

## GUIDANCE FOR TRAIL DESIGN

For Trails next to Streams and Streamside Resources

### INTRODUCTION

The guidelines and details in this Design Guide are intended to provide clarification to G&S IX.A and IX.A.2, which discuss design and construction of trails next to streams and riparian areas. Most of the guidelines and details, which are specifically related to streams, grading and riparian resources, have been excerpted from the document, Uniform Interjurisdictional Trail Design, Use and Management Guidelines (UD) (April 15, 1999), which was prepared by the Santa Clara County Parks and Recreation Department.

### GENERAL GUIDELINES FOR PROTECTION OF RIPARIAN HABITAT

While trails are often located near natural and streamside areas for recreation and enjoyment purposes, it is important that the construction, design and use of the trail not negatively impact the nearby stream and stream resources that users of the trail want to enjoy. A biological resource assessment will be required for trail routes along streams or creeks. While there is no standard setback, the general guideline is to locate the trail adjacent to - not within - the riparian corridor.

In designing the trail, **the goal is to remove the minimum amount of vegetation as necessary** to accommodate the trail clearing width and to mitigate and restore riparian habitat. Consideration should be given to acquiring additional land rights, where feasible, to place the trail outside of the riparian corridor. In addition, the following guidelines should be followed:

- To control trail use and prevent environmental damage, the design should include barriers such as fences, vegetation, stiles and fallen trees. (UD – 1.3.1.3)
- To the maximum extent feasible, trail alignment should avoid impacts to

known special status plants and animal habitats. In special status species areas, trail use may be limited as appropriate to ensure protection of these resources. (UD – 1.3.2.1)

- Revegetation or enhancement will be undertaken where any sensitive habitat or special status species habitat will be disturbed by construction. The design of an appropriate revegetation program shall fully compensate for the lost habitat and shall be designed by a qualified biologist. Riparian and wetland habitat will typically be mitigated at a 3:1 ratio for high quality habitat areas and at a lower ratio where lower habitat quality justifies a lower ratio. Locally native plants will be utilized in all mitigation work. (UD – 1.3.3.6)
- Any cut or fill slopes adjacent to the trail shall be immediately reseeded or replanted. Vegetation will vary by location and surrounding landscape context.

### FOR MORE INFORMATION

Refer to sections in this Design Guide for protection riparian vegetation and planting guidelines.

### GENERAL GUIDELINES FOR SITING OF TRAILS NEXT TO STREAMS/STREAM CROSSINGS

The objective is to set trails back from the top of bank to avoid erosion over time and protect the existing riparian area.

- Use existing maintenance trails, access route and levees wherever possible to minimize impacts of new construction in riparian zones (UD – 1.3.2.3)
- When parallel to a stream or riparian zone and not located on a levee, new trails should be located behind the top of bank or at the back or outside edge of the riparian zone – except where topographic, resource management, or other constraints make this infeasible or undesirable. (UD – 1.3.3.1)

- Trails in areas of moderate or difficult terrain and adjacent to a riparian zone shall be composed of natural materials or shall be designed to minimize disturbance, and the need for drainage structures. (UD – 1.3.3.2)
- Trail crossings of streams and drainages shall be designed to minimize disturbance through the use of bridges or culverts, whichever is least environmentally damaging. Bridges and culverts should be designed so that they visually and functionally blend with the environment. (UD – 1.3.3.3)
- New native riparian vegetation should be planted in the setback zone, where practical, to complement existing vegetation (UD – 1.3.3.4)
- Trails will avoid wetlands, including seasonal wetlands, wherever possible. Trails adjacent to wetlands will be constructed so that trail fills avoid wetland impacts. (UD – 1.3.3.5)
- Locate trail alignment and crossings under bridges above the 100 year or 1% flood water surface elevation.
- Trail alignment will be limited to one side of the stream to minimize impacts to habitat.
- Trail use will generally be limited to the hours between dawn and dusk to minimize impacts to wildlife.
- Lighting of trails should be avoided. Exceptions include security lighting in downtown commercial and entertainment areas where lighting should be minimized.
- Use limited terracing or building steps to avoid large-scale grading. Reinforce steps with stone or wood. (UD – 3.5.3)
- Surface water shall be diverted from trails by cross sloping the trail tread between 2 and 3%. (UD – 3.5.4)
- Where there is potential for significant soil erosion, require a specific erosion control plan. (UD – 3.5.5)
- Do not locate irrigation systems within 2 feet of the edge of the trail. Irrigation for turf areas around a trail should use only a pop-up variety of irrigation head. To avoid erosion and undercutting of the trail, the irrigation system should be controlled so that only incidental spray might reach the trail surface and edge. (UD – 3.5.6)
- Select plants for streamside areas that do not require irrigation beyond an establishment period.
- Use permeable pavements where possible.
- Where overland direction of drainage away from the creek is constrained, provide positive drainage.

