05 PROPOSED BIKEWAY NETWORK

This chapter presents the recommended bikeway network, which supports a vision for Berkeley where bicycling is safe, comfortable, and convenient for people of all ages and abilities.

Recommendations were guided by the Plan's goals and policies, a data-driven safety and demand analysis, and extensive community input. Through this process emerged an overarching bikeway network vision: a continuous and connected system of "Low Stress" bikeways that provide safe and comfortable travel for all users and link to all key destinations in Berkeley. Figure 5.1 illustrates the Low Stress Bikeway Network Vision showing how low-traffic bicycle boulevards, separated major-street bikeways and multi-use paths, all with safe intersection crossings, can form a network that 79% of Berkeley's population would feel comfortable bicycling on.

Safety considerations are especially important for parents riding with their children, or for older children riding independently. And in terms of the potential for reducing traffic congestion and helping to achieve the City's climate action goals, school trips account for a significant portion of morning auto traffic and yet are often less than a mile in length. Therefore it was important that the Low Stress Network connect to as many schools in Berkeley as possible, and allow parents and children within a given enrollment area to have the option of a completely low stress trip from their residence to school. Figure 5.2 illustrates the Low Stress Network in relation to Berkeley's schools; as shown nearly all the city's schools are within 1/8 of a mile (approximately 1 block) from a Low Stress facility.

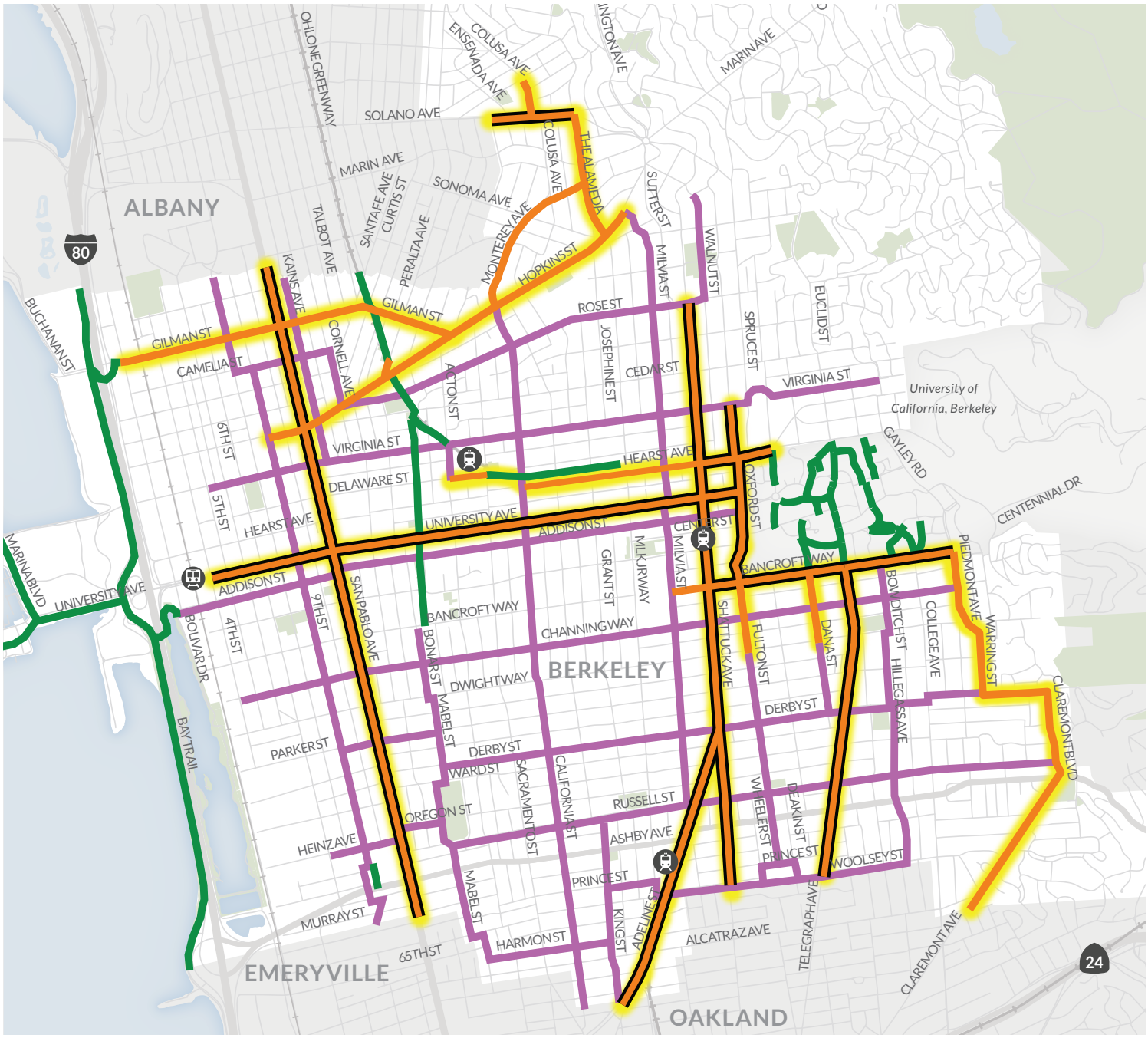

FIGURE 5-1: LOW-STRESS BIKEWAY NETWORK VISION

- PAVED PATH
- BICYCLE BOULEVARD NETWORK
- CYCLETRACK [4]

COMPLETE STREET CORRIDOR STUDIES - LOW STRESS BIKEWAY RECOMMENDATION

- STUDY CYCLETRACK [4]*
- PRIMARY TRANSIT ROUTE - STUDY CYCLETRACK [4]*

**Complete Street Corridor Studies are proposed multimodal transportation studies, not planned projects. Class IV Cycle Tracks and other bikeway types that might impact transit operations, parking, or roadway capacity will not be implemented without Complete Street Corridor Studies that will include a traffic study, environmental analysis, public process, and coordination with all affected State, County, and local transit agencies. Potential bikeways to be considered as part of future Complete Street Corridor Studies will be evaluated in the context of the modal priorities established by the Berkeley General Plan Transportation Element and the Alameda County Transportation Commission Countywide Multimodal Arterial Plan, as well as recommendations from AC Transit's Major Corridors Study. For further information, see Section 5.7 of the Berkeley Bicycle Plan.*

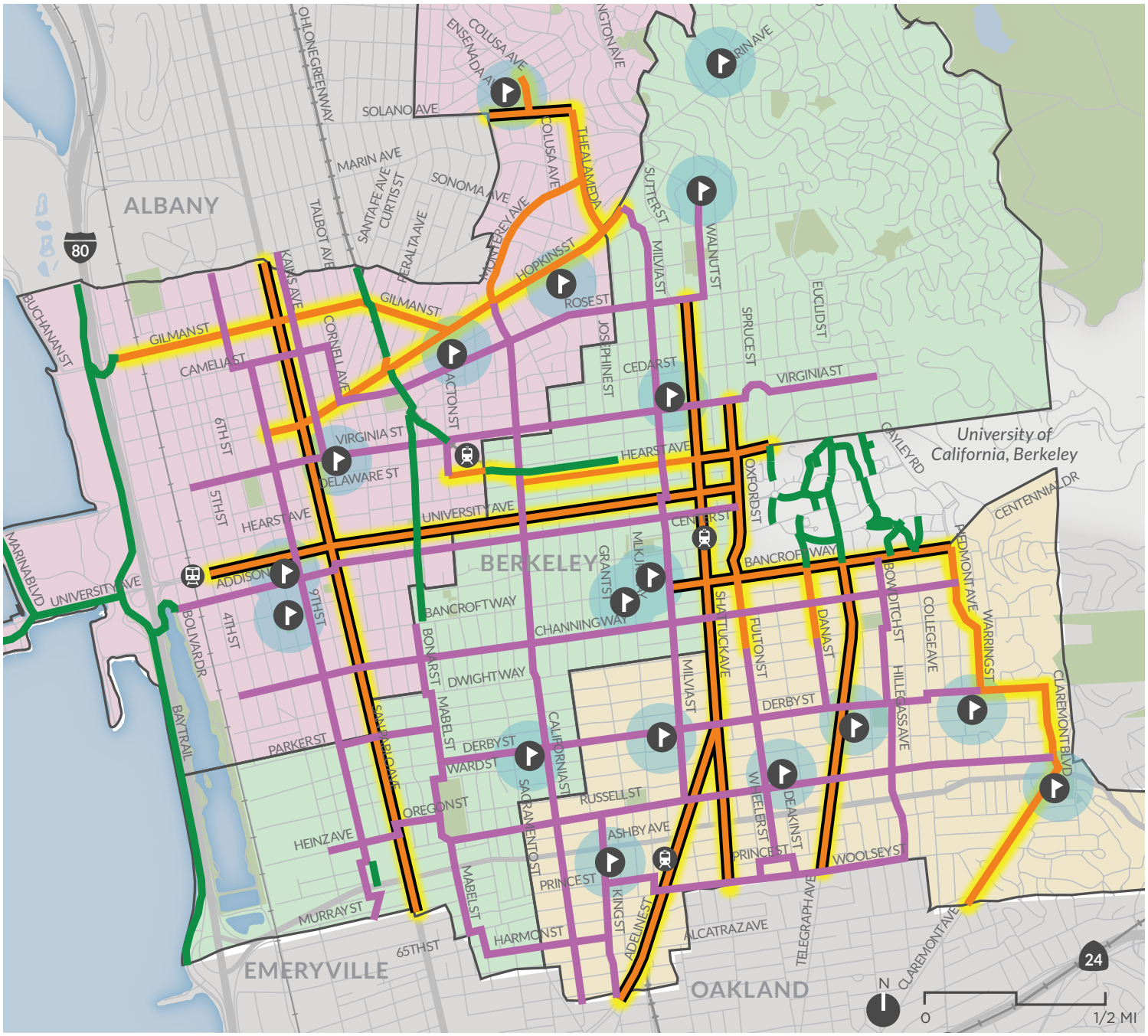

FIGURE 5-2: LOW-STRESS BIKEWAY NETWORK VISION WITH BERKELEY SCHOOLS

- PAVED PATH
- BICYCLE BOULEVARD NETWORK
- CYCLETRACK [4]

COMPLETE STREET CORRIDOR STUDIES - LOW STRESS BIKEWAY RECOMMENDATION

- STUDY CYCLETRACK [4]*
- PRIMARY TRANSIT ROUTE - STUDY CYCLETRACK [4]*

- SCHOOL WITH 1/8 MILE BUFFER
- ENROLLMENT BOUNDARIES

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5.1 PROJECT RECOMMENDATION CATEGORIES

Berkeley's bikeway network recommendations are described in detail on the following pages and have been grouped into five categories:

1. **Bicycle Boulevards**
   a. New and Enhanced Bicycle Boulevard Segments
   b. Bicycle Boulevard Crossing Improvements
2. **Downtown and UC Berkeley Campus Area Projects**
3. **Ohlone Greenway Improvements**
4. **Upgrades to Existing Class II Bike Lanes and Class III Bike Routes**
5. **Citywide Recommendations**
6. **Complete Street Corridors**

Figures 5-3 and **5-4** display the recommended bicycle network and future studies. The associated costs for each project and description of the implementation process can be found in **Chapter 6: Implementation**.

Table 5-1 summarizes the miles of recommended bikeways by project type.

