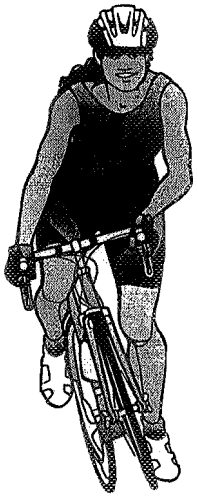
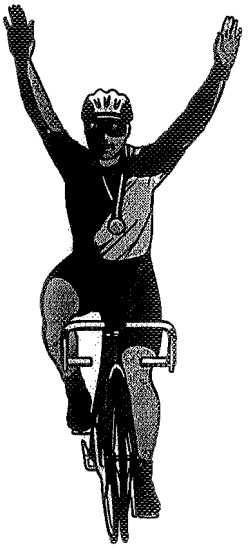


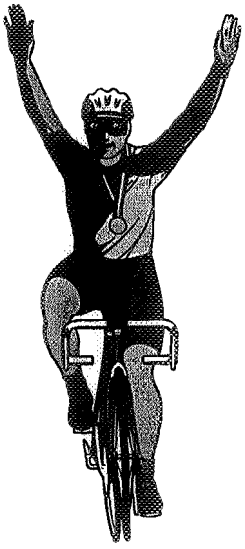


CONCEPTUAL BIKEWAYS PLAN

FOR THE CITY OF RANCHO PALOS VERDES

ADOPTED: JANUARY 22, 1990

REVISED: OCTOBER 15, 1996



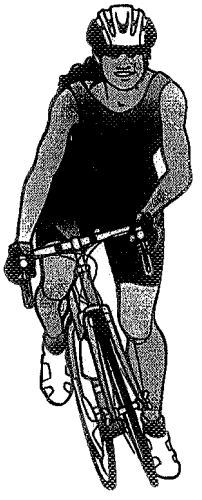


Table of Contents

City of Rancho Palos Verdes - Conceptual Bikeways Plan

I. INTRODUCTION

This document constitutes the City of Rancho Palos Verdes "Conceptual Bikeways Plan" , adopted by the City Council on January 22, 1990, and revised by the City Council on October 15, 1996. The preparation of updates to the "Conceptual Bikeways Plan" represents the City's continuing efforts to implement the City's Trails Network Plan. The information contained in the "Conceptual Bikeways Plan," should be used in conjunction with the City's "Conceptual Trails Plan," as part of a comprehensive Trails Network Plan for the City.

II. PURPOSE

The purpose of the Conceptual Bikeways Plan is to identify the bikeway's opportunities within the community so that the acquisition and development of new bikeways through development proposals, public works projects, and voluntary efforts can be integrated into the City's existing public trails network. Therefore, with the exception of existing bikeways, the paths contained in this document are **conceptual only**. The inclusion of any bikeway or bikeway segment does not legally grant use of the bikeway or bikeway segment by the public, or in any way guarantee their eventual implementation. Additionally, the City reserves the right to modify, realign, or eliminate any bikeway identified in the Plan (including existing bikeways), and may add previously unidentified paths, as circumstances warrant in the future. Consideration should be given for implementation or improvement of all non-existing and existing but substandard bikeways contained in this document in the course of scheduled street improvements. Several of the proposed bikeways need only striping and/or signage to be implemented. In these instances, it is recommended that the Public Works Department initiate these segments as part of regular street maintenance and Capital Improvement Programs. Other segments may require extensive engineering to accommodate specific issues along certain segments, which may or may not be feasible for construction.

III. AMENDMENT PROCEDURES

Any resident of the City of Rancho Palos Verdes may request an amendment to the Conceptual Bikeways Plan by writing a letter or submitting a petition (which includes the name, address, and phone number of each person signing the request) to the Director of Planning, Building, and Code Enforcement. The Director will then forward the request to the Recreation and Parks Committee and to the Traffic Committee (for those conceptual bikeways located in the City's public right-of-way). Each respective Committee will consider that request at its next available regular meeting as a public hearing item. If the Committee(s) recommend the change (by a majority vote), that recommendation will go to the City Council for approval. This procedure should only be utilized for cases where immediate action is required. General changes should be made through the Public Workshop procedures described below.

IV. PUBLIC WORKSHOP ON BIKEWAYS

The City shall hold a public workshop on bikeways during the Spring of 2000. Thereafter the next workshop shall be held during the Spring, every four years (i.e., 2004, 2008, 2012, etc.), to coincide with the City's review of the Conceptual Trails Plan. The Public Workshop on Bikeways shall be considered as public hearing items by both the City's Recreation and Parks Committee and by the Traffic Committee. Any changes, additions, or deletions the Committee(s) desire to make to the Plan will be presented for public comment. Changes suggested by the public at the workshop will be considered by the Committee(s). Based on public input and their deliberations, the Committee(s) will forward any recommended changes to the Conceptual Bikeways Plan and/or the Trails Network Plan to the City Council for review and approval at a duly noticed public hearing.

At the workshop, the Committee(s) will also present a "Trails Action Plan" for bikeways development in the succeeding years. This will prioritize projects and actions to be taken by the City. After hearing public input, the Committee(s) will finalize the "Trails Action Plan", which will then be forwarded to the City Council in time for it to be considered during the budget formulation process. The attached Matrix A serves as the action plan for this update of the Plan.

V. DESCRIPTION OF BIKEWAYS AND CLASSIFICATIONS IN THE CONCEPTUAL PLAN

Each bikeway being recommended in the plan is described with respect to four factors: (1) segment location, (2) type, (3) status, and (4) access. An explanation of each follows:

Segment Location: Bikeways are identified by street name, and by beginning and ending points. Unless otherwise noted, the bikeway Segment will be located in both travel directions along the roadway.

Type: Each bikeway is described as being either Class I, Class I/Off-Road, Class II, or Class III. Except where noted, these classes coincide with the State guidelines for bikeways (see Appendix A). A description of each follows:

Class I

A Class I bikeway is a special pathway designated for the exclusive use of bicycles. Crossflows by pedestrians and motorists are minimized. It is usually separated from motor vehicle facilities by a space or physical barrier. It is usually grade separated, but it may have street crossings at designated traffic controlled locations. It is identified with signing and also may have pavement

markings. It can be used in both directions and is located on one side of the street. It should be noted that the State refers to a Class I bikeway as a "bike trail." To avoid confusion with unpaved trails (e.g., pedestrian/equestrian), Class I bikeways are instead referred to as "bike paths" in this document.

Class I/Off-Road

While not specifically described by Caltrans, this designation has been included by the City in order to accommodate off-road bicycling interests within the City. These bikeways are to be designed for use by "mountain" or "all terrain" bicycle enthusiasts, and should be separated as much as possible from the roadway by a grade change and landscaping. In addition, these bikeways should not be paved with standard concrete or asphalt material, and instead should be constructed of natural earth or other soft "off-road" tread. Currently this bikeway designation is found in the Ocean Trails project area (VTM 50666 and 50667) and in the Forrestal project area (Tentative Tract 37885).

Class II

A Class II bikeway, or "bike lane," is a lane on the paved area of a road for preferential use by bicycles. It is usually located along the edge of the paved area outside the traveled lanes or between the parking lane and the first motor vehicle lane. It is identified by limited "bike lane" or "bike route" signing, special lane lines, bicycle symbols or "bikes only" stencils on the pavement, and other pavement markings or signs deemed appropriate to give adequate instructions to bicyclists. Bicycles usually have exclusive use of a bike lane for longitudinal travel, but must accommodate cross-flows by motorists at driveways and intersections, and also by pedestrians at various locations. Bike lanes are used only in the same direction of motor vehicle flow and, therefore, must be on both sides of the street.

Class III

A Class III bikeway, or "shared route," is a roadway identified as a bicycle facility by "bike route" signing only. There are no special lane markings, and bicycle traffic shares the roadway with motor vehicles. Special regulations may be enacted and posted along such facilities to control motor vehicular speeds or restrict parking to enhance bicycling safety. Class III lanes are mainly to provide continuity in the bikeway system by connecting discontinuous segments of Class I and/or class II facilities, or to provide a link to specific destination points.

Status: Bikeways are described in terms of their current implementation status. The description may also identify specific considerations which may impact the

implementation of a new bikeway or the improvement of an existing bikeway.
Access: Each bikeway is described in relation to its place in the overall bikeways network. Connections with other bikeways, including those in neighboring cities, are listed.

VI. BIKEWAY SUMMARY BY SEGMENT

A. Hawthorne Boulevard

A1. Hawthorne Boulevard - Northern Segment

Segment Location: This segment begins at the City's northern boundary with the City of Rolling Hills Estates and extends along Hawthorne Boulevard to the City Boundary at Silver Spur Road.
Type: Class II
Status: There is no bikeway at present, although the street width is adequate.
Access: This bikeway connects to the Class II segment of Hawthorne Boulevard between Palos Verdes Drive North and Silver Spur Road, in the City of Rolling Hills Estates.

A2. Hawthorne Boulevard - Central Segment

Segment Location: This segment begins at the City boundary near Indian Peak Road and extends along Hawthorne Boulevard to the intersection with Granvia Altamira.
Type: Class II
Status: There is no bikeway at present although the street width is adequate.
Access: This bikeway forms a loop with the recommended bikeways on Crenshaw Boulevard, Silver Spur Road and Indian Peak Road in the City of Rolling Hills Estates. It also connects to Highridge Road, and Hawthorne Boulevard .

A3. Hawthorne Boulevard - Los Verdes Segment

Segment Location: This segment begins at the intersection with Granvia Altamira and extends along Hawthorne Boulevard to the intersection with Crest Road.
Type: Class II
Status: There is no bikeway at present, although the street width is adequate.
Access: This bikeway forms a loop with the Central Segment (A2) and the Crest Road (D1 and D2), Crenshaw Boulevard (C1), and Indian Peak (B5) segments.

A4. Hawthorne Boulevard - Southern Segment

Segment Location: This segment begins at the intersection with Crest Road and extends along Hawthorne Boulevard to Palos Verdes Drive West.

Type: Class II
Status: This is an existing bike lane. A pedestrian trail is proposed on the northbound side of this road, parallel to the bikeway.
Access: This bikeway connects to the Los Verdes Segment (A3), the Palos Verdes Drive West (E1, E2 and E3) and Crest Road (D1 and D2) segments.

B. Peninsula Center Area Bikeways

B1. Granvia Altamira

Segment Location: This segment begins at the intersection with Hawthorne Boulevard and extends along Granvia Altamira to the City boundary with Palos Verdes Estates.
Type: Class II
Status: There is an existing bikeway and signage along this road.
Access: The Bicycle Plan for the City of Palos Verdes Estates does not propose implementation of any connection to Montemalaga Drive along those portions of Granvia Altamira which are located in Palos Verdes Estates. However, since Granvia Altamira serves as a collector street, the connection to Hawthorne Boulevard has been maintained in the Rancho Palos Verdes Conceptual Bikeways Plan.

B2. Montemalaga Drive

Segment Location: This segment begins at the border with Palos Verdes Estates and extends along Montemalaga Drive to the City boundary next to Silver Spur Road.
Type: Class II
Status: There are no bike lanes along this road, although the width is adequate.
Access: The Bicycle Plan for the City of Palos Verdes Estates does not propose implementation of any bikeways through their City which would connect Montemalaga Drive to Granvia Altamira. However, since Montemalaga Drive serves as a collector street, the connection to Silver Spur Road has been maintained in the Rancho Palos Verdes Conceptual Bikeways Plan.

B3. Silver Spur Road

Segment Location: This segment begins at the City boundary with Rolling Hills Estates. south of Montemalaga Drive and extends along the southbound side of the roadway to the City boundary north of Hawthorne Boulevard.
Type: Class III
Status: Parking and landscaped median improvements along Silver Spur Road do not provide adequate width along the northbound side of the roadway to accommodate any bikeways. However, there is adequate right-of-way along the southbound side of the road to accommodate a Class III bikeway. In the event that the parking situation adjacent to the High School improves, it is recommended that a Class II bikeway

replace the Class III bikeway along the southbound side of the roadway.
Access: This segment provides a linkage to the Granvia Altamira (B1) and Montemalaga Drive (B2) segments, the Central Segment of Hawthorne Boulevard (A2), and connects with bikeways on Silver Spur Road in the City of Rolling Hills Estates.

B4. Highridge Road

Segment Location: This segment begins at the intersection with Hawthorne Boulevard and extends along Highridge Road to the City boundary with Rolling Hills Estates.
Type: Class II
Status: This is an existing bikeway which includes identification signs and bike lane markings.
Access: This bikeway connects to the Central Segment (A2) of Hawthorne Boulevard. Combined with an existing bikeway along Highridge Road in the City of Rolling Hills Estates, this bikeway connects to the Crest Road segments (D1 and D2) providing a route across the top of the Peninsula.

B5. Indian Peak Road

Segment Location: This segment begins at the City Boundary with Rolling Hills Estates near Crossfield Drive and extends on the eastbound side of the road along Indian Peak Road to Crenshaw Boulevard.
Type: Class I
Status: This is an existing bikeway. The City of Rolling Hills Estates has requested that the bikeway be removed from this road. That request was considered as part of the discussion of the Marriott Lifecare (CUP#131) project, and it was decided to leave the bikeway in place. An important consideration was the fact that the State monies used to construct the path might have to be returned if it were removed. At such time as segment C1 on Crenshaw Boulevard is constructed, the intersection of this segment with segment C1 shall be analyzed designed appropriately.
Access: This bikeway connects to Crenshaw Boulevard (C1) and the Peninsula Center commercial areas.

C. Crenshaw Boulevard

C1. Crenshaw North Segment

Segment Location: This segment begins at the intersection with Indian Peak Road and extends to the intersection with Crest Road.
Type: Class II
Status: There is no bikeway at present although the street width is adequate.

Access: This segment connects with Indian Peak and Crest Roads. It is also part of a loop with Hawthorne Boulevard (Segments A2 and A3), and Crest Road (Segments D1 and D2), in the City of Rancho Palos Verdes, and Indian Peak Road in the City of Rolling Hills Estates.

C2. Crenshaw South Segment

Segment Location: This segment begins at the intersection with Crest Road and extends along Crenshaw Boulevard to Del Cerro Park.
Type: Class II
Status: The planned Class II bike lane along both sides of this street should be implemented as soon as feasible, as existing right-of-way is adequate.
Access: This segment connects Crest Road (D1) and Del Cerro Park.

D. Crest Road

D1. Island Crest Segment

Segment Location: This segment begins at the intersection with Crenshaw Boulevard and extends along Crest Road to the intersection with Highridge Road.
Type: Class II
Status: The existing Class II bike lane along both sides of this street should be retained.
Access: This segment connects to bike segments along Crenshaw Boulevard and Hawthorne Boulevard. It is also part of a loop with Hawthorne Boulevard (Segments A2 and A3), and Crenshaw Boulevard (Segments C1 and C2) in the City of Rancho Palos Verdes, as well as with segments along Highridge Road (B4) and Indian Peak Road in the City of Rolling Hills Estates.

D2. Crest Ranch Segment

Segment Location: This segment begins at the intersection with Highridge Road and extends along Crest Road to Hawthorne Boulevard.
Type: Class II
Status: Bikeways exist in both directions along this segment. A pedestrian/equestrian trail is also proposed parallel to the bikeway from Highridge Road to the point where the Kajima Trail meets Crest Road. A pedestrian trail is proposed from that point westward to Hawthorne Boulevard.
Access: This segment connects to bike segments along Hawthorne Boulevard and Crenshaw Boulevard. It is also part of a loop with Hawthorne Boulevard (Segments A2 and A3) and Crenshaw Boulevard (Segments C1 and C2) in the City of Rancho Palos Verdes, as well as with segments along Highridge Road (B4) and Indian Peak Road (B5) in the City of Rolling Hills Estates.

E. Palos Verdes Drive

E1. Palos Verdes Drive West, Lunada Pointe Segment

Segment Location: This very short segment of the bikeway begins at the border with Palos Verdes Estates and extends along Palos Verdes Drive West to Marguerite Drive.
Type: Class II
Status: There is no bikeway at present although the road width is adequate in both directions.
Access: This segment connects to Palos Verdes Estates and the Sunset Segment (E2) of the Palos Verdes Drive West Bikeway.

E2. Palos Verdes Drive West, Sunset Segment

Segment Location: This segment begins at Marguerite Drive and extends along Palos Verdes Drive West to Hawthorne Boulevard.
Type: Class I and Class II
Status: There is an existing Class I bikeway for a portion of this segment along the southbound side of the road, from Marguerite Drive to the southern boundary of Tract 40640 (Lunada Point). Conditions of Approval requiring the developer of the adjacent parcel (Vesting Tentative Tract No. 46628) to complete this segment to Class I and Class II bikeway standards, from the southern border of Tract 40460 to Hawthorne Boulevard, have been incorporated and should be implemented at the time that this parcel is developed. Along the northbound side of the roadway, there is adequate road width to accommodate a Class II bikeway, which should be implemented. A pedestrian/equestrian trail is proposed parallel to the bike lane on the west side of the road.
Access: This segment connects bikeways along Palos Verdes Drive West to Hawthorne Boulevard (Segment A2) and Palos Verdes Drive South (Segment E3).

E3. Palos Verdes Drive West, Golden Cove Segment

Segment Location: This segment begins at the intersection with Hawthorne Boulevard and extends along Palos Verdes Drive West to Point Vicente.
Type: Class I (on the eastbound side of the street) and Class II along both sides of the street.
Status: There is an existing Class II bikeway along the entire length of the segment on the eastbound side of the roadway. Along the westbound side of the roadway, the bikeway extends from Point Vicente and ends near the existing St. Paul's Lutheran Church. This portion of the bikeway should be extended from its current end point to the intersection with Hawthorne Boulevard. Providing both Class I and Class II bikeways along the eastbound side of the street would permit bicycle access for both recreational (slower speed) and serious bicyclists. A pedestrian trail is proposed

parallel to the bikeway for the eastbound side of the street.
Access: This bikeway connects the Sunset (E2) and Point Vicente (E4) segments of the bikeway.

E4. Palos Verdes Drive South, Point Vicente Segment

Segment Location: This segment begins at Point Vicente and extends eastward to the County Fishing Access.
Type: Class I (on the eastbound side of the street) and Class II along both sides of the street.
Status: There is an existing Class II bike lane. Providing both Class I and Class II bikeways would permit bicycle access for both recreational (slower speed) and serious bicyclists. A pedestrian trail is proposed parallel to the bikeway on the eastbound side of the road.
Access: This bikeway connects the Golden Cove Segment (E3) to the Long Point Segment (E5).

E5. Palos Verdes Drive South, Long Point Segment

Segment Location: This segment begins at the County Fishing Access and extends along Palos Verdes Drive South to the entrance to Long Point.
Type: Class I (on the eastbound side of the street) and Class II along both sides of the street.
Status: There is an existing Class I bikeway on the south side of the road. It has design flaws, however, and is not heavily used. Improvements to this segment of the bikeway should be included as part of any future development proposal for the Long Point property. Providing both Class I and Class II bikeways would permit bicycle access for both recreational (slower speed) and serious bicyclists. A pedestrian trail is proposed parallel to the bikeway on the eastbound side of the road.
Access: This connects segments along Palos Verdes Drive South (E4 and E6).

E6. Palos Verdes Drive South, Abalone Cove Segment

Segment Location: This segment begins at the entrance to Long Point and extends along Palos Verdes Drive South to the Abalone Cove Parking lot.
Type: Class I (on the eastbound side of the street) and Class II along both sides of the street.
Status: There is an existing Class II bikeway. A pedestrian trail is proposed on the eastbound side of the road, parallel to the bikeway. The Class I bikeway should be extended along this segment of the bikeway plan. Providing both Class I and Class II bikeways would permit bicycle access for both recreational (slower speed) and serious bicyclists. A pedestrian trail is proposed parallel to the bikeway on the eastbound side of the road.

Access: This connects segments along Palos Verdes Drive South (E5 and E7).

E7. Palos Verdes Drive South, RDA Segment

Segment Location: This segment begins at the Abalone Cove parking lot and extends along Palos Verdes Drive South to the western boundary of Tentative Tract Map No. 50666 (Ocean Trails).
Type: Class II
Status: In some portions of this segment there is a Class II bike lane, but ongoing construction and landslide activity obstructs and changes the bikeway. A pedestrian trail (with a small portion equestrian) is proposed on the eastbound side of the road, parallel to the bikeway.
Access: This connects segments along Palos Verdes Drive South (E6 and E8).

E8. Palos Verdes Drive South, Ocean Trails Segment

Segment Location: This segment begins at the western boundary of Tentative Tract Map No. 50666 and extends along Palos Verdes Drive South to the eastern boundary of Tentative Tract Map No. 50667 (Ocean Trails)
Type: Class I and Class II
Status: As part of the approvals for construction of the Ocean Trails project, the developer has been required to construct a Class I off-road bike path on the south (eastbound) side of Palos Verdes Drive South, and a Class II bikeway along both the eastbound and westbound sides of Palos Verdes Drive South. A pedestrian trail has also been required along the eastbound side of the roadway, parallel to the bikeway.
Access: This connects segments of Palos Verdes Drive South (E7 and E9).

E9. Palos Verdes Drive South, Shoreline Park Segment

Segment Location: This segment begins at the eastern tract boundary of Tentative Tract Map No. 50667 and extends along Palos Verdes Drive South to the City boundary with San Pedro.
Type: Class II
Status: There is no room for any bikeway as the road is now constructed. As part of the approvals for construction of the Ocean Trails project, the developer has been required to improve the roadway from the eastern boundary of the project site to the City's border with San Pedro. Included in these requirements, the developer will construct a Class II bikeway along both the east and westbound sides of Palos Verdes Drive South.
Access: This connects Palos Verdes Drive South with an existing Class III bikeway in San Pedro.