**GENERAL GUIDELINES FOR GRADING AND DRAINAGE**

- No significant grading as defined by local ordinances will be used for trail construction unless in conjunction with an approved development project. (UD – 3.5.1)
- The degree of cut allowed on a slope depends on the soil type, hardness and surrounding natural resources. Cuts should be contoured to blend with the natural slopes. Berms of earth, rocks or wood may be necessary. (UD – 3.5.2)

**GENERAL DESIGN AND AESTHETIC PLANS AND SECTIONS**

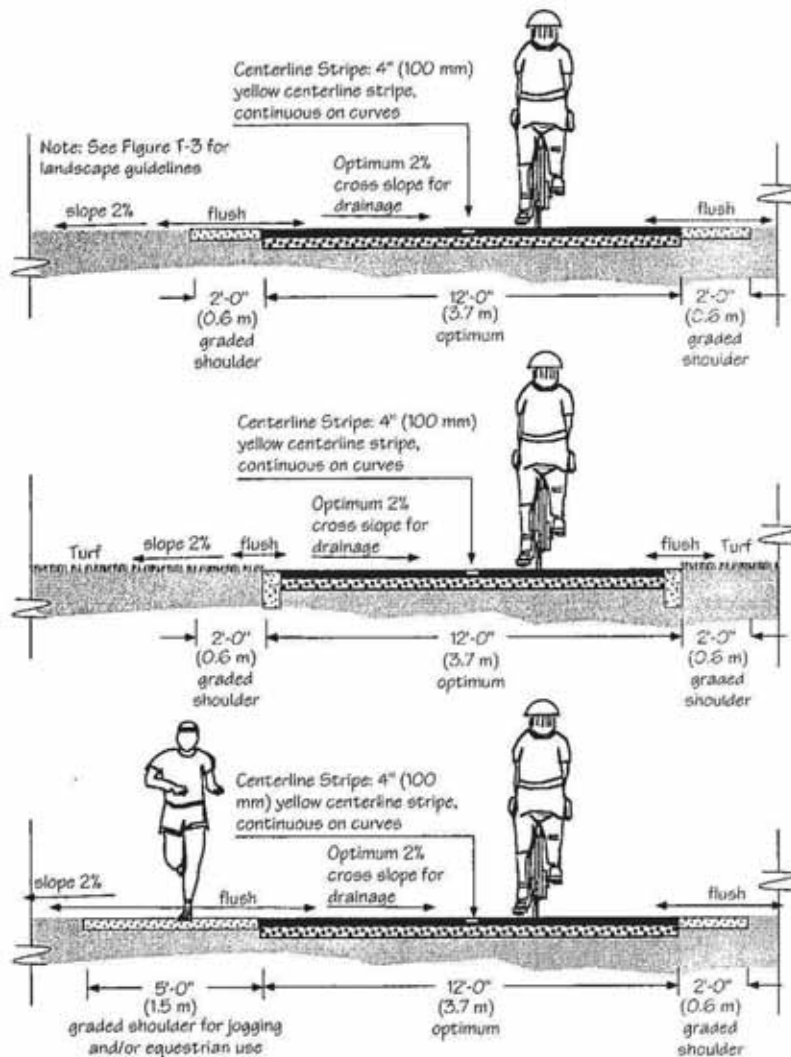
In addition to the excerpted guidelines above, this section also includes 7 plans and/or sections to help guide the design and placement of trails taken from the Santa Clara County Parks Departments Uniform Interjurisdictional Trail Design manual.

