Bikeway Master Plan

Prepared for the

City of Carlsbad

by

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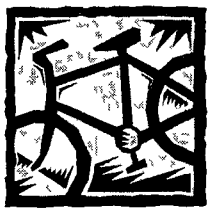

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1-EXECUTIVE SUMMARY

1 1 Significant Findings

From a bicycle commuting perspective, Class 2 lanes (marked lanes on existing roadways) are usually preferred over Class 1 (separated bike trails) or Class 3 (routes marked by signage only) facilities This is primarily because Class 1 trails are generally used by recreationists such as walkers, joggers skaters and cyclists with limited cycling experience, all of which combine to make Class 1 trails less desirable for commuting Class 1 facilities are also much more difficult and expensive to build, which has typically resulted in phased and piecemeal route systems

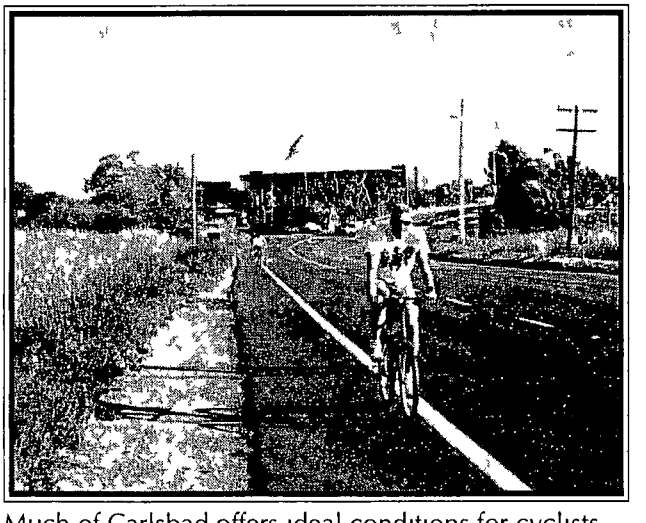
Class 1 facilities, however, are important to non-commuting cyclists They are perceived to be safer facilities which may encourage people to use their bikes, even if at first they are using the trails only for recreational purposes These individuals may, in time, decide to use other bikeway facilities for commuting purposes Also, a trail system such as that proposed for the Coastal Rail Trail may actually provide a more direct and faster route for commuters This is due, in part, to the limited number of roadway crossings, minimal traffic control devices and relatively flat grades

Other Class 1 facilities may play an important part in providing more direct connections throughout the community Due to the topography and natural open spaces in Carlsbad, cyclists face a large number of bikeway system gaps Class 1 trails may provide the only possible short cuts between Class 2 lanes Some of these off-street routes could be implemented in conjunction with Carlsbad's programmed trails According to survey questionnaire results and observed use of "unofficial" routes, there is considerable demand for this type of route

The majority of the City of Carlsbad's existing major roadways are well served by on-street Class 2 bicycle facilities In addition, virtually all future major roadways or extensions will also be equipped with Class 2 lanes Full implementation of the programmed roadways and their associated Class 2 facilities will provide a comprehensive on-street bicycle facility system However, there are a number of planned arterials as yet unbuilt, especially in the hilly southeastern portion of the city, creating significant gaps in Carlsbad's bicycle facility system This lack of routes is only a minor inconvenience for motor vehicle drivers, but cyclists are required to make longer, more indirect trips than they would prefer

Several problems consistently constrain bicycle use in Carlsbad The most common constraints to bicycle use result from narrow bridges, lack of crossings over barriers such as highways and rail lines, and topography Especially in the southeastern and east central portions of the city, long and often steep grades are common Also, many of Carlsbad's existing Class 2 roadways have relatively high posted motor vehicle speeds Experienced cyclists are generally not concerned with adjacent motor vehicle speeds, especially when they can rely on the relative safety of their own lane However, less experienced cyclists are more likely to find such conditions uncomfortable and are therefore less likely to use these roadways

