

3
design

design overview: link, edge, and seam

The link, edge, and seam are the organizing elements of our design. The Greenway corridor first developed as a **link**, a railroad transportation system that was later augmented by roadways and the BART line. This link created an **edge**, a dividing line between land uses and neighborhoods. The East Bay Greenway is an opportunity to turn this corridor into a **seam** that joins the edges together again. But the seam does not erase the link and the edge; it builds on their strengths to become a place in and of itself—a destination in its own right.

The Link: Pathway Alignment

The link gives the corridor its original significance and strength. As our economy has shifted from manufacturing to service-based, the corridor has shifted from transporting goods to transporting people. Every day, the BART line transports people throughout the Bay Area and, by connecting to Amtrak and the Oakland International Airport, to the rest of the country and world. The Greenway will add a safe bicycle and pedestrian route to this vital transportation link.

The Edge: Material Guidelines

The juxtapositions and transitions that characterize an edge infuse the corridor with excitement and energy, giving it “edginess.” In edge communities—where artist groups and recent immigrants live, and new industries and local businesses grow—fresh opportunities for innovation arise. The edge gives the Greenway character and vibrancy, informing its overall look and style.

The Seam: Community Connections

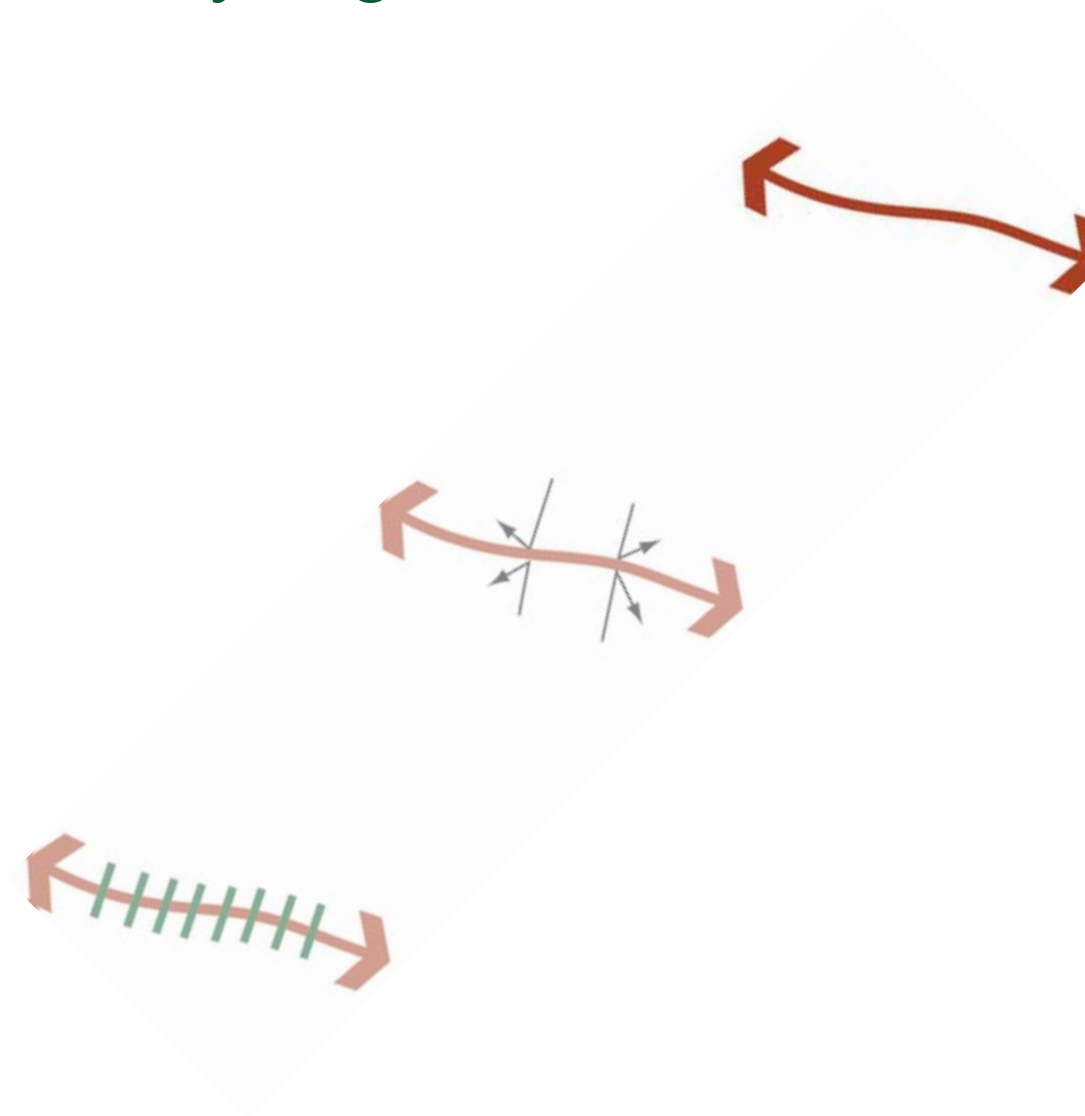
Urban Ecology hopes to build on the strength and the edginess that already exists in the Greenway corridor by adding connectivity and healing. As a seam, the Greenway will attract people and activity to a space that has long been neglected. To create a seam, our design uses carefully planned access to the Greenway, community designed spaces, and environmental restoration along the corridor’s length.

The Greenway is designed to meet the needs of the communities along the corridor. Some of these neighborhoods have a high percentage of youth; others have many seniors. In general, the potential users of the Greenway are inexperienced cyclists who are not used to negotiating heavy traffic. Our goal is to make the Greenway comfortable and inviting for inexperienced and/or beginning cyclists.

So that the Greenway is attractive to novice cyclists, we aim to create a separated multi-use pathway (Class I bike path) for as much of the route as possible. Along streets with high levels of traffic where space for a separated path is inadequate, we propose Class II bike lanes. On residential streets with less traffic, we propose installing Class III Bicycle Boulevards (*for definitions of bikeway types see the next page*).

The Greenway will provide a safe and continuous pedestrian path from 18th Avenue in Oakland to the Hayward BART station.

the link: pathway alignment



Bicycle Route Guidelines

The minimum standards for the Greenway path design are based on Caltrans's *Highway Design Manual* "Chapter 1000: Bikeway Planning and Design (HDM)" and the Federal Highway Administration (FHWA)'s *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD).

To increase the visibility of the route and the comfort of novice cyclists, we propose the following design recommendations in addition to the federal and state standards:

1. Color the Greenway Class II bike lanes solid green. A solid color identifies the lanes as part of the Greenway route and, more important, makes the lane more visible to motorists. On Class II bike lanes, paint a 6-inch bike lane marking strip that either ends or changes to a dashed line 100 to 200 feet from intersections. Use stencils with the bike lane symbol at proper intervals.
2. Design Greenway Class III bike routes as Bicycle Boulevards. Bicycle Boulevards are roadways where cars and cyclists share the travel lane with priority given to cyclists. Often located on residential streets with low volumes of traffic, these bike routes are designed to discourage cut-through motor vehicle traffic.

Bicycle Boulevards work well for young and inexperienced riders. Designate Bicycle Boulevards with signage and pavement markings, following the City of Berkeley's *Bicycle Boulevard Design Tools and Guidelines* for design standards. Additional traffic-calming measures may be needed to discourage through-vehicle traffic.