- Design of Urban Shared-Use Trails (T-1)
- Section: Trail Adjacent to Creek, Park, or Open Space (T-5A)
- Plan: Trail Adjacent to Creek, Park or Open Space (T-5B)
- Plan: Design of a Trail on a Levee (T-15)
- Plan and Section: Levee Trail Undercrossing (T-16)
- Creek Crossings and Water Quality (T-17)
- Trail Placement Adjacent to Streams (T-18)

# DESIGN OF URBAN SHARED-USE TRAILS

## Urban Shared-Use Trail Sections T-1

Uniform Interjurisdictional Trail Design, Use, and Management Guidelines  
 Santa Clara County Interjurisdictional Trails Committee



Paved Trail  
(See Figure T-2, A and B)

Section  
**A**

Paved Trail  
in Turf Area  
(See Figure T-2, C)

Section  
**B**

Combination Paved Trail and  
Unpaved Jogging Trail  
(See Figure T-2, A and B)

Section  
**C**

Related Policies: UD-2.2.2; UD-3.5.4; UD-4.11.1; UM-3.4

**Notes:**

- For natural-surfaced trail cross-sections and urban Shared-Use Trails that include an equestrian shoulder, refer to the 1995 Countywide Trails Master Plan, Figures G-2 and G-3.
- Trail shoulders: 2' (0.6 m) graded shoulder; 2' (0.6 m) minimum vegetation clearance; prune all brush over 12" (0.3 m) in height and 1/2" (12 mm) dia. that extends into trailway.
- Centerline stripes should be used along trails. Solid centerline stripes should be used where there is heavy use, on curves greater than 100 feet long (30.5 m) with restricted sight distances, and where the path is unlighted and nighttime riding is expected. Dashed stripes should be used where there is heavy use but only where sight distances permit.
- "Optimum": The best or most favorable condition for a particular trail situation from the perspective of responsible management.
- Reference Also: Highway Design Manual, Chapter 1000 Bikeway Planning and Design; Topic 1003 - Design Criteria; and Topic 1004 - Uniform Signs. California State Department of Transportation.

