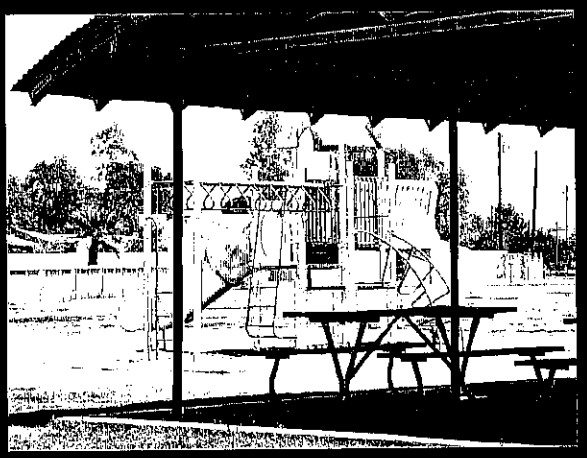
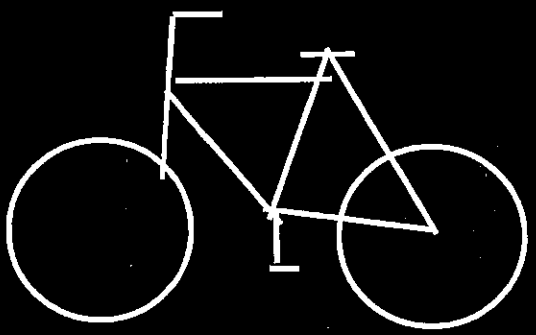
BICYCLE MASTER PLAN





City of Imperial Bicycle Master Plan

Prepared for the
City of Imperial

Prepared by
Wallace Roberts & Todd, LLC.
Landscape Architecture / Planning

September 30, 2002

WRT

Draft

CITY OF IMPERIAL

BICYCLE MASTER PLAN

September 30, 2002

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TABLE OF CONTENTS

Appendix

Figures

Tables

DEFINITIONS

Terms or acronyms used in this document or acronyms are defined below:

AASHTO - American Association of State Highway and Transportation Officials

ADA - The Americans with Disabilities Act (civil rights legislation passed in 1990, effective July 1992).

ADT - Average Daily Traffic - The measurement of the average number of vehicles passing a certain point each day on a highway, road, street, or path.

Arterial (Road) - divided or undivided, relatively continuous routes that primarily serve through traffic, high traffic volumes and long average trip lengths. Traffic movement is of primary importance, with abutting land access of secondary importance.

Bicycle - A vehicle having two tandem wheels, either of which is more than 0.4 m. (16 in.) in diameter, or having three wheels in contact with the ground, any of which is more than 0.4 m. (16 in.) in diameter, propelled solely by human power, upon which any person or persons may ride.

Bicycle Facilities - A general term denoting improvements and provisions made by public agencies to accommodate or encourage bicycling including bicycle paths, bike lanes, parking and storage facilities, lockers and showers, maps of bikeways, and marked routes and shared roadways not specifically designated for bicycle use.

BHSI - Bicycle Helmet Safety Institute (www.helmets.org)

Bicycle Lane (Class II) - A portion of a roadway (typically 1.2-1.5 m.) which has been designated by signing and pavement markings for the preferential or exclusive use by bicyclists.

Bicycle Path (Class I) – A separated paved or hard surface (typically 2.4 m.) that serves the exclusive use of bicycles and pedestrians.

Bicycle Route (Class III) - A system of roadways that is linked by signs that designates the roadway as a route for bicyclists, generally providing a preferred route.

Bikeway - Any road, path, or bikeway which, in some manner, is specifically designated as open to bicycle travel, regardless of whether such facility is designated for the exclusive use of bicycles or is to be shared with other transportation modes.

Clearance, Lateral - The width required for safe passage of a bicyclist as measured in a horizontal plane.

Clearance, Vertical - The height necessary for the safe passage of bicyclists as measured in a vertical plane.

Collector (Road) - A road designated to carry traffic between local streets and arterials, or from local street to local street.

Edge Line - A painted or applied line to designate the edge of the road (typically 150-200 mm, 6-8 inches wide).

Enhancement funds - Under TEA 21, set aside funds for twelve categories of projects including bicycling and pedestrian facilities and trails.

ISTEA - Intermodal Surface Transportation Efficiency Act enacted in 1991. Federal legislation guiding the expenditure of federal highway funds for bicycle, pedestrian, and other improvements.

NHTSA – National Highway Traffic Safety Administration (www.nhtsa.org)

Lateral Clearance - The distance between the edge of a roadway or bikeway and a fixed object. Also, the separation distance a roadway user needs to feel safe operating near a fixed object.

Maquiladora – Assembly plants located in Mexico, mostly along the northern Mexican border. Materials are exported to these plants where they are assembled into finished products and then imported back into the country of origin for sale.

Shared Roadway - Any roadway upon which a bicycle lane is not designated and which may be legally used by bicycles regardless of whether such facility is specifically designated as a bikeway.

Shoulder (Paved) - Portion of highway or roadway that is contiguous to the traffic lanes to allow access for emergency vehicles, bicyclists, and where designated, pedestrians.

Staging Area - A designated area at a beginning of a trail or bikeway that is established for the use and comfort of trail users. Generally, it will include parking areas and other amenities such as, restrooms, sign kiosks, waste receptacles, picnic tables, benches and water fountains.

CHAPTER 1 EXECUTIVE SUMMARY

A. *Significant Findings*

Incorporated in 1904, the City of Imperial is located approximately 13 miles from the California-Mexico border, 125 miles east of San Diego and just north of the City of El Centro's northern border.

As of January 1, 2002, the U. S. Census Bureau estimates the population at 7,560 with a median age of 30 years. According to the California State Department of Finance and the Southern California Association of Governments (SCAG) the population is estimated to grow to 20,082 by the year 2020.

Residential use comprises over 50% of the existing land use with a large percentage of the balance in public land. The residential is primarily low density residential. The most dominant land uses include the Imperial County Airport, the California Mid-winter Fairgrounds, and the Imperial Irrigation District headquarters.

A constant warm, sunny climate with temperatures from October to May averaging 80 degrees makes biking on a regular basis reasonable and desirable. Currently there are no bicycle facilities within the City.

Preparing for future growth and planning for a desired quality of life predicates the development of this Master Plan. As growth continues to occur, there is an ongoing demand for increased services and facilities as well as recreation.

In order to encourage public input, a Planning Commission workshop was held on June 12, 2002. Some concerns that were conveyed to the Commission included, there are no places to bike and that biking along with traffic on Imperial Avenue is unsafe. A recommendation that the City consider an off-road bicycle path along SR86 would address concerns for cyclists and would provide an avenue to pedestrians as well.

The purpose of this plan is to identify key destination areas and determine where appropriate facilities should be located so that once the bicycle network is complete; cyclists will be provided with a comprehensive, well-connected bicycle facility system. Additionally, a well-designed bicycle plan will allow the City to pursue state and federal funding programs for implementation.

B. *Major Recommendations*

This Master Plan (Bikeway Network Figure 5.0) recommends implementation of a 20.36 -mile bicycle system at a cost of $1,625,440. When completed the bicycle network will offer facilities to connect to schools, parks, employment centers, and the city center.

The recommended bikeway network consists of pathways separated from the roadway, bicycle lanes and bicycle routes.

This Master Plan outlines the planning criteria and descriptions of each proposed bikeway route by type. The bikeway system will be implemented over time, as funding becomes available through grant programs, implementation of roadway improvements, or regular roadway maintenance. The ultimate system is designed to meet the needs of cyclists as Imperial continues to grow. The recommended bikeway network is comprised of 20.36 miles of bicycle paths, lanes and routes at an estimated cost of $1,625,440 to implement.

Implementation of the bicycle network may be realized through a variety of sources including general funds, new development, road improvements, and grant funds. Grant funds awarded by Caltrans are contingent on the local jurisdiction's adoption of a Bicycle Master Plan. The Bicycle Master Plan must be reviewed and updated every four years to reflect changing conditions. As a part of the preparation and ongoing review of the Bicycle Master Plan process, public participation must be included to ensure the Master Plan reflects the interests of the community. A point of contact should be established at the City to respond to public concern and/ or comments, to coordinate bikeways in conjunction with public works improvement projects, and to prepare and administer grant applications.

CHAPTER 2 INTRODUCTION

Incorporated in 1904, the City of Imperial is located approximately 13 miles from the California-Mexico border, surrounded to the north, east and west by agriculture, the City remains predominantly an agricultural city. The Imperial County Airport, the California Mid-Winter Fairgrounds and the Imperial Irrigation District (IID) headquarters are located within the City. Additionally, the U. S. Border Patrol will be locating their El Centro Sector Headquarters in the southeast portion of the City, 125 miles east of San Diego and just north of the City of El Centro's northern border. The City enjoys a sunny climate of approximately 332 days of sunshine per year, making bicycling a viable alternative to the automobile and a great from of exercise and recreation.

Preparing for future growth and planning for a desired quality of life predicates the development of this Master Plan. As growth continues to occur, there is an ongoing demand for increased services, recreation, facilities and alternate transportation modes.

A. Purpose

The primary purpose of the Imperial Bicycle Master Plan is to identify a system of bicycle routes that will serve as a tool for planning future bicycle facilities and roadway improvements.

This plan is intended to provide a fair assessment of current and future bicycle needs, implementation costs, and funding opportunities for bicycle facilities. The City recognizes that in order to construct bicycle facilities, they must first identify where the facilities should be located and plan accordingly. Currently, the City offers no bicycling facilities while bicycle racks are located only at the schools and parks.

Once implemented, an effective bikeway system can offer residents the convenience for cycling to and reduce the number of vehicles on local roads, the result will be enhanced personal health, increased tourism, improved quality of life and increased air quality. This plan recommends a system of bicycle routes that will connect existing and developing residential areas to destination points for both commuter and recreation bicyclists. The system is designed to connect to planned bicycle facilities in the County of Imperial and the City of El Centro. The City will use this plan as a tool when planning future roadway facilities, improvements to existing roadways, scheduling capital improvements, and applying for grant funds for bikeway facilities.

Additionally, this plan responds to the provisions of the State of California Bikeways Act, administered by Caltrans, which defines specific requirements to be included in a Bicycle Master Plan. A Bicycle Master Plan or Bicycle Transportation Plan must comply with the program guidelines as set forth in Section 890-894.2 of the Streets and Highways Code (Appendix D) in order to be eligible for Bicycle Transportation Account (BTA) grant funds for construction of bicycle facilities. To meet Caltrans requirements, the Bicycle Transportation Plan or the Bicycle Master Plan must address the following components:

1. A needs assessment of the estimated number of existing and future bicyclists in the project area, (Table 2.0, page 20)
2. A map and description of existing and proposed land uses. (Figure 3, page 14)
3. A map and description of existing and proposed bikeways, destination points, parking facilities, support facilities, (See Figure 4.0 page 39 and Figure 5.0 page 40)
4. A description of bicycle safety and education programs, (Page 24)
5. A community participation program, (Page 10)
6. A discussion of how the plan is consistent with other plans, (Page 11)
7. A description of each project proposed in the plan and a priority list for implementation (Page 37 and Tables 7.0 & 8.0, Pages 46-47)
8. A description of past expenditures for bicycle facilities (Page 8) and future financial needs for projects that will improve safety and convenience for bicycle commuters. (Table 7.0 and 8.0, pages 46-47)
9. Plan Review and Update (Page 37)

For easy reference of these items is addressed in this document on the page as noted in parentheses.

B. Project Study Area

At the prospect of Colorado River water being diverted to Imperial Valley, George Chaffey and L. M. Holt formed the California Land Development Company to house workers digging the canal from the Colorado River. In early 1901, the first lots of the Imperial Land company were offered for sale. By 1904, with a population of 700, the City incorporated.

Located in Imperial, the Imperial Irrigation District (IID) dispenses all power and water to Imperial Valley. Approximately 2.6 million acre-feet of water a year is distributed by IID to the nine cities and the 500,00 acres of agriculture. The town has maintained its rural, farming character through the years. Recent pressure from the growth in San Diego and Riverside Counties and the low cost of labor across the border has resulted in increasing growth.

The project study area includes the incorporated boundaries of the City and in order to plan for future growth, extends to include the Sphere of Influence as identified in the General Plan (Figure 3.0).

C. Land Use

The City is comprised of 1,622 acres with an additional 2,131 acres within their Sphere of Influence. Residential use comprises over 50% of the existing land use with a large percentage of the remaining land in public ownership. The residential community is comprised of primarily low density residential. The most dominant land uses include the Imperial County Airport, the California Mid-winter Fairgrounds, the Imperial Irrigation District headquarters and the Union Pacific Railroad. General industrial uses surround the airport while railroad serving industrial is located adjacent to the railroad. While most of the retail services for the community is located south of the City along SR86 or within the City of El Centro, there are some commercial uses at SR86 and Baroni Road. (See Figure 2.0)

D. Citizen and Community Involvement

An important goal of this Master Plan is to develop a network of bicycle facilities that responds to the current unmet need of the community and anticipated growth. In order to encourage public input, the City of Imperial conducted a workshop on June 12, 2002. Comments received included concerns related to the difficulty of bicycling along SR86 due to high traffic volume and cross traffic at Baroni Boulevard. Bicyclists generally avoid SR86 although some cyclists to commute to work either to El Centro to the south or Brawley to the north. A separate bicycle path along SR86 would address concerns for cyclists and would provide an avenue to pedestrians as well.

E. Circulation

State Route 86 bisects the City in a north-south direction linking El Centro and Interstate 8 to the south and Brawley to the north. Over 25,000 average daily traffic (ADTs) volumes for 1999 were documented by Caltrans along SR86 at Wall, 21,100 at Barioni Boulevard, and 17,800 at 14th Street. Controlled intersections are provided at the intersections along SR86 at Aten Road, Barioni Boulevard, and 15th Street. Major east-west arterials consist of Aten Road, Barioni Boulevard (Worthington Road) and Neckel Road. Both SR86 and Aten Road are four lane roadways.

Imperial County Transit offers bus service connecting Imperial with El Centro to the south and Brawley to the north. It also offers connection to the Imperial Valley College, and Imperial Valley Irrigation District offices. Bus routes extend beyond El Centro to the border at Calexico. Bicycle racks were a recent addition to the buses.

F. Relationship to General Plan

The City's General Plan does not address bicycle facilities. Adoption of the Master Plan would require amending the General Plan to include the proposed bicycle network and roadway design standards for bicycle paths (Class I), bicycle lanes (Class II), and bicycle routes (Class III). These bikeway standards should be consistent with Caltrans Highway Design Manual, Chapter 1000, Bikeway Planning and Design (included in the appendix of this document).

G. Consistency with Other Adopted Plans

The Bicycle Master Plan is consistent with the Bicycle Master Plans of the County of Imperial (Figure 3.0) and the City of El Centro. The County of Imperial adopted the first Bicycle Master Plan for Imperial Valley and several other cities following suit.

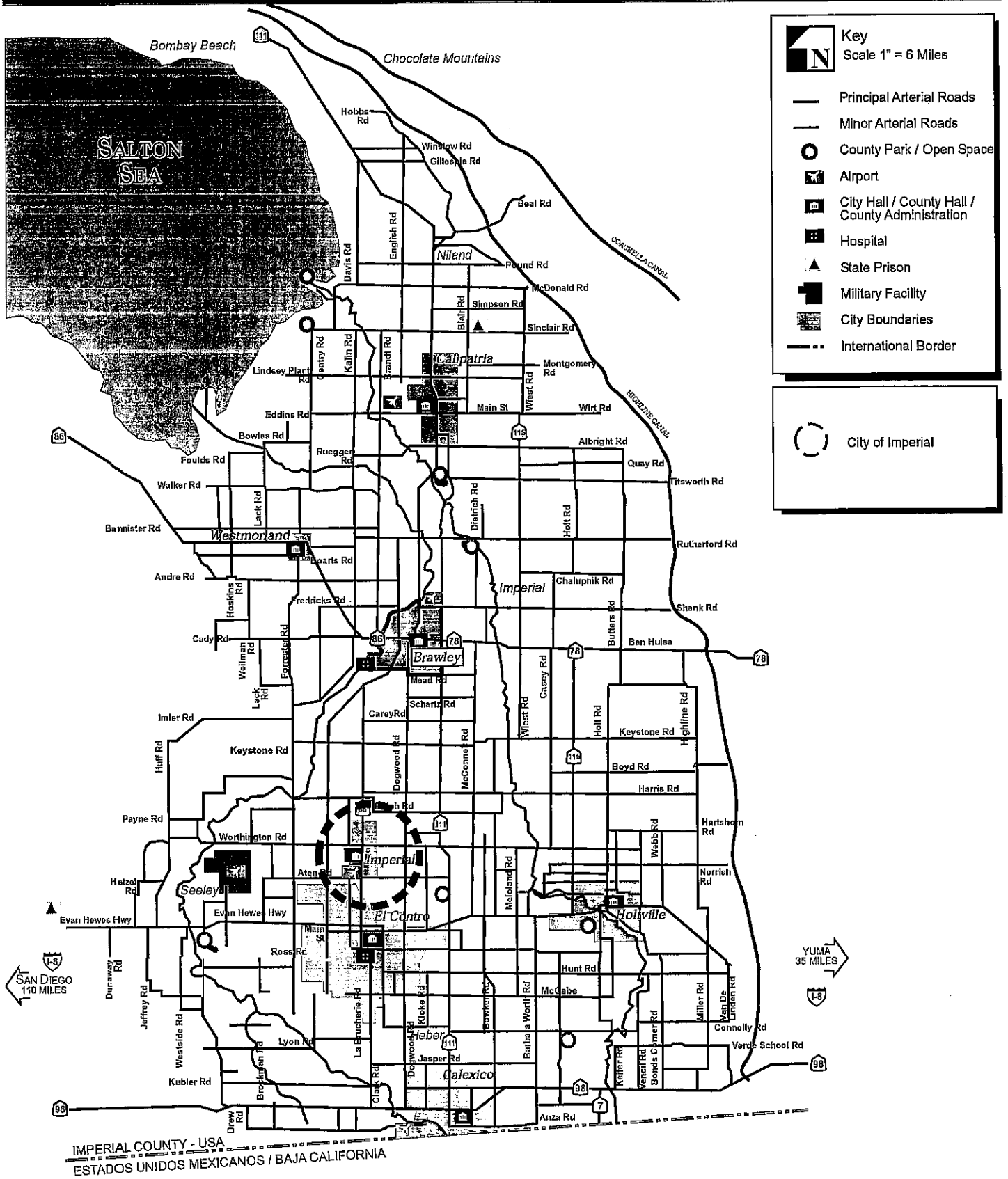
The County of Imperial's Bicycle Master Plan identifies a system of recommended bicycle facilities throughout the unincorporated areas of Imperial Valley. Connecting bicycle facilities tot he City of Imperial include the following recommended routes:

> Imperial Valley College – Improve the existing nonconforming bicycle path along the northside of Aten Road to a Class I bicycle path connecting Imperial with the Imperial Valley College.
>
> Worthington Road/Highline Road/Ben Hulsa – This class II bicycle lane would be constructed along Worthington Road at Holt Road through the City of Imperial and then north along La Brucherie road and north to Brawley.

The Master Plan is consistent with the City of El Centro's Bicycle Master Plan as identifies a bicycle lane along SR86 from Euclid Avenue in El Centro to Imperial connecting the retail development with the residential communities in Imperial. A Class I bicycle path is identified along La Brucherie Road to Imperial.

