7:00 am to 7:00 pm. The Little House Activity Center and Nealon Park and the Menlo Atherton Nursery School are also located to the west of the Specific Plan area.

The Specific Plan proposes a possible extension of Middle Avenue as a public access area to future development on the east side of El Camino Real. The Plan also assumes a proposed and previously studied bicycle and pedestrian grade-separated crossing of the railroad tracks at Middle Avenue. As such, potential design solutions were assumed to continue through the intersection with El Camino Real.

Design Solutions

In order to accommodate 5' bicycle lanes on Middle Avenue, parking would need to be removed from University Drive to approximately 150' east of University Drive (4 south side spaces) and from 100' west of Morey Drive to El Camino Real (13 north side or 12 south side parking spaces). Parking would not need to be removed in front of Little House, where the outside travel lane is 20' in width. One concern is that vehicles parking in the perpendicular spaces adjacent to Nealon Park would have to back into the bicycle lane to exit the spaces. Parking utilization should be studied along Middle Avenue to confirm that a sufficient number of spaces would be retained if one lane was removed. As a result, Middle Avenue from University Drive to El Camino Real should be designated a "Future Class II/Minimum Class III" bikeway in the plan.

When bicycle lanes are striped, a combined bicycle lane/right-turn lane at the intersection of Middle Avenue and El Camino Real should be striped to facilitate bicycle traffic across El Camino Real to access the Middle Avenue crossing. Should automobiles be allowed to make a through movement onto a future Middle Avenue extension once the area is redeveloped, the left-turn lane could become a shared left- and through-lane, with the right-turn pocket remaining a combined bicycle lane/right-turn only lane to prevent right-hook auto/bicyclist collisions. The westbound bicycle lane would be created by narrowing the westbound through lane. The proposed mitigation measure at this intersection identified in the Draft EIR is to add a second northbound left-turn lane which would require two receiving lanes on westbound Middle Avenue. A detailed design would need to be conducted to determine the feasibility of a bicycle lane in this segment.

Prior to the intersection and gas station driveway, the bicycle lane should shift from running against the curb to its eventual alignment between the left- and right-turn pockets. This area should be demarcated by dashed white striping on the outside of the bicycle lanes, with the optional application of a 6'-wide green-colored asphalt strip to further highlight the conflict zone. This is presented conceptually on **Figure 6**.

Encinal Avenue

Existing Conditions

Existing and proposed pedestrian and bicycle facilities were evaluated on Encinal Avenue within the Specific Plan area in support of safe routes to school. Encinal Elementary School is located approximately 0.5 miles to the east of the Specific Plan area, prompting a review of the adequacy

of pedestrian and bicycle facilities linking the school and downtown. The existing curb-to-curb dimension of Encinal is 40', reflecting a parking lane and through lane in each direction. At its intersection with El Camino Real, Encinal Avenue has a wide receiving lane, right-turn pocket, and shared through- and left-turn lane. Crossings are marked on the north and west legs of the intersection. Within the Specific Plan Area, Encinal Avenue has sidewalks on both sides of the street.

Outside of the Specific Plan area, just east of the railroad tracks, Encinal Avenue has no sidewalks. From Felton Drive to Middlefield Road, a sidewalk is present on the north side of Encinal only. Eastbound and westbound bicycle lanes begin east of the railroad tracks and continue to Middlefield Road.

Design Solutions

Within the Specific Plan area, Encinal Avenue was observed to have adequate pedestrian facilities and does not have additional room within the right-of-way for the continuation of the existing bicycle lanes to the west. The City may consider reviewing the pedestrian- and bicycle-related signage for compliance with 2010 MUTCD Part 7, School Signage.

East of the Specific Plan area, Encincal Avenue may be a candidate for sidewalk improvements under a safe routes to school grant. Given the narrow width of the paved area on Encinal, the City should review the boundaries of the city-owned right-of-way to determine if it is wide enough to provide for a sidewalk.

Valparaiso Avenue

Existing Conditions

Valparaiso Avenue is a two-lane roadway with bicycle lanes in both directions. A parking lane and sidewalk are provided on the south side of Valparaiso Avenue only. The westbound bicycle lane is 7′ in width and has a very wide concrete gutter pan. The Specific Plan area includes approximately one block of Valparaiso Avenue, ending at Victoria Drive. In this area adjacent to its intersection with El Camino Real, Valparaiso Avenue widens to one receiving lane with eastbound left-turn, through, and right-turn lanes and a through bicycle lane between the through and right-turn lanes.

Outside of the Specific Plan area, the Menlo School is located at the intersection of Valparaiso Avenue and University Drive. Just east of University Drive, the westbound bicycle lane splits off from the roadway and becomes a paved asphalt path, reconnecting with the roadway just west of the school's driveway. There is no north sidewalk in front of the school; however, the northern side of Valparaiso Avenue is in the Town of Atherton. On the west side of the intersection, there is a sidewalk gap on the southern side of Valparaiso from the University Drive intersection approximately 80′ to the west. The sidewalk gap is also the site of a SamTrans bus stop.