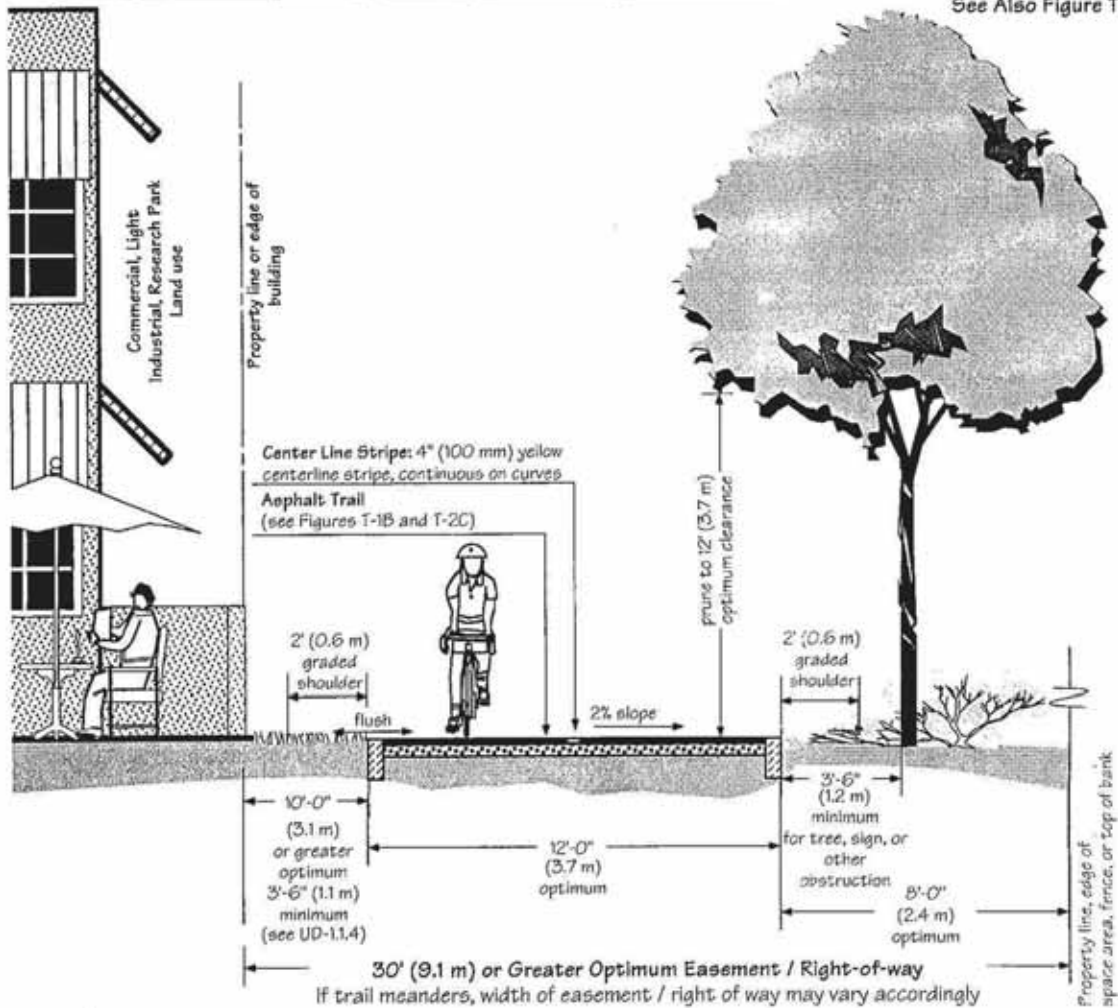
Final: April 15, 1999

# SECTION: TRAIL ADJACENT TO CREEK, PARK OR OPEN SPACE

## Trail Adjacent to Creek, Park, or Open Space T-5A

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See Also Figure T-5B



Related Policies: UD-1.1.1; UD-1.1.4; UD-2.2.2; UD-3.5.6; UD-4.11.1; UM-3.4

**Notes:**

- Maximum grade of 5% is optimum; 8.33% maximum for short sections.
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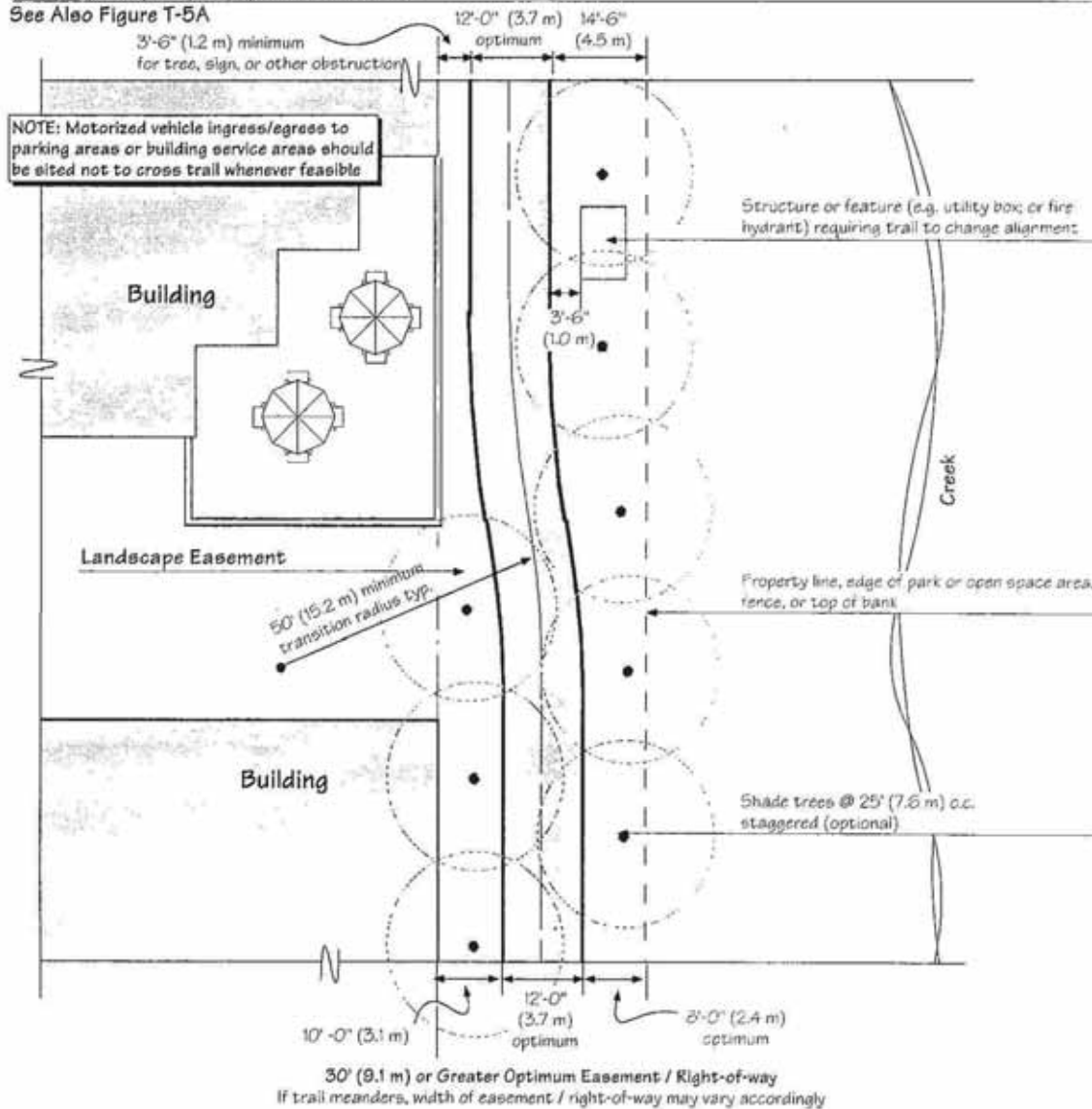


