Hearst Avenue Complete Streets Study

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November 2012
DRAFT
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BACKGROUND

The University of California, Berkeley commissioned the *Hearst Street Complete Streets Study* in December, 2011 to consolidate previous proposals along the corridor and move these identified projects toward design and implementation. The study was conducted in collaboration with the City of Berkeley because while the corridor is located on the north side of the University’s campus, it also falls within the city’s jurisdiction and any changes to the corridor must be approved by the City.

This document presents the analysis and preferred designs for transportation changes on Hearst Avenue within the study corridor between the Shattuck Avenue and the Gayley Road/La Loma Avenue intersections. The study corridor, shown on Figure 1, is well-traveled by drivers, pedestrians, bicyclists, and transit riders, and it also serves an important commercial function for local businesses, routinely carrying delivery traffic including large trucks.

PURPOSE & NEED

Many studies and adopted plans completed by the City and the University have already identified infrastructure changes along the Hearst Avenue corridor, some of which have been constructed. Recent changes include signalizing the Arch Street/Le Conte Avenue/Hearst Avenue intersection and converting the northbound right-turn slip lane at the Oxford Street/Hearst Avenue intersection to a bike-only slip-lane.

However, a systematic, complete streets approach to changes along the corridor had not previously been made. A complete streets approach for the corridor would provide preferred design solutions that balance the needs and improve the safety of all roadways users. For example as considerations for improving the biking and walking environments, especially near bus stops, were proposed, traffic operations and queuing analysis was conducted iteratively to test the various proposals’ ability to create a mutli-modal design for Hearst Avenue.

RELATED STUDIES & PLANS

This study responds to the variety of University and City planning documents that have made recommendations for the Hearst Avenue corridor including:

- *City of Berkeley Pedestrian Plan* – Recommends a new sidewalk between the Arch Street/Le Conte Avenue and the Euclid Avenue intersections, and bringing channelized right-turns at Gayley Road under yield or stop control.
• **City of Berkeley Bicycle Plan** – Recommends Class 2 lanes from Shattuck Avenue to Arch Street and “Class 2.5 lanes” between Arch Street / Le Conte Avenue and Gayley Road, consisting of a downhill Class 3 route and an uphill climbing lane.

• **UC Berkeley Long Range Development Plan / New Century Plan** – Recommends removing the three channelized right-turns at the Hearst Avenue/Gayley Road/La Loma Avenue intersection and reducing the turning radius of the northeast corner as a priority project. Recommends ADA curb ramp upgrades east of Oxford Street to include truncated domes.

• **UC Berkeley Landscape Master Plan** – Recommends enhancing the crossing at Arch Street / Le Conte Avenue to make it a major entrance into campus.

• **UC Berkeley College of Engineering Master Plan** – Recommends pedestrian crossing and ADA changes at intersections between Euclid Avenue and Gayley Road and a new mid-block crossing between Euclid and LeRoy Avenues.

• **Northeast Quadrant Science and Safety (NEQSS) Projects** – Recommends pedestrian crossing changes along Hearst Avenue as mitigation.

• **Lawrence Berkeley National Laboratory (LBNL) Long Range Development Plan and Environmental Impact Report** – Mitigation Measure TRANS-1c states that LBNL shall fund and conduct a study to look at cumulative year traffic impacts at the Hearst Avenue/Gayley Road/La Loma Avenue intersection. Additional shuttle traffic is anticipated on Hearst Avenue associated with their travel demand management (TDM) program.

**STUDY GOALS**

• Engage both the University and the City to develop mutually preferred complete streets transportation changes for Hearst Avenue

• Reconfigure Hearst Avenue to a complete street to provide optimal safety and convenience for all users—pedestrians, bicyclists, transit users, and drivers—including users of all ages and abilities

• Resolve gaps and deficiencies in the bicycle and pedestrian networks, bus stops, and roadway geometries

• Provide an implementation-oriented planning document and 35% design drawings to move the identified projects toward final design and environmental clearance
EXISTING CONDITIONS

The Hearst Avenue corridor is a key east-west link for pedestrians, bicyclists, transit users, and drivers. Hearst Avenue has traditionally been the northern bound of the UC Berkeley campus, though some campus buildings are located to the north. Hearst Avenue is also a transitional space, as the core campus gives way to peripheral commercial uses and residential neighborhoods. For those who walk and bicycle, Hearst Avenue has the potential to create a direct east-west link serving the University community, Downtown Berkeley, and residential neighborhoods. West of the study area, Hearst Avenue receives the bicycle and pedestrian traffic from the Ohlone Greenway, which provides a north-south connection through Berkeley, Albany and El Cerrito. For automobiles and trucks, Hearst Avenue serves as an important cross-campus route, linking University Avenue and Downtown Berkeley to Oxford Street and Gayley Road, which provide north-south connections to Berkeley neighborhoods. UC Berkeley shuttles and AC Transit routes provide service along the corridor. Given the demands of the full range of transportation modes, the corridor often struggles to meet the needs of any one group.

PEDESTRIAN FACILITIES

Hearst Avenue is a critical interface between campus pedestrian circulation needs and the surrounding commercial and residential neighborhoods. The crossing distances west of the Euclid Avenue, and the sidewalk gap from Arch Street/Le Conte Avenue to just west of Euclid Avenue, pose challenging barriers. Pedestrian volumes along Hearst Avenue are presented in Figure 2.

Sidewalk Conditions

Sidewalks are provided along both sides of Hearst Avenue with one notable exception; a 900-foot sidewalk gap on the south side of Hearst Avenue between Arch Street/Le Conte Avenue and Euclid Avenue. The lack of sidewalk also fails to provide ADA-compliant access to the vehicles parked on the south side of Hearst Avenue during the off-peak hours. Where sidewalks exist, they are typically 10 feet or more in width in front of university buildings on the south side of the corridor, and six or seven feet on the north side.
stop-control on LeRoy Avenue
stop-control on Walnut Street
*counts collected during construction of EBB Building. Crosswalk on Hearst was removed.

TRUE

STOP

EXISTING PEAK HOUR BICYCLE & PEDESTRIAN VOLUMES

FIGURE 2
Crossing/Intersection Treatments & ADA Compliance

Marked crossings are provided across Hearst Avenue at all intersecting streets. At all crossings—marked and unmarked—the higher speeds of downhill traffic, the direct sun during the PM peak period, and the risk of multiple-threat collisions make it difficult for drivers to adjust for pedestrians crossing the street.

Between Shattuck Avenue and Euclid Avenue pedestrians must cross a five-lane cross-section. Pedestrians crossing Hearst Avenue on this segment are exposed to vehicle traffic for greater distances than east of Euclid Avenue where there is a two-lane cross-section. Crossing multiple lanes of vehicle traffic means that pedestrians are exposed to multiple-threat collisions, whereby the motorist in the outside travel lane stops for a pedestrian in the crosswalk and therefore prevents the driver in the adjacent travel lane from being able to see the oncoming pedestrian.

Hearst Avenue narrows to two lanes east of Euclid Avenue. Near Le Roy Avenue many pedestrians currently cross mid-block in front of Soda Hall and Etcheverry Hall to get between those buildings’ main entrances and the campus core. Though the University has made attempts to restrict access to the campus paths directly across the street from those buildings, pedestrians still choose to cross in this mid-block location.

ADA features along Hearst Avenue are, in many cases, deficient either because there are not compliant ramps or curbs are not accessible.

At Gayley Road/La Loma Road, right-turn slip lanes are located at three corners of the intersection to provide pedestrian refuge while accommodating truck turning movements. These slip lanes are controlled by yield signs which de-emphasize pedestrians. Some of the pork-chop islands intended to provide pedestrian refuge do not have pedestrian accommodations such as curb cuts.
large corner radii prioritize heavy vehicles while creating long crossing distances for pedestrians. Pedestrian desire lines are not met for those traveling north-south along Gayley Road/La Loma Avenue where pedestrians were observed not using the striped crossing of the southwest slip lane, in favor of taking the most direct path possible.

**BICYCLE FACILITIES**

Hearst Avenue does not presently have designated bicycle facilities within the study area. Class II bicycle lanes and enhanced Class III bicycles routes have been proposed along the corridor as part of the *City of Berkeley Bicycle Plan*. Bicycle counts were collected in January 2012 when classes were in session and are presented on **Figure 2**. No bicycle data was available at Hearst Avenue/Shattuck Avenue and Hearst Avenue/Gayley Road/La Loma Avenue.

**Existing Facilities**

To the west, Hearst Avenue has bike lanes from California Street to Shattuck Avenue. These parallel the Ohlone Greenway from California Street to Milvia Street and then become the on-street continuation of that route until Shattuck Avenue. Oxford Street has bicycle lanes from Bancroft Way to Hearst Avenue, including a bicycle-only right-turn slip lane at the southeast corner of the Oxford Street/Hearst Avenue intersection.