Finally, site-specific problems encountered in Carlsbad are not numerous, but a few locations have conditions detrimental enough to a safe bicycle facility system to warrant special attention (These were at State Street/ Carlsbad Boulevard, Carlsbad Boulevard/Palomar Airport Road, and Tamarack Avenue/Pio Pico Drive) Though the vast majority of intersections do not pose a threat to competent cyclists in Carlsbad, these three were singled out for further analysis Personal experience and field work revealed these locations posed special challenges, even for experienced cyclists A common thread running through the layout of these locations was that they were intersections with motor vehicle traffic merging without sufficient advance notice for cyclists or motorists to beware of each others presence, whether by line of sight or by signed warnings, or both



Much of Carlsbad offers ideal conditions for cyclists

1 2 Recommendations

These recommendations are intended to take advantage of programmed roadways, bicycle facilities and trails to resolve cyclists' concerns for safety and connectivity

A primary recommendation for this study is to provide improved connectivity via increased access points across the rail right-of-way and I-5 While the northern portion of Carlsbad will have a sufficient number of points to cross I-5, programmed plans do not include many rail line crossings Crossings at Chestnut Avenue and Chinquapin Avenue would help to alleviate the connectivity issues for this area

A second primary recommendation is the addition of several Class 1 off-street routes in the undeveloped areas of Carlsbad User questionnaire responses indicate there is a considerable demand for this type of route

A third primary recommendation is that the programmed roadways with associated Class 2 lanes should be implemented as soon as possible, but that some of the recommended Class 1 routes could supplement the Class 2 lanes until they are actually built These routes, once built, may be able to remain adjacent to the extended roadways

Carlsbad currently has no Class 1 facilities, but the potential exists for creating a Class 1 trail system throughout the city (See Figure 10-5, Proposed Bikeway Facil ity Map) Since Carlsbad already has an extensive Class 2 system, and since there is a substantial amount of land designated as open space without Class 1 routes through them, most of the new routes shown on the map are Class 1 trails Several of the proposed system's Class 1 facilities would fall at least partially within the rights-of way of programmed roadways Class 1 facilities could be provided until the roadways are actually built, or be permanently installed and offset as far as possible from the roadways

Opportunities exist for the installation of several Class 1 facilities that would not only provide the relaxed recre ational atmosphere associated with off-street facilities, but would also improve commuter connections Normally, Class 2 facilities are preferred for transportation or commuting purposes However, if no roadways exist through a relatively large area, Class 1 facilities will be useful to commuters Together, these facilities would fill in many of the gaps in the current system where topog raphy and lack of facilities currently limit access

The proposed Class 1 routes would be paved paths officially designated as Class 1 routes, and designed for multipurpose use versus the generally unpaved surface treatment endorsed for most informal trail facilities The paths should be wide enough (12 feet minimum) to accommodate multiple user types and should include an unpaved side path (2 to 4 feet) for users who prefer a softer trail The Class 1 path is not in addition to any proposed soft surface trail, but would replace it where the trails coincide Paving is recommended for these specific routes within the context of the overall trail system to maximize their value for recreational and transportational cycling throughout Carlsbad

Proposed Class 1 facilities would connect several existing and programmed parks in the central portion of the city The proposed Class 1 facilities would also intersect with other proposed trails and allow connection via those trails with several other parks around the periphery of the city

A major Class 1 facility that will be running through the City of Carlsbad is the Coastal Rail Trail A recommendation is made to design proposed rest stops to be purposefully specific to Carlsbad to help to distinguish the City from other municipalities along the route They would occur at three scenic points along the Coastal Rail Trail within Carlsbad and would be equipped with a number of amenities for cyclists

In conjunction with Rail Trail development, the areas immediately surrounding transit stations in Carlsbad are proposed to have enhanced urban design amenities to highlight the importance of the stations The existing design elements of these transit centers could be expanded throughout the urban design zones, with progressively more detail as users got closer to the transit center themselves The urban design detailing could form relatively concentric zones of certain elements, beginning with landscaping, for example, and layering on the other amenities such as lighting, paving, fencing and site structures, culminating in a zone immediately around the transit center with all proposed amenities, as well as site structures that resemble the existing transit center buildings, but on a smaller scale