E10. Palos Verdes Drive East, Switchbacks Segment
E11. Palos Verdes Drive East, Miraleste Segment

These segments were deleted from the Conceptual Bikeways Plan in accordance with City Council action on October 15, 1996.

F. Subregion One Bikeways

F1. Tide Pool Overlook Segment

Segment Location: This segment begins at the northern most entrance to the tract, and parallels the bluff top road to the tracts southern most entrance at Hawthorne Boulevard.
Type: Class I
Status: This bikeway was required as part of the conditions of approval for construction of Vesting Tentative Tract No. 46628 and should be implemented at the time of development.
Access: This bikeway provides internal access along the bluff top within the tract, and views of the tide pools below can be enjoyed from the bike path.

G. Ocean Trails Bikeways

G1. Portuguese Bend Overlook Segment

Segment Location: This segment begins at the westernmost border of Tentative Tract No. 50666, and extends southward along the western side of the residential lots to the Portuguese Point Overlook. The path then turns toward the east and runs along the southern side of the residential lots, across Forrestal Canyon to the parking lot west of the golf course clubhouse.
Type: Class I/Off-Road

Status: This bikeway was required as part of the Conditions of Approval for construction of the Ocean Trails project, and will be built at the time of development.
Access: This bikeway, which is intended for use by off-road (all-terrain) bicyclists, connects to a network of similar trails within the project site and along the bluff top.

G2. Forrestal Draw Segment

Segment Location: This segment is located within a fire access easement which begins at the end of the cul-de-sac of the northern most residential street in Tentative Tract No. 50666, and extends southward along the western side of Forrestal Canyon, and connects to the Portuguese Bend Overlook segment. It will be dedicated for both off-road bicycle and pedestrian use.

Type: Class I/Off-Road
Status: This segment was required as part of the Conditions of Approval for construction of the Ocean Trails project, and will be built at the time of development. The surface shall meet Los Angeles County Fire Department standards for all weather fire access.
Access: This segment, which is intended for use by off-road (all-terrain) bicyclists, connects to a network of similar trails (G1 and G3) within the project site and along the bluff top.

G3. Clubhouse Segment

Segment Location: This segment connects to the Portuguese Bend Overlook segment at the parking lot located to the west of the club house, and extends eastward along the south side of the clubhouse, to the parking lot east of the clubhouse.
Type: Class I/Off-Road
Status: This bikeway was required as part of the Conditions of Approval for construction of the Ocean Trails project, and will be built at the time of development.
Access: This bikeway, which is intended for use by off-road (all-terrain) bicyclists, connects to a network of similar trails (G1, G2, G4, and G5) within the project site and along the bluff top.

G4. Paseo del Mar Segment

Segment Location: This segment begins at the southeast intersection of Palos Verdes Drive South and Paseo del Mar, and extends southward along Paseo del Mar and the extension of Paseo del Mar ("A" Street) to the terminus of the cul-de-sac. The bikeway continues to the south along the eastern side of the parking lot, and connects to the Clubhouse segment of the bikeway.
Type: Class I/Off-Road
Status: This bikeway was required as part of the Conditions of Approval for construction of the Ocean Trails project, and will be built at the time of development.
Access: This bikeway, which is intended for use by off-road (all-terrain) bicyclists, connects to a network of similar trails (G3 and G5) within the project site and along the bluff top, as well as providing connection to the Palos Verdes Drive South bikeway (E8).

G5. Halfway Point Park Segment

Segment Location: This segment begins at the intersection of the Clubhouse and Paseo del Mar segments of the bikeway, and continues south along the eastern side of Halfway Point Park to the Halfway Point Preserve.
Type: Class I/Off-Road
Status: This bikeway was required as part of the Conditions of Approval for construction of the Ocean Trails project, and will be built at the time of development.

Access: This bikeway, which is intended for use by off-road (all-terrain) bicyclists, connects to a network of similar trails within the project site and along the bluff top (G3, G4, and G6).

G6. Bluff Top Overlook Segment

Segment Location: This segment begins at the eastern boundary of Halfway Point Park, and runs eastward along the bluff top to La Rotunda Canyon. The bikeway then crosses La Rotunda Canyon and extends northward, to the terminus of La Rotunda Drive.
Type: Class I/Off-Road
Status: This bikeway was required as part of the Conditions of Approval for construction of the Ocean Trails project, and will be built at the time of development. A portion of this segment along the bluff top is intended to be shared by pedestrians and off-road bicyclists.
Access: This bikeway, which is intended for use by off-road (all-terrain) bicyclists, connects to a network of similar trails within the project site and along the bluff top (G5 and G7).

G7. La Rotunda Segment

Segment Location: Beginning at the intersection of Palos Verdes Drive South and La Rotunda Drive, this segment extends along both sides of the street to the terminus of La Rotunda Drive.
Type: Class II
Status: This bikeway was required as part of the Conditions of Approval for construction of the Ocean Trails project, and will be built at the time of development.
Access: This bikeway provides an overlook and interior access to the golf course, a linkage to Bluff Top Overlook segment (G6), as well as a connection to the Palos Verdes Drive South bikeway (E8).

H. Western Avenue

Segment Location: This segment begins at the northern City boundary near Delasonde Drive and extends along Western Avenue to the southern City boundary at Summerland Street.
Type: Class II
Status: There is no bikeway at present. This is a major arterial and circulation and parking needs may make the addition of a bike lane difficult. City policy should follow the lead of Caltrans in adjacent cities. At this time Caltrans has expressed a lack of interest in a bikeway for this road. However, the City of Los Angeles has included the necessary connecting segments along Western Avenue in pending updates to their Bikeways Plan.

Access: This connects segment of Western Avenue in Rancho Palos Verdes to bikeways along Western Avenue in the neighboring cities of Los Angeles and Lomita.

I. Miraleste Drive

Segment Location: This segment begins at the intersection with Palos Verdes Drive East and extends along Miraleste Drive to the City boundary with Los Angeles.
Type: Class II
Status: There is no bikeway at present.
Access: This segment connects the Miraleste area with San Pedro.

J. Forrestal Bikeways

Segment Location: The location of these segments has not been determined at this time, however, the underlying Tract Map Number 37885, has been conditioned for inclusion of bike trails. Several outstanding design issues must be addressed prior to establishment of the exact segment locations. The segments will generally consist of a network of small trails through the bench area and to the northwest of the quarry bowl, but not including the quarry bowl itself.
Type: Class I/Off-Road
Status: These bikeways are required as part of the Conditions of Approval for Tentative Tract No. 37885, and will be built at the time development of the tract occurs.
Access: This bikeway segment which is intended for exclusive use by off-road (all-terrain bicyclists), and is accessed via a series of multi-purpose trails which will be built as part of this development.

VII. BIKEWAY USAGE DISCUSSION

Bikeways within the City of Rancho Palos Verdes are generally used for recreational purposes. A limited number of commute trips occur within the City due to the ratio of jobs to population. The number of commute trips is expected to grow with the growth in population, however will likely remain insignificant except for on Western Avenue, which is largely a commercial corridor and therefore a job center. The land use, topography, and demographic makeup of the Peninsula are not conducive to extensive bicycle commuting activities. Usage of the bikeways in the city swells during early evening hours, during the summer months, and on weekends due to the picturesque nature of the peninsula and the views to be enjoyed while utilizing the various bikeways. Several of the bikeways are semi-regional in nature as riders from beyond the Peninsula either ride or drive here expressly to ride along the bikeways and streets.

VIII. SAFETY AND EDUCATION PROGRAMS

A. CITY SPONSORED

The Recreation and Parks Department will conduct a Safety and Educational program on an annual bases, in conjunction with the Automobile Club of Southern California Bicycle Testing Unit, and/or any other provider of such services. The Program is structured to instruct participants about the following topics:

- Traffic Rules as they apply to bicyclists
- Operational safety precautions
- Equipment maintenance and safety

The program would target bicyclists of all ages, and participation could be sought through any of the following means:

- Advertisement in Local newspaper(s)
- Coordination and advertisement through local Schools
- Advertisement on Local Access Television
- Advertisement through flyers at City offices and facilities

B. OTHER PROVIDERS

The following matrix includes other safety and education programs that are available, and the providers of these programs:

Agency	Program Description	Phone Number
Automobile Club of Southern California 2601 S. Figueroa Street Los Angeles, CA 90007	Bike Testing Unit - performs inspections of bicycles for safety items	(213)741-4047
Bicycle Center (bike shop) 714 Deep Valley Drive Rolling Hills Estates, CA 90274	Safety workshop, based on demand, aimed at groups of 8 to 10 riders	(310)377-7441
City of Palos Verdes Estates 340 Palos Verdes Dr. West Palos Verdes Estates, CA 90274	City has Automobile Association of America conduct annual safety program geared toward elementary school children	(310)378-0383

IX. SUPPORT FACILITIES

Support facilities are located in various locations throughout the City. Support facilities offer the following types of services:

- Parking Areas for vehicles
- Access to water and/or rest room facilities
- Access to air for tires
- Bicycle maintenance services
- Access to telephones

Exhibit B identifies the location of these services within the City, as well as the type of services available.

Bikeways throughout Rancho Palos Verdes are linked to other modes of transportation through availability of parking areas, as identified on Exhibit B, as well as through the existence of bus stops which are located on major streets throughout the City.

X. FUNDING

A. DESIGN AND CONSTRUCTION

The City has incorporated several of the planned bikeways into the Capital Improvement Plans for the forthcoming years. The schedule for engineering and design as well as construction is included in Matrix A, attached hereto, under the heading of Implementation Status. The schedule is tentative, and is reliant solely on the availability and allocation of funds for the projects, as determined by the City Council.

A portion of the planned bikeway segments are the result of conditions of approval and mitigation measures associated with specific development projects. These trails, though required by the City, are the responsibility of the respective developments, and will be installed in conjunction with those development projects. These bikeways in the Ocean Trails, Forrestal Tract, and Subregion 1 areas are associated with the development schedule, and as such are not included in the Capital Improvement Program for any given year. The time of improvement is solely dependent on the development schedule of the respective projects.

B. MAINTENANCE

The City currently incurs costs each year due to ongoing maintenance of existing bikeways. This maintenance cost will increase with the increased number of improved

bikeways. The estimated cost to maintain one mile of bikeway off each class bikeway is as follows:

Class	Maintenance Costs (per mile per year)
Class I	$700.00
Class I/Off-Road	$350.00
Class II	$130.00
Class III	$20.00
Updated: October 1996	Source: Public Works Department

Using these factors, the expected annual maintenance cost can be calculated based on the miles of each type of bikeway existing in the city at any given time. The following matrix identifies the number of miles of each type of facility existing at this time:

Class	Miles of Existing Bikeways	Maintenance Costs (per mile per year)	Total Cost Per Year
Class I	1.6	$700.00	$1,120.00
Class I/Off-Road	0	$350.00	$0.00
Class II	18.2[1]	$130.00	$2,366.00
Class III	0	$20.00	$0.00
Total	19.8		$3,486.00
Updated: October 1996			

Typical maintenance shall include re-striping of Class II bike ways in conjunction with the planned five year cycle for resurfacing of streets. The striping shall generally include stencils at the far side of each intersection along the Class II bikeways, on both sides of the street, and other markings as appropriate. Pavement markings shall be provided for all Class II lanes which do not already have such markings, as soon as is feasible, and as budgets allow.

---

[1]Class II bikeway distance is doubled, as the lanes exist on each side of the road, therefore doubling the actual distance requiring maintenance.

Striping of Class II bikeways will cost approximately $0.10 per foot, plus $200.00 for each stencil, which would occur approximately each quarter of a mile.

C. GRANTS

Grants will be actively sought for all types of bikeways in the City. Particular near term focus will be towards Western Avenue, as this is a Caltrans Facility, and is included as a regionally significant bikeway in the MTA South Bay Area Regional Bicycle Master Plan Report (dated June 1995).

Grants will be sought for other specific facilities such as the Palos Verdes Drive South and Palos Verdes Drive West Class I bikeways.

Grants or other funding may be available from a number of sources, including the following:

Program	Administering Agency	Comments	Potentially Applicable Segments
TDA Article 3	MTA	Funds are passed through MTA to local jurisdictions based upon formula. Funds are earmarked for bicycle and pedestrian facilities.	Class II bikeways which would be commute oriented
Proposition C Discretionary Funds	MTA	Program from which Regional Bikeway Funds currently come	E1 - E4, A1-A4, and H - as these segments are designated as regionally significant in the MTA South Bay Area Regional Bicycle Plan
Proposition C Local Return	Local Agencies	Amount distributed to jurisdictions by formula.	Bikeway projects are eligible
Proposition A Neighborhood Parks Proposition of 1992 Discretionary Funds	LA County Regional Park and Open Space District	For projects which can be factually identified as important recreational and park purposes	E1-E8 Class I bikeways, which are recreational in nature

Program	Administering Agency	Comments	Potentially Applicable Segments
Proposition A Neighborhood Parks Proposition of 1992 Local Return	Local Agencies	Amount distributed to jurisdictions by formula	E1-E8 Class I bikeways, which are recreational in nature
Environmental Enhancement and Mitigation Program	State Resources Agency	Projects first prioritized by MTA, then submitted to CTC for approval. Funds can be used for landscaping.	H based on MTA regionally significant designation, and the fact that Western Avenue is a Caltrans facility.
Land and Water Conservation Program	State of California Department of Parks and Recreation	Pedestrian and bicycle trails	Class I, and right-of-way acquisition
State Gas Tax	Local Jurisdictions	Amount distributed to jurisdictions by formula	Class II - commute oriented
Bicycle Lane Account	Caltrans	Only $360,000.00 available annually state wide	H - as Western Avenue is a Caltrans facility
ISTEA National Recreational Trails Fund	California Resource Agency, Department of Parks and Recreation	Property acquisition for trails, urban trail linkages, maintenance of existing trails, trail facility development.	Class I recreationally oriented
Recreation and Public Purposes Act	Federal Bureau of Land Management	Provides for turnover of federal land for bicycle and pedestrian paths for minimal fee.	Class I recreationally oriented

See Appendix B, SCAG Non-motorized Funding Information for additional sources.

XI. ATTACHMENTS

MAP EXHIBITS

A. EXISTING AND PLANNED BIKEWAYS
B. SUPPORT FACILITIES
C. GENERAL PLAN LAND USE MAP

MATRICES

A. BIKEWAY SEGMENT/CLASS/STATUS
B. SEGMENT MILEAGE

APPENDICES

A. CALTRANS STANDARDS

B. NON-MOTORIZED TRANSPORTATION STATUTES, REGULATIONS, FUNDING AND OTHER PROGRAM OPPORTUNITIES

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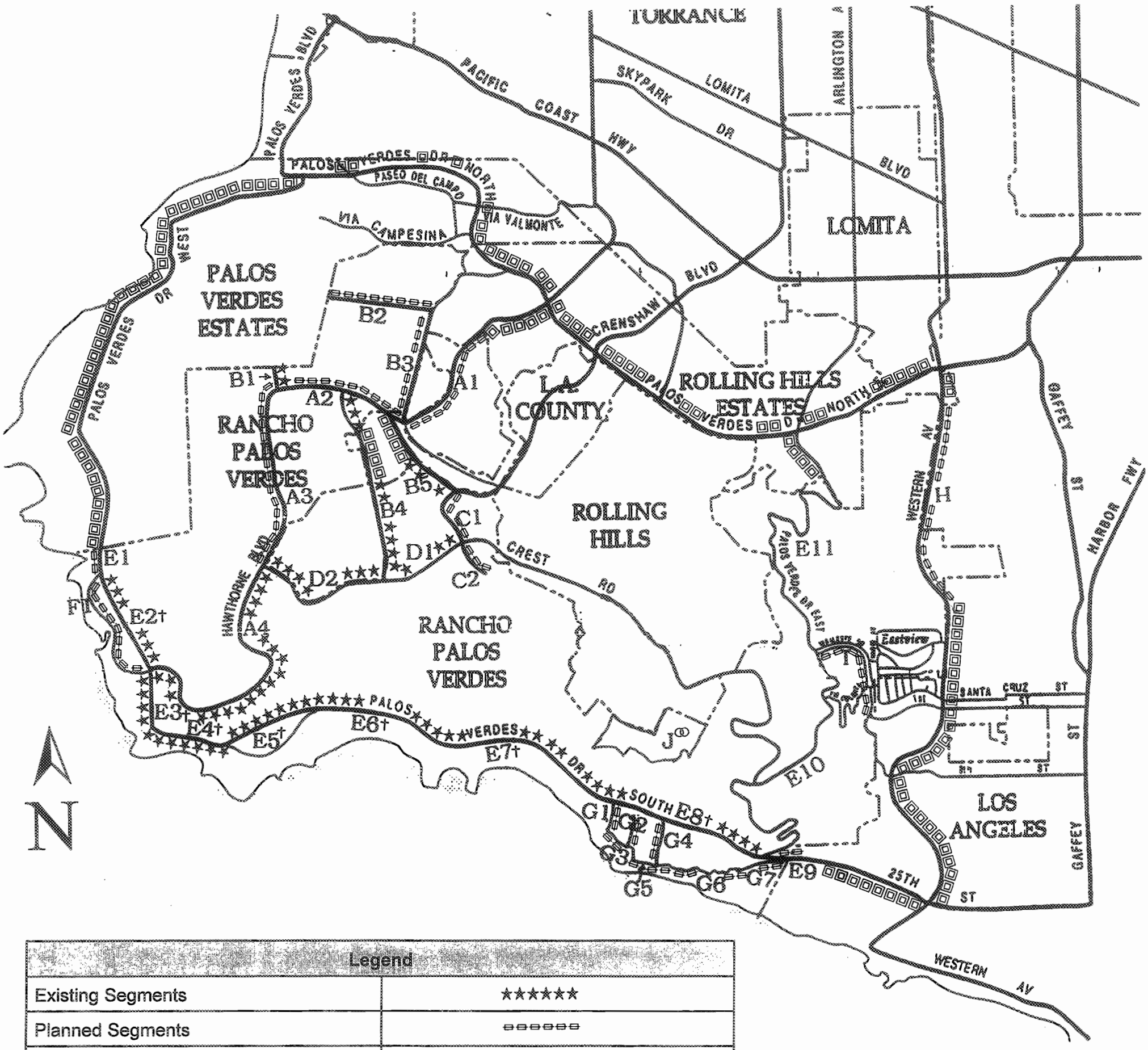


Legend	
Existing Segments	★★★★★★
Planned Segments	▭▭▭▭▭▭
Neighboring City Bikeways	▭▭▭▭▭▭

† Segment Contains both Existing and Planned Facilities - see segment description for further details

◎ Bikeways are Planned, however exact configuration and location is unknown at this time.

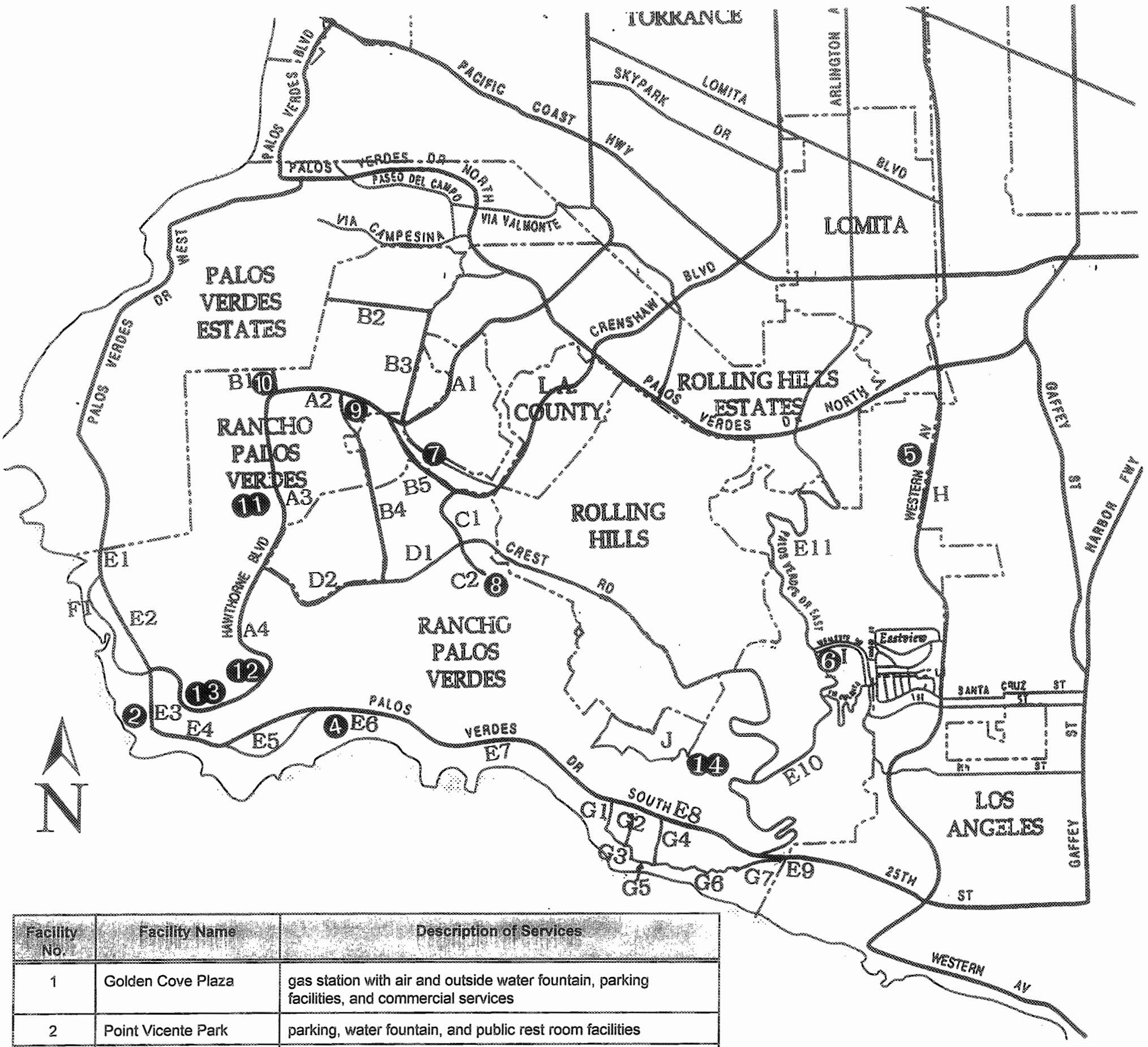
Please note that symbols on this exhibit indicate street section only, and does not represent which side(s) of the street the facilities are located. Refer to Section V of the plan for details.