The UC Berkeley campus bicycle routes intersect Hearst Avenue at Arch Street and at Euclid Avenue, providing north-south connections through the Main Campus. At Euclid Avenue, bicyclists were observed using the pedestrian signal to cross. The lack of a traffic signal facing campus, which also serves as a driveway for service vehicles, makes it challenging for bicyclists to navigate crossing the intersection at the appropriate time.

Bicyclists using the Hearst Avenue corridor are exposed to potential "doorin" i.e., a driver in a parked car opens their door into the path of a bicycle rider. The grade changes along the corridor slow bike riders in the eastbound direction resulting in greater speed differences with motor vehicle traffic. Right turning motor vehicle traffic at Oxford Street and bus stops near Arch Street conflict with bicyclists using Hearst Avenue.
TRANSIT SERVICE

Transit service along Hearst Avenue provides connections around the perimeter of the UC Berkeley campus and access to all three Berkeley BART stations as well as San Francisco. The bus stops are typically shared by the three service providers: AC Transit, Bear Transit (UC Berkeley), and Lawrence Berkeley National Laboratory (LBNL). Transit routes and stops are presented on Figure 3.

The westbound bus stop on Hearst Avenue, east of Le Roy Avenue, has limited space for pedestrians to wait for a bus. Buses accessing the bus stop partially block the westbound travel lane and motor vehicle drivers were observed crossing the center line to pass a stopped bus. This maneuver is unsafe for several reasons; the grade change on Hearst Avenue restricts sight lines of on-coming traffic and pedestrians have poor sight lines crossing the street at Le Roy Avenue when a bus is in the westbound bus stop. This condition does not exist in the eastbound direction because the eastbound bus stop is located after the Le Roy Avenue intersection and buses are able to maneuver in and out of the stop.

Sidewalk adjacent to the eastbound North Gate bus stop (located west of Euclid Avenue) is constrained with street furniture and signage. The clutter limits space for pedestrians waiting for the bus. This particular bus stop is very wide so that it can be difficult for a bus driver to align the bus door with the curb. This can result in patrons stepping off the curb into the street to access the waiting bus.

**AC Transit Service**

AC Transit operates three routes in the study area, including two local routes and one Transbay route. Route 52 connects Albany with UC Berkeley via the North Berkeley BART Station.
Route 52 runs from about 5:53 AM to 12:06 AM weekdays with 15-minute headways during the peak periods and 35-minute headways in the off-peak hours. The route operates from about 8:40 AM-7:44 PM with 35-minute headways throughout the weekend.

Route 65 connects the Downtown Berkeley BART Station to Euclid Avenue and Grizzly Peak Boulevard via Hearst Avenue and Oxford Street. It runs from about 5:39 AM to 8:57 PM on the weekdays approximately every 30 minutes and hourly from 7:30 AM-7:18 PM on weekends.

Route F is an AC Transit Transbay bus, running along the perimeter of campus and connecting to the San Francisco Transbay Terminal via the Downtown Berkeley and Ashby BART Stations and the City of Emeryville. Route F runs from about 6:10 AM to 12:55 AM on weekdays and weekends every 30 minutes.

**Bear Transit**

Bear Transit, operated by Bauer IT, is the UC Berkeley campus shuttle and it has two routes along the Hearst Avenue corridor. Running along the perimeter of the campus and through Downtown, the P Line is the daytime perimeter shuttle operating from about 6:45 AM to 7:30 PM with 15 minute headways during the morning and evening and 30 minute headways midday. The P Line is free to those affiliated with campus while the general public can pay $0.50 to ride the shuttle. The North Side Night Safety Shuttle travels the perimeter of campus and along University Drive through the campus. Service operates from 7:45 PM to 2:11 AM with 30 minute headways. The Night Safety Shuttle is free to campus affiliates as well as the public. Bus stops are located in both directions at the Arch Street/Le Conte Avenue, Euclid Avenue, and Le Roy Avenue intersections.

**Lawrence Berkeley National Laboratory Bus**

Lawrence Berkeley National Laboratory (LBNL) operates two shuttle routes between its campus in the hills, the campus perimeter, and the Downtown Berkeley BART Station. The shuttle is limited to LBNL employees and their guests. The Blue Route (Blackberry Gate) runs eastbound and westbound buses on Hearst Avenue every 10 minutes from 6:20 AM to 7:30 PM. The Orange Route (Strawberry Gate) operates eastbound service on Hearst Avenue every 15 minutes from 6:30 to 7:30 AM and from 9:45 AM to 7:05 PM, with 10 minute headways between the 7:30 AM-9:45 AM peak service. Bus stops for LBNL shuttles are located in both directions at the Euclid Avenue and Le Roy Avenue intersections as well as at the Arch Street intersection in the westbound direction.

**VEHICLE TRAFFIC CONDITIONS**

Between Shattuck Avenue and Arch Street/Le Conte Avenue, Hearst Avenue includes two travel lanes in each direction with left-turn lanes at select intersections. Lanes are generally 10 to 11 feet wide, with on-
street parking or bus stops adjacent to the curb. Between Arch Street/Le Conte Avenue and Euclid Avenue, Hearst Avenue is grade separated between the east and westbound directions, narrowing the right-of-way in each direction. The lane configuration along this stretch includes one dedicated travel lane and one peak period travel lane in each direction. During the morning commute time (AM peak period), the eastbound direction has two travel lanes and no on-street parking, while the westbound direction has one travel lane and includes on-street parking. During the evening commute (PM peak period), these configurations are reversed. East of Euclid Avenue, Hearst Avenue narrows to one travel lane in each direction with on-street parking. Existing lane configurations are shown on Figure 4.

**Vehicle Volumes**

Traffic volumes are shown on Figure 5 for the AM and PM peak hours. The peak hour traffic volumes were derived from peak period intersection turning movement counts collected at eight study intersections along Hearst Avenue:

- Shattuck Avenue
- Walnut Street
- Oxford Avenue
- Spruce Street
- Arch Street/Le Conte Avenue
- Euclid Avenue
- Le Roy Avenue
- La Loma Avenue/Gayley Road

Passenger vehicle, truck, bus, bicycle, and pedestrian counts were collected at Oxford Street, Arch Street/Le Conte Avenue, Euclid Avenue, and Le Roy Avenue on January 24, 2012. Counts were collected at Walnut Street on May 3 and May 4, 2012 and at Spruce Street on April 26, 2012. Intersection counts at Shattuck Avenue are from the *Downtown Area Plan EIR* (IBI Group, 2008). Counts at the La Loma Avenue/Gayley Road intersection are from a memorandum prepared by Fehr & Peers for the Lawrence Berkeley National Lab in 2009.

During the AM peak hour, vehicle volumes are generally highest traveling eastbound Hearst Avenue and to Downtown Berkeley along southbound Shattuck Avenue and Oxford Street. Hearst Avenue provides the primary vehicular access to the UC Berkeley parking garages along the north side of campus and the Lawrence Berkeley National Lab. During the PM peak hour, these trends are reversed.
STUDY INTERSECTIONS & EXISTING LANE GEOMETRY

Figure 3:
- Study intersections and existing lane geometry.

Figure 4:
- Stop-control on LeRoy Avenue.
- Stop-control on Walnut Street.
- Stop-control on Spruce Street.

KEY:
- Signalized Intersection
- Stop-Controlled

NOT TO SCALE
Daily roadway volumes collected in 2008 by the City of Berkeley indicate that about 11,000 vehicles use Hearst Avenue east of Oxford Street during a typical weekday. Research indicates that four lane roads with less than 12,000 vehicles per day are strong potential candidates for a reduction in travel lanes without degrading traffic flow\(^1\). Observations during the AM and PM peak periods indicate minimal congestion along Hearst Avenue in either the two-lane or four-lane segments of the corridor.

Although Hearst Avenue is not a City of Berkeley designated truck route, it is an important access for trucks destined to parts of UC Berkeley and Lawrence Berkeley National Laboratory from I-80 via University Avenue and Oxford Street. As a result, truck traffic is higher on Hearst Avenue than would be expected on a typical city street, with almost seven percent truck traffic, as shown in Table 1. While the majority of the truck traffic consists of two-axle vehicles or buses, one percent of the total traffic has five axels or more, signifying heavy trucks traversing the corridor each day. The presence and number of heavy trucks, combined with high levels of pedestrian and bicycle activity, are indicators that transportation solutions must be sensitive to a wide variety of users.