Design Solutions

Within the Menlo Park city boundaries, a marked crossing could be considered on the south leg of Valparaiso Avenue's intersection with Hoover Street. Outside of the Specific Plan area, the City should strongly consider completing the sidewalk gap closure just west of University Drive with a safe routes to school grant funding source. These improvements are presented on **Figure 7**.

Bicycle Sharing

Bicycle sharing refers to programs that make a fleet of shared bicycles available typically for short-term public use and may require a fee. Bicycle pods store the fleet of bicycles and are located throughout an area—whether that be a private campus, particular district, or city, allowing users to check out a bicycle and return it to the same station or any other station in the network. Locally, the first phase of the Bay Area Air Quality Management District (BAAQMD) Bicycle Share Pilot program will include the Caltrain corridor in San Francisco, Mountain View, Palo Alto, Redwood City and San Jose. The project is funded through a combination of local, regional and federal grants with major funding coming from the Metropolitan Transportation Commission's Innovative Bay Area Climate Initiatives Grant Program (BACI). This pilot program will be implemented in 2012-2014 in the above listed communities. Subsequent investments in the Bay Area bicycle share system and additional implementation will be determined based on the success/findings from the pilot program. One of the primary lessons to be learned from the Caltrain corridor sites (Redwood City, Palo Alto, and Mountain View) will be how to site and operate bicycle share pods in smaller transit-served downtowns. Bicycle share systems globally have to date been located in major cities with significant density and tourism providing support for both membership and point of use customer groups. While Menlo Park may not share these characteristics, the City might reexamine the viability of bicycle sharing as lessons are learned from Peninsula cities included the BAAQMD Pilot Program.

Bicycle Parking

Section F.5 of the Draft Specific Plan provides standards and guidelines for the provision and siting of bicycle parking within the Specific Plan area, many of which meet the requirements of Leadership in Energy and Environmental Design, Neighborhood Design (LEED-ND). Though the standard requires new commercial development outside of the downtown to provide secure bicycle parking facilities on-site and may provide the bicycle parking necessary to qualify for the corresponding LEED-ND credit, these bicycle parking guidelines may not be enforceable, as

bicycle parking is not currently included in the existing off-street parking requirements set forth in the Draft Specific Plan.

For the purpose of the Specific Plan, it is recommended that the plan replace the existing discussion of standards and guidelines related to LEED-ND with the bicycle parking requirements presented in **Table 1**, which presents Association of Bicycle and Pedestrian Professionals (APBP)'s *Bicycle Parking Guidelines* bicycle parking generation by land use with modification to the requirements for residential uses. These requirements would be applied to uses both within and outside downtown.

APBP's *Bicycle Parking Guidelines* also provides detailed information on design, materials and coatings, and spacing of racks and bicycle lockers. The document should be consulted to provide more specific guidance on types of short-term (used for visitors and guests) and long-term (used for employees and residents) bicycle parking preferred by the City and cyclists to avoid designs that do not offer two points of contact to support the bicycle from falling over or do not allow a U-lock to secure the bicycle frame and one wheel. Additionally, the *Caltrain Bicycle Parking and Access Plan* provides additional guidance on bicycle parking and access.

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TABLE 1
LONG-TERM AND SHORT-TERM BICYCLE PARKING REQUIREMENTS BY LAND USE TYPE

Land Use	Long-Term Bicycle Parking Requirement (Employees and Residents)	Short-Term Bicycle Parking Requirement (Visitors and Guests)
Commercial		
Retail-general food sales or groceries	1 space for each 12,000 SF of floor area. Minimum requirement 2 spaces.	1 space for each 2,000 SF of floor area. Minimum requirement 2 spaces.
Retail-general retail	1 space for each 12,000 SF of floor area. Minimum requirement 2 spaces.	1 space for each 5,000 SF of floor area. Minimum requirement 2 spaces.
Office	1 space for each 10,000 SF of floor area. Minimum requirement 2 spaces	1 space for each 20,000 SF of floor area. Minimum requirement 2 spaces
Automotive sales, rental, and delivery; automotive servicing; automotive repair and cleaning	1 space for each 12,000 SF of floor area. Minimum requirement 2 spaces	1 space for each 20,000 SF of floor area. Minimum requirement 2 spaces
Off-street parking lots and garages available to the general public (with or without fee)	1 space for each 20 automobile spaces. Minimum requirement is 2 spaces. Unattended surface parking lots excepted.	Minimum of 6 spaces or 1 per 20 auto spaces. Unattended surface parking lots excepted.
Residential		
Single Family Dwelling	No spaces required.	No spaces required.
Multi-Family Dwelling-with private garage for each unit[1]	No spaces required.	1 per 10 units.
Multi-Family Dwelling-without private garage for each unit	1 per unit.	1 per 10 units.

1. A private locked storage unit may be considered as a private garage if a bicycle can fit in it.

Source: Association of Bicycle and Pedestrian Professionals (APBP), *Bicycle Parking Guidelines*, 2010, with modifications.

Wayfinding Signage

Source: oaklandlocal.com

Signage that easily and effectively guides cyclists to major destinations within Menlo Park and neighboring communities and on to major east/west and north/south routes is important for making bicycling comfortable and intuitive for a wide variety of users. The existing Draft Plan contains many references to the importance of pedestrian wayfinding in the Plan Area; however, it includes no specific references to wayfinding for cyclists.