Updated: October 1996

City of Rancho Palos Verdes
Conceptual Bikeway Plan

Bikeway Network

EXHIBIT A



Facility No.	Facility Name	Description of Services
1	Golden Cove Plaza	gas station with air and outside water fountain, parking facilities, and commercial services
2	Point Vicente Park	parking, water fountain, and public rest room facilities
3	Fishing Access	limited amount of parking, water fountain, and rest room facilities
4	Abalone Cove Park	paid parking area and rest room facilities
5	Western Avenue	Western Avenue is lined with commercial services of various types
6	Miraleste Commercial Area	various commercial services, including a gas station with air and water
7	Peninsula Center Area	this area contains commercial activities providing a full range of services, including bicycle shops
8	Del Cerro Park	limited parking area
9	Gas Station	gas station with access to air and water
10	Gas Station	gas station with access to air and water
11	Hesse Park	parking, water, and public rest rooms
12	Ryan Park	parking, water, and public rest rooms
13	Civic Center	parking, water, and public rest rooms
14	Ladera Linda Park	limited parking, water, and public rest rooms

Updated: October 1996

City of Rancho Palos Verdes
Conceptual Bikeway Plan

Bikeway Support Facilities

EXHIBIT B

general plan
land use map

Adopted June 26 1975

natural environment/hazard
- hazard areas

urban environment

residential
- ≤1 d.u./5 acres
- ≤1 d.u./acre
- 1-2 d.u./acre
- 2-4 d.u./acre
- 4-6 d.u./acre
- 6-12 d.u./acre
- 12-22 d.u./acre

commercial
- r retail
- o office
- r recreational

recreational
- a active
- p passive

institutional
- e educational
- p public
- r religious

agricultural
- agriculture

industrial
- scientific research

infrastructure
- facility
- arterial
- collector

control districts
- urban
- socio-cultural
- natural

specific plan
- specific plan district

AMENDMENTS

(2) 4-6 D.U./ACRE
(lots 1,2,3,16 and 17 of Tract 28750)

(4) 6-12 D.U./ACRE
(lots 1 thru 8 of Tract 27832)

(5A) 2-4 D.U./ACRE
(former Los Cerros School site)

(5B) 2-4 D.U./ACRE WITH URBAN APPEARANCE OVERLAY CONTROL DISTRICT
(former Tierra Altra School site)

(6) COMMERCIAL RETAIL, NO NATURAL OVERLAY CONTROL DISTRICT
(980 Silver Spur Road)

(10) COMMERCIAL RECREATIONAL
(former Abalone Cove School site)

(11) 1 D.U./ACRE
(southwest corner of Paseo Del Mar and La Rotunda Drive)

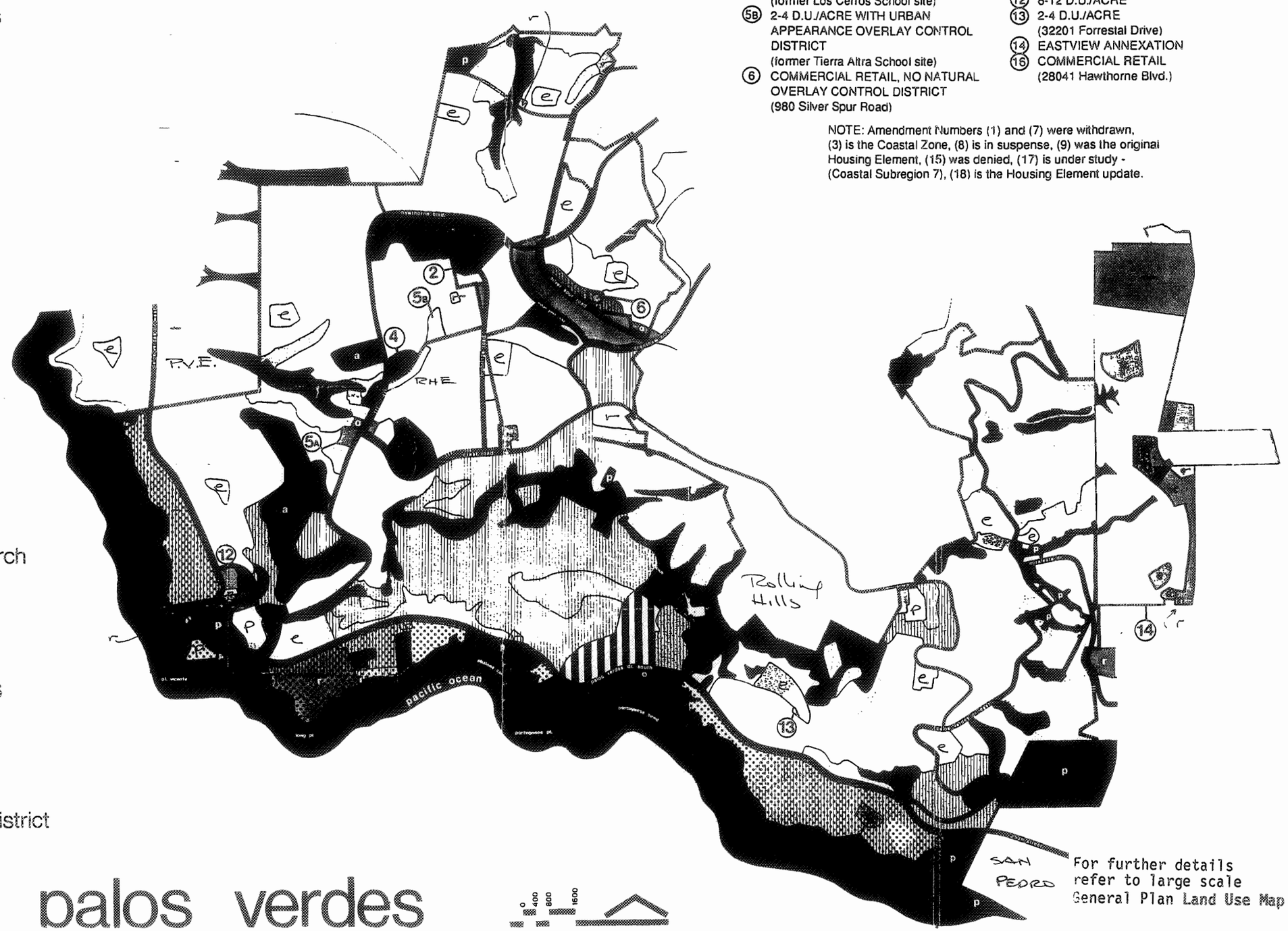
(12) 6-12 D.U./ACRE

(13) 2-4 D.U./ACRE
(32201 Forrestal Drive)

(14) EASTVIEW ANNEXATION

(16) COMMERCIAL RETAIL
(28041 Hawthorne Blvd.)

NOTE: Amendment Numbers (1) and (7) were withdrawn, (3) is the Coastal Zone, (8) is in suspense, (9) was the original Housing Element, (15) was denied, (17) is under study - (Coastal Subregion 7), (18) is the Housing Element update.



For further details refer to large scale General Plan Land Use Map

rancho palos verdes

EXHIBIT C

Bikeway Segment-Class-Status

Segment	Segment Name	Class	Current Status	Implementation Status
A	Hawthorne Blvd Bikeways			
A1	Hawthorne Blvd - Northern	II	Planned	96-97 Eng.; 97-98 Const.
A2	Hawthorne Blvd - Central	II	Planned	96-97 Eng.; 97-98 Const.
A3	Hawthorne Blvd - Los Verdes	II	Planned	96-97 Eng.; 97-98 Const.
A4	Hawthorne Blvd - Southern	II	Existing	Existing
B	Peninsula Center Area Bikeways			
B1	Granvia Altamira	II	Existing	Existing
B2	Montemalaga Drive	II	Planned	96-97 Eng. and Const.
B3	Silver Spur Road	III	Planned	96-97 Eng. and Const.
B4	Highridge Road	II	Existing	Existing
B5	Indian Peak Road	I	Existing	Existing
C	Crenshaw Blvd Bikeways			
C1	Crenshaw North	II	Planned	96-97 Eng.; 97-98 Const.***
C2	Crenshaw South	II	Planned	96-97 Const.
D	Crest Road Bikeways			
D1	Inland Crest	II	Existing	Existing
D2	Crest Ranch	II	Existing	Existing
E	Palos Verdes Drive Bikeways			
E1	PVDW - Lunada Pointe	II	Planned	97-98 Eng.; 98-99 Const. *
E2	PVDW - Sunset	I & II**	Existing and Planned	97-98 Eng.; 98-99 Const. *
E3	PVDW - Golden Cove	I & II**	Existing and Planned	97-98 Eng.; 98-99 Const. *
E4	PVDS - Point Vicente	I & II**	Existing and Planned	97-98 Eng.; 98-99 Const. *
E5	PVDS - Long Point	I & II**	Existing and Planned	97-98 Eng.; 98-99 Const. *
E6	PVDS - Abalone Cove	I & II**	Existing and Planned	97-98 Eng.; 98-99 Const. *
E7	PVDS - RDA	II	Existing and Planned	97-98 Eng.; 98-99 Const. *
E8	PVDS - Ocean Trails	I & II	Existing and Planned	97-98 Eng.; 98-99 Const. *
E9	PVDS - Shoreline Park	II	Planned	97-98 Eng.; 98-99 Const. *
F	Subregion 1 Bikeways			
F1	Tide Pool Overlook	I	Planned	With Subregion 1 Development
G	Ocean Trails			
G1	Portuguese Bend Overlook	I(OR)	Planned	With Ocean Trails Development
G2	Forrestal Draw	I(OR)	Planned	With Ocean Trails Development
G3	Clubhouse	I(OR)	Planned	With Ocean Trails Development
G4	Paseo del Mar	I(OR)	Planned	With Ocean Trails Development
G5	Halfway Point Park	I(OR)	Planned	With Ocean Trails Development
G6	Bluff Top Overlook	I(OR)	Planned	With Ocean Trails Development
G7	La Rotunda	II	Planned	With Ocean Trails Development
H	Western	II	Planned	Caltrans - MTA
I	Miraleste	II	Planned	97-98 Eng.; 98-99 Const.
J	Forestal Bikeways	I(OR)	Planned	With Tract Development

* Class II portions only, Class I will be based on adjacent development, or through grants.

** Class I on eastbound side of street, and Class II on both sides of street

*** The B5 segment intersection with this segment will be analysed and designed appropriately when C1 is implemented

**** Recreation & Parks Committee Recommends retaining in plan, Traffic Committee Recommends deletion

Matrix A

Segment Mileage

Segment	Segment Name	Class	Mileage	Current Status
A	**Hawthorne Blvd Bikeways**		4.4	
A1	Hawthorne Blvd - Northern	II	0.9	Planned
A2	Hawthorne Blvd - Central	II	1.0	Planned
A3	Hawthorne Blvd - Los Verdes	II	1.3	Planned
A4	Hawthorne Blvd - Southern	II	1.2	Existing
B	**Peninsula Center Area Bikeways**		3.3	
B1	Granvia Altamira	II	0.2	Existing
B2	Montemalaga Drive	II	0.7	Planned
B3	Silver Spur Road	III	0.8	Planned
B4	Highridge Road	II	1.2	Existing
B5	Indian Peak Road	I	0.4	Existing
C	**Crenshaw Blvd Bikeways**		0.8	
C1	Crenshaw North	II	0.4	Planned
C2	Crenshaw South	II	0.4	Planned
D	**Crest Road Bikeways**		1.6	
D1	Inland Crest	II	0.6	Existing
D2	Crest Ranch	II	1.0	Existing
E	**Palos Verdes Drive Bikeways**		6.4	
E1	PVDW - Lunada Pointe	II	0.1	Planned
E2	PVDW - Sunset	I & II	0.9	Existing and Planned
E3	PVDW - Golden Cove	I & II	0.4	Existing and Planned
E4	PVDS - Point Vicente	I & II	0.4	Existing and Planned
E5	PVDS - Long Point	I & II	0.3	Existing and Planned
E6	PVDS - Abalone Cove	I & II	0.9	Existing and Planned
E7	PVDS - RDA	II	2.0	Existing and Planned
E8	PVDS - Ocean Trails	I & II	0.9	Existing and Planned
E9	PVDS - Shoreline Park	II	0.5	Planned
F	**Subregion 1 Bikeways**		1.0	
F1	Tide Pool Overlook	I	1.0	Planned
G	**Ocean Trails**		1.6	
G1	Portuguese Bend Overlook	I(OR)	0.2	Planned
G2	Forrestal Draw	I(OR)	0.1	Planned
G3	Clubhouse	I(OR)	0.1	Planned
G4	Paseo del Mar	I(OR)	0.2	Planned
G5	Halfway Point Park	I(OR)	0.1	Planned
G6	Bluff Top Overlook	I(OR)	0.5	Planned
G7	La Rotunda	II	0.4	Planned
H	Western	II	1.1	Planned
I	Miraleste	II	0.8	Planned
J	Forestal Bikeways	I(OR)	unknown	Planned

Class		Mileage	Mileage - Existing
Class I		5.2	1.6
Class I(OR)		1.2	0
Class II		17.6	9.1
Class III		0.8	0
Total:		24.8	10.7

Updated:October 1996

Matrix B

APPENDIX A

CALIFORNIA DEPARTMENT OF TRANSPORTATION

BIKEWAY PLANNING AND DESIGN

reproduced from

California Department of Transportation

Highway Design Manual

Fourth Edition

Chapter 1000

JULY 1993

Caltrans

FOREWORD

Purpose

This publication was assembled by the Office of Project Planning and Design, Division of State and Local Project Development for the benefit of those whose primary mission is the planning and design of bicycle facilities. The contents of this publication have been reproduced from the Highway Design Manual (essentially Chapters 80 and 1000 in their entirety, and various other Tables, Figures, etc. which are referenced in Chapters 80 and 1000).

The contents have been selected and assembled to function independently of the Highway Design Manual (HDM), so that the reader/user of this publication need not obtain the entire Highway Design Manual.

This publication establishes uniform policies and procedures to carry out the highway design functions of the California Department of Transportation (Caltrans). Streets and Highways code sections 2374 through 2376 specify that the department shall establish minimum general design criteria and uniform specifications and symbols for signs, markers, etc. The Department, in cooperation with city and county governments, shall establish mandatory minimum safety design criteria. All cities, counties, and regional departments of public works shall utilize all mimum safety design criteria and uniform specifications and symbols for signs, markers, and traffic control devices.

Many of the instructions given herein are subject to amendment as conditions and experience seem to warrent. Special situations may call for variation from requirement, subject to Office of Project Planning and Design approval, or such other approval as may be specifically provided for.

Scope

This publication is not a textbook or a substitute for engineering knowledge, experience, or judgment. It includes techniques as well as graphs and tables not ordinarily found in textbooks. These are intended as aids in the solution of field and office problems. Except for new developments, no attempt is made to detail basic engineering techniques; for these, standard textbooks should be used. Criteria contained in this publication are intended for new construction or reconstruction of bikeway facilities performed after July 1, 1993. It is not intended to make these criteria retroactive to bikeway facilities constructed prior to July 1, 1993.

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TABLE OF CONTENTS

CHAPTER 80 APPLICATION OF DESIGN STANDARDS

Topic 81 - Project Development Overview

Index 81.1 - Philosophy

The Project Development process seeks to provide a degree of mobility that is in balance with other values. Social, economic, and environmental effects must be considered fully along with technical issues in the development of transportation projects so that final decisions are made in the best overall public interest, with attention to such considerations as:

(a) Need for safe and efficient transportation.

(b) Attainment of community goals and objectives.

(c) Needs of low mobility and minority groups.

(d) Costs of eliminating or minimizing adverse effects on natural resources, environmental values, public services, aesthetic values, and community and individual integrity.

(e) Planning based on realistic financial estimates.

(f) The cost, ease, and safety of maintaining whatever is built.

Proper consideration of these items requires that a facility be viewed from the different perspectives of the user, the nearby community, and larger statewide interests. For the user, efficient travel and safety are paramount concerns. At the same time, the community often is more concerned about local aesthetic, social, and economic impacts. The general population, however, tends to be interested in how successfully a project functions as part of the overall transportation system and how large a share of available capital resources it cosumes. Therefore, individual projects must be selected for construction on the basis of both overall system benefits and community goals, plans, and values.

Decisions must also emphasize different transportation modes working together effectively.

The goal is to increase highway mobility and safety in a manner that is compatible with, or which enhances, adjacent community values and plans.

Topic 82 - Application of Standards

82.1 Highway Design Manual Standards

(1) General. The highway design criteria and policies in this manual provide a guide for the engineer to exercise sound judgment in applying standards, consistent with the above Project Development philosophy, in the design of projects.

The design standards used for any project should equal or exceed the minimum given in the Manual to the maximum extent feasible, taking into account costs, traffic volumes, traffic and safety benefits, right of way, socioeconomic and environmental impacts, etc. The philosophy provides for use of lower standards when such use best satisfies the concerns of a given situation. Because design standards have evolved over many years, many existing highways do not conform fully with current standards. It is not intended that current manual standards be applied retroactively to all existing State highways; such is neither warranted nor economically feasible. However, when warranted, upgrading of existing roadway features such as guardrail, lighting, superelevation, roadbed width, etc., should be considered, either as independent projects or as part of larger projects.

In this manual design standards are categorized in order of importance in development of a safe State highway system operating at selected levels of service commensurate with projected traffic volumes and highway classification.

(2) Mandatory Standards. Mandatory design standards are those considered most essential to achievement of overall design objectives. Many pertain to requirements of law or

regulations such as those embodied in the FHWA's 13 controlling criteria (see below). Mandatory standards use the word "shall" and are printed in **Boldface** type (see Table 82.1A).

(3) Advisory Standards. Advisory design standards are important also, but allow greater flexibility in application to accommodate design constraints or be compatible with local conditions on resurfacing or rehabilitation projects. Advisory standards use the word "should" and are indicated by Underlining (see Table 82.1B).

(4) Permissive Standards. All standards other than mandatory or advisory, whether indicated by the use of "should" or "may", are permissive with no requirement for application intended.

(5) Controlling Criteria. The FHWA has designated thirteen controlling criteria for selection of design standards of primary importance for highway safety, listed as follows: design speed, lane width, shoulder width, bridge width, horizontal alignment, vertical alignment, grade, stopping sight distance, cross slope, superelevation, horizontal clearance, vertical clearance and bridge structural capacity. All but the last of these criteria are also designated as geometric criteria.

The design standards related to the 12 geometric criteria are designated as mandatory standards in this manual (see Index 82.1(2) and Table 82.1A).

(6) Other. In addition to the design standards in this manual, the Traffic Manual contains standards relating to signs, delineation, barrier systems, signals, and lighting.

Caution must be exercised when using other Caltrans publications which provide guidelines for the design of highway facilities, such as ramp meters and HOV lanes. These guidelines do not contain design standards; moreover, the designs suggested in these publications do not always meet Highway Design Manual Standards. Therefore, all other Caltrans publications must be used in conjunction with this manual.

82.2 Approvals for Nonstandard Design

(1) Mandatory Standards. **To promote uniform practice on a statewide basis, design features or elements which deviate from the mandatory standards indicated herein shall require the approval of the Chief, Office of Project Planning and Design. This approval authority has been delegated to the Project Development Coordinators.**

The current procedures and documentation requirements pertaining to the approval process for exceptions to mandatory design standards are contained in the June 7, 1991 memorandum signed by W.P. Smith.

FHWA approval of exceptions to mandatory design standards related to the 13 controlling criteria should be sought as early in the project development process as possible. However, formal approval shall not be requested until the appropriate Project Development Coordinator has approved the design exception.

FHWA approval is not required for exceptions to "Caltrans-only" mandatory standards. Table 82.1A identifies these mandatory standards.

(2) Advisory Standards. The authority to approve exceptions to advisory standards has been delegated to the District Directors. Proposals for exceptions from advisory standards should be discussed with the Project Development Coordinators during development of the approval documentation. The responsibility for the establishment of procedures for review, documentation, and long term retention of approved exceptions from advisory standards has also been delegated to the District Directors.