***Table 5-1:** Summary of Project Recommendations*

TYPE	MILEAGE
Class 1A: Paved Path	1.5
Class 2A: Standard Bike Lane	0.1
Class 2B: Upgraded Bike Lane	3.0
Class 3C: Sharrows	13.9
Class 3E: Bicycle Boulevard	12.4
Class 4: Cycletrack	18.4

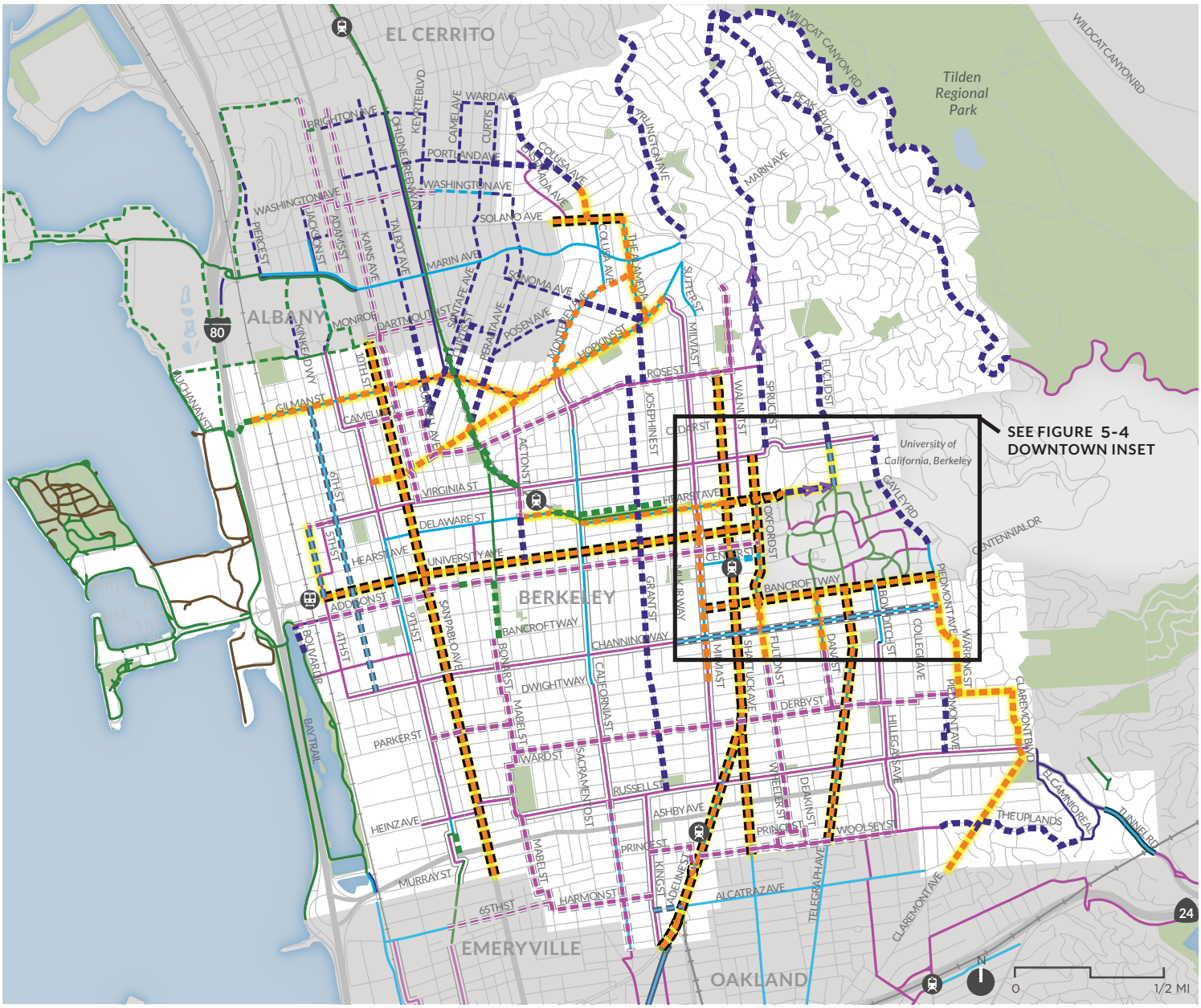

FIGURE 5-3: RECOMMENDED NETWORK IMPROVEMENTS

CLASS 1
- PAVED PATH [1A]

CLASS 2
- STANDARD BIKE LANE [2A]
- UPGRADED BIKE LANE [2B]

CLASS 3
- SHARROWS [3C]
- UPHILL CLIMBING LANE/ DOWNHILL SHARROWS [3C]
- BIKE BOULEVARD [3E]

CLASS 4
- CYCLETRACK [4]

COMPLETE STREET CORRIDOR STUDIES - LOW STRESS BIKEWAY RECOMMENDATION
- STUDY CYCLETRACK [4]*
- PRIMARY TRANSIT ROUTE - STUDY CYCLETRACK [4]*
- UPGRADED BIKE LANE [2B]
- UPHILL CLIMBING LANE/ DOWNHILL SHARROWS [3C]

EXISTING FACILITIES
- PAVED PATH [1A]
- UNPAVED PATH [1A]
- STANDARD BIKE LANE [2A]
- UPGRADED BIKE LANE [2B]
- SIGNAGE-ONLY [3A]
- SHARROWS [3C]
- BICYCLE BOULEVARD
- CYCLETRACK [4A]

BICYCLE BOULEVARD NETWORK

PARK/REC · RAILROAD · BART STATION · AMTRAK STATION

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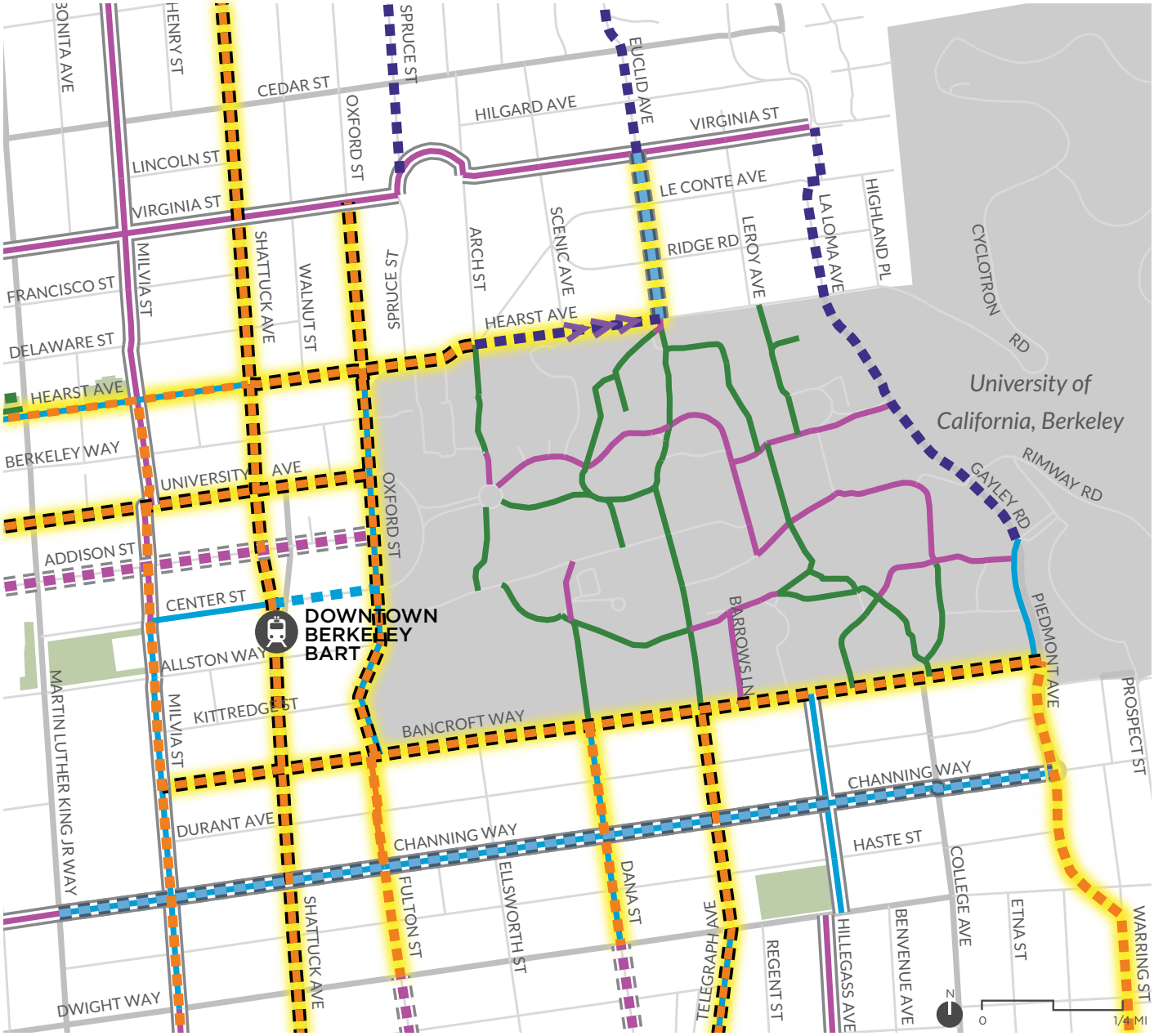

FIGURE 5-4: RECOMMENDED NETWORK IMPROVEMENTS, UC BERKELEY CAMPUS AND DOWNTOWN AREA

CLASS 1
- PAVED PATH [1A]

CLASS 2
- STANDARD BIKE LANE [2A]
- UPGRADED BIKE LANE [2B]

CLASS 3
- SHARROWS [3C]
- UPHILL CLIMBING LANE/ DOWNHILL SHARROWS [3C]
- BIKE BOULEVARD [3E]

CLASS 4
- CYCLETRACK [4]

COMPLETE STREET CORRIDOR STUDIES - LOW STRESS BIKEWAY RECOMMENDATION
- STUDY CYCLETRACK [4]*
- PRIMARY TRANSIT ROUTE - STUDY CYCLETRACK [4]*
- UPGRADED BIKE LANE [2B]
- UPHILL CLIMBING LANE/ DOWNHILL SHARROWS [3C]

EXISTING FACILITIES
- PAVED PATH [1A]
- UNPAVED PATH [1A]
- STANDARD BIKE LANE [2A]
- UPGRADED BIKE LANE [2B]
- SIGNAGE-ONLY [3A]
- SHARROWS [3C]
- BICYCLE BOULEVARD
- CYCLETRACK [4A]

BICYCLE BOULEVARD NETWORK

PARK/REC · RAILROAD · BART STATION · AMTRAK STATION

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5.2 BICYCLE BOULEVARD NETWORK IMPROVEMENTS

Berkeley's Bicycle Boulevards form the core of the city's low stress bikeway network, and as such should offer a safe, comfortable and convenient experience for people who bicycle. Bicycle Boulevards accomplish this through:

- Traffic control or warning devices to help people on bicycles cross major streets;
- Low traffic volumes and speeds, which in some cases are achieved through traffic calming devices that discourage or limit non-local vehicle through traffic;
- Prioritized travel for bikes by assigning the right-of-way to the Bicycle Boulevard at intersections wherever possible; and
- Traffic control to help bicycles cross major streets.

Existing Bicycle Boulevard corridors are:

North-South Bicycle Boulevards

- Ninth Street
- California Street/King Street
- Milvia Street
- Bowditch Street/Hillegass Avenue

East-West Bicycle Boulevards

- Virginia Street
- Channing Way
- Russell Street

This Plan proposes several new Bicycle Boulevards and enhancements to the existing seven Bicycle Boulevards to provide greater traffic calming and convenience for through bicycle travel. **Sections 5.2.1**, **5.2.2** and **5.2.3** describe the Bicycle Boulevard enhancements in greater detail. **Figures 5-3** and **5-4** depict the Bicycle Boulevard network within the overall bikeway network, while **Figures 5-13** and **5-14** depict intersection control improvements along Bicycle Boulevard and low stress bikeway network. **Figure 5-15** presents proposed traffic calming enhancements on the Bicycle Boulevard network. **Table E-4** in Appendix E lists specific improvements and costs.

5.2.1 New Bicycle Boulevards

This Plan recommends five new Bicycle Boulevard corridors. These additional corridors are intended to fill gaps in the low stress network, particularly in south Berkeley.

Addison Street - This east-west corridor runs parallel to University Avenue and connects downtown Berkeley to West Berkeley, connecting to Strawberry Creek Park, the I-80 overcrossing. It also links to 9th Street and Milvia Street Bicycle Boulevards.

Derby Street/Parker Street - This east-west corridor follows Parker Street and Derby Street, linking the residential, industrial and commercial areas of West Berkeley to the UC Clark Kerr Campus. It connects to several existing and proposed north-south Bicycle Boulevards, and provides access to Longfellow Middle School, Moellering Field, Berkeley Tech Academy, Willard Middle School, Willard Park, and Emerson Elementary along with numerous residential areas.

Fulton Street - South of Dwight Way, Fulton Street is designated as a Bicycle Boulevard. This north-south route extends from the proposed Class IV bikeway along Fulton Street through the campus area, provides access to LeConte Elementary, and connects with the existing Russell Street and proposed Derby Street and Woolsey Street Bicycle Boulevards. It links the downtown/campus area through residential areas and provides a connection south onto the City of Oakland's bikeway network via Woolsey Street.

Harmon Street/65th Street - This east-west corridor in south Berkeley runs parallel to Alcatraz Avenue and provides a connection between the Adeline Street corridor / Lorin District and the 65th Street bikeway corridor which connects into Emeryville. It links to existing King Street and proposed Mabel Street Bicycle Boulevards.

Kains Avenue - This route extends north from the Virginia Street Bicycle Boulevard and provides a connection into the city of Albany's bikeway network east of San Pablo Avenue.

Mabel Street - This north-south corridor runs parallel to San Pablo Avenue, provides a signalized crossing of Ashby Street in south Berkeley, links to San Pablo Park, and connects north to Strawberry Creek Park. It would also Link to Russell Street and Channing Way and proposed Harmon Street/65th Street Bicycle Boulevards.

Rose Street/Camelia Street - This east-west corridor follows Camelia Street, Cornell Avenue, Rose Street and Walnut Street. It links the residential and retail areas of the Gilman District with Cedar-Rose Park, Jefferson Elementary, Martin Luther King, Jr. Middle School, Live Oak Park, and Oxford Elementary. This bikeway connects with the 9th Street, California Street, and Milvia Street Bicycle Boulevards, as well as the Ohlone Greenway.

Woolsey Street - This existing signed Class III route is proposed to be upgraded to a Bicycle Boulevard. This east-west route along Berkeley's south border extends between the Hillegass Avenue and King Street Bicycle Boulevards, providing direct access to the Ashby BART station. It provides connections south into the City of Oakland's bikeway network at Colby Street and King Street.