The City has implemented the first phase of a bicycle wayfinding signage program in the Willows neighborhood. The second phase is under review by the Bicycle Commission for the western portion of the city. The conclusions and recommendations of the commission should include standards and guidelines related to the design of signs, information to be included on them, and their location along major bicycle routes. To be most effective, wayfinding should be implemented through the City's bicycle network and integrated into the next update of the City's *Comprehensive Bicycle Development Plan*.

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REFERENCES

Association of Pedestrian and Bicycle Professionals (APBP), *Bicycle Parking Guidelines: A Set of Recommendations*, 2nd Edition (2010).

Caltrain Bicycle Parking and Access Plan (October 2008).

City of Menlo Park, Zoning Ordinance (December 2010).

Design Guidelines for Bicycle Wayfinding Signage, City of Oakland (July 2011).
http://www2.oaklandnet.com/oakca/groups/pwa/documents/report/oak025118.pdf

El Camino Real and Downtown Menlo Park Specific Plan, DRAFT.

Field Observations performed by Fehr & Peers, Wednesday, January 4, 2012.

Final Grand Boulevard Multimodal Transportation Corridor Study (October 2010).

National Association of City Transportation Officials, *Urban Bikeway Guide*, 2010.
http://nacto.org/cities-for-cycling/design-guide/

ATTACHMENTS

TABLE A-1
PARKING INVENTORY ALONG FUTURE CLASS II/MINIMUM CLASS III BIKEWAYS

Street	To	From	Number of Parking Spaces	
North/South Roadways			**East Side of Street**	**West Side of Street**
El Camino Real (North of Menlo/Ravenswood Avenue)[1]	Encinal Avenue	Valparaiso Avenue	0	0
	Valparaiso Avenue	Oak Grove Avenue	16	-
	Oak Grove Avenue	Santa Cruz Avenue	0[3]	0[3]
	Santa Cruz Avenue	Menlo Avenue/Ravenswood Avenue	0[3]	0[3]
		Total	**16**	**0**
El Camino Real (South of Menlo/Ravenswood Avenue)[1]	400' north of Middle Avenue	Middle Avenue	11	-
	Middle Avenue	College Avenue	-	8
	College Avenue	Partridge Avenue	11	4
	Partridge Avenue	Cambridge Avenue	11	-
	Cambridge Avenue	Harvard Avenue	10	-
	Harvard Avenue	200' north of Creek Drive	16	3
		Total	**59**	**15**
University Drive (North)[2]	Valparaiso Avenue	Rose Avenue	16	16
	Rose Avenue	Millie Avenue	6	6
	Millie Avenue	Oak Grove Avenue	2	4
	Oak Grove Avenue	Santa Cruz Avenue	14	14
		Total	**38**	**40**
University Drive (South)[2]	Santa Cruz Avenue	Menlo Avenue	-	-
	Menlo Avenue	Oak Lane (SB), Live Oak Avenue (NB)	5	5
	Oak Lane	Live Oak Avenue	2	3
	Live Oak Avenue	Roble Avenue	7	5
	Roble Avenue	Florence Lane	7	9
	Florence Lane	Alice Lane	13	9
	Alice Lane	Middle Avenue	10	9
		Total	**44**	**40**
East/West Roadways			**South Side of Street**	**North Side of Street**
Menlo Avenue[2]	University Drive	Evelyn Street	1	3
	Evelyn Street	Crane Street	10	9
	Crane Street	Chestnut Street	8	6
	Chestnut Street	Curtis Street	9	7
	Curtis Street	Doyle Street	6	9
	Doyle Street	El Camino Real	-	-
		Total	**34**	**34**
Middle Avenue[4]	University Drive	150' east of University Drive	4	-
	Blake Street	Morey Drive	2	4
	Morey Drive	Kenwood Drive	5	5
	Kenwood Drive	El Camino Real	5	4
		Total	**16**	**13**