City of Imperial Bicycle Master Plan

Location Map



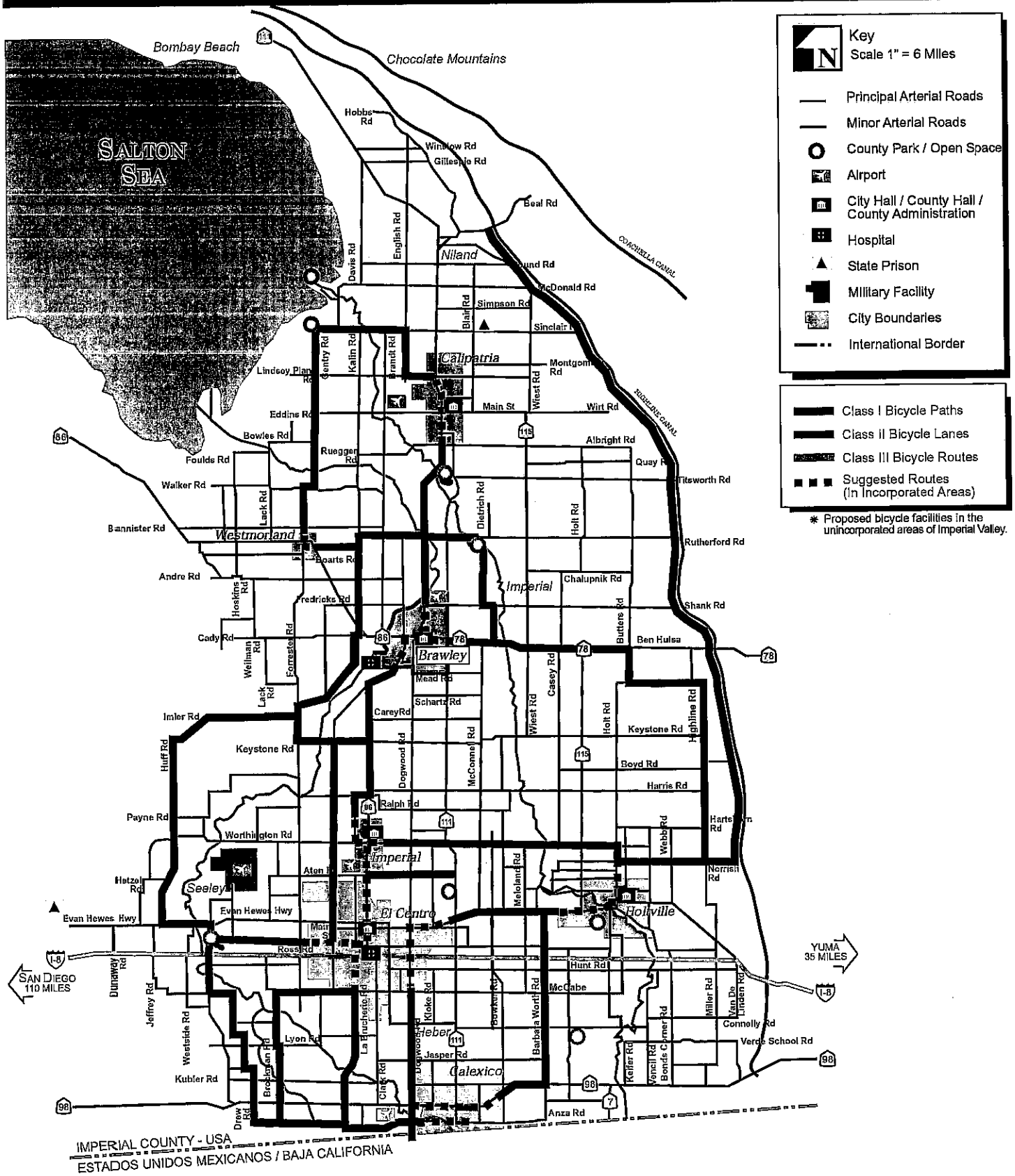
Prepared by: Wallace Roberts & Todd, September 30, 2002

City of Imperial

Figure 1.0

City of Imperial Bicycle Master Plan

Proposed Regional Bicycle Facilities*



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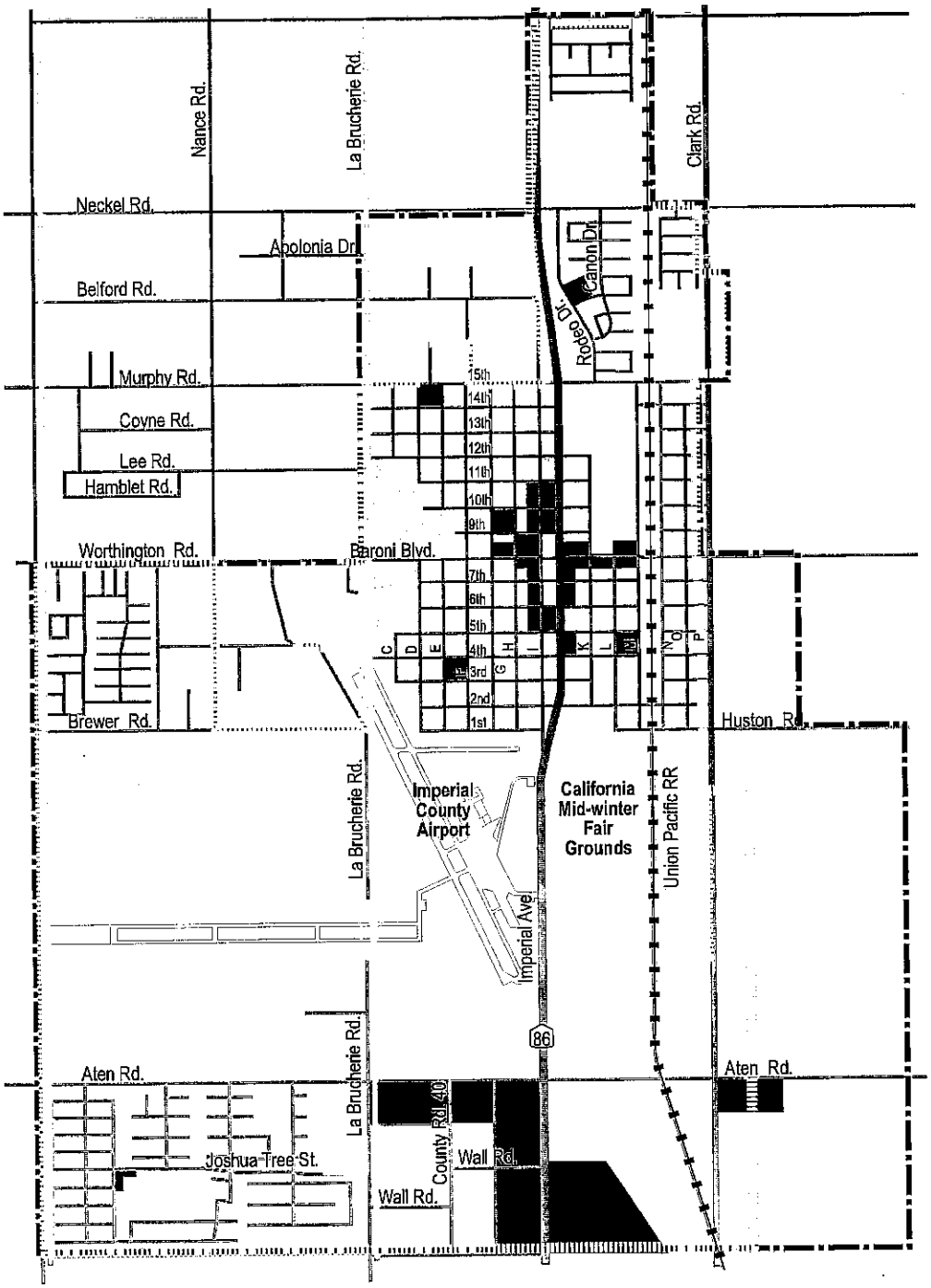
City of Imperial

Figure 2.0



LEGEND

- Schools
- Parks / Open Space
- Hospital / Medical Centers
- Industrial
- Commercial
- Community Facilities
- Residential
- Agriculture
- Union Pacific Railway
- Sphere of Influence
- Canal
- City Boundary

N

0 1/8 1/4 3/8 1/2 Mile

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September 30, 2002

City of Imperial

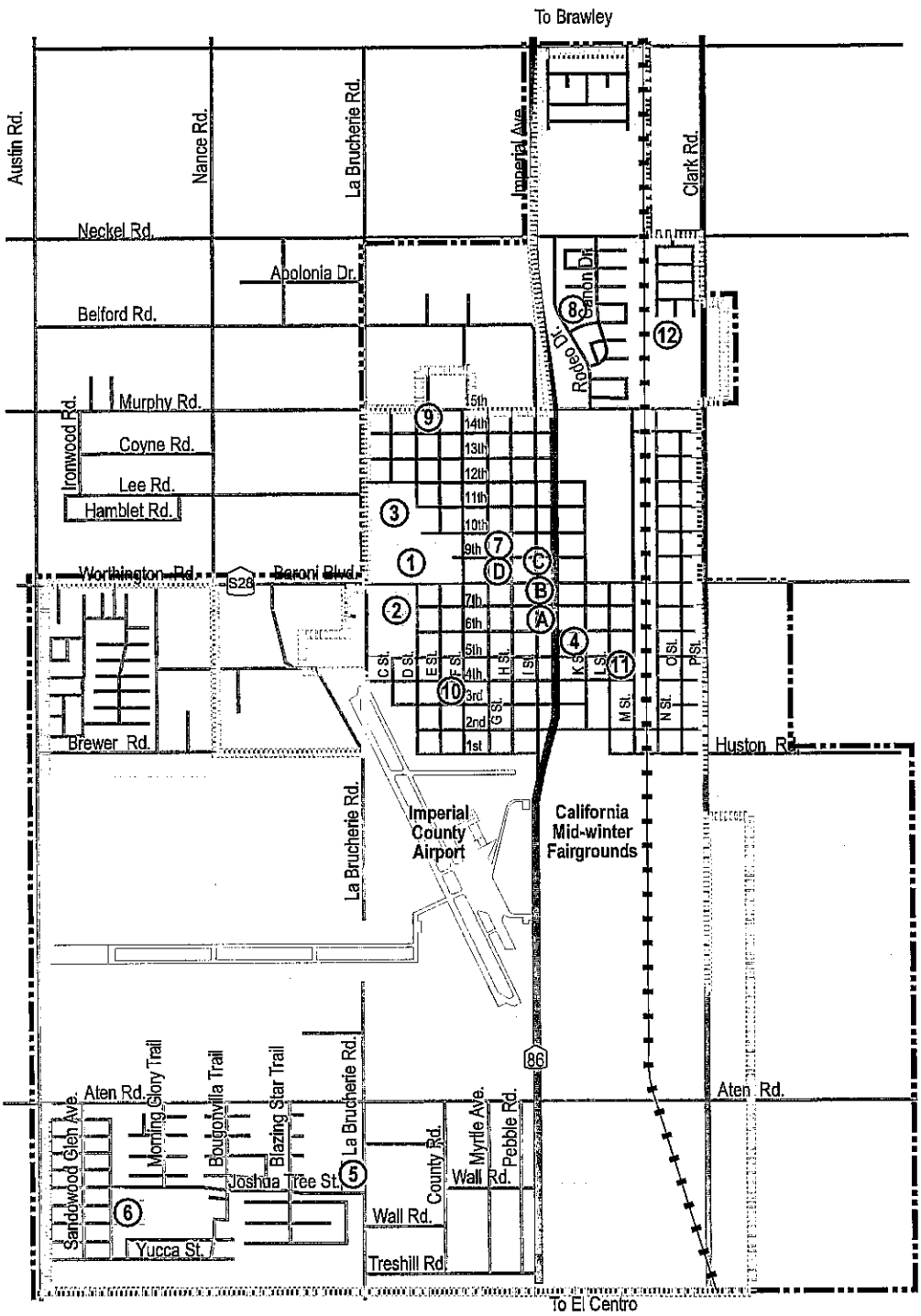
Figure 3.0

SCHOOLS & PARKS

1. Imperial Union High School
2. Ben Hulse Elementary
3. Frank Wright Junior High School
4. Faith Academy Christian
5. Valley Christian School
6. Waggoner Elementary School and Park
7. Lawrence "Papa A." Eager Park
8. Sunset Park
9. Irving Park
10. Freddy White Park
11. Evans Park
12. Proposed Park

COMMUNITY FACILITIES

- (A) City Hall
- (B) Fire Satation
- (C) Post Office
- (D) Library



LEGEND

- Schools
- Parks / Open Space
- Community Facilities
- Union Pacific Railway
- City Boundary
- Sphere of Influence

N

0 1/8 1/4 3/8 1/2 Mile

CHAPTER 3 GOALS AND OBJECTIVES

Implementation of the Bicycle Master Plan will increase bicycling which in turn will increase health benefits, improves air quality, and reduces traffic. The potential for increasing the number of bicycle trips has been documented by a National Personal Transportation Survey conducted by the Federal Highway Administration (1992). This documentation shows that ¼ of all bicycling trips are less than one mile, 40% are two miles or less and almost half are 3 miles or less and approximately 53% of all people live less than 2 miles from the nearest public transportation route.

In Imperial, residential neighborhoods are all within cycling distance of retail centers, employment, schools & public transportation routes. The provisions of the Intermodal Surface Transportation Efficiency Act (ISTEA) encourage alternative transportation modes by offering grant funds for implementation. Through this program, public awareness of the benefits of cycling were renewed. With the availability of grant programs cycling is a reasonable approach to achieve alternative transportation, personal health, and air quality goals.

A. Key Goals

Overall, the goals of creating a well-designed, well-used bicycle network is to increase non-motorized transportation and thereby reduce air pollution, reduce vehicular congestion, reduce energy consumption, reduce bicycle related accidents, injuries, and fatalities; increase health benefits; and contribute to the livability of the community. More specifically, the following goals guide the preparation of the Bicycle Master Plan:

Goal 1. A comprehensive, rational and equitable bikeway system connecting residential neighborhoods with parks, schools, city hall, and existing and future employment.

Goal 2. School and commuter bikeways that are easily recognized by signs and accessible from residential areas through appropriate design.

Goal 3. Bicycle storage facilities and/or bicycle racks located at all parks, schools and major retail and employment centers.

Goal 4. Bikeways integrated with roadway improvements and/or new construction projects based on the recommended bikeway network.

B. Key Objectives

Key goals may be best accomplished by setting out key objectives or strategies for implementing the bikeway network. Objectives of the Imperial bicycle network are:

Objective 1. Encourage the use of bicycles for personal transportation as an alternative to motor vehicles.

Objective 2. Provide for bicycle access to employment, commercial, and other transportation and travel destinations.

Objective 3. Plan, design, and construct roadways that consider facilities for bicyclists and where feasible, multi-use class I paths for pedestrians, bicyclists, and disabled persons.

Objective 4. Encourage cycling by planning accordingly when developing new schools, parks, and residential communities.

Objective 5. Reduce vehicle fuel consumption and the number of vehicular miles traveled by increasing the percentage of total non-motorized transportation trips.

Objective 6. Increase the number of multi-modal transit facilities with bike facilities linking to bus stops served by bicycle lanes and install bike storage on buses.

Objective 7. Integrate bicycle facilities as part of the design and construction of new roadways and upgrade existing roadways.

Objective 8. Establish a bicycle network that offers facilities for all ages and physical abilities.

Objective 9. Encourage educational programs that promote the safe and efficient travel of cyclists.

Objective 10. Provide for bicycle access and bicycle parking at employment, commercial, recreation, and transit destinations.

Objective 11. Improve the existing bikeway network by restriping existing bicycle lanes that are consistent with the recommended routes.

Objective 12. Integrate bicycle planning into the City's General Plan

Objective 13. Develop guidelines and/or standards for bicycle parking with new commercial and industrial development.

Objective 14. Pursue grant-funding programs for implementing the bikeway network.

Objective 15. Assign a staff person or appoint a volunteer or committee to coordinate and implement the bikeway system.

Objective 16. Encourage large employment centers to provide on-site showers for bicycling employees.

CHAPTER 4 BIKEWAY DEMAND AND BENEFITS

A. Demand for bicycle facilities

Bicycling is one of the most popular forms of recreational activity in the United States, with 46% of Americans bicycling for pleasure. It offers a convenient and economical form of transportation. Generally, the demand for bikeways is predicated by the number of cyclists evident on roadways, the number of bike-related accidents, and public opinion or requests for new bikeways. However, establishing bicycle facilities as the City continues to grow will provide opportunities for cycling for pleasure and for commuting to work, school, or shopping.

As of January 1, 2002, the U. S. Census Bureau estimates the population at 7,560 with a median age of 30 years. According to the California State Department of Finance and the Southern California Association of Governments (SCAG), the population is estimated to grow to 20,082 by the year 2020. Additionally, proposed annexations will greatly increase the projected population. Proposed annexations are expected to result in an additional increase of 10,865 residents.

TABLE 1.0

YEAR	PROJECTED POPULATION
2005	11,211
2010	14,167
2015	17,123
2020	20,082

Hoffman Associates, City of Imperial Service Area Plan, March 4, 2002

Schools located within the City include: Ben Hulse Elementary and Waggoner Elementary Schools, Frank Wright Intermediate School, Imperial High School and two private schools, Valley Christian and Faith Academy Christian. Currently, 38% of the population is under the age of 19. Almost doubling from the 1991-192 enrollment of 1,695 students, the current enrollment of Imperial Unified School District is 2,537 with a projected estimate of 2,889 for the 2002-03 school year and 4,062 by the 2010-10 school year. The General Plan anticipates that four new elementary schools, one intermediate school, and expansion of the high school will be necessary to accommodate the growing school population by 2020. Imperial Valley College offers a two – year program and is located several miles east of the City. The City owns and operates it's own library located at 200 West Ninth Street as well as seven parks offering playing fields and playgrounds.

In order to estimate the probable number of non-motorized transportation users, Southern California Association of Governments (SCAG) and Imperial Valley Association of Governments (IVAG) jointly prepared an independent study. The study primarily focuses on pedestrian's mobility based on population density and existing and future growth. The report recognizes that the availability of bicycle and pedestrian

infrastructure that would aid in encouraging non-motorized transportation. The study, "Imperial Valley Association of Governments Draft Non-Motorized Transportation Framework Plan," determined that Imperial Valley has the demographics to support non-motorized transportation because there are:

1. Significantly higher than the state average (28%) of school age children and
2. Lower than average median family income.

The largest increase in non-motorized users will be where there is dense residential development, high number of employees, available non-motorized facilities and a destination point within a "bicycling" distance or 3.5 miles (see pg. 19). The study identified these areas as:

- The highest concentrations of population of students, elderly, and autoless households are located west of Imperial Avenue (Highway 86) and to the north and south of Baroni Boulevard.
- The highest concentration of retail and entertainment activities area in center of the City surrounding the intersection of Baroni Boulevard and Imperial Avenue (Highway 86).
- The highest concentration of jobs can be found along Baroni Boulevard and along E Street to the north of Baroni Boulevard.
- The primary transit market opportunities include additional service coverage to the west of Highway 86 focuses along the G Street Corridor.

Bicyclists form a highly diverse group of individuals whose cycling preferences and cycling skill is varied. The levels of cyclists are typically classified as advanced, basic, and inexperienced (including children). These categories are described below:

> *Advanced cyclists* are highly experienced cyclists who ride frequently, are confident in cycling with motorized traffic, and can negotiate with less operating space. These cyclists generally range in age from 20 – 50+ years, representing 20% of all cyclists but accounting for an estimated 80% of all bicycle trips. They are comfortable traveling long distances, are accustomed to cycling in a variety of environments, and will most likely choose to bicycle for commuting or shopping.
>
> *Basic bicyclists* are more casual riders, are less comfortable in traffic and have limited experience and skills. They form the largest group of bicyclists, but cycle occasionally and account for the largest group ranging in age from 9 years old to 50+ and are both male and female.
>
> *Inexperienced cyclists and children* form a separate group of bicycle riders. Children have minimal riding skill, little experience, limited physical capability, and are not comfortable riding with traffic or within the roadway. These cyclists lack confidence and judgement regarding safe cycling practices. Sidewalks, school grounds, parks, and Class I bicycle paths generally provide safe environments for the young riders.

Generally, when planning for bicycle facilities, each of the three levels of bicyclist's abilities is considered in relation to the community and environment in which they live and cycle. Advanced cyclists are best served by bicycle *compatible roadways* designed to accommodate shared use by bicycles and vehicles. Basic riders are more comfortable with *designated roadways* with bicycle facilities that encourage bicycle use.

A *compatible roadway* is one, which incorporates design features that allow a competent bicyclist to safely share the roadway with a vehicle. Design features may include traffic volumes, speeds and environmental setting and signage. Typically, this facility is a Class III bicycle route as classified by Caltrans (see Chapter 5).

A *designated roadway* is one that encourages cycling through the use of lane markings and signage. Typically, this facility is classified as a Class II bicycle lane (see Chapter 5). Other considerations of a designated roadway may include traffic conditions, appropriate width and geometrics, and directness of route. A Class I bicycle path is recommended for those inexperienced cyclists and other recreational uses since it is separated from the road and motorized traffic.

As in much of the Imperial Valley, similarly in the City of Imperial, there are two primary types of cyclists, those who bike around town to school, work, and recreation; and those who bike on the county roadways for long distance cycling – primarily on those roadways not designated as truck routes. The experience level of cyclists in Imperial falls into the basic cyclists and inexperienced or younger cyclists who bike to stores and schools and those more experienced cyclists that bike long distance. Implementation of the recommended bicycle network (See Chapter 6) would ultimately result in bicycle facilities for students and commuters making bicycling an integral component of the community.