Public art is recommended for inclusion within the Coastal Rail Trail development and may be particularly appropriate at the transit stations, within the special urban design zones and at the proposed rest stops For example, interpretive features at the rest stops could be designed to be part of the public art and take advantage of the views

The lagoons provide an opportunity for an extensive scenic recreational trail system that could also provide more direct bicycle transportation access than is now possible between the central and coastal sections of Carlsbad This is especially true for Batiquitos Lagoon, for example, where the nearest current roadways to the north and south have either significant grades or experience high motor vehicle traffic volumes and high speeds A trail along the northern shore would provide a scenic connection and would be a convenient and relatively level link between coastal Carlsbad and the La Costa area Agua Hedionda Lagoon presents a similar case where a trail along the shore could connect the major employment center around Palomar Airport with downtown Carlsbad This paved trail along the Agua Hedionda Lagoon could also connect coastal Carlsbad to the Carrillo Ranch site in eastern Carlsbad and continue on to connect to trail systems in San Marcos and Vista

The City of Carlsbad has an almost complete system of Class 2 bikeways along its major roadways, and plans to install Class 2 facilities on the as-yet unbuilt roadways as well Implementation of the programmed major roadways will provide greater choice in Class 2 routes between relatively isolated sections of Carlsbad Full implementation of the programmed Class 2 facilities would provide a relatively complete Class 2 system

A general improvement to the Class 2 facilities is the provision of more roadway width on freeway and rail line bridges and underpasses It is common for bikeway facilities to end prior to where the roadway crosses a bridge and to have the curb pinch inward, eliminating the previously available space for cyclists In addition, many bridges have excessively high curbs that could potentially catch a cyclist's pedals, especially if the cyclist was attempting to stay far to the right to avoid the motor vehicles on a narrow bridge In general, there are a number of solutions short of the ideal, which would be to actually widen the bridges In some cases, the lanes could be restriped, the sidewalk width decreased or a lane of traffic eliminated In other situations where high motor vehicle volumes and limited width create particularly difficult cycling situations, alternative routes could be provided

Carlsbad has some Class 3 facilities, but several roadway segments are currently listed within the SANDAG data base as parts of "proposed routes" and "existing undesignated routes" that could be upgraded to Class 3 These possible Class 3 routes could link proposed trails along the shores of two lagoons and provide an attractive route through residential neighborhoods The roadway segments proposed for these routes are, for the most part, not subject to heavy traffic

For example, Chestnut Avenue is not currently designated as a bikeway This street connects Carlsbad Boulevard to El Camino Real, unimpeded except for the rail line It runs almost entirely through residential neighborhoods and generally has low motor vehicle traffic volumes It has definite potential as a Class 3 facility and is recommended for designation, especially if a crossing can be implemented where it intersects the rail line

Though it will consider new crossings on a case-by-case basis, the Public Utilities Commission (PUC) prefers no net increase in crossings, meaning that it is desirable to close an old crossing when proposing a new one In some cases, the City can install new crossings if it is willing to take liability for them The PUC will be more likely to grant permission for a new crossing that can be proven to be substantially safer than the unofficial one it is replacing

Finally, suggested solutions for the site-specific problems (State Street/Carlsbad Boulevard, Carlsbad Boulevard/Palomar Airport Road, and Tamarack Avenue/Pio Pico Drive) range from simply restriping the approaches to these intersections to completely reconfiguring them For example, the most drastic solution would be at the Palomar Airport Road /Carlsbad Boulevard interchange, where a distinct motor vehicle bias makes cycling through it an uncomfortable undertaking The problems with this interchange can probably only be resolved by completely reconfiguring the intersection and eliminating some of the high speed on and off ramps This is now a programmed project that is slated to rebuild the interchange as a standard intersection more condusive to all modes of transportation, not just motor vehicles

2 - INTRODUCTION

This bikeway master plan is intended to guide bicycle facility planning for the City of Carlsbad The process included evaluating existing roadways and bicycle facilities using conventional field techniques, computerized geographic information systems, survey questionnaires and a bicycling suitability formula The plan recommends revisions to existing facilities, construction of new facilities and an implementation program The plan also includes general design and engineering guidelines for the development of these facilities

