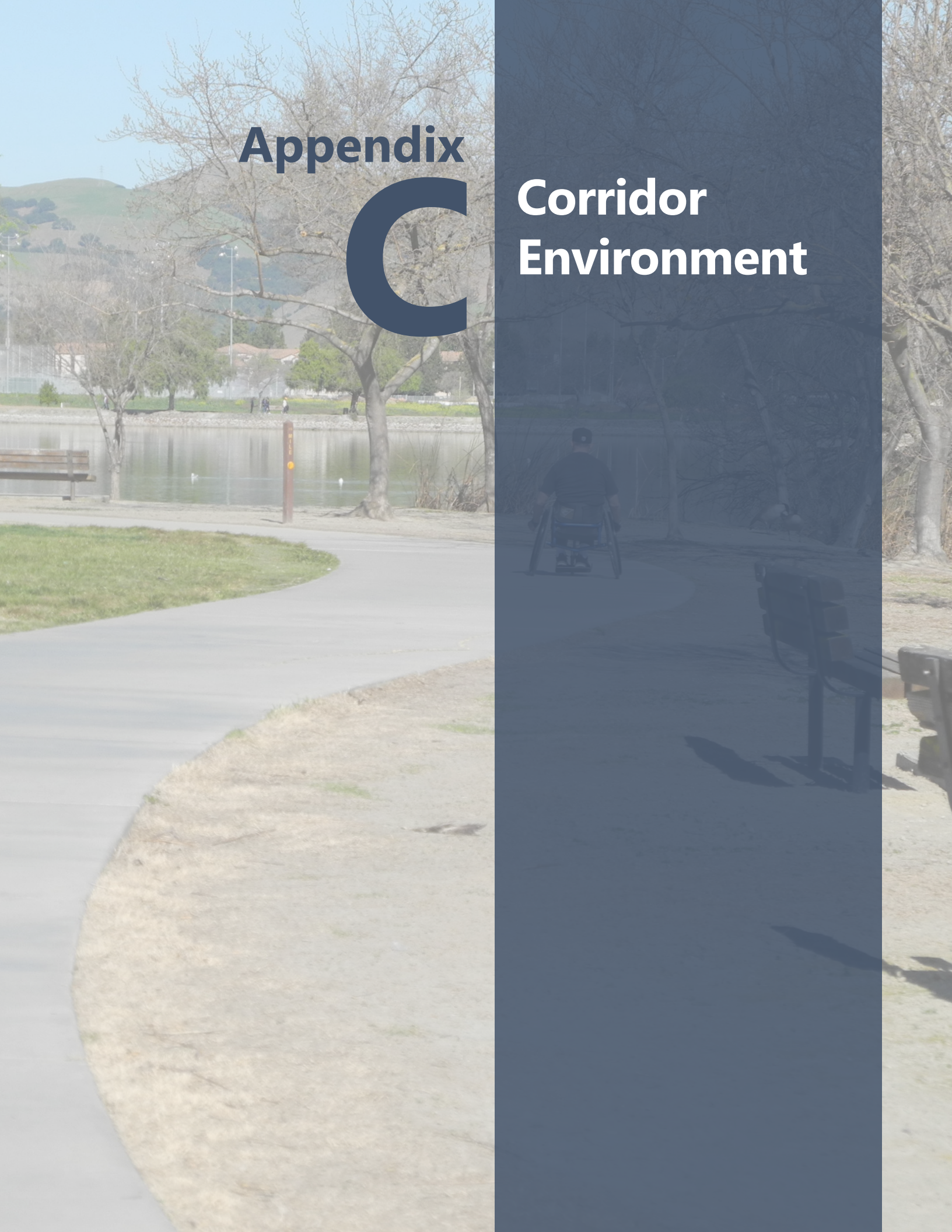


Appendix C
Corridor Environment

Contents

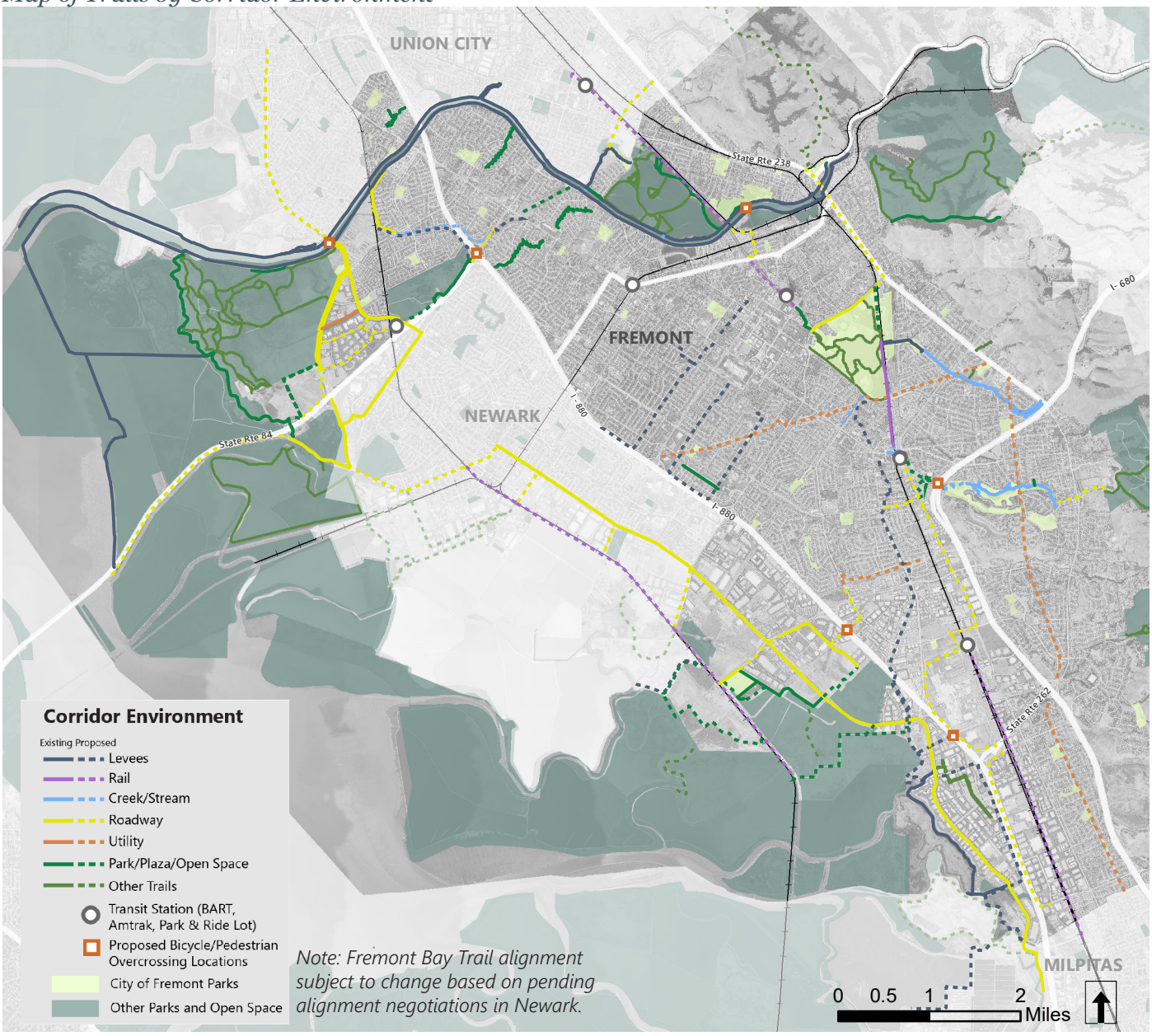
Corridor Environment

A trail's corridor environment, whether along a levee, rail line, creek, roadway, or utility line, impacts the design, use, management, and maintenance of a trail.

This Appendix provides an overview of guidance, opportunities, and limitations when designing, building, and maintaining trails along different corridor environments. This report section should be used in conjunction with **Chapter 6, Corridor Ownership** and **Chapter 7, Trail Typologies and Design** to ensure that trails in Fremont are built or upgraded to meet the trail typology standards while recognizing that each corridor environment will be unique and each corridor owner will have their own trail specifications.

Climate change and sea level rise will impact trails in some corridor environments more than others, and must be considered along with other corridor factors. For example, levee trails may need to be adjusted or relocated as sea level rise requires levee modifications. Trails near the hills may need to be adapted as emergency evacuation routes as fires become more frequent and more intense.