Green bike lane in Brooklyn, NY.

distance from the railroad tracks

Much of the Greenway runs parallel to the existing Union Pacific Railroad (UPRR) rail line. The minimum width required for a paved multi-purpose path between UPRR tracks and BART structures is 27 feet (12-foot wide path set 15 feet from rail center line). Though much of the path exceeds this minimum, two cases — segments 11 and 14 — noted in chapter 4, would require a variance from this standard.

Note: in a 1999 survey of 61 existing rails-with-trails, the average distance between the centerline of the track and the nearest edge of the trail was 33 feet, the responses varying from 2 to 7 feet (12%) to 91 to 100 feet (10%). All of the Greenway proposed route falls within these parameters.

Class I Bikeway (Bike Path)

Bikeway types in the Greenway plan are based on the following Caltrans Highway Design Manual definitions:



Provides a completely separated right-of-way for the exclusive use of bicycles and pedestrians with crossflow by motorists minimized.

Class II Bikeway (Bike Lane)



Provides a striped lane for one-way bike travel on a street or highway.

Class III Bikeway (Bike Route)



Provides for shared use with pedestrian or motor vehicle traffic. (HDM p. 1000-1 to 1000-2).

The Greenway Crossings

The correct design and alignment of the East Bay Greenway as it crosses roads, waterways, and railroad tracks are essential to creating a safe pedestrian and bicycle link. Greenway crossings can be classified as follows:

Grade Crossings:

- Crossing roadways at existing intersections
- Crossing roadways midblock
- Crossing railroad tracks

Overpasses:

- Creek and waterway overpasses
- Road overpasses

grade crossings: existing intersections

Where possible, the Greenway path crosses roadways at existing intersections. Pedestrians and cyclists on the Greenway can use the existing crosswalk and traffic signals at these intersections.

Striping and signage at these crossings should follow the minimum standards set by the FHWA's *Manual on Uniform Traffic Control Devices* and local jurisdictions. Pavement markings and signs should define the crossing location clearly by directing

pedestrians and cyclists on the Greenway (as well as approaching motorists)... anticipate cross traffic.

Where the Greenway crosses at an existing intersection, we recommend installing high-visibility crosswalks. The typical high-visibility crosswalk consists of wide yellow or white cross stripes that cover the entire crosswalk area. The most typical high-visibility crossings are continental and ladder-type crossings.

In many jurisdictions, however, the ladder crossing implies that pedestrians have the right-of-way. If placed at intersections with a traffic light, ladder crossings may confuse motorists and pedestrians. Because pedestrians should follow traffic lights at signalized intersections, some engineers discourage the use of ladder-type crossings. In these cases we recommend alternative high-visibility crosswalks such as asphalt stamped imprints or solid-painted crosswalks.

Where possible at intersection crossings, curb extensions, also known as bulb-outs or pop-outs, should be installed. Curb extensions make the pedestrians and cyclists more visible to motorists and shorten the roadway crossing distance.



High-visibility asphalt-imprinted crosswalk in San Leandro



High-visibility ladder style crosswalk on the Ohlone Greenway



Curb extension (bulb-out) on the Ohlone Greenway

grade crossings: midblock

In areas where the Greenway path is more than 300 feet from an existing intersection, we recommend installing midblock crossings. On streets with a low level of traffic and only two lanes to cross, we recommend installing high-visibility crosswalks, signage, and pavement markings per the FHWA’s *MUTCD* and local agency guidelines. Curb extensions should also be installed where feasible. Proposed non-signalized midblock crossings are located at 139th Avenue, 143rd Avenue, and Halcyon Drive in San Leandro; Lewelling Boulevard in Ashland; and B Street in Hayward.

At crossings with high levels of traffic, we recommend an on-demand crossing signal along with a high-visibility crosswalk and appropriate signage for cyclists and on-coming traffic. Where feasible, curb extensions and pedestrian refuge medians should also be installed. We propose a signalized midblock crossing on Hesperian Boulevard in San Leandro.



Midblock crossing on the Ohlone Greenway

grade crossings: railroad tracks

The proposed Greenway route crosses the railroad tracks where existing roadways now cross the tracks. These crossings are located at 47th Avenue, 69th Avenue, Snell Street, 105th Avenue, Thornton Street, Access road near Hudson Lane, 147th Avenue, Lewelling Boulevard, and B Street.

These crossings need to be improved with crossing signals, new railroad surfacing (rubberized material between the tracks is preferred) and an evaluation of sight distances. Pedestrian crossings should be designed to minimize pedestrian crossing time, and devices should be designed to avoid trapping pedestrians and cyclists between sets of tracks. Further guidelines for non-motorist signals and crossings are found in the FHWA’s *MUTCD*.

In two places—south of 85th Avenue and north of 98th Avenue in Oakland—the Greenway crosses a railroad spur. These spurs appear to be inactive, but the inactivity needs to be verified before proceeding with the design.



Existing railroad track crossing in Oakland



Pedestrian railroad crossings need to be accessible, with a reubberized surface or concrete slab insert.

Land Ownership

Land under the BART tracks is owned by a combination of city or county, BART, and UPRR. In some places one entity has ownership; in others, all three do. One design objective was to minimize the use of UPRR-owned land. However, visibility issues and obstacles in the pathway made using UPRR land highly desirable in some cases. The route that best balances concerns for visibility and safety with land ownership is called the preferred route.

- Two segments require use of UPRR-owned land for the preferred route:
- Segment 8: 105th Avenue to Davis Street, Oakland and San Leandro
- Segment 11: Hudson Lane to 147th Avenue, San Leandro

Because the land ownership along the Greenway is so complex, our Concept Plan includes several alternative routes if the preferred route cannot be implemented. These alternatives are illustrated in Appendix F.

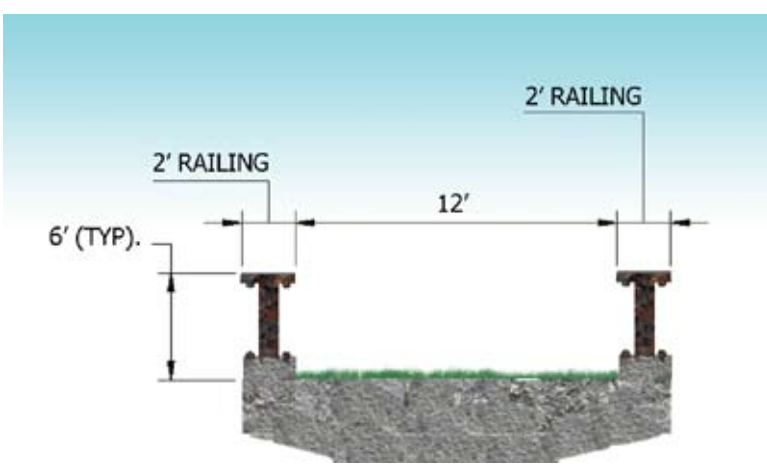


Location of Segments 8 and 11

overpasses

Seven streams or creeks intersect the Greenway; of these, only two, Estudillo Canal and San Lorenzo Creek, require the construction of new overpasses. Only one new road overpass—at Thornally Drive, near the Bay Fair BART station—will be necessary. An existing unused railroad bridge over Washington Avenue in San Leandro can work as a functional crossing for the Greenway.

Specific recommendations for the overpasses are listed in the Chapter 4. In general, proposed bridge structures will have a minimum width of 12 feet between railings, and bridge railings will have a minimum height of 6 feet. Bridge structures constructed adjacent to existing UPRR bridge crossings will have a minimum 2-foot clearance.



Typical overpass design dimensions



Bike crossing Estudillo Canal near Bay Fair Station

Traffic Impact of the Greenway

A preliminary traffic analysis was conducted on the impact of the preferred Greenway route on existing traffic flow. In general, the proposed changes make only a minor impact on traffic delays. But several of the streets studied are projected to fail for 2030 traffic volumes, both with or without the Greenway project. By changing the signal timing plan for 2030 traffic volumes, performance of these intersections can be improved.