82.3 Use of FHWA and AASHTO Standards and Policies

The standards in this manual generally conform to the standards and policies set forth in the AASHTO publication, "A Policy on Geometric Design of Highways and Streets" (1984) and "A Policy on Design Standards-Interstate System" (1988), together with other AASHTO and FHWA documents cited in 23 CFR Ch. 1, Part 625, Appendix A. These two documents, plus a third AASHTO publication focused on creating safer roadsides, "Roadside Design Guide" (1988), contain most of the current AASHTO policies and standards, and are approved references to be used in conjunction with this manual.

AASHTO policies and standards, which are established as nationwide standards, do not always satisfy California conditions. When standards differ, the instructions in this manual govern, except when necessary for FHWA project approval (Index 108.3, Coordination with the FHWA).

82.4 Mandatory Procedural Requirements

Required procedures and policies for which Caltrans is responsible, relating to project clearances, permits, licenses, required tests, documentation, value engineering, etc., are indicated by use of the word "must". Procedures and actions to be performed by others (subject to notification by Caltrans), or statements of fact are indicated by the word "will".

Table 82.1A
Mandatory Standards

CHAPTER 80 APPLICATION OF DESIGN STANDARDS

Topic 82 Application of Standards

Index 82.2 Approvals for Nonstandard Design

CHAPTER 100 BASIC DESIGN POLICIES

Topic 101 Design Speed

Index 101.1 Selection of Design Speed

101.2 Design Speed Standards

Topic 104 Control of Access

Index 104.4 Protection of Access Rights*

CHAPTER 200 GEOMETRIC DESIGN AND STRUCTURE STANDARDS

Topic 201 Sight Distance

Index 201.1 General

Topic 202 Superelevation

Index 202.2 Standards for Superelevation

Topic 203 Horizontal Alignment

Index 203.1 General Controls

Topic 204 Grade

Index 204.3 Standards for Grade

204.6 Grade Line of Structures*

Topic 205 Road Connections and Driveways

Index 205.1 Access Openings on Expressways

Topic 208 Bridges and Grade Separation Structures

Index 208.1 Bridge Width

208.10 Bridge Railings*

CHAPTER 300 GEOMETRIC CROSS SECTION

Topic 301 Pavement Standards

Index 301.1 Pavement Width

301.2 Cross Slopes

Topic 302 Shoulder Standards

Index 302.1 Width

302.2 Cross Slopes

Topic 305 Median Standards

Index 305.1 Width*

305.6 Separate Roadways

Topic 307 Cross Sections for State Highways

Index 307.2 Two-lane Cross Sections for New Construction

307.3 Two-lane Cross Sections for RRR Projects

Topic 308 Cross Sections for Roads Under Other Jurisdictions

Index 308.1 City Streets and County Roads

Topic 309 Clearances

Index 309.1 Horizontal Clearances

309.2 Vertical Clearances

309.3 Tunnel Clearances

309.4 Lateral Clearance for Elevated Structures*

309.5 Structures Across or Adjacent to Railroads

Topic 310 Frontage Roads

Index 310.1 Cross Section*

*Caltrans-only Mandatory Standard

Table 82.1A

Mandatory Standards
(Cont.)

CHAPTER 400 INTERSECTIONS AT GRADE

Topic 405 Intersection Design Standards

Index 405.1 Sight Distance

405.2 Left-turn Channelization

405.3 Right-turn Channelization

CHAPTER 500 TRAFFIC INTERCHANGES

Topic 504 Interchange Design Standards

Index 504.7 Freeway Entrances & Exits*

504.8 Ramps

504.9 Freeway-to-freeway Connections

504.13 Access Control*

CHAPTER 700 MISCELLANEOUS STANDARDS

Topic 701 Fences

Index 701.2 Fences on Freeways and Expressways*

CHAPTER 900 LANDSCAPE ARCHITECTURE

Topic 903 Safety Roadside Rest Area Design Standards

Index 903.2 General Notes*

903.5 Facilities and Features*

CHAPTER 1000 BIKEWAY PLANNING AND DESIGN

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CHAPTER 1000
BIKEWAY PLANNING AND DESIGN

Topic 1001 - General Information

Index 1001.1 - Definitions

"Bikeway" means all facilities that provide primarily for bicycle travel.

(1) Class I Bikeway (Bike Path). Provides a completely separated right of way for the exclusive use of bicycles and pedestrians with cross-flow minimized.

(2) Class II Bikeway (Bike Lane). Provides a striped lane for one-way bike travel on a street or highway.

(3) Class III Bikeway (Bike Route). Provides for shared use with pedestrian or motor vehicle traffic.

More detailed definitions are contained in Section 2373 of the Streets and Highways Code.

1001.2 Streets and Highways Code References

(a) Section 157--Severance of a major bicycle route by freeway construction.

(b) Section 157.2--Incorporation of bicycle facilities in the design of freeways.

(c) Chapter 8--California Bikeways Act.

(d) Section 2374--Caltrans to establish design criteria for bikeways.

(e) Section 2376--Local agencies must comply to the criteria established by Caltrans.

(f) Section 2381--Use of abandoned right of way as a bicycle facility.

1001.3 Vehicle Code References

(a) 21100(H)--Operation of bicycles on sidewalks.

(b) 21207.5--Prohibition of motorized bicycles on Class I and II bikeways.

(c) 21208--Mandatory use of bike lanes by bicyclists.

(d) 21210--Bicycle parking.

(e) 21960--Use of freeway shoulders by bicyclists.

Topic 1002 - General Planning Criteria

1002.1 Introduction

Bicycle travel can be enhanced by improved maintenance and by upgrading existing roads used regularly by bicyclists, regardless of whether or not bikeways are designated. This effort requires increased attention to the right-hand portion of roadways where bicyclists are expected to ride. On new construction, and major reconstruction projects, adequate width should be provided to permit shared use by motorists and bicyclists. **On resurfacing projects, the entire paved shoulder and traveled way shall be resurfaced. When adding lanes or turn pockets, a minimum 4-foot shoulder shall be provided (see Table 302.1).** When placing a roadway edge stripe, sufficient room outside the stripe should be provided for bicyclists. When considering the restriping of roadways for more traffic lanes, the impact on bicycle travel should be assessed. These efforts, to preserve or improve an area for bicyclists to ride, can benefit motorists as well as bicyclists.

1002.2 The Role of Bikeways

Bikeways are one element of an effort to improve bicycling safety and convenience - either to help accommodate motor vehicle and bicycle traffic on shared roadways, or to complement the road system to meet needs not adequately met by roads.

Off-street bikeways in exclusive corridors can be effective in providing new recreational opportunities, or in some instances, desirable commuter routes. They can also be used to close gaps where barriers exist to bicycle travel (e.g., river crossing). On-street bikeways can serve to enhance safety and convenience, especially if other commitments are made in conjunction with establishment of bikeways, such as: elimination of parking or increasing roadway width, elimination of surface irregularities

ing, establishing intersection priority on the bike route street as compared with the majority of cross streets, and installation of bicycle-sensitive loop detectors at signalized intersections.

1002.3 The Decision to Develop Bikeways

The decision to develop bikeways should be made with the knowledge that bikeways are not the solution to all bicycle-related problems. Many of the common problems are related to improper bicyclist and motorist behavior and can only be corrected through effective education and enforcement programs. The development of well conceived bikeways can have a positive effect on bicyclist and motorist behavior. Conversely, poorly conceived bikeways can be counterproductive to education and enforcement programs.

1002.4 Selection of the Type of Facility

The type of facility to select in meeting the bicycle need is dependent on many factors, but the following applications are the most common for each type.

(1) Shared Roadway (No Bikeway Designation). Most bicycle travel in the State now occurs on streets and highways without bikeway designations. This probably will be true in the future as well. In some instances, entire street systems may be fully adequate for safe and efficient bicycle travel, and signing and striping for bicycle use may be unnecessary. In other cases, routes may be unsuitable for bicycle travel, and it would be inappropriate to encourage additional bicycle travel by designating the routes as bikeways. Finally, routes may not be along high bicycle demand corridors, and it would be inappropriate to designate bikeways regardless of roadway conditions (e.g., on minor residential streets).

Many rural highways are used by touring bicyclists for intercity and recreational travel. In most cases, it would be inappropriate to designate the highways as bikeways because of the limited use and the lack of continuity with other bike routes. However, the development and maintenance of a minimum 4-foot paved roadway shoulders with a standard 4-inch edge stripe can significantly improve the safety and convenience for bicyclists and motorists along such routes.

(2) Class I Bikeway (Bike Path). Generally, bike paths should be used to serve corridors not served by streets and highways or where wide right of way exists, permitting such facilities to be constructed away from the influence of parallel streets. Bike paths should offer opportunities not provided by the road system. They can either provide a recreational opportunity, or in some instances, can serve as direct high-speed commute routes if cross flow by motor vehicles can be minimized. The most common applications are along rivers, ocean fronts, canals, utility right of way, abandoned railroad right of way, within college campuses, or within and between parks. There may also be situations where such facilities can be provided as part of planned developments. Another common application of Class I facilities is to close gaps to bicycle travel caused by construction of freeways or because of the existence of natural barriers (rivers, mountains, etc.).

(3) Class II Bikeway (Bike Lane). Bike lanes are established along streets in corridors where there is significant bicycle demand, and where there are distinct needs that can be served by them. The purpose should be to improve conditions for bicyclists in the corridors. Bike lanes are intended to delineate the right of way assigned to bicyclists and motorists and to provide for more predictable movements by each. But a more important reason for constructing bike lanes is to better accommodate bicyclists through corridors where insufficient room exists for safe bicycling on existing streets. This can be accomplished by reducing the number of lanes, or prohibiting parking on given streets in order to delineate bike lanes. In addition, other things can be done on bike lane streets to improve the situation for bicyclists, that might not be possible on all streets (e.g., improvements to the surface, augmented sweeping programs, special signal facilities, etc.). Generally, stripes alone will not measurably enhance bicycling.

If bicycle travel is to be controlled by delineation, special efforts should be made to assure that high levels of service are provided with these lanes.

In selecting appropriate streets for bike lanes, location criteria discussed in the next section should be considered.

(4) Class III Bikeway (Bike Route). Bike routes are shared facilities which serve either to:

(a) Provide continuity to other bicycle facilities (usually Class II bikeways); or

(b) Designate preferred routes through high demand corridors.

As with bike lanes, designation of bike routes should indicate to bicyclists that there are particular advantages to using these routes as compared with alternative routes. This means that responsible agencies have taken actions to assure that these routes are suitable as shared routes and will be maintained in a manner consistent with the needs of bicyclists. Normally, bike routes are shared with motor vehicles. The use of sidewalks as Class III bikeways is strongly discouraged.

It is emphasized that the designation of bikeways as Class I, II and III should not be construed as a hierarchy of bikeways; that one is better than the other. Each class of bikeway has its appropriate application.

In selecting the proper facility, an overriding concern is to assure that the proposed facility will not encourage or require bicyclists or motorists to operate in a manner that is inconsistent with the rules of the road.

An important consideration in selecting the type of facility is continuity. Alternating segments of Class I and Class II (or Class III) bikeways along a route are generally incompatible, as street crossings by bicyclists are required when the route changes character. Also, wrong-way bicycle travel will occur on the street beyond the ends of bike paths because of the inconvenience of having to cross the street.

Topic 1003 - Design Criteria

1003.1 Class I Bikeways

Class I bikeways (bike paths) are facilities with exclusive right of way, with cross flows by motorists minimized. Section 2373 of the Streets and Highways Code describes Class I bikeways as serving "the exclusive use of bicycles and pedestrians". However, experience has shown that if significant pedestrian use is anticipated, separate facilities for pedestrians are necessary to minimize conflicts. Dual use by pedestrians and bicycles is undesirable, and the two should be separated wherever possible.

Sidewalk facilities are not considered Class I facilities because they are primarily intended to serve pedestrians, generally cannot meet the design standards for Class I bikeways, and do not minimize motorist cross flows. See Index 1003.3 for discussion relative to sidewalk bikeways.

By State law, motorized bicycles ("mopeds") are prohibited on bike paths unless authorized by ordinance or approval of the agency having jurisdiction over the path. Likewise, all motor vehicles are prohibited from bike paths. These prohibitions can be strengthened by signing.

(1) Widths. **The minimum paved width for a two-way bike path shall be 8 feet. The minimum paved width for a one-way bike path shall be 5 feet. A minimum 2-foot wide graded area shall be provided adjacent to the pavement (see Figure 1003.1A).** A 3-foot graded area is recommended. Where the paved width is wider than the minimum required, the graded area may be reduced accordingly; however, the graded area is a desirable feature regardless of the paved width. Development of a one-way bike path should be undertaken only after careful consideration due to the problems of enforcing one-way operation and the difficulties in maintaining a path of restricted width.

Where heavy bicycle volumes are anticipated and or significant pedestrian traffic is expected, the paved width of a two-way path should be greater than 8 feet, preferably 12 feet or more. Another important factor to consider in determining the appropriate width is that bicyclists will tend to ride side by side on bike paths, necessitating more width for safe use.

Experience has shown that paved paths less than 12 feet wide sometimes break up along the edge as a result of loads from maintenance vehicles.

Where equestrians are expected, a separate facility should be provided.

Figure 1003.1A

Two-way Bike Path on Separate Right of Way

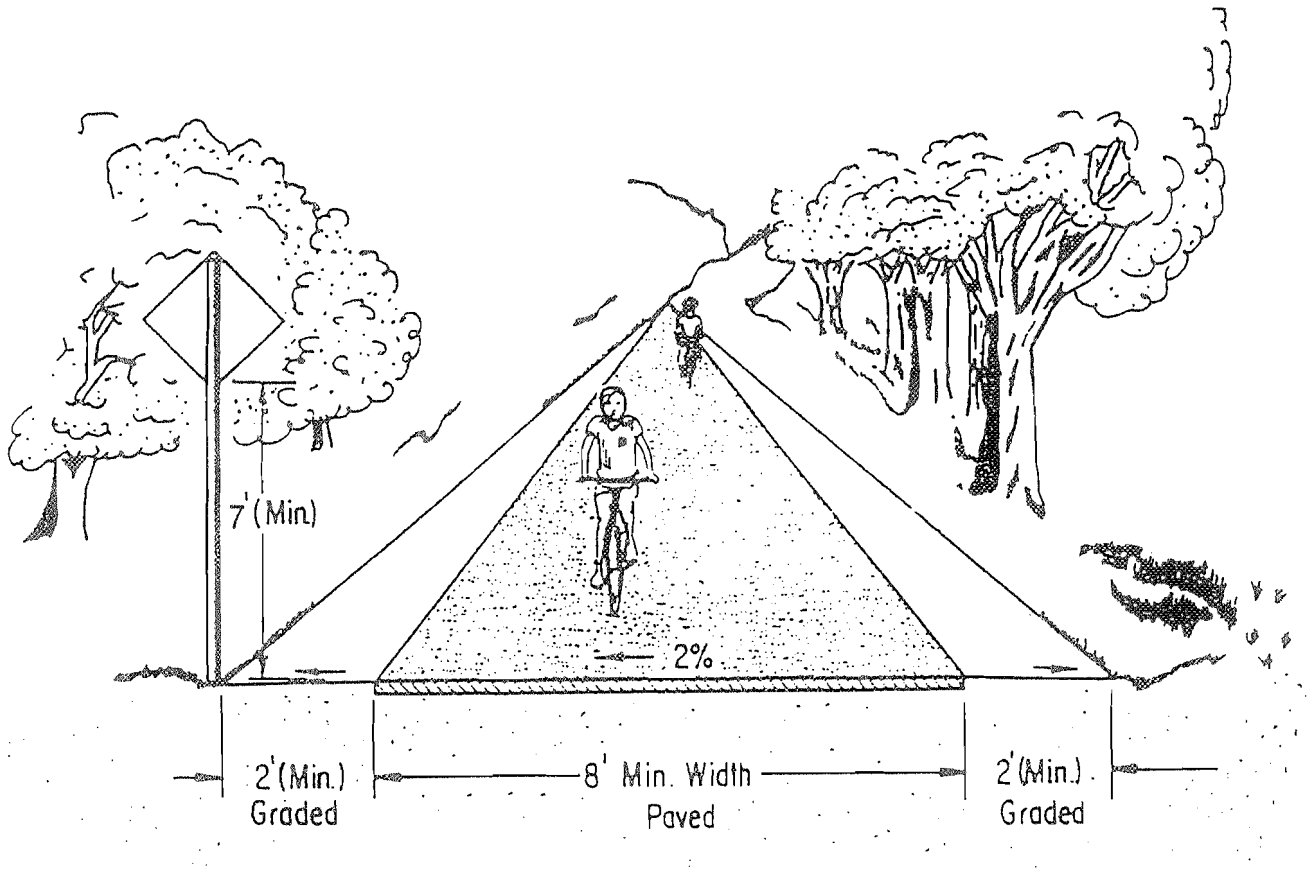
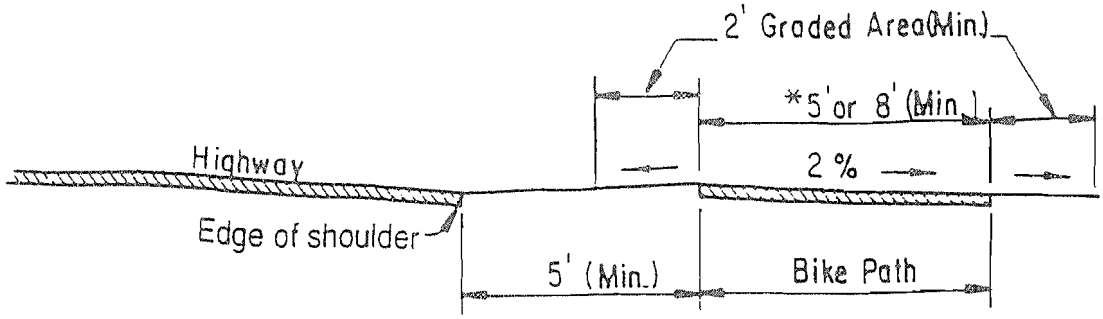


Figure 1003.1B

Typical Cross Section of Bike Path Along Highway



*One-Way: 5' Minimum Width
Two-Way: 8' Minimum Width

(2) Clearance to Obstructions. **A minimum 2-foot horizontal clearance to obstructions shall be provided adjacent to the pavement (see Figure 1003.1A).** A 3-foot clearance is recommended. Where the paved width is wider than the minimum required, the clearance may be reduced accordingly; however, an adequate clearance is desirable regardless of the paved width. If a wide path is paved contiguous with a continuous fixed object (e.g., block wall), a 4-inch white edge stripe, 1-foot from the fixed object, is recommended to minimize the likelihood of a bicyclist hitting it. **The clear width on structures between railings shall be not less than 8 feet.** It is desirable that the clear width of structures be equal to the minimum clear width of the path (i.e., 12 feet).

The vertical clearance to obstructions across the clear width of the path shall be a minimum of 8 feet.

(3) Striping and Signing. A yellow centerline stripe may be used to separate opposing directions of travel. A centerline stripe is particularly beneficial in the following circumstances:

(a) Where there is heavy use;

(b) On curves with restricted sight distance; and,

(c) Where the path is unlighted and nighttime riding is expected. (Refer to Topic 1004 for signing and striping details.)

(4) Intersections with Highways. Intersections are a prime consideration in bike path design. If alternate locations for a bike path are available, the one with the most favorable intersection conditions should be selected.

Where motor vehicle cross traffic and bicycle traffic is heavy, grade separations are desirable to eliminate intersection conflicts. Where grade separations are not feasible, assignment of right of way by traffic signals should be considered. Where traffic is not heavy, stop or yield signs for bicyclists may suffice.

When crossing an arterial street, the crossing should either occur at the pedestrian crossing, where motorists can be expected to stop, or at a location completely out of the influence of any intersection to permit adequate opportunity for bicyclists to see turning vehicles. When crossing at midblock locations, right of way should be assigned by devices such as yield signs, stop signs, or traffic signals which can be activated by bicyclists. Even when crossing within or adjacent to the pedestrian crossing, stop or yield signs for bicyclists should be placed to minimize potential for conflict resulting from turning autos. Where bike path signs are visible to approaching auto traffic, they should be shielded to avoid confusion. In some cases, Bike Xing signs may be placed in advance of the crossing to alert motorists. Ramps should be installed in the curbs, to preserve the utility of the bike path.

(5) Separation Between Bike Paths and Highways. A wide separation is recommended between bike paths and adjacent highways (see Figure 1003.1B). **Bike paths closer than 8 feet from the edge of the shoulder shall include a physical barrier to prevent bicyclists from encroaching onto the highway.** Suitable barriers could include chain link fences or dense shrubs. Low barriers (e.g., dikes, raised traffic bars) next to a highway are not recommended because bicyclists could fall over them and into oncoming automobile traffic. In instances where there is danger of motorists encroaching into the bike path, a positive barrier (e.g., concrete barrier, steel guardrailing) should be provided. See Index 1003.6 for criteria relative to bike paths carried over highway bridges.

Bike paths immediately adjacent to streets and highways are not recommended. They should not be considered a substitute for the street, because many bicyclists will find it less convenient to ride on these types of facilities as compared with the streets, particularly for utility trips.

(6) Bike Paths in the Median of Highways. As a general rule, bike paths in the median of highways are not recommended because they require movements contrary to normal rules of the road. Specific problems with such facilities include:

(a) Bicyclist right turns from the center of roadways are unnatural for bicyclists and confusing to motorists.

(b) Proper bicyclist movements through intersections with signals are unclear.