# PLAN: TRAIL ADJACENT TO CREEK, PARK OR OPENSOURCE

## T-5B Plan: Trail Adjacent to Creek, Park, or Open Space

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See Also Figure T-5A



**Related Policies:** UD-1.1.1; UD-1.1.4; UD 2.2.2; UD-4.11.1

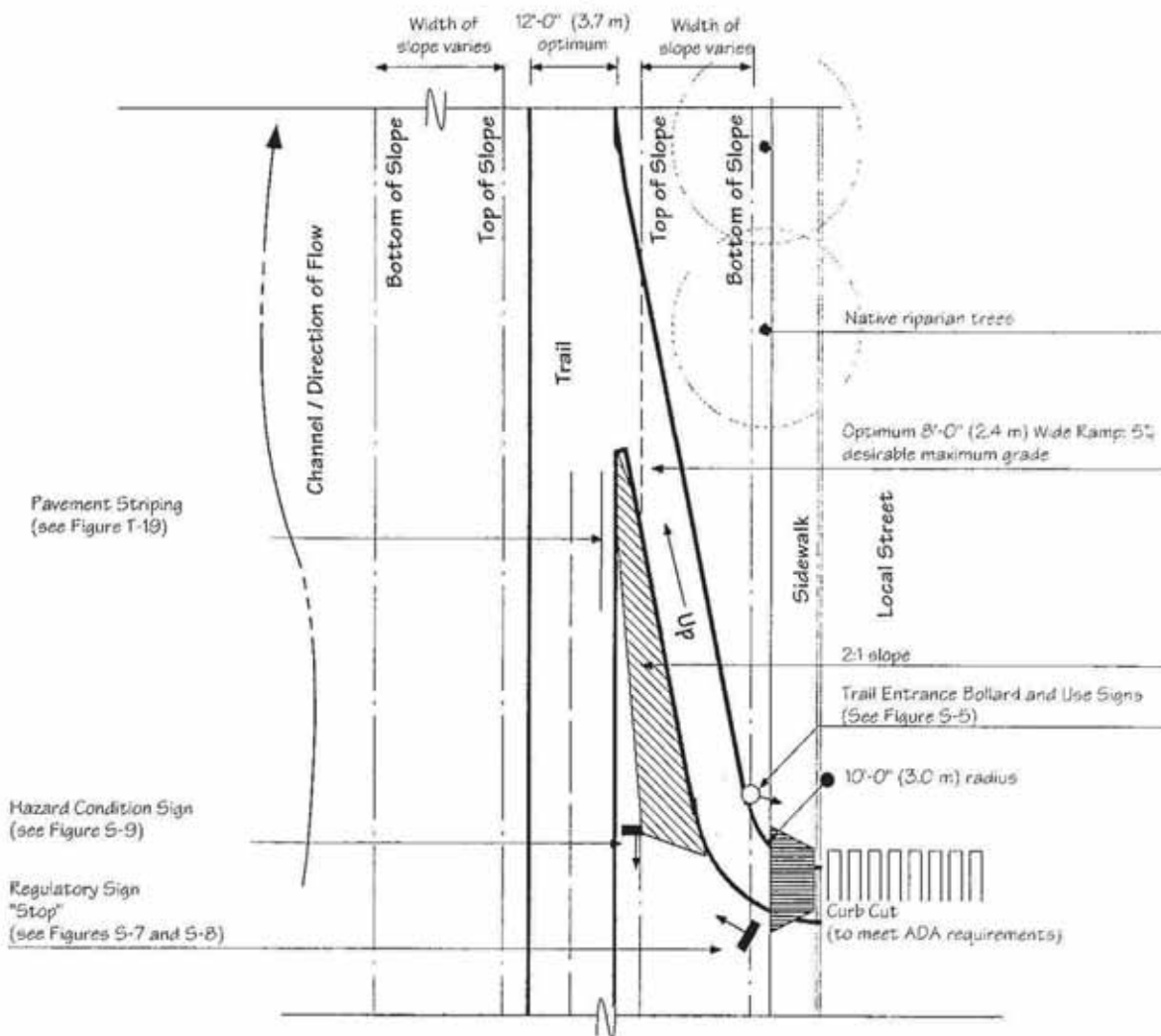
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# PLAN: DESIGN OF A TRAIL ON A LEVEE

