SECTION 13: BIKEWAYS

13-1 GENERAL

The City of Roseville bikeway standards are designed to insure that transportation and recreational bikeways are constructed in a manner that would provide a safe and comfortable use by both bicycles and pedestrians. Bikeways shall be designed to enhance safety and reduce maintenance.

13-2 DESIGN CRITERIA

All bikeway design shall conform to the latest editions of the following documents:

- The American Association of State Highway and Transportation Officials "Guide for the Development of Bicycle Facilities
- The State of California Department of Transportation (Caltrans) Highway Design Manual Chapter 1000, "Bikeway Planning and Design"
- The latest editions of the California Manual on Uniform Traffic Control Devices (California MUTCD) for Streets and Highways (FHWA's MUTCD, as amended for use in California)
- These standards and any applicable Specific Plan guidelines which pertain to various areas of the City. Specific Plan Guidelines are available from the Planning Department.

All Bikeway improvement plans shall be prepared per the requirements of Section 3, "Plan Sheet Requirements", of these standards and shall be drawn at a scale no smaller than 1 inch = 40 feet. The plans shall show all existing and proposed grades, sidewalks, landscaping, fences, guardrails, utilities, street lights, traffic signs, and any other structure which may be impacted by revisions to grading.

13-3 PLAN ACCEPTANCE

Prior to construction of any bikeway related improvements, a complete set of bikeway improvement plans must be accepted by the Development Services Engineering Division. See Section 2, "General Requirements", of these standards for submittal requirements of bikeway improvement plans.

13-4 CLASS I BIKEWAYS (Bike Paths)

Class I bike paths are facilities located in separate right-of-way, for the exclusive use of bicycles and pedestrians with minimal cross flow by motor vehicles. Sidewalks are not considered Class I facilities. Sidewalks, including Class IA Sidewalks, Bikeways, are not subject to this Standard. See Section 7, "Streets", of these Standards for design requirements of sidewalks and pedestrian walks.

A. Width: The minimum paved width for a two-way bike path shall be 10 feet. The minimum width of a one-way bike path shall be 5 feet. In each case, per BK-1, a minimum of 2 feet wide graded shoulders shall be provided adjacent to the pavement. One shoulder shall consist of Class 2 Aggregate Base material and one shoulder shall consist of decomposed granite. Where profile grades are 4% or more, the decomposed granite may be stabilized with lime/fly ash or cement treatment. Otherwise, Class 2 Aggregate Base material may be considered for both shoulders.

B. Clearance to Obstructions: A minimum of 3 feet of horizontal clearance to obstructions, including post and cable fencing, retaining walls, buildings, and other permanent improvements, shall be provided adjacent to the pavement where the downgrades are less than 4% and a minimum of 5 feet from the edge of pavement where downgrades exceed 4%. If a bike path is paved contiguous with a continuous fixed object, such as a block wall, a 4-inch white edge line, 2 feet from the fixed object, is required.

Manhole covers shall be located within the bike path's shoulder area, with preference given to the Class 2 Aggregate Base shoulder. The Class 2 Aggregate Base or decomposed granite material shall be extended 1 foot beyond the rim of the manhole cover.

In conditions where the bike path is located adjacent to creeks, ditches, or down-slopes greater than 3 feet horizontal to 1 foot vertical, a minimum shoulder width of 5 feet from the edge of pavement to the top of the slope is required.

The clear width on structures between railings shall be not less than 12 feet, with a preferred width of 14 feet.

The vertical clearance to obstructions across the clear width of the bike path shall be a minimum of 12 feet when Fire Department access is required, otherwise 9 feet, including bike paths placed beneath bridge structures. The minimum elevation of the path shall coincide with the 2-year water surface elevation.

C. Signing and Delineation: For applications and placements of signs, see the California Manual on Uniform Traffic Control Devices (California MUTCD) for Streets and Highways, Section 9B.01 and figure 9B-101. For pavement markings guidance, see section 9C.03.

The sign sizes for shared-use paths shown in Table 9B-1 of the California MUTCD are preferred for all Class I bike paths. The minimum sign sizes for shared-use paths shall be used only for signs installed specifically for bicycle traffic applications. The minimum sign sizes for bicycle facilities shall not be used for signs that are placed in a location that would have any application to other vehicles.