(c) Left-turning motorists must cross one direction of motor vehicle traffic and two di-

rections of bicycle traffic, which increases conflicts.

(d) Where intersections are infrequent, bicyclists will enter or exit bike paths at midblock.

(e) Where medians are landscaped, visual relationships between bicyclists and motorists at intersections are impaired.

For the above reasons, bike paths in the median of highways should be considered only when the above problems can be avoided.

(7) Design Speed. The proper design speed for a bike path is dependent on the expected type of use and on the terrain. **The minimum design speed for bike paths shall be 20 mph except as noted in the table below.**

Type of Facility	Design Speed (mph)
Bike Paths with Mopeds Prohibited	20
Bike Paths with Mopeds Permitted	30
Bike Paths on Long Downgrades (steeper than 4%, and longer than 500 ft.)	30

Installation of "speed bumps" or other similar surface obstructions, intended to cause bicyclists to slow down in advance of intersections, shall not be used. These devices cannot compensate for improper design.

(8) Horizontal Alignment and Superelevation. Minimum recommended curve radii and superelevations for various design speeds are shown on Figure 1003.1C. When minimum curve radii are selected, increased pavement width on the inside of the curve is recommended to compensate for bicyclist lean.

A straight 2% cross slope is recommended on tangent sections. Superelevations steeper than 2% should be avoided on bike paths expected to have adult tricycle traffic.

(9) Stopping Sight Distance. Figure 1003.1D indicates the minimum stopping sight distances for various design speeds and grades. For two-way bike paths, the descending direction will control the design.

(10) Length of Crest Vertical Curves. Figure 1003.1E indicates the minimum lengths of crest vertical curves for varying design speeds.

(11) Lateral Clearance on Horizontal Curves. Figure 1003.1F indicates the minimum clearances to line of sight obstructions for horizontal curves. The required lateral clearance is obtained by entering Figure 1003.1F with the stopping sight distance from Figure 1003.1D and the proposed horizontal curve radius.

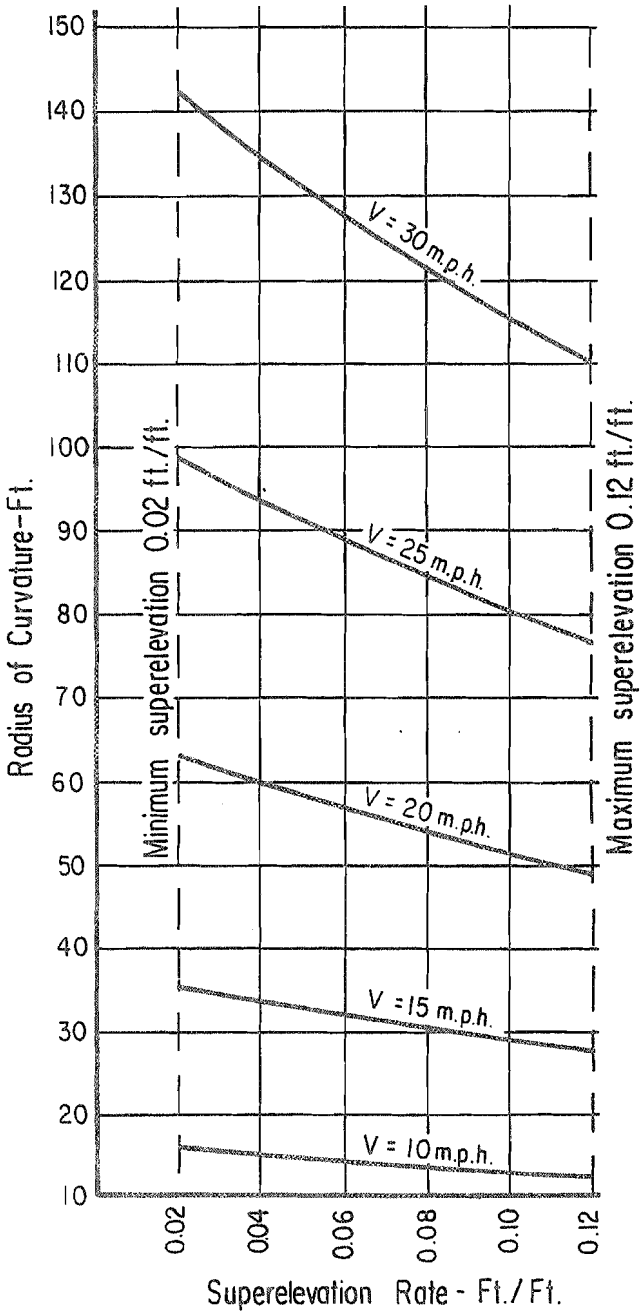
(12) Grades. Bike paths generally attract less skilled bicyclists, so it is important to avoid steep grades in their design. Bicyclists not physically conditioned will be unable to negotiate long, steep uphill grades. Since novice bicyclists often ride poorly maintained bicycles, long downgrades can cause problems. For these reasons, bike paths with long, steep grades will generally receive very little use. The maximum grade rate recommended for bike paths is 5%. It is desirable that sustained grades be limited to 2% if a wide range of riders is to be accommodated. Steeper grades can be tolerated for short segments (e.g., up to about 500 feet). Where steeper grades are necessitated, the design speed should be increased and additional width should be provided for maneuverability.

(13) Structural Section. The structural section of a bike path should be designed in the same manner as a highway, with consideration given to the quality of the basement soil and the anticipated loads the bikeway will experience. Principal loads will normally be from maintenance and emergency vehicles. Expansive soil should be given special consideration and will probably require a special structural section. A minimum pavement thickness of 2 inches of asphalt concrete is recommended. Type "A" or "B" asphalt concrete (as described in Department of Transportation Standard Specifications), with 1/2-inch maximum aggregate and medium grading is recommended. Consideration should be given to increasing the asphalt content to provide increased pavement life. Consideration should also be given to sterilization of basement soil to preclude possible weed growth through the pavement.

(14) Drainage. For proper drainage, the surface of a bike should have a cross slope of 2%. Sloping in one direction usually simplifies longitudinal drainage design and surface construction, and accordingly is the preferred

Figure 1003.1C

Curve Radii & Superelevations

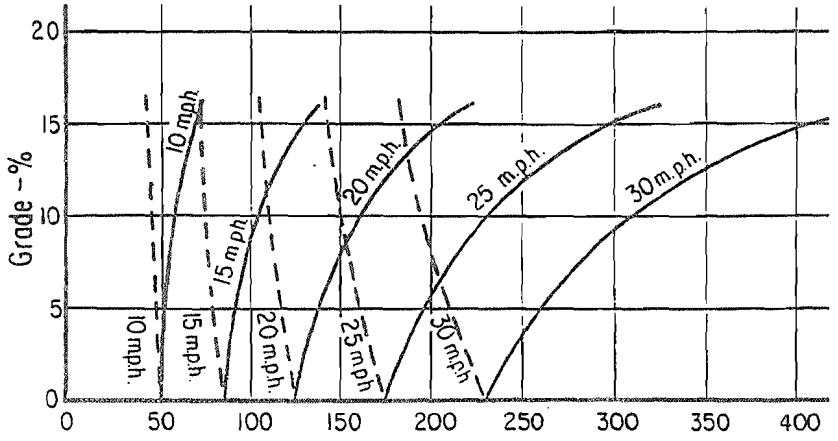


plot of: $\frac{V^2}{gR} = \frac{\tan\theta + f}{1 - f\tan\theta}$

where: V = velocity, ft./sec.
g = acceleration due to gravity, ft./sec.^{2}
R = radius of curvature, ft.
f = coefficient of friction on dry pavement = 0.4 (based on maximum 20° lean)
tan θ = superelevation rate, ft./ft.

Figure 1003.1D

Stopping Sight Distance



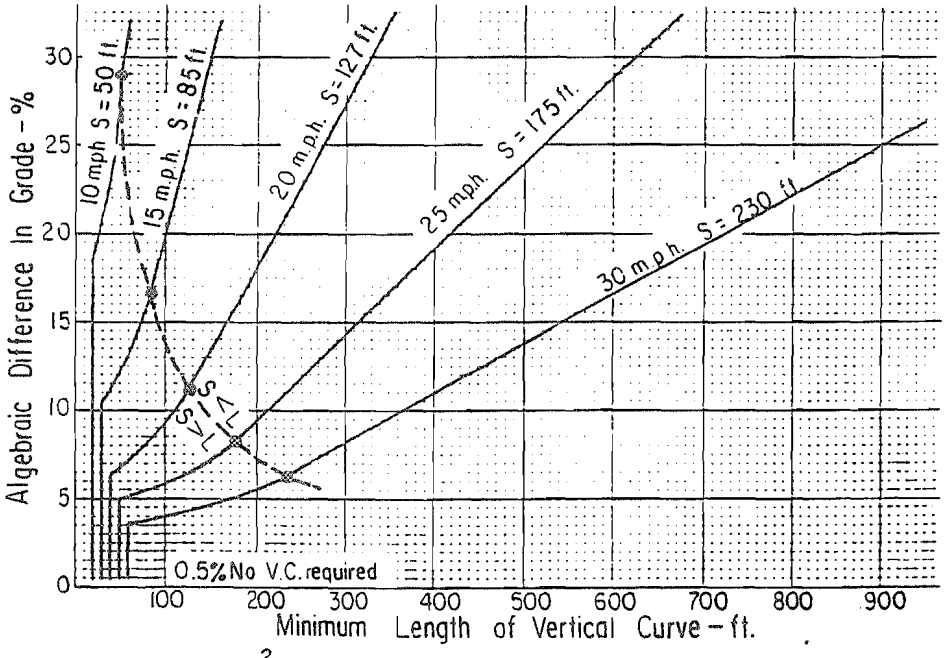
$$S = \frac{V^2}{30(f \pm G)} + 3.67\,V$$

where: S = stopping sight distance, ft.
V = velocity, mph.
f = coefficient of friction (use 0.25)
G = grade ft./ft. (rise/run)

Descend ——————
Ascend - - - - - -

Figure 1003.1E

Sight Distances for Crest Vertical Curves



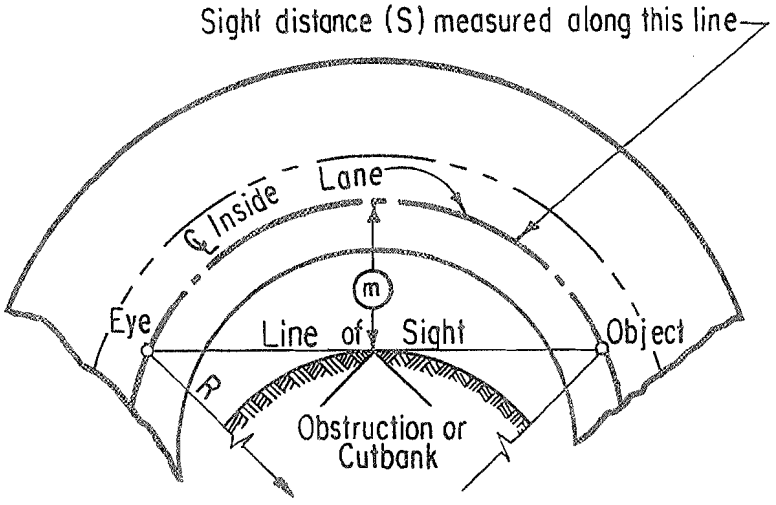
$$L = 2S - \frac{200\left(\sqrt{h_1} + \sqrt{h_2}\right)^2}{A} \quad \text{when } S > L$$

$$L = \frac{AS^2}{100\left(\sqrt{2h_1} + \sqrt{2h_2}\right)^2} \quad \text{when } S < L$$

where: S = Stopping sight distance.
A = Algebraic difference in grade.
h_1 = 4 1/2 ft. - eye height of cyclist.
h_2 = 1/3 ft. - height of object.
L = Minimum vertical curve length.

Figure 1003.1F

Lateral Clearances on Horizontal Curves



Line of sight is 2.0' above ℄ inside lane at point of obstruction.

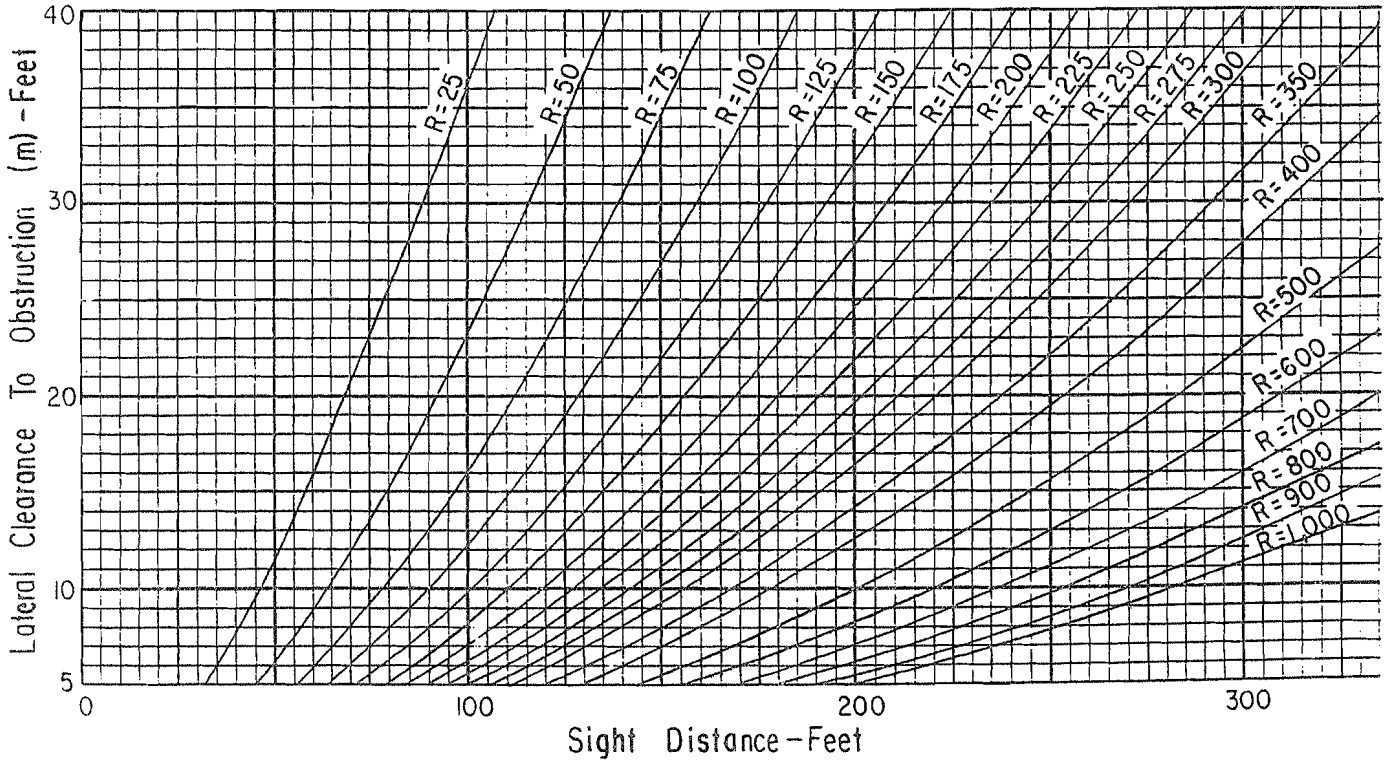
S = Sight distance in feet.
R = Radius of ℄ inside lane in feet.
M = Distance from ℄ inside lane in feet.
V = Design speed for S in M.P.H.

Angle is expressed in degrees

$$m = R\left[\text{vers}\left(\frac{28.65S}{R}\right)\right]$$

$$S = \frac{R}{28.65}\left[\cos^{-1}\left(\frac{R-m}{R}\right)\right]$$

Formula applies only when S is equal to or less than length of curve.



practice. Ordinarily, surface drainage from the path will be adequately dissipated as it flows down the gently sloping shoulder. However, when a bike path is constructed on the side of a hill, a drainage ditch of suitable dimensions may be necessary on the uphill side to intercept the hillside drainage. Where necessary, catch basins with drains should be provided to carry intercepted water across the path.

Culverts or bridges are necessary where a bike path crosses a drainage channel.

(15) Barrier Posts. It may be necessary to install barrier posts at entrances to bike paths to prevent motor vehicles from entering. When locating such installations, care should be taken to assure that barriers are well marked and visible to bicyclists, day or night (i.e., install reflectors or reflectorized tape).

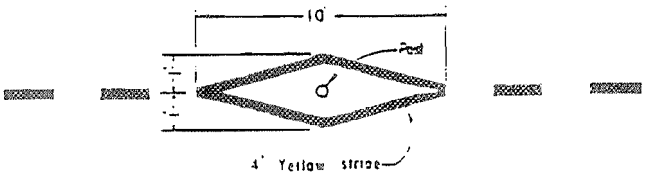
Striping an envelope around the barriers is recommended (see Figure 1003.1G). If sight distance is limited, special advance warning signs or painted pavement warnings should be provided. Where more than one post is necessary, a 5-foot spacing should be used to permit passage of bicycle-towed trailers, adult tricycles, and to assure adequate room for safe bicycle passage without dismounting. Barrier post installations should be designed so they are removable to permit entrance by emergency and service vehicles.

Generally, barrier configurations that preclude entry by motorcycles present safety and convenience problems for bicyclists. Such devices should be used only where extreme problems are encountered.

1003.2 Class II Bikeways

Class II bikeways (bike lanes) for preferential use by bicycles are established within the paved area of highways. Bike lane stripes are intended to promote an orderly flow of traffic, by establishing specific lines of demarcation between areas reserved for bicycles and lanes to be occupied by motor vehicles. This effect is supported by bike lane signs and pavement markings. Bike lane stripes can increase bicyclists' confidence that motorists will not stray into their path of travel if they remain within the bike lane. Likewise, with more certainty as to where bicyclists will be, passing motorists are less apt to swerve toward opposing traffic in making certain they will not hit bicyclists.

Figure 1003.1G
Barrier Post Striping



Class II bike lanes shall be one-way facilities. Two-way bike lanes (or bike paths that are contiguous to the roadway) are not permitted, as such facilities have proved unsatisfactory.

(1) Widths. Typical Class II bikeway configurations are illustrated in Figure 1003.2A and are described below:

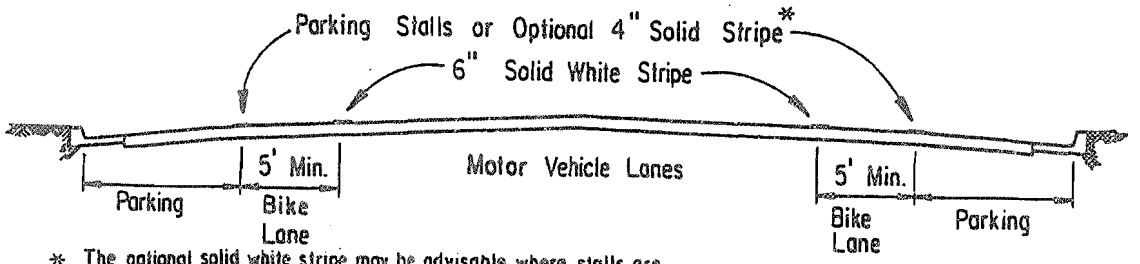
(a) Figure 1003.2A-1 depicts bike lanes on an urban type curbed street where parking stalls (or continuous parking stripes) are marked. Bike lanes are located between the parking area and the traffic lanes. Minimum widths are as shown.

Bike lanes shall not be placed between the parking area and the curb. Such facilities increase the conflict between bicyclists and opening car doors and reduce visibility at intersections. Also, they prevent bicyclists from leaving the bike lane to turn left and cannot be effectively maintained.

(b) Figure 1003.2A-2 depicts bike lanes on an urban-type curbed street, where parking is permitted, but without parking stripe or stall marking. Bike lanes are established in conjunction with the parking areas. **As indicated, 11 feet or 12 feet (depending on the type of curb) shall be the minimum width of the bike lane where parking is permitted.** This type of lane is satisfactory where parking is not extensive and where turnover of parked cars is infrequent.

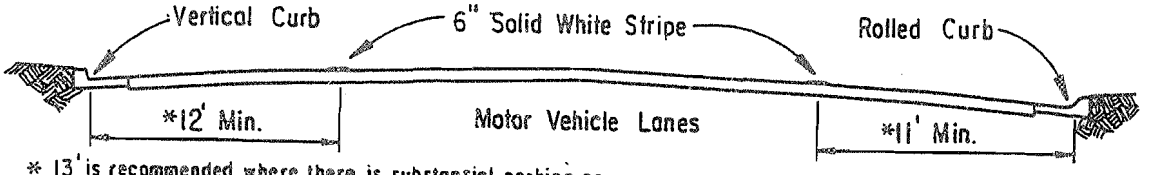
Figure 1003.2A

Typical Bike Lane Cross Sections (On 2-lane or Multilane Highways)



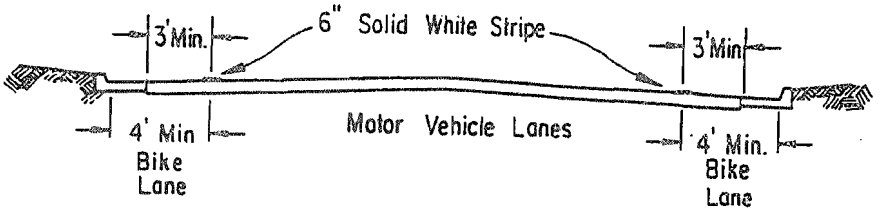
* The optional solid white stripe may be advisable where stalls are unnecessary (because parking is light) but there is concern that motorists may misconstrue the bike lane to be a traffic lane.