2 1 Project Scope

The scope of this project included documenting and evaluating the existing bicycle facility system of the City of Carlsbad and its relationship to other existing systems such as mass transit, and recommending improvements wherever appropriate

Based on observation, experience and research, a number of potential problems related to bikeways have been encountered A number of categories of typical problems were evaluated and noted while performing field work They included problems such as high speed merging arterials or high speed merge lanes (such as freeway on and off ramps), roadways with rapidly narrowing lanes (such as at bridges), on-street parking (especially on narrow roadways), uncontrolled left turns, high speed right turn lanes, and situations with significant roadway speed differentials between motor vehicles and bicycles

A more complete review of the types of analysis undertaken during field work can be found in Figure 8-6, Roadway Segment Suitability The data were further refined to include specific criteria used to determine a roadway segment's bicycle suitability using an equation described in Section 8 3 2, Roadway Segment Suitability Equation

2 2 Project Study Area

The project study area was specifically within the City of Carlsbad Surrounding communities were analyzed where an adjoining community's bicycle systems indicated opportunities for connections with Carlsbad's (See Figure 2-1, Project Location)

2.3 Methodology

The project methodology included a literature review of applicable documents, field work, a mail-in survey questionnaire and geographic information systems (GIS) analysis of the field work data Carlsbad's existing bikeway system was analyzed for a number of factors using both traditional field survey and GIS techniques

2 3 1 Literature Review

A literature review was conducted of applicable excerpts from documents relevant to this bikeway master plan These documents were from the City of Carlsbad, adjacent communities, the County of San Diego, and a variety of specialized bicycling publications In addition, the gathering of data for the project GIS data base could be considered part of the traditional literature review Data were acquired from San Diego Association of Governments (SANDAG), the County of San Diego and the City of Carlsbad (See Chapter 3, Background Information)

2 3 2 Field Work

All roadway segments with an existing bicycle facility, as well as a number of additional segments, were inventoried at least once by the project team via bicycle because it was felt that a cyclist's perspective was important to understanding the condition of the bikeway system in Carlsbad Observation items examined within each segment were the presence or absence of bicycle facilities, posted speed limit, number of travel lanes, estimated outside lane width, and the presence of specific paving and roadway conditions that could adversely affect cycling, such as rough paving or steep grades (See Figure 8-6, Roadway Segment Suitability)

Roadways were divided into segments at points where sufficient variation occurred in roadway configuration to warrant regarding a segment as different from adjoining segments Such variations included changes in the number of lanes, posted speed limits, roadway widths, or presence or absence of bicycle facilities

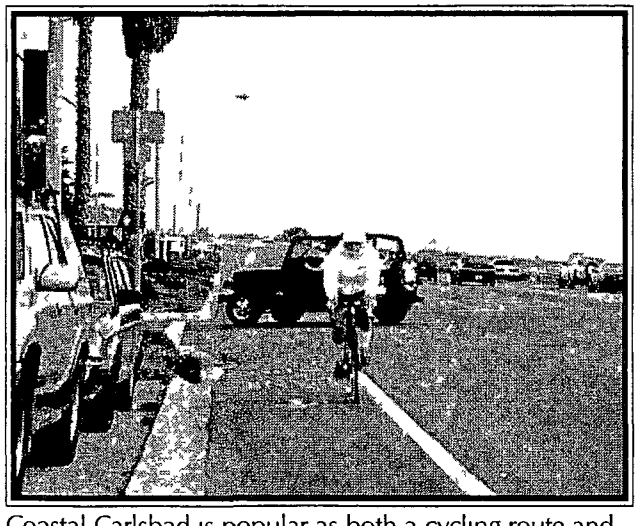
2 3 3 Survey Questionnaire

A questionnaire was produced and distributed primarily through local bicycle shops and bicycle advocacy groups It was a single sheet with informational and attitudinal questions on the front and a map of the current bikeways as indicated in the City of Carlsbad's Circulation Element on the back side This map included instructions to the respondent to indicate which routes they used most frequently, where they would like to see new routes, which routes they did not use and why (See Section 8 5, User Questionnaire Response and Analysis)