All Class I bike paths shall be striped per BK-2 or at intervals determined by the City Engineer.

Guide signs to roadways, parks, and other points of interest shall be provided at trail junctions and as determined by the City Engineer.

All stripes and pavement markings for Class I bike paths shall be constructed with paint per Section 84-3 of the CalTrans Standard Specifications.

D. Intersections with Roadways: Bicycle path intersections and approaches should be on relatively flat grades. Stopping sight distances at intersections shall be met for vehicle traffic per section 7-12, Design Site Distances, of these design standards and adequate warning should be given to permit bicyclists to stop before reaching the intersection, especially on downgrades. Curb ramps shall be installed with the same widths as the bicycle path.

When crossing an arterial roadway, the crossing should either occur at the pedestrian crossing or at a location completely out of the influence of any intersection to permit adequate opportunity for bicyclists to see turning vehicles.

Mid-block crossing shall be considered on a case by case basis by the City Engineer. In these instances, right-of-way should be assigned by devices such as stop signs or traffic signals which can be activated by bicyclists. Grade separations shall also be considered at the discretion of the City Engineer.

E. Entry Control: Entry points to bike paths shall be designed to prevent unauthorized vehicle entry. The approach to prevent unauthorized vehicle entry is:

1. At a minimum, post signs identifying the entry as a bicycle path with regulatory signs prohibiting motor vehicle entry per Section 9B of the California MUTCD, or as approved by the City Engineer.

2. Design the path entry so it does not look like a vehicle access and makes Intentional access by unauthorized users more difficult. Dividing a path into two one-way paths prior to the intersection, separated by low plantings or other features not conducive to motor vehicle use, can discourage motorists from entering and reduce driver error.

3. If installation of a bollard is deemed warranted by the City Engineer then a flexible, spring loaded bollard shall be used. The flexible bollard shall be a Tuff Post 3" Flexible Post manufactured by Impact Recovery Systems or approved equal. The flexible bollard shall meet the following specifications:

- Height: 28"
- Post Type: 3" post
- Post color: Yellow
- Post Top: Short Squeeze (when installed, the flat side of the squeeze is to face traffic)
- Sheeting: White, 3M Diamond Grade
- Sheeting Quantity: Two (std. tubular)
- Base: Surface Mount Fixed

- Base Color: Black

F. Separation Between Bike Paths and Roadways: Bike paths immediately adjacent to roadways and within medians are not recommended. Bike paths closer than 5 feet from back of curb shall include a physical barrier to prevent bicyclist from encroaching onto the roadway. Suitable barriers could include dense shrubs or other materials approved by the Development Services, Planning and Parks and Recreation Departments.

G. Design Speed: The minimum design speed for bike paths is 20 mph. When a downgrade exceeds 4%, the minimum design speed for the section of bike path is 30 mph.

H. Grades: The maximum grade rate recommended for bike paths is 5%. However, steeper grades can be allowed for short segments.

When using grades steeper than 5%, the following grade restrictions and grade lengths are required:

- 5-6% for up to 800 feet
- 7% for up to 400 feet
- 8% for up to 200 feet

The bike path segment immediately following a positive grade of 8% is required to have a maximum grade of 5%. All bike paths segments with grades steeper than 5% shall be posted with the appropriate warning signs.

Any bike path segments designed with a grade greater than 8% will require approval by the City Engineer and Parks and Recreation Director.

I. Horizontal Alignment and Super elevation: A 2% cross slope is required on tangent sections. Bike paths super elevations rates may vary from a minimum of 2% to ensure drainage to a maximum of 5%.

The minimum distance for a transition from a 2% cross slope is 75 feet per one percent change in superelevation.

The minimum radius of curvature can be derived from figure 1003.1C of the CalTrans Highway Design Manual. The minimum radius with any given combination of design speed, rate of superelevation, and friction factor shall not be less than 30 feet. The minimum radius of curvature may be increased to 45 feet if the bikeway will also serve to function as a utility maintenance access.

J. Stopping Sight Distance: The minimum stopping sight distances for various design speeds and grades can be determined from figure 1003.1D of the CalTrans Highway Design

Manual. For two-way bike paths, the descending direction grade and design speed will control the design.