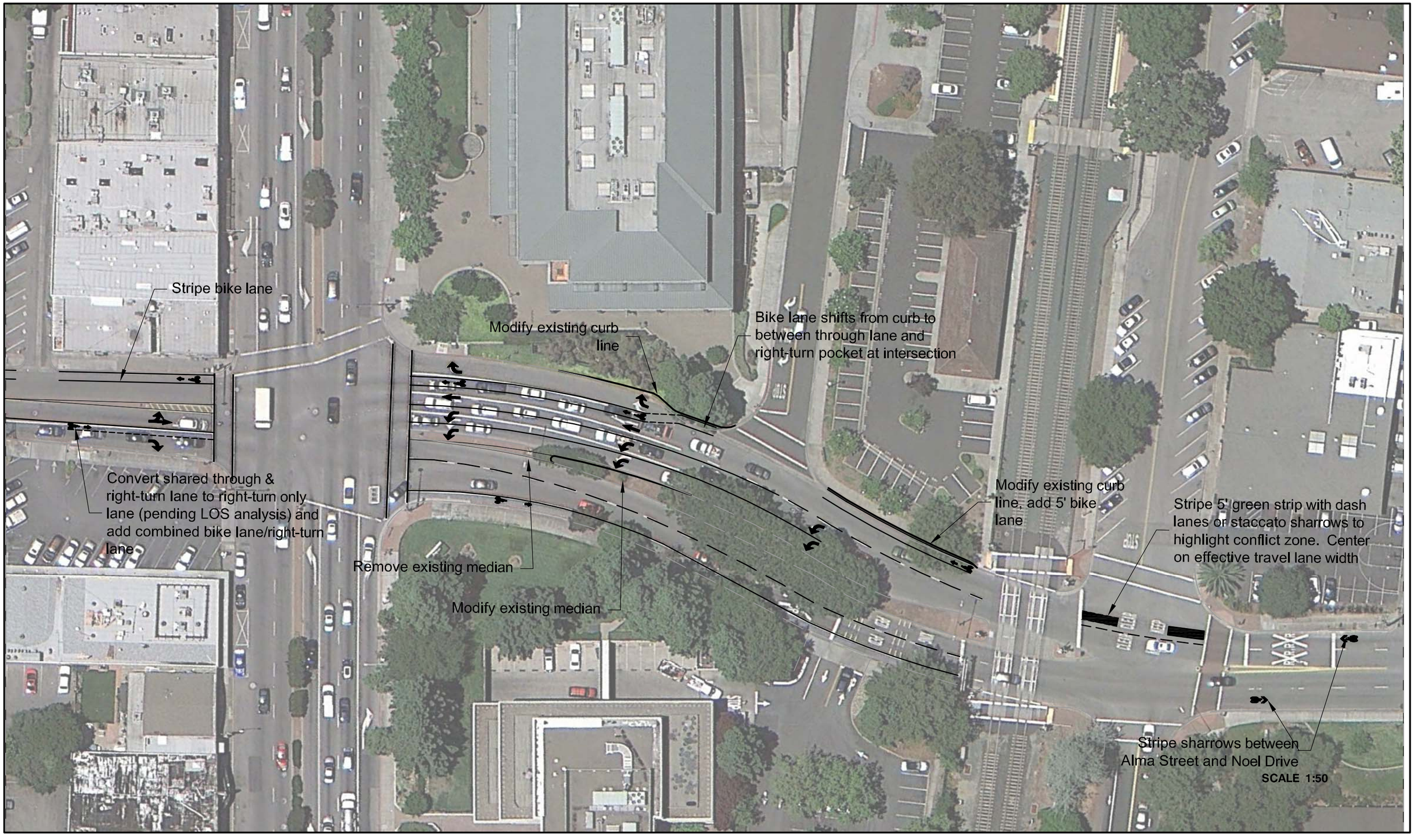
1. Parking inventory for El Camino Real is only shown if it would need to be removed in order to accommodate a bicycle lane. For El Camino Real only, parking may need to be removed in both directions to accommodate bicycles lanes. Detailed analysis is required to identify the exact number of parking spaces south of Menlo Avenue/Ravenswood Avenue.

2. Only one parking lane would need to be removed to allow for two bicycle lanes. The parking estimates include the parking inventory for the whole Future Class II/Minimum Class III segment, which may include areas outside of the Study Area.

3. Up to 19 parking spaces total could be removed in downtown, depending on the preferred cross-section.

4. To accommodate bicycle lanes on Middle Avenue, parking would only have to be removed eastbound from University Drive to approximately 150' east of University Drive and on one side of the street from approximately 100' west of Morey Drive to El Camino Real. Whether eastbound or westbound parking spaces are chosen for removal, the 4 spaces from University Drive to 150' east of University Drive would also have to be removed in order to accommodate the bicycle lanes at the University Drive/Middle Avenue intersection.

Source: Fehr & Peers, 2012. Parking estimates based on field observations and Google Earth.



FEHR & PEERS

RAVENSWOOD AVENUE & MENLO AVENUE APPROACH TO EL CAMINO REAL
CONCEPTUAL DESIGN FOR POTENTIAL BICYCLE LANES

FIGURE 1

Mar 19, 2012 FPA
N:\PROJECTS\Other_Office_Projects_SJ Projects\SJ09-1089 Menlo Park Downtown Specific Plan ADD ON\Ravenswood CAD_Plot_Styles.dwg