(1) STRIPED PARKING

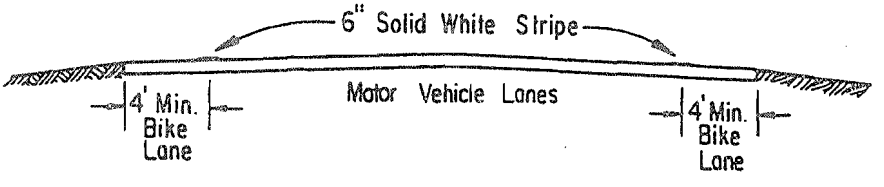


* 13' is recommended where there is substantial parking or turnover of parked cars is high (e.g. commercial areas).

(2) PARKING PERMITTED WITHOUT PARKING STRIPE OR STALL



(3) PARKING PROHIBITED



(4) TYPICAL ROADWAY IN OUTLYING AREAS PARKING RESTRICTED

However, if parking is substantial or turnover of parked cars is high, additional width is recommended.

(c) Figure 1003.2A-3 depicts bike lanes along the outer portions of an urban type curbed street, where parking is prohibited. This is generally the most desirable configuration for bike lanes, as it eliminates potential conflicts resulting from auto parking (e.g., opening car doors). **Minimum widths shall be as shown. Both minimums shall be achieved. With a normal 2-foot gutter, the minimum bike lane width shall be 5 feet.** The intent is to provide a minimum 4-foot wide bike lane, but with at least 3 feet between the traffic lane and the longitudinal joint at the concrete gutter, since the gutter reduces the effective width of the bike lane for two reasons. First, the longitudinal joint may not always be smooth, and may be difficult to ride along. Secondly, the gutter does not provide a suitable surface for bicycle travel. Where gutters are wide (say, 4 feet), an additional 3 feet must be provided because bicyclists should not be expected to ride in the gutter. Wherever possible, the width of bike lanes should be increased to 6 to 8 feet to provide for greater safety. Eight-foot bike lanes can also serve as emergency parking areas for disabled vehicles.

Striping bike lanes next to curbs where parking is prohibited only during certain hours shall be done only in conjunction with special signing to designate the hours bike lanes are to be effective. Since the Vehicle Code requires bicyclists to ride in bike lanes where provided (except under certain conditions), proper signing is necessary to inform bicyclists that they are required to ride in bike lanes only during the course of the parking prohibition. This type of bike lane should be considered only if the vast majority of bicycle travel would occur during the hours of the parking prohibition, and only if there is a firm commitment to enforce the parking prohibition. Because of the obvious complications, this type of bike lane is not encouraged for general application.

Figure 1003.2A-4 depicts bike lanes on a highway without curbs and gutters. This location is in an undeveloped area where infrequent parking is handled off the pavement. This can be accomplished by supplementing the bike lane signing with R25 (park off pavement) signs, or R26 (no parking) signs. **Minimum widths shall be as shown.** Additional width is desirable, particularly where motor vehicle speeds exceed 40 mph.

The typical motor vehicle lane width next to a bike lane is 12 feet. There are situations where it may be necessary to reduce the width of motor vehicle lanes in order to stripe bike lanes. In determining the appropriateness of narrower motor vehicle lanes, consideration should be given to factors such as motor vehicle speeds, truck volumes, alignment, and sight distance. Where favorable conditions exist, motor vehicle lanes of 11 feet may be feasible.

Bike lanes are not advisable on long, steep downgrades, where bicycle speeds greater than 30 mph are expected. As grades increase, downhill bicycle speeds will increase, which increases the problem of riding near the edge of the roadway. In such situations, bicycle speeds can approach those of motor vehicles, and experienced bicyclists will generally move into the motor vehicle lanes to increase sight distance and maneuverability. If bike lanes are to be striped, additional width should be provided to accommodate higher bicycle speeds.

If the bike lanes are to be located on one-way streets, they should be placed on the right side of the street. Bike lanes on the left side would cause bicyclists and motorists to undertake crossing maneuvers in making left turns onto a two-way street.

(2) Striping and Signing. Details for striping and signing of bike lanes are included under Topic 1004.

Raised barriers (e.g., raised traffic bars and asphalt concrete dikes) or raised pavement markers shall not be used to delineate bike lanes. Raised barriers prevent motorists from merging into bike lanes before making right turns, as required by the Vehicle Code, and restrict the movement of bicyclists desiring to enter or exit bike lanes. They also impede routine maintenance. Raised pavement markers increase the difficulty for bicyclists when entering or exiting bike lanes, and discourage motorists from merging into bike lanes before making right turns.

Bike lane stripes should be placed a constant distance from the outside motor vehicle lane. Bike lanes with parking permitted (11 ft to 13 ft between the bike lane line and the curb) should not be directed toward the curb at intersections or localized areas where parking is prohibited. Such a practice prevents bicyclists from following a straight course. Where transitions from one type of bike lane to another are necessary, smooth tapers should be provided.

(3) Intersection Design. Most auto/bicycle accidents occur at intersections. For this reason, bikeway design at intersections should be accomplished in a manner that will minimize confusion by motorists and bicyclists, and will permit both to operate in accordance with the normal rules of the road.

Figure 1003.2B illustrates a typical intersection of multilane streets, with bike lanes on all approaches. Some common movements of motor vehicles and bicycles are shown. A prevalent type of accident involves straight-through bicycle traffic and right-turning motorists. Left-turning bicyclists also have problems, as the bike lane is on the right side of the street, and bicyclists have to cross the path of cars traveling in both directions. Some bicyclists are proficient enough to merge across one or more lanes of traffic, to use the inside lane or left-turn lane provided for motor vehicles. However, there are many who do not feel comfortable making this maneuver. They have the option of making a two-legged left turn by riding along a course similar to that followed by pedestrians, as shown in the diagram. Young children will oftentimes prefer to dismount and change directions by walking their bike in the crosswalk.

At intersections where there is a bike lane and traffic-actuated signal, installation of bicycle-sensitive detectors within the bike lane is desirable. Push button detectors are not as satisfactory as those located in the pavement because the cyclist must stop to actuate the push button. It is also desirable that detectors in left-turn lanes be sensitive enough to detect bicycles (see Chapter 9 of the Traffic Manual and Standard Plans for bicycle-sensitive detector designs).

At intersections (without bike lanes) with significant bicycle use and a traffic-actuated signal, it is desirable to install detectors that are sensitive enough to detect bicycles.

Figure 1003.2C illustrates recommended striping patterns for bike lanes crossing a motorist right-turn-only lane. When confronted with such intersections, bicyclists will have to merge with right-turning motorists. Since bicyclists are typically traveling at speeds less than motorists, they should signal and merge where there is sufficient gap in right-turning traffic, rather than at any predetermined location. For this reason, it is recommended that all delineation be dropped at the approach of the right-turn lane (or off-ramp). A pair of parallel lines (delineating a bike lane crossing) to channel the bike merge is not recommended, as bicyclists will be encouraged to cross at a predetermined location, rather than when there is a safe gap in right-turning traffic. Also, some bicyclists are apt to assume they have the right of way, and may not check for right-turning motor vehicle traffic.

A dashed line across the right-turn-only lane is not recommended on extremely long lanes, or where there are double right-turn-only lanes. For these types of intersections, all striping should be dropped to permit judgment by the bicyclists to prevail. A Bike Xing sign may be used to warn motorists of the potential for bicyclists crossing their path.

1003.3 Class III Bikeways

Class III bikeways (bike routes) are intended to provide continuity to the bikeway system. Bike routes are established along through routes not served by Class I or II bikeways, or to connect discontinuous segments of bikeway (normally bike lanes). Class III facilities are shared facilities, either with motor vehicles on the street, or with pedestrians on sidewalks, and in either case bicycle usage is secondary. Class III facilities are established by placing Bike Route signs along roadways.

Minimum widths for Class III bikeways are not presented, as the acceptable width is dependent on many factors, including the volume and character of vehicular traffic on the road, typical speeds, vertical and horizontal alignment, sight distance, and parking conditions.

Figure 1003.2B

Typical Bicycle/Auto Movements at Intersections of Multilane Streets

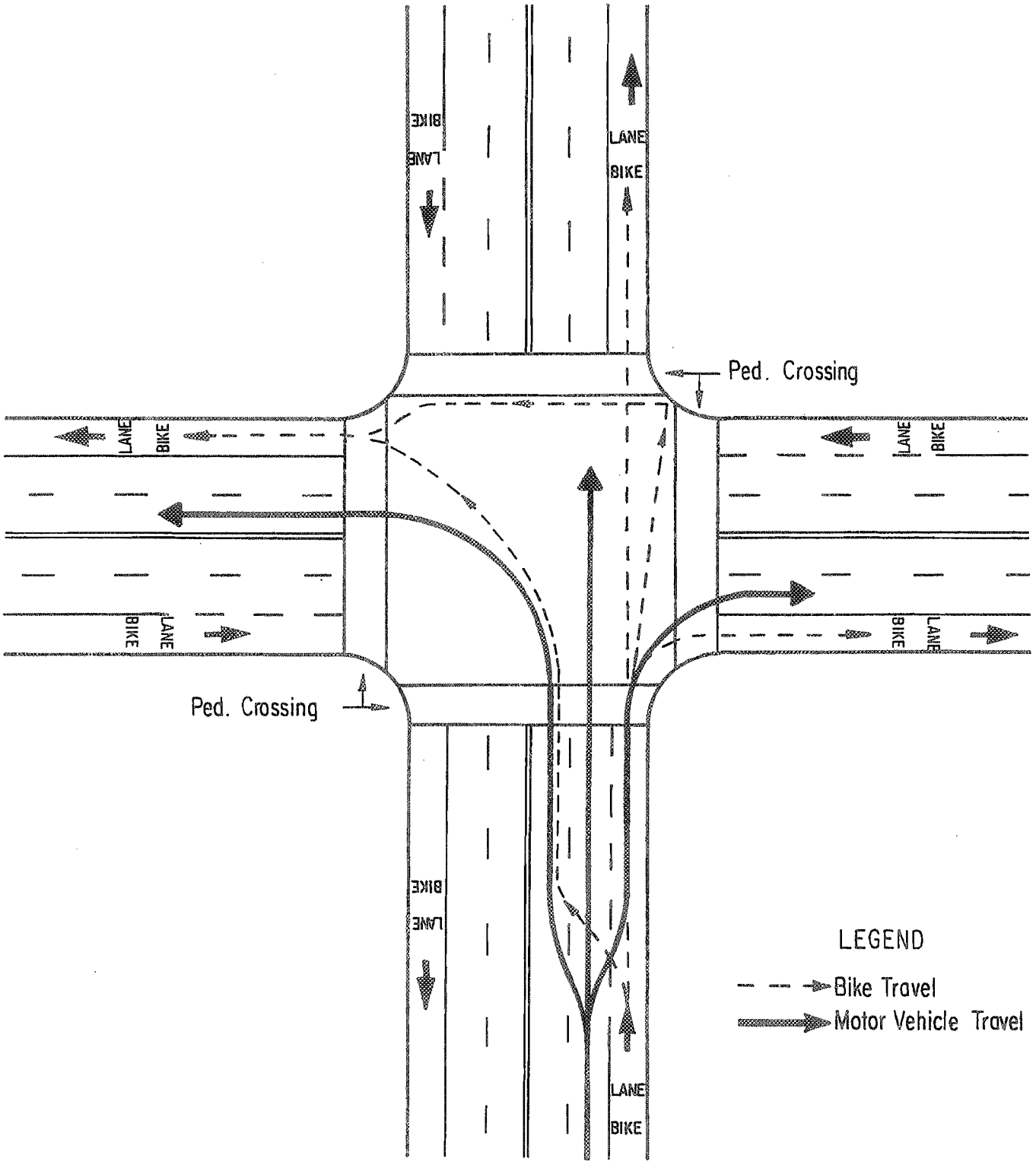
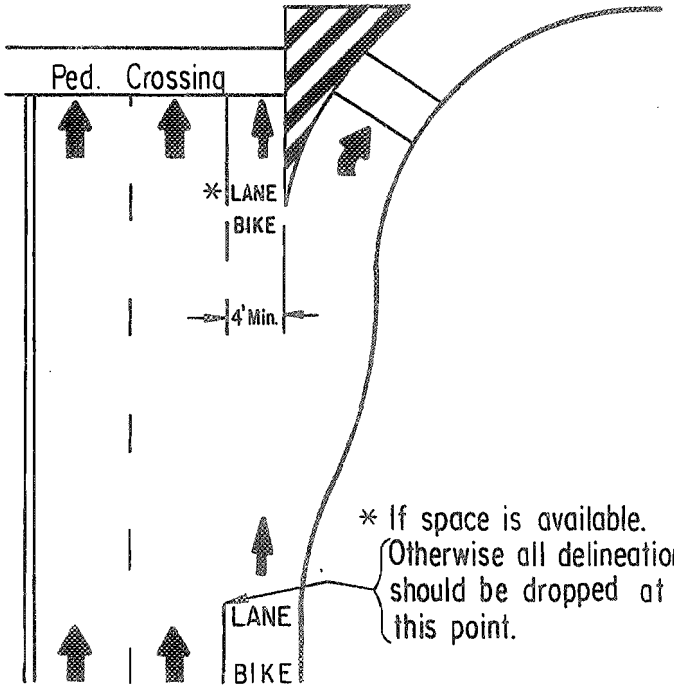
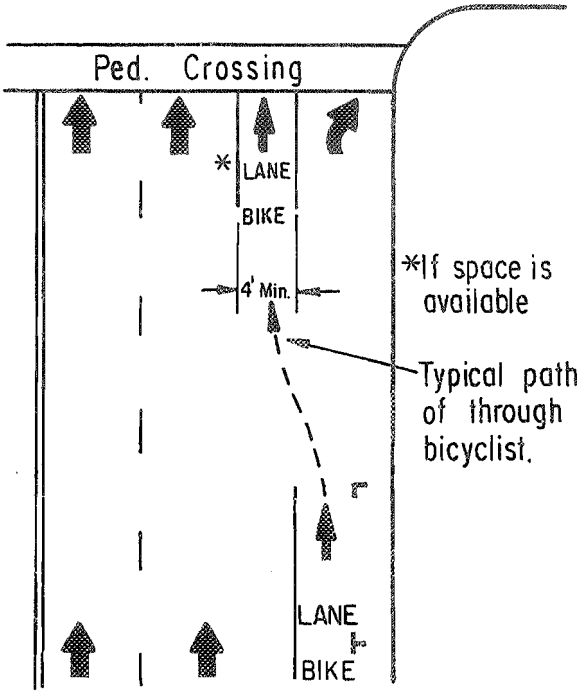


Figure 1003.2C

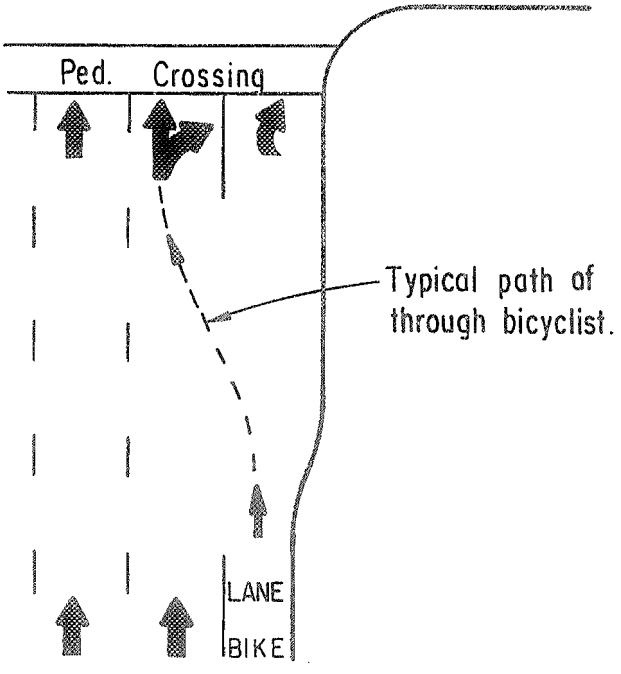
Bike Lanes Approaching Motorist Right-turn-only Lanes



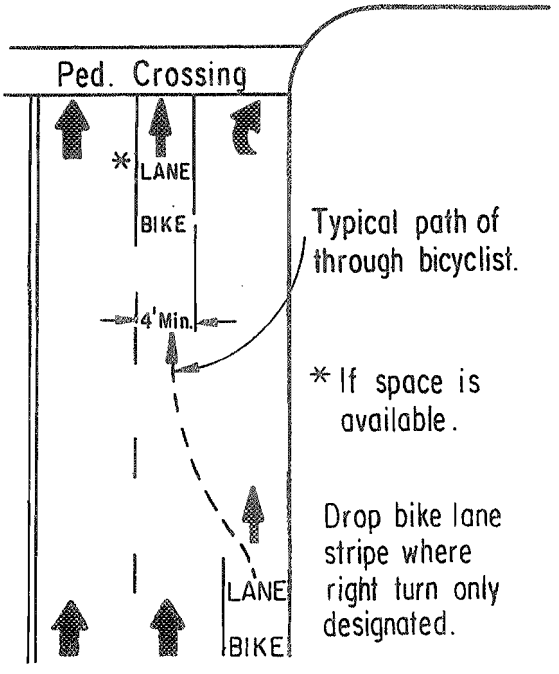
RIGHT-TURN-ONLY LANE



PARKING AREA BECOMES RIGHT-TURN-ONLY LANE



OPTIONAL DOUBLE RIGHT-TURN-ONLY LANE



RIGHT LANE BECOMES RIGHT-TURN-ONLY LANE

Since bicyclists are permitted on all highways (except prohibited freeways), the decision to sign the route should be based on the advisability of encouraging bicycle travel on the route and other factors listed below.

(1) On-street Bike Route Criteria. To be of benefit to bicyclists, bike routes should offer a higher degree of service than alternative streets. Routes should be signed only if some of the following apply:

(a) They provide for through and direct travel in bicycle-demand corridors.

(b) Connect discontinuous segments of bike lanes.

(c) An effort has been made to adjust traffic control devices (stop signs, signals) to give greater priority to bicyclists, as compared with alternative streets. This could include placement of bicycle-sensitive detectors on the righthand portion of the road, where bicyclists are expected to ride.

(d) Street parking has been removed or restricted in areas of critical width to provide improved safety.

(e) Surface imperfections or irregularities have been corrected (e.g., utility covers adjusted to grade, potholes filled, etc.).

(f) Maintenance of the route will be at a higher standard than that of other comparable streets (e.g., more frequent street sweeping).

(2) Sidewalk Bikeway Criteria. In general, the designated use of sidewalks (as a Class III bikeway) for bicycle travel is unsatisfactory.

It is important to recognize that the development of extremely wide sidewalks does not necessarily add to the safety of sidewalk bicycle travel, as wide sidewalks will encourage higher speed bicycle use and can increase potential for conflicts with motor vehicles at intersections, as well as with pedestrians and fixed objects.

Sidewalk bikeways should be considered only under special circumstances, such as:

(a) To provide bikeway continuity along high speed or heavily traveled roadways having inadequate space for bicyclists, and uninterrupted by driveways and intersections for long distances.

(b) On long, narrow bridges. In such cases, ramps should be installed at the sidewalk approaches. If approach bikeways are two-way, sidewalk facilities should also be two-way.

Whenever sidewalk bikeways are established, a special effort should be made to remove unnecessary obstacles. Whenever bicyclists are directed from bike lanes to sidewalks, curb cuts should be flush with the street to assure that bicyclists are not subjected to problems associated with crossing a vertical lip at a flat angle. Also curb cuts at each intersection are necessary, as well as bikeway yield or stop signs at uncontrolled intersections. Curb cuts should be wide enough to accommodate adult tricycles and two-wheel bicycle trailers.

In residential areas, sidewalk riding by young children too inexperienced to ride in the street is common. With lower bicycle speeds and lower auto speeds, potential conflicts are somewhat lessened, but still exist. Nevertheless, this type of sidewalk bicycle use is accepted. But it is inappropriate to sign these facilities as bikeways. Bicyclists should not be encouraged (through signing) to ride facilities that are not designed to accommodate bicycle travel.

(3) Destination Signing of Bike Routes. For Bike Route signs to be more functional, supplemental plates may be placed beneath them when located along routes leading to high demand destinations (e.g., "To Downtown"; "To State College"; etc.-- see Figure 1004.4 for typical signing).

There are instances where it is necessary to sign a route to direct bicyclists to a logical destination, but where the route does not offer any of the above listed bike route features. In such cases, the route should not be signed as a bike route; however, destination signing may be advisable. A typical application of destination signing would be where bicyclists are directed off a highway to bypass a section of freeway. Special signs would be placed to guide bicyclists to the next logical destination. The intent is to direct bicyclists in the same way as motorists would be directed if a highway detour was necessitated.

1003.4 Bicycles on Freeways

In some instances, bicyclists are permitted on freeways. Seldom would a freeway be signed or striped as a bikeway, but it can be opened for use if it meets certain criteria. Essentially, the criteria involve assessing the safety and convenience of the freeway as compared with available alternate routes. If a reasonable alternate route exists, it would normally be unnecessary to open the freeway. However, if the alternate route is inconvenient (e.g., it involves substantial out of direction travel) and/or is considered unsuitable for bicycle travel (e.g., high-speed traffic, no paved shoulders, poor sight distance, etc.), the freeway may be a better alternative for bicyclists. However, a freeway should not be opened to bicycle use if it is determined to be incompatible (e.g., narrow lanes, no shoulders, freeway-to-freeway interchanges, etc.). Normally, freeways in urban areas will have characteristics that make it infeasible to permit bicycle use. Where no reasonable alternative exists within a freeway corridor, development of a separate bike path should be considered if dictated by demand.