## T-15 Plan: Trail on Levee

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Related Policies: UD-1.3.2.3

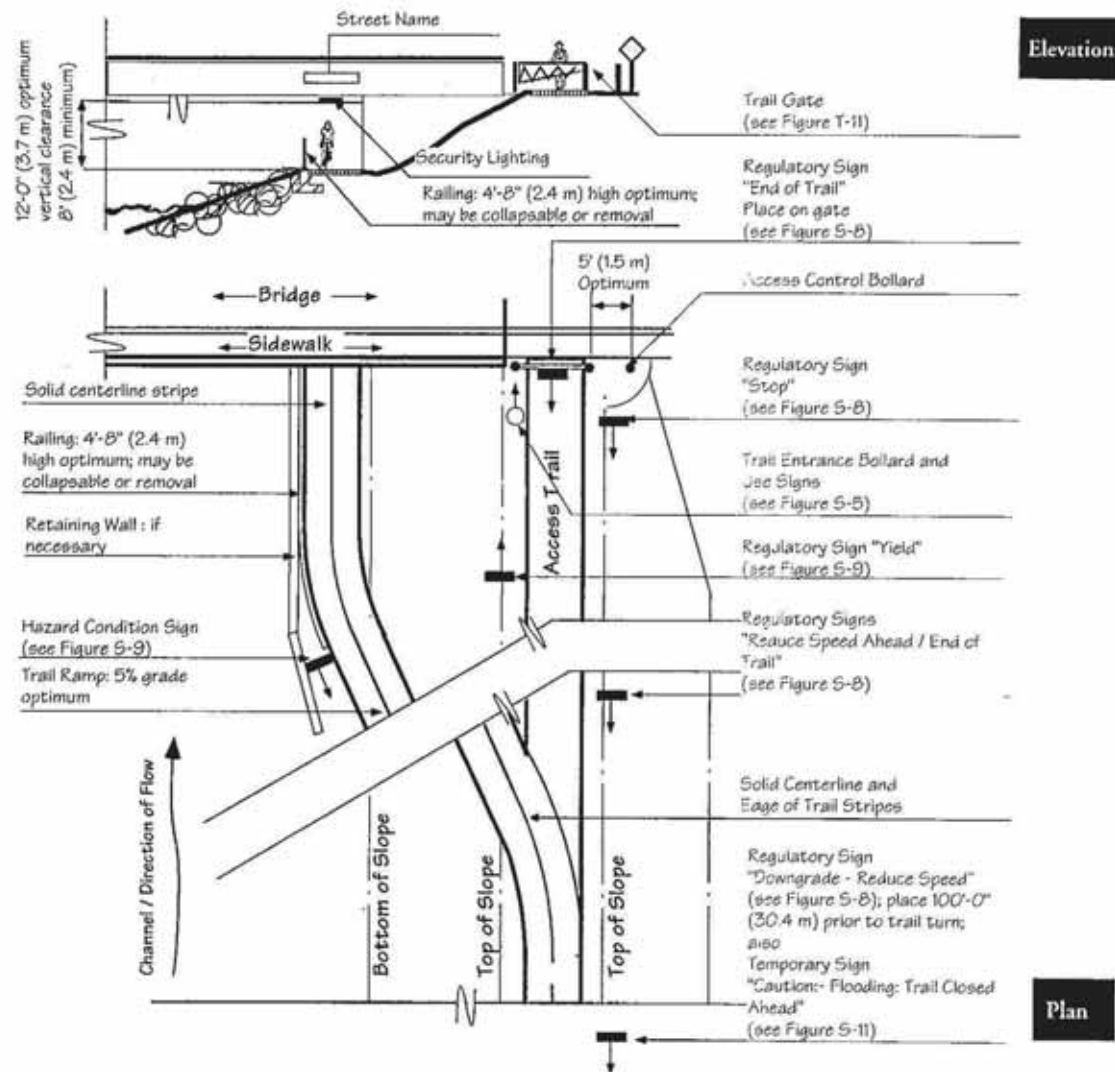
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# PLAN AND SECTION: LEVEE TRAIL UNDERCROSSING