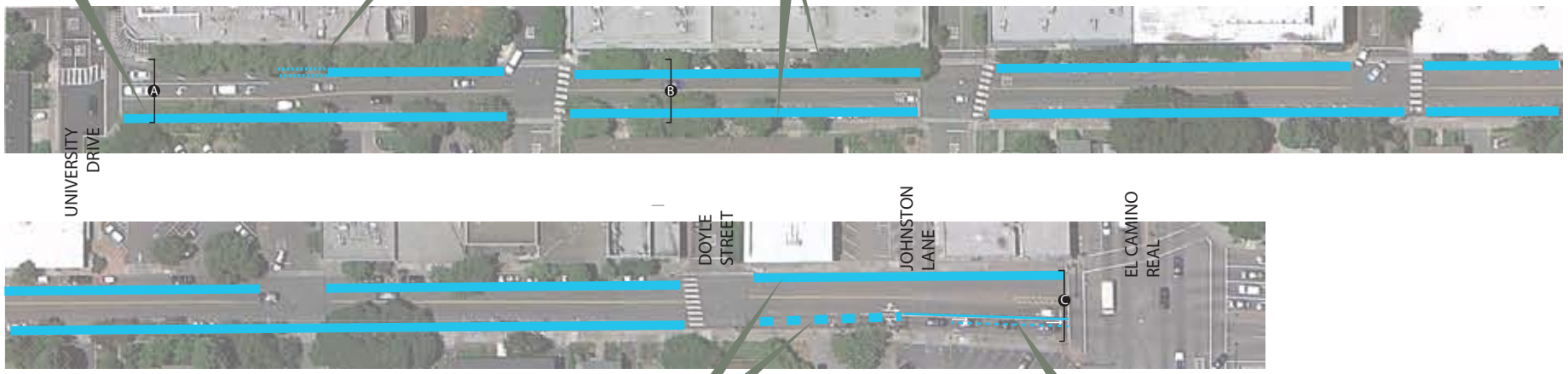
Menlo Avenue

Menlo Avenue at University Drive
DESIGN SOLUTION
-Narrow eastbound & westbound travel lanes to allow for 5' eastbound bike lane beginning at the intersection

Menlo Avenue at University Drive
DESIGN SOLUTION
-Drop bicycle lane before intersection

Menlo Avenue, University Drive to El Camino Real
DESIGN SOLUTION
-Stripe 5'-wide Class II Bicycle Lanes

DESIGN REQUIREMENTS
-Requires removal of one lane of parking, the southside is recommended given limited retail uses and proximity to downtown on the north side



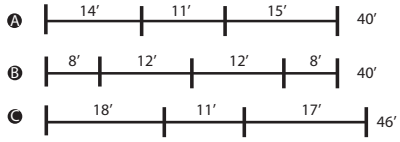
KEY
Ultimate Design
Bicycle Route
Bicycle Lane

Menlo Avenue , from Doyle Street to Johnston Lane
DESIGN SOLUTION
-Stripe sharrows in eastbound outside travel lane where Menlo Avenue adds a travel lane
-Stripe westbound bicycle lane

DESIGN REQUIREMENTS
-Reduce width of westbound travel lane

Menlo Avenue at El Camino Real
DESIGN SOLUTION
-Consider converting shared through & right-turn lane into a right-turn only lane
-Add combined bicycle lane/right-turn lane