Map of Trails by Corridor Environment



Levees

Levees are constructed earthen walls along creeks and present an important opportunity for trail networks. The primary purpose of levees is to control flood water. While the crowns of levees are typically designed to accommodate maintenance vehicles and can often accommodate trail users, trail design and management should recognize the original flood control purpose. These long, scenic, uninterrupted corridors typically feature few street crossings, which reduces trail user conflicts with vehicles.

Levees are long, linear structures intended to control water flow.

The parts of a levee include:

- crown (top)
- waterside slope and toe (bottom)
- land-side slope and toe (bottom)

In Fremont, levees have been built in the Bay (for salt ponds) and along creeks and drainage channels (for flood control). Most have a maintenance road on the crown of the levee.

Levees within the existing or proposed Fremont trail network are owned and/or managed by:

- Alameda County Flood Control District (ACFC)
- US Fish and Wildlife Service (USFWS)
- East Bay Regional Park District (EBRPD)

Levee Maintenance

Levee maintenance is typically conducted by the levee owner or the land management agency responsible for that area. When present, trail maintenance is typically conducted by the trail operator, although there is much overlap between trail and levee maintenance.

Levee maintenance includes road repair, removal of plants and trees along the slope and toe, and maintenance of fencing, gates, signs, and water control facilities. Major maintenance of the levee structure sometimes occurs as part of a major Capital Improvement Program (CIP), and may include opportunities for additional trail development. A trail entity may be responsible for, or choose to take on,

Alameda Creek Trail at David Jones Neighborhood Park

the removal or maintenance of plants and trees on the land-side slope and toe, trash pick-up, signage replacement, and graffiti abatement, among other responsibilities.

Levee Trail Development

In Fremont, there are numerous opportunities to add to the trail network by working with levee agencies, particularly ACFC, which owns most of the levees within the existing and proposed Fremont trail network. For further information about opportunities for levee trail development along ACFC channels, see **Chapter 6, Corridor Ownership**.

Entities that own and operate levees often support trail use, particularly when trail use can support funding and maintenance of the levee facilities.

Trails on levees, however, must not interfere with flood control functions or levee maintenance, inspections, and improvements. Levee trails may also need to be closed during high water events to protect public safety.

Details regarding levee maintenance operations, public safety liability, and trail closures are covered in operating agreements and/or memorandums of understanding between the levee agency and the trail operating agency.

To accommodate trail use, a levee may require the construction of ramps or switchbacks to connect the community to the trail on the levee crown. Other minor and major trailside elements may also be required, such as signage, benches, lighting, and trash receptacles. Ramps or stairs on the waterside slope to allow community access to the water (where allowed) may also be considered.

Environmental Permitting

Most construction work done on a levee will one or more require environmental permits or review, including:

- US Army Corps of Engineers (USACE) Section 408
- National Environmental Policy Act (NEPA)
- California Environmental Quality Act (CEQA)
- Endangered Species Act, Section 7
- National Historic Preservation Act, Section 106
- Clean Water Act (CWA) Section 404
- California State Water Resources Control Board (CSWRCB) Section 401

Section 408 permits are typically required for construction or modification on the waterside of a levee, but may also be required for some activities on the crown or land-side of a levee. Exceptions are made for specific operations and maintenance activities. Typical activities requiring a Section 408 permit include: construction of ramps, stairs, or modifications to levee maintenance roads (or trails).

Alameda Creek Trail at David Jones Neighborhood Park

Locally-approved Section 408 permits may be used for activities on the crown or land-side of a levee, outside of the floodway, as long as the work does not affect levee performance. Examples of such activities include paving a gravel maintenance road, modifying land-side ramps, and/or adding trailside elements.

Section 404 permits and Section 401 certification would be required if any activity could result in the filing of a waterway considered to be a "water of the US". A Section 408 and 404 permits would also require compliance with NEPA, CEQA, the Endangered Species Act, and the National Historic Preservation Act. All activities would be required to meet all other local, state, and federal codes and regulations.

Additional information can be found in the U.S. Army Corps of Engineer's "Policy and Procedural Guidance for Processing Requests to Alter US Army Corps of Engineers Civil Works Projects Pursuant to 33 USC 408." Engineer Circular 1165-2-216, Washington, DC. September 30, 2015.