When bicyclists are permitted on segments of freeway, it will be necessary to modify and supplement freeway regulatory signs, particularly those at freeway ramp entrances (see Chapter 4 of the Traffic Manual).

1003.5 Multipurpose Recreational Trails

In some instances, it may be appropriate for recreational agencies to develop multipurpose recreational trails - for hikers, joggers, equestrians, bicyclists, etc. Many of these trails will not be paved and will not meet the standards for Class I bikeways. As such, these facilities should not be signed as bikeways. Rather, they should be designated as recreational trails (or similar designation), along with regulatory signing to restrict motor vehicles, as appropriate. If recreational trails are to serve primarily bicycle travel, they should be developed in accordance with standards for Class I bikeways.

1003.6 Miscellaneous Bikeway Criteria

The following are miscellaneous bikeway criteria which should be followed to the extent pertinent to Class I, II and III bikeways. Some, by their very nature, will not apply to all classes of bikeway. Many of the criteria are important to consider on any highway where bicycle travel is expected, without regard to whether or not bikeways are established.

(1) Bridges. Bikeways on highway bridges must be carefully coordinated with approach bikeways to make sure that all elements are compatible. For example, bicycle traffic bound in opposite directions is best accommodated by bike lanes on each side of a highway. In such cases, a two-way bike path on one side of a bridge would normally be inappropriate, as one direction of bicycle traffic would be required to cross the highway at grade twice to get to and from the bridge bike path. Because of the inconvenience, many bicyclists will be encouraged to ride on the wrong side of the highway beyond the bridge termini.

The following criteria apply to a two-way bike path on one side of a highway bridge:

(a) The bikeway approach to the bridge should be by way of a separate two-way facility for the reason explained above.

(b) **A physical separation, such as a chain link fence or railing, shall be provided to offset the adverse effects of having bicycles traveling against motor vehicle traffic.** The physical separation should be designed to minimize fixed end hazards to motor vehicles and if the bridge is an interchange structure, to minimize sight distance restrictions at ramp intersections.

It is recommended that bikeway bridge railings or fences placed between traffic lanes and bikeways be at least 4.5 feet high to minimize the likelihood of bicyclists falling over the railings. Standard bridge railings which are lower than 4.5 feet can be retrofitted with lightweight upper railings or chain link fence suitable to restrain bicyclists.

Seperate highway overcrossing structures for bikeway traffic shall conform to Caltrans' standard pedestrian overcrossing design loading of 85 pounds per square foot. The minimum clear width shall be the paved width of the approach bikeway. If pedestrians are to use the structure, additional width is recommended.

(2) Surface Quality. The surface to be used by bicyclists should be smooth, free of potholes,

and the pavement edge uniform. For rideability on new construction, the finished surface of bikeways should not vary more than 0.02 foot from the lower edge of an 8-foot long straight edge when laid on the surface in any direction.

Table 1003.6

BIKEWAY SURFACE TOLERANCES

Direction of Travel	Grooves(1)	Steps(2)
Parallel to travel	No more than 1/2" wide	No more than 3/8" high
Perpendicular to travel	---	No more than 3/4" high

(1) Groove--A narrow slot in the surface that could catch a bicycle wheel, such as a gap between two concrete slabs.

(2) Step--A ridge in the pavement, such as that which might exist between the pavement and a concrete gutter or manhole cover; or that might exist between two pavement blankets when the top level does not extend to the edge of the roadway.

Table 1003.6 indicates the recommended bikeway surface tolerances for Class II and III bikeways developed on existing streets to minimize the potential for causing bicyclists to lose control of their bicycle (Note: Stricter tolerances should be achieved on new bikeway construction.) Shoulder rumble strips are not suitable as a riding surface for bicycles. See Traffic Manual section 6-03.2 for additional information regarding rumble strip design considerations for bicycles.

(3) Drainage Grates, Manhole Covers, and Driveways. Drainage inlet grates, manhole covers, etc., on bikeways should be designed and installed in a manner that provides an adequate surface for bicyclists. They should be maintained flush with the surface when resurfacing.

Drainage inlet grates on bikeways shall have openings narrow enough and short enough to assure bicycle tires will not drop into the grates (e.g., reticuline type), regardless of the direction of bicycle travel. Where it is not immediately feasible to replace existing grates with standard grates designed for bicycles, 1 inch x 1/4 inch steel cross straps should be welded to the grates at a spacing of 6 inches to 8 inches on centers to reduce the size of the openings adequately.

Corrective actions described above are recommended on all highways where bicycle travel is permitted, whether or not bikeways are designated.

Future driveway construction should avoid construction of a vertical lip from the driveway to the gutter, as the lip may create a problem for bicyclists when entering from the edge of the roadway at a flat angle. If a lip is deemed necessary, the height should be limited to 1/2 inch.

(4) At-grade Railroad Crossings and Cattle Guards. Whenever it is necessary to cross railroad tracks with a bikeway, special care must be taken to assure that the safety of bicyclists is protected. The bikeway crossing should be at least as wide as the approaches of the bikeway. Wherever possible, the crossing should be straight and at right angles to the rails. For on-street bikeways where a skew is unavoidable, the shoulder (or bike lane) should be widened, if possible, to permit bicyclists to cross at right angles (see Figure 1003.6A). If this is not possible, special construction and materials should be considered to keep the flangeway depth and width to a minimum. Pavement should be maintained so ridge buildup does not occur next to the rails. In some cases, timber plank crossings can be justified and can provide for a smoother crossing. Where hazards to bicyclist cannot be avoided, appropriate signs should be installed to warn bicyclists of the danger.

All railroad crossings are regulated by the California Public Utilities Commission (CPUC). All new bike path railroad crossings must be approved by the CPUC. Necessary railroad protection will be determined based on a joint field review involving the applicant, the railroad company, and the CPUC.

The presence of cattle guards along any roadway where bicyclists are expected should be clearly marked with adequate advance warning.

(5) Hazard Markings. Vertical barriers and obstructions, such as abutments, piers, and other features causing bikeway constriction, should be clearly marked to gain the attention of approaching bicyclists. This treatment should be used only where unavoidable, and is by no means a substitute for good bikeway design. An example of a hazard marking is shown in Figure 1003.6B. Signs, reflectors, diagonal black and yellow markings, or other treatments will be appropriate in other instances to alert bicyclists to potential hazards.

(6) Lighting. Bikeway lighting should be considered along routes where nighttime riding is expected. This is particularly important for bike paths serving as commuter routes, such as paths leading to colleges. Adequate lighting is also important at bike path crossings of streets and for underpasses. Normally, on-street bikeways will be adequately lighted if street lights exist.

Topic 1004 - Uniform Signs, Markings and Traffic Control Devices

1004.1 Introduction

Per Section 2376 of the Streets and Highways Code, uniform signs, markings, and traffic control devices shall be used. As such this section is mandatory, except where permissive language is used. See the Traffic Manual for detailed specifications.

1004.2 Bike Path (Class I)

An optional 4-inch yellow stripe may be placed to separate opposing directions of travel. A 3-foot stripe with a 9-foot space is the recommended striping pattern, but may be revised, depending on the situation.

Standard regulatory, warning, and guide signs used on highways may be used on bike paths, as appropriate (and may be scaled down in size). Special regulatory, warning, and guide signs may also be used to meet specific needs.

White painted word (or symbol) warning markings on the pavement may be used as an effective means of alerting bicyclists to approaching hazards, such as sharp curves, barrier posts, etc.

1004.3 Bike Lanes (Class II)

Bike lanes require standard signing and pavement markings as shown on Figure 1004.3. This figure also depicts the proper method of striping bike lanes through intersections. Bike lane lines are not typically extended through intersections. Where motor vehicle right turns are not permitted, the solid bike lane stripe should extend to the edge of the intersection, and begin again on the far side. Where right turns are permitted, the solid stripe should terminate 100 to 200 feet prior to the intersection. A dashed line, as shown in Figure, may be carried to, or near, the intersection. Where city blocks are short (< 400 feet), the length of dashed stripe is typically close to 100 feet. Where blocks are longer or motor vehicle speeds are high (> 40 mph), the length of dashed stripe should be increased up to 200 feet.

The R81 bike lane sign shall be placed at the beginning of all bike lanes, on the far side of every arterial street intersection, at all major changes in direction, and at maximum half-mile intervals.

Bike lane pavement markings shall be placed on the far side of each intersection, and may be placed at other locations as desired.

Raised pavement markers or other raised barriers shall not be used to delineate bike lanes.

The G93 Bike Route sign may also be used along bike lanes, but its primary purpose should be to provide directional signing and destination signing where necessary. A proliferation of Bike Route signs along signed and striped bike lanes serves no useful purpose.

Many signs on the roadway also will apply to bicyclists in bike lanes. Standard regulatory, warning, and guide signs used specifically in conjunction with bike lanes are shown in Chapter 4 of the Traffic Manual.

1004.4 Bike Routes (Class III)

Bike routes are shared routes and do not require pavement markings. In some instances, a 4-inch white edge stripe separating the traffic lanes from the shoulder can be helpful in providing for safer shared use. This practice is

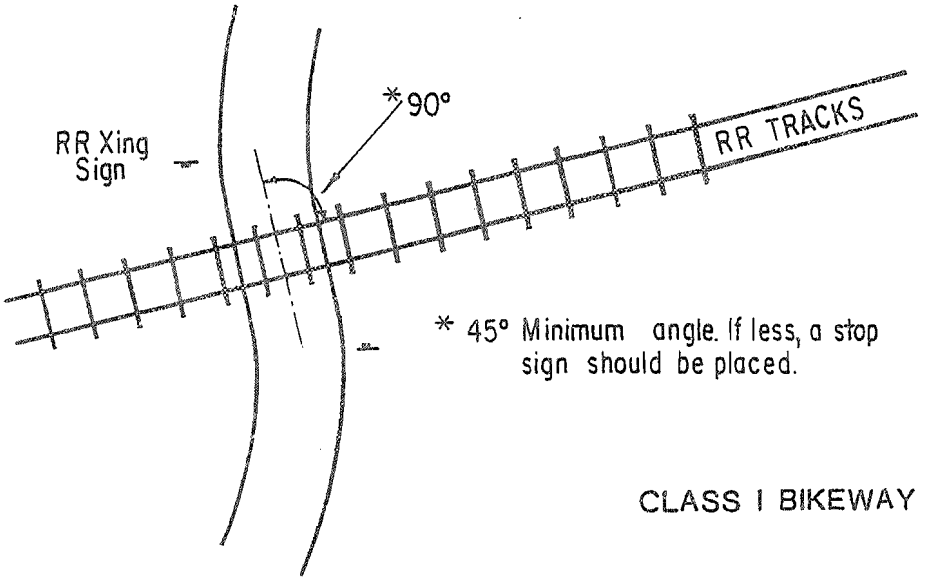
particularly applicable on rural highways, and on major arterials in urban areas where there is no vehicle parking.

Bike routes are established through placement of the G93 Bike Route sign. Bike route signs are to be placed periodically along the route. At changes in direction, the bike route signs are supplemented by G33 directional arrows. Typical bike route signing is shown on Figure 1004.4. The figure shows how destination signing, through application of a special plate, can make the Bike Route sign more functional for the bicyclist. This type of signing is recommended when a bike route leads to a high demand destination (e.g., downtown, college, etc.).

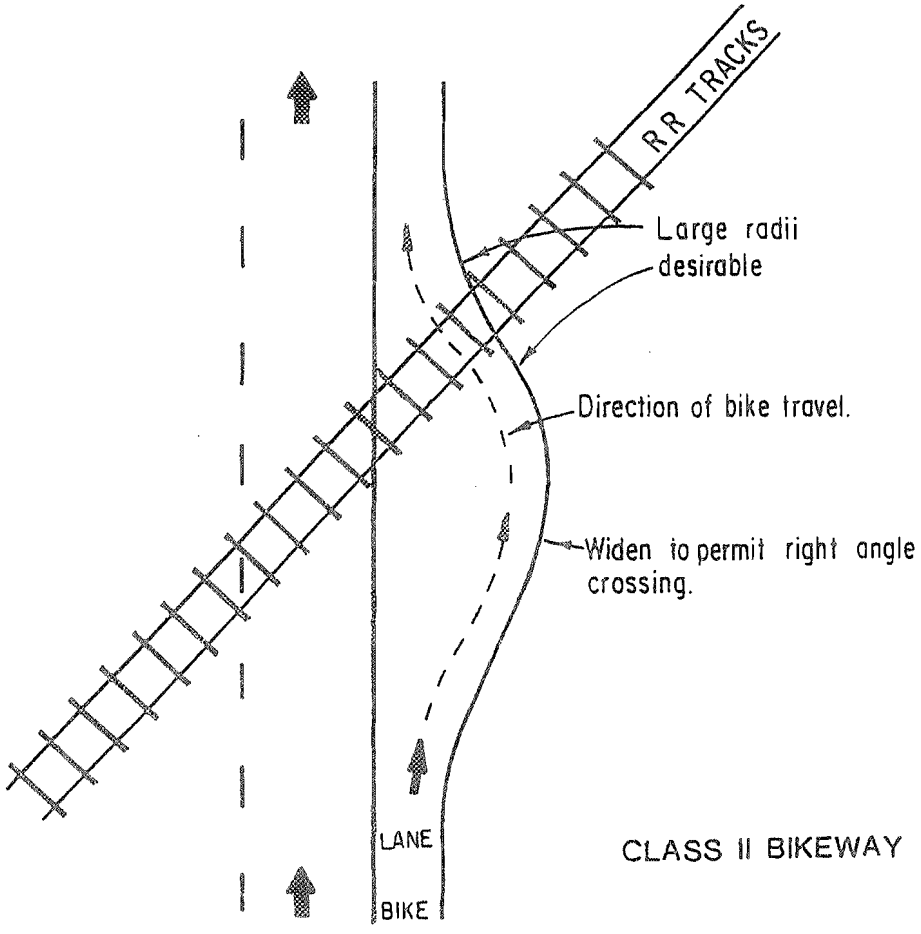
Many signs on the roadway also will apply to bicyclists. Standard warning and guide signs used specifically in conjunction with bike routes are shown in Chapter 4 of the Traffic Manual.

Figure 1003.6A

Railroad Crossings



CLASS I BIKEWAY



CLASS II BIKEWAY

Figure 1003.6B
Obstruction Markings

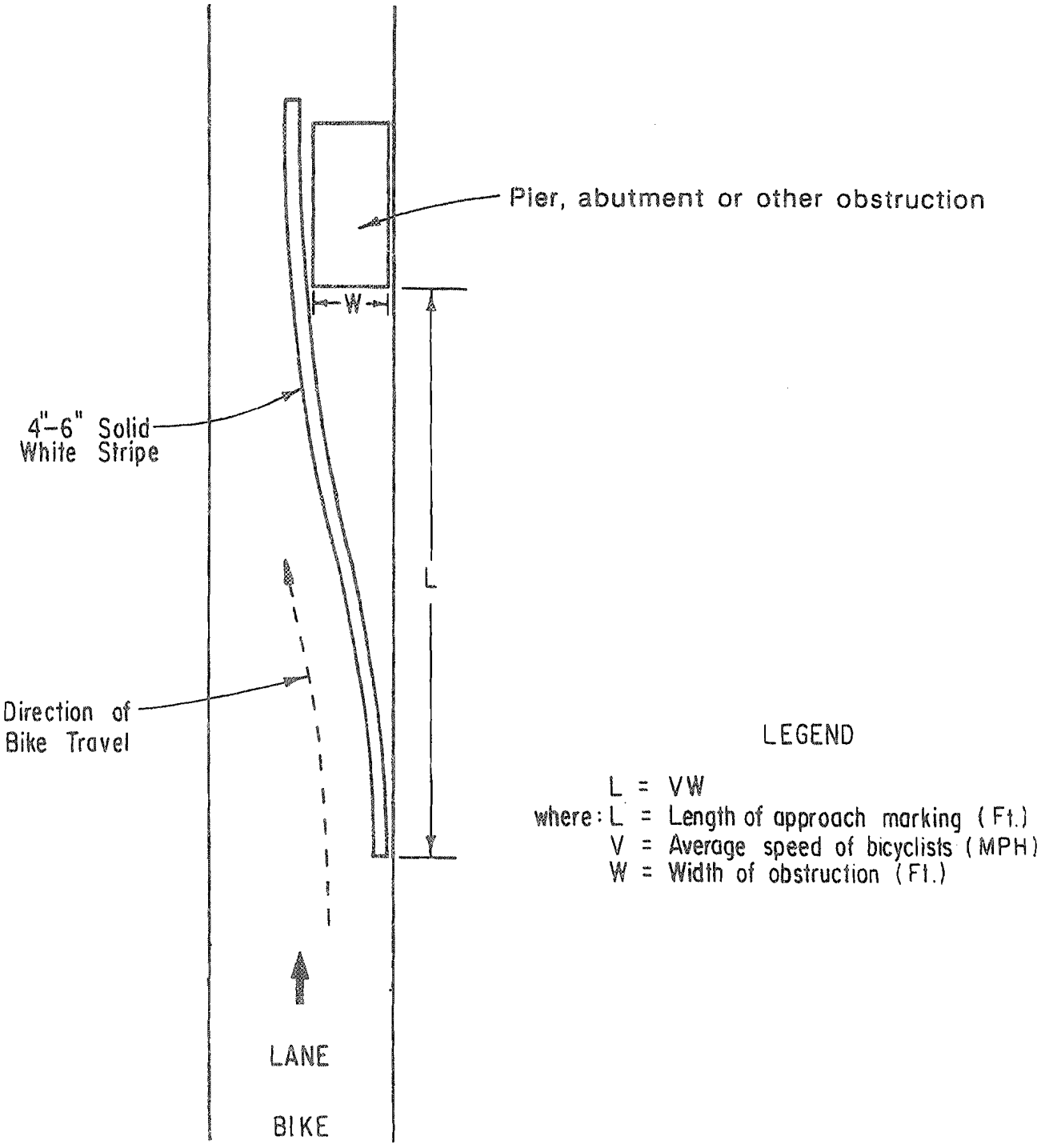
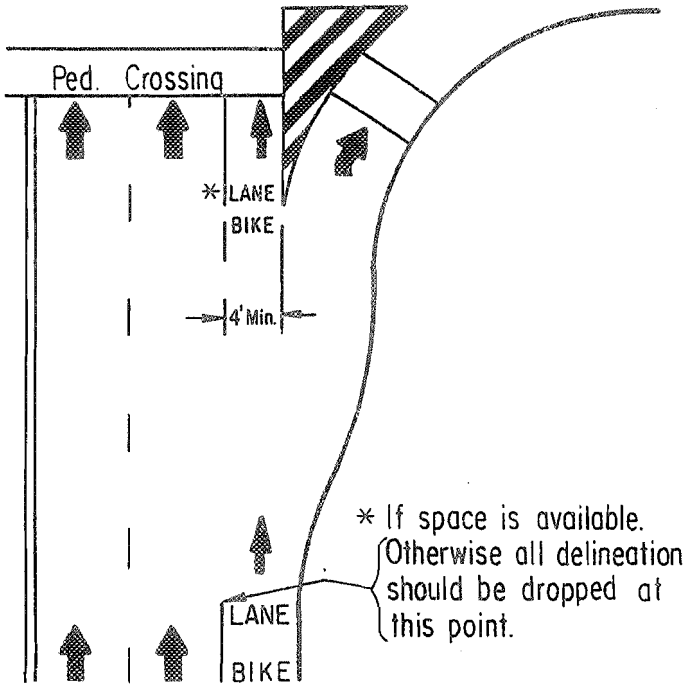
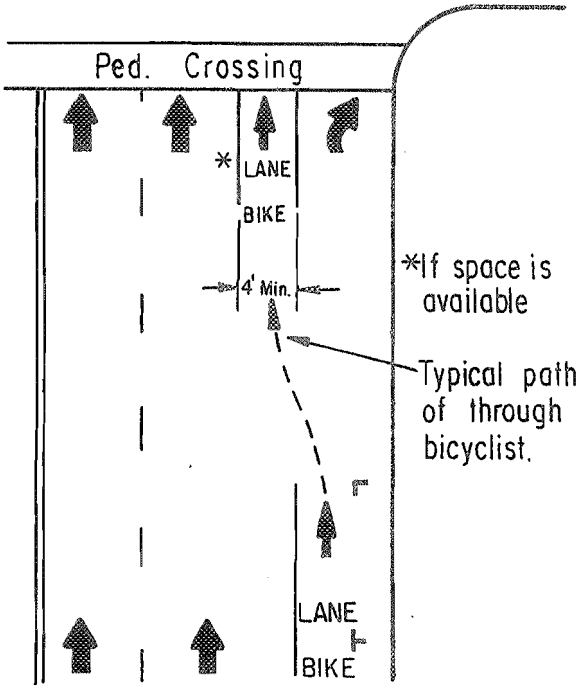