Bicycle Boulevards make riding a bicycle feel safer and more intuitive for all ages and abilities.

5.2.2 Bicycle Boulevard Major Street Crossings

Major street crossings are a critical piece of the Bicycle Boulevard network. One of the three goals for Bicycle Boulevards is to "develop a network of efficient routes for bicyclists," which means reducing the number of times that a cyclist must stop along the route, and improving the ability to cross major intersections.

As discussed in **Chapter 4: Needs Analysis**, many Bicycle Boulevard corridors are low stress within the neighborhood until a person on bike must cross a major street such as Sacramento Street or San Pablo Avenue. These high stress crossings are barriers to more people bicycling, and a single high-stress crossing point along an otherwise low stress Bicycle Boulevard route can be a major deterrent to use.

All major street crossings of the existing and proposed Bicycle Boulevard network were studied as part of this Plan, and each location was assigned a recommended treatment based on the Unsignalized Bikeway Crossing Treatment Progression shown in **Table 5-2**. This treatment progression shows the LTS score achieved by implementing specific warning devices or traffic controls at currently unsignalized crossings along the Bicycle Boulevard network. The higher the major street volume and greater number of lanes, the higher intensity of warning devices or traffic controls necessary to achieve a low stress (LTS 1 or 2) crossing.

The goal is for all Bicycle Boulevards to achieve a score of LTS 1 or LTS 2, with LTS 2 being the level of traffic stress that most adults are willing to tolerate. Upgrading all crossing treatments to an LTS 2 would mean that approximately 79 percent of Berkeley's population would be comfortable using them.

The following pages discuss and illustrate the different crossing treatments outlined in Table 5-2.

***Table 5-2:** Unsignalized Bikeway Crossing Treatment Progression*

CROSSING TREATMENT	TRAFFIC VOLUMES						
	VERY LOW	LOW		MEDIUM		HIGH	
	Up to 3 lanes	Up to 3 lanes	4 lanes	Up to 3 lanes	4 or 5 lanes	Up to 3 lanes	4 or 5 lanes
Marked Crossing	LTS 1	LTS 1 or 2	LTS 2	LTS 3	LTS 3	LTS 4	LTS 4
Median Refuge Island[1]	LTS 1	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 4
RRFB[2, 3]	X	LTS 1	LTS 1	LTS 2	LTS 3	LTS 3	LTS 3
RRFB with median[1, 2, 3]	X	LTS 1	LTS 1	LTS 1	LTS 2	LTS 2	LTS 3
Pedestrian Hybrid Beacon (HAWK)[2]	X	X	LTS 1	LTS 1	LTS 1	LTS 1	LTS 1
Traffic Signal[2]	X	X	X	LTS 1	LTS 1	LTS 1	LTS 1

X No additional benefit

1. Minimum 6-ft wide median
2. Subject to successful warrant analysis
3. 4-Way Stop Signs may be considered as an alternative to RRFBs

LTS refers to Level of Traffic Stress

MARKED CROSSINGS

Marked crossings by themselves are appropriate on low and very low traffic streets with one lane in each direction. Marked crossings should always include advance warning signage and advance yield lines, and can be enhanced with curb extensions to shorten the crossing distance and increase visibility. On streets with one lane each direction and moderate traffic volumes, the addition of a median refuge is necessary to achieve LTS 2. **Figure 5-5** shows an example of a marked crossing.

RRFB CROSSING

Rectangular Rapid Flashing Beacons (RRFBs) are user-actuated amber LEDs that supplement warning signs at uncontrolled intersections and mid-block crosswalks. They can be activated by people walking and bicycling by manually pushing a button or passively by a video detection or detector loop system.

RRFBs by themselves can achieve LTS 1 on streets up to 4 lanes with low traffic volumes. **Figure 5-6** shows an example of an RRFB at an LTS 1 location.

***Figure 5-5:** Marked Crossing*

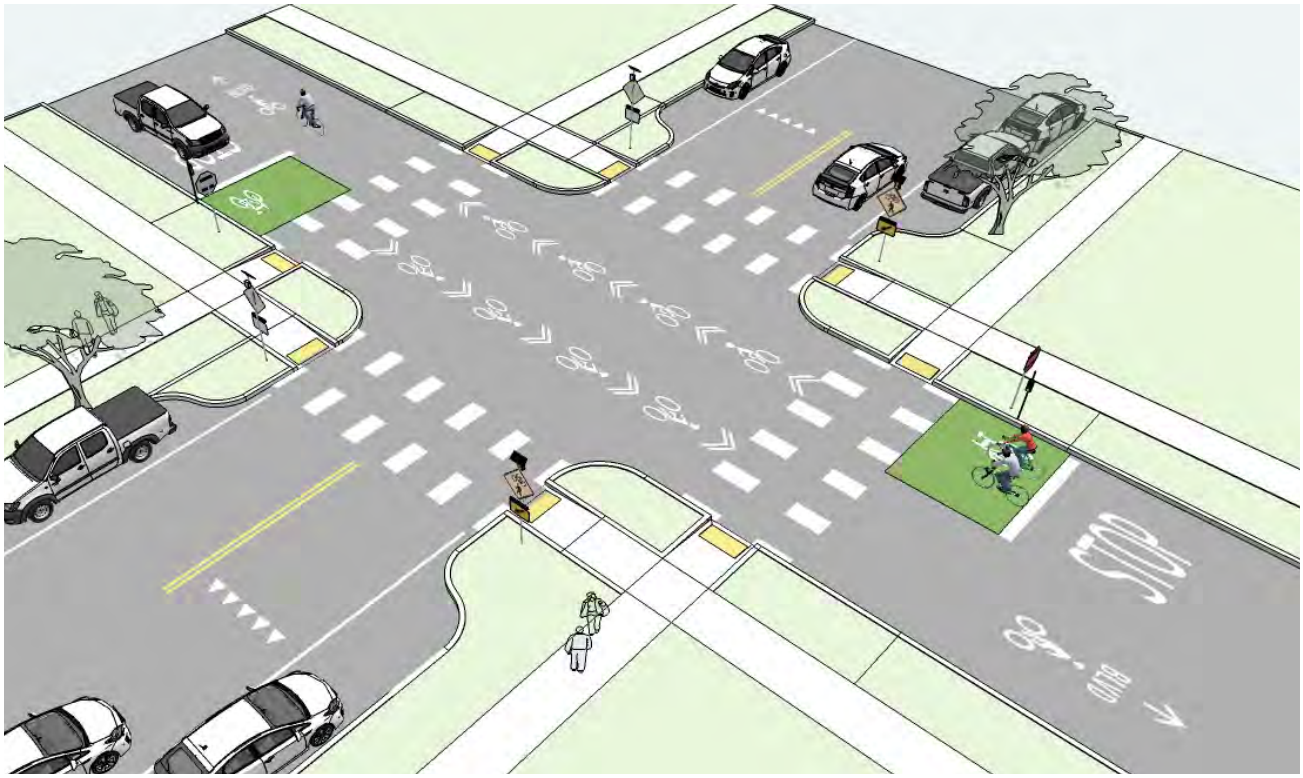


***Figure 5-6**: RRFB at LTS 1 Location*

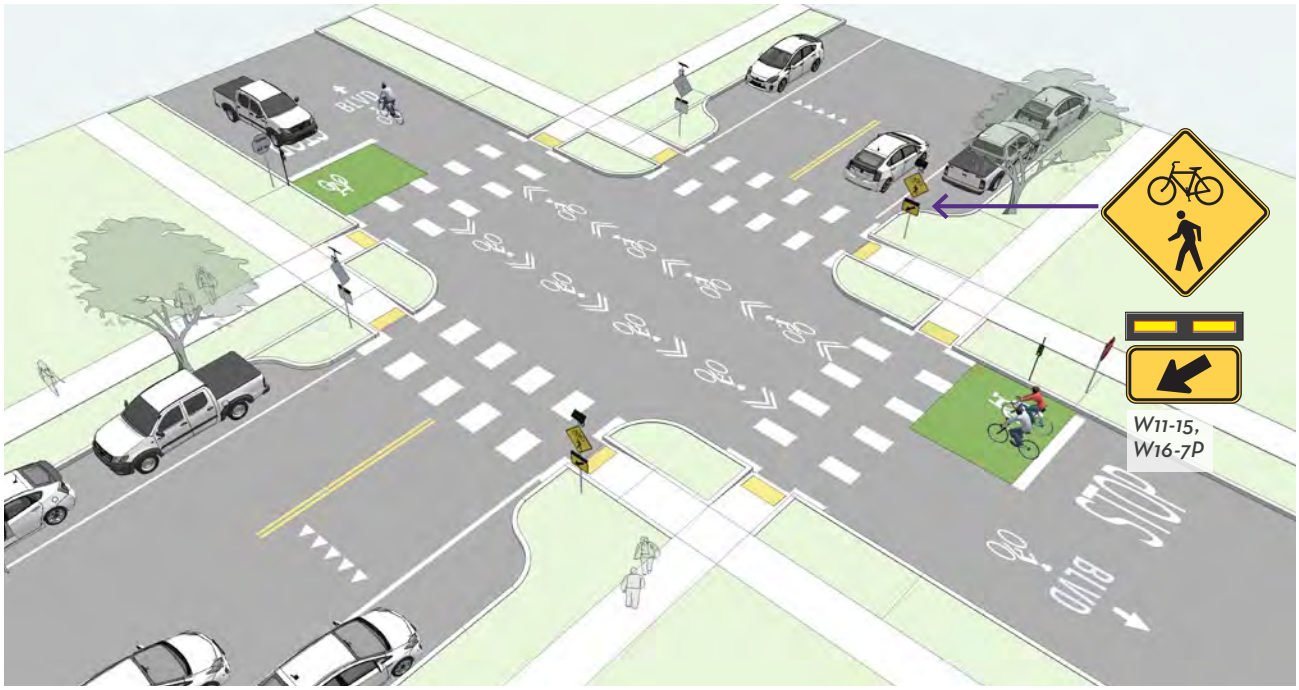


***Figure 5-7**: Median Island Refuge*

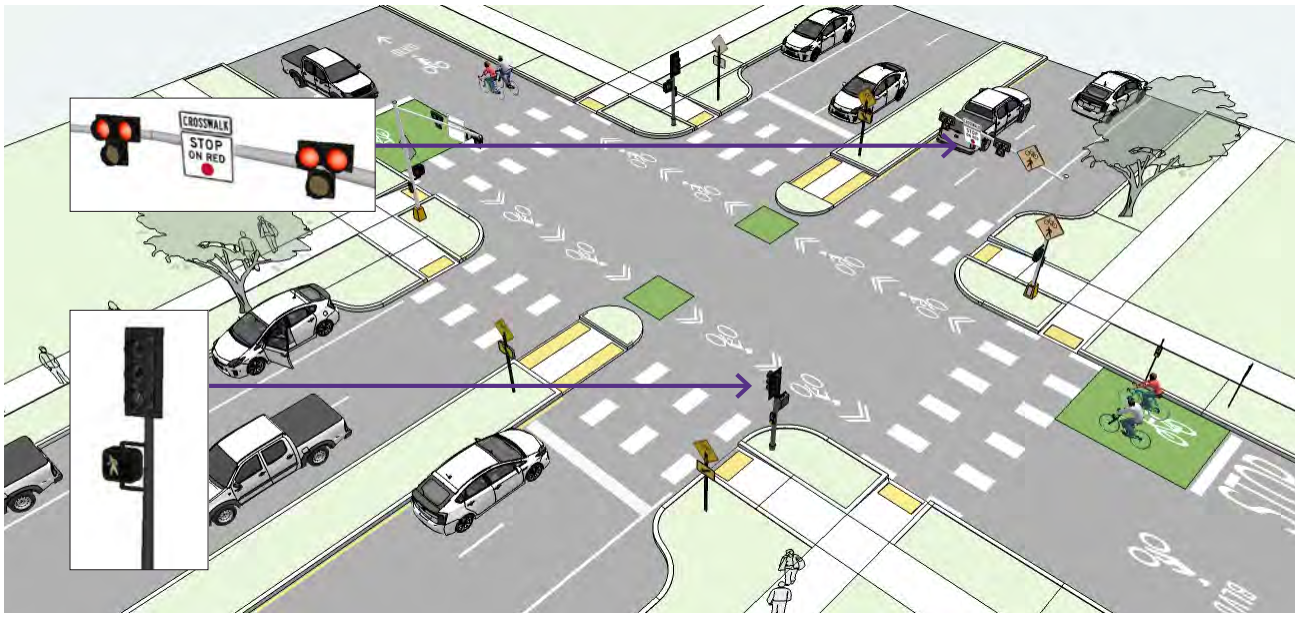
For crossings of roadways with one lane in each direction and higher traffic volumes (12,500+ ADT), or on 4-lane streets with medium volumes, a median refuge island is recommended to achieve LTS 2, as shown in **Figure 5-7**.