## Plan and Section: Levee Trail Undercrossing T-16

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Related Policies: UD-2.6; UD 4.1.5

**Notes**

- Trail connections will likely occur on both sides of road bridge

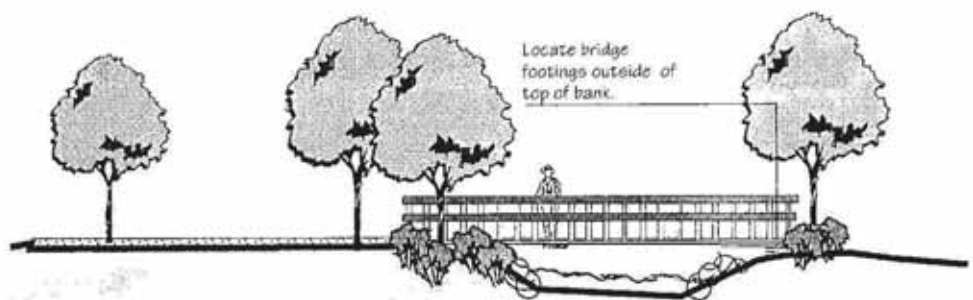
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# CREEK CROSSINGS AND WATER QUALITY

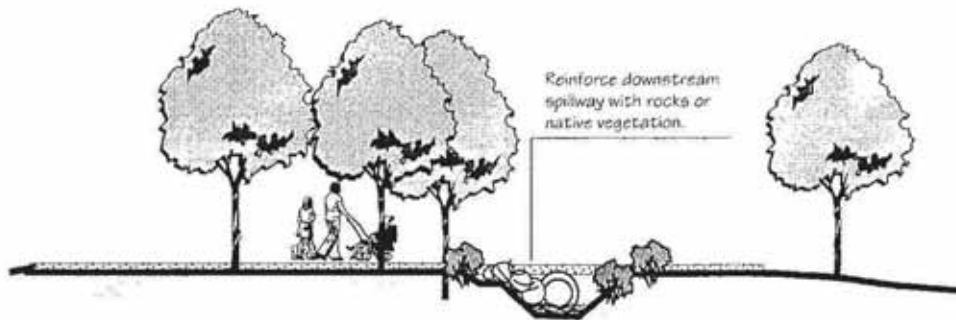
## T-17 Creek Crossings & Water Quality

*Uniform Interjurisdictional Trail Design, Use, and Management Guidelines*  
 Santa Clara County Interjurisdictional Trails Committee