### Table 1: Existing Vehicle Classifications

<table>
<thead>
<tr>
<th>Segment</th>
<th>Average Daily Traffic</th>
<th>Autos, Vans, &amp; Pickups</th>
<th>2-Axle Trucks and Buses</th>
<th>3- and 4-Axle Trucks</th>
<th>5 or More Axle Trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hearst Avenue between Oxford Street and La Loma Avenue/ Gayley Road</td>
<td>10,400</td>
<td>93%</td>
<td>5%</td>
<td>&lt;1%</td>
<td>1%</td>
</tr>
</tbody>
</table>


**Parking**

**On-Street Parking**

On-street parking is available along the majority of Hearst Avenue except where there are bus stops. Table 2 lists the parking conditions by block. Types of parking include:

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### TABLE 2:
**HEARST AVENUE EXISTING PARKING CONDITIONS**

<table>
<thead>
<tr>
<th>Block</th>
<th>Type of Parking</th>
<th>Number of Spaces¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Eastbound</strong></td>
<td><strong>Westbound</strong></td>
</tr>
<tr>
<td>Oxford Avenue to Spruce Street</td>
<td>Not Allowed</td>
<td></td>
</tr>
<tr>
<td>Spruce Street to Arch Street / Le Conte Avenue</td>
<td>Motorcycle / Metered</td>
<td>Restricted Residential</td>
</tr>
<tr>
<td>Arch Street / Le Conte Avenue to Scenic Avenue</td>
<td>One hour (No AM peak period parking)</td>
<td>Open Parking (No PM peak period parking)</td>
</tr>
<tr>
<td>Scenic Avenue to Euclid Avenue</td>
<td>One hour and 24-minute (No AM peak period parking)</td>
<td>Metered (No PM peak period parking)</td>
</tr>
<tr>
<td>Euclid Avenue to Le Roy Avenue</td>
<td>Metered</td>
<td></td>
</tr>
<tr>
<td>Le Roy Avenue to La Loma Avenue / Gayley Road</td>
<td>Metered</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1. Data obtained from SafeTREC.
Source: Fehr & Peers, 2012

- Restricted residential parking – Two-hour parking limit for vehicles without residential parking permit from 9:00 AM to 6:00 PM
- Metered Parking – One- and two-hour metered parking from 9:00 AM to 6:00 PM
- 30-minute or one-hour parking from 9:00 AM to 6:00 PM

Hearst Avenue between the Arch Street/Le Conte Avenue and the Euclid Avenue intersections includes restricted parking during the AM and PM peak periods to allow additional travel lanes in the peak direction of travel. There are 42 parking spaces on this segment of Hearst Avenue.

**Off-Street Parking**

There are several parking garages located in the study area including the Lower Hearst and the Upper Hearst Parking Structures. These structures provide permitted and metered parking primarily for UC Berkeley students and faculty.

**Lower Hearst Parking Structure** – This four story parking garage is located along Hearst Avenue between Scenic Avenue and Euclid Avenue. It has 622 parking spaces with a mix of permit parking and public pay parking spaces, including 145 spaces dedicated to attendant parking. The peak parking demand at this
garage is 547 vehicles, which results in an 88 percent occupancy rate. Access to the garage is provided via one driveway on Hearst Avenue and two driveways on Scenic Avenue. This parking garage is arranged such that each driveway provides access to one floor, with the exception of one driveway on Scenic Avenue that provides access to two floors. This creates a circulation issue when vehicles have to circulate out of the parking garage to look for available parking spaces in a different level.

*Upper Hearst Parking Structure* – This four story parking garage is located along Hearst Avenue on the corner of La Loma Avenue. Access to the garage is provided via driveways on Hearst Avenue, La Loma Avenue, and Ridge Road. The parking garage has 446 parking spaces and includes 110 spaces dedicated to attendant parking. The peak parking demand at this garage is 327 vehicles, which results in a 73 percent occupancy rate. The garage is restricted to permit parking on weekdays between 7:00 AM and 5:30 PM and is open to public parking on weekdays from 5:00 PM to 2:00 AM and on weekends at all times. Vehicles heading eastbound on Hearst Avenue could potentially block Hearst Avenue as drivers wait to turn left into the parking garage.

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Counts and utilization data provided by UC Berkeley Parking & Transportation (2009). Parking restriction information also provided by UC Berkeley Parking & Transportation (2011).
PLANNING AND DESIGN PROCESS

Once the existing transportation characteristics had been identified for the study corridor, the University and City staff worked collaboratively with Fehr & Peers to develop possible transportation solutions that address the existing transportation deficiencies. To facilitate this process, the Hearst Avenue study corridor was divided into four segments including:

1) Shattuck Avenue to Oxford Street
2) Oxford Street to Le Conte Avenue/Arch Street
3) Le Conte Avenue/Arch Street to Euclid Avenue
4) Euclid Avenue to La Loma Avenue/Gayley Road

Once a comprehensive set of alternatives was identified, each concept was evaluated through a multi-modal lens. Analysis methodologies include the use of Fehr & Peer’s crosswalk evaluation tool\(^3\), traffic operations analysis using Synchro and SimTraffic\(^4\), and qualitative analysis based on best practices. This process was a team effort, with University and City staff working closely and providing direct feedback on the various proposals.

With the alternatives evaluated, preferred designs for each segment and intersection were selected. These designs were developed as a set of 35% design drawings. This level of design development readies the University and City to create final designs and construction documents, as funding allows.

Multiple key stakeholders have been actively engaged in the planning and design for this Study. Both the University and City are core stakeholders, as the projects will enhance the circulation along the entire north side of campus and are located within the City of Berkeley’s right-of-way. The project team represented various University and City staff with expertise in:

- University campus planning
- University transportation planning and engineering
- University landscape architecture
- City traffic engineering
- City bicycle and pedestrian planning

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3 The Crosswalk Tool is based on research from the National Cooperative Highway Research Program and Federal Highway Administration. Refer to Appendix D for an overview of the Crosswalk Tool and how potential crossing treatments are identified.

4 Refer to Appendix C for the traffic operations and micro-simulation analysis.
In addition to the project team, other stakeholders also provided input. The Study recommendations were presented to the City of Berkeley Transportation Commission, which passed a resolution in favor of the proposed changes, and members of the public as well as representatives from the East Bay Bicycle Coalition also provided their input and support through the commission hearing.

Some design ideas were discussed but were not developed as alternatives. Continuing the road diet in both directions all the way to Euclid Avenue was considered. This would close the southern portion of the divided roadway to all motor vehicle traffic, converting it to a pocket park with space for a bicycle facility and pedestrian path. All motor vehicle traffic would be rerouted to the existing westbound Hearst Avenue lanes. This concept was infeasible due to roadway geometries at the Arch Street/Le Conte Avenue intersection, grade transitions, the loss of metered parking spaces, and the loss of an ADA parking space. A two-way cycle track concept was also discussed. It would run along the eastbound motor vehicle lane between the Arch Street/Le Conte Avenue and the Euclid Avenue intersections and was discarded due to the need for a minimum width of 12.5-feet, which would not allow for construction of a sidewalk in this segment. In addition, the grade of the roadway would encourage faster bicycle speeds and introduce potential safety conflicts with pedestrians.

Table 3 summarizes the outcome of the collaborative process highlighting the design options studied and the various considerations in the selection process. The next chapter describes the preferred design that was carried forward into 35% design development.
<table>
<thead>
<tr>
<th>Street Segment</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
<th>Preferred Option</th>
<th>Selection Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shattuck Avenue to Oxford Street</td>
<td>Two-lane road diet with bicycle lanes and median</td>
<td></td>
<td></td>
<td>Option 1</td>
<td>+ Provides vehicle storage for westbound left-turns onto Shattuck + Provides vehicle storage for eastbound left-turns onto Walnut + Allows for bicycle lanes</td>
</tr>
<tr>
<td>Oxford Street to Spruce Street</td>
<td>Three-lane road diet (two westbound lanes, one eastbound lane), bicycle lanes and median</td>
<td></td>
<td></td>
<td>Option 1</td>
<td>+ Provides vehicle storage for westbound left-turns onto Oxford + Allows for bicycle lanes + Allows for median refuge</td>
</tr>
<tr>
<td>Spruce Street to Arch Street/Le Conte Avenue</td>
<td>Three-lane road diet (two westbound lanes, one eastbound lane) with westbound Sharrows, eastbound bicycle lane and median</td>
<td>Two-lane road diet, convert Arch Street to right-out only, bike lanes and median</td>
<td></td>
<td>Option 2</td>
<td>+ Option 2 allows for bicycle lanes in both directions while providing adequate vehicle capacity + Option 2 reduces crossing distances at multiple locations</td>
</tr>
<tr>
<td>Arch Street/Le Conte Avenue to Euclid Avenue</td>
<td>One-lane road diet with buffered bicycle lane and sidewalk</td>
<td>One-lane road diet with one-way cycletrack and sidewalk</td>
<td>One-lane road diet with two-way multi-use path</td>
<td>Option 1</td>
<td>+ Option 1 and 2 provide separated bicycle facility – Option 2 may encourage wrong-way riding – Option 3 may create pedestrian conflict with fast-moving downhill (westbound) bicyclists</td>
</tr>
<tr>
<td></td>
<td>Eastbound</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>One lane at all times and class III sharrows</td>
<td>One lane and buffered bicycle lane</td>
<td></td>
<td>Option 1</td>
<td>+ With steep downhill (westbound), bicyclists travel at close to vehicle speeds and may prefer to ride in the center of the roadway – Option 2 would require removal of unrestricted and metered parking</td>
</tr>
<tr>
<td></td>
<td>Westbound</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Euclid Avenue to La Loma Avenue/Gayley Road,</td>
<td>Sidewalk extension or median between Etcheverry Hall and Le Roy Avenue</td>
<td></td>
<td></td>
<td></td>
<td>– Option 1 would require removal of heavily used metered parking on one side of Hearst Avenue</td>
</tr>
<tr>
<td></td>
<td>Pedestrian</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Class III route with sharrows both directions</td>
<td>Climbing class II bike lane and downhill class III sharrows</td>
<td></td>
<td>Option 1</td>
<td>– Climbing Class II bike lane would require removal of heavily used metered parking on south side of Hearst Avenue</td>
</tr>
</tbody>
</table>
PREFERRED DESIGN

Conceptual and 35% designs were developed for the preferred designs. This chapter details the conceptual preferred design proposal. The 35% design drawings are presented in Appendix A.