The latent "need" for bikeways are those cyclists who would cycle, if bikeways were available. This latent need is difficult to quantify and requires reliance on evaluating other comparable communities to determine potential usage. During the months of August, September and October of 2000, surveys conducted by the Bureau of Transportation Statistics (BTS) identified that one in five adults reported using a bicycle in the last 30 days. The BTS also found that 7% or 2.9 million persons commute to work. Bicycle usage may increase if there are more bicycle facilities. A study (March 2001) released by the Association of Pedestrian and Bicycle Professionals "states that 79% of voters felt bicycle trails and lanes are important to creating safe communities."

Using the 1990 U.S. census, "Journey to Work" data and the 2000 U.S. census population data, it can be estimated that almost 1.5% (64) of all employed Imperial residents (4,232) commute primarily by bicycle. This does not include those who ride to work less than 50% of the time, nor does it always include those who may walk or ride to transit and who list "transit" as their primary mode.

Determining how many future cyclists there will be also depends on how far away the destination is. Nationally, the mean travel time for bicycle and pedestrian commuters was 14.2 minutes, which translates roughly into a commute distance of about 3.5 miles for bicyclists or a 7-mile round trip. This data is used to estimate, the potential reduction in the number of vehicle miles if cycling is increased as well as the distance to

reasonably expect a commuter or student to bike to school or work.

A detailed summary of bicycle demand and benefits for the City is shown below in Table 1. It is assumed that once the facilities are constructed within Imperial and connecting routes are constructed by the County of Imperial and within the neighboring City of El Centro, more cyclists would enjoy long distance rides in the Valley. As bikeways are constructed, a reduction of short distance vehicle trips is anticipated.

The U.S. Department of Transportation publication entitled "National Walking and Bicycling Study" (1995) sets as a national goal to double current walking and bicycling mode shares by the year 2010, assuming that a comprehensive bicycle and pedestrian system is in place. This would translate into a commuter bicycle mode share of 3% or 64 commuters in Imperial. Add to this number, the number of commuters who bike occasionally and students who bike to schools, and the average number of daily bicyclists in Imperial increases to an estimated 128 bicycle commuters by the year 2010. These bicyclists will be saving an estimated 79,200 vehicle trips and 10,201 vehicle miles per year. With the estimated population projected by SCAG (see Chapter 4A) for Imperial, this number could significantly rise. In addition, the table below uses a 200 commute days per year that persons will cycle, however Imperial Valley has a yearly average of 332 sunny days. Temperatures during the summer months swell to over 110 degrees, which reduces cycling potential to early morning and late evening.

TABLE 2.0
DEMOGRAPHICS AND BICYCLE TRANSPORTATION

Population Estimate (Census 2002)	7,560
Estimated City Resident who would like to Bicycle for Pleasure *(National estimate of 46%)*	3,478
Current Bicycle Commute Mode share *(1.5% of adults 18-65 – U.S. Census 2000)*	64
Future Bicycle Commute Mode Share *(US DOT goal of 3% to double commuting by 2010)*	128
School-related bicycle commuters (20% of 7-14 year olds)	268
Total future bicycle commuters *(employed + student commuters)*	396
Reduced Vehicle Trips/Year	79,200
Reduced Vehicle Miles/Year	544,400
Reduced PM10/lbs./Year *(.0184 tons per reduced mile)*	10,201
Reduced NOX/lbs.Year *(.04988 tons per reduced mile)*	27,155
Reduced ROG/lbs./Year *(.0726 tons per reduced mile)*	39,523

1. Assume a 7 mile average round trip and an average of 200 commute days/year bike/walk commute for adult commuters and 100 commute days/year for students.

Commuter Needs

Most of Imperial's residents are employed locally, primarily in agriculture (producing, packaging, or distribution), at maquiladoras (factories) in Mexicali, or government services (police, fire, or border patrol). The largest employer in the City is the Imperial Irrigation District with approximately 1,000 employees, General Dynamics employs about 150 persons, and the Imperial Unified School District employs 278 persons. Safe and economical transportation becomes a necessity in a community where transportation costs must be affordable.

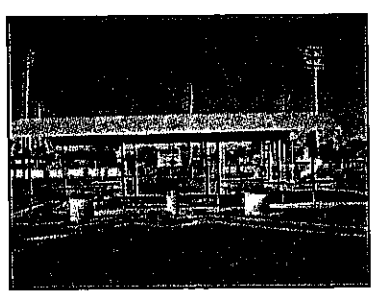
Bus services are provided by Greyhound/Trailways, Inc. with daily connections to El Centro and Calexico to the south and Brawley to the north. To encourage multi-modal transit, bicycle racks are included on the buses.

Many times commuters do not cycle to work due to lack of storage facilities or secure bicycle parking. In order to accommodate bicyclists that would like to commute to work, the City should consider adopting standards for bicycling parking for new commercial and industrial development. The recommended provision is to require 5% of the automobile parking requirement of over 15 spaces designated for bicycle parking. Each inverted-U bicycle rack counts as two bicycle parking spaces. (Reference City of Denver Municipal Code Section 59-582(e)). (See also Chapter 5, c. Support Facilities.) Additionally, more persons might bike to work if showers and lockers were available for employees.

Student Needs

A survey was circulated to each of the public schools in Imperial to determine the estimated number of daily bicyclists and key problems associated with biking to school. Responses were received from Westside Elementary School, Imperial High School, and Waggoneer Elementary School. Since Westside Elementary is located 20 miles west of downtown Imperial, they have no students who bike to school. The response received from Imperial High School noted that approximately 15 students bike to school. The reasons for not cycling to school include students discouraged by traffic along roadways; theft of bicycles; and long distance to school. Waggoneer Elementary School noted that 20-30 students bike to school while another 20-30 use scooters or skateboards. The reasons for not cycling were primarily due to the traffic volumes on Joshua Tree Street.

Recreation Needs



With over six parks within the City, offering playgrounds and playing fields, bicycle facilities that connect to each of the parks will enhance the overall recreational amenities of the city. Bicycle racks were only noted at the City Hall but not available at the other city parks. As the City continues to grow, the demand for more parks and increased park facilities will also continue to rise. To address this concern, the City Council has embarked on the preparation of a Parks Master Plan. The Parks Master Plan will consider the potential growth in population of children and how to

accommodate the demand for more recreational activities. As the City plans for improvements to the City parks, connecting to the parks for pedestrians and bicyclists should also be a priority.

B. Accident and Safety Analysis

The City of Imperial's Police Department bicycle related accident data compiled over a period of 4 years, (from 1998 through 2001) documents that there has been six bicycle related accidents. The accidents have occurred at the following locations:

- Neckel Road and Imperial Avenue (SR 86)
- S. F Street
- Imperial Avenue (SR86) and 10th Street (2 separate accidents at this location)
- 4th Street and F Street
- Imperial Avenue (SR 86) and 6th Street

In discussing bicycle safety, it is important to separate perceived dangers from actual safety hazards. Bicycle riding in cities or areas where there are high traffic volumes is commonly perceived as at least semi-dangerous because of the exposure of a lightweight, two-wheeled vehicle trying to negotiate safely between automobiles, trucks, buses, and pedestrians. In Imperial, the perceived safety hazards are associated with truck movements and high traffic volumes along Imperial Avenue (SR 86), especially at the non-signalized intersection.

In fact, bicyclists face only a marginally higher chance of sustaining an injury than motorists based on the numbers of users and miles traveled. Much of the perception of danger comes from motorists who have to veer into an opposing lane of traffic to pass a bicyclist(s) or who must slow down in order to accommodate a bicyclist(s) in the lane of traffic. Awareness of the shared use of the road with bicyclists can be promoted through signs that state "Share the Road" (see Chapter 5, Section B Bikeway Signage) and through education classes at community groups and driver education programs.

Some apparent dangers of cycling may be reduced by continuing current bicycle safety programs offered by the Police Department at local schools, and expanding those programs to adult organizations. It is evident by the numbers of bicycles at the bike racks of the local schools that many children bike to school. Bicycle helmets, however, are of limited use. An education program aimed at students to promote the use of wearing helmets and bicycle safety would reduce the potential for severe accidents and a "Share the Road" program targeted to adult groups.

Theft and vandalism is a concern for cyclists who bike to parks, schools, and employment centers where there may not be adequate provisions to safely lock up bikes. The lack of bike racks at parks, employment centers, and retail areas makes it difficult for cyclists to commute to work or shopping. Bicycle racks are located at all of the schools but not at the City parks. Other retail and employment areas may consider adding bicycle racks or lockers to encourage bicycling for customers and employees.

C. Air Quality Analysis and Health Benefits

Air Quality

Statewide about 7 tons per day of smog-forming gases and almost a ton of inhaleable particles are spared from the air we breathe due to use of bicycles rather than motor vehicles (California Air Resources Board, 1998). Over half of the commute trips and three out of four shopping trips are less than five miles. With a variety of retail services provided within a five mile distance south to El Centro, bicycling in Imperial is a viable alternative.

Imperial Valley is located within the Southeast Desert Air Basin (SEDAB). Air pollution monitoring stations controlled by the Air Pollution Control District are located in Brawley, El Centro, and Calexico. These stations determine if the County is meeting the national air quality standards. Exposure to air pollutants has a serious effect on health. Particulate matter is a good indicator of the air pollution mix that people are exposed to and has been associated with short term and long term increases in mortality. People exposed to particulate matter have higher than average risk of respiratory symptoms, greater use of drugs for asthma, and respiratory and cardiovascular disease. At the present time, according to the local Air Pollution Control District office in El Centro, Imperial Valley is a non-attainment area for PM10 (particulate matter) and ozone.

Several studies have linked the proximity to busy roads and heavy goods vehicles (mostly with diesel engines) with respiratory problems. (Occupational Environmental Medicine, 1998 and Epidemiology 1997). Car users have been shown to breathe more air pollutants than walkers, cyclists, or people using public transport on the same road due air pollutants breathed in congested traffic, at drive-thru restaurants and banks, and at intersections.

The California Clean Air Act (CCAA) of 1988 requires that all areas of the state achieve and maintain ambient air quality standards. The Air Quality Attainment Plan for Imperial prepared by the Imperial County Air Pollution Control District in 1991 is designed to meet these requirements. Installing bicycle facilities will encourage bicycling and thereby reduce the use of vehicles. The combined benefit of estimated future bicycle commuters in Imperial over the next 20 years will be improved air quality based on an annual reduction of about 10,201 lbs. of particulate matter in the air (PM10), and a reduction of 27,155 lbs. of NOx, and 39,523 lbs. of ROG (See Table 2).

Health Benefits

The benefits of cycling and walking are frequently overlooked. Cycling or walking can bring major health benefits. A half an hour a day of walking or cycling can reduce the risk of developing heart disease by half. More people are at risk of coronary heart disease due to physical inactivity than any other single risk factor. Low to moderate levels of exercise, such as bicycling can also reduce hypertension, obesity, diabetes, osteoporosis, and depression. As important as measurable health benefits, there are also the benefits of improved mental outlook and enhanced well-being that is associated with physical activity and recreation.

The health and recreational benefits of bicycling can contribute to an increased demand for recreational bicycling facilities for those who regularly migrate to the Imperial Valley for winter residence. Such demand would likely be for separated facilities such as bike paths or trails. Favorable year-round weather combined with available and safe facilities would increase the numbers of active seniors who bicycle periodically, although statistical verification of this is difficult to establish at this time.

D. Education

Growth in non-motorized travel typically entails development of systems of facilities, including appropriately designed roads and traffic systems, separated bicycle paths and trails, provision of safe and secure parking at destinations, transit systems which accommodate bicyclists. Perhaps most importantly to the promotion of non-motorized travel is the dissemination of information, education and enforcement policies and programs.

The purpose of an education program is reduce bicycle injuries and fatalities and to encourage bicycling as an alternate mode of transportation to motor vehicle travel. An education program which promotes the advantages of cycling and explains how to cycle effectively and defensively are key to improving cycling in the community. Safety education programs should target cyclists of all ages and motorists as well with emphasis placed on educating cyclists on the rules of the road, riding on the street, advantages to using helmets, using lights at night, selecting appropriate routes for cycling and sharing the road.

It has been noted (The National Bicycle and Walking Study) that as more cyclists are evident on roadways, vehicles are more apt to expect and watch for cyclists. Making bicycling and walking more viable and attractive relies on the "four E's" of cycling as defined by the Federal Highway Administration: **E**ngineering, **E**ducation, **E**nforcement and **E**ncouragement. Each must be optimized into a cohesive strategy to make cycling a reality to the community.

The Bicycle Helmet Safety Institute (BHSI) encourages communities to conduct safety programs recommending a "Basic Approach" to bike safety. The ideal campaign would include:

- Basic Bicycle Safety Education for Riders
- Helmet Promotion
- Driver Education
- Facility Improvement

Although the State of California Bike Helmet Law, enacted on October 8, 1993 requires children under the age of 18 to wear a helmet or a $25.00 fine may be assessed. However, most children do not wear helmets or are not required by their parents to wear helmets while bicycling. The BHSI quotes statistics that wearing a bike helmet can reduce head injury by 85% and prevent three out of four head injury deaths. An effective bicycle helmet campaign can be accomplished economically with donations from bicycle

helmet manufacturers and incentives donated from local stores, bowling alleys, miniature golf, and other recreation outlets. The BHSI website at www.helmets.org also suggests poster contests for children to color helmet posters is an effective method for promoting safe cycling for students.

National Highway Traffic Safety Administration (NHTSA) is a valuable resource for educational tools on the safety of bicycling such as a peer-to-peer approach video on values of wearing helmets and rules of the road (see www.nhtsa.org). A comprehensive guide, "Resource Guide on Laws Related to Pedestrian and Bicycle Safety" includes vehicle and traffic laws that may affect pedestrian and bicyclists safety and contains model legislation that is designed to have a positive effect on pedestrian safety.

The Imperial Police Department targets all the schools, except the high school for an annual Career Day. They present bicycle safety, which includes information on the consequences of unsafe bicycle use, helmet use, and rules of the road for cycling.

Awareness of cyclists serves as an educational component for the safety of cyclists. To promote bicycle safety, other cities have advertised bicycle safety messages on bus billboards, bus benches, park and recreation brochures, local street maps, bumper stickers, school bulletin boards, radio shows, traffic signs, library bulletin boards, and trail kiosks. Promoting annual "Bike-to-Work" Week encourages commuting to work and more importantly recognizes and promotes cycling as a true form of transportation.

Ongoing education programs that reinforce wearing bike helmets and riding on the right side of the roadway should be a part of the education program. The "Safe Routes to School Program," approved by the State of California in 1999 and extended in 2001, sets aside funds for bicycle safety education and implementation of bicycle facilities.

It is recommended that the City adopt an education program that would include the following:

1. Conduct regularly scheduled bicycle safety programs and bicycle rodeos at local schools and community centers.
2. Identify a key contact person to coordinate and resolve issues related to cycling.
3. Create and distribute bicycling maps that identify bicycling routes to schools and employment centers, locations of bicycling racks and staging areas, and safety tips.
4. Pursue grant funds for bicycling safety and public awareness programs.
5. Conduct periodic surveys at schools and through community groups and parent teacher associations to identify current bicycling concerns.
6. Promote "Bike to Work" week.
7. Promote bicycling licensing as a way to track stolen bikes and children involved in accidents.
8. Expand bicycle education with "share the road" education programs to local adult organizations.

CHAPTER 5 BICYCLE DESIGN GUIDELINES AND STANDARDS

Bicyclists are entitled to travel on all roads except those that are lawfully prohibited to them (Cal. Veh. Code § 21200). Many motorists do not know that by law bicyclists on conventional roadways are not required to use a separated path or even a shoulder. There are many cyclists who prefer cycling in the lane of traffic. Like motorists, bicyclists want to reach their destinations safely, conveniently, and with minimum delay. Many bicycle commuters or long distance cyclists avoid bicycle paths due to slower moving bicyclists or pedestrians. Frequently, bicycle paths are not direct or continuous and are used more by recreationists rather than commuters. However, each community is comprised of cyclists of different abilities and those who desire different types of facilities. All three bike facilities, Class I bike paths, Class II bike lanes, and Class III bicycle routes described below serve difference purposes and different user groups. Each community should offer facilities that meet these varied needs.

A. Classifications

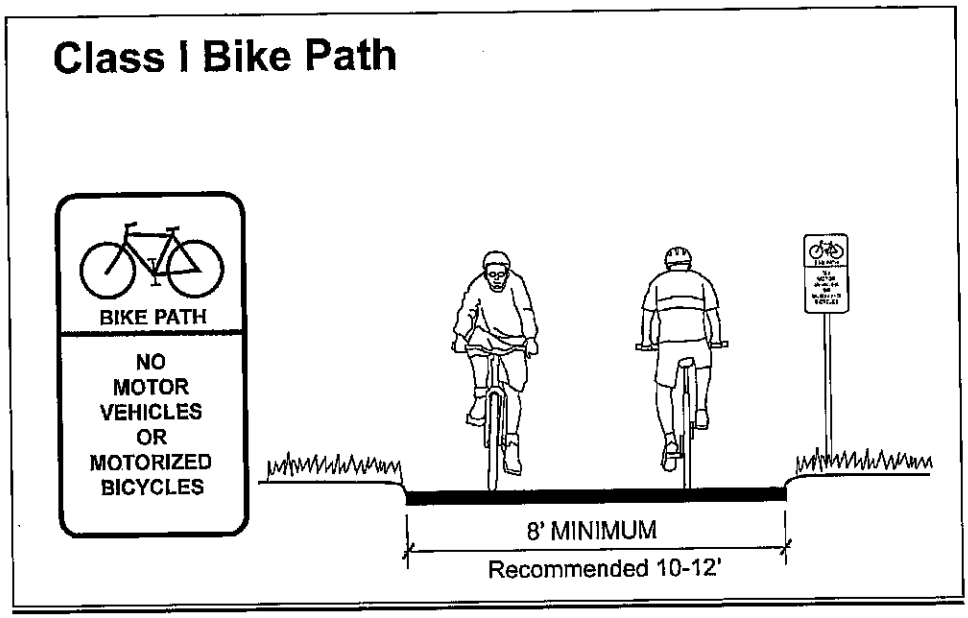
Design standards for bikeways have been established by American Association of Highway and Transportation Officials (AASHTO) and the California Department of Transportation (Caltrans). In California, all new bikeways should meet or exceed Caltrans guidelines as described in the "Caltrans Highway Design Manual, Chapter 1000, Bikeway Planning and Design" found in Appendix D. Planning of bikeways should concentrate on providing the highest level of safety for bicyclists and motorists alike.

Class I - Bikeways

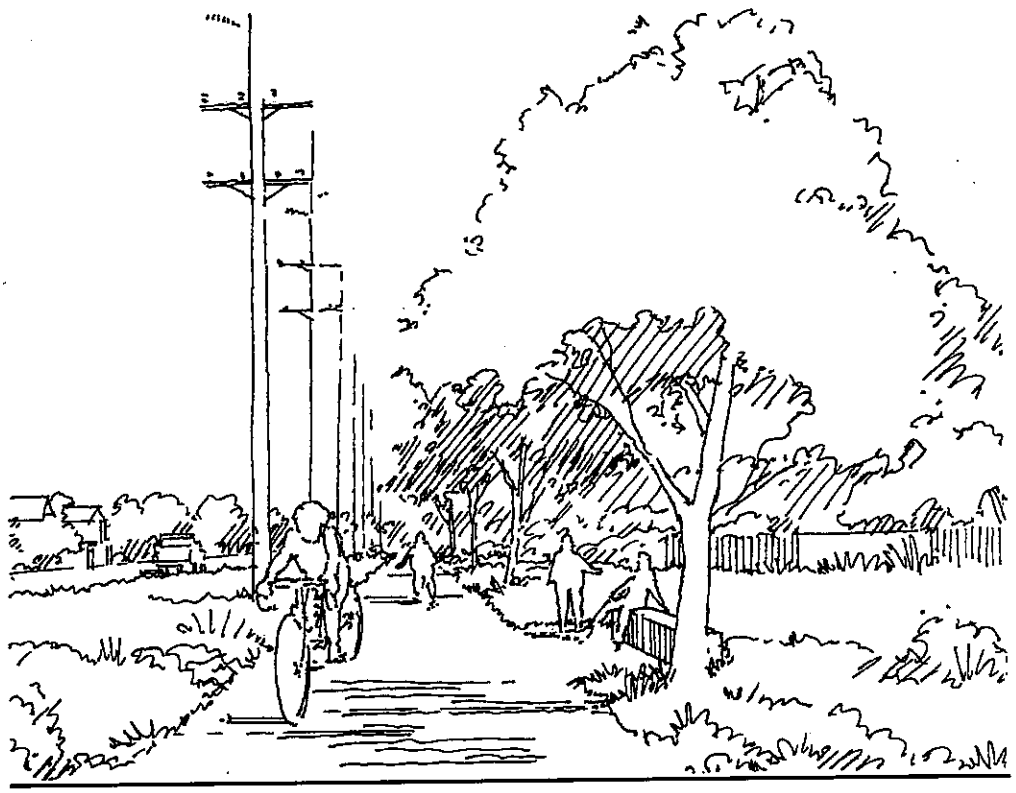
Class I bikeways are facilities where exclusive right of way with cross-vehicular traffic is minimized. Class I bikeways serve the exclusive use of bicycles and pedestrians and are not shared by motor vehicles except for maintenance, security or emergencies. The minimum paved width for a two way bike path is 2.4 m. (8 ft.). The minimum paved width for a one way bike path shall be 1.5 m. (5 ft.). A bicycle path is not a sidewalk but may be designated as multi-use to permit shared use with pedestrians, rollerbladers, and/or skateboarders. Although the Caltrans standard is for a smooth paved surface, other communities are discovering that there is a broader interest for hiking or mountain biking along a more natural terrain. Decomposed granite or a soil stabilized surface treatment is relatively inexpensive in comparison with hard-surface trails, and these trails offer an alternative to smooth surface trails.