As more detailed levels of the design are developed, additional safety evaluations of the Greenway based on design speed, horizontal and vertical alignment, grade levels, and sight distances need to be conducted.

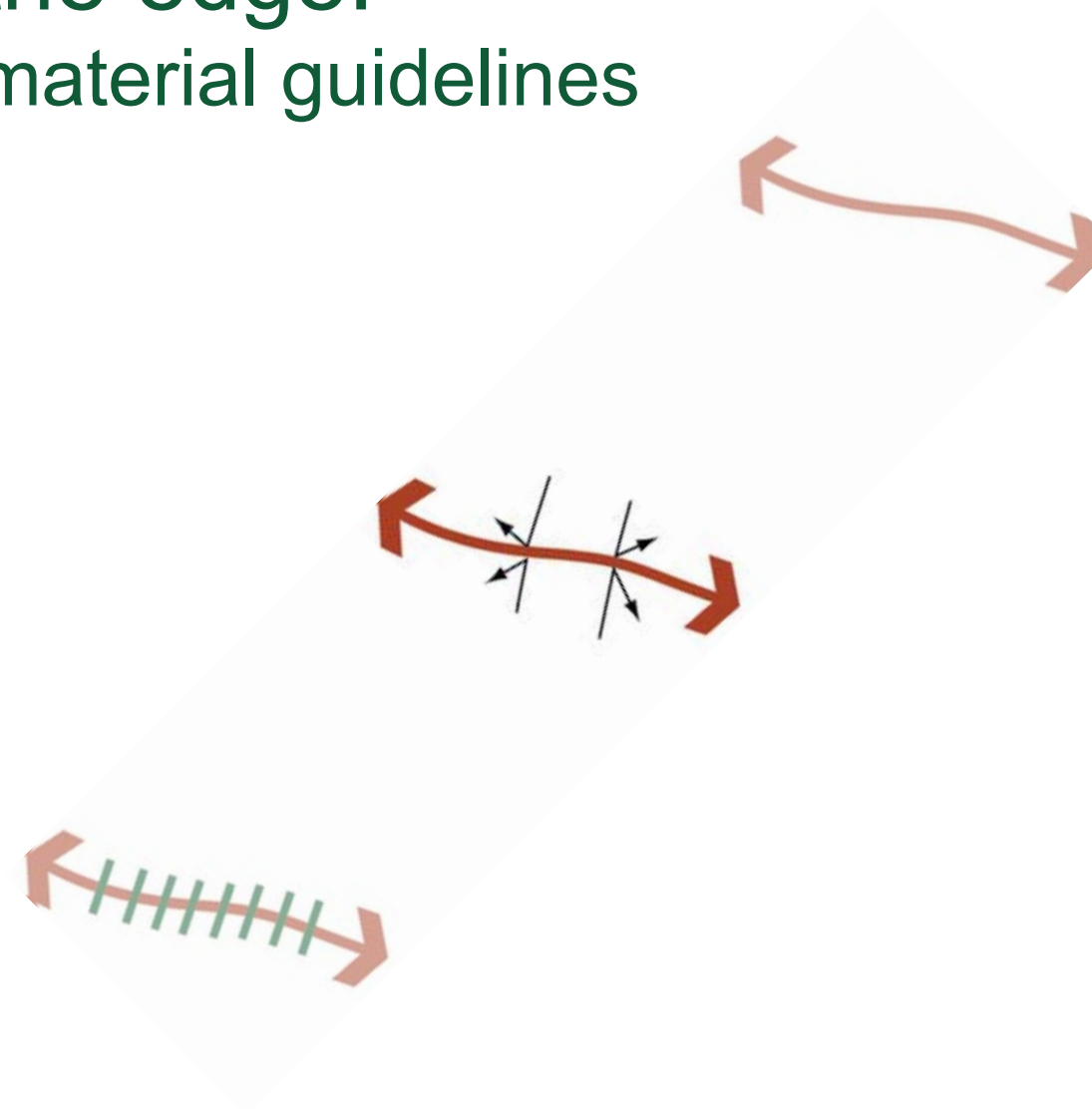
3 design overview

link
edge
seam

The East Bay Greenway runs through different cities, distinct neighborhoods, diverse land uses, and unique communities. The style of the Greenway should reflect the identity and the history of each place it passes through, and yet maintain a unified identity of its own.

The urban environment along the Greenway corridor grew up within the natural ecology of the area, and in many places paved over and erased it. The contrast between the harsh, urban, industrial environment and the soft, evanescent, ecological setting creates a juxtaposition that is strong and intriguing. This urban + ecology edge is the framework within which the different neighborhoods and communities can express their own character.

the edge: material guidelines



urban

Urban is the railroad, the factories, the roadways and the BART structure, the warehouses and water towers.

Urban is strong, durable, vandal-resistant, functional, and low maintenance.

Urban form is simple and minimal with clean, straight lines.

Urban colors are rust brown, gray, metallic, brick red.

Urban materials are concrete, steel, wood, brick, aluminum.





ecology

Ecology is the San Francisco Bay and the creeks that drain into the Bay, former marshlands and native plants, the sky and horizon, and birds travelling on the Pacific flyway.

Ecology is flexible and adaptable, using renewable resources and recycling old materials, healthy and alive.

Ecological form is soft and detailed, naturalistic, finely textured.

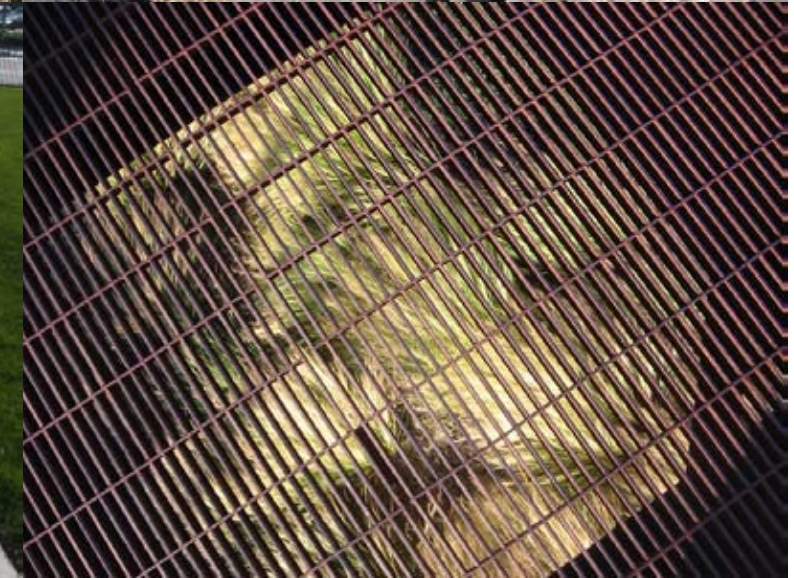
Ecological colors are all shades of green, gold, and blue.

Ecological materials are plants, wood, soil, stone, and rock.

urban + ecology

The combination of urban + ecology creates strong, durable materials that last in a harsh environment but at the same time flexible, healthy and green, soft and beautiful. These are the principles we used to develop the following recommendations for paving, wayfinding, fencing, site furnishings, plant materials, and storm water management. These are a preliminary vision for the character of the Greenway. Final selection of materials will be determined by local jurisdictions and community members.