CORRIDOR-WIDE CONSIDERATIONS

Multiple corridor-wide changes were identified, including pavement considerations, accommodation of bicyclists through bus stops, and design of medians. ADA access changes should also be addressed as a corridor-wide issue, as discussed in the City’s ADA Transition Plan, and bi-directional curb ramps should be installed wherever feasible along the corridor.

Pavement Considerations

It is assumed that the Hearst Avenue corridor between Shattuck Avenue and La Loma Avenue/Gayley Road will be slurry-sealed prior to implementation of the roadway projects. Slurry-sealing the roadway requires adequate pavement quality. Several locations along the corridor may require repaving prior to application of the slurry-seal.

Bicycle Accommodation at Bus Stops

Where Class II bicycle lanes pass through bus stop areas, a dashed green conflict zone treatment is recommended to indicate the presence and appropriate placement of bicyclists through the bus stop zone. The skip-stripe green conflict zones are proposed at bus stops along Hearst Avenue, where buses may merge across or stop in the bike lane near stops. Skip-stripe green conflict zones are also proposed where autos merge across the bike lane to turn at intersection approaches. Additional shuttle traffic associated with the LBNL was also considered.

Median Design

All medians proposed in the conceptual design should be a minimum of six feet-wide. This is the minimum recommended width to provide refuge for bicyclists as well as pedestrians with strollers. Medians at intersections should also include a median tip as feasible to provide pedestrian refuge and delineate the waiting space for pedestrians at intersections.

Crosswalk Striping

The crosswalk striping shown on the 35% design drawings replicate the existing crosswalk striping. Crosswalk striping should be reevaluated during final design to be consistent with the design guidelines.
in the City of Berkeley’s Pedestrian Master Plan. The guidelines suggest standard crosswalk striping at the signalized intersections. At uncontrolled locations, high-visibility ladder striping is suggested. Following these guidelines would mean that the uncontrolled crosswalks at Walnut Street and Spruce Street would be the only locations where high-visibility crosswalks are provided.

SEGMENT 1: SHATTUCK AVENUE TO OXFORD STREET

Existing Configuration

Between Shattuck Avenue and Oxford Street, Hearst Avenue is a four-lane roadway with left-turn pockets at the signal-controlled intersections with Shattuck Avenue and Oxford Street. The 60-foot curb-to-curb width of the roadway includes on-street parallel parking on both sides of the street. Recently-constructed, the Ebb building includes a new mid-block, multi-use path to connect the two isolated segments of Walnut Street, and the west leg of the intersection is striped as a high-visibility crosswalk to reflect this new desire line. At Walnut Street, no crosswalk is marked at the east leg of the intersection, and the west leg high-visibility crosswalk was ground out in conjunction with the construction of the Helios building. Hearst Avenue widens from one lane to two lanes in each direction at the west leg of the Hearst Avenue/Shattuck Avenue intersection.

Proposed Configuration

A road diet is proposed for this segment of Hearst Avenue to provide one travel lane in each direction with bicycle lanes and a median. A striped median would allow for left-turn pockets at both the Shattuck Avenue and Walnut Street intersections. A raised median with landscaping is proposed between Walnut Street and Oxford Street, with a left-turn pocket at the Oxford Street intersection. In addition to signal modifications at the Oxford Street intersection, RRFBs would be installed at the high-visibility crosswalk at Walnut Street. Table 4 and Table 5 show additional proposed changes to the intersection and mid-block conditions, respectively, and Figure 6 presents the conceptual design.

At the eastbound approach to Oxford Street, the skip-stripe green conflict zone treatment is marked through a shared bike-lane and right-turn pocket. A green conflict zone treatment is also proposed on the westbound Oxford Street approach. Bike boxes are proposed on the eastbound, westbound, and northbound approaches with bike lanes at the Oxford Street intersection. Southbound, a sharrow would be centered in the outside travel lane with an advanced stop bar placed four feet back from the crosswalk.

The existing striping configuration on the west side of the Hearst Avenue/Shattuck Avenue intersection would be restriped to match the proposed geometry on Hearst Avenue east of Shattuck Avenue.
### TABLE 4: SEGMENT 1 INTERSECTION RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Location</th>
<th>Engineering Solutions</th>
<th>Signal</th>
<th>Signage &amp; Striping</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Crosswalk</td>
</tr>
<tr>
<td></td>
<td>Curb Extns</td>
<td>Median Refuge</td>
<td>Bus Bulb</td>
</tr>
<tr>
<td>Walnut Street/ Hearst Avenue</td>
<td>NW and SW corners</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxford Street/ Hearst Avenue</td>
<td>NW corner</td>
<td>East crosswalk</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE 5: SEGMENT 1 MID-BLOCK RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Location</th>
<th>Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Road Diet</td>
</tr>
<tr>
<td>Shattuck Avenue to Walnut Street</td>
<td>Two-lanes to one-lane in each direction</td>
</tr>
<tr>
<td>Walnut Street to Oxford Street</td>
<td>Two-lanes to one-lane in each direction</td>
</tr>
</tbody>
</table>
Hearst Avenue Conceptual Design: Shattuck Avenue to Oxford Street

Figure 6

- **Bus Stop**: Design of Helios Building & Driveways may impact
- **Advanced Curb**: Extensions feasibility may depend on future bus layovers on South side of Hearst
- **Advance Yield**: Crosswalks with recently constructed mid-block connection between Hearst & University Avenues
- **Combined Bike Lane/Turn Lane**: Through conflict zone
- **Bike Box & Dashed Green Pavement**: Through conflict zone
- **Existing Curb Line**: Striping to conform with proposed striping east of Shattuck Avenue
SEGMENT 2: OXFORD STREET TO ARCH STREET/LE CONTE AVENUE

Existing Configuration

Between Oxford Street and Arch Street/Le Conte Avenue, Hearst Avenue is a four-lane roadway with on-street parking, measuring 60 feet curb-to-curb and widening to 80 feet at its widest point just west of Arch Street. Hearst Avenue has left-turn pockets and is signal-controlled at the Oxford Street and Arch Street/Le Conte Avenue intersections. Approximately 200 feet east of the Oxford Street/Hearst Avenue intersection, Spruce Street intersects Hearst Avenue at a side-street stop-controlled, three-way intersection, where the north and east crosswalks are marked. The east leg is marked as a high-visibility crossing.

Proposed Configuration

A road diet is proposed for this segment of Hearst Avenue to create one travel lane in each direction with bicycle lanes and a raised median. The raised median would be extended through the Spruce Street/Hearst Avenue intersection. The raised, landscaped median between Oxford Street and Le Conte Avenue would be closed at Spruce Street, restricting motor vehicle movements to right turns into and out of Spruce Street. A bicycle cut through would allow bicyclists to turn onto and off of Spruce Street. RRFBs would be installed on the east crosswalk at Spruce Street.

The Arch Street/Le Conte Avenue intersection would be reconfigured to remove Arch Street from the existing four-way intersection. Arch Street would become stop-controlled and the signalized intersection would become the three-way intersection of Le Conte Avenue and Hearst Avenue. The intersection would be further narrowed through a curb extension on the northwest corner, between Arch Street and Le Conte Avenue, and a sidewalk extension on south side of the intersection. West of Arch Street, large curb extensions are proposed on the north side of the street, maintaining access to the existing driveways and providing a new sidewalk along the new face of curb. One parking space would be lost with the new curb extensions.