It is recommended that along Class I bikeways landscaping should consist of drought tolerant and low maintenance plant species. A Class I bicycle path along the railroad or the canal would remain consistent with the Class I Bike Path as depicted below.

11-3-04
-Date approved by council



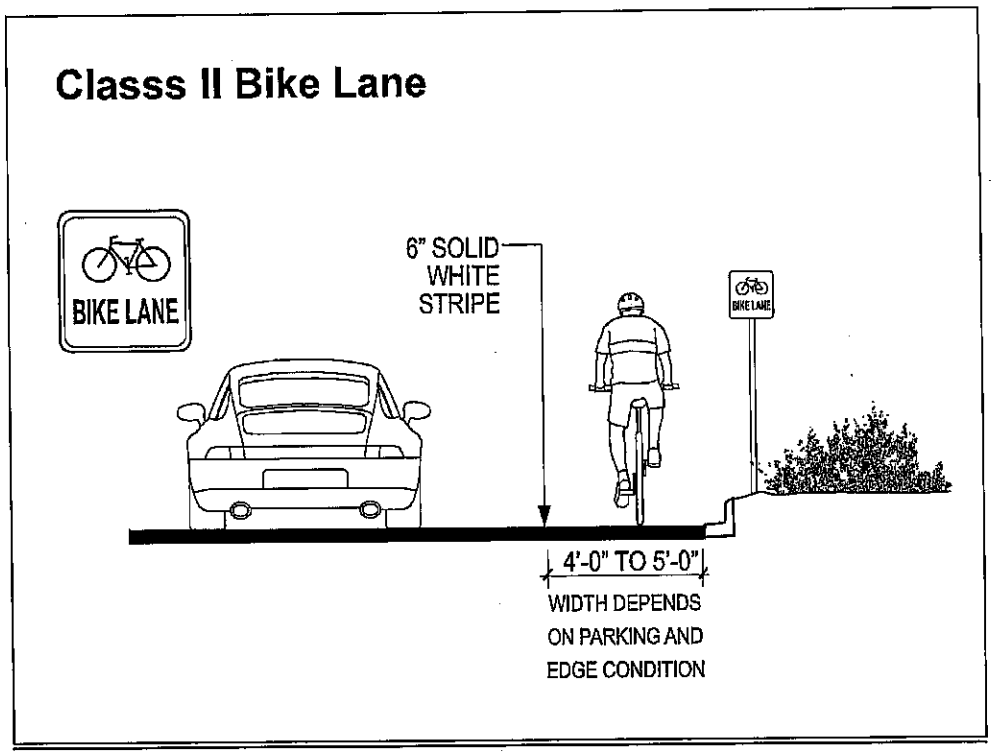
The recommended bicycle network includes a Class I path along the canal that borders the eastern and northern portion of the city. A similar path is proposed in the City of El Centro along La Brucherie Road, above the underground irrigation canal. A conceptual design for an 8' – 10' wide Class I bicycle path is shown below.



Class II - Bicycle Lanes

Class II bikeways (bike lanes) for preferential use by bicyclists is established within the paved area of roadways adjacent to vehicle lanes through identifiable pavement striping and markings and signage.

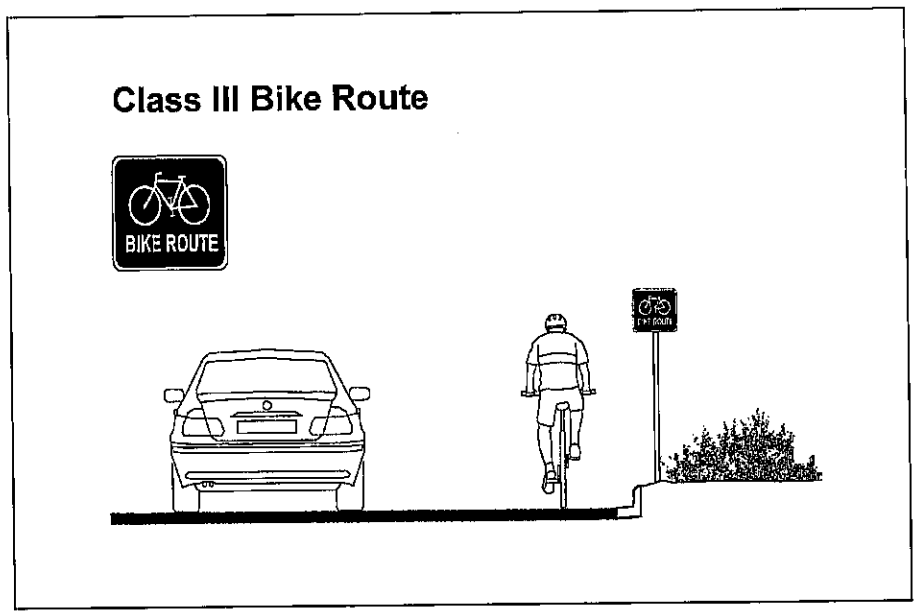
Caltrans recommends that Class II bicycle lanes use a minimum 1.2 m. (4 ft.) paved roadway shoulders with a standard 100 mm. (4 in.) edge stripe to improve the safety and convenience for bicyclists and motorists (Section 1002.4(1)).



Class III - Bicycle Routes

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 a bikeway (normally bike lanes) where there is not adequate width to install bike lanes.

Class III facilities are shared facilities, either with motor vehicles on the street or with pedestrians on sidewalks. In either case, bicycle usage is secondary. Class III facilities are established by placing bike route signs along roadways.

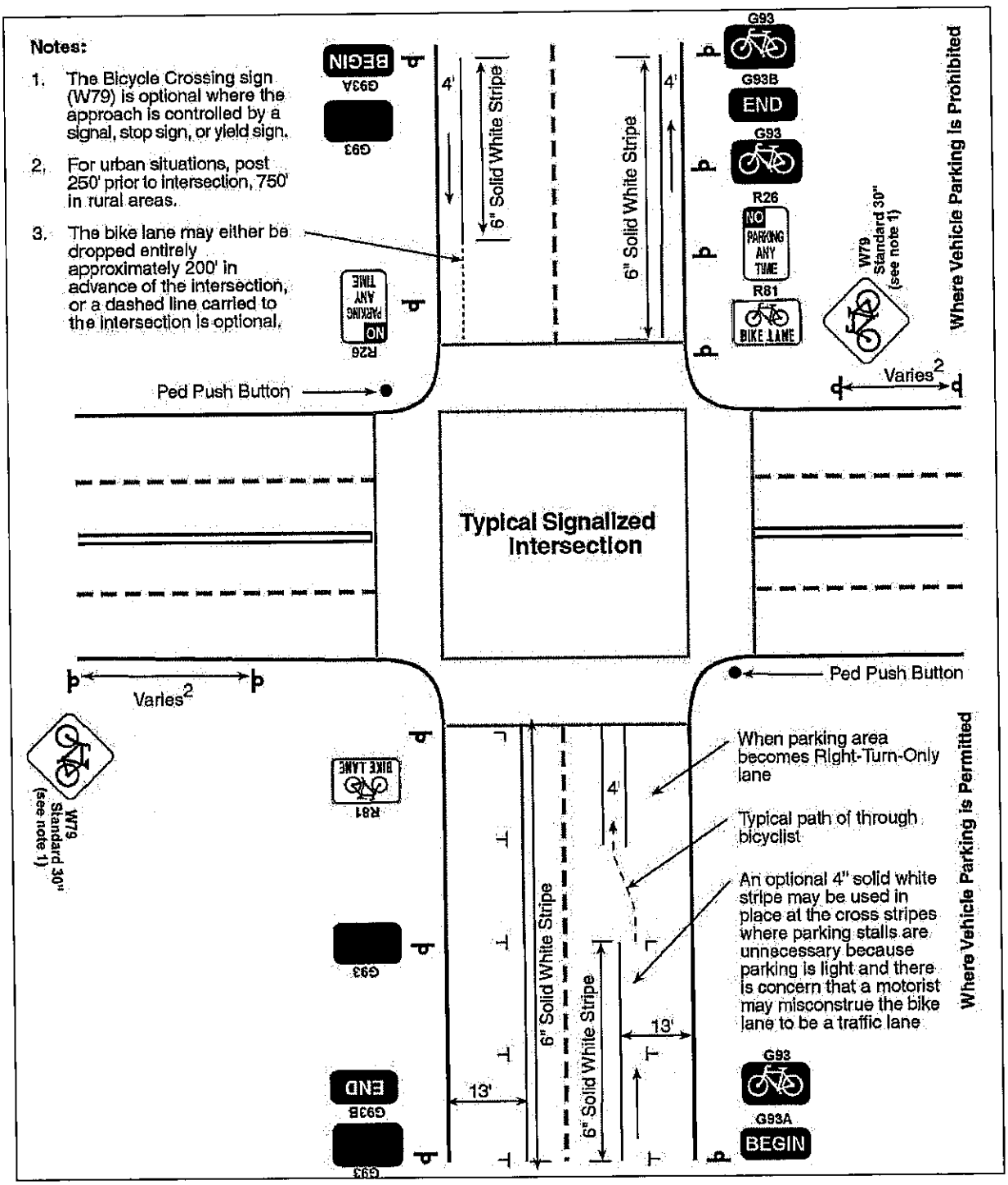


B. Bikeway Signage

Many standard roadway signs, such as speed limit and warning signs, apply to both motorists and bicyclists. Additional signs specifically for designated bike facilities should conform to the Caltrans Traffic Manual and/or the Manual on Uniform Traffic Control Devices (MUTCD). Caltrans guidelines (see Appendix) require that bikeways include standard signs and pavement markings as shown.

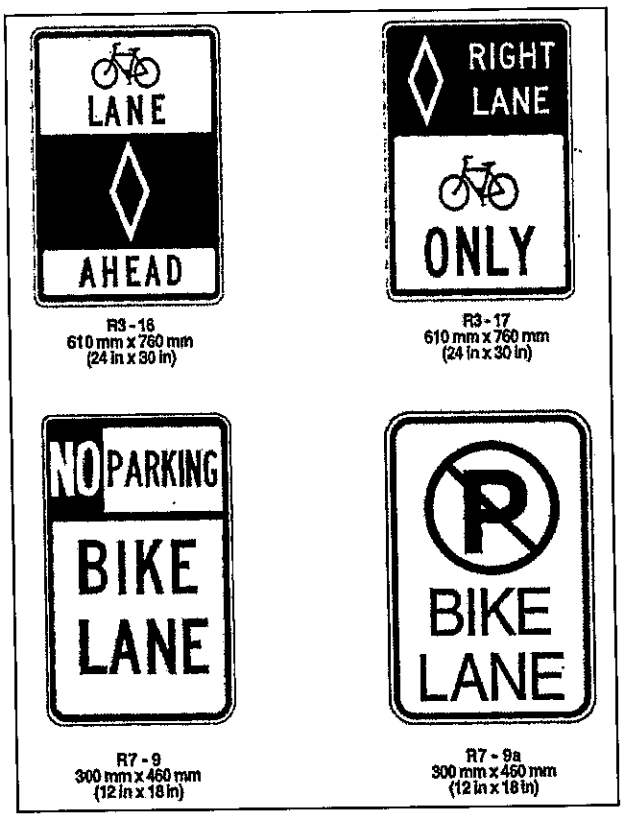
Standard regulatory, warning, and guide signs used on highways may be used on Class I bike paths, as appropriate.

The R3-17 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 1-km intervals. The following page reflects a typical intersection and standard placement of bicycle regulation signs. Bike routes are established through placement of the G93 bike route sign. Bike route signs are to be placed periodically along the route.


Notes:
1. The Bicycle Crossing sign (W79) is optional where the approach is controlled by a signal, stop sign, or yield sign.
2. For urban situations, post 250' prior to intersection, 750' in rural areas.
3. The bike lane may either be dropped entirely approximately 200' in advance of the intersection, or a dashed line carried to the intersection is optional.
BEGIN
G93A
G93
4'
6" Solid White Stripe
6" Solid White Stripe
4'
G93
G93B
END
G93
R26
NO PARKING ANY TIME
R81
BIKE LANE
W79 Standard 30" (see note 1)
Where Vehicle Parking Is Prohibited
Ped Push Button
Varies2
Typical Signalized Intersection
Varies2
Ped Push Button
When parking area becomes Right-Turn-Only lane
Typical path of through bicyclist
An optional 4" solid white stripe may be used in place at the cross stripes where parking stalls are unnecessary because parking is light and there is concern that a motorist may misconstrue the bike lane to be a traffic lane
Where Vehicle Parking is Permitted
W79 Standard 30" (see note 1)
R81
G93
4'
6" Solid White Stripe
6" Solid White Stripe
13'
13'
G93
G93B
END
G93
G93A
BEGIN

In order to create continuity and identity of the bicycle system, a comprehensive sign program utilizes an identifiable logo or City seal that may be attached to the bike signs. This identifiable logo can help build support, recognition and awareness of the bikeway system and increase the number of cyclists. This identity would be used on all bikeway signage, brochures, and other materials. The logo will help define the bikeway facilities as a cohesive system rather than a series of disconnected segments. A City-wide numbering system may also be used that would identify bikeways to enable cyclists to plan a route or note where support facilities are located.

Although bicyclists are permitted to bike on any roadway in the State of California unless specifically restricted otherwise, many motorists are unaware of this fact. Advising motorists that bicyclists may use the road not only provides a visual awareness for motorists to expect bicyclists. Installing the "Share the Road" signs on roadways where bicyclists are frequently seen as well in areas where there may have been conflicts with bicyclists and vehicles, helps with the awareness.



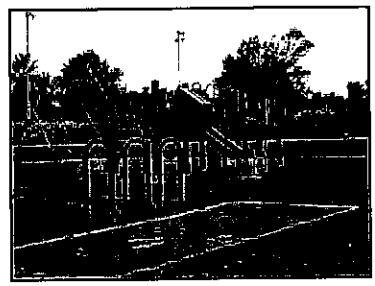
C. *Support Facilities*

Support facilities and programs are an important part of the Imperial Bikeway Master Plan. Secure bicycle parking and workplace changing facilities are important elements for bicycle commuters. Combining workplace amenities such as bicycle lockers and showers with good bike lanes will substantially increase cycling.

Bike racks are located at each of the schools and but not at the City parks or at any of the key employment centers. Other major employment areas should consider installing bike racks. The fear of bicycle theft is a significant deterrent to bicycle use. Lack of bike racks and other facilities are frequently mentioned by bicyclists and would-be bicyclists as reasons why they don't ride or why they ride less often.

Bicycle parking may be separated into two categories - short-term parking and long-term parking. Short-term bicycle parking is usually defined as being two hours or less and consists of a bicycle rack or series of bicycle racks. Whereas long-term parking suggests that bicyclists may leave the bike all day, overnight, or for a longer duration. Long-term parking options include:

- Lockers, individual lockers for one or two bicycles
- Racks in an enclosed, lockable room or fenced area
- Racks in an area monitored by security (cameras, guards, or other personnel)
- Racks or lockers in an area always visible to employees



The City of Imperial Zoning Code (section 24.13.130 G.) includes standards for bicycle parking. A minimum of 5 spaces is required in conjunction with administrative and professional service use over 20,000 square feet of floor area. The City may consider standards that include bicycle racks at parks and development of retail facilities.

Typical standards for bike racks at schools are one bicycle rack (10 bicycles) per 40 elementary and junior high schools students, per 100 high school students, and per 100 employees. The number of racks needed at each location can be determined when the existing rack begins to exceed 80% capacity.

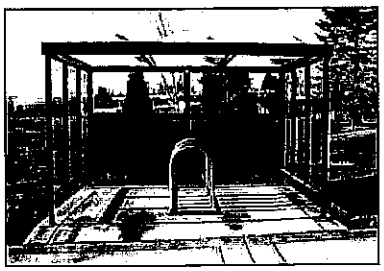
Heavy bicycle use is the primary reason for citing bicycling racks. Standard locations are schools and parks. Other determents for siting bike parking are:

- Visual observation – observe where bikes are illegally parked due to lack of bicycle racks.
- User Input – ask bicyclists and bike groups. Due to high number of bicyclists, a the Taco Bell in El Centro installed bike racks for its bicycling patrons.
- Land use criteria – target areas where people gather such as coffee shops, bookstores, recreation centers (miniature golf, video arcade, and transit stations, and areas around the border crossings.)
- Zoning code – require new commercial development and change in business to install bike parking proportionate to car parking requirements. Bike racks should

be located at each school and at shopping areas in excess of 50,000 square feet or where it is evident of high cycling use (such as the downtown retail center).

Racks should either be installed in the public right-of-way, at schools and parks, or at commercial and industrial sites in conformance with setback requirements. Bike racks should be located based on the following:

- Visibility – Cyclists should be able to easily spot bicycle racks from the street.
- Access – Bicycle racks should be convenient to building entrances and street access. Whenever possible, racks should be placed within 50 feet of building entrances.
- Security – Locate parking within view of passers-by, retail activity, or office windows or within a fenced area for long-term parking such as at a school.
- Lighting - To avoid theft, bicycle-parking areas should be well lit or located within a well-lighted area.
- Weather protection – Whenever possible protect bicycle parking area from weather by siting under an existing overhand or covered walkway.
- Avoid conflict with pedestrians or vehicles– Locate racks so that parked bicycles do not block walkways or near vehicle parking.



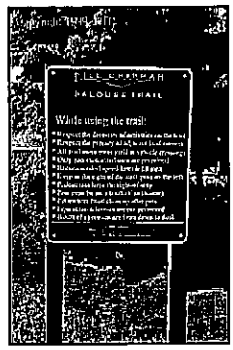
The selection of the type of rack are based on the following:

- Supports the bike frame at two locations (not just the wheel)
- Allows both the frame and at least one wheel to be locked to the rack (without requiring that the lock be placed near the bicycle chain.)
- Allows the use of either a cable or "U-type" lock
- Secures all types of size of bicycles, including various types of and sizes of frames, wheel sizes, and tire widths, with or without kickstands, and with water bottle cages.

Three common ways of providing secure long-term bicycle parking are 1) fully enclosed lockers accessible only by the user, 2) a continuously monitored facility, and c) restricted access to facilities where only owners of bicycles are permitted access to the area. Bicycle lockers are intended for long term parking and to protect against theft of the entire bicycle and its components and accessories. Due to the high costs of bicycle lockers and the difficulty to maintain them, bicycle lockers are often not used. Bicycle storage lockers should be considered at transit stations or major employment locations. Bicycle lockers are typically rented to bicyclists for daily use over a period of time. Rental costs vary from one agency to another. A survey conducted by Pedestrian and Bicycling Information Center revealed a low rental of $2.00 per month (Tucson, AZ), to a mid-range of $5.00 per month (Santa Cruz, CA and Caltrain), to a high end rental of $10.00 per month in Portland, Oregon.

Other support facilities may include staging (parking) areas at key locations where it is anticipated to have a high usage or if the facility is located a long distance from where

cyclists may start their rides. These staging areas may include a number of other amenities including:



- Bike racks
- Shade shelters
- Benches and/or picnic tables
- Signage (interpretative and directional)
- Lighting
- Trash receptacles
- Emergency telephones
- Portable restrooms
- Water fountains (with bottle spouts and dog basins)

Staging areas are typically at local parks that already offer parking and frequently have restrooms, drinking faucets and picnic areas. Since the design of the recommended facilities will connect to the parks, the logical choice will be to use the existing parking at the local parks.

There are areas that may not require a complete staging area, but would serve the cyclists by providing some of the amenities. Bike racks at schools, employment centers, and parks not only encourage cycling, but also discourage vandalism. Class I bike paths frequently include support facilities such as lighting, signing, water fountains, and interpretative signing since the number of users are frequently higher than a roadway and the type of users include not only cyclists, but pedestrians, disabled persons, and roller bladers. Loop detectors designed for the purpose of detecting bicycles waiting at signalized intersections should be installed at intersections with bicycle lanes as part of roadway expansion or reconstruction projects.