Attention to comfort, convenience, and aesthetics guide the material section of this plan. People using the Greenway should be able to walk and ride along the corridor with ease, and to sit and relax at community hubs while enjoying public art and historic signage. They should feel safe at night walking or riding along a well-lit, clearly marked path that is beautifully landscaped.



Paving

The paving types described below—all of which meet Americans with Disabilities Act standards—were selected because of their durability and installation and maintenance requirements.

class I bike path paving

1. Asphalt is the preferred paving material for bicycle and multi-use paths. Concrete or other paving types may be used for pedestrian paths and bridges or overpasses.
2. Rubberized asphalt is a good alternative to standard asphalt where there is a Class I separated bike lane or a shared-use path. It has greater capacity to absorb shock and shock attenuation to the legs, knees, feet, and lower back than standard asphalt. The greater initial investment in rubberized asphalt is offset by the longevity of the material and the increased safety and comfort for Greenway users.
3. Where the path is not adjacent to a roadway, the path should be wide enough to allow for emergency and maintenance vehicle access. Removable bollards (with standard paving striping and reflective markers) should be located at intersections to discourage use by non-authorized vehicles. Additionally, the pavement base should be engineered to withstand vehicle use.
4. “Soft” shoulders of gravel or decomposed granite with a 2-foot minimum width should be incorporated where space allows.

class II and III bike route paving

1. The paving material will not be altered from the asphalt on the road in Class II or III bike lanes. Potholes and cracks will be filled.
2. As stated in the Link section, Class II bike lanes will be painted solid green, while Class III bike routes will have the Bicycle Boulevard markings based on the City of Berkeley’s *Bicycle Boulevard Design Guidelines*.

other paving

Small seating areas, places to stop for directions or information, and other community amenities will be located at logical points along the route. These areas may be paved with permeable materials such as interlocking pavers, permeable concrete, or decomposed granite.



Examples of paving options



Bollards and paving define this small seating space



Removable bollards with striping and reflective markers stops vehicles from driving on the Greenway.



Rubberized asphalt, a Class I bikeway, BART column signage, and 2-foot wide soft shoulders are shown in this simulation of the Greenway at 81st Avenue in Oakland





The logo for the East Bay Greenway could be stamped in the Class 1 bike routes along the entire route in quarter-mile intervals.

To the right is a map of the Greenway that could be printed on sleeves to wrap around the BART columns. This map would assist people in planning their trips on the Greenway and also give identity to the route.



Wayfinding Signage

A comprehensive wayfinding system will be developed to help people navigate the Greenway and easily find other pathways and nearby places of interest.

1. The main form of signage will be maps on the BART columns at intersections and places where people enter the Greenway. The columns, large enough to be seen from a distance, will be painted with maps of the route. The maps will create a strong visual statement, identify the Greenway route, and reduce the clutter of independent signage, as well as provide directional information.
2. Where the Greenway route is not underneath BART tracks, free-standing signs will identify the Greenway and provide directional information.
3. A uniform signage system is important for the Greenway. Often different agencies have different route numbering and signage systems. As much as possible, all signs should be combined into one BART column or one freestanding sign to reduce clutter and confusion.
4. An asphalt imprint of the Greenway logo should be placed where the Class I pathway meets an existing road. These symbols will establish continuity, providing a consistent marking system and identity for the Greenway.
5. Along the path, ¼-mile markers will be inset into the pathway and painted on top of paths on the Greenway route.
6. Larger asphalt imprints can be used along the length of the path, or in specific areas that invite people to slow down, such as community hubs with benches or places of historical or ecological interest.

Fencing

along railroad tracks

1. The Greenway runs next to the Union Pacific rail lines through much of the route. Even though many of these lines are inactive or seldom used, fencing must be placed between the rail tracks and the Greenway at all locations.
2. The height of the fencing will be determined by the Public Utility Commission (PUC) and UPRR standards. The existing chain-link fences between the railroad and BART tracks are 6 feet high.
3. Fences shall be black vinyl-coated chain link or welded wire mesh. In more visible areas with more activity, steel picket fences or more decorative fences may be used.



in community hubs

1. In areas with a high levels of activity, the fencing can be decorative, made of recycled local material and assembled by local artists.
2. Low fencing (42 inches or lower) will be used to delineate boundaries of children's play areas, community gardens, ecological restoration sites, and other community amenities. Low fences can be of recycled wood or metal and can incorporate art panels.
3. An ecological option for low fences is a "living fence" (right) made of willow trees. Willow fences, which must be kept under 42-inches tall and require a regular maintenance plan. In general, low shrubs and plantings may be used instead of fencing to delineate boundaries.



as a road buffer - barrier rail

1. In areas where the Class I bike path/multi-use path is less than 5 feet from a road edge, Caltrans requires a physical barrier between the path and the road.
2. The physical barrier should be a 42-inch tall guardrail of post and beam construction. It should be made of metal (cor-ten steel, aluminum, steel) and wood, including recycled materials when possible. The form should be simple and unobtrusive.

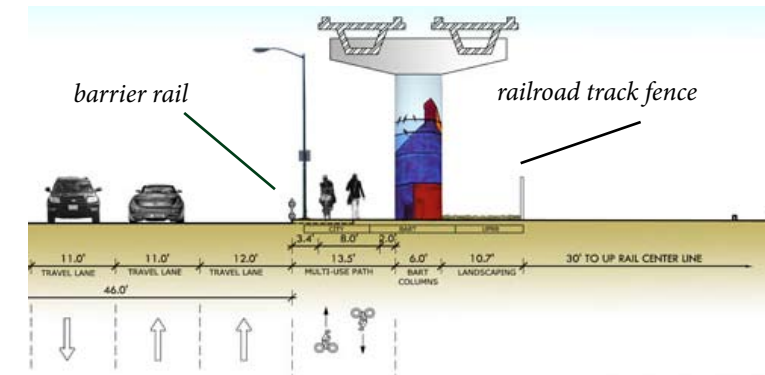
3. In certain areas, the physical barrier can be a public art element or integrate decorative features.
4. In some areas where a barrier rail is not required by Caltrans but parking under the BART structure has become a problem (near the Coliseum BART Station, for example), we recommend incorporating a barrier rail into the planted buffer zone.



property edges

Most properties along the edge of the Greenway are already fenced. Fencing along property edges needs to balance personal privacy with concerns for the Greenway's visibility.

1. Behind residences
 - New privacy fencing is not needed for most of the route because fencing has already been installed to screen the railroad right-of-way.
 - Residents may, however, feel that increased use of the corridor will require new fencing. We recommend creating a program that supports individual homeowners in upgrading their fencing when the Greenway is constructed.
 - Fencing type will be determined by the homeowners, but we recommend that fencing behind residences be solid to protect the home owners' privacy.
2. Between the Greenway and commercial/industrial uses and parking lots
 - Encourage adjacent commercial/industrial properties to use fences with 5% to 20% opacity to improve views into the Greenway area, especially on parking lot edges.
 - Work with the design of new developments so they open up to the Greenway and provide pedestrian access to the Greenway route.



According to the authors of *Safescape* (Zelinka and Brennan 2001), while fences are important boundary markers, seeing and being seen can enhance public safety. A solid brick wall with 100% opacity obscures an area, whereas a chain-link fence, which has a 5% to 20% level of opacity, can provide visibility and thus contribute to public safety.

Site Furnishings

Site furnishings—practical amenities such as benches, bike racks, and trash cans—are fundamental to the comfort and convenience of Greenway users.

In general, the form, color, and style of site furnishings should reflect the urban industrial feel of the area, while the material choices should reflect ecological principles (recycled, reused, renewable resources).



bike racks and stations

Bike racks should be concentrated in and near the BART stations along the Greenway and placed near community destinations: parks, schools, and retail centers. Bike racks should be located in well-lit areas with high visibility where they do not block pedestrian and bicycle traffic flow.