Table 6 and Table 7 show additional proposed changes to the intersection and mid-block conditions, respectively, and Figure 7 presents the conceptual design.
### TABLE 6: SEGMENT 2 INTERSECTION RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Location</th>
<th>Engineering Solutions</th>
<th>Signal</th>
<th>Signage &amp; Striping</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Curb Extns</td>
<td>Median Refuge</td>
<td>Bus Bulb</td>
</tr>
<tr>
<td>Spruce Street/ Hearst Avenue</td>
<td>East crosswalk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Le Conte Avenue/ Hearst Avenue</td>
<td>NW corner, south side</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### TABLE 7: SEGMENT 2 MID-BLOCK RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Location</th>
<th>Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxford Street to Spruce Street</td>
<td>Two-lanes to one-lane in each direction</td>
</tr>
<tr>
<td>Spruce Street to Le Conte Avenue</td>
<td>Two-lanes to one-lane in each direction</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Hearst Avenue Conceptual Design: Oxford Street to Arch Street/Le Conte Avenue

- New bicycle lane
- One WB travel lane
- Extend left-turn pocket by 50 feet
- Sidewalk extension
- Restrict Spruce to right-in/right-out only operations for autos
- Bike box and dashed green pavement through conflict zone
- Maintain 2 lanes
- Restrict Arch to right-out only operations
- Install RRFBs
- Consider installing soft-hit posts or other delineator near to intersection to highlight bike lane
- Install "DO NOT ENTER" sign
- Install RRFBs
- Potential bus pullout
- Restrict Spruce to right-in/right-out only operations
- Install RRFBs
- Two-way bicycle cut-through
- Dashed colorized bicycle lane through bus stop
- Extend driveways to new face of curb
- Dashed colorized bicycle lane
- Existing bicycle lanes
- Extend left-turn pocket by 50 feet
- Bike box and dashed green pavement through conflict zone
- Install RRFBs
- New bicycle lane
- Green pavement through bus stop
- Maintain 2 lanes
SEGMENT 3: ARCH STREET/LE CONTE AVENUE TO EUCLID AVENUE

Existing Configuration

Hearst Avenue is a divided roadway with vertical grade separation between Arch Street/Le Conte Avenue and Euclid Avenue. The roadway consists of one travel lane and one peak hour travel lane, with on-street parking allowed during off-peak hours. One travel lane exists westbound with a mix of metered and residential on-street parking occupying what would be the outside travel lane. Near the intersection with Le Conte Avenue, parking is restricted, allowing the roadway to function as two-lanes approximately 130 feet east of the intersection. The eastbound lanes are 25.5 feet curb-to-fence, and the westbound lanes are 23 feet curb-to-curb. No sidewalk is provided on the south side of Hearst Avenue between Le Conte Avenue and the bus pull-out west of Euclid Avenue.

Proposed Configuration

A road diet is proposed for eastbound Hearst Avenue to create a single travel lane with the conversion of the peak-period lane/off-peak parking lane to a buffered bike lane and a sidewalk. This would remove approximately 34 parking spaces and 40 feet of motorcycle parking.

The westbound geometry would largely be unaffected, retaining all existing parking, even during peak hours. Green-backed sharrows would be spaced approximately every 100 feet and centered on the travel lane. The westbound existing dashed lane line would be removed. Table 8 and Table 9 show proposed changes to the intersection and mid-block conditions, respectively, and Figure 8 presents the proposed changes.
### TABLE 8: SEGMENT 3 INTERSECTION RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Location</th>
<th>Engineering Solutions</th>
<th>Signal</th>
<th>Signage &amp; Striping</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Curb Extns</td>
<td>Median Refuge</td>
<td>Bus Bulb</td>
</tr>
<tr>
<td>Euclid Avenue/ Hearst Avenue</td>
<td>South side</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### TABLE 9: SEGMENT 3 MID-BLOCK RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Location</th>
<th>Treatments</th>
</tr>
</thead>
</table>
| Le Conte Avenue to Euclid Avenue | • Two-lanes to one-lane eastbound
• Existing westbound geometry to remain but remove peak period parking restrictions

<table>
<thead>
<tr>
<th></th>
<th>Median</th>
<th>Bike Facilities</th>
<th>Sidewalk</th>
</tr>
</thead>
</table>
|                          |                                           | • Five-foot climbing lane with two-foot buffer eastbound
• Green-backed sharrows centered on lane westbound | Six-foot sidewalk on south side |
Figure 8
Hearst Avenue Conceptual Design: Arch Street/Le Conte Avenue to Euclid Avenue

- **ARCH STREET**
  - Buffered bicycle lane
  - Sidewalk
  - Install pedestrian scale lighting between Le Conte Avenue and existing bus stop west of Euclid Avenue
  - Install safe-hit posts for first 50' of striped buffer

- **EUCLID AVENUE**
  - Curb extension through intersection
  - Install bread crumb treatment & sharrows at campus entrance

- **LE CONTE AVENUE**
  - Curb extension, increase size of bus waiting area

- **SCENIC AVENUE**
  - Consider decorative stamped pavement or pavers across crosswalks

- **KEY**
  - Bus stop
  - Curb line
  - Existing curb line
  - Striping
SEGMENT 4: EUCLID AVENUE TO LA LOMA AVENUE/GAYLEY ROAD

Existing Configuration

At Euclid Avenue, the eastbound departure lanes merge down from two lanes to one. East of Euclid Avenue, Hearst Avenue becomes one lane in each direction with metered parking on either side of the street, and a 40-foot curb-to-curb width. During the AM peak hours, the parking on the south side becomes a peak-hour travel lane between Euclid Avenue and Le Roy Avenue.

Le Roy Avenue is a side-street, stop-controlled intersection with high pedestrian volumes. Just to the west of the intersection, a high number of mid-block pedestrian crossings occur in front of Etchevery Hall. At the La Loma Avenue/Gayley Road intersection, large turning radii and right-turn slip lanes on the northwest and southwest corners and the large radii on the northeast corner create long pedestrian crossing distances and poor sightlines.

Proposed Configuration

The existing two-lane cross-section with on-street parking would remain; however, the eastbound peak-hour parking restriction would be removed. Sharrows would be added in both directions on the corridor. The Le Roy Avenue intersection would be fully signalized. The intersection geometry at La Loma Avenue/Gayley Road would be reconfigured to remove the channelized right-turns on the northwest and southwest corners, bringing those right-turns under signal control and adding tightening the radius on the northeast, northwest, and southwest corners. To accommodate larger semi-trucks making the eastbound right-turn onto Gayley Road, the Gayley Road centerline would shift five feet to the east. Table 10 and Table 11 show proposed changes to the intersection and mid-block conditions, respectively, and Figure 9 presents the proposed changes.
### TABLE 10: SEGMENT 4 INTERSECTION RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Location</th>
<th>Engineering Solutions</th>
<th>Signage &amp; Striping</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Curb Extns</td>
<td>Median Refuge</td>
</tr>
<tr>
<td>Le Roy Avenue/ Hearst Avenue</td>
<td>NW corner</td>
<td>NE corner</td>
</tr>
<tr>
<td>La Loma Avenue/ Gayley Road/ Hearst Avenue</td>
<td>NE, NW, and SW corners</td>
<td>NE, NW, and SW corners</td>
</tr>
</tbody>
</table>

### TABLE 11: SEGMENT 4 MID-BLOCK RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Location</th>
<th>Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Road Diet</td>
</tr>
<tr>
<td>Euclid Avenue to Le Roy Avenue</td>
<td></td>
</tr>
<tr>
<td>Le Roy Avenue to La Loma Avenue/ Gayley Road</td>
<td></td>
</tr>
</tbody>
</table>
Figures 9

Hearst Avenue Conceptual Design: Euclid Avenue to La Loma Avenue/Gayley Road

- Eliminate slip lane, add new sidewalk
- Reduce radii, eliminate slip lane
- Add landscaping
- Signalize intersection
curb extension through intersection
install "BICYCLISTS MAY USE FULL LANE" signage
install speed feedback sign
sharrows
bus bulb out
bread curb treatment & sharrows at campus entrance

KEY
- bus stop
- curb line
- existing curb line
- striping
ESTIMATED COSTS

Based on the 35% design drawings presented in Appendix A, conceptual level cost estimates were developed. The cost estimates were determined based on recent construction bid reports obtained from the City of Berkeley as well as current industry standard costs. Detailed cost estimates are presented in Appendix B.

The estimated total cost for all identified projects is $2,885,614. This estimate includes 5% for traffic control, 5% for construction management, 5% for mobilization, 15% for design and environmental review, and 20% for contingencies. Table 12 shows the cost breakdown by the four segments.

<table>
<thead>
<tr>
<th>Segment</th>
<th>Project Overview</th>
<th>Cost Estimate</th>
</tr>
</thead>
</table>
| 1. Shattuck Avenue to Oxford Street | • Lane reduction, both directions  
• Class II bicycle lanes  
• Intersection changes at Walnut Street  
• Intersection changes at Oxford Street | $402,930 |
| 2. Oxford Street to Arch Street/Le Conte Avenue | • Lane reduction, both directions  
• Class II bicycle lanes  
• Intersection changes at Spruce Street  
• Intersection changes at Arch Street/Le Conte Avenue | $701,774 |
| 3. Arch Street/Le Conte Avenue to Euclid Avenue | • Eastbound lane reduction  
• Eastbound Class II buffered bicycle lanes  
• Sidewalk on south side of Hearst Avenue  
• Westbound Class III bicycle route with green-backed sharrows  
• Intersection changes at Euclid Avenue  
• Speed feedback signs | $906,187 |
| 4. Euclid Avenue to La Loma Avenue/Gayley Road | • Class II bicycle route with sharrows, both directions  
• Intersection changes at Le Roy Avenue  
• Intersection changes at La Loma Avenue/Gayley Road | $874,692 |

PHASING & IMPLEMENTATION

Full funding for the preferred design has not yet been identified. The City is currently pursuing a detailed approach to prioritizing these projects, pending further conversations between University and City staff. Criteria for project prioritization may include:

- Inclusion in an adopted plan
- Documented public support
- Immediate safety need
- Implementation feasibility and costs
- Estimated demand

An important aspect of any planning and implementation proposal for Hearst Avenue is balancing planning and engineering concerns as the projects move toward final design. While certain projects or segments of a project may have a high priority, it is important to consider the circulation implications of those decisions to provide key connections and continuous, cohesive facilities to the extent possible. Additionally, some projects are interrelated and may have a necessary order to their implementation. Any implementation will be based on funding availability and appropriate phasing strategies.