CHAPTER 6 BIKEWAY PLAN

A. Route Selection

The choice of whether the bicycle facility should be a Class I, II, or III is dependent on many factors. Bicycle travel is permitted on most streets and highways without bikeway designations, however it may be desirable to place a bike route (Class III) designations on those roadways to identify a more preferred route and provide awareness for bicyclists.

Many of the roadways which could easily accommodate Class II bike lanes with signing, striping and minor improvements and would provide connections to schools, parks and employment centers, are considered logical choices for bike lanes. Improvements may include asphalt paving, in addition to striping and signing.

An ideal location for a bicycle path within the City of Imperial is along the west side of Imperial Avenue (SR 86). This separated multi-use path would provide a connection to the retail centers along the westside of SR86 south of the city.

Based on the key goals, recommendations presented during the public workshop, and upon conducting visual site surveys, a system of proposed bikeway routes was developed. Some general principles should guide the bicycle facilities planning process:

- Every street is a bicycling street and all locations accessible to a motor vehicle should be accessible by bike.
- All appropriate agencies and general public should be involved in the planning process.
- Transportation plans should overcome existing barriers to bicycle travel, create no new barriers, and encourage new bicycling facilities.
- Roadway improvements should provide access to all destinations through the most direct or feasible route.
- The plan should remain flexible and anticipate changes to the system as the City grows and community facilities, schools, and employment centers are established.

The bikeway system is a network of planned routes based on the following criteria:

1. Directness to schools, employment centers, or attractions
2. Roadway conditions
3. Traffic volumes and speeds
4. Continuity
5. Access
6. Attractiveness
7. Security
8. Elimination of barriers that restrict bicycle travel
9. Delays
10. Conflicts

Field review revealed that although there are a number of opportunities for cycling, the key problem areas are cycling on the major roadways such as Imperial Avenue (SR 86) that experience high volumes of truck traffic.

Plan Review and Update

Once adopted, the City of Imperial should review and update the plan every four years as required by Caltrans. The update will include an assessment of the successes of completed facilities, a reappraisal of cost estimates, and identification of changes in the proposed system to meet increased demand for bicycle facilities and new development. Any major changes in the Master Plan will be subject to further environmental review. Once approved, the document will need to be forwarded to Caltrans for approval.

B. Proposed Bikeway System

The Imperial bicycle system was based on public input at the public workshop held on June 12, 2002, consultation with staff, and site review. The Non-Motorized Transportation Framework Plan prepared for the Imperial Valley Association of Governments and Southern California Association of Governments recommended consideration of the following bicycle facilities:

- Pedestrian and bike crossing at Imperial Avenue (SR 86) and Baroni Blvd.
- Pedestrian and bike crossing of the railroad tracks at Barioni Blvd., 2nd Street and 14th Street.
- Bike routes connecting areas to Irvin Park and Emerson Park with possible connections across Imperial Avenue (SR 86) at Baroni Blvd., 2nd Street, and 14th Street, and to the Midwinter Fairgrounds and Pioneer's Museum (on Aten Road).
- Multi-use and/or air rights use of Dahlia Canal especially between 2nd and 14th, and North Central Canal between Aten and Neckel Roads.

Additionally, the Transportation Framework Plan recommends a long-term maintenance of the existing bike path to Imperial Valley College along Aten Road (located along the northern side of Aten Road).

The criteria for selecting a specific route includes:

1. Coverage - The system should provide equitable, reasonable access from all portions of Imperial for commuting to employment, including downtown and commercial areas, schools, and recreation routes.

2. System Rationale - Each route in the system should serve a definitive purpose (recreation connection, or commuting) so that users will understand and use the facilities.

3. Regional Bike System - The bikeway system should have good connections to existing and proposed bikeways in the adjacent cities and county, and provide potential routes to schools and employment centers within the cities.

4. Loop Systems should be created that offer routes for recreation bicyclists to ride without having to cross major roadways or double back to their destination.

Segment Descriptions

The following describes the Imperial Bikeway Network consisting of the following:

Class I Bicycle Paths - 5.5 miles

1. La Brucherie Road
2. Aten Road to Imperial Valley College
3. Imperial Avenue (SR 86)

Class II Bicycle Lanes – 12.37 miles

4. Imperial Avenue (north)
5. Austin Road
6. K Street
7. Clark Road
8. Neckel Road
9. Baroni Boulevard
10. Aten Road (west of Imperial Avenue)

Class III Bicycle Routes – 2.49 miles

11. Joshua Tree – Sandlewood Glen
12. D Street
13. E Street
14. H Street
15. 10th Street
16. 15th Street
17. Rodeo Drive – Canon Drive
18. 2nd Street

SCHOOLS & PARKS

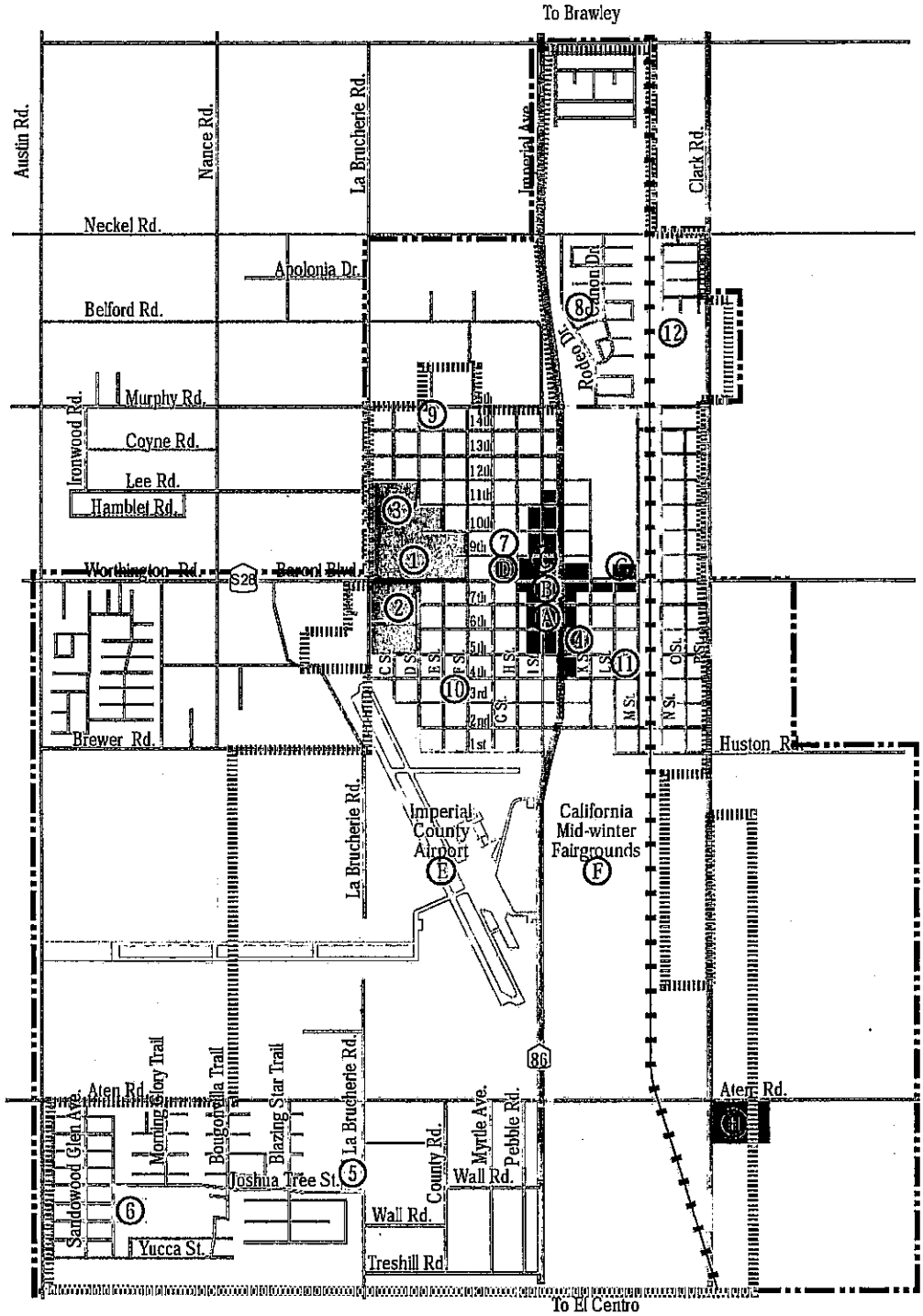
1. Imperial Union High School
2. Ben Hulse Elementary
3. Frank Wright Junior High School
4. Faith Academy Christian
5. Valley Christian School
6. Waggoner Elementary School and Park
7. Lawrence "Papa A." Eager Park
8. Sunset Park
9. Irving Park
10. Freddy White Park
11. Evans Park
12. Proposed Park

COMMUNITY FACILITIES

- (A) City Hall
- (B) Fire Satation
- (C) Post Office
- (D) Library

EMPLOYMENT CENTERS

- (E) Imperial County Airport
- (F) California Mid-Winter Fair Grounds
- (G) Imperial Valley Irrigation District
- (H) Border Patrol Offices



LEGEND

- Schools
- Parks / Open Space
- Community Facilities
- Commerial
- Industrial
- Union Pacific Railway
- City Boundary
- Sphere of Influence

N

0 1/8 1/4 3/8 1/2 Mile

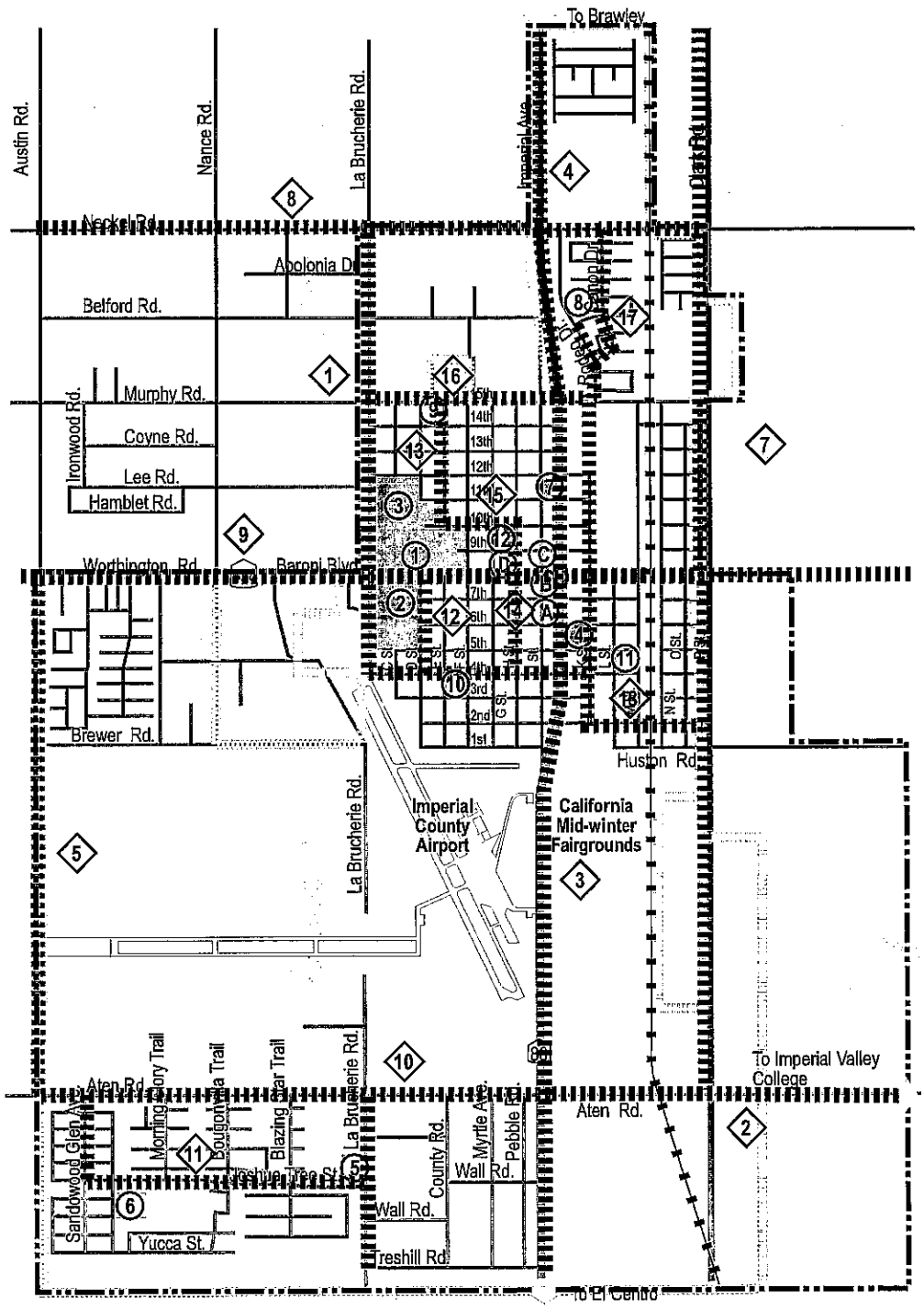
SCHOOLS & PARKS

1. Imperial Union H.S.
2. Ben Hulse Elementary
3. Frank Wright J. H. S.
4. Faith Academy Christian
5. Valley Christian School
6. Elementary School
7. Holbrook High School
8. City Park
9. Irving Park
10. White Park
11. Evans Park
12. Lawrence "Papa A." Eager Park

COMMUNITY FACILITIES

- (A) City Hall
- (B) Fire Satation
- (C) Post Office
- (D) Library

(1) Bicycle Segments



LEGEND

- Schools
- Parks / Open Space
- Community Facilities
- Union Pacific Railway
- Sphere of Influence
- Class I Proposed Bicycle Routes
- Class II Proposed Bicycle Routes
- Class III Proposed Bicycle Routes
- City Boundary

N

0 1/8 1/4 3/8 1/2 Mile

C. Project Costs

The following is a list of typical costs for design and construction of the three types of facilities. All costs are based on 2002 dollars and should be adjusted based on more current rates. These costs may be used to determine the approximate costs to construct a segment. Preliminary engineering will provide a more definitive cost estimate.

TABLE 3.0
UNIT COST ESTIMATES

Bikeway Facility	Cost Per Mile
Class III - Bike Route	
▪ Signing, minor surface repair	$1,000
▪ Rural road widening (32" shoulder)	20% of total roadway improvement costs
Class II - Bike Lane	
▪ Signing and Striping only	$ 5,000
▪ Signing, striping, minor surface repair	$20,000
▪ Signing, striping, road widening	$65,000
Class I Bike Path	
▪ Rehabilitate or upgrade existing path	$50,000
▪ Construct DG path. Includes signing.	$52,000
▪ Construct DG path. Includes signing with removal of existing railroad tracks.	$100,000
▪ Construct asphalt path on existing level embankment, or right of way, includes signing, striping for two-way path.	$150,000
▪ Construct asphalt path on existing level embankment, or right of way, includes signing, striping with removal of existing railroad tracks.	$194,000
Support Facilities:	
▪ Bicycle Racks	$420 ea. (parks 12 bikes)
▪ Bicycle Lockers	$1,000 ea. (parks 2 bikes)
▪ Paved Parking Space	$2,200 (parks 10-12 bikes)
▪ Signal Loop Detectors	$2,500/intersection
▪ Undercrossing	$150,000 - 350,000
▪ Signing, striping	$5,000/mile
▪ Signing, striping, signals	$65,000/mile
▪ Irrigated Landscaping	$350,000 - 600,000 mile
▪ Non-irrigated Landscaping	$150,000 - 300,000 mile
▪ Bridge (8' wide)	$60 - 100 square foot
▪ Fencing	$20 linear foot
▪ Railroad Crossing	$125,000
▪ Emergency Cellular Phone (installed)	$3,500/ea
▪ Benches (concrete 8' long)	$1,000/ea
▪ Trash Receptacle (concrete)	$500/ea
▪ Rural pathway (native soil - 5' wide)	$40,000/mile

The above are estimates only, more detailed estimates will be developed during preliminary engineering.

Implementation costs for each route are based on typical construction costs. The following table lists each segment, length of the segment, and estimated cost for implementation. From a bikeway perspective, bike lanes may be installed along the roadway providing adequate width is available. Imperial's roadways are generally wide enough to accommodate bicycle lanes provided there is also adequate width for vehicle parking. The exceptions to this occur when drainage ditches, curb cuts, utility poles or lack of right-of-way make widening cost prohibitive.

Relocation of utilities or the removal of drainage ditches would be estimated on a case by case basis. The City should consider installing loop detectors at an estimated cost of $2,500 per intersection when repairing the streets, replacing utilities that require cutting into the asphalt, or when installing new traffic lights. Loop detectors designed to detect bicyclists at stop lights will encourage bicyclists to cycle more often and deter cyclists from darting across streets when the lights turn red. "Why cyclists Run Red Lights" by Tom Revay wrote that cyclists would not run red lights as often if they were in the lane of traffic rather than to the right of traffic, as they would wait in line with vehicles. However, the average cyclists doesn't want to wait in the main stream of traffic as they are concerned with getting up to speed with cars and hindering the flow of traffic. Additionally, it the cyclists is in the front of the line, a traffic signal set to change when a vehicle arrives, will not change unless the detection system can recognize a bicycle in the lane of traffic. It might be better suited for the traffic light to recognize a cyclist in the bicycle lane and change accordingly.

TABLE 4.0
BICYCLE NETWORK

Segment	Class I, II, or III	Comments	Cost
1. La Brucherie Road – 1.6 miles	I	Pathway to be constructed above existing canal along east side of roadway	$240,000
2. Aten Road to Imperial Valley College – 1.4 miles	I	Pathway to be constructed along northern side of roadway along existing utility easement to tie in with existing pathway to college.	$210,000
3. *Imperial Avenue – 2.5 miles	I	Pathway along western side of SR 86 within the drainage channel. Will require improvements to drainage.	$375,000
4. Imperial Avenue – North – 1 mile	II	Bicycle lanes to be installed along 4-5' shoulder of roadway.	$65,000
5. Austin Road – 1.37miles	II	Install bicycle lanes along existing roadway. Will require additional pavement.	$108,550
6. K Street – 1.4 miles	II	Install bicycle lanes along existing roadway. Will require additional pavement. Provides alternative to SR86	$127,400
7. Clark Road – 2.75 miles	II	Install bicycle lanes along existing roadway. Will require additional pavement.	$178,750
8. Neckel Road – 1.6 miles	II	Install bicycle lanes along existing roadway. Will require additional pavement.	$104,000
9. Baroni Boulevard – 2 miles	II	Install bicycle lanes along existing roadway. Install loop detectors at SR 86 – Imperial Avenue and 4th Street intersection.	$130,000
10. Aten Road (west of Imperial Ave) – 1.25 miles	II	Install bicycle lanes along existing roadway.	$81,250
11. Joshua Tree – Sandlewood Glen – 1 mile	II	Install lanes along existing roadway.	$3,000
12. D Street - .12 mile	III	Install bicycle route signs.	$120
13. E Street - .25 mile	III	Install bicycle route signs.	$250
14. H Street - .25 mile	III	Install bicycle route signs.	$250
15. 10th Street - .5 mile	III	Install bicycle route signs.	$500
16. 15th Street - .5 mile	III	Install bicycle route signs.	$500
17. Rodeo Drive – Cannon Drive - .5 mile	III	Install bicycle route signs.	$500
18. 2nd Street - .37 mile	III	Install bicycle route signs.	$370
Total			**$1,625,440**

Costs are estimates only. More detailed estimates should be developed during preliminary engineering stage.
*Pathway cost only. Additional cost is anticipated for construction of drainage improvements. A Feasibility Study should be conducted to determine approximate costs for implementation.