See the Topic Box to the right for more details about Bike Stations and existing bike parking capacity at BART stations.

Bike rack style will be determined by the local jurisdiction, property owners, and the East Bay Bicycle Coalition. Bicycle racks should allow for locking of both frame and wheels.



benches

Seating is important along a path shared by community members of all ages. In order to make the Greenway family friendly, benches need to be accessible and placed in locations with enough light and visibility to discourage misuse.

Benches can be clustered in community hub areas and evenly dispersed along the path. In places where Greenway users need a moment to rest, smaller, single-user benches are most appropriate. In places where Greenway users may spend more time, such as community hubs or pocket parks, the benches will be larger with back and arm rests.



litter receptacles

An adequate number of litter receptacles spaced out evenly along the Greenway will help the path stay litter free. They will supplement the city and county trash cans already placed along the route. Areas of high use, like community hubs, need at least one litter receptacle.



A uniform style will be used throughout the Greenway. Litter receptacles should have a separate recycling bin on the top. Litter receptacles with planters on top can add greening at community hubs.

The Fruitvale BART station has a much larger capacity for bike parking than do other BART stations along the Greenway (see the table) because of the Bike Station operated by Alameda Bicycle with the support of BART, CalTrans, the Unity Council, the City of Oakland, and Alameda County Congestion Management Agency. Over 200 bikes are stored on weekdays during extended business hours in a safe enclosure. This free public service encourages people to bike to the BART station. Bicycle repair and tune-up services are available on request.



People are generally more willing to bike to the BART station if they have a safe place to park their bikes. Urban Ecology recommends that the Fruitvale Station model be used in other BART stations along the Greenway.

Existing Bicycle Parking Spaces at BART stations along the Greenway

BART station	Total	Racks	Lockers	Station
Hayward	90	70	20	0
Bayfair	58	42	16	0
San Leandro	140	84	56	0
Coliseum	65	63	2	0
Fruitvale	332	56	40	236

Figures from *BART Fall 2006 Parking, Access and Occupancy Summary Survey*

Lighting

Lighting along the corridor is vital to safety. The issue of adequate lighting was brought up in every community meeting Urban Ecology attended. Seventy-five percent of those surveyed about the Greenway listed lighting as an amenity they would like to see incorporated into the design.

inset lighting

Most of the lighting fixtures will be inset into the elevated BART structure between columns. This inset lighting provides almost full illumination under the BART columns, yet it does not produce spillover glare into adjacent homes and businesses. It is also vandal-resistant.

street lights

In areas where the Greenway is not near the BART tracks, solar-powered, pedestrian-scaled lights approximately 12 feet to 15 feet high should be used. This lighting can be attached to existing street lights.

Pedestrian lights should match the style, form, and color of the existing street lights and be durable and vandal-resistant.

accent lighting

Accent lighting will be used for public art pieces, special architectural features, interpretive signage, and the wayfinding signs on the BART columns wherever possible.

Accent lighting needs to be durable and vandal-resistant.

All lighting will meet the standards set by the Illuminating Engineering Society of North America (IESNA) and jurisdictional requirements.



Solar-powered lighting



Pedestrian scale lamps



Inset lighting on the Ohlone Greenway



Accent lighting can add interest and improve safety

The lighting design that Urban Ecology recommends for the Greenway is based on lessons learned from the Ohlone Greenway, a linear multi-use path under the BART tracks in North Albany and El Cerrito. In 1999, after years of dealing with routinely vandalized globe lighting, the City of El Cerrito installed intermediary lighting between the BART columns beneath the cat walk (One light between each pair of columns). Albany is following the example. A standard parking garage light that has no light spillover into residential areas has proven to be an excellent choice. The energy-efficient 100kWh bulbs take about 10 minutes to reach full illumination after being turned on.



Ohlone Greenway

In a discussion with Urban Ecology staff in 2007, the Public Works Manager of the City of Albany, Rich Cunningham, stressed the importance of vandal-resistant lighting. The lights inset into the elevated BART structure provided the best option. Mr. Cunningham strongly recommended against ground-level lighting because it is often vandalized. Ground-level accent lights will be used sparingly where pedestrian activity is high.

Plant Materials

Plants for the Greenway were selected to be urban (able to survive in harsh, often-polluted urban environments) and ecological (California natives and drought-tolerant species). The plant palette (see Appendix D) consists predominantly of California native species, with the addition of some Mediterranean-type plants. The benefits of using these plant species include low maintenance and water needs, fewer pest and disease problems, and the potential to provide food and habitat for birds and butterflies.

planting design recommendations

1. Along the corridor, planting design should be simple with ample spacing between plants to allow for mature growth. Mulching around plants will retain soil moisture and deter weed growth.
2. Areas of high visibility and high activity should have plants with colorful flowers and/or foliage and more detailed planting arrangements.
3. Include plants that flower at different times of the year to foster an awareness and appreciation of seasonal natural beauty.
4. The plant palette should emphasize tough, durable plants that can thrive in an urban setting with minimal maintenance, water-use, and care. The plants selected should tolerate pollutants and, in some cases, remove pollutants from the air and soil.
5. Plants should be kept under 3 feet tall, and tree and shrub branches trimmed to 8 feet or higher, to allow for views throughout the corridor and to minimize hiding spaces.
6. Include plants like cherry and apricot trees that have historical significance for the corridor.
7. Minimize lawn areas. Lawn is appropriate in larger, high-use spaces (for example, playing ball and picnicking), but it is not recommended for narrow planting areas where people will not be walking.
8. When used, lawn should be a low-water variety intended for areas that are difficult to mow or water often. These areas should be large enough to be power mowed for easy maintenance.
9. Encourage the creation and adoption of community gardens within the Greenway by local community organizations, botanical associations, and school groups throughout the corridor.



Ample-spaced plantings with mulch allows for visibility through the site



Detailed arrangements in highly-visible areas



Native grasses

10. The landscape design should use the best practices promoted by the Bay-Friendly Gardening. The Bay-Friendly Landscaping Plan Review & Scorecard tool should be used to evaluate the plan. The landscape plan should incorporate all the “Required” practices as indicated in the Plan Review and score 60 points on the Scorecard (see box below for web address).



Native and drought -tolerant species

11. Using the Bay-Friendly Model Landscape Maintenance Specifications as guidelines, develop a maintenance plan in conjunction with the landscape construction plan.
12. Planting underneath the BART tracks is subject to review by BART operations staff.



Cherry trees reflect local history

Bay-Friendly Gardening and Landscape Maintenance

Bay-Friendly Landscaping staff work with the Alameda County Waste Management Authority’s 17 member agencies to help make informed decisions about sustainable landscaping in their communities. Many tools and resources have been developed that will benefit elected officials and public agency staff including planners, capital project managers, landscape architects, engineers, and landscape maintenance workers.

For public agencies, Bay-Friendly means that civic landscapes can model practices that:

- Provide a sense of place and are suited to local climate, soils, and topography
- Reduce waste and help meet recycling goals
- Reduce water use on landscapes by 50% or more
- Prevent or reduce storm water pollution to local creeks and bay
- Lower maintenance associated with mowing and shearing
- Reduce greenhouse gas emissions

Bay-Friendly’s services include free technical assistance and landscape grants for civic landscapes in Alameda County. These services are designed to assist local and regional governments in Alameda County to incorporate bay-friendly practices and materials into public landscapes.