A phased crossing treatment approach is recommended in these locations: In Phase 1, install an RRFB and monitor the effectiveness (e.g., driver yield rate to people bicycling). If the yield compliance appears to be unacceptable according to standards established by the City Traffic Engineer, the City should consider installing a Pedestrian Hybrid Beacon (see below) as a Phase 2. Note that the Bike Crossing Treatment Progression table notes that these locations should have an RRFB with a median – it may be infeasible to install a sufficiently wide median in some of these locations. Although they do not serve precisely the same function as a median refuge island, this Plan recommends consideration of curb extensions as a way to shorten the crossing distance and improve visibility of people bicycling and walking across the street, given that there is only one lane of crossing in each direction.

PEDESTRIAN HYBRID BEACON CROSSING

A Pedestrian Hybrid Beacon (PHB), also known as a High-Intensity Activated crosswalk (HAWK) beacon, is a traffic control device used to stop roadway traffic and allow people to walk or bike across an intersection. They can be activated by people walking and bicycling by manually pushing a button or passively by a video detection or detector loop system. A PHB creates the lowest level of stress (LTS 1) for people crossing major streets on a bicycle (see **Figure 5-8** and **Figure 5-9**).

***Figure 5-8:** PHBs Help Create an LTS 1 Environment for Bicyclists*



On Bicycle Boulevard segments where the Bicycle Boulevard approach has higher volumes or significant right turn movements, creating a channelized lane for the Bicycle Boulevard can reduce potential conflicts on the approach, and also provide an opportunity for a forced motorist right turn to eliminate through traffic.

Traffic diversion can also be accomplished by installing a continuous median across the intersection with a bicycle pass-through channel, as shown in **Figure 5-10.**

***Figure 5-9:** PHB with a Channelized Approach*

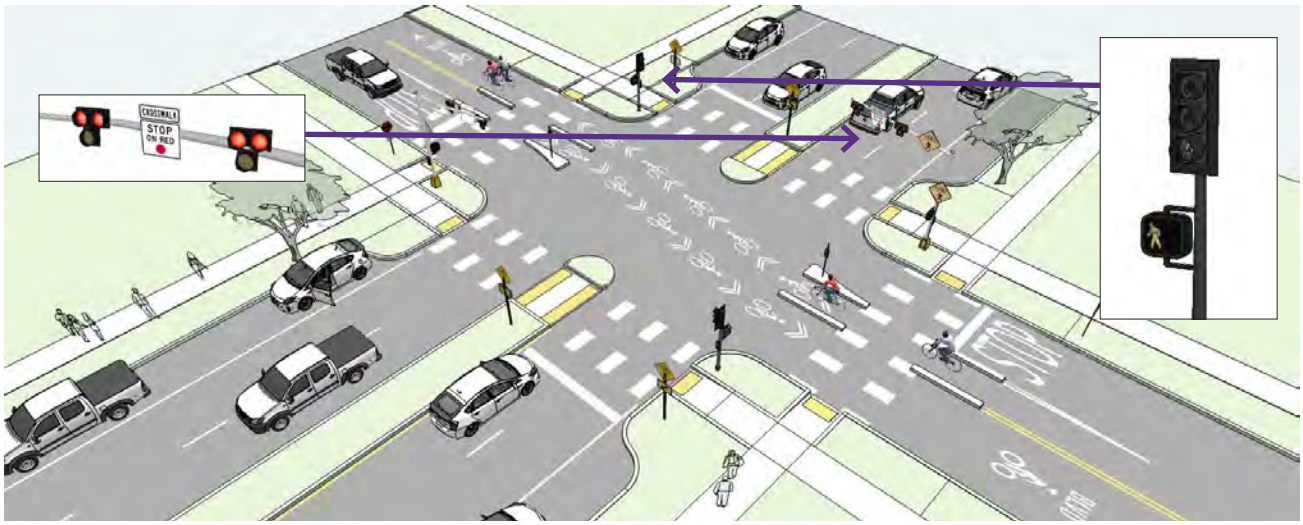
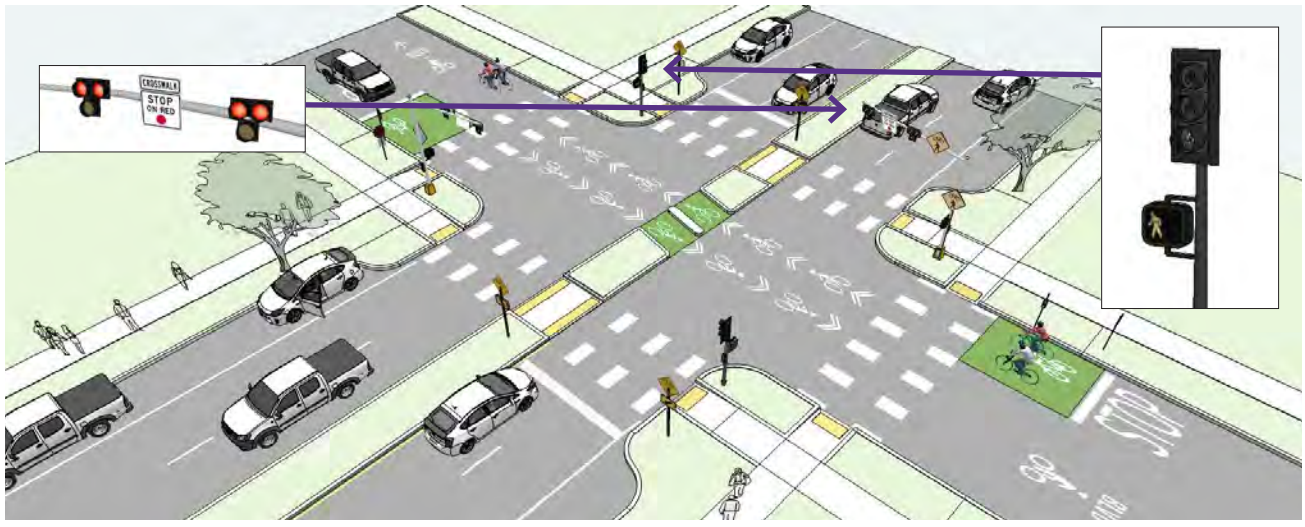


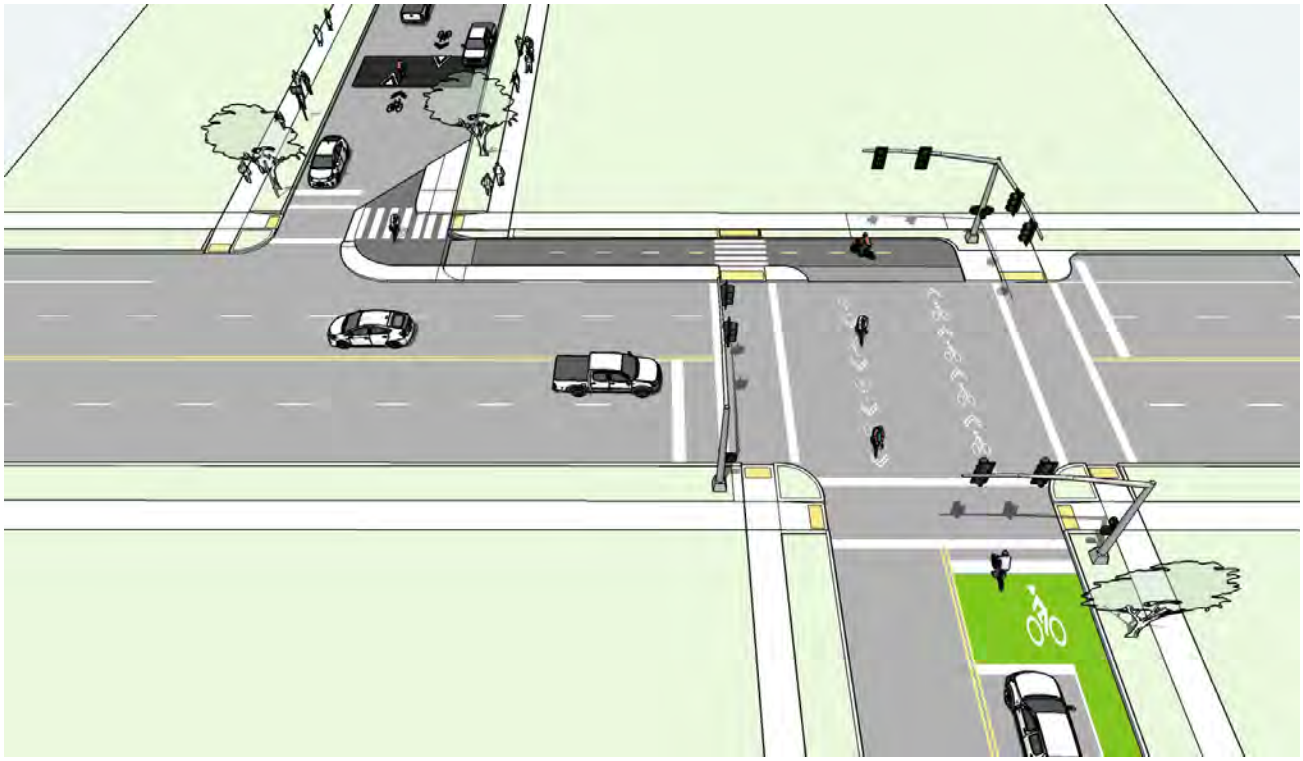
***Figure 5-10:** PHB with Median Diverter*



TWO-WAY CYCLETRACK CONNECTOR (AT INTERSECTION)

A cycletrack connector is proposed for offset major intersection crossings along the Bicycle Boulevard network. This treatment provides a protected, low stress crossing on the bikeway approach, and a low stress two-way facility on the cross-street parallel to the bikeway approach. An example of this is on eastbound Heinz Avenue, where the Bicycle Boulevard reaches San Pablo Avenue, then continues east on Oregon Street (which is offset approximately 200 feet to the north of Heinz Avenue). A cycletrack connector will offer protected travel space and physical separation from adjacent vehicle traffic along San Pablo Avenue and allow cyclists to utilize designated crossing points to best handle offset major street crossings.

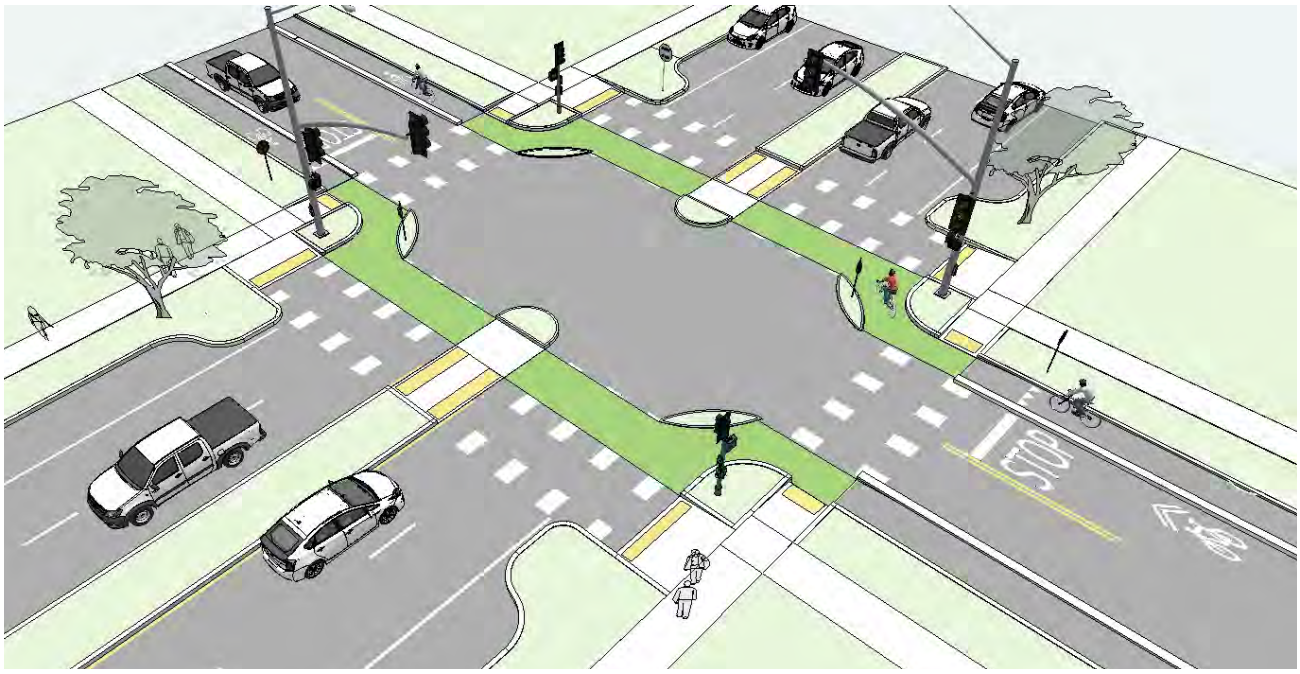
***Figure 5-11:** Two-Way Cycle Track Connector*



PROTECTED INTERSECTION

With a protected intersection, the Bicycle Boulevard approach has a physical barrier separating the bikeway from the adjacent travel lane. Protected intersections may be physically protected and/or protected using signal timing. This protection could be in the form of a fully protected cycletrack extending to the intersection, or in the case of Bicycle Boulevards with channelized bikeway treatments such as seen on Channing Way at Martin Luther King, Jr. Boulevard. Protected intersections typically require the use of bicycle signals to isolate bicycle movements from conflicting vehicle movements. Bicycle signal phases can be added to the traffic signals to isolate bicycle movements from conflicting vehicle movements. **Figure 5-12** shows an example of a protected intersection at a Bicycle Boulevard crossing.