2 3 4 Geographic Information Systems (GIS)

An industry textbook describes GIS as "An organized collection of computer hardware, software, geographic data and personnel designed to efficiently capture, store, update, manipulate, analyze and display all forms of geographically referenced information " While this definition is technically accurate, it is rather cryptic for the layperson Basically, a GIS is a computerized map with various types of associated information attached to specific places on the map Using a computer system configured for the purpose, a user can query the GIS about the place in question and selectively call up its associated information A GIS is much more than just a computer system for making maps It is an analytical tool that allows the user to identify spatial relationships between map features

A GIS does not store a map in the conventional sense, nor does it store a particular image or view of a geographic area Instead, a GIS stores the data from which a user can draw a desired view to suit a particular purpose (The majority of the maps in this report were generated from a single data base compiled specifically for this project) With a computer system capable of holding and using data describing specific features on a map, a user can overlay a number of related data layers to represent the many interrelated characteristics of the feature in question The real value of GIS is its ability to overlay information from multiple sources over a map feature, often revealing relationships that would not otherwise have been noticeable Several data sources were used to contribute to the GIS data base for this project Land use data was acquired from SANDAG and roads and trails from the County's Regional Urban Information System (RUIS)



Coastal Carlsbad is popular as both a cycling route and destination, even though it contains a large number of parking areas and suffers from periodic congestion

2.4 Project Approach and Goals

The overall approach for this master plan is summarized in the following paragraphs The approaches listed below also constitute the planning goals for this study

- The bicycle master plan should be integrated into all transportation plans, especially if the proposed bicycle facilities will use general purpose roads shared with other forms of transportation The planning efforts should include the integration of various modes of transportation including transfers between modes at transit centers and park and ride facilities
- The aim of planning for bicycles should not be focused on any particular facility type so much as it should be focused on the safe and efficient travel of cyclists This will generally require both the use of the existing transportation infrastructure and the construction of special facilities for cyclists
- The maintenance of bicycle facilities and the monitoring and assessment of their performance are critical for ensuring safe and efficient travel for cyclists Planning for cyclists is an ongoing process
- The coexistence of cyclists and drivers on roads requires that both are sensitive to and recognize a common set of rules Training, education and enforcement are as important as physical planning and design
- It is imperative that a "bicycle perspective" guide any planning for cyclists The bicycle has its own characteristics, constraints and opportunities that the planner must consider This must be combined with the recognition that cyclists do not form a homogeneous group in terms of age, ability, experience or traffic judgment
- An integration of land use planning and transportation planning is needed in order to support future projects that are not intensively dependent on the automobile This study needs to take into account future land use and population projections and provide bicycle facilities to help decrease auto dependence