TABLE 5.0 COST ASSUMPTIONS FOR CLASS I BIKEWAY	
Multi Use Trail/Bike Path (8')	**Cost Per LF**
Adjacent to roadway, level terrain, minimal grading	$50 - 65
Adjacent to roadway, moderate slope, some cut and fill	$60 - 75
Adjacent to roadway, steep slope, retaining wall	$90 - 110
Level terrain, minimal grading	$20 - 25
Moderate slope, some cut and fill	$25 - 35
Roadway Improvements	**Cost per LF**
2 - 4 feet asphalt/base, some fill, debris removal, relocate some fencing and utilities, restripe	$25 - 35
2 - 4 feet asphalt/base, some fill, debris removal, relocate some fencing and utilities, restripe, and new guardrail	$60 - 70

TABLE 6.0 WORKSHEET FOR BIKEWAY COSTS					
Item No.	**Description**	**Estimated Quantity**	**Unit**	**Unit Cost**	**Total Cost**
1	Clearing & Grubbing		L.F.	$10-40	
2	Earth/Excavation		C.Y.	$30-40	
3	Asphalt Concrete Pavement		S.F.	$1.20 - 1.50	
4	Traffic Bike Lane Stripe		L.F.	$.60 - .80	
5	Pavement Markings		EA.	$40 - 50	
6	Fencing (chain link)		L.F.	$16 - 20	
7	Guardrail		L.F.	$20 - 25	
8	8' Steel or Concrete Bridge		L.F.	$1,200 - 1,500	
9	3' Retaining Walls (Concrete)		S.F.	$32 - 40	
10	Relocate Signs/Fencing		L.F.	$1.00 - 2.00	
11	Drainage		L.F.	$1.00 - 5.00	
12	Environmental Mitigation		L.F.	$.50 - 2.50	
13	Traffic/Bike Path Signing		L.F.	$2.40 - 3.00	
14	Lighting		EA.	$500.00	
15	Traffic Control		L.F.	$.20 - .40	
16	Clean-up		L.F.	$.10 - .20	
Subtotal 15% Design Cost 20% Contingency					
Total Cost					

D. Phasing Plan

The proposed 20.36-mile bikeway system consists 5.5 miles of Class I paths, 12.37 miles of Class II bicycle lanes and 2.49 miles of Class III bicycle routes. The total estimated cost to implement is $1,625,440. In addition, the plan recommends installation of 8 bicycle racks at the parks, city hall and the library at a cost of $3,360.

In order to develop a priority schedule for implementation of the bicycle network, a rating system was used. Table 6.0 lists each segment and provides a basis for rating based on estimated usage, safety concerns, and location to schools, parks, and employment centers. The higher the rate, the higher up on the priority schedule the segment is listed and therefore, the earlier the segment should be implemented. Phasing is ultimately based upon the availability of funding or immediate safety concerns. Specific factors that determine which route may be constructed are based on a) availability of funding for specific types of bikeways, b) capital improvement projects such as road widening and traffic control lights at intersection, or c) immediate safety concerns about a specific area.

Table 7.0, Rating Chart on the next page rates each of the 18 routes based on connection to parks, schools, and employment centers and safety concerns. Those segments with a priority rating of 10 and above have been selected to be listed for Phase I implementation. Phase 2 includes segments that have priority ratings from 6 to 10 and Phase 3 includes segments with ratings from 1 to 5.

TABLE 7.0
BICYCLE SEGMENT RATING CHART

Segment	Class I, II, III	Length (Miles)	A	B	C	D	Total
1. La Brucherie Road	I	1.60	3	3	3	3	12
2. Aten Road to Imperial Valley College	I	1.40	1	2	2	1	6
3. Imperial Avenue (SR 86)	I	2.50	3	3	3	5	14
4. Imperial Avenue – North (SR 86)	II	1.00	1	2	1	1	5
5. Austin Road	II	1.37	1	2	0	0	3
6. K Street	II	1.40	2	2	2	2	6
7. Clark Road	II	2.75	2	1	0	0	3
8. Neckel Road	II	1.60	2	1	0	0	3
9. Baroni Boulevard	II	2.00	3	3	3	3	12
10. Aten Road	II	1.25	2	2	2	2	6
11. Joshua Tree	III	1.00	3	3	2	2	10
12. D Street	III	.12	3	3	3	2	11
13. E Street	III	.25	3	3	2	3	11
14. H Street	III	.25	1	1	2	1	5
15. 10th Street	III	.50	2	2	2	1	7
16. 15th Street	III	.50	1	2	0	1	3
17. Rodeo Drive – Cannon Drive	III	.50	2	1	1	0	4
18. 2nd Street	III	.37	1	1	0	0	2
Total		20.36					

Total
A. Estimated Usage (1=low, 3=high)
B. Safety Concern (1=low, 3=high)
C. Schools/Parks (actual no. of schools)
D. Employment Centers (actual number)

Based on the above table, the following phases have been identified for implementation:

TABLE 7.0
ESTIMATED COST

Priority No. - Phase I	Class I, II, III	Length (Miles)	Estimated Cost
1. Route 3 - Imperial Avenue (SR 86)	I	2.50	$375,000
2. Route 2 - La Brucherie Road	I	1.60	$240,000
3. Route 9 - Baroni Boulevard	II	2.00	$130,000
4. Route 12 - D Street	II	.12	$120
5. Route 13 - E Street	II	.25	$250
6. Route 11 - Joshua Tree	II	1.00	$3,000
7. Route 15 - 10th Street	II	.50	$500
8. Route 2 - Aten Road to Imperial Valley College	I	1.40	$210,000
9. Route 6 - K Street	II	1.40	$127,000
10. Route 10 - Aten Road	II	1.25	$81,250
11. Route 4 - Imperial Avenue - North (SR 86)	III	1.00	$65,000
12. Route 14 - H Street	III	.25	$250
13. Route 5 - Austin Road	II	1.37	$108,550
14. Route 17 - Rodeo Drive – Cannon Drive	III	.50	$500
15. Route 7 - Clark Road	II	2.75	$178,750
16. Route 16 - 15th Street	III	.50	$500
17. Route 8 - Neckel Road	II	1.60	$104,000
18. Route 18 - 2nd Street	III	.37	$370
Total Cost of Bike Network		**20.36**	**$1,625,040**
Bike racks		Install at 6 parks, library and city hall at $420/ea	$3,360

Installation of bicycle facilities in the past has not been included in the General Fund for the capital improvement program (CIP). Implementation of the bicycle facilities based on the rating system reflected on Table 7 and the Phasing Program outlined on Table 8, should be flexible to change based on funding availability, roadway improvements scheduled on the City's capital improvement program, scheduled Caltrans improvements, and safety concerns. Taking advantage of scheduled roadway improvements will result in cost efficient savings when constructing improvements. Safety concerns should always be the first priority and an annual review of the accident data and input from the community will assist in identifying these areas.

Installation of bicycle racks at each of the parks is essential in order to encourage cycling and the cost of installing bike racks at each of the parks has been included in Phase 1.

E. Maintenance

Bicycle facilities must be maintained in an appropriate manner and an ongoing maintenance program should be established. Well-maintained bicycle facilities will increase safety, encourage use of the facilities, and increase longevity of the facility. The maintenance program should include a periodic review of the condition of signs, pavement markings, barriers, and surface condition. Roadway dirt, debris, and potholes affect cyclists to a greater extent than cars. It is recommended that routine surveys of the bicycle facilities are conducted to remove glass and other debris, especially on Class I bicycle paths, and to conduct routine restriping and sign replacement. Negotiation of maintenance responsibility for the proposed Class I bicycle paths located along the canal or Imperial Avenue (SR 86) will need to be closely coordinate with the property owner (Imperial Valley Irrigation District and Caltrans respectively) prior to developing detailed construction documents.

It is recommended that the City designate a staff person or appoint a local organization to serve as the bicycle coordinator. Then, local residents know whom to contact when there are maintenance, connectivity, and general concerns for cyclists. This person would have the primary responsibility to implement the Master Plan by pursuing grant funds, coordinating with the Public Works or Engineering Department to incorporate bikeways into the Capitol Improvement Program (CIP), and updating the Master Plan as appropriate. Tasks for the bicycle coordinator may include:

- Pursuing grants for bikeway projects and bicycle programs.
- Participating in Imperial Valley Association of Governments (IVAG) bicycle committees and other regional transportation groups involved in funding programs and transportation planning.
- Coordinating and promoting bikeway education, incentives, and awareness programs and events.
- Serving as the contact person for bikeway questions and concerns.
- Reviewing the Regional Transportation Improvement Plan (RTIP) to ensure consistency with local and regional bikeways.
- Participating with IVAG in the developing the Regional Transportation Improvement Plan (RTIP) as it relates to bicycle facilities.
- Assembling and storing bicycle accident data, usage data, and other statistical bikeway data that may be used for grant funding applications.
- Maintaining a log of maintenance tasks, costs, and scheduled bikeway improvements.
- Serve as a clearing house for filtering community concerns, education materials and for coordinating volunteer groups.
- Review and provide an update of the Master Plan to the City Council at a minimum of every four years and forward to Caltrans for review and approval.

F. Bikeway Funding

Sometimes planning efforts are constrained by concern about limited implementation resources - why do a grand plan when there is no money to turn it into a reality?

However, projects that are part of comprehensive plans often have a competitive edge over stand-alone projects. Also, there are many different ways to combine funding and other resources. Federal, state and local government agencies invest billions of dollars every year in the nation's transportation systems. Only a fraction of that funding is in planning, designing and/or constructing bicycle facilities. In California, a percentage of the gas tax is allocated for bicycle facilities. Effective January 1, 1998, the State of California's Bicycle Transportation Account was increased from $360,000 a year to $5 million a year. A good resource for bicycle funding programs is "The 2nd Guide of the Guide to Bicycle Project and Program Funding in California" available through the California Bicycle Coalition at www.calbike.org.

Whether the City is trying to implement a comprehensive multi-year bicycle plan or complete a specific project, the following strategies and programs can help secure the resources needed, such as:

- Federal Funds and Programs
- State Funds
- Piggybacking
- New Development
- Partnerships

Federal Funds and Programs

In 1998, ISTEA funds were reauthorized by TEA-21 (Transportation Equity Act for the 21st Century). Funds for bicycle projects in Imperial County over the next six years should increase over the levels under ISTEA since 1992. Changes in TEA-21 include:

- The Surface Transportation Program (STP) will allocate funds of $320 million statewide for bike and pedestrian projects. This program requires a 20% local match funds. Information available at www.dot.ca.gov/hq/transprog/cmaqstp.htm

- The National Highway System (NHS) program provides funding for bicycle programs within Interstate corridors. Eligible projects include pedestrian and bicycle safety programs, program implementation, and identification of highway hazards. This program requires a 20% local match. Further information contact www.fhw.dot.gov/tea21/factsheets

- The Congestion Mitigation and Air Quality Improvements (CMAQ) information is available at www.dot.ca.gov/hq/transprog/reports/Official_CMAQ_Web_Page.htm

- National Recreational Trails Program provides $6 million statewide. Funds are available for recreational trails for use by bicyclists, pedestrians, and other non-motorized and motorized users. Projects must be consistent with a Statewide Comprehensive Outdoor Recreation Plan (SCORP). More information can be found at www.parks.ca.gov/grants/index.htm.

- The Hazard Elimination Program (HEP) offered through Caltrans includes funding for bicycling and walking hazards. Definition of a 'public road' now

expanded to include bikeways, pathways, and traffic calming measures.

- A new category, ***Transit Enhancements Program***, was created that calls for transit agencies in urbanized areas over 200,000 population to use 1% of their Urban Formula Funds for Transit Enhancements Activities. Up to $50 million per year may be available for pedestrian access, walkways, bicycle access, bike storage facilities, and bike-on-bus racks. The program calls for a 5% local match.

- ***Federal Lands Highway Program Fund*** - This Discretionary Program provides funding for any kind of transportation project (including pedestrian and bicycle facilities) that are within, provide access to or are adjacent to public lands. Facilities must be incorporated into the RTIP. Approximately $150 million per annum rising to $165 million in FY 2003. No match is required.

- ***Scenic Byways Program Fund*** - This program provides funding for the planning, design, and development of a State Scenic Byways Program. Funds may be used for the construction of facilities along the highway for the use of pedestrians and bicyclist, including pedestrian/bicycle access, safety improvements, and rest areas. Approximately $10 million annually is available statewide. A 20% local match is required.

State Funds and Programs

Planning provisions for states and MPOs have been streamlined, with bicycle and pedestrian needs to be given consideration in the development of regional transportation plans. Specific policies include directives to not approve any project or regulatory action that will have an adverse impact on non-motorized safety, unless a reasonable alternative route is provided or already exists.

The ones most relevant for bicycle and pedestrian planning include:

- ***Bicycle Transportation Account (BTA)*** – Available for jurisdictions with approved bicycle transportation plans and consistent with the local Regional Transportation Plans (RTP), this program funds projects, which demonstrate to improve the safety and convenience of commuter bicycling. No agency may receive more than 25% of the total funds appropriated. A local match of 10% is required. Additional information is available at www.dot.ca.gov/hq/LocalPrograms/

- ***Transportation Development Act (TDA)*** - One quarter cent of retail sales tax is returned to the county of origin. Up to two percent of funds can be set aside for pedestrian and bicycle facilities, and five percent can be spent for supplementing other funds to implement bicycle safety education programs. The local MPO distributes funds.

- ***Safe Routes to School*** - Funds programs for sidewalks and bicycle facilities, which directly benefit access to schools. A 10% match is required. Deadlines for

applications is May 31 and December 1 of each year. Individual applications cannot exceed $450,000. Contact www.dot.ca.gov/hq/LocalPrograms/

- ***Environmental Enhancement and Mitigation Program (EEM)*** - Funds are allocated to projects that offset environmental impacts of modified or new public transportation facilities and the acquisition or development of roadside recreational facilities, such as trails. A 20% match is required and a maximum application of $250,000. Grant applications are due in November of each year. Contact www.dot.ca.gov/hq/LandArch/eem/eemfram.htm

- ***Recreational Trails Program*** --This program provides up to 80% funding for assistance for acquisition, development, rehabilitation and maintenance of motorized and non-motorized recreation trails.

- ***Habitat Conservation Fund Grant Program*** - This program originates from the California Wildlife Protection Act of 1990 (Prop 117). Eligible projects include the acquisition of various types of wildlife habitats, enhancement and restoration of various Projects must be incorporated into the RTIP if they are regionally significant. The local match can not be a state source. Provides a maximum of $500,000 with 50% local match for construction of projects. Contact www.parks.ca.gov/grants/hcf.htm

- ***Land and Water Conservation Fund*** - The program provides grants to eligible local governments to protect open space and provide enhanced outdoor recreational opportunities. Land acquired form the program must be maintained in perpetuity for public open space and natural resource recreational purposes. Funding requests cannot exceed $200,000. Applications are due May 1. Contact www.parks.ca.gov/grants/wcf/wcf.htm

- ***Office of Traffic*** *Safety (OTS)* – Grants are provided to agencies for educational programs. Grants are due in October of each year. Contact www.ots.ca.gov

- ***Air Pollution Control District (APCD)*** – Each local Air Pollution Control District funds projects that can be determined to reduce air pollution through implementation. Grant applications and due dates vary by each individual Air Pollution Control District.

- **TransNet Local Sales Tax Program (Proposition A)**
  Proposition A is a local sales tax to fund transportation improvements. The tax generates $1 million annually. The funds are used to augment the available TDA funds. Proposition A funds are lumped with 2% TDA funds. No matching funds are required.

Piggybacking

It is more cost effective to include bicycle and pedestrian accommodations into a larger scale transportation project than it is to retrofit – or piggybacking on another project. Refer to the priority schedule and needs analysis in the Bicycle Master Plan to justify the accommodating cyclists in local road projects. If a road is being resurfaced, work with the implementation agency to restripe it to include bicycle lanes or wide curb lanes. If a bridge is being reconstructed, make sure cyclists and pedestrians will have a way to safely and comfortably get across it. If a transit stop is constructed, provide access for pedestrians and consider a bicycle rack to accommodate cyclists. Close coordination with planning, public works and engineering department staff, as well as IVAG and Caltrans can result in cost-effective improvements that benefit the entire community.

New Development

Another no-cost implementation strategy is to pass ordinances that require new developments to be designed in accordance with your bicycle and pedestrian plans. For example, ordinances and zoning can mandate including sidewalks, providing bicycle parking, designing streets that discourage speeding and building car parking facilities that minimize pedestrian conflicts at entrance and exit points.

Partnerships

There are various private organizations that provide funding for bicycle facility implementation projects. "Bikes Belong Coalition" funds up to $10,000 for approved projects. Contact www.bikewbelong.org. Recreational Equipment, Inc. (REI) also offer funding programs that improve recreational opportunities. Each application cannot exceed $2,500. Contact www.rei.com.

APPENDIX

A. SOURCES CONSULTED

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3. Bicycle Accident Data, City of Imperial Police Department, July 17, 2002.
4. California Air Resources Board, "Improving California Air Quality Through Increased Bicycling, California Bicycle Summit, March 5-6,1998
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22. Imperial Unified School District, 10 Year Student Enrollment Projection, Barbara Layaye, May 16, 2002.

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24. Meyer Mohaddes Associates, Imperial County Transit Vision Draft Report, January 2000.

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26. National Highway Traffic Safety Administration, Traffic Tech, January 2002.

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28. Pedestrian and Bicycle Information Center, "Bicycle Parking: Costs", "Bicycle Parking: The Basics", "Shared-Use Paths", September 5, 2002, www.bicyclinginfo.org

29. Revay, Tom, "Why Cyclists Run Red Lights", Massbike/Metro Boston, February 21, 2000.

30. U. S. Department of Transportation, "National Bicycling and Walking Study", Publication No. FHWA-PD-92-041.

31. Wachtel, Alan, "Bicycles and the Law: The Case of California".

32. Wallace Roberts & Todd, County of Imperial Bicycle Master Plan, 1999.

33. Wallace Roberts & Todd, City of El Centro Bicycle Master Plan, 2000.

B. FUNDING PROGRAM CONTACTS

Imperial Valley Association of Governments (IVAG)
940 West Main Street, Suite 208, El Centro, CA 92243
Contact: Rosa Lopez - (760) 482-4290

Caltrans, Office of Transportation Enhancement Activities
1120 N Street, Sacramento, CA 95814
Contact: Marsha Mason - (916) 654-5275

Caltrans, Division of State and Local Project Development
Office of Local Programs, P.O. Box 942874, Sacramento, CA 94274-0001
Contact: Mel Aros - (916) 653-8220

California Department of Transportation
Division of Planning, 1120 N Street, P.O. Box 942873, Sacramento, CA 95814
Contact: Donna Long - (916) 324-6514

Caltrans Division of Structures, Local Assistance and Programming Branch
1801 30th Street, Sacramento, CA 95816
Contact: Gene Cowley - (916) 227-8023

State Department of Parks and Recreation
P.O. Box 942896, Sacramento, CA 94296-0001
Contact: (916) 653-8803

Office of Traffic Safety
7000 Franklin Boulevard, Suite 440, Sacramento, CA 95823
Contact: Arthur L. Anderson - Director (916) 445-0527

Public Affairs Office, United States Forest Service Department
630 Sansome Street, San Francisco, CA 94111
Contact: Denise Mills-Ford - (415) 705-2703

Caltrans District Office, Caltrans Office of Bicycle Facilities
P.O. Box 942874, Sacramento, CA 94274-0001
Contact: Richard L. Blunden, Chief - (916) 653-0036

State Lands Commission
1807 13th Street, Sacramento, CA 95814
Contact: Mary Howe, (916) 322-5645

State of California Resources Agency
1416 Ninth Street, Suite 1311, Sacramento, CA 95814
Contact: Hal Waraas - (916) 653-9709

San Diego Area Air Pollution Control District
9150 Chesapeake Drive, San Diego, CA 92123
Contact: Dennis McGee - (619) 694-3307

Federal Highway Administration, Intermodal Division, Hep-50
400 Seventh Street, S.W., Room 3222, Washington, DC 20590
Contact: John C. Fegan - (202) 366-5007

C. Responses to Questionnaires distributed to local schools

D. Insert Chapter 1000

Student Bicycle Survey

City of Imperial Date of Interview: _____

School: Westside E.S. Person interviewed: A. Rood

Phone No.: _____

1. What is the current enrollment? 75
2. What is the projected enrollment? (For what period of time?) approximately 75 each year
3. What age does the school serve?
4. Could you estimate the number of students who bike daily to school? Ø
5. Are there restrictions to biking or does the school discourage biking? (such as too young or key safety concern)

   N/A
6. Why do you think students don't bike? Too far — (25 mi. from Imperial)
   We are located in the country. Students come from Ocotillo (20 miles away) & Imperial.
7. What are the key problems with biking to school?

   Too far
8. Where do you feel there should be bicycle lanes or bike paths?

   N/A
9. Does the school provide bike racks?

   N/A
10. Are the bike racks located in an area that the administration can watch over them?

    N/A
11. Other comments or suggestions?

We are just temporarily housed at Ben Hulse while construction is going on at Westside.