***Figure 5-12:** Protected Intersection*



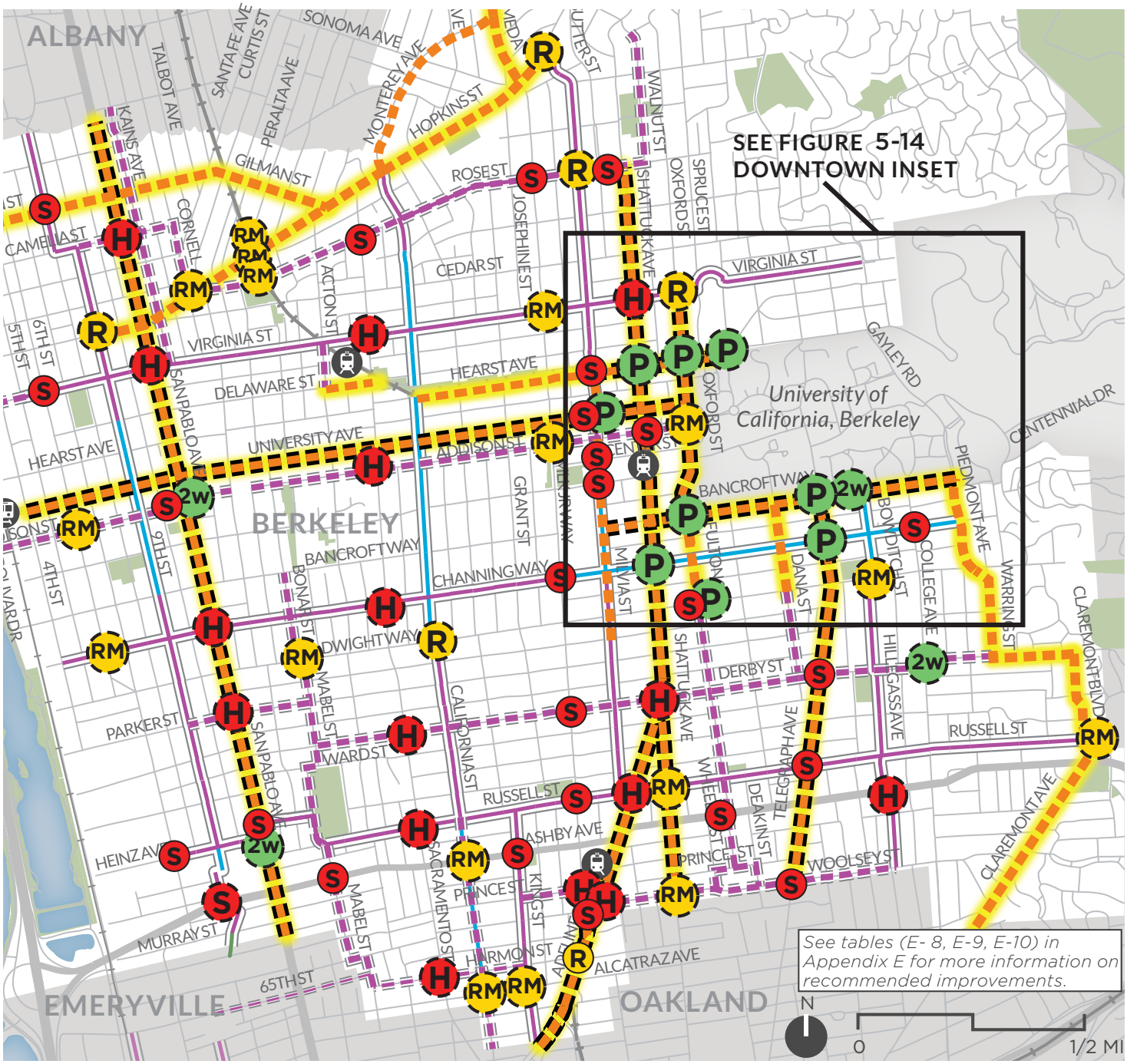


FIGURE 5-13: RECOMMENDED LOW STRESS BIKEWAY INTERSECTION CONTROL IMPROVEMENTS

INTERSECTION CROSSING IMPROVEMENTS

- P — PROTECTED INTERSECTION
- 2w — 2-WAY CYCLETRACK CONNECTOR
- R — RRFB
- RM — RRFB + MEDIAN
- H — PEDESTRIAN HYBRID BEACON
- S — TRAFFIC SIGNAL

EXISTING INTERSECTION CONTROL

- S — TRAFFIC SIGNAL
- R — RRFB

NETWORK IMPROVEMENTS

- BICYCLE BOULEVARD [3E]
- CYCLETRACK [4]

COMPLETE STREET CORRIDOR STUDIES - LOW STRESS BIKEWAY RECOMMENDATION

- STUDY CYCLETRACK [4]*
- PRIMARY TRANSIT ROUTE - STUDY CYCLETRACK [4]*

EXISTING BICYCLE BOULEVARD NETWORK

- PAVED PATH [1A]
- STANDARD BIKE LANE [2A]
- BICYCLE BOULEVARD [3E]

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FIGURE 5-14: RECOMMENDED LOW STRESS BIKEWAY INTERSECTION CONTROL IMPROVEMENTS, UC BERKELEY CAMPUS & DOWNTOWN AREA

INTERSECTION CROSSING IMPROVEMENTS

- P — PROTECTED INTERSECTION
- 2w — 2-WAY CYCLETRACK CONNECTOR
- R — RRFB
- RM — RRFB + MEDIAN
- H — PEDESTRIAN HYBRID BEACON
- S — TRAFFIC SIGNAL

EXISTING INTERSECTION CONTROL

- S — TRAFFIC SIGNAL
- R — RRFB

NETWORK IMPROVEMENTS

- BICYCLE BOULEVARD [3E]
- CYCLETRACK [4]

COMPLETE STREET CORRIDOR STUDIES - LOW STRESS BIKEWAY RECOMMENDATION

- STUDY CYCLETRACK [4]*
- PRIMARY TRANSIT ROUTE - STUDY CYCLETRACK [4]*

EXISTING BICYCLE BOULEVARD NETWORK

- PAVED PATH [1A]
- STANDARD BIKE LANE [2A]
- BICYCLE BOULEVARD [3E]

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5.2.3 Bicycle Boulevard Traffic Calming and Bicycle Priority

Berkeley's Bicycle Boulevards use traffic calming and bicycle priority to achieve a safe, comfortable and convenient experience for people who bicycle. Intersections along Bicycle Boulevards will be evaluated as part of neighborhood-level public outreach and involvement, to see whether traffic calming treatments would be more effective than stop signs in establishing bicycle priority while reducing the speed and volume of motor vehicles cut-through traffic. While these plan recommendations focus on traffic circles and diverters as primary Bicycle Boulevard traffic calming strategies, the City should utilize the full range of traffic calming options when needed. Examples of other traffic calming treatments that have been found effective in Berkeley and Bay Area cities include speed tables, raised crosswalks, corner sidewalk bulbouts, and chicanes. Pilot projects using temporary materials may be developed at some locations to test effectiveness before longer-term installations are pursued.

TRAFFIC CIRCLES AND DIVERTERS

Figure 5-15 shows recommended conceptual traffic calming improvements along the Bicycle Boulevard network. New traffic circles are recommended as a traffic calming feature to slow and discourage non-local vehicle traffic. Diverters are recommended to direct vehicles off the Bicycle Boulevards and onto larger roadways, decreasing vehicle speeding and cut-through traffic. New recommended diverter locations were generally selected to provide at least one diversion point between each major street along the Bicycle Boulevard network. Recommended traffic circle and diverter locations in this Plan may be changed based on traffic studies, public process, and/or neighborhood feedback. The City may pilot these locations with temporary installations to understand their traffic impacts before making them permanent. **Table E-4** in Appendix E lists specific locations where traffic circles and diverters are proposed in this Plan.

SPEED TABLES AND HUMPS

The City should continue to utilize speed tables where appropriate to reduce vehicle speeds, and consider them for inclusion on Bicycle Boulevards where additional traffic calming is needed. It is recommended that the City of Berkeley continue its practice of replacing existing speed humps on Bicycle Boulevards when these streets are repaved. These replacement speed humps should be designed with gentle transitions on the approach and departure ramps, in the form of a sinusoidal curve. In partnership with Berkeley's accessibility community, the City should evaluate these newer speed hump design standards for use on Bicycle Boulevards.

FIGURE 5-15: RECOMMENDED LOW STRESS BIKE BOULEVARD TRAFFIC CALMING IMPROVEMENTS

TRAFFIC CALMING IMPROVEMENTS

- TRAFFIC CIRCLE
- TRAFFIC DIVERTER

EXISTING TRAFFIC CALMING FACILITIES

- TRAFFIC CIRCLE
- SPEED HUMP
- TRAFFIC DIVERTER

NETWORK IMPROVEMENTS

- BICYCLE BOULEVARD [3E]

EXISTING BICYCLE BOULEVARD NETWORK

- PAVED PATH [1A]
- STANDARD BIKE LANE [2A]
- BICYCLE BOULEVARD [3E]

- PARK/REC
- RAILROAD
- BART STATION
- AMTRAK STATION

BICYCLE RIGHT-OF-WAY EVALUATION

Prioritizing travel for people riding bicycles can be accomplished by assigning the right-of-way to the Bicycle Boulevard at intersections, wherever possible. This right-of-way assignment is a critical design element of Bicycle Boulevards and offers a similar level of flow and connectivity to what is offered on major streets, yet without forcing people riding bicycles to share the road with high-volume vehicle traffic. Before assigning right-of-way to the Bicycle Boulevard, intersections will be evaluated as part of neighborhood-level traffic study, public outreach, and involvement, to ensure that the needs of local residents are also being met.

5.3 DOWNTOWN AND UC BERKELEY CAMPUS RECOMMENDATIONS

This Plan includes several recommendations surrounding the UC Berkeley campus and around the Downtown area, shown in **Figure 5-14**, and listed in **Table E-5** in **Appendix E**.

One key project in the downtown area is the Milvia Street corridor, which is proposed for a Class IV two-way cycletrack between Blake Street and Hearst Avenue. **Figures 5-16** through **Figure 5-20** provide an overview of the Milvia Street Corridor project, including conceptual designs for implementing the cycletrack through the downtown area as well as a new protected intersection at Milvia Street/University Avenue.

Note that these are illustrative concepts only and specific project design details, including facility geometrics, travel or parking lane modifications, signage and pavement markings, and signal phasing, will be considered during the design phase and associated public outreach for each recommended project.