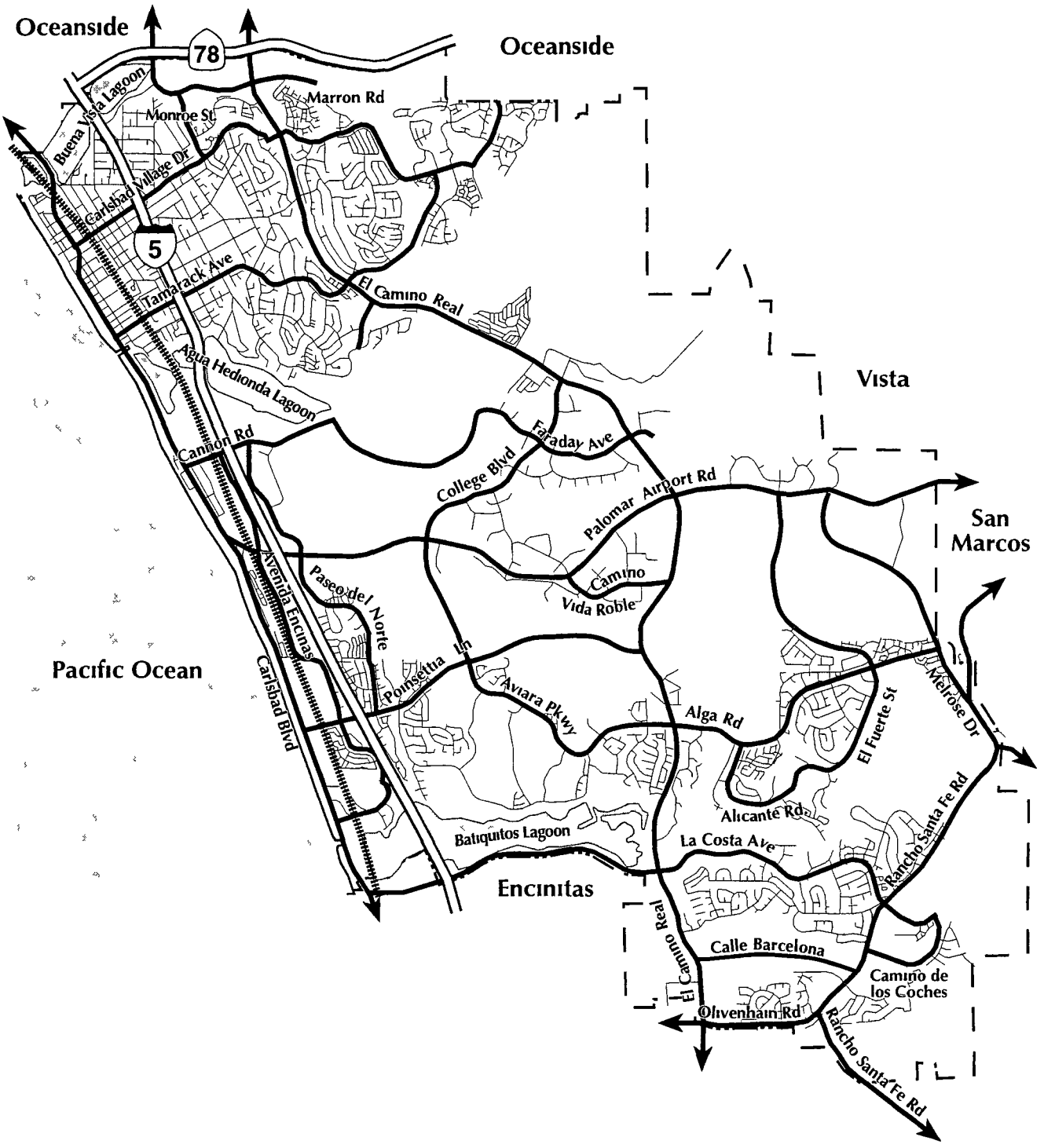
2 5 Project Definitions

To prevent the confusion that can occur when referring to bikeways, bicycle lanes, bicycle routes, bicycle trails or bicycle paths, the Caltrans standard for referring to bikeway facility types is used throughout this document (See Figure 2-2, Bikeway Facility Types)

- Class 1 Bicycle path physically separated from vehicular roadway intended specifically for non-motorized use
- Class 2 - On street bicycle lane designated by striping and signage
- Class 3 On street bicycle route designated by signage only
- Undesignated An additional category defined as locally recommended on-street bicycle routes that appear on bikeway maps only

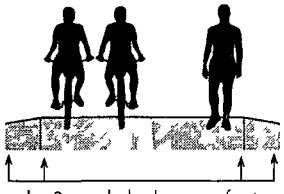
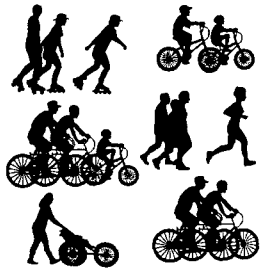
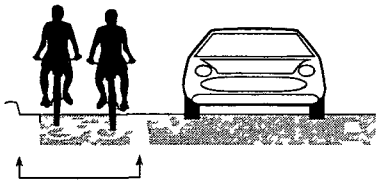
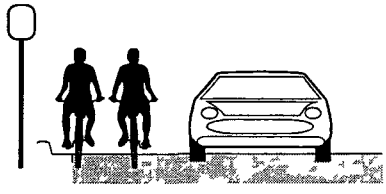
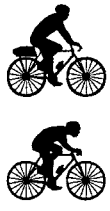
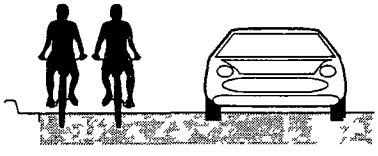
PROJECT LOCATION
CITY OF CARLSBAD BIKEWAY MASTER PLAN