Source: <http://www.stopwaste.org/>

Storm Water Management

Proper treatment of storm water falling on the site and channeled onto the site from the BART tracks can:

- Remove pollutants from water as it filters through soil and plants
- Increase public awareness of the hydrological cycle
- Provide water for plants while reducing flooding and stagnant water puddles
- Protect and recharge existing groundwater systems and creeks

Current conditions underneath the site demonstrate a need for new and better storm water management design. During seasonal storms, water collects in puddles between the BART line and the railroad. In addition to appearing unsightly, these puddles are potential breeding grounds for mosquitoes. Water runoff from the BART tracks contributes to the erosion of the concrete curbs in certain areas. The current drainage system could be less urban and more ecological – making use of rain to water plants and slowing the flow of water to reduce erosion.

There are two basic types of storm water systems – self-contained and under-drained. Self-contained systems can drain all the water on a site into the ground within two hours. Vegetated drainage swales and infiltration basins are examples of self-contained systems. Under-drained systems have drain pipes beneath the surface to drain excess water that the soil cannot absorb within the two-hour time frame.

Based on the infiltration rates of the soils on site and the average width of the Greenway, opportunities for self-contained systems are limited. Following is a description of the limited use of self-contained drainage systems.

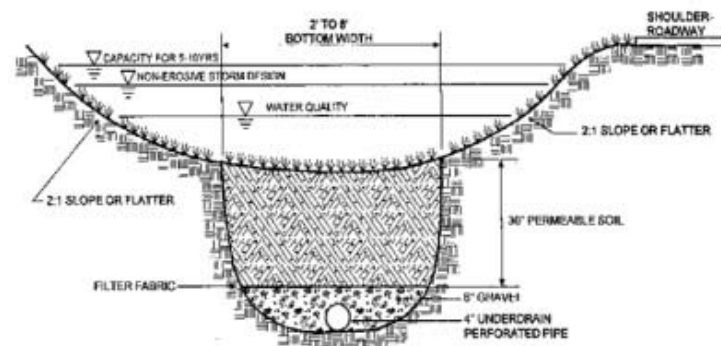


Diagram of a vegetated swale with an underdrain system

vegetated drainage swales

The ideal storm water management solution would be to create a vegetated drainage swale adjacent to the Greenway path. A vegetated drainage swale would slow water run off, filter pollutants, and increase the infiltration of water into the ground (and decrease the amount in the storm drain).



Puddles between BART and UPRR in Oakland



Vegetated swale example at Lake Merced

Structural considerations, however, render vegetative swales infeasible in many Greenway areas. The swales must be placed at least 10 feet from BART column foundations, and be a minimum of 12 feet wide. In most places the proposed Greenway is not wide enough to accommodate a vegetated swale. One exception is the median along E 12th Street in Oakland.

Vegetated Swale Recommendations:

Install demonstration gardens in E 12th Street medians along with public art and interpretive signage that explains the purpose of the swales. Involve local school groups in the project.

If additional easements (10-foot minimum) of the current Union Pacific Railroad land between BART and the railroad are obtained, the vegetated drainage swale would be the best storm water management practice for draining both the site and the elevated BART tracks.



A simulation of a vegetated swale in Oakland under the BART columns using upper easements

infiltration basins



An infiltration basin at Lake Merced

Since there is not enough space for a vegetated swale along the columns, a second option would be to provide an infiltration basin between columns.

However, the infiltration rates of the soil along much of the Greenway are low. In many cases, the space between the columns cannot handle infiltration of all the water from a typical storm.

The best infiltration rates are in the following areas (based on U.S. Department of Agriculture/ National Resources Conservation Agency Web Soil Survey):

- Oakland between 99th Avenue and 105th Avenue.
- San Leandro between Davis Street and Hudson Lane
- Ashland and Cherryland between Lewelling Boulevard and Willow Avenue

On-site testing would need to be done in these areas to determine the seasonal high-ground water level. Ideally, the infiltration rate should be between 0.5 and 2.4 inches per hour. Initial research indicates that the infiltration rate for the above areas is only 0.27 inches per hour, enough to infiltrate only about 65% of the annual area.

Although this evidence suggests that infiltration basins are not the solution for the entire Greenway or for full storm events, installing several basins has some advantages. First, treating even small amounts of runoff is valuable to the environment. Additionally, if combined with a rain garden, an infiltration basin could serve as a model demonstration garden used by cities or other agencies.



constructed depression planted with deep-rooted native plants and grasses. Rain gardens slow the rush of water from down spouts, briefly holding the water before allowing it to naturally infiltrate into the ground.

Surface Treatment Recommendations:

At a minimum, we recommend that splash rocks and a planted swale be installed beneath the BART downspouts. The splash rocks will slow the water draining down from the BART tracks; the planted swale will filter the water and allow it to infiltrate into the ground.

Although this treatment will not infiltrate all rainfall, it will impede the flow of water, allow for some infiltration, remove some pollutants and particles, reduce erosion and puddling and create an attractive landscape. It will also make the hydrologic cycle visible for environmental education purposes.



A simulation of splash rocks and a rain garden along the Greenway between the BART columns.

Infiltration Basin Recommendations:

Install a demonstration infiltration rain garden. Because of its soil infiltration rates and proximity to downtown, the highly visible pocket park near San Leandro Station would be the best site.

rain gardens and surface water treatment

Constructing an underdrain rain garden system throughout the Greenway is cost prohibitive. But any treatment that slows the flow of water and filters the water through plant materials benefits the storm system.

Rain gardens offer an alternative to the concrete pads now in use under the BART downspouts. A rain garden is a shallow,