***Figure 5-16:** Milvia Street Bicycle Boulevard Recommended Improvement Concept Overview Map*

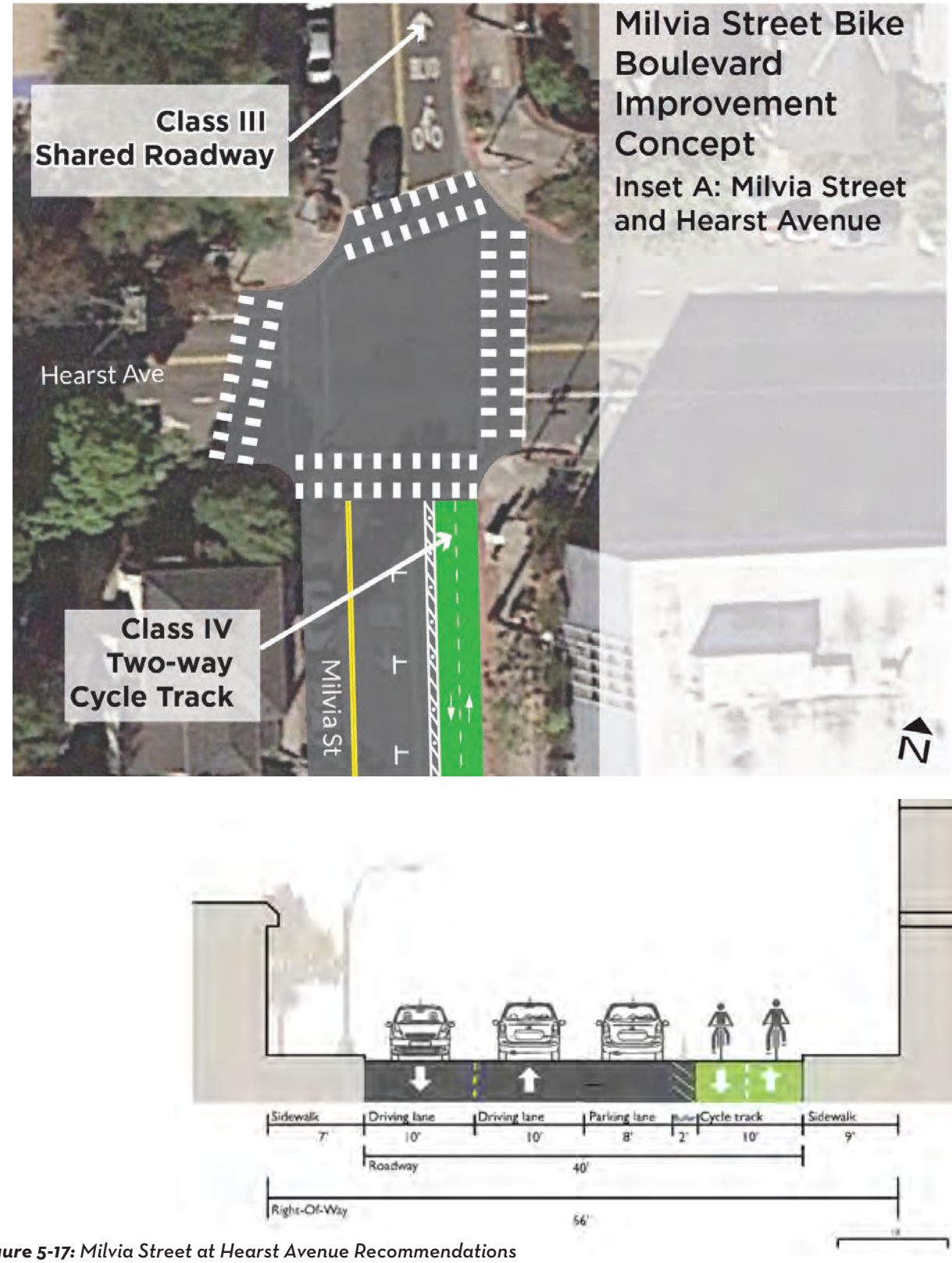
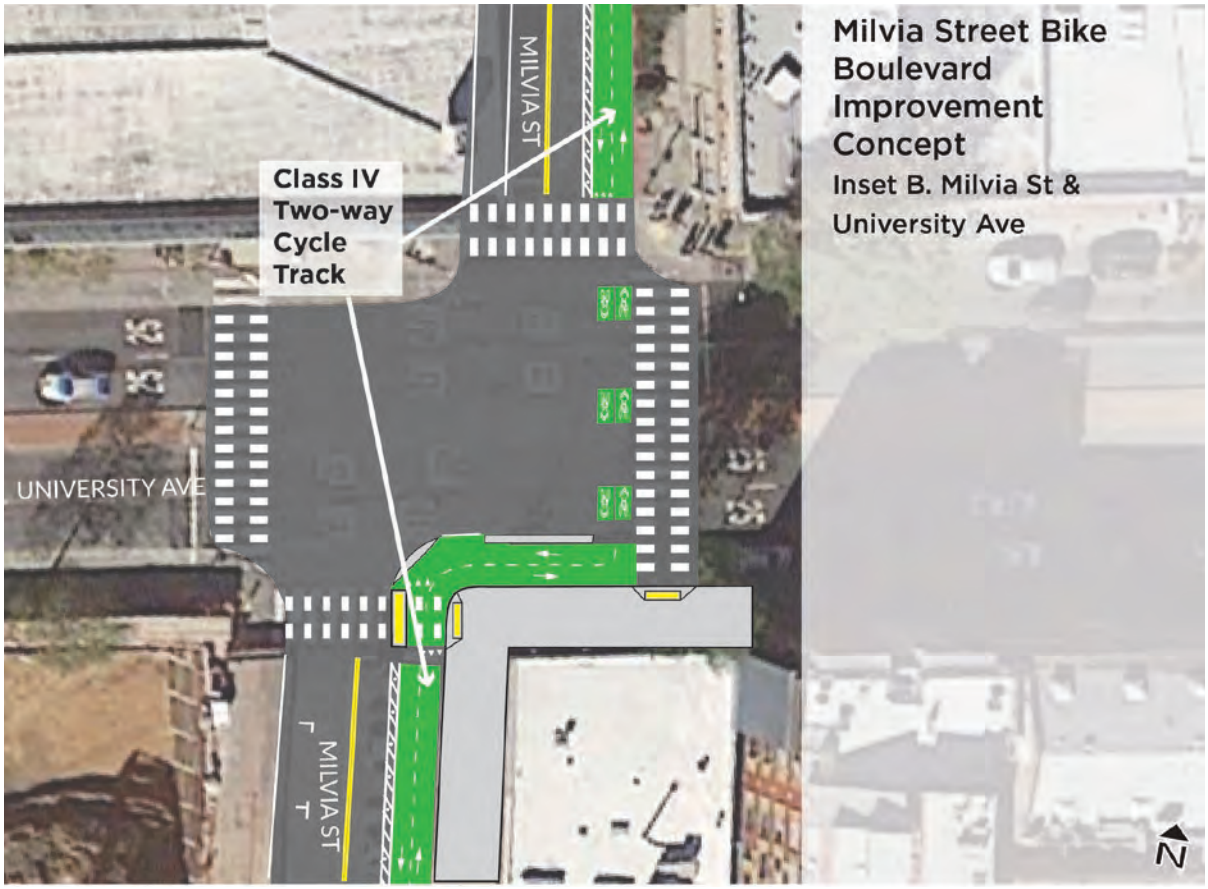