EXISTING CROSS-SECTIONS

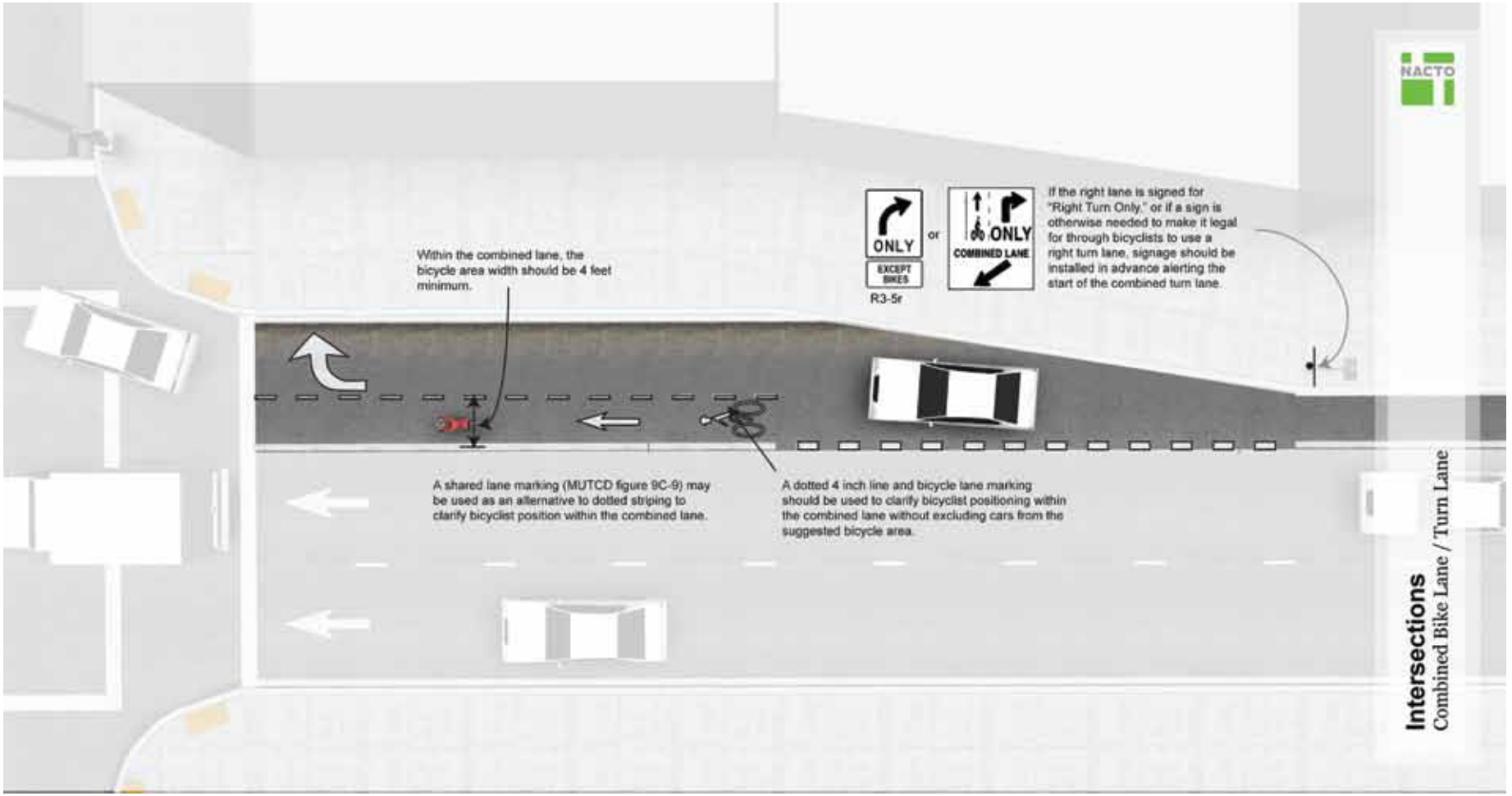


PARKING SPACES TO BE REMOVED

34 WEST SIDE or EAST SIDE SPACES
(UNIVERSITY DRIVE
TO EL CAMINO REAL)

RECOMMENDATION

Designate Middle Avenue as Future Class II/Minimum Class III.



N

NOT TO SCALE

Source: National Association of City Transportation Officials, *Urban Bikeway Guide*, 2010.
http://nacto.org/cities-for-cycling/design-guide/

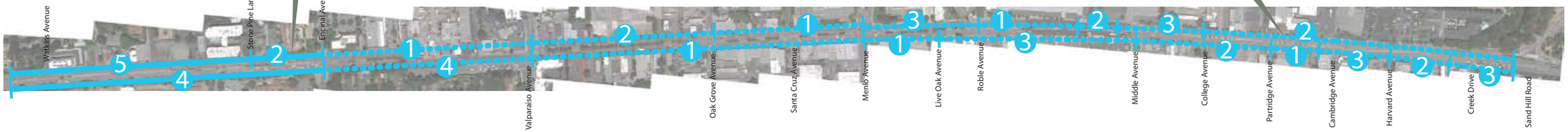
El Camino Real

El Camino Real, Menlo Park/Atherton boundary to Menlo Avenue/ Ravenswood Avenue
DESIGN SOLUTION
-Stripe Class II bicycle lanes, including buffer (painted and/or soft-hit posts, as shown at right) as space allows

DESIGN REQUIREMENTS
-Add striping for bicycle lanes by narrowing outside travel lanes or by removing parking (from Valparaiso to Oak Grove Avenues)
-Bicycle lanes may need to be dropped at intersections, depending on right-of-way constraints

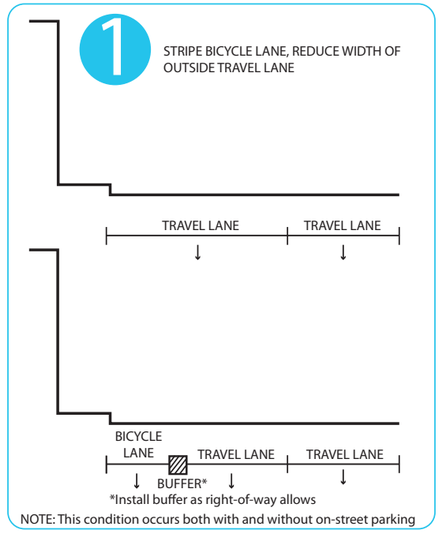
El Camino Real, from Menlo Avenue/Ravenswood Avenue to Menlo Park/Palo Alto boundary
DESIGN SOLUTIONS
-Consider Class II bicycle lanes in future through parking removal and right-of-way acquisition as properties redevelop

DESIGN REQUIREMENTS
-Reduce width of outside travel lane and remove parking, as necessary
-Acquire right-of-way in currently constrained areas

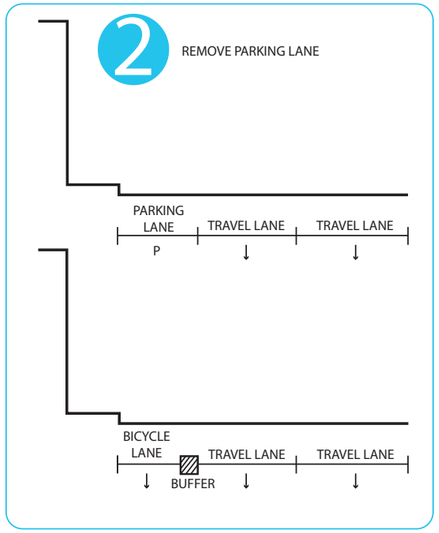


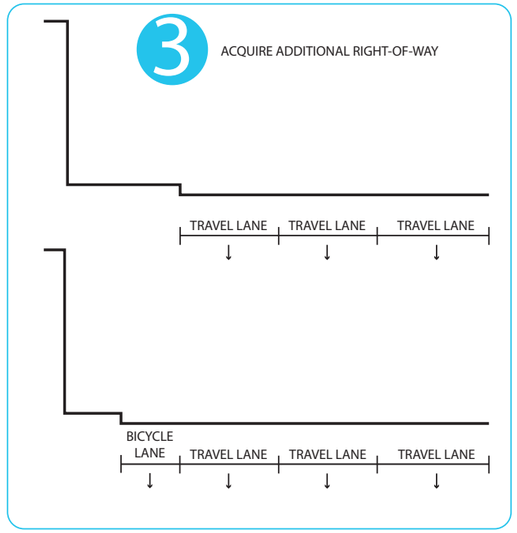
KEY
- Class II Bicycle Lane
- Future Class II/Minimum Class III