K. Lateral Clearance on Horizontal Curves: The minimum clearances to line of site obstructions for horizontal curves can be determined from the figure 1003.1F of the CalTrans Highway Design Manual.

Bicyclist frequently ride abreast of each other on bicycle paths, and on narrow bicycle paths, bicyclists have a tendency to ride near the middle of the path. For these reasons, and because of the serious consequences of head-on bicycle accident, lateral clearances on horizontal curves should be calculated based on the sum of the stopping sight distances for bicyclist traveling in opposite directions around the curve. Where this is not possible or feasible, consideration should be given to widening the path through the curve, installing a solid yellow centerline, installing a curve warning sign, or combination of these alternatives.

L. Vertical Curves: The minimum allowable vertical (sag or crest) curve length at the intersection of two grades shall be 50 feet; however, vertical curves may not be omitted where the algebraic difference in grades does not exceed 2.0 percent. The minimum lengths of crest vertical curves can be determined from figure 1003.1E of the CalTrans Highway Design Manual. When vertical curves are required, they shall provide for adequate sight distance based in the minimum design speeds specified in paragraph 13-4F of these standards.

M. Structural Section: Bike path structural section shall be a minimum of 2 inches of Type A asphalt concrete on 4 inches of class 2 aggregate base or 5 inches of Portland Cement Concrete on compacted native soil. In those cases where Class 1 bikeways will be accessed by maintenance and/or emergency response vehicles the bikeway shall be capable of supporting a minimum gross vehicular weight of 30,000 pounds. Based on an assumed Traffic Index equal to 4.0 for Class 1 bikeways the table shown below identifies the appropriate structural sections to support a gross vehicular weight of 30,000 pounds:

R-value Range	Asphalt Concrete Bikeway Structural Section	Portland Cement Concrete Bikeway Structural Section
25<	2” AC/8” AB	5” PCC
25-40	2” AC/6” AB	5” PCC
>40	2” AC/4” AB	5” PCC

If soils analysis along the bike path identifies an R-value less than 10, the structural section shall be modified as necessary, by the recommendation of a geotechnical engineer, to support 30,000 pounds and meet the Traffic Index Requirement 4.0. Soils tests shall be taken every 1,000 feet along the bike trail alignment or as directed by City Engineer.

N. Drainage: Bike paths constructed within cut-slopes shall have a drainage ditch of suitable dimensions along the uphill side to intercept the hillside drainage. Where necessary, drain inlets and drain pipes or other acceptable conveyance systems shall be provided to carry intercepted water across the bike path. Bike paths constructed on top of fill slopes shall have drainage ditch of suitable dimensions along the downhill side to intercept the trail's drainage. Where necessary, drain inlets and drain pipes or other acceptable conveyance systems shall be provided to carry the intercepted water over the fill slope as to control erosion of the slope.

O. Access Points: Access points with a width of 20 feet shall be placed in minimum intervals of 750 feet and the cable must be coated with yellow plastic to designate access. A Roseville Parks and Recreation Department padlock must be placed on both ends of access.

P. Temporary Bike Path Closures: Should a bike path need to be closed temporarily, at a minimum the following measures shall be taken: Signage warning users of the trail shall be provided on each side of closure. Safety cones and orange safety fencing shall be provided as appropriate. Other measures may be taken as determined by the Public Works and Parks and Recreation Departments.

Q. Bike Bridges: Bridge design shall conform to the requirements for pedestrian and bicycle bridges within the latest edition of the California Department of Transportation (CalTrans) Bridge Design Specifications.

The minimum width of a bike path bridge is 12 feet with a minimum vertical clearance of 12 feet when Fire Department access is required, otherwise 10 feet. A straight-line approach of 35 feet is required on each side of the bridge.

All bicycle bridges shall be designed for a fire access use and maintenance vehicles, capable of supporting a minimum gross vehicular weight of 30,000 pounds. All bicycle bridges shall have the maximum gross vehicular weight rating posted on each approach.

Bicycle bridges may be designed to support a gross vehicular weight of less than 30,000 pounds but shall include maintenance vehicle traffic loading with the approval of the Fire Department and City Engineer. In cases where the bike trail is not required for fire access use and bridge loading is less than 30,000 pounds, the bike trail shall be designed to accommodate a fire vehicle turn-around area on each side of the bridge and/or provisions for alternative access.