Figure 5-17: *Milvia Street at Hearst Avenue Recommendations*



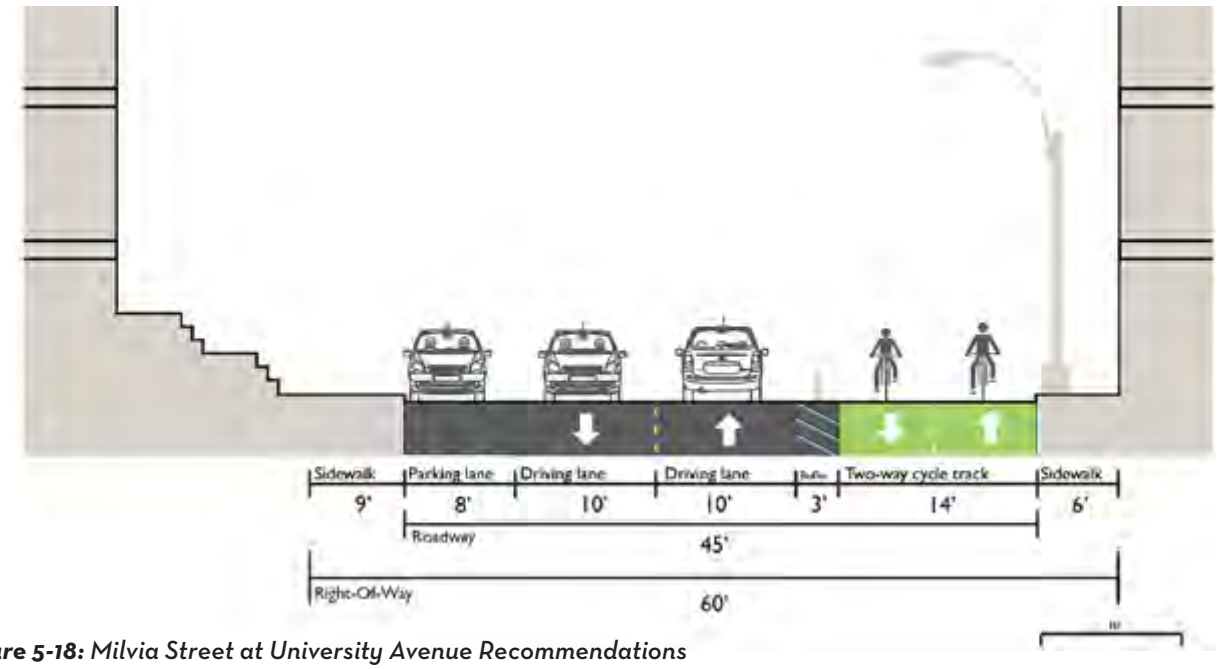


Figure 5-18: *Milvia Street at University Avenue Recommendations*

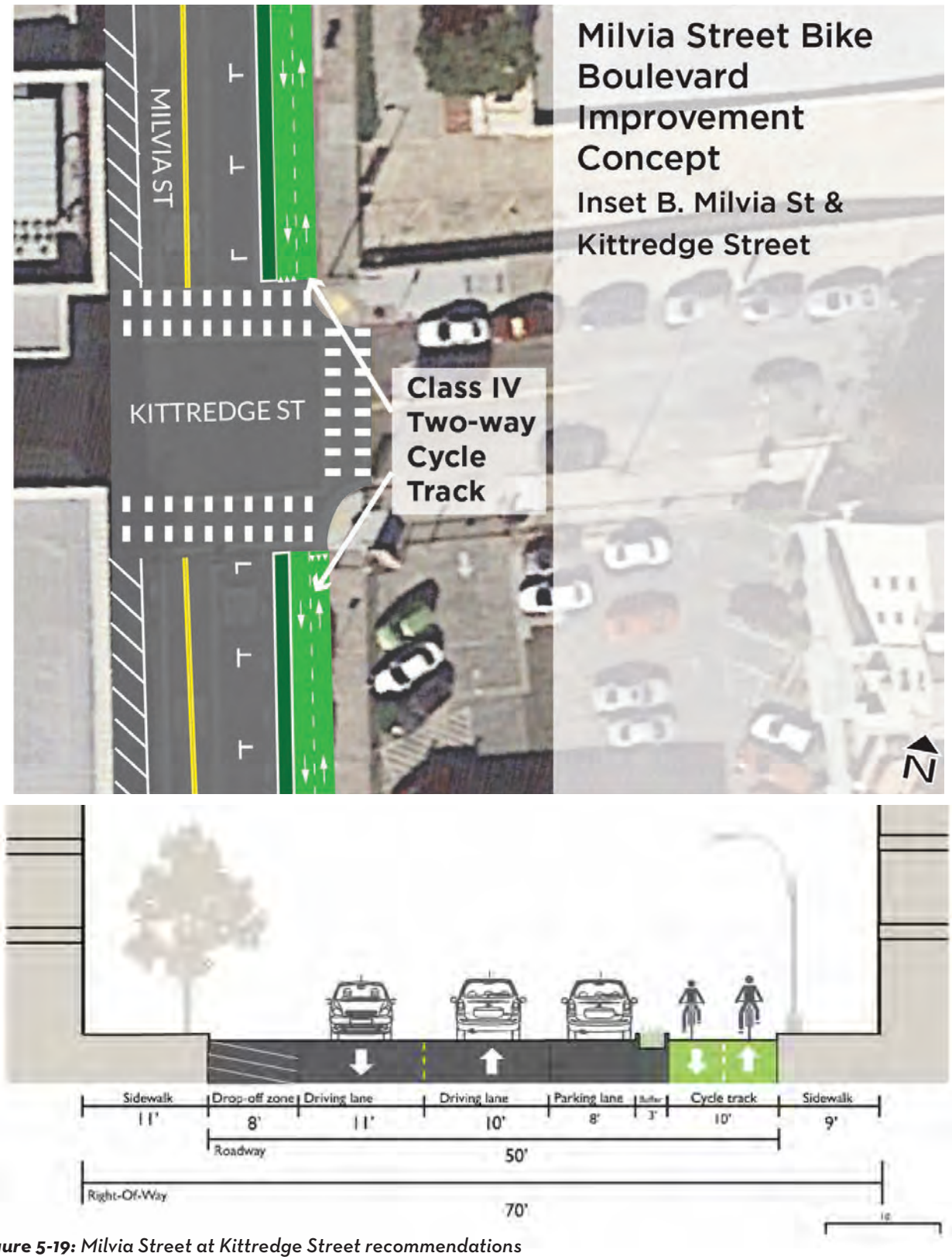


Figure 5-19: *Milvia Street at Kittredge Street recommendations*

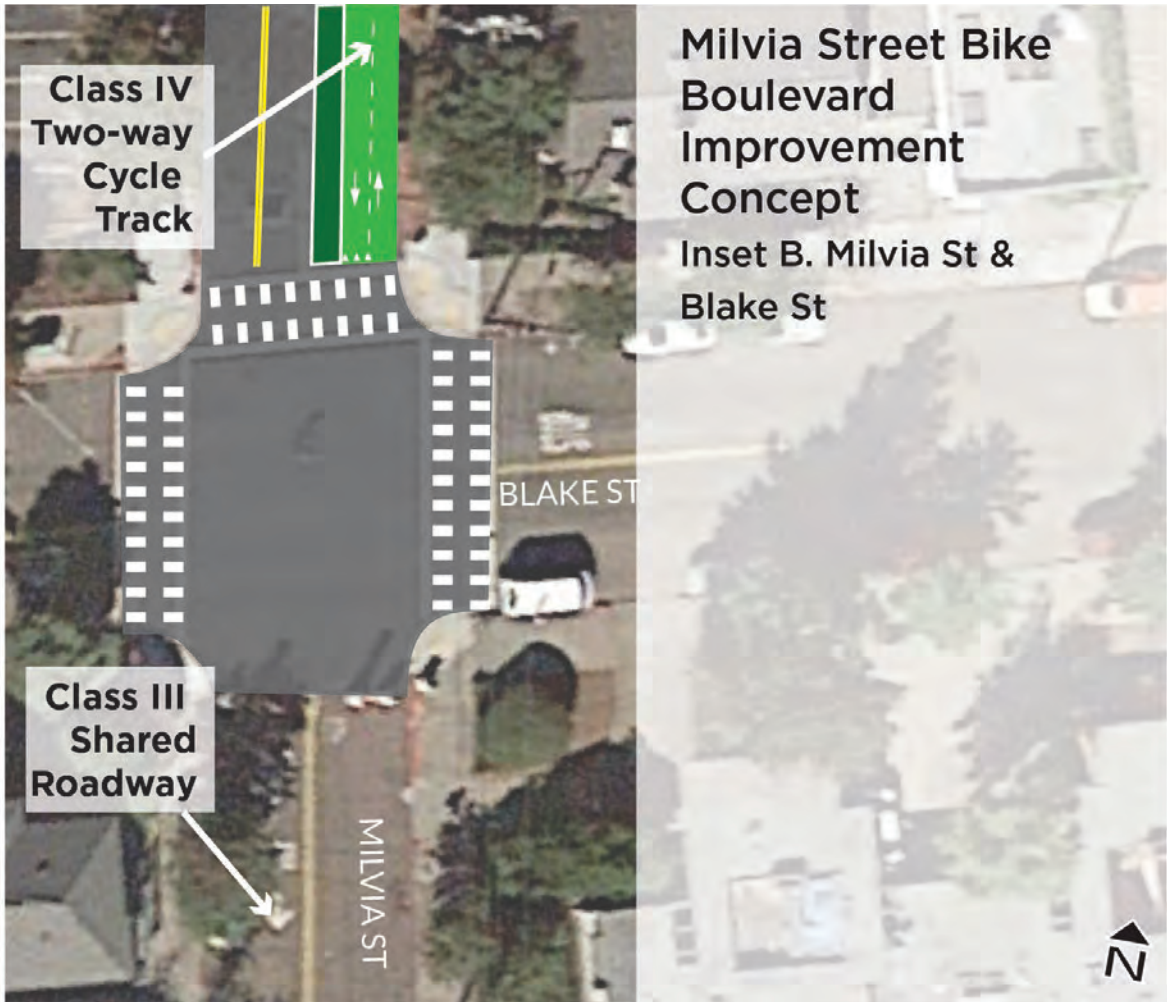


Figure 5-20: *Milvia Street at Blake Street Recommendations*

5.4 OHLONE GREENWAY IMPROVEMENTS

The Ohlone Greenway is an existing shared use path that runs north-south from Richmond to Berkeley. This Plan recommends a series of pathway widening, enhanced lighting, and roadway crossing improvements along the Ohlone Greenway corridor within Berkeley.

The Ohlone Greenway is approximately eight feet wide for much of its length through Berkeley. Design standards for shared use paths like the Ohlone Greenway (which receive heavy recreational and commuter use by bicyclists and other non-motorized users) recommend at least a 12-foot width with separated areas for pedestrians and bicyclists if possible. North of Santa Fe Avenue into Albany, sufficient width below the elevated BART tracks exists to provide separated bicycle and pedestrian space. However, within Berkeley, adjacent uses including fenced portions of the BART right-of-way, residential property lines, tennis courts, and parking areas constrain much of the Ohlone Greenway alignment between Gilman Street and the North Berkeley BART station, and limit possibilities for widening. Where possible opportunities to widen the pathway should be evaluated through this section. One area where widening is feasible is where the Ohlone Greenway extends through Cedar- Rose Park. Through the park a minimum 12 foot wide greenway width is recommended, with a separate soft-surface pedestrian path.

Crossing enhancements are also recommended for roadway crossings along the Ohlone Greenway. For all uncontrolled crossings a standard crossing treatment is proposed, consisting of Rectangular Rapid Flash Beacons (RRFBs) and a raised crosswalk and shown in **Figure 5-21**. Other crossing enhancements include studying a fully raised intersection at the Gilman Street / Curtis Street crossing, and installing a two-way cycletrack connector at Peralta Avenue.

Lighting improves the safety and security of path users by increasing visibility during non-daylight hours. Given the Ohlone Greenway's function as a major year-round recreation and commute corridor, having adequate lighting is essential. Lighting upgrades are recommended along the full corridor. Per AASHTO recommendations, average maintained horizontal illumination levels should be 5 lux to 22 lux. Higher illumination levels should be considered at crossing approaches, drinking fountains, benches, or any location where potential security problems exist. Lighting should be downcast to minimize light pollution.

Landscaping along the corridor should be trimmed back to provide for additional clear path space and to increase visibility, security, and effectiveness of lighting.

Along the Ohlone Park segment (parallel to Hearst Avenue) a widened pathway is recommended along with the creation of mixing zones at the cross-streets where pedestrian cross traffic can be expected. Mixing zones can be designed through the use of different paving materials such as pavers as well as with signage and markings.

Figures 5-21 through 5-26 illustrate conceptual improvements to the Ohlone Greenway. These improvements are also listed in **Table E-6** in **Appendix E**.

Note that these are illustrative concepts only and specific design details will be considered during the design phase and associated public outreach for each recommended improvement.

***Figure 5-21:** Ohlone Greenway Recommended Improvement Locations*

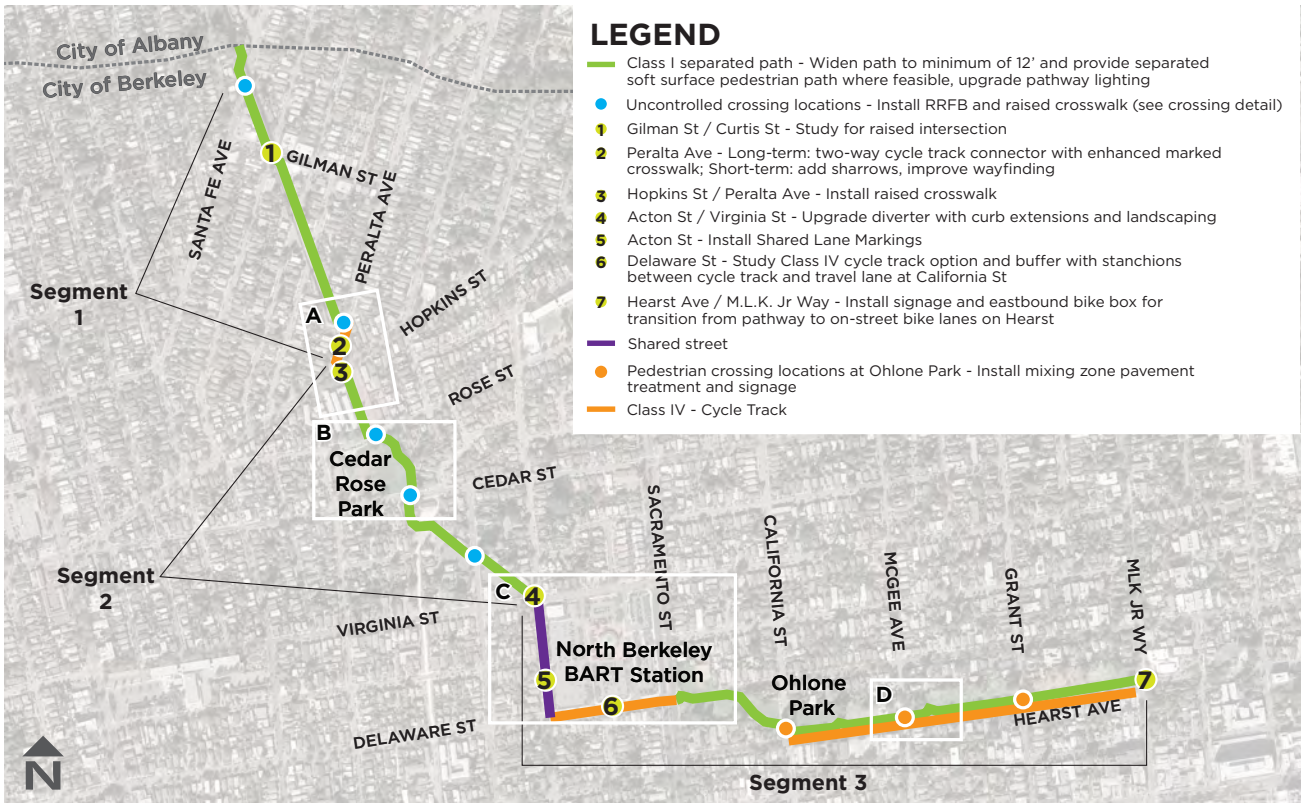


Figure 5-22: *Path Improvements to the Ohlone Greenway*

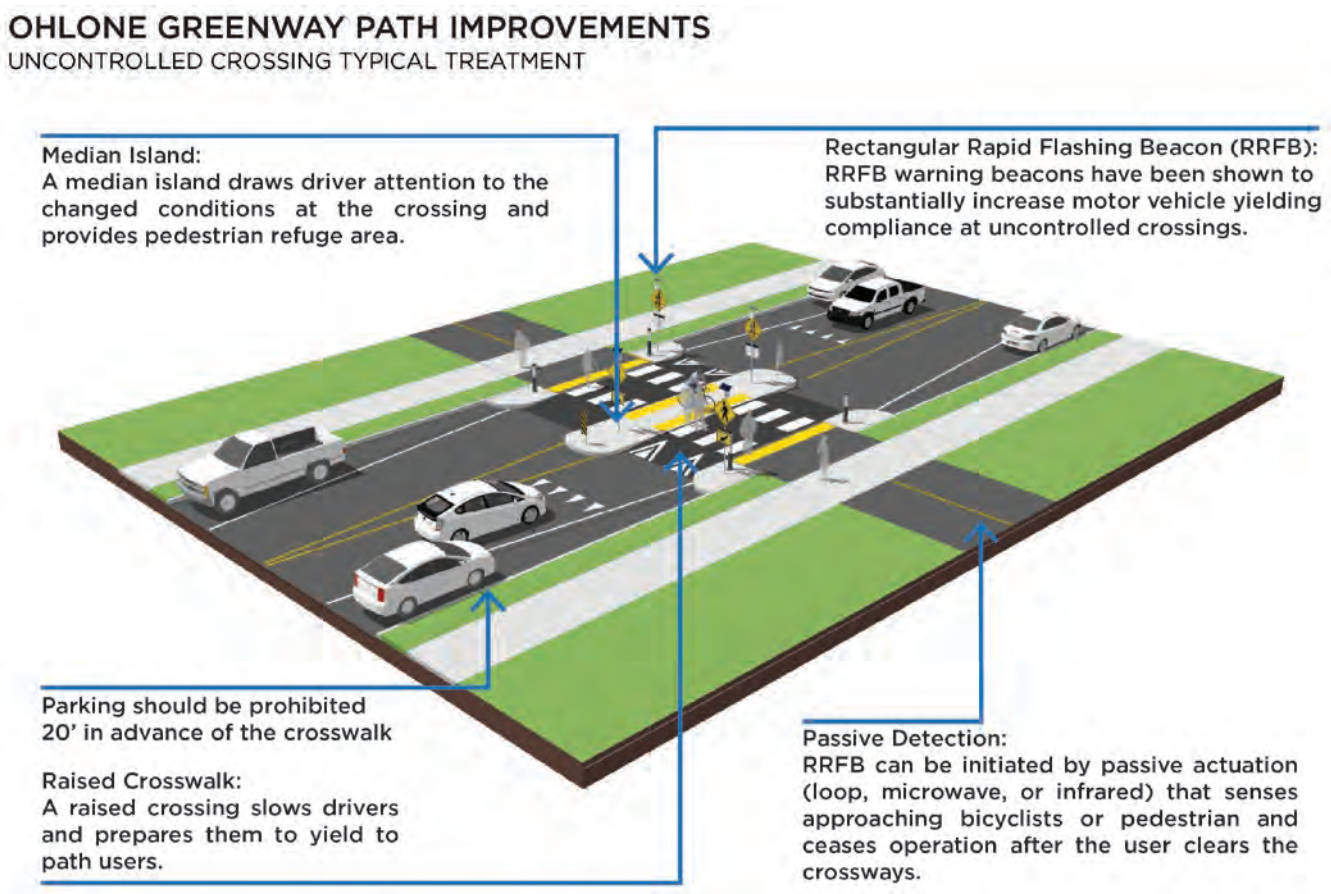
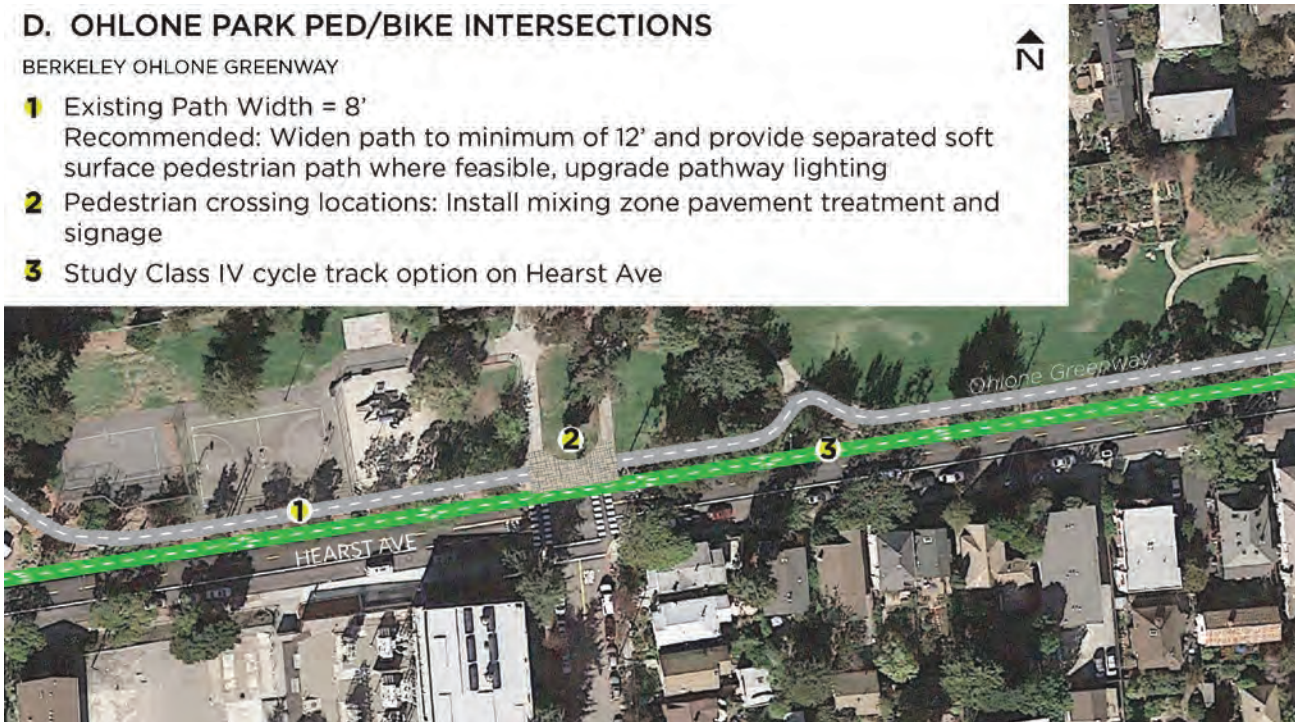