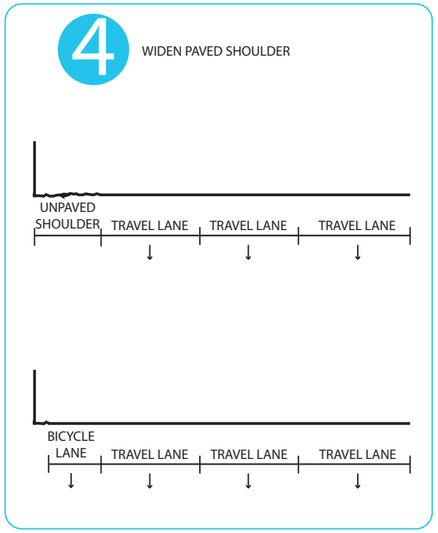
BICYCLE LANE DESIGN REQUIREMENTS

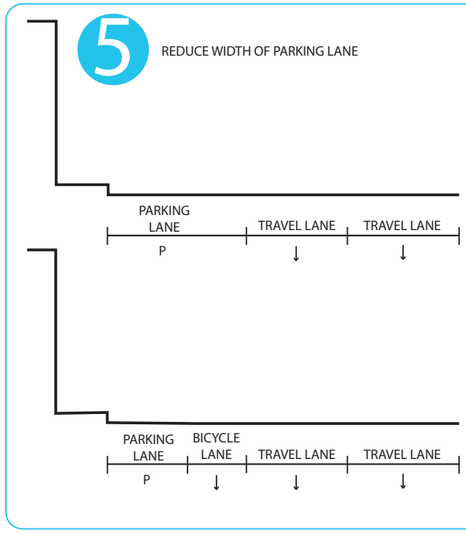


NOTE: This condition occurs both with and without on-street parking









RECOMMENDATION

El Camino Real north of Encial Avenue is recommended as future Class II bicyle lanes. El Camino Real south of Encinal Avenue is recommended as Future Class II/Minimum Class III due to right-of-way constriants.

PARKING SPACES TO BE REMOVED

NORTH OF RAVENSWOOD:	SOUTH OF RAVENSWOOD:
21 SPACES EAST SIDE (OAK GROVE AVENUE TO STONE PINE LANE)	59 SPACES EAST SIDE + 15 SPACES WEST SIDE (ROBLE AVENUE/MENLO AVENUE TO MENLO PARK/PALO ALTO BOUNDARY)

N

NOT TO SCALE

FEHR PEERS

EL CAMINO REAL BICYCLE LANE FEASIBILITY & RECOMMENDATIONS

FIGURE 4

University Drive

University Drive, between Valpariso Avenue and Santa Cruz Avenue
DESIGN SOLUTION
-Stripe 5' Class II bicycle lanes

DESIGN REQUIREMENTS
-Need to remove one lane of on-street parking

Santa Cruz Avenue, between eastern + western University Drive
DESIGN SOLUTION
-Paint sharrows on Santa Cruz Avenue, with the facility remaining a Class III bike route

University Drive, between Menlo Avenue and Middle Avenue
DESIGN SOLUTION
-Stripe 5' Class II bicycle lanes

DESIGN REQUIREMENTS
-Need to remove one lane of on-street parking

PARKING SPACES TO BE REMOVED

38 EAST SIDE OR 40 WEST SIDE SPACES
(VALPARAISO AVENUE TO
SANTA CRUZ AVENUE)

44 EAST SIDE OR 40 WEST SIDE SPACES
(SANTA CRUZ AVENUE TO
MIDDLE AVENUE)

EXISTING CROSS-SECTION

University Drive, between Santa Cruz Avenue and Menlo Avenue
DESIGN SOLUTION
-Stripe shared southbound left-turn lane on University Drive in support of cyclists making the southbound left on to Menlo Avenue
-Widen left-turn lane to 12' and narrow through lane to 10'

DESIGN REQUIREMENTS
-No lane removal required: bicycle lane is striped on eastern edge of existing turn pocket per image below from NACTO Urban Bikeway Guide

KEY
Ultimate Design
Bicycle Route
Bicycle Lane

N

NOT TO SCALE

RECOMMENDATION

Designate University Drive as Future Class II/Minimum Class III.

Middle Avenue

Middle Avenue, west of Specific Plan border
DESIGN SOLUTION
-Stripe 5′ Class II bike lanes

DESIGN REQUIREMENTS
-Bike lanes require removal of one parking lane
-Conduct parking utilization to verify low utilization levels and to determine which parking lane to remove.