FUNDING

Multiple sources of funding will be required to design and construct the proposed projects. In addition to City, regional and State funds that may be available for complete streets and bicycle and pedestrian-related projects, potential funding sources from UC Berkeley that may be available are presented in Table 13. The intention of this table is to begin a discussion of possible funding sources for environmental review, final design documents and construction, and will require refinement and additional input from the City and UC Berkeley staff.
TABLE 13: FUNDING SOURCES

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Description/Notes</th>
<th>Potential Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Foothill Bridge Project</strong></td>
<td>Funds from UC Berkeley for pedestrian safety and public infrastructure on Hearst corridor</td>
<td>$200,000</td>
</tr>
<tr>
<td><strong>Northeast Quadrant Science and Safety Projects EIR (NEQSS) EIR Mitigation TRAF-2</strong></td>
<td>Requires advanced pedestrian warning devices at Hearst Avenue/Le Roy Avenue and Hearst Avenue/Gayley Road</td>
<td>unknown</td>
</tr>
<tr>
<td><strong>UC Workers Compensation Fund</strong></td>
<td>-</td>
<td>$150,000</td>
</tr>
<tr>
<td><strong>LRDP Settlement</strong></td>
<td>-</td>
<td>Design: $90,000 Construction: $375,000</td>
</tr>
</tbody>
</table>
| **UC Berkeley Landscape Master Plan** | Item 26 – Hearst Frontage:  
- Provide sidewalk with pedestrian lighting  
- Intersection changes at Le Roy and Arch/Le-Conte  
- Eliminate vehicular use of free right turn lane at Hearst/Gayley to improve pedestrian safety  
- Provide bike lanes where possible | unknown |
| **UC College of Engineering Streetscape and Open Space Plan** | Item 27 – Goal to create “campus” door near Le Roy intersection/Davis Hall North | unknown |

APPENDIX A: 35% DESIGN DRAWINGS
GENERAL NOTES:
1. ALL PAVEMENT STRIPING AND MARKINGS SHALL BE THERMOPLASTIC.
2. EXISTING STRIPING AND PAVEMENT MARKINGS THAT ARE IN CONFLICT WITH PROPOSED STRIPING AND PAVEMENT MARKINGS SHALL BE REMOVED AND REPLACED WITH Sections 15-2.02 (B)(4) and 15-2.03 of the State Standard Specifications.
3. ALL EXISTING STRIPING ON HEARST AVENUE FROM SMITHFIELD AVENUE TO HEDGEWOOD AVENUE SHALL BE REMOVED.
4. ALL CURB RAMPS SHALL BE UPDATED TO MEET ADA RAMP REQUIREMENTS AT THE TIME OF CONSTRUCTION.
SIGNING & STRIPING PLAN

GENERAL NOTES:

1. All permanent striping and markings shall be thermoplastic.
2. Existing striping and pavement markings that are in conflict with proposed striping and pavement markings shall be removed and replaced with Sections 15-2.02 (580) and 15-2.63 of the State Standard Specifications.
3. All existing striping on Heerst Avenue from Shattuck Avenue to Gates Way-La Loma shall be removed.
4. All curb ramps shall be upgraded to meet ADA ramp requirements at the time of construction.

LEGEND

- NEW CONCRETE
- POTENTIAL LANDSCAPE
- DESIGN WITH IRRIGATION

DATE: 10/10/12
PROJECT: HEERST AVENUE STREETSCAPE
CONTRACTOR: SF11-0600

THE PLAN IS ACCURATE FOR SIGNING AND STRIPING WORK ONLY. ALL DIMENSIONS IN FEET, UNLESS OTHERWISE NOTED.
GENERAL NOTES:

1. All pedestrian striping and markings shall be thermoplastic.
2. Existing striping and pedestrian markings that are in conflict with proposed striping and pedestrian markings shall be removed.
3. All existing striping on Hearst Avenue from Shattuck Avenue to Gayley Road-La Loma shall be removed.
4. All curb ramps shall be upgraded to meet ADA ramp requirements at the time of construction.
GENERAL NOTES:
1. All pavement striping and markings shall be thermoplastic.
2. Existing striping and pavement markings that are in conflict with proposed striping and pavement markings shall be removed and replaced per sections 70-2.02 (b)(b) and 70-2.03 of the State Standard Specifications.
3. All existing striping on Hearst Avenue from Shrakoe Avenue to Oilley Road - Le Lona shall be removed.
4. All curb ramps shall be upgraded to meet ADA ramp requirements at the time of construction.

LEGEND
- NEW CONCRETE
- POTENTIAL LANDSCAPE MEANS WITH INJECTIONS
-ThanOrEqualTo
GENERAL NOTES:

1. ALL PAINTED STRIPES AND MARKINGS SHALL BE THERMOPLASTIC.
2. EXISTING STRIPING AND PAINTED MARKINGS THAT ARE IN CONFLICT WITH PROPOSED STRIPING AND PAINTED MARKINGS SHALL BE REMOVED AND REPLACED IN CONFORMITY WITH SDOT STREET RULES AND TITLE 24-280 (WAC) AND TITLE 24-283 OF THE STATE STANDARD SPECIFICATIONS.
3. ALL EXISTING STRIPING OR MARKINGS DEFEAT SPOTTER DUTY TO CATCH VEHICLES LANE SHALL BE REMOVED.
4. ALL Curb Ramps shall be upgraded to meet ADA ramp requirements at the time of construction.

PROPOSED PLAN:

- Install green pattern thermoplastic with sharrows.
- Upgrade curb ramps to ADA and ramp requirements.
- Install new signs.
- Upgrade green pattern thermoplastic with sharrows.
- Install new signs.
- Install new parking space.
- Maintain through travel lane.
- Upgrade curb ramps to ADA and ramp requirements.
- Install new parking space.
- Maintain through travel lane.

LEGEND:
- NEW CONCRETE
- POTENTIAL LANDSCAPE HAZARD WITH INFECTION

NOTE: THIS PLAN IS ACCURATE FOR SIGNING AND STRIPING WORK ONLY. ALL DIMENSIONS IN FEET UNLESS OTHERWISE NOTED.
GENERAL NOTES:

1. All pavement striping and markings shall be thermoplastic.

2. Existing striping and pavement markings that are in conflict with proposed striping and pavement markings shall be removed and replaced of per sections 15-2.02 (860) and 15-2.03 of the state standard specifications.

3. All existing striping on Hearst Avenue from Shattuck Avenue to the Olympic Bowl employee lot shall be removed.

4. All curb ramps shall be upgraded to meet ADA ramp requirements at the time of construction.
GENERAL NOTES:

1. ALL PAVEMENT STRIPING AND WARNINGS SHALL BE THERMOPLASTIC.

2. EXISTING STRIPING AND PAVEMENT WARNINGS THAT ARE IN CONFLICT WITH PROPOSED STRIPING AND PAVEMENT WARNINGS SHALL BE REMOVED AND DEPOSITS OF PER SECTIONS 15-2.02 (B4C) AND 15-2.03 OF THE STATE STANDARD SPECIFICATIONS.