Figure 2-1



BIKEWAY FACILITY TYPES
CITY OF CARLSBAD BIKEWAY MASTER PLAN

Figure 2-2

	Typical Sections	Locational Criteria	Typical Users
Class I (Bike Path or Bike Trail)	 (8 paved + 2 graded edge min for two way) (Greater width recommended where high bike volumes or high levels of mixed use occur)	Separate right-of way away from motor vehicular traffic Used where adjacent roadway speeds and ADTs are too high for safe joint use, for connections through open space areas and parks or where no other facility type is feasible	 Kids, Family Recreational, Adult Exercise, Skaters, Joggers, Recreational Walkers, Exercise Walkers
Class II (Bike Lane or Bikeway)	 (5 min total width where curb occurs) (Wider bike lane recommended where bike volumes are high)	Within vehicular right of way, but typically delineated by warning symbols and striping Used where roadway speeds and ADTs may be fairly high, but where adequate roadway width is available Directness and number of users are significant factors	 Adult Recreational, Commuters and Serious Cyclists
Class III (Bike Route)	 (Wider than standard outside lane recommended)	Within vehicular right of way, but typically delineated by directional signage only Used where roadway speeds and ADTs are fairly low, and where route directness and number of users is not likely to be significant Primarily for route directions on suggested roadways	 Commuters and Serious Cyclists
Undesignated	 (No modifications required)	Within vehicular right-of-way, but not signed or delineated except in bikeway maps Used where roadway speeds and ADTs are quite low, and where route directness and number of users is not likely to be significant Used to informally connect other facilities	 Kids, Family Recreational, Commuters and Serious Cyclists

3-BACKGROUND INFORMATION

3 1 Carlsbad Circulation Element

A Circulation Element is required by state law (Government Code Section 65032(b)) and must consist of "the general location and extent of existing and proposed major thoroughfares, transportation routes, terminals, and other public utilities and facilities, all correlated with the Land Use Element of the General Plan " The Circulation Element must state the overall goals, objectives and policies concerning the circulation needs of the City and specifically address issues relating to major thoroughfares, transportation routes, terminals and other local public utilities and facilities The City of Carlsbad's Circulation Element also addresses issues of public transit, bicycle and pedestrian facilities, railroads and light rail transit, air travel, parking, transportation demand management, vehicular and pedestrian safety

The City of Carlsbad's Circulation Element is most closely related to, and is a reflection of, the Land Use Element of the General Plan The Circulation Element was developed in conjunction with computerized traffic modeling and analysis utilizing the projected land uses contained in Carlsbad's Land Use Element, as well as the land use plans of surrounding communities

The comprehensive nature of the Circulation Element requires that it relate to and correlate with all other elements of the General Plan including the Noise, Housing, Open Space and Conservation, Parks and Recreation, and Public Safety Elements All these elements address various aspects of the circulation system and together they provide the basic policies and guidelines for the development of a safe, efficient and aesthetically pleasing transportation network

3 1 1 Setting

Carlsbad's dominant natural and man-made features, which establish the framework within which the circulation network must function, include the Pacific Ocean to the west, the three natural lagoons extending from the ocean to the interior of the City, the steep hills and canyons which punctuate the eastern half of the City, Highway 78 along the northern boundary, the Coast Highway, the San Diego Northern Railway and Interstate 5 along the coast These features all serve to separate the coastal portion of the City from the interior portion

There are five prime arterials (ADTs $\geq$ 40,000) in the City (See Figure 2-1, Project Location)

- El Camino Real
- Palomar Airport Road
- Melrose Drive
- Olivenhain Road
- Rancho Santa Fe Road