Rails

Rail-trails take two forms: rails-to-trails, where an abandoned rail line is converted into a trail, and rails-with-trails, where a rail line is parallel to a trail. In Fremont, there are locations where both rails-to-trails and rails-with-trails may be possible. These include both freight lines and passenger lines, such as along the BART tracks. Similar to levees, rail lines often present long, uninterrupted corridors with gentle grades and few street crossings.

Rails-to-Trails

Rails-to-trails use rail corridors that are not in use (either abandoned or railbanked) for the construction of a trail. This has numerous advantages for trail development as rail corridors are typically designed as elevated surfaces with good drainage; do not exceed 5% grades; have minimized street crossings; and are usually ten feet wide or more (rail ties are typically eight feet apart). Rail lines also were often developed to link city centers (or a town grew around a rail station) and can enhance access to a City's downtown.

A rail-to-trail project developer may gain control of an unused rail corridor through railbanking, property acquisition, and/or easement agreements. Property acquisition requires the corridor be officially abandoned through a federal process.

Railbanking

Railbanking, established in 1983 as an amendment to Section 8(d) of the National Trails System Act, is a voluntary agreement between a railroad company and a trail agency to use an out-of-service rail corridor as a trail until a railroad might need the corridor again for rail service. Railbanking also preserves the linear right-of-way by preventing subdivision of the land, which can occur if the railway is abandoned.

When a railroad files for abandonment with the Surface Transportation Board (STB), the trail developer will work directly with the railroad — via sale, donation, or lease — to temporarily acquire the railroad corridor and convert it into a trail.

Because a railbanked corridor may be converted back to a rail line, railbanking provides an option for rail agencies to give up control of a corridor until the corridor is needed for rail use again. Tracks and ties on a railbanked line may be removed, but bridges and trestles must typically remain in place.

Rails-with-Trails

Rails-with-trails, where the trail is placed adjacent to an active rail line, allows the use of a continuous corridor that might not otherwise be accessible. Where the trail follows a passenger line, the trail can create direct access to a station. Rails-with-trails are typically more complicated to design and construct because of limited corridor width, adjacent drainage ditches, varying grades, and rail line safety.

Where a trail is constructed adjacent to an active, or potentially active rail line, the California Public

Utilities Commission (CPUC) regulates the safety of rail operations, including rail crossings. Rules established by the CPUC include General Order No. 26D, which establishes that the edge of a trail must be at least ten feet from the center line of a rail line. Many private rail lines may require a wider separation.

Rails crossing a trail or roadway can also create a hazard for bicycle wheels, which can catch in the space between the tracks and the pavement. A best practice is to have the trail approach the railroad crossing at a perpendicular angle, which reduces the wheel hazard and also increases visibility for the trail users.

Contamination

Soil within rail corridors are commonly contaminated with arsenic (used to treat rail ties), lead and polycyclic aromatic hydrocarbons (PAH) (from diesel fuel combustion), and/or pesticides. Additional contamination can occur if the rail line carried hazardous substances (raw product, waste, etc.) and there was a spill. Traditional Phase I and Phase II Environmental Assessments (ESA) will find the common contaminants, but may overlook contamination from spills.

It is important to understand that in most rail settings (where there is no indication of a spill in transit of a hazardous substance) the distribution of rail use-related substances differs from that in a traditional industrial setting. Unlike fixed facilities where spills come from tanks, pipes, or processes that do not change in physical location, the application of pesticides or the distribution of combustion by-products produces a somewhat chaotic environmental signature that is difficult to characterize — i.e. their distribution is unpredictable. Care must be taken to design a plan of assessment that takes this into account and also factors the objective of the undertaking such that a truly useful (and cost-effective) data set is produced.

San Francisco Bay Trail along BART tracks, Oakland

Creeks and Streams

Creeks and streams are non-channelized, natural waterways. As with levees and rail lines, creeks and streams are long features with few street crossings and may have space for trails and allow trail users to easily connect with nature. However, there may be significant environmental constraints for trails near waterways.

Trails along waterways can be placed directly adjacent to the waterway, within the floodway, or within the flood plain, and each requires different design techniques. Ideally, the trail will be set back from the waterway via a riparian buffer whose width may be determined by the permitting agency. Riparian buffers filter stormwater pollution, stabilize streambanks, moderate stream flow and temperature, and provide animal habitat. Regardless of what the permitting agency requires, the riparian buffer should be established according to site conditions, such as slope, soil, hydrology, and vegetation. The establishment of the riparian buffer should address the potential water quality impacts of impervious surface trails.