R. Lighting: Lighting is not required along bike trails. However, lighting may be required through underpasses, tunnels, roadway intersections, mid-block crossings, and whenever security could be a problem and at the City's discretion.

Depending on the location, average maintained horizontal illumination levels within underpasses and tunnels of 50 foot-candles should be considered. Where special security

problems exist, higher illumination levels may be considered. All lighting shall be designed with appropriate shielding to prevent unnecessary glare and resistant to vandalism.

Light standards should meet the recommended horizontal and vertical clearances as specified within Section 13-4B of these standards. Luminaries and standards should be at a scale appropriate for a pedestrian on bicycle path.

13-5 BIKE PATHS IN FLOODPLAINS

When a bike path is to be located in the City's Floodplain, the path shall be designed to be no more than one (1) foot below the 10-year storm event water surface elevation (10-WSE). Exceptions to this requirement may be allowed where the path goes under existing bridges to accommodate minimum vertical clearance. At these crossings, the path shall have an elevation at least as high as the 2-year storm event water surface elevation (2-WSE). All segments of the path that are below the 10-WSE shall be Portland Cement Concrete, or other approved material, with toe protection to prevent the path from being undermined during flood events. All segments of the path that are more than 45 degrees to the directional flow of the water shall be Portland Cement concrete, or other approved material, and shall have armored embankments with toe protection to prevent the path from being undermined during flood events.

13-6 BIKE BRIDGES IN FLOODPLAINS

When a bike or pedestrian bridge is to be placed in the City's Floodplain, the minimum elevation of the bridge deck shall be at or above the 10-WSE. Bridge railings shall be designed to sustain the 100-year flood event without damage and without human intervention. Hydraulic and structural calculations shall be based on the assumption that the bridge (with railings) is solid, not assuming that water will pass through the rails.

Bridge railings shall be a minimum of 54" high, and shall have a toe board at the base of the guardrail.

All material used on the bridge shall be water resistant.

A letter of map revision (LOMR) may need to be submitted to FEMA for approval, as determined by the Department of Public Works.

Approach ramps to the bridge shall be armored to allow for cross flow around the bridge with out damage to path. Where feasible, the approaches to the bridge shall contain a dip in the profile (lower than the bridge) to facilitate the water to flow around the bridge instead of directly over it. All portions of the path that are more than 45 degrees to the flow path, shall be Portland Cement Concrete, or other approved material, and shall have armored embankments with toe protections to prevent the path from being undermined during flood events.

13-7 CLASS IA SIDEWALK BIKEWAYS

Class IA sidewalk bikeways are typically located along major streets and separated from the normal vehicle lanes. They are primarily sidewalks, paseos, etc, that are wider than normal to accommodate both pedestrians and bicycles.

The design of Class IA sidewalk bikeways shall follow the design standards for pedestrian walk construction located within Section 7-7 of these standards. The location and width of Class IA sidewalk bikeways shall follow the applicable Specific Plan guidelines which pertain to various areas of the City. Specific Plan Guidelines are available from the Planning Department.

13-8 CLASS II BIKEWAYS

Class II bikeways (bike lanes) shall be provided within all collectors and arterial roadways as shown per the cross sections for various roadways within these Design Standards.

A. Signing and Pavement Markings: Details for signage and pavement markings for Class II bikeways are found in the California MUTCD, and within the standard drawings for streets within these Design Standards.

B. At-grade Intersection Design: Details for design of Class II bikeways at intersections are found within the standard drawings of these Design Standards.

Bicycle-sensitive detectors, signs, and pavement markings for traffic signal actuation shall be included within the traffic signal design for all intersections requiring traffic signals and at the discretion of the City Engineer per Sections 4D.104 &105 of the California MUTCD.

13-9 CLASS III BIKEWAYS

Class III Bikeways are on-street routes designated by signs or permanent markings per the California MUTCD, and are shared by motorists. The locations of Class III bikeway route shall follow the Bicycle Master Plan and applicable Specific Plan guidelines which pertain to various areas of the City. Specific Plan Design Guidelines are available from the Planning Department.