3. ALL EXISTING STRIPING ON HEART AVENUE FROM (SKETCH) AVENUE TO (CALEF) ROAD-LA LOMA SHALL BE REMOVED.

4. ALL CURB RAMP SHALL BE UPGRADED TO MEET ADA RAMP REQUIREMENTS AT THE TIME OF CONSTRUCTION.

LEGEND:

- NEW CONCRETE
- POTENTIAL LANDSCAPE
- DESIGN WITH INSCRIPTION
- PROPOSED PLAN
- INSTALL NEW SIGNAL - POSSIBLE POWER SOURCE MAY BE TRANSFORMER/SIGNAL
- PULL AT (FACILITY) - ADDITIONAL CURB RAMP TYPES MAY BE CONSIDERED TO STRAIGHTEN CROSSWALKS AND CONFORM RAMP WITHIN CROSSWALKS

NOTE: THIS PLAN IS ACCURATE FOR STRIPING AND STRIPING WORK ONLY. ALL DIMENSIONS IN FEET. UNLESS OTHERWISE NOTED.
APPENDIX B: COST ESTIMATES
## CONSTRUCTION COST ESTIMATE

### Segment 1: Hearst Avenue between Shattuck and Oxford

### Project No.: SF11-0600

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demolition</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remove Thermoplastic Lane Striping</td>
<td>1,590 LF</td>
<td>1,590</td>
<td>LF</td>
<td>$1.00</td>
<td>$1,590.00</td>
</tr>
<tr>
<td>Remove Thermoplastic Pavement Legends</td>
<td>20 SF</td>
<td>20</td>
<td>SF</td>
<td>$3.00</td>
<td>$60.00</td>
</tr>
<tr>
<td><strong>Paving</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slurry-Seal</td>
<td>31,320 SF</td>
<td>31,320</td>
<td>SF</td>
<td>$2.00</td>
<td>$62,640.00</td>
</tr>
<tr>
<td>Asphalt</td>
<td>2.3 TON</td>
<td>2.3</td>
<td>TON</td>
<td>$220.00</td>
<td>$506.00</td>
</tr>
<tr>
<td>Concrete Curb and Gutter (Curb Extensions)</td>
<td>160 LF</td>
<td>160</td>
<td>LF</td>
<td>$44.00</td>
<td>$7,040.00</td>
</tr>
<tr>
<td>Concrete Curb (Medians, Median Tips)</td>
<td>405 LF</td>
<td>405</td>
<td>LF</td>
<td>$34.00</td>
<td>$13,770.00</td>
</tr>
<tr>
<td>Concrete Sidewalk (Curb Extensions)</td>
<td>800 SF</td>
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**Notes:**
- Estimated by: RJM/CN
# Construction Cost Estimate

## Segment 2: Hearst Avenue between Oxford and Arch/Le Conte

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<td>Relocate Existing Sign Panel and Post</td>
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<td>Install AC-Powered Rectangular Rapid-Flashing Beacons (RRFBs), including device in median</td>
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**Sub-Total:** $442,201.50

**Traffic Control (5%)**: $22,110.08

**Construction Management (5%)**: $22,110.08

**Mobilization (5%)**: $22,110.08

**Total Estimate**: $701,773.78

**Notes**:}

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**Estimated by**: RJM/CN

**Date**: November 15, 2012
## CONSTRUCTION COST ESTIMATE

### Segment 3: Hearst Avenue between Arch/Le Conte and Euclid

### Project No.
- SF11-0600

### QUANTITY | UNIT | UNIT PRICE | AMOUNT
--- | --- | --- | ---

#### Demolition
- **Remove Lane Striping**: 2,060 LF, $1.00, $2,060.00
- **Remove Pavement Legends**: 100 SF, $3.00, $300.00

#### Paving
- **Slurry-Seal**: 43,510 SF, $2.00, $87,020.00
- **Asphalt**: 4.6 TON, $220.00, $1,012.00
- **Concrete Curb and Gutter (Curb Extensions, New Sidewalk)**: 1,260 LF, $44.00, $55,440.00
- **Concrete Sidewalk (Curb Extensions, New Sidewalk)**: 7,190 SF, $10.00, $71,900.00
- **New Accessible Ramp (Case E)**: 2 EA, $3,500.00, $7,000.00
- **Upgrade Accessible Ramp**: 4 EA, $3,500.00, $14,000.00
- **Green Pavement (Conflict Zones, Green-Backed Sharrows, EB Bike Lane)**: 1,200 SF, $15.00, $18,000.00

#### Striping and Signing
- **Yellow Center Lines**: 340 LF, $3.70, $1,258.00
- **Lane Line**: 60 LF, $2.70, $162.00
- **4” Solid Edgeline**: 500 LF, $3.70, $1,850.00
- **12” Thermoplastic Advanced Stop Bar**: 60 LF, $4.60, $276.00
- **Crosswalk Striping**: 300 LF, $4.60, $1,380.00
- **Bicycle Lane Striping (including Striped Buffer)**: 2,050 LF, $3.70, $7,585.00
- **Bicycle Lane Pavement Legend**: 40 SF, $4.70, $188.00
- **Bicycle Loop Detector Pavement Legend**: 20 SF, $4.70, $94.00
- **Sharrow Legend**: 170 SF, $4.70, $799.00
- **Paint Curb**: 1,260 LF, $2.70, $3,402.00
- **New Sign and Steel Post**: 18 EA, $700.00, $12,600.00
- **Remove and Salvage Signs and Steel Posts**: 8 EA, $150.00, $1,200.00
- **Relocate Existing Sign and Steel Posts**: 3 EA, $160.00, $480.00
- **New Sign on Existing Post**: 9 EA, $500.00, $4,500.00

#### Lighting and Traffic Signal
- **Signal Modification**: 1 EA, $100,000.00, $100,000.00
- **Pedestrian Scale Lighting**: 1,000 LF, $150.00, $150,000.00
- **Transit Signal Priority and Emergency Vehicle Detection**: 1 EA, $8,500.00, $8,500.00
- **Video Detection**: 1 EA, $20,000.00, $20,000.00

**SUB-TOTAL**: $571,006.00

### Notes:

- **TOTAL**: $656,656.90
- **20% CONTINGENCIES**: $131,331.38
- **TOTAL CONSTRUCTION**: $787,988.28
- **Design and Environmental**: **15%** $118,198.24

**TOTAL ESTIMATE**: $906,186.52

Estimated by: RJM/CN
## CONSTRUCTION COST Estimate

**Segment 4: Hearst Avenue between Euclid and Gayley/La Loma**

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<th>AMOUNT</th>
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<td></td>
<td></td>
<td>$114,094.38</td>
</tr>
<tr>
<td><strong>TOTAL ESTIMATE:</strong></td>
<td></td>
<td></td>
<td>$874,723.61</td>
</tr>
</tbody>
</table>

Estimated by: RJM/CN
APPENDIX C: SUPPORTING TRAFFIC ANALYSIS
MEMORANDUM

Date: March 14, 2012

To: Billy Riggs, UC Berkeley

From: Matt Goyne, Brooke DuBose and Rob Rees, Fehr & Peers

Subject: Hearst Avenue Corridor: Vehicle Traffic Operations

Traffic operations were evaluated at six intersections along Hearst Avenue, between Shattuck Avenue and La Loma Avenue/Gayley Road. Traffic operations at intersections are typically described in terms of “Level of Service” (LOS). LOS is a qualitative measure of the effect of several factors on traffic operating conditions, including speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort, and convenience. It is generally measured quantitatively in terms of vehicular delay and described using a scale that ranges from LOS A to F, with LOS A representing essentially free-flow conditions and LOS F indicating over-capacity conditions with substantial congestion and delay. The appendix in the final study report will contain additional information regarding the use of LOS in peak hour intersection analysis. Fehr & Peers can provide this information now, if requested.

For this study, the intersection peak hour operational analysis was conducted using the Synchro/SimTraffic software package. The intersection analysis was conducted using Synchro, while SimTraffic was used to visually confirm operating and queuing conditions along the corridor. SimTraffic provides a microsimulation of vehicular traffic, capturing the variations in the nature of driver behavior and modeling the interaction between vehicles within the roadway network. More information on Synchro and SimTraffic and the development and calibration of the SimTraffic model will be included in the report appendices.

EXISTING CONDITIONS

During the development of the existing Synchro traffic analysis model, the following assumptions were made to ensure the Synchro/SimTraffic model was calibrated to match existing operations along the corridor:

- Traffic volumes were balanced between study intersections for use in SimTraffic.
During the PM peak hour, the existing pedestrian volumes at the intersection of Hearst Avenue / Le Roy Avenue cause excessive vehicle delay and queuing at this intersection in Synchro/SimTraffic, which does not match observations in the field of minor queuing and delay. The cause of these mismatched results in the Synchro/SimTraffic model is due to the assumption that pedestrians will arrive randomly and consistently throughout the peak hour, rather than in groups between classes. Therefore, pedestrian volumes were adjusted until the overall vehicle operations matched field observations. The proposed road diet is not likely to affect operations at this intersection.

Based on this calibrated Synchro model, the LOS was calculated at each of the six study intersection for the weekday AM and PM peak hours (the final study report will include the detailed level of service calculations). Table 1 lists the resulting level of service and corresponding delay at each study intersection. Under existing conditions, there is minimal congestion along the Hearst Avenue corridor during the AM and PM peak hours. All of the study intersections operate at LOS C or better during both peak hours. The SimTraffic model matched observations in the field of minimal queuing between intersections during the peak hours.