Middle Avenue, between Specific Plan border & El Camino Real
DESIGN SOLUTION
-Stripe 5′ Class II Bicycle Lanes
-Stripe combined bicycle lane/right-turn lane at intersection with El Camino Real per NACTO Urban Bikeway Guidance (striping of dashed bike transition lane may change depending on bicycle lane alignment)

DESIGN REQUIREMENTS
-Reduce outside travel lanes to 11′

KEY
Ultimate Design
Bicycle Lane

EXISTING CROSS-SECTION

PARKING SPACES TO BE REMOVED

4 SPACES +
12 NORTH SIDE or 13 SOUTH SIDE SPACES
(UNIVERSITY DRIVE TO 150′ TO THE EAST +
100′ WEST OF MOREY DRIVE TO EL CAMINO REAL)

RECOMMENDATION

Designate Middle Avenue as Future Class II/Minimum Class III.

Valparaiso Avenue

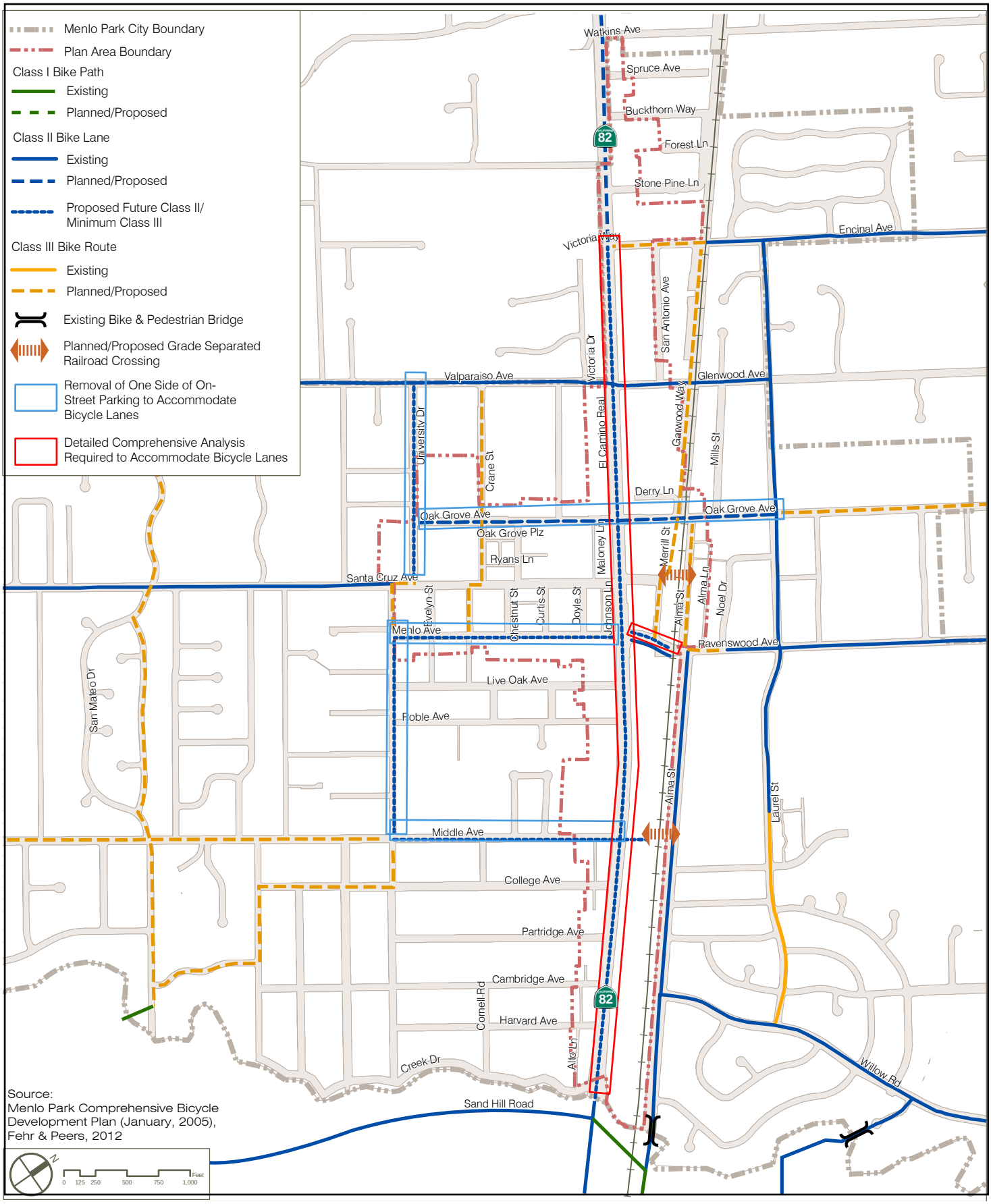
Valparaiso Avenue, just west of University Drive
DESIGN SOLUTION
-Close sidewalk gap under separate planning grant effort

Hoover Street at Valparaiso Avenue
DESIGN SOLUTION
-Consider striping crossing

KEY
Proposed sidewalk
Proposed Crossing

N

NOT TO SCALE



FEHR PEERS

Existing & Planned Bicycle Facilities

February 2012
SJ09-1089

Figure 8