Student Bicycle Survey

City of Imperial Date of Interview: 4-15-02

School: Imperial High School Person interviewed: Jerry Johnson

Phone No.: (760) 355-3220

1. What is the current enrollment? 665
2. What is the projected enrollment? (For what period of time?) 700 Fall 2002
3. What age does the school serve? grades 9-12 14-18 yrs of age
4. Could you estimate the number of students who bike daily to school? 15
5. Are there restrictions to biking or does the school discourage biking? (such as too young or key safety concern) We do not allow bikes to be ridden on campus. However, we do not discourage riding bikes to school.
6. Why do you think students don't bike? Many of our students ride the bus.
7. What are the key problems with biking to school? potential problems: theft, traffic accidents
8. Where do you feel there should be bicycle lanes or bike paths? on Barioni Blvd.
9. Does the school provide bike racks? yes,
10. Are the bike racks located in an area that the administration can watch over them? yes

11. Other comments or suggestions?

TO: Karina Wolford

Student Bicycle Survey

City of Imperial Date of Interview: 4-15-02

School: Waggoner TL E.S. Person interviewed: Madeline Willis

Phone No.: 355-3266

1. What is the current enrollment? 553
2. What is the projected enrollment? (For what period of time?) 800 - 5 yrs.
3. What age does the school serve? 5-12 yrs.
4. Could you estimate the number of students who bike daily to school? 20-30 Bikes
   20-30 Scooters & skateboards
5. Are there restrictions to biking or does the school discourage biking? (such as too young or key safety concern) No restrictions
6. Why do you think students don't bike? Parents are concerned for their safety.
7. What are the key problems with biking to school? Heavy traffic on Joshua Tree St.
8. Where do you feel there should be bicycle lanes or bike paths?
   All the way down Joshua Tree Street.
9. Does the school provide bike racks? Yes
10. Are the bike racks located in an area that the administration can watch over them? Yes

11. Other comments or suggestions?

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 crossflow 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.

1001.2 Streets and Highways Code References - Chapter 8 - Nonmotorized Transportation

(a) Section 887 -- Definition of nonmotorized facility.

(b) Section 887.6 -- Agreements with local agencies to construct and maintain nonmotorized facilities.

(c) Section 887.8 -- Payment for construction and maintenance of nonmotorized facilities approximately paralleling state highways.

(d) Section 888 -- Severance of existing major nonmotorized route by freeway construction.

(e) Section 888.2 -- Incorporation of non-motorized facilities in the design of freeways.

(f) Section 888.4 -- Requires Caltrans to budget not less than $360,000 annually for nonmotorized facilities used in conjunction with the state highway system.

(g) Section 890.4 -- Class I, II, and III bike-way definitions.

(h) Section 890.6 - 890.8 -- Caltrans and local agencies to develop design criteria and symbols for signs, markers, and traffic control devices for bikeways and roadways where bicycle travel is permitted.

(i) Section 891 -- Local agencies must comply with design criteria and uniform symbols.

(j) Section 892 -- Use of abandoned right-of-way as a nonmotorized facility.

1001.3 Vehicle Code References - Bicycle Operation

(a) Section 21200 -- Bicyclist's rights and responsibilities for traveling on highways.

(b) Section 21202 -- Bicyclist's position on roadways when traveling slower than the normal traffic speed.

(c) Section 21206 -- Allows local agencies to regulate operation of bicycles on pedestrian or bicycle facilities.

(d) Section 21207 -- Allows local agencies to establish bike lanes on non-state highways.

(e) Section 21207.5 -- Prohibits motorized bicycles on bike paths or bike lanes.

(f) Section 21208 -- Specifies permitted movements by bicyclists from bike lanes.

(g) Section 21209 -- Specifies permitted movements by motorists in bike lanes.

(h) Section 21210 -- Prohibits bicycle parking on sidewalks unless pedestrians have an adequate path.

(i) Section 21211 -- Prohibits impeding or obstruction of bicyclists on bike paths.

(j) Section 21212 -- Requires a bicyclist under 18 years of age to wear an approved helmet.

(k) Section 21717 -- Requires a motorist to drive in a bike lane prior to making a turn.

(l) Section 21960 -- Use of freeway shoulders by bicyclists.

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 1.2 m paved roadway shoulders with a standard 100 mm 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 and pedestrian conflicts 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

Figure 1003.1A

Two-Way Bike Path on Separate Right of Way

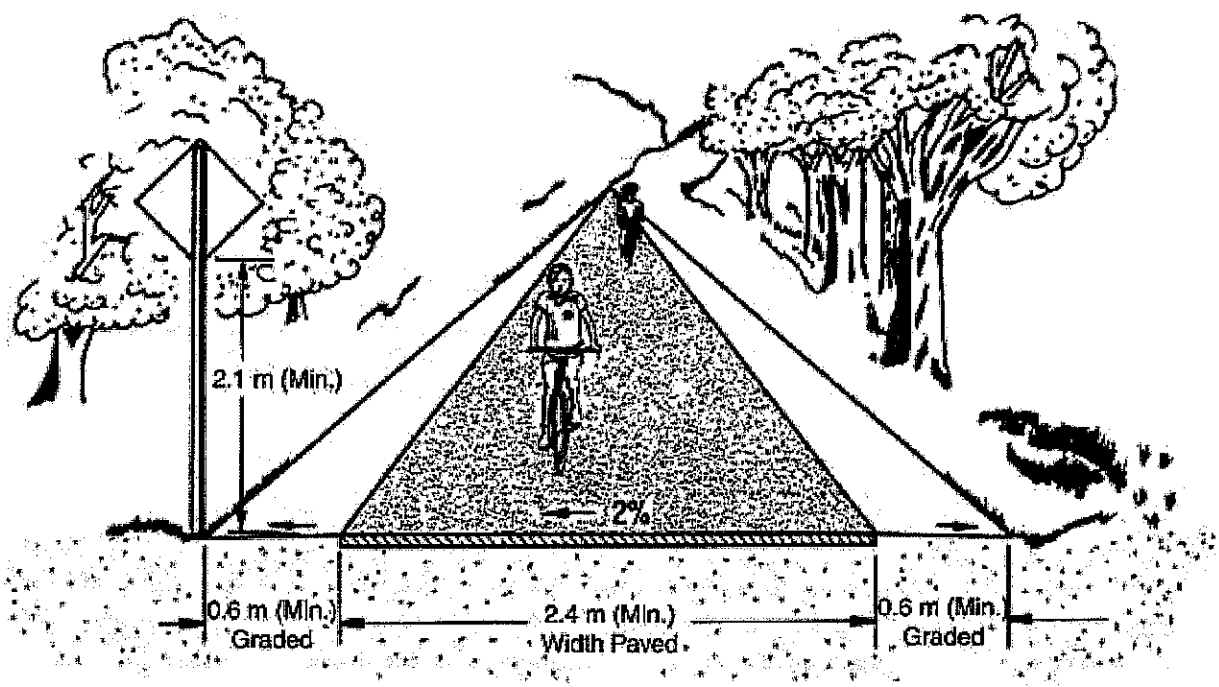
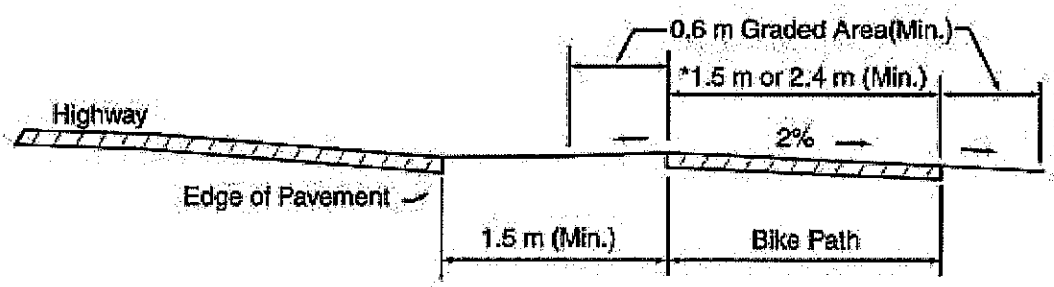


Figure 1003.1A

Typical Cross Section of Bike Path Along Highway



NOTE: See Index 1003.1(5)

*One - Way: 1.5 m Minimum Width
Two - Way: 2.4 m Minimum Width

For the above reasons, bike paths in the median of highways should be considered only when the above problems can be avoided. **Bike paths shall not be designed in the medians of freeways or expressways.**

(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 40 km/h except as noted in Table 1003.1.**

Table 1003.1

Bike Path Design Speeds

Type of Facility	Design Speed (km/h)
Bike Paths with Mopeds Prohibited	40
Bike Paths with Mopeds Permitted	50
Bike Paths on Long Downgrades (steeper than 4%, and longer than 150 m)	50

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

(8) *Horizontal Alignment and Superelevation.* The minimum radius of curvature negotiable by a bicycle is a function of the superelevation rate of the bicycle path surface, the coefficient of friction between the bicycle tires and the bicycle path surface, and the speed of the bicycle.

For most bicycle path applications the superelevation rate will vary from a minimum of 2 percent (the minimum necessary to encourage adequate drainage) to a maximum of approximately 5 percent (beyond which maneuvering difficulties by slow bicyclists and adult tricyclists might be expected). A straight 2% cross slope is recommended on tangent sections. The minimum superelevation rate of 2% will be adequate for most conditions and will simplify construction. Superelevation rates steeper than 5 percent should be avoided on bike paths expected to have adult tricycle traffic.

The coefficient of friction depends upon speed; surface type, roughness, and condition; tire type and condition; and whether the surface is wet or dry. Friction factors used for design should be selected based upon the point at which centrifugal force causes the bicyclist to recognize a feeling of discomfort and instinctively act to avoid higher speed. Extrapolating from values used in highway design, design friction factors for paved bicycle paths can be assumed to vary from 0.31 at 20 km/h to 0.21 at 50 km/h. Although there is no data available for unpaved surfaces, it is suggested that friction factors be reduced by 50 percent to allow a sufficient margin of safety.

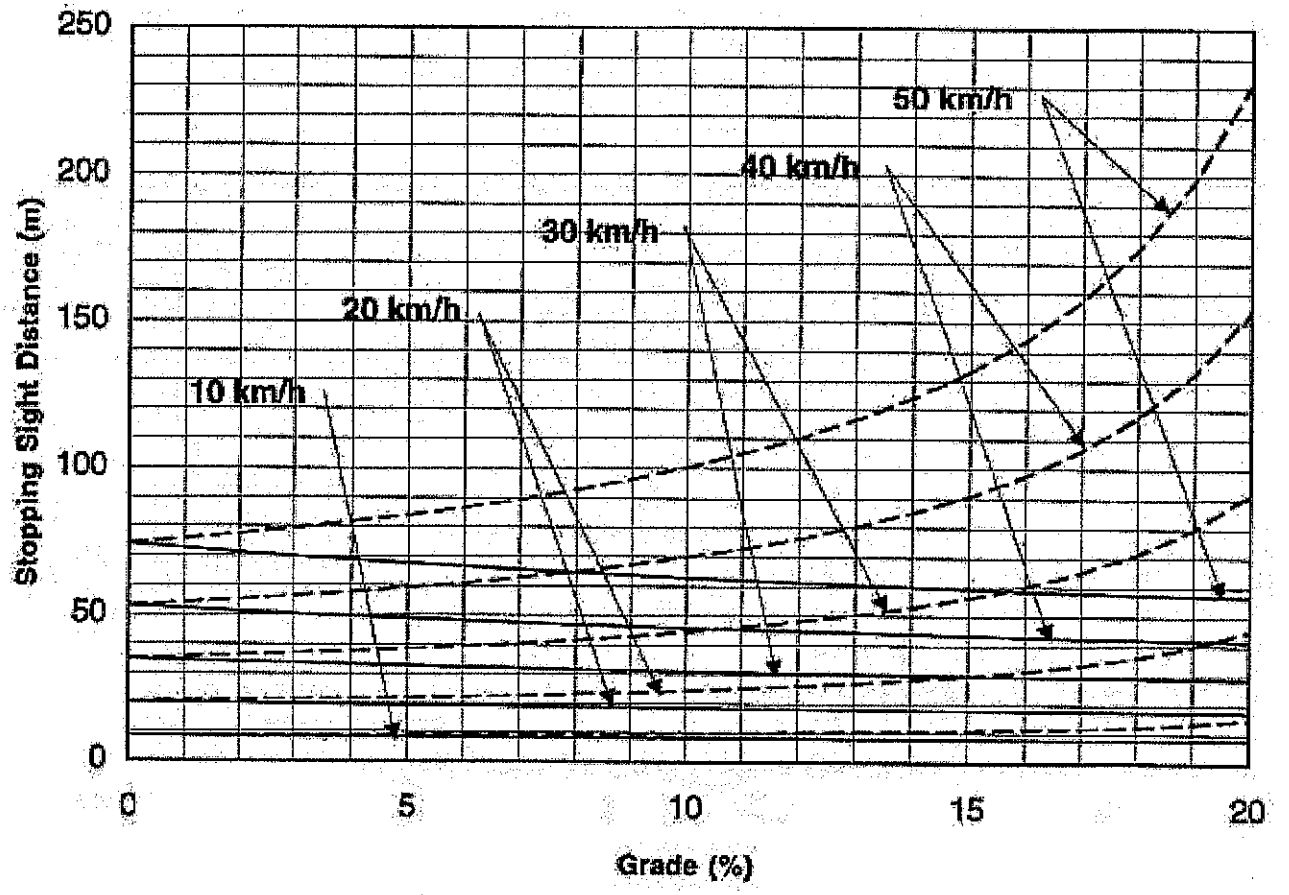
The minimum radius of curvature can be selected from Figure 1003.1C. When curve radii smaller than those shown in Figure 1003.1C must be used on bicycle paths because of right of way, topographical or other considerations, standard curve warning signs and supplemental pavement markings should be installed. The negative effects of nonstandard curves can also be partially offset by widening the pavement through the curves.

(9) *Stopping Sight Distance.* To provide bicyclists with an opportunity to see and react to the unexpected, a bicycle path should be designed with adequate stopping sight distances. The distance required to bring a bicycle to a full controlled stop is a function of the bicyclist's perception and brake reaction time, the initial speed of the bicycle, the coefficient of friction between the tires and the pavement, and the braking ability of the bicycle.

Figure 1003.1D indicates the minimum stopping sight distances for various design speeds and grades. For two-way bike paths, the descending direction, that is, where "G" is negative, will control the design.

Figure 1003.1D

Stopping Sight Distance



$$S = \frac{V^2}{254\,(f \pm G)} + \frac{V}{1.4}$$

Descend ------
Ascend ——

Where : S = stopping sight, m

V = velocity, km/h

f = coefficient of friction (use 0.25)

G = grade, m/m (rise/run)

Figure 1003.1E

Stopping Sight Distances for Crest Vertical Curves

$L = 2S - \frac{450}{A}$ when $S > L$

$L = \frac{AS^2}{450}$ when $S < L$

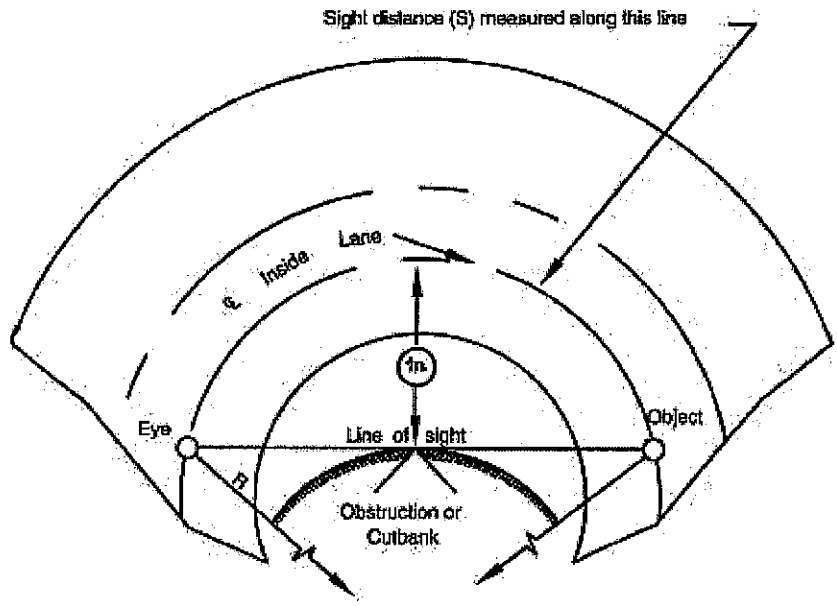
Height of cyclist eye - 1400 mm
Height of object - 100 mm

Double line represents S=L
L = Min. length of vertical curve - meters
A = Algebraic grade difference-%
S = Stopping sight distance - meters
V = Design speed km/h (Refer to Figure 1003.1D to determine "V", after "S" is determined.

GIVEN "A" AND "L"; FIND "S"

A (%)	L=50 m S (m)	L=100 m S (m)	L=150 m S (m)	L=200 m S (m)	L=250 m S (m)	L=300 m S (m)
4.5	75					
5	70	95				
5.5	66	90				
6	63	87				
6.5	60	83				
7	57	80	98			
7.5	55	77	95			
8	53	75	92			
8.5	51	73	89	103		
9	50	71	87	100		
9.5	49	69	84	97		
10	47	67	82	95		
10.5	46	65	80	93		
11	45	64	78	90		
11.5	44	63	77	88	99	
12	43	61	75	87	97	
12.5	42	60	73	85	95	
13	42	59	72	83	93	
13.5	41	58	71	82	91	
14	40	57	69	80	90	98
14.5	39	56	68	79	88	96
15	39	55	67	77	87	95

Figure 1003.1F
Lateral Clearances on Horizontal Curves



S = Sight distance in meters.
R = Radius of ℄ of lane in meters.
m = Distance from ℄ of lane in meters.
V = Design speed for S in km/h.
(Refer to Figure 1003.1D to determine "V", after "S" is determined.)

Angle is expressed in degrees

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

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

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

Line of sight is 600 mm above ℄ inside lane at point of obstruction.

GIVEN "R" AND "S"; FIND "m"

R (m)	S=10 m *m* meters	S=20 m *m* meters	S=30 m *m* meters	S=40 m *m* meters	S=50 *m* meters	S=60 m *m* meters	S=70 m *m* meters	S=80 m *m* meters	S=90 m *m* meters	S=100 m *m* meters	S=110 m *m* meters
25	0.50	1.97	4.37	7.58	11.49	15.94	20.75	25.73	30.68	35.41	39.72
50	0.25	1.00	2.23	3.95	6.12	8.73	11.76	15.17	18.92	22.99	27.32
75	0.17	0.67	1.50	2.65	4.13	5.92	8.02	10.42	13.10	16.06	19.28
100	0.12	0.50	1.12	1.99	3.11	4.47	6.06	7.90	9.96	12.24	14.75
125	0.10	0.40	0.90	1.60	2.49	3.58	4.87	6.35	8.01	9.87	11.91
150	0.08	0.33	0.75	1.33	2.08	2.99	4.07	5.30	6.70	8.26	9.97
175	0.07	0.29	0.64	1.14	1.78	2.57	3.49	4.55	5.75	7.10	8.57
200	0.06	0.25	0.56	1.00	1.56	2.25	3.06	3.99	5.04	6.22	7.52
225	0.06	0.22	0.50	0.89	1.39	2.00	2.72	3.55	4.49	5.53	6.69
250	0.05	0.20	0.45	0.80	1.25	1.80	2.45	3.19	4.04	4.98	6.03
275	0.05	0.18	0.41	0.73	1.14	1.63	2.22	2.90	3.67	4.53	5.48
300	0.04	0.17	0.37	0.67	1.04	1.50	2.04	2.66	3.37	4.16	5.03
350	0.04	0.14	0.32	0.57	0.89	1.29	1.75	2.28	2.89	3.57	4.31
400	0.03	0.13	0.28	0.50	0.78	1.12	1.53	2.00	2.53	3.12	3.78
500	0.03	0.10	0.23	0.40	0.62	0.90	1.22	1.60	2.02	2.50	3.02
600	0.02	0.08	0.19	0.33	0.52	0.75	1.02	1.33	1.69	2.08	2.52
700	0.02	0.07	0.16	0.29	0.45	0.64	0.87	1.14	1.45	1.79	2.16
800	0.02	0.06	0.14	0.25	0.39	0.56	0.77	1.00	1.27	1.56	1.89
900	0.01	0.06	0.13	0.22	0.35	0.50	0.68	0.89	1.12	1.39	1.68
1000	0.01	0.05	0.11	0.20	0.31	0.45	0.61	0.80	1.01	1.25	1.51

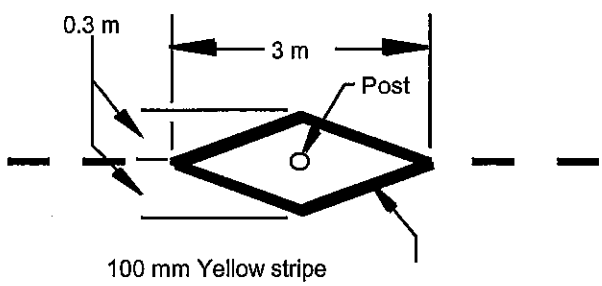
(15) Barrier Posts. It may be necessary to install barrier posts at entrances to bike paths to prevent motor vehicles from entering. When locating such installations, care should be taken to assure that barriers are well marked and visible to bicyclists, day or night (i.e., install reflectors or reflectorized 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 1.5 m 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.