For trails immediately adjacent to a waterway, which most often occurs in urban areas where space is limited, the trail will be prone to frequent flooding. These trails should be built of hard-paved material, preferably concrete, which can best withstand high-velocity water flows. Trailside elements such as benches, trash receptacles, and signage should be designed to withstand, but not obstruct, water flows. To stabilize the trail, retaining walls or other structural elements are often required.

Trails developed in the floodway or floodplain should be designed with vegetated buffers. While they may be subject to periodic flooding, the occurrence will be less frequent. Depending on the frequency of flooding and expected velocity of water, these trails should be paved with concrete or asphalt with a focus on a substantial foundation, which will increase the longevity of the trail. Where flooding is expected to be minimal, a stone or natural earth trail may be adequate.

A boardwalk may be used in more sensitive environments to reduce impacts from trail development.

Waterway Trail: Mission Creek Trail

Roadways

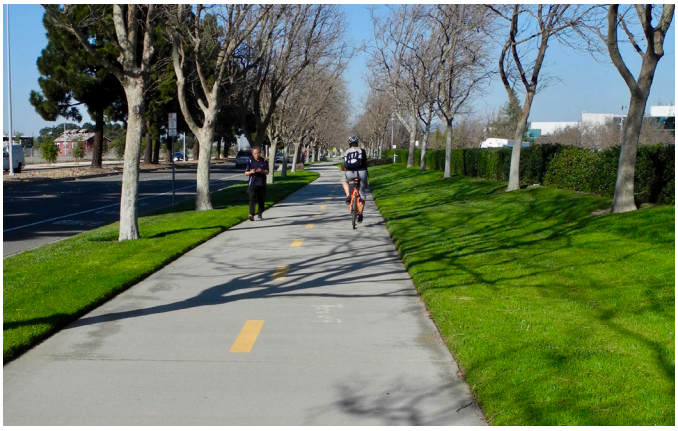
Roadway environments can facilitate trail development. In Fremont, most trail facilities are not developed along roadways, unless the trail is developed as a sidepath. In some limited cases, a corridor may rely on a separated bike lane (Class IV bikeway) to make a connection. Because roadways are the primary transportation network in Fremont, they connect to all important destinations; however, vehicular traffic on roadways presents a hazard to trail users and may create an unpleasant environment.

Sidepaths

Sidepaths are multi-use paths located immediately adjacent to the roadway; they are similar to sidewalks except they explicitly allow two-way bicycle travel. Sidepaths are referred to as Class I bikeways in some cases and the design of sidepaths may be similar to the design of a Class I bikeway. However, because sidepaths run parallel to the roadway, they typically have more street and driveway crossings, which presents more potential conflicts.

Sidepaths should be considered where street crossings and driveways are limited, and where the corridor right-of-way is wide enough to provide ample clearance from the roadway and the adjacent properties.

In Fremont, streets such as Paseo Padre Parkway, Ardenwood Boulevard, Cushing Boulevard, and southern sections of Fremont Boulevard all feature sidepaths on the Bay side of the street. These roadways form the western boundary of the urbanized area and directly abut open space on the sidepath side where there are few intersecting streets or conflict points.



Sidepath on Paseo Padre Parkway between Kaiser Drive and Commerce Drive

Separated Bikeways

Separated (Class IV) bikeways are bike facilities that are in or adjacent to a roadway, but are separated from vehicle traffic by a physical barrier. Whereas sidepaths are shared use spaces, separated bike lanes are exclusively for bicyclists, with pedestrians using sidewalks.

The physical barriers separating people biking from vehicles range from raised curbs or concrete barriers, grade separation, flexible delineators or bollards, planters or landscaped medians, and parked cars. These bikeways may be either one-way or two-way cycle tracks.

Separated bikeways are most frequently used on streets with higher traffic volumes and vehicular speeds. While Fremont features a growing network of separated bike lanes, these are only considered part of the trail network in limited situations where they form a link in an overall trail corridor. Separated bikeways are mainly considered as part of the City's Bicycle Master Plan.

Separated bikeway on the Embarcadero, San Francisco