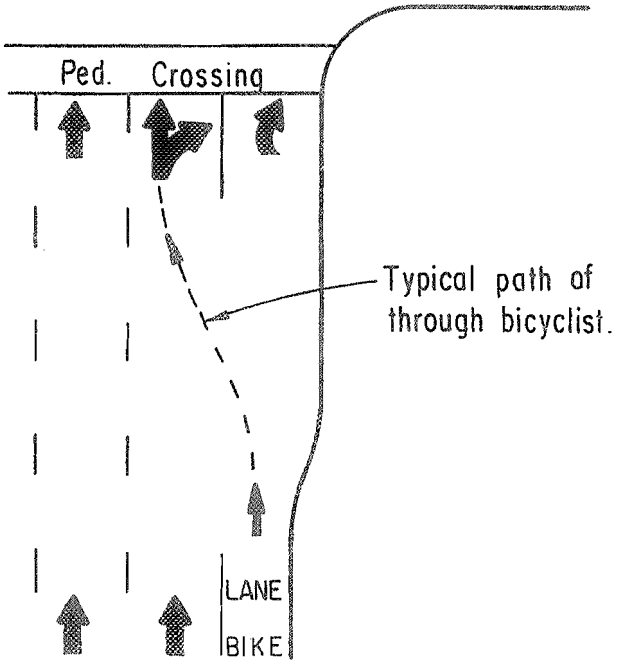
Figure 1003.6A
Railroad Crossings



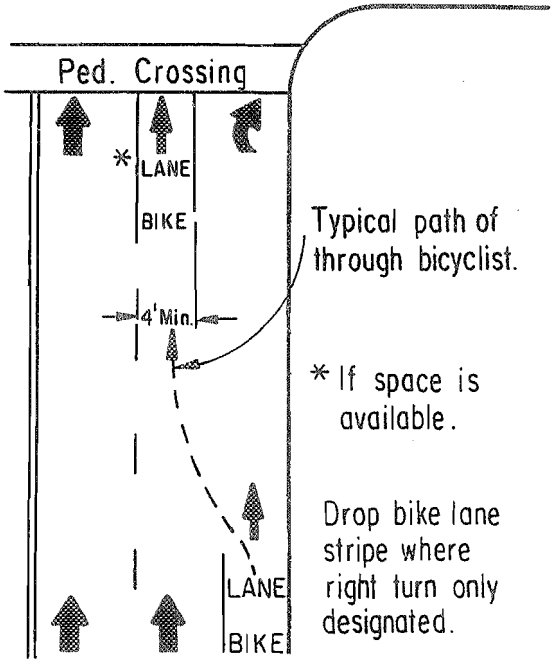
RIGHT-TURN-ONLY LANE



PARKING AREA BECOMES
RIGHT-TURN-ONLY LANE



OPTIONAL DOUBLE
RIGHT-TURN-ONLY LANE



RIGHT LANE BECOMES
RIGHT-TURN-ONLY LANE

Figure 1003.6B
Obstruction Markings

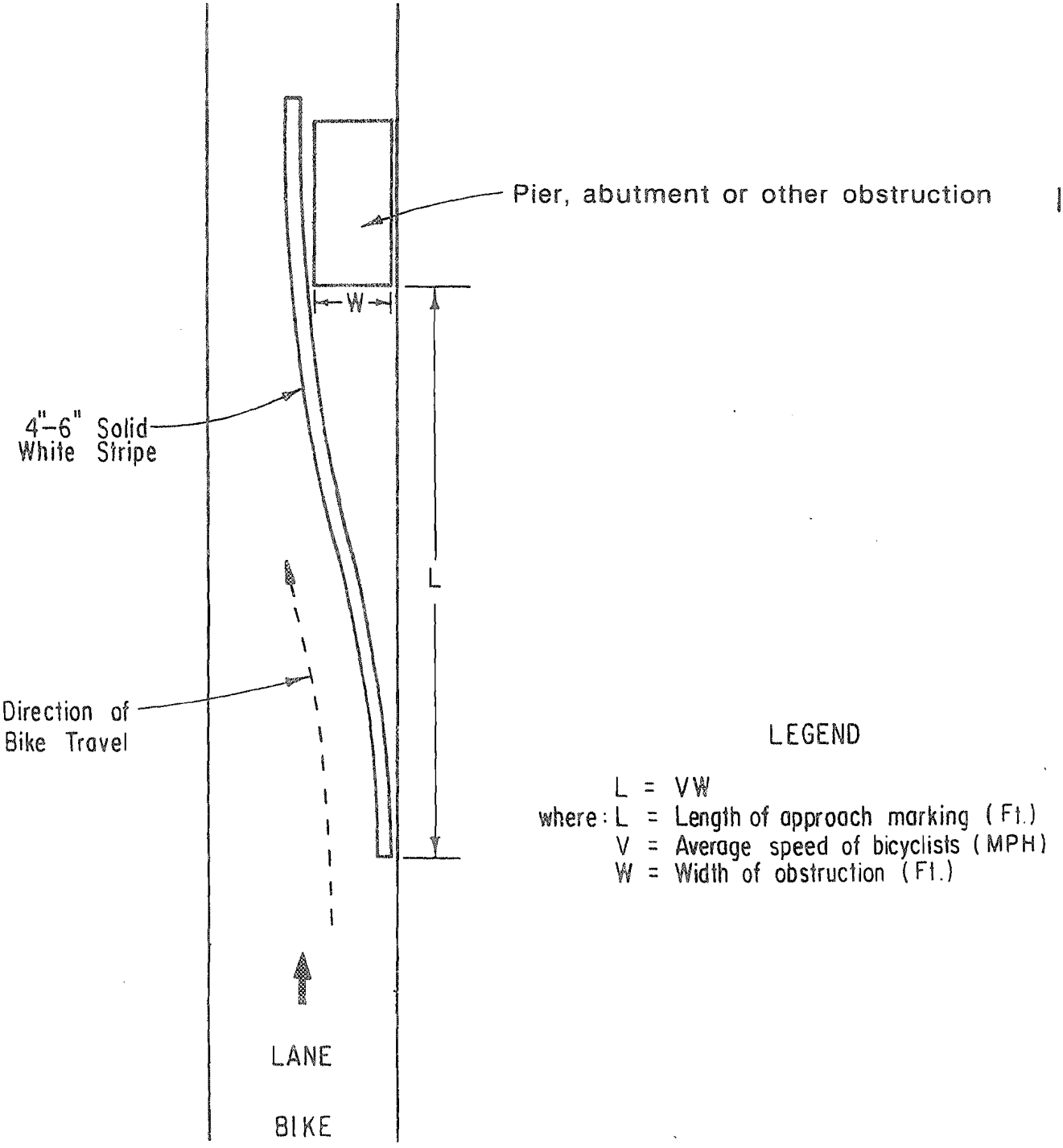
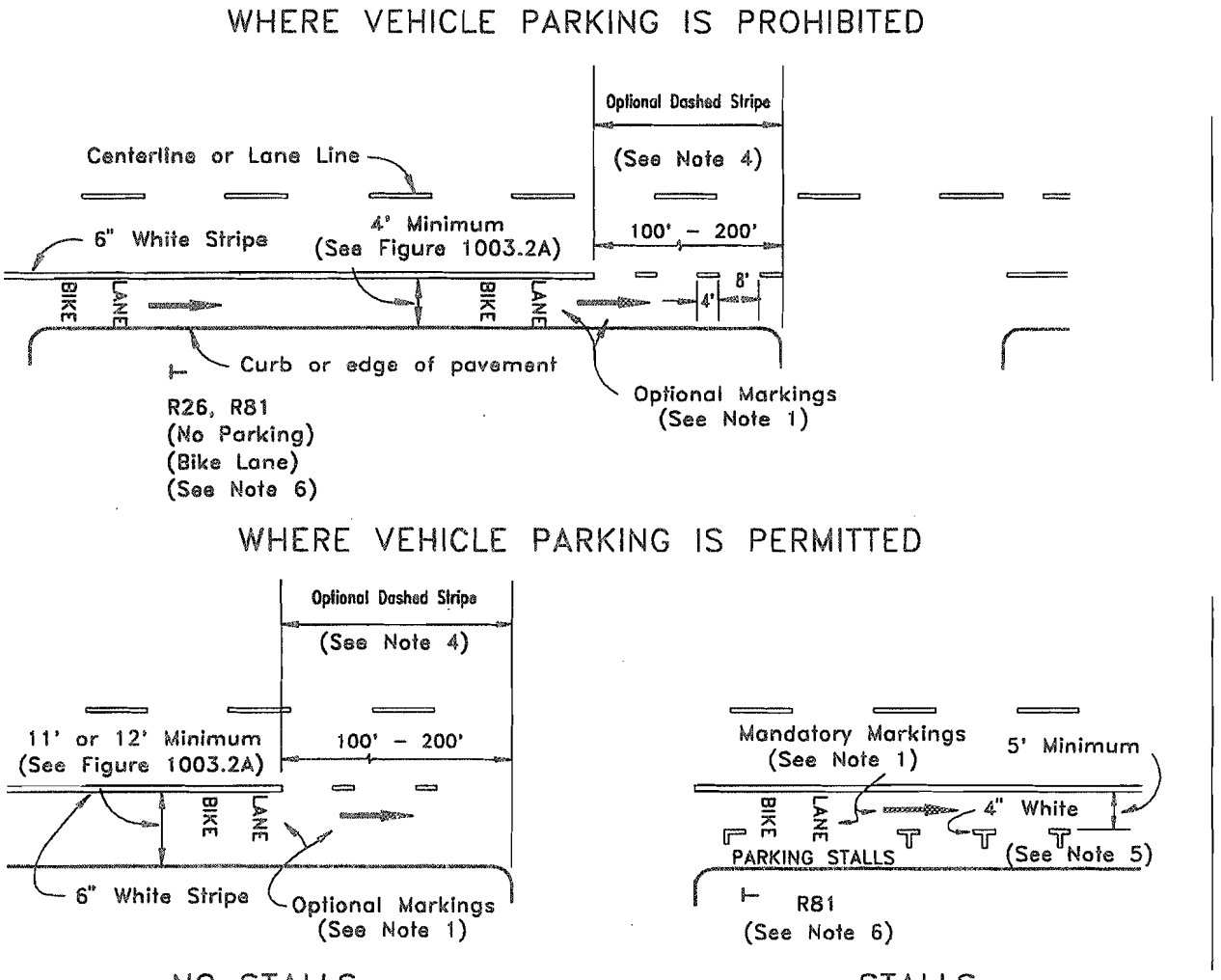


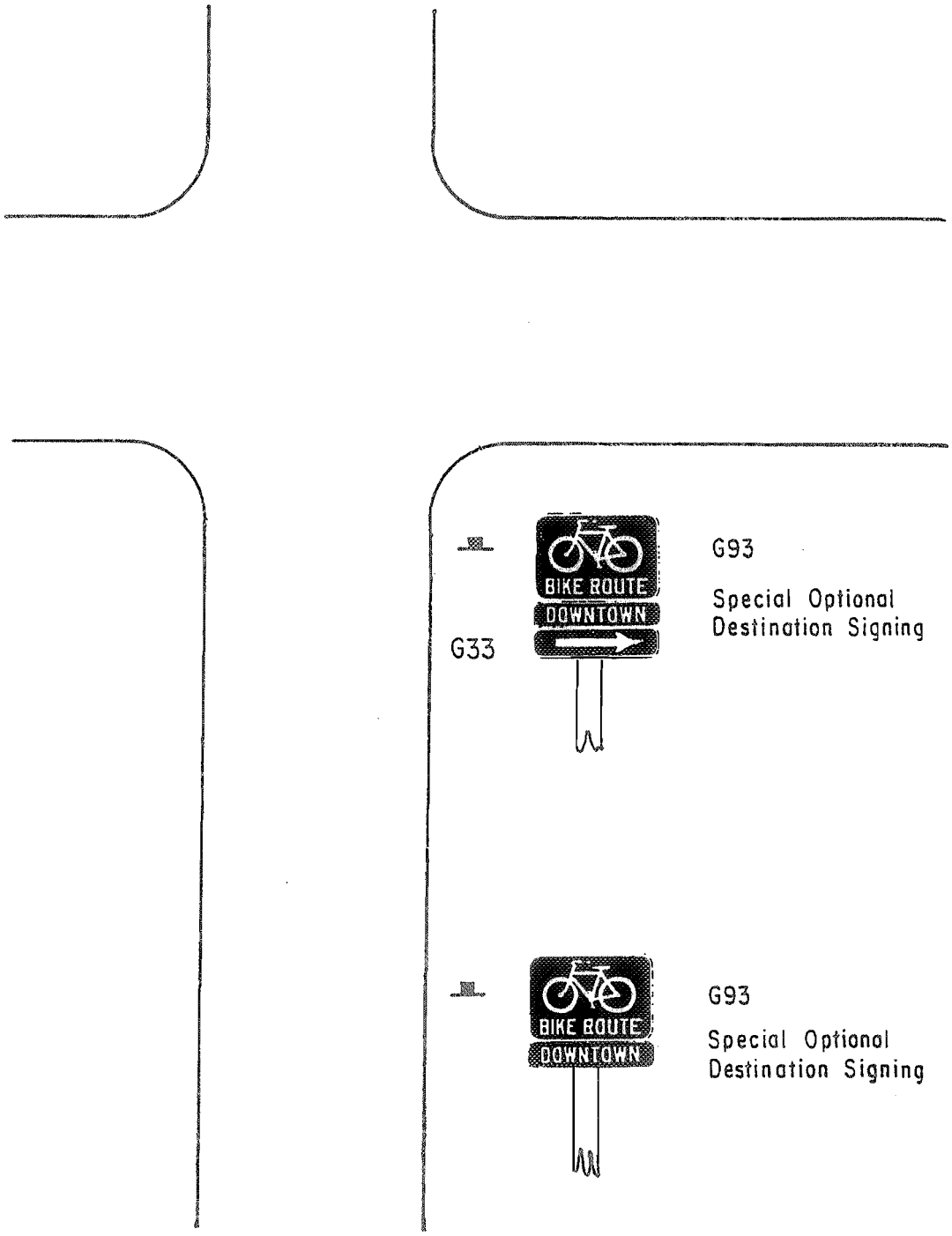
Figure 1004.3
Bike Lane Signs and Markings



Notes:

1. The Bike Lane Pavement markings shall be placed on the far side of each intersection, and may be place at other locations as desired.
2. The use of the bicycle symbol pavement marking to supplement the word message is optional.
3. The G93 Bike Route sign may be placed intermittently along the bike lane if desired.
4. Where motorist right turns are permitted, the solid bike lane line shall either be dropped entirely, or dashed as shown, beginning at a point between 100 and 200 feet in advance of the intersection.
5. In areas where parking stalls are not necessary (because parking is light), it is permissible to paint a 4" solid white stripe to fully delineate the bike lane. This may be advisable where there is concern that motorist may misconstrue the bike lane to be a traffic lane.
6. The R81 Bike Sign shall be placed at the beginning of all bike lanes, on the far side of every arterial street intersection, at all major changes in direction, and at maximum half-mile intervals.

Figure 1004.4
Bike Route Signing



NOTE: The G93 Bike Route signs shall be placed at all points where the route changes direction and periodically as necessary.

Table 302.1

Standards for Paved Shoulder Width

	Paved Shoulder Width (ft) Left	Right
	Freeways & Expressways	
4 lanes[1]	5	10
6 or more lanes[1]	10	10
Separate roadways	(2)	10
Auxiliary lanes	--	10
	Freeway-to-freeway	
connections	5	10[3]
Single-Lane Ramps	2[4]	8
Multilane Ramps	4[5]	8[6]
Multilane undivided	--	10
	Conventional Highways	
Multilane divided	(7)	8
Multilane undivided	--	8
2-lane	--	(8)
Slow-moving vehicle lane	--	4[9]

NOTES:

(1) Total in both directions. See Index 62.1.

(2) Use widths above. See Fig. 305.6 for slope treatment.

(3) A single lane connection over 1500 feet in length should be widened to 2 lanes with 5-foot shoulders.

(4) 4 feet preferred in urban areas and/or when ramp is metered. See Index 504.8 and "Ramp Meter Design Guidelines," dated January 1991, for additional information.

(5) May be reduced to 2 feet. 4 feet preferred in urban areas and/or when ramp is metered. See "Ramp Meter Design Guidelines".

(6) May be reduced to 2 feet or 4 feet (preferred in urban areas) in the 2-lane section of an exit ramp which transitions from a single lane. May be reduced to 2 feet in ramp sections having 3 or more lanes. See Index 504.8 and the "Ramp Meter Design Guidelines".

(7) Use 5 feet for 4-lanes and 8 feet for 6 or more lane facilities. May be reduced to 2 foot offset for curbed medians in urban areas where design speed is 45 mph or less (Index 209.3).

(8) See Table 307.2 and 307.3, respectively for minimum shoulder widths for new construction and for RRR projects on 2-lane highways.

(9) On right side of climbing or passing lane section only.

CHAPTER 200
GEOMETRIC DESIGN AND STRUCTURE STANDARDS

209.3 Position of Curbs

The general policy for positioning curbs is to provide the same unobstructed roadbed width at intersections and median openings as is normally provided between such points. All dimensions (offsets) to curbs are from the near edge of traveled way to the inside face of curb at gutter grade.

(1) Through Lanes. Minimum curb offsets, right and left, should be the normal width of the outside (right) and inside (median) shoulder, respectively, as set forth in Table 302.1.

(2) Channelization. Island curbs used to channelize intersection traffic movements should be positioned as described in Index 405.4.

(3) Separate Turning Lanes. Curb offsets to the right of right turn lanes in urban areas may be reduced to 2 feet if bicycle traffic is not a consideration and design exception approval has been obtained in accordance with Index 82.2. No curb offset is required to the left of left turn lanes in urban areas.

(4) Median Openings. Median openings (Figure 405.5) should not be curbed unless necessary to delineate areas occupied by traffic signal posts. Mountable B4 curbs should be used in these special cases.

(5) Urban Arterial Highways. Continuous median curb offsets may be reduced to 2 feet when necessary to match local agency standards on conventional divided highways in urban areas when design speed is equal to or less than 45 mph.

CHAPTER 300
GEOMETRIC CROSS SECTION

307.2 Two-lane Cross Sections for New Construction

These standards are to be used for highways on new alignment as well as on existing highways where the width, alignment, grade, or other geometric features are being upgraded.

A 2-lane, 2-way roadbed consists of a 24-foot wide traveled way plus paved shoulders. **In order to provide structural support, the minimum paved width of each shoulder shall be 2 feet.** Typical 2-lane cross sections are shown in Figure 307.2.

Shoulder widths based on design year traffic volumes shall conform to the standards given in Table 307.2.

Table 307.2

Shoulder Widths for Two-lane Roadbed New Construction Projects

Two-way ADT (Design Year)	Shoulder Width (ft)
Less than 400	2(1) or 4(2)
Over 400	8

(1) Requires FHWA exception

(2) Bridge width is to be 32 feet minimum (see Index 208.1).

307.3 Two-lane Cross Sections for RRR Projects

(1) General. These standards have been excerpted from Design Information Bulletin Number 75 (DIB No. 75), "Geometric Design Criteria for Resurfacing, Restoration, and Rehabilitation (RRR) Projects", dated April 15, 1991, and the June 26, 1991 memorandum providing clarification of DIB No. 75.

The above referenced documents also contain additional geometric design criteria and policies pertinent to the development of RRR projects.

(2) Geometric Design Criteria.

(a) Roadbed Width--**The "Roadbed Minimum" column from Table 307.3 shall be the RRR standard applied to roadbeds.** Roadbed is defined as traveled way plus usable shoulders, either paved or unpaved. **Roadbeds less than the "Roadbed Minimum" shall be widened to the "Roadbed Desirable Minimum". Roadbeds at or above "Minimum" may be rehabilitated at their existing widths (including minor widening for lateral support or uniformity of pavement width) unless the safety analysis indicates a deficiency that requires widening, in which case the roadbed shall be widened to the "Desirable Minimum".**

(b) Bridge Width--**The "In-Place Bridge Minimum" from Table 307.3 shall be the standard width for bridges to remain in place with the condition that the clear width shall equal or exceed the approach roadbed width.** Bridge width is defined as the clear width between curbs or rails, whichever is less. Bridges which are at or exceed the "In-Place Bridge Minimum" may be left in place and rehabilitated as appropriate regarding joint reconstruction, deck seals, etc. **Bridges that are within the limits of an RRR project and are less than the "In-Place Bridge Minimum" shall be widened according to the "Bridge Widened" column of Table 307.3.**

The correction of existing bridge rail, approach guardrail, and guardrail connection deficiencies shall be included in the RRR project, regardless of the widening requirements discussed above.

The deferral of bridge widening or rail deficiency correction work may be considered when the completion of the Structure PS&E for such work will result in a significant delay to the completion of the RRR project.

Table 307.3

RRR Width(1) Standards for Bridges and Roadbeds

Current ADT	Bridge Widened	In-Place Bridge Min. & Roadbed Desirable Min. (ft)	Roadbed(2) Min. (ft)
0-250	32	24	24
251-400	32	26	24
401-1000	32	28	24
1001-3000	40	32	28
3001-6000	40	36 & 40(3)	28
Over 6000	40	40	32

1 Bridge width is defined as the clear width between curbs or rails, whichever is lesser. Roadbed is defined as the traveled way plus usable shoulders. Width criteria for new and reconstructed bridges are given under Index 208.1.

2 The truck usage on the highway should be considered when determining roadbed widths.

3 The "In-Place Bridge Min." is 36 feet, and the "Roadbed Desirable Min." is 40 feet. Design exception approval is required whenever the approach roadbed width is greater than the bridge width.