Figure 1003.1G

Barrier Post Striping



(16) Lighting. Fixed-source lighting reduces conflicts along paths and at intersections. In addition, lighting allows the bicyclist to see the bicycle path direction, surface conditions, and obstacles. Lighting for bicycle paths is important and should be considered where riding at night is expected, such as bicycle paths serving college students or commuters, and at highway intersections. Lighting should also be considered through underpasses or tunnels, and when nighttime security could be a problem.

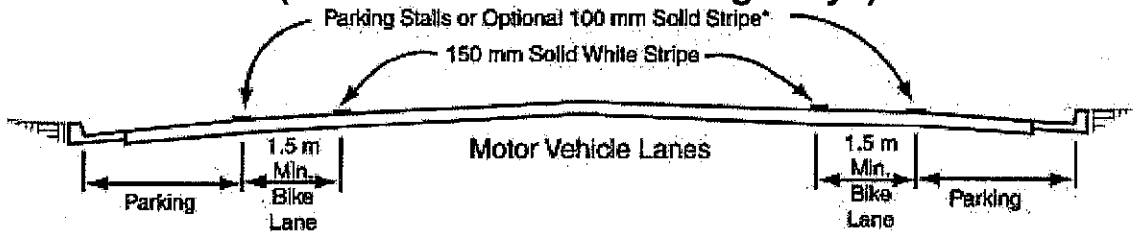
Depending on the location, average maintained horizontal illumination levels of 5 lux to 22 lux should be considered. Where special security problems exist, higher illumination levels may be considered. Light standards (poles) should meet the recommended horizontal and vertical clearances. Luminaires and standards should be at a scale appropriate for a pedestrian or bicycle path.

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.

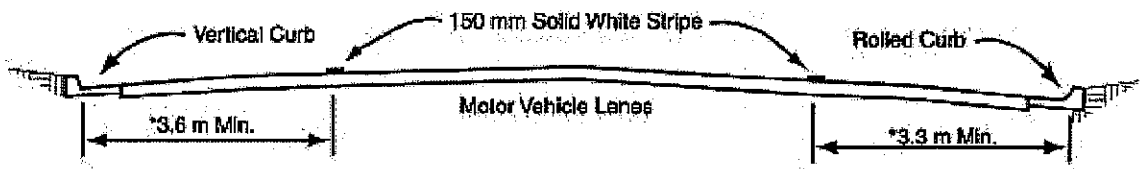
Class II bike lanes shall be one-way facilities. Two-way bike lanes (or bike paths that are contiguous to the roadway) are not permitted, as such facilities have proved unsatisfactory and promote riding against the flow of motor vehicle traffic.

Figure 1003.2A
Typical Bike Lane Cross Sections
(On 2-lane or Multilane Highways)



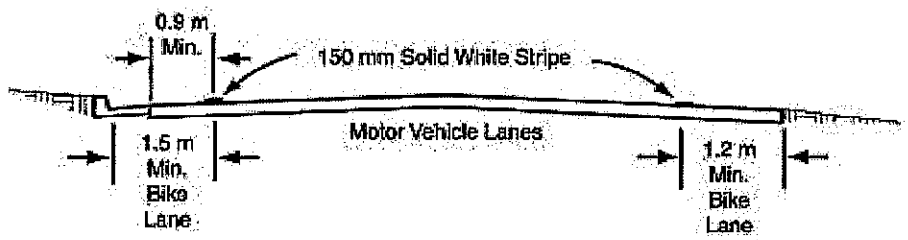
*The optional solid white stripe may be advisable where stalls are unnecessary (because parking is light) but there is concern that motorists may misconstrue the bike lane to be a traffic lane.

(1) STRIPED PARKING

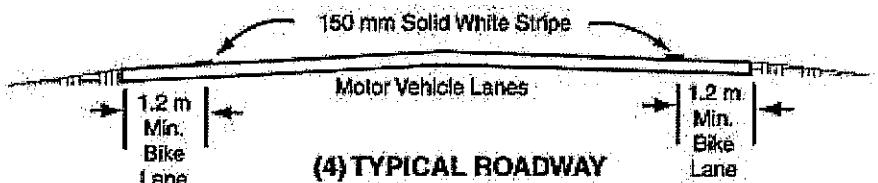


* 3.9 is recommended where there is substantial parking or turnover of parked cars is high (e.g. commercial areas).

(2) PARKING PERMITTED WITHOUT PARKING STRIPE OR STALL



(3) PARKING PROHIBITED



(4) TYPICAL ROADWAY IN OUTLYING AREAS PARKING RESTRICTED

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. 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.

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.

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). See Figure 1003.2D for bicycle loop detector pavement marking.

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.

(4) *Interchange Design.* As with bikeway design through at-grade intersections, bikeway design through interchanges should be accomplished in a manner that will minimize confusion by motorists and bicyclists. Designers should work closely with the local agency in designing bicycle facilities through interchanges. Local Agencies should carefully select interchange locations which are most suitable for bikeway designations and where the crossing meets applicable design standards. The local agency may have special needs and desires for continuity through interchanges which should be considered in the design process.

When a bike lane approaches a ramp intersection that intersects the local facility at or close to 90° (typical of a compact or spread diamond configuration), then Figure 1003.2C may be the appropriate method of getting bike lanes through the interchange.

However, when a bike lane approaches one or more ramp intersections that intersect the local facility at various angles other than 90° (typically high-speed, skewed ramps), Figure 1003.2E should be considered.

Figure 1003.2E, shows a bike lane through a typical interchange. The 150 mm bike lane stripe should be dropped 30 m prior to the ramp intersection as shown in the figure to allow for adequate weaving distance. **The shoulder width shall not be reduced through the interchange area. The minimum shoulder width shall match the approach roadway shoulder width, but not less than 1.2 m or 1.5 m if a gutter exists. If the shoulder width is not available, the designated bike lane shall end at the previous local road intersection.**

Depending on the intersection angles, either Figure 1003.2C or 1003.2E should also be used for multilane ramp intersections. Additionally, the outside through lane should be widened to 4.2 m when feasible. This allows extra room for bicycles to share the through lane with vehicles. The outside shoulder width should not be reduced through the interchange area to accommodate this additional width.

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.

Figure 1003.2C
Bike Lanes Approaching Motorist
Right-turn-only Lane

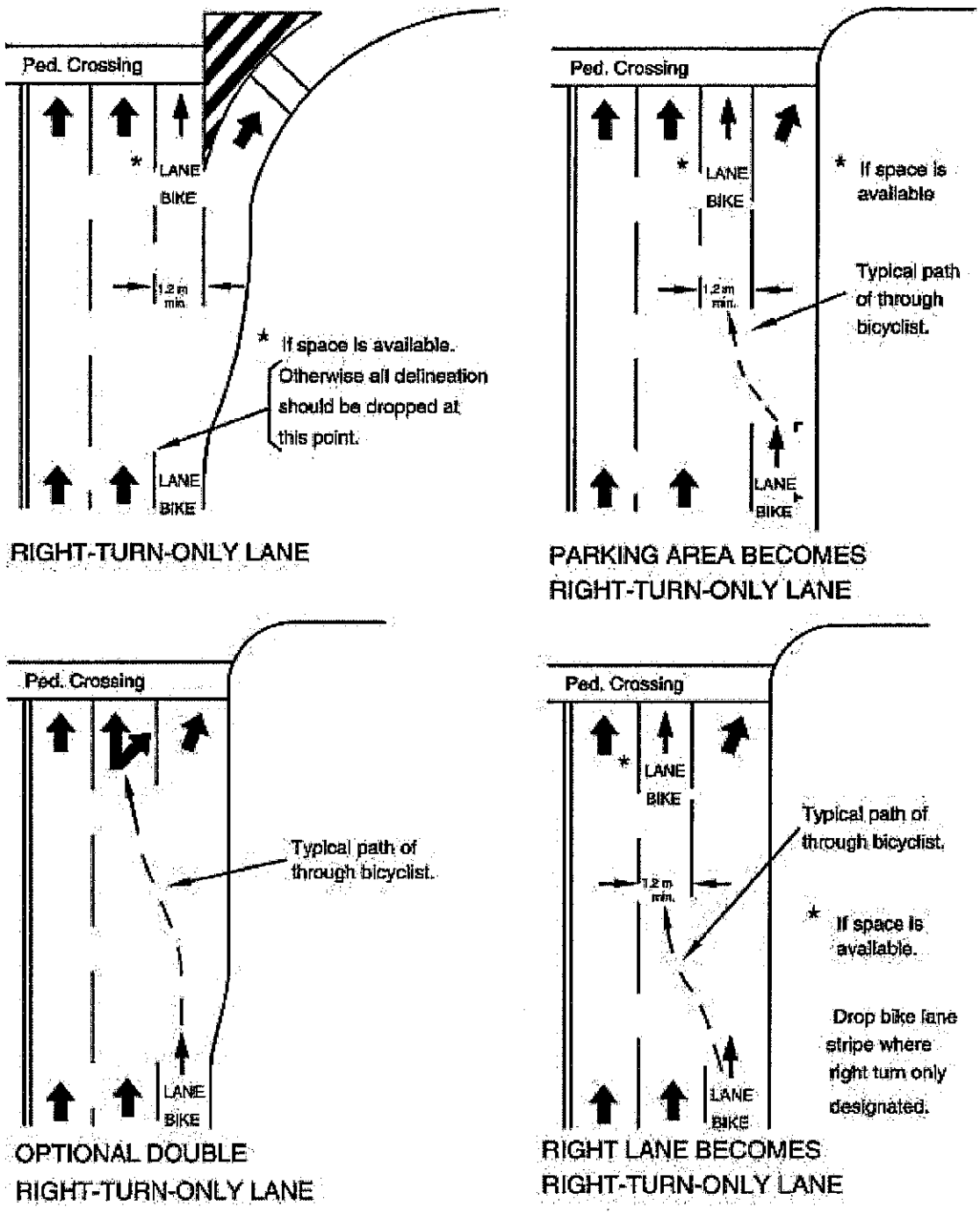
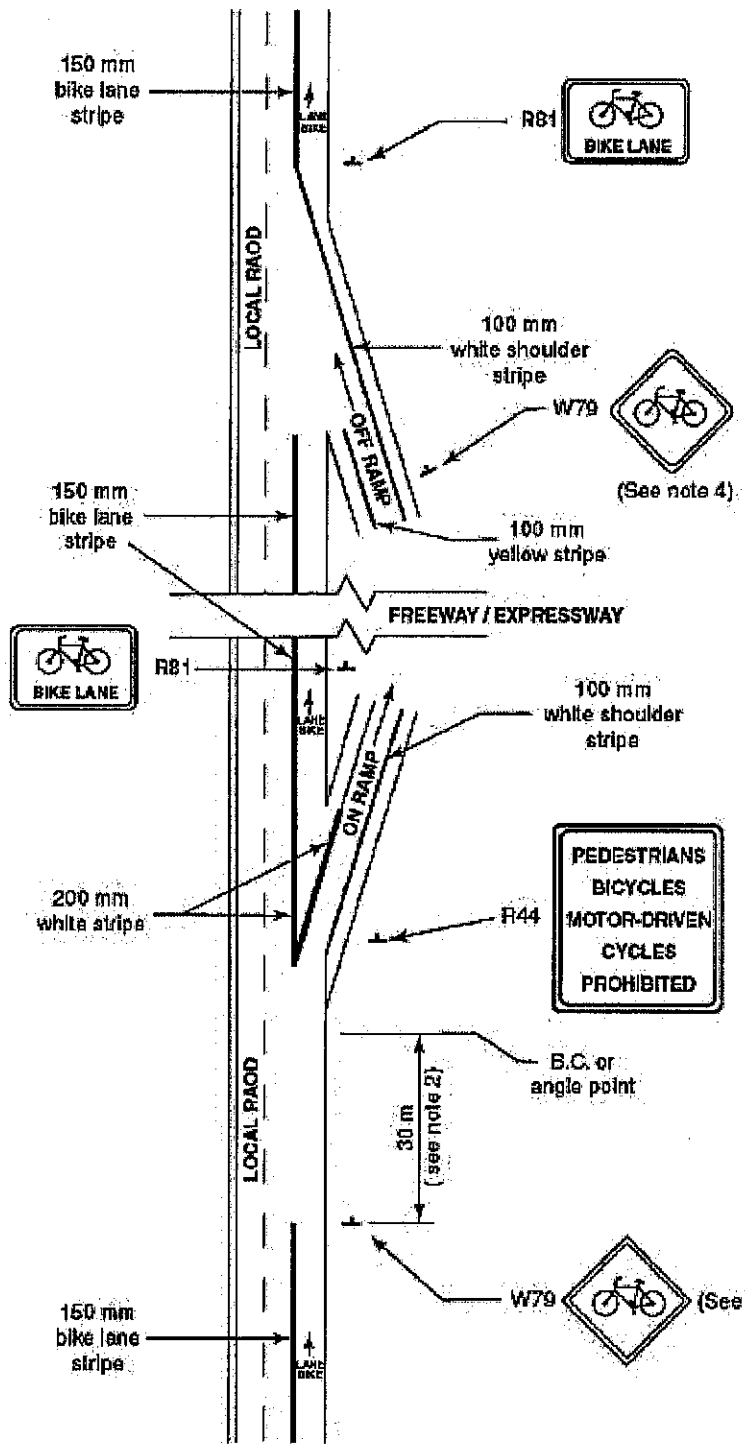


Figure 1003.2E

Bike Lanes Through Interchanges



Notes:

1.) See Index 1003.2 (4) for additional information.

2.) At additional on-ramps within the interchange the signing & striping as shown shall be repeated. Where the on-ramps intersect at the local road at or near 90 degrees, the striping should follow Figure 1003.2C.

3.) The shoulder width shall not be reduced through the interchange area. The minimum shoulder width shall match the approach roadway shoulder width, but not less than 1.2 m or 1.5 m if a gutter exists. If the shoulder width is not available, the designated bike lane shall end at the previous local raod intersection.

4.) The W79 signs are optional and should be used only when determined appropriate by the Engineer.

5.) See Index 1003.3 (4) for information on Bike Routes Through Interchanges.

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.

(4) Interchange Design As with bikeway design through at-grade intersections, bikeway design through interchanges should be accomplished in a manner that will minimize confusion by motorists and bicyclists. Designers should work closely with the local agency in designing bicycle facilities through interchanges. Local Agencies should carefully select interchange locations which are most suitable for bikeway designations and where the crossing meets applicable design standards. The local agency may have special needs and desires for continuity through interchanges which should be considered in the design process.

Figure 1003.2E may also be used where the preferred designation is a class III (bike route), with the R81 signs being replaced with G93 signs and the bike lane delineation eliminated. A 100 mm stripe may be used to delineate the shoulder through out the bike route designation. **Within the Interchange area the bike route shall require either an outside lane width of 4.8 m or a 3.6 m lane and a 1.2 m shoulder. If the above width is not available, the designated bike route shall end at the previous local road intersection.**

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. However, a freeway should not be opened to bicycle use if it is determined to be incompatible. The Headquarters Traffic Liaisons and the Project Development Coordinator must approve any proposals to open freeways to bicyclists.

If a suitable alternate route exists, it would normally be unnecessary to open the freeway. However, if the alternate route is unsuitable for bicycle travel the freeway may be a better alternative for bicyclists. In determining the suitability of an alternate route, safety should be the paramount consideration. The following factors should be considered:

- Number of intersections
- Shoulder widths
- Traffic volumes
- Vehicle speeds
- Bus, truck and recreational vehicle volumes
- Grades
- Travel time

When a suitable alternate route does not exist, a freeway shoulder may be considered for bicycle travel. Normally, freeways in urban areas will have characteristics that make it unfeasible to permit bicycle use. In determining if the freeway shoulder is suitable for bicycle travel, the following factors should be considered;

- Shoulder widths
- Bicycle hazards on shoulders (drainage grates, expansion joints, etc.)
- Number and location of entrance/exit ramps
- Traffic volumes on entrance/exit ramps

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 and exits (see Chapter 4 of the Traffic Manual).

Where no reasonable alternate route exists within a freeway corridor, the Department should coordinate with local agencies to develop or improve

Separate highway overcrossing structures for bikeway traffic shall conform to Caltrans' standard pedestrian overcrossing design loading. The minimum clear width shall be the paved width of the approach bikeway but not less than 2.4 m. 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 6 mm from the lower edge of a 2.4 m 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 12 mm wide	No more than 10 mm high
Perpendicular to travel	---	No more than 20 mm 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, 25 mm x 6 mm steel cross straps should be welded to the grates at a spacing of 150 mm to 200 mm on centers to reduce the size of the openings adequately.

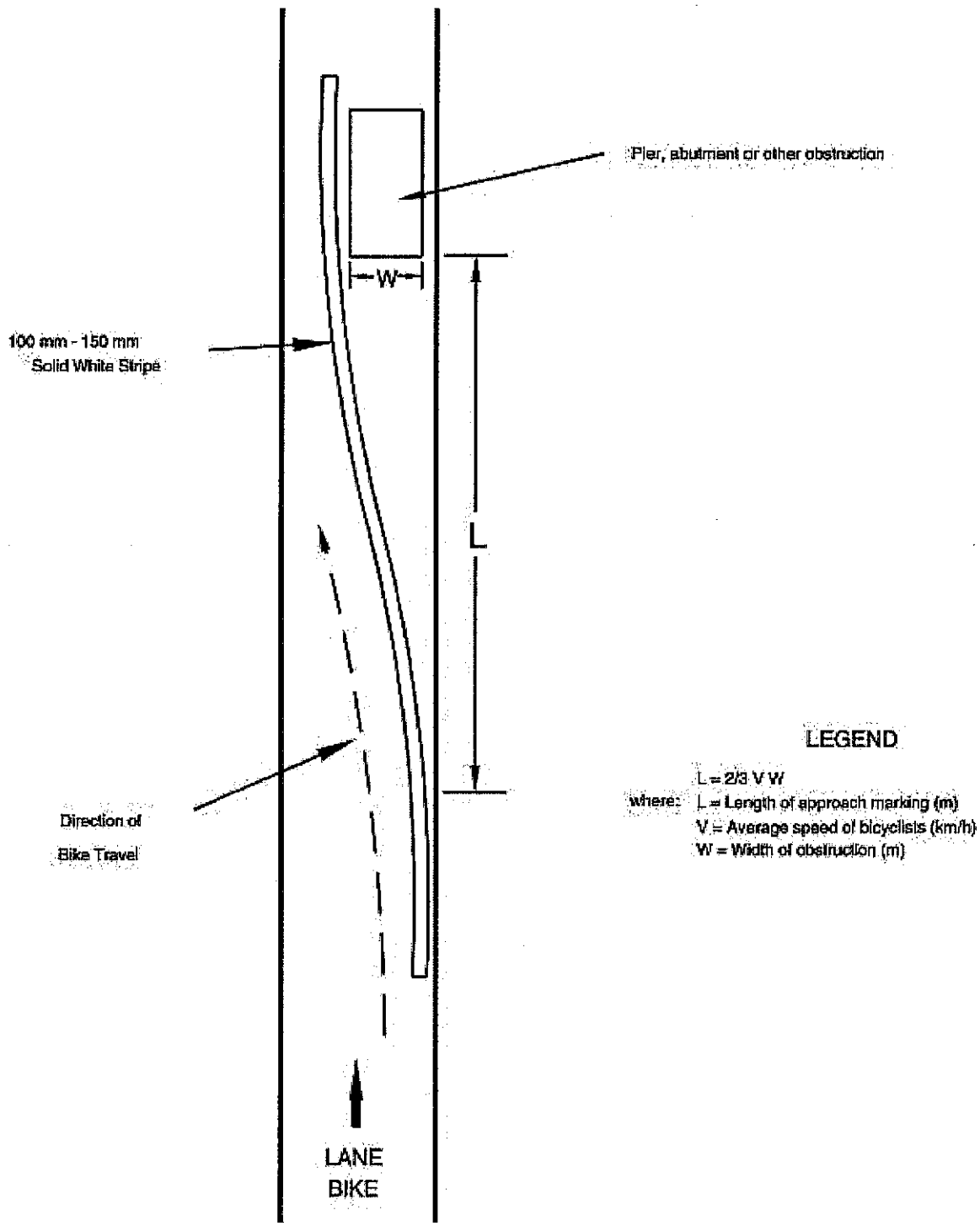
Corrective actions described above are recommended on all highways where bicycle travel is permitted, whether or not bikeways are designated.

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 15 mm.

(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.

Figure 1003.6B

Obstruction Markings



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 100 mm 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 1004.5. 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 1004.4
Bike Lane Symbol