***Figure 5-23:** Peralta and Hopkins Streets improvements*

***Figure 5-24:** Improvements around Cedar-Rose Park*

Figure 5-25: *Improvements Around North Berkeley BART Station*

Figure 5-26: *Improvements Around Ohlone Park*



5.5 UPGRADES TO EXISTING CLASS II BIKE LANES AND CLASS III BIKE ROUTES

5.5.1 New / Upgraded Class II Bike Lanes

A bike lane is a striped lane that provides a designated space within the roadway for people who bike. Design guidelines require a minimum 5-foot-width for standard bike lanes striped next to curbs or parking lanes, but 6 to 7 feet is the preferred width and the addition of a painted buffer between traffic and/or parking lanes is desired where traffic volumes are high or there is high parking turnover.

This Plan recommends both new and upgraded Class II bike lanes. Upgrades include adding painted buffers between the vehicle lane and bike lane or painting conflict areas of the existing bike lanes green.

These improvements are depicted on **Figures 5-3** and **5-4**, and are listed in **Tables E-3** and **E-5** in **Appendix E**.

5.5.2 New / Upgraded Class III Bike Routes

Class III bicycle routes are signed bicycle routes where people riding bicycles share a travel lane with people driving motor vehicles. Because they are mixed-flow facilities, Class III bicycle routes are only appropriate for low-volume streets with slow travel speeds. Many of Berkeley's Class III bike routes are part of the Bicycle Boulevard Network and discussed as part of the Bicycle Boulevard network projects below.

This project category includes enhancements to existing Class 3A signage-only facilities to add shared lane markings (upgrading to Class 3C), as well as some new Class 3C facilities to complete the network. There is also a project segment along Spruce Street in the Berkeley hills to install an uphill "climbing lane" with a Class 2A bike lane in the uphill direction and Class 3C sharrows in the downhill direction, to provide better separation for the slower moving uphill cyclist.

These improvements are depicted on **Figures 5-3** and **5-4**, and are listed in **Tables E-3** and **E-5** in **Appendix E.**

5.6 CITYWIDE RECOMMENDATIONS

5.6.1 Bicycle Detection

Detection of bicyclists at actuated (not pre-timed) traffic signals is important for safety of bicyclists and motorists. The California Manual on Uniform Traffic Control Devices (CA MUTCD) requires that all new and modified traffics signals be able to detect bicyclists with passive detection (rather than having to push a button). This Plan recommends that the City of Berkeley continue to adhere to this requirement by ensuring passive detection of bicyclists at all signalized intersections.

5.6.2 Bicycle Parking

Bicycle parking is available throughout Berkeley, but many locations do not provide an adequate amount of bike parking to meet demand. As such, many bicyclists instead lock their bikes to street fixtures such as trees, telephone poles, and sign poles.

RECOMMENDED TYPES AND QUANTITIES OF BICYCLE PARKING

Bicycle parking can be categorized into short-term and long-term parking. Sidewalk bicycle racks or bicycle corrals are preferred for short-term bike parking (less than two hours), serving people who leave their bicycles for relatively short periods of time, typically for shopping, errands, eating or recreation. Bicycle racks provide a high level of convenience but relatively low level of security.

Long-term bike parking includes bike lockers, bike rooms, or Bike Stations. Long-term parking serves people who intend to leave their bicycles for longer periods of time and is typically found at workplaces and in multifamily residential buildings, transit stations, and other commercial buildings. These facilities provide a high level of security but are less convenient than bicycle racks. Berkeley has bike lockers available citywide at BART and Amtrak stations.

Figure 5-27: Types of Bicycle Racks

The City has developed specifications for architects, engineers and contractors on how and where bike racks should be placed and installed. These are available at **http://www.ci.berkeley.ca.us/uploadedFiles/Public_Works/Level_3_Transportation/Bike_Rack_Specs_Installation_Sept2008.pdf**.

Expanded Bicycle Parking Design Guidelines and recommended quantities by land use can be found in **Appendix F: Design Guidelines**.

CITYWIDE BICYCLE PARKING PROGRAM

More than 1,000 bicycle racks exist throughout Berkeley, as well as Bike Station and high-capacity, in-street Bicycle Corrals. The locations where bike parking is available are described in Chapter 3 and shown on an interactive map on the City's website. This website is updated frequently and can be found at **http://www.cityofberkeley.info/bikeparkingmap/**.

It is recommended the City continue its highly successful request-based bicycle rack and corral program, and continue to proactively install bike parking in commercial areas. As noted in Chapter 3, bicycle corrals typically take up unused red curb area or a vehicle parking space and can accommodate up to 12 bicycles. They can be placed at intersection corners (where vehicles are not allowed to park) because they do not inhibit sight distances for roadway users. Business owners can apply for free bike corral installation. More information can be found at **http://cityofberkeley.info/bikecorral/**.

The City should work with BART to plan, fund, design, and construct a new Bike Station at North Berkeley BART, where demand for bicycle parking is exceptionally high and BART has documented recurring theft and vandalism issues.

The City should begin to consider the needs of electric bicycle users in any study of the provision of bike parking. The needs of e-bike users are different than typical bicyclists, including capabilities for charging bicycle batteries and enhanced safety/anti-theft options.

On-street bike corrals can take the place of a vehicle parking space and be installed at street corners

5.7 COMPLETE STREETS CORRIDOR STUDIES

As defined by the Berkeley Complete Streets Policy, "Complete Streets" describes a comprehensive, integrated transportation network with infrastructure and design that allows safe and convenient travel along and across streets for all users, including people walking, people bicycling, persons with disabilities, people driving motor vehicles, movers of commercial goods, users and operators of public transportation, emergency responders, seniors, youth, and families. Providing a complete network does not necessarily mean that every street will provide dedicated facilities for all transportation modes, but rather that the transportation network will provide convenient, safe, and connected routes for all modes of transportation within and across the City. For the purposes of bikeway planning, the City of Berkeley considers both the major/collector street and parallel streets part of a Complete Street Corridor; potential bikeways on both the major/collector street bikeway and on parallel streets should be evaluated as part of a Complete Street Corridor Study.

Of the major and collector streets shown in the map figures as requiring a Class IV Cycletrack to meet LTS 1 or 2 (see **Figures 5-1, 5-2, 5-3, 5-4, 5-13, 5-14, 6-1**, and **6-2**), most of them will

require further study in order to evaluate their suitability for this treatment and impacts on other modes of transportation. These major and collector Streets provide access to local Berkeley businesses. Some facilitate direct cross-town or interjurisdictional travel not duplicated by a parallel street. They currently serve multiple modes of transportation, on-street parking, and many are commercial corridors that have goods movement needs related to deliveries and loading/unloading at businesses, which are vital to the economic vitality of these areas. As such, they require further consideration above and beyond that of bicycle travel. These streets are therefore labeled as "Complete Street Corridor Studies" on **Figures 5-1, 5-2, 5-3, 5-4, 5-13, 5-14, 6-1**, and **6-2**.

Class IV Cycle Tracks and other bikeway types that might impact transit operations, parking, or roadway capacity will not be implemented without these Complete Street Corridor Studies that will include a traffic study, environmental analysis, public process, and coordination with all affected State, County, and local transit agencies. Potential bikeways to be considered as part of future Complete Street Corridor Studies will be evaluated in the context of the modal priorities established by the Berkeley General Plan Transportation Element and the Alameda County Transportation Commission Countywide Multimodal Arterial Plan. Corridor studies on San Pablo Avenue, Telegraph Avenue, University Avenue, and Ashby Avenue will be led by the Alameda County Transportation Commission (CTC). The City of Berkeley has already initiated studies and/or capital projects on a number of other Complete Street Corridors, including Hearst Avenue, Bancroft Way, Fulton Street, and Adeline Street, in coordination with outside partner agencies, including UC Berkeley, AC Transit, BART, and others.

As defined by the City of Berkeley General Plan Transportation Element, most of the future Complete Street Corridor Studies are either Primary or Secondary Transit Routes. General Plan Policy T-4 "Transit-First Policy" gives priority to alternative transportation and transit over single-occupant vehicles on Transit Routes. The Alameda County Transportation Commission Countywide Multimodal Arterial Plan identifies many of the future Complete Street Corridor Studies as part of the Transit Emphasis modal priority network. In this planning and policy context and given the importance of approaching Complete Streets from an integrated, layered network perspective, it is critically important to consider how transit service can be maintained and improved as an outcome of future Complete Street Corridor Studies. Studies to consider the inclusion of bikeways will be coordinated with proposed improvements to transit performance on Primary Transit Routes, such as bus boarding islands, transit-only lanes, transit signal priority/ queue jump lanes, far-side bus stop relocations, and other improvements as described in the AC Transit Major Corridor Study. In addition, these studies should approach Secondary Transit Routes as opportunities for transit improvements, such as bus stop optimization

and relocation, among other potential improvements. At the conclusion of the Complete Streets Corridor Study process, design alternatives which have a significant negative effect on transit on Primary Transit Routes will not be recommended. Criteria to define what constitutes a significant negative effect on transit will be developed and applied during the Study process for each corridor. Consideration of how to allocate limited public right-of-way among various travel modes will be made consistent with Alameda County Transportation Commission modal priorities and the City of Berkeley General Plan.

Future Complete Street Corridor Studies should be undertaken in the context of national design best practices such as the National Association of City Transportation Officials (NACTO) Transit Street Design Guide and Urban Street Design Guide. Local guidance such as the forthcoming AC Transit Design Standards and Guidelines Manual for Safe and Efficient Multimodal Transit Stops and Corridors will also be consulted. Studies should carefully consider the potential impacts and trade-offs of including bikeways on Primary and Secondary Transit Routes, including potential median reductions, repurposing of parking or travel lanes, and the need to avoid impacts to transit operations that could otherwise occur. Example transit performance criteria that may be considered as part of future Complete Street Corridor Studies could include: on-time performance and reliability; gapping/bunching; transit travel time; operational and safety conflicts with other modes of transportation; maintaining minimum lane widths; and other criteria to be identified through the study process.

These corridors may have interim treatments installed while the corridor study and final recommended design are being completed. Interim treatments are those that do not require a full Complete Streets Corridor Study. Interim or phased treatments may still require traffic study, interagency coordination, and public process if they impact roadway capacity, parking, or transit operations. Interim or phased treatments should not negatively impact existing transit operations; mitigations should accompany interim treatments to ensure no degradation of transit service. For example, Shared Roadway Bicycle Markings may be installed, or existing bike lanes may first be colored green, then later converted into a Class IV Cycletrack if feasible without negatively impacting existing or planned transit operations on Primary or Secondary Transit Routes. **Table 6-8** shows the extent of the Complete Street Corridor Study projects and provides the recommended interim treatments. Some corridors list multiple interim treatment types that would be implemented along different segments of the same corridor. **Table E-7** in **Appendix E** presents a more detailed breakdown of the recommended Complete Street Corridor Studies and interim treatments.

For more information about future Complete Street Corridor Studies, see **Section 6.7**, **Appendix E**, and **Appendix F**.