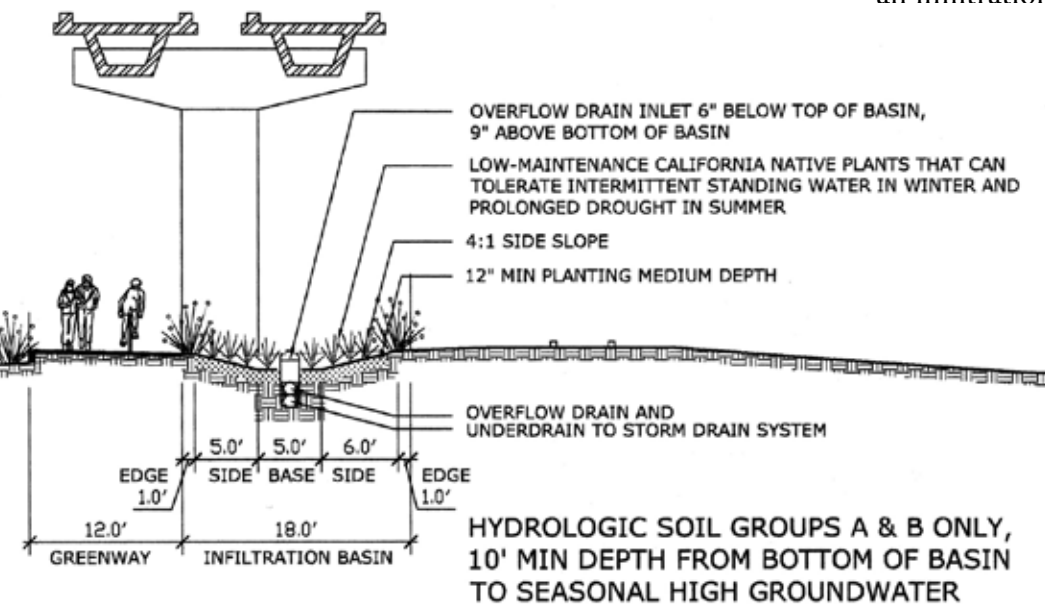


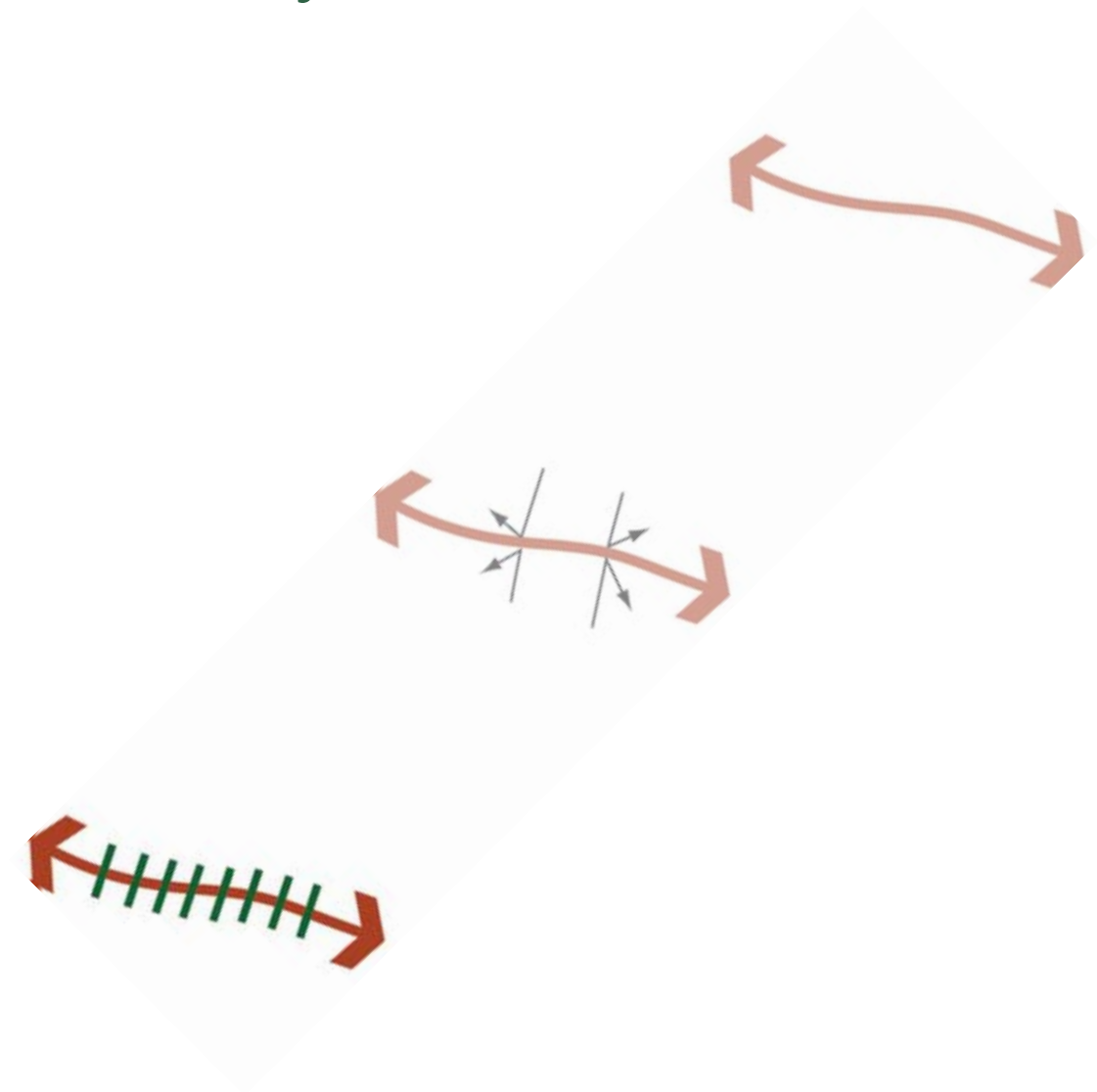
Diagram of an infiltration basin between BART columns

Beyond getting people from one place to the next, the Greenway also has the potential to bring people together. As a seam, the Greenway will attract people and activity to a space that has until now been neglected. Our hope is that the Greenway will bring people together to begin to heal past injustices and repair the fragile environment.

We propose to turn the Greenway into a seam by applying four main design principles:

1. Design to address people's concerns about crime and safety.
2. Focus on the roads that connect to the Greenway, and make crossings—both road and railroad—less daunting. For the Greenway to become a community space, people must be able to get to it easily. Traffic calming and improved pedestrian crossings will connect people to the Greenway.
3. Identify opportunities for community-based public places. Design these spaces to respond to the needs of the community members, especially those near the corridor. Involve community groups—homeowners, school groups, artist collectives—in the design and programming of the places. Specific community open-space opportunities are identified and explained in Chapter 4.
4. Enhance the visibility of the social and environmental conditions that tie the neighborhoods together: the history of the area, the cultures of its residents, and the geography of the creeks and watersheds that cross the corridor. Use public art to tell some of these stories along the corridor. See the following recommendations for public art, interpretive signage, and creeks and waterways. Public art opportunities and points of interest are labeled on the site maps in Chapter 4.

the seam: community connections



Crime and Safety



Solar powered call box on the Ohlone Greenway

The best way to ensure safety is to activate the space with people who will provide “eyes on the Greenway.” Including program elements such as play areas, exercise equipment, and community gardens that relate specifically to the community’s preferences will encourage more use of the Greenway. In this way programming and design go hand-in-hand.

Other design principles to make the Greenway safe include:

1. Keeping vegetation low and discouraging any elements that would block views through the site.
2. Making the place attractive and well cared for. Well maintained places are less likely to attract crime and vandalism than neglected, abandoned places.
3. Designing a path that can be accessed by emergency vehicles.
4. Using durable and vandal-resistant materials.
5. Installing evenly spaced solar-powered call boxes along the route.
6. Considering adding security cameras in areas not visible from adjacent streets.



Community places like playgrounds (left) and farmer’s markets (right) will draw people to the Greeway, activate the space, and deter crime

Access to the Greenway

Several areas along the Greenway have busy streets that pedestrians are hesitant to cross. Traffic calming measures can help make pedestrians and cyclists more comfortable crossing these streets to get to the Greenway.

Traffic calming recommendations include:

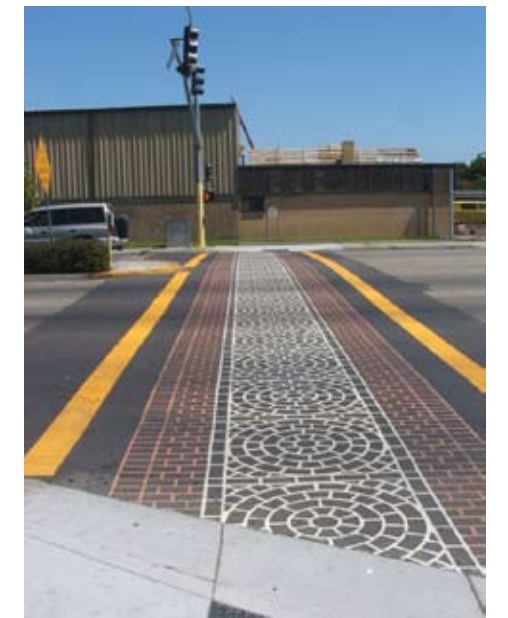
- Narrowing traffic lanes that are extra wide (12-foot wide is adequate for truck traffic).
- Adding street trees and planted buffer zones between the sidewalk and the street.

In general, pedestrian-crossing improvement recommendations include:

1. Installing high-visibility crosswalks.
2. Adding curb extensions to narrow the length of crossings.
3. Installing pedestrian count-down signals where warranted.
4. Removing free right-turn lanes where possible.
5. Adding a median pedestrian refuge area in multi-lane streets.
6. Making sure crossings are well lit at night.