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Existing Traffic Control</th>
<th>Peak Hour</th>
<th>Existing</th>
<th>Existing Plus Full Road Diet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hearst Avenue / Shattuck Avenue</td>
<td>Signal</td>
<td>AM</td>
<td>15</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>15</td>
<td>B</td>
</tr>
<tr>
<td>2. Hearst Avenue / Oxford Street</td>
<td>Signal</td>
<td>AM</td>
<td>12</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>14</td>
<td>B</td>
</tr>
<tr>
<td>3. Hearst Avenue / Le Conte Avenue / Arch Street</td>
<td>Signal</td>
<td>AM</td>
<td>10</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>14</td>
<td>B</td>
</tr>
<tr>
<td>4. Hearst Avenue / Euclid Avenue</td>
<td>Signal</td>
<td>AM</td>
<td>17</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>24</td>
<td>C</td>
</tr>
<tr>
<td>5. Hearst Avenue / Le Roy Avenue</td>
<td>SSS</td>
<td>AM</td>
<td>18</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>14</td>
<td>B</td>
</tr>
<tr>
<td>6. Hearst Avenue / La Loma Avenue / Gayley Avenue</td>
<td>Signal</td>
<td>AM</td>
<td>&lt; 10</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>12</td>
<td>B</td>
</tr>
</tbody>
</table>

Notes: SSS = Side-Street Stop-Controlled intersection. Results presented are from Synchro. A SimTraffic model was developed for informational purposes only.

1. Delay shown is average delay in seconds per vehicle.
2. The road diet results assume that the PM peak hour signal timings would be modified at this intersection to give more green time to the westbound approach.

Source: Fehr & Peers, 2012
PROPOSED ROAD DIET SCENARIO CONDITIONS

The Hearst Avenue Corridor Study alternatives include a proposal to reduce the number of vehicle travel lanes, also known as a "road diet", between Shattuck and Euclid Avenue. As shown in Table 1, vehicle traffic along the corridor would continue to operate acceptably with the proposed road diet in place. However, the Synchro model does not account for the effects of queue interactions between adjacent intersections. When queues extend between adjacent intersections, the likelihood of congestion and unacceptable (LOS F) traffic operations along a corridor increases dramatically. Therefore, SimTraffic was tested iteratively to determine what road diet configuration would be required to minimize queues on Hearst Avenue from extending between study intersections. Based on the SimTraffic analysis of the road diet alternative, Fehr & Peers recommends the following treatments so that vehicle queues do not extend past adjacent intersections along the Hearst Avenue corridor:

- Retain the existing turn pockets at all approaches. The 100 foot eastbound left turn pocket at Arch Street / Le Conte Avenue should be extended by approximately 50 feet to 150 feet to prevent eastbound queues from extending to Oxford Street.

- Retain two westbound lanes on Hearst Avenue between Spruce and Oxford Street. Modify the approach to include one dedicated left turn lane and one through-right lane.

- Either of the following treatments to minimize westbound congestion and queues at the intersection of Arch Street / Le Conte Avenue:
  - Modify signal timings during the PM peak hour to reallocate additional green time to the westbound approach.
  - Maintain two lanes on the westbound approach, extending back approximately 200 feet. This would also require two westbound lanes between Arch Street and Oxford Street.

- Modify the signal timing at Oxford Street to reallocate additional time to the eastbound approach during the AM peak hour

- Modifications to pedestrian signal timings:
  - Signal timings should be based on the updated MUTCD standard for a walking speed of 3.5 feet per second, compared to the 4.0-4.5 feet per second that the signals are currently timed for. The road diet analysis assumes 3.5 feet per second.
  - Since the roadway and cross section configurations are currently being evaluated in the Hearst Corridor Study, the pedestrian crossing distances were reduced by 10 feet from the existing roadway width to account for the proposed removal of vehicle travel lanes which may be replaced by a median or curb extensions. This calculation can be adjusted as the preferred alternative design is further refined.
With these treatments and adjustments included in the proposed road diet scenario, queues would not extend back to block upstream intersections.

The primary constraint for traffic operations with the proposed road diet is at Oxford Street and Arch Street / Le Conte Avenue, in the westbound direction during the AM peak hour and in the eastbound direction during the PM peak hour. Although the recommendations above would reduce congestion and queues, some minor queuing between intersections would continue to occur. These queues are shown in Figure 1 and are described below:

- During the AM peak hour, maximum westbound queues would extend from Arch Street / Le Conte Avenue to in between Spruce Street and Oxford, and from Oxford Street to between Walnut Street and Shattuck Street. These queues would only occur during the peak 15 minutes, and in general would clear within one cycle period and therefore not cause unacceptable levels of delay.

- During the PM peak hour, maximum eastbound queues would extend from Arch Street / Le Conte Avenue to Scenic Avenue. These queues would only occur during the peak 15 minutes, and in general would clear within one cycle period and therefore not cause unacceptable levels of delay.
Peak Hour Queues

AM Queues

Average Max

PM Queues

Note: Queues are based on preliminary SimTraffic analysis runs. In general, observed queues cleared within one signal cycle and did not extend to affect upstream intersections. Max queues occur only during the peak 15 minutes of traffic.
APPENDIX D: CROSSWALK TOOL DOCUMENTATION
APPENDIX D: PEDESTRIAN SAFETY ANALYSIS

Appendix D explains the methodology and rationale behind Fehr & Peers Crosswalk Tool, which was used to identify potential treatments for existing unsignalized crosswalk on the Hearst Avenue corridor. The recommended intersection improvements include considerations such as:

- Best Practices at uncontrolled intersections and mid-block locations
- Demand considerations
- Stopping sight distances
- Signal warrants

Based on research from the National Cooperative Highway Research Program and Federal Highway Administration, a crosswalk treatment identification tool was used to identify appropriate crossing treatments for the Hearst Avenue corridor. The tool used inputs from recent multi-modal traffic counts and fieldwork, including pedestrian and vehicle volumes, number of lanes, posted speed, and average daily traffic, to provide candidate crosswalk treatments at the intersections at Walnut Street, Spruce Street, and LeRoy Avenue.

**Best Practices at uncontrolled intersections and mid-block locations**

The following is the recommended or best practice for pedestrian treatments at uncontrolled intersections and mid-block locations.¹

Crossings should be marked where all of the following occur:

- Sufficient demand exists to justify the installation of a crosswalk (see Demand Considerations below)
- The location has sufficient sight and/or sight distance will be improved prior to crosswalk marking
- Safety considerations do not preclude a crosswalk

**Demand Considerations**

Uncontrolled and mid-block crossings should be identified as a candidate for marking if there is a demonstrated need for a crosswalk. Need can be demonstrated by any of the following:

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¹ The most common crosswalk of this type will be at intersections where a minor side street is stop controlled and a major street is uncontrolled.
- Location near existing or proposed pedestrian generators (such as a school or park)
- Existing pedestrian volumes
- Pedestrian-vehicle collisions at this location (over several years)
- Location of nearest (adequately) marked or controlled crosswalk
- Citizen surveys, requests, walking audits, etc.

Demand considerations at along Hearst Avenue include major pedestrian routes and volumes between academic buildings and commercial areas. Based on the results of Chart 1 shown on the following page, the Crosswalk Tool was used at each uncontrolled crosswalk within the study area. The Crosswalk Tool follows a two-step process to determine a “match” for the study location characteristics. The first step is to determine if the pedestrian and vehicle volumes meet the signal warrant requirements to install a pedestrian signal. If this warrant is met, the tool will recommend a signal. If the warrant is not met, the tool recommends one or more less “intense” treatments, as described below.

Level 1 Treatments:
- High Visibility Crosswalk Markings, Advance Yield Lines, Advance Signage

Level 2 Treatments:
- Curb Extensions, Bus Bulb, Reduced Curb Radii, Staggered Pedestrian Refuge

Level 3 Treatments:
- In-pavement Flashers, Overhead Flashing Beacons (two-lane roads)
- Stutter Flash (multi-lane roads)

Level 4 Treatments:
- HAWK, Stutter Flash, or Direct Pedestrians to Nearest Safe Crossing

Treatments are selected within each level based on the characteristics of the location (presence of bicycle lanes, transit, etc.). For higher levels of treatments, combinations of treatments across levels (such as a HAWK signal with curb extensions) may be appropriate. These combinations should be determined based on site feasibility and engineering judgment.
Chart 1: Feasibility Analysis for Treatments at Uncontrolled Locations

Note: Where no engineering action is recommended in Chart 1, consider applicable education and enforcement efforts.

Location is near an existing or proposed park, school, hospital or other major pedestrian generator/attractor

20 pedestrians per hour (15 elderly and/or children) or 60 in 4 hours cross at location and ADT ≥ 1500 vpd

Pedestrian injuries or fatalities have occurred at this location in the past 5 years

Citizen surveys or walkability audits overwhelmingly suggest the need

No action recommended

Nearest appropriately marked or protected crosswalk is at least 300 feet away

YES

40 pedestrians per hour (30 elderly and/or children) or 120 in 4 hours cross at location*

NO

Direct pedestrians to the nearest marked or protected crosswalk

YES

Pedestrians can be easily seen from a distance 10x the speed limit or 250 feet

NO

Direct pedestrians to the nearest marked or protected crosswalk or consider installing signal or grade separation

feasible

Use Crosswalk Treatment Identification Tool and Engineering

infeasible

Is it feasible to remove sight distance obstruction or lower speed limit?

* Consider lowering the volume requirements in rural locations or to meet local ranges for pedestrian volumes

optional