Bridge major streams and drainages

A



Culvert crossings of small streams and drainages

B

Related Policies: UD-1.3.3,14

- "Optimum": The best or most favorable condition for a particular trail situation from the perspective of responsible management.
- Reference Also: Highway Design Manual, Chapter 1000 Bikeway Planning and Design; Topic 1003 - Design Criteria; and Topic 1004 - Uniform Signs, California State Department of Transportation.

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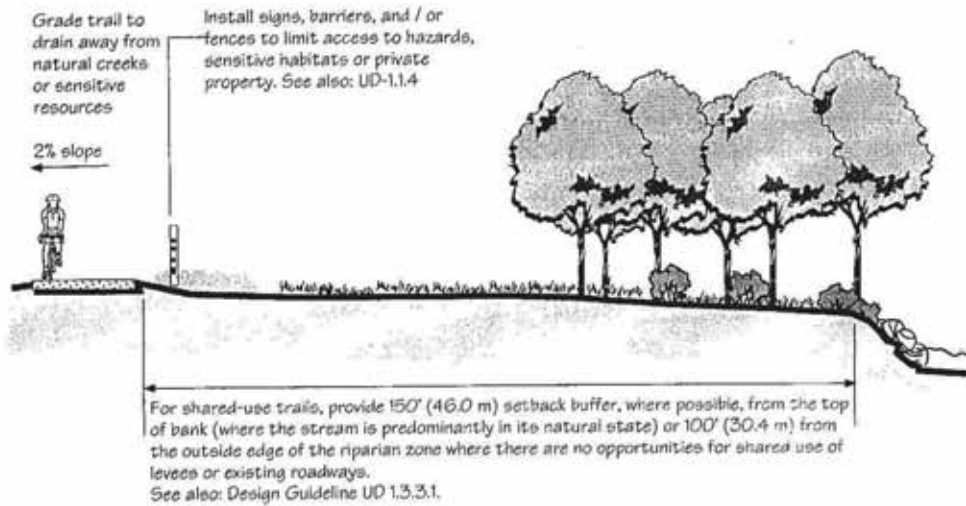


# TRAIL PLACEMENT ADJACENT TO STREAMS

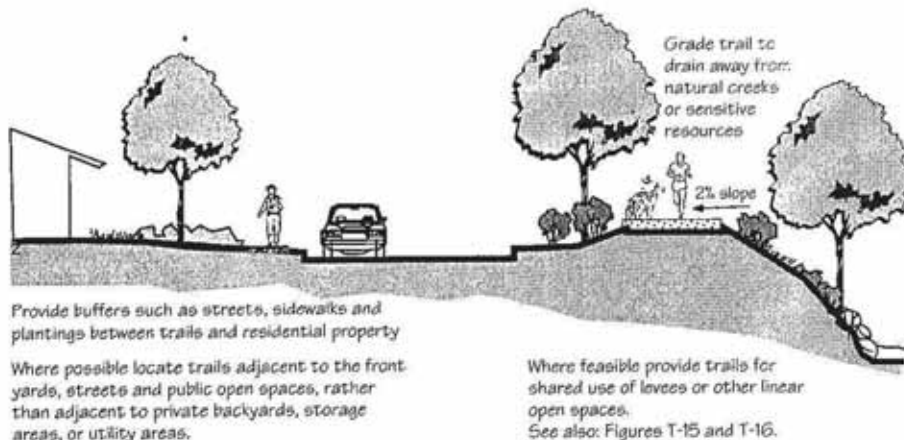
## Trail Placement Adjacent to Streams T-18

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Santa Clara County Interjurisdictional Trails Committee*

### Relationship to property lines, environmentally sensitive areas & residences



**A**



**B**

See also: Design Guideline UD 2.1, Tables UD-1 and UD-2

**Related Policies:** UD-1.1.1; UD-1.3.3.14; UD 1.1.4

- "Optimum": The best or most favorable condition for a particular trail situation from the perspective of responsible management
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