Traffic-calming measures like street trees and medians can completely change the feel of a street



High visibility crosswalk in San Leandro

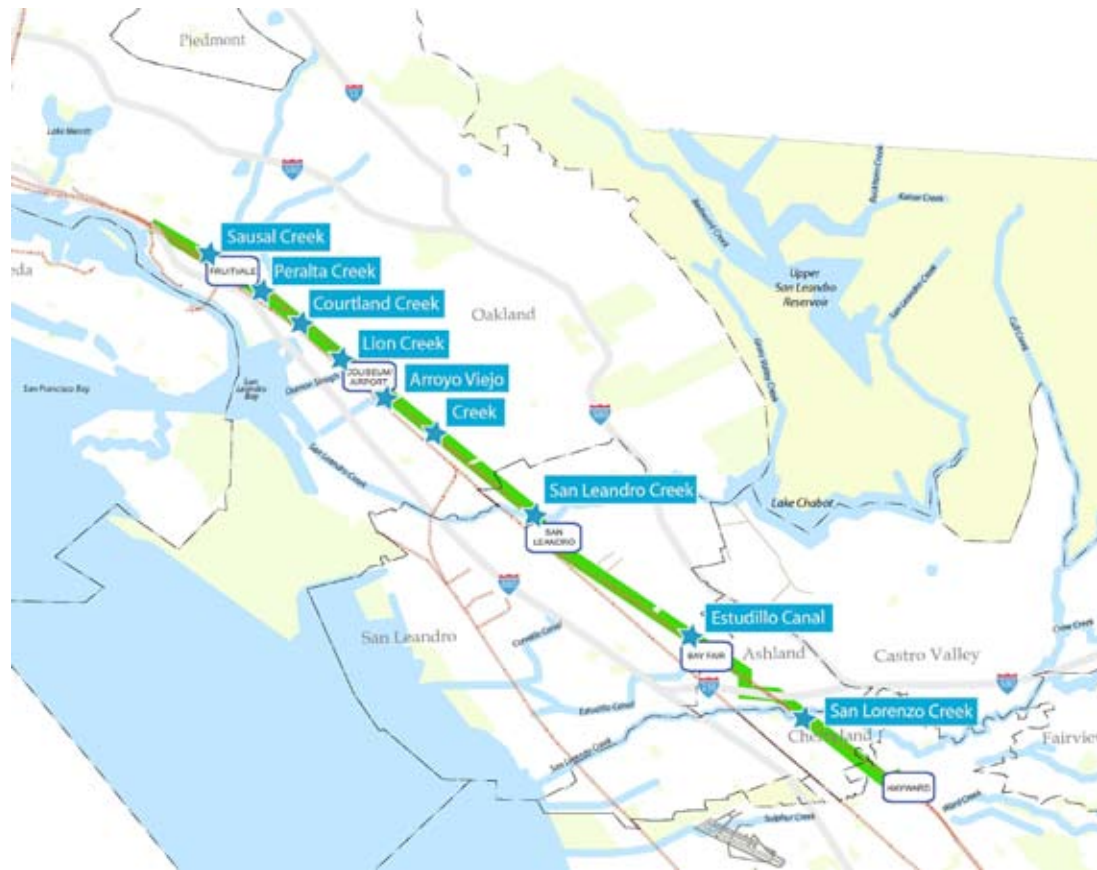
Creeks and Waterways

The creeks and waterways that intersect the Greenway are existing seams that can be highlighted to tie the corridor back together. Along its twelve miles, the Greenway crosses approximately nine creeks and channels.

Recommendations:

1. In general, use interpretative signage, vertical elements, and public art to make the stream crossings more visible to pedestrians, cyclists, and motorists on nearby roads.
2. For waterways that are culverted and underground where they intersect the Greenway (Sausal Creek near 30th Avenue, Peralta Creek near 34th Avenue, Lion Creek near 69th Avenue), use pavement markings and watershed maps to designate the creek locations.
3. For creeks that are underground but briefly exposed next to the Greenway (Courtland Creek near 47th Avenue, Arroyo Viejo near Hegenberger Road, and an unnamed channel near 81st Avenue), clean up the creek, use signage to discourage dumping, install plants around the creek edges, and install interpretive signs.
4. For creeks that are exposed but in concrete-lined channels (San Leandro Creek, Estudillo Canal, San Lorenzo Creek), clean up the creek, plant the edges with native plants, and consider mural art in the concrete channel to discourage graffiti.

In the long term, encourage the establishment of trail systems along the creeks connecting the Greenway to the San Francisco Bay. Damon Slough and San Leandro Creek already have trails along portions of their corridors.



Pavement design indicates where creeks are underground



Interpretive signage informs people about the watershed. In the long term, trails along creek edges can connect to the Greenway

Courtland Creek



Lion Creek/Damon Slough



Creek near 85th Avenue



San Leandro Creek



Estudillo Canal



San Lorenzo Creek





Artwork that interacts with the existing environment makes people more aware of their surroundings.



Symbols, like this heart in San Francisco, placed around the city incorporate art into everyday places.



Installing art pieces on one theme throughout the site (like this exhibit of “urban trees” in San Diego) draws people through a site.

Public Art

Public art makes a place’s stories and history visible to visitors and residents alike. Properly designed and executed, public art can make a place unique and special. By including the community in the creation of art, art can also bring people together and provide a space for everyone’s voices to be heard.

Recommendations:

1. Create a public art competition focusing on the design of one Greenway element—benches or bike racks, for example. Install the artwork at points throughout the Greenway to encourage visitors to travel the length of the project to each art installation.
2. Engage local artists to plan and participate in an art competition aimed at reusing found materials that tell stories about the neighborhood. A uniform theme or art concept for the Greenway should be decided by those who live and work there.
3. Involve local school children in producing semi-permanent art installations and artwork that can be added to year after year. Art pieces should be well-lit and placed in areas of maximum visibility.
4. Select public art that relates specifically to the site’s environmental, historical, and/or cultural context. Artwork that encourages a new awareness of or interaction with the existing environment is preferred.
5. Provide information about the art work, artists’ statements about the process, and maps at kiosks and BART stations.
6. In order to integrate art into the Greenway site and avoid clutter, use existing structural elements and site furnishings as potential canvases for art. Some of these potential canvases include BART columns and overhead structures, fencing, vertical barrier rails, pavement, building walls (especially the backs of industrial buildings along the route), water towers, benches, litter receptacles, and bike racks.



Incorporating art into site furnishing like seatwalls (left) and signage (right) integrates artwork with the site.

Interpretive Signage

Interpretive signage promotes awareness of the natural and cultural history of the area.

Recommendations:

1. Use signage and art to highlight the history of the area, including the architecture, industry, and cultures of the people along the corridor. Use signage and art to highlight the natural elements in the corridor, including buried creeks and lost wetlands.
2. Work with community groups, watershed groups, historical societies, and arts organizations to develop themes to highlight along each segment of the Greenway.
3. Incorporate public art into the signage design and placement.
4. Create short walking “tours” with separate themes—local ecology, art, historical buildings, and cultures along the Greenway, for example—which can be completed in one to two hours.
5. Make interpretive signage as interactive and engaging as possible with the ultimate goal of increasing awareness of the surrounding environment.
6. Place maps of nearby connecting bicycle and pedestrian routes, current information about neighborhood events, and possibly displays of children’s art work from neighborhood schools in information kiosks. Position kiosks at busy intersections and places of heightened activity.