There are also six major arterials (ADTs = 20,000 to 40,000)

- Alga Road
- Cannon Road
- Carlsbad Boulevard
- College Boulevard
- La Costa Avenue (west of El Camino Real)
- Poinsettia Lane

Given the existing topographic constraints, the City has developed an integrated land use and circulation plan to take advantage of the natural land form features and the existing transportation facilities A major challenge for the City in the future will be to complete the remaining roadway segments of the Circulation Element in a timely manner within a climate of increasingly strict environmental guidelines The City must also find ways to refine the existing circulation network in the developed portions of the City to accommodate increased redevelopment activity and the development of surrounding communities Finally, it is recognized that the City circulation system is a part of the larger regional, state and national transportation systems As such, the City circulation system will continue to be influenced by the demands placed upon it by larger transportation system needs

3 1 2 Circulation Goals and Objectives

Goals

- A City with an integrated transportation network serving local and regional needs which accommodates a balance of different travel modes based on safety convenience attractiveness, costs, environmental and social impacts
- A City with an adequate circulation infrastructure to serve the projected population
- A City with a comprehensive network of roads which provides appropriate access to all land uses
- A City with properly maintained, smooth functioning and safe traffic control systems

Objectives

- To provide an adequate circulation infrastructure concurrent with or prior to the actual demand for such activities
- To design streets for the safe and efficient movement of people, goods and services within and through the City in the most environmentally sound and aesthetically pleas ing manner possible
- To enhance the economic value of property and improve the economic competitiveness of the City through the construction of well designed, efficient, and cost effective transportation facilities

Alternative Modes of Transportation

Goal

- A City which promotes, encourages, and accommo dates a variety of transportation modes as alternatives to the automobile

Objectives

- To provide infrastructure and facilities necessary to ac commodate pedestrians, bicycles and other non automo bile modes of transportation
- To reduce the number and severity of vehicular, bicycle and pedestrian-related accidents

Implementing Policies and Action Programs

- Install sidewalks and trail systems within existing and new industrial developments
- Encourage school districts to implement safety programs for pedestrians and bicyclists within the public school system
- Employ improved traffic control devices and monitor police accident reports to increase pedestrian and bicyclist safety
- Coordinate the location of bicycle routes with the Parks and Recreation Element and the Open Space and Conservation Element
- Extend bicycle routes to cultural educational and recreational facilities whenever possible
- Develop and implement employer incentive programs to encourage the placement of strategic bicycle storage lock ers (or other secure bicycle parking) and the construction of safe and convenient bicycle facilities
- Design bicycle routes in accordance with "Bicycle Route Standards" Chapter 1000 of the State of California High way Design Manual
- Improve bicycle access to beach areas
- Review, periodically the Circulation Element Bicycle Route Map and revise, as necessary, to reflect existing roadway conditions and changed land uses
- Provide linkage to bus, pedestrian and bicycle routes from any new light rail commuter transit facility
- Encourage passive and active use of the railroad right of-way as trail linkage and bicycle pathway

Scenic Roadways

Goal

- A City which preserves and enhances the visual environmental and historical characteristics of the local community through sensitive planning and design of transportation and utility corridors

Objectives

- To enhance the scenic, environmental and historical qual ity of roadways in conjunction with the Circulation, Open Space and Conservation, and Park and Recreation Ele ments of the General Plan
- To establish a route map identifying existing and future scenic roadway railroad and utility corridors within the City
- To consider a system of routes and special treatments to increase the enjoyment of and opportunities for recre ational and cultural pursuits and tourism in Carlsbad
- To provide a process for the establishment of convenient and safe scenic routes to major recreational areas and points of historic, scenic or cultural significance
- To provide multiple recreational uses, such as bikeways, roadside rests and observation points, when appropriate, on lands within and adjacent to designated scenic corri dors, and provide a means of coordinating scenic road ways with other transportation and recreational opportu nities within the City

3 1 3 Implementing Policies and Action Programs

Establish four categories of scenic corridors and designate streets to be included within those categories as follows

Community Theme Corridors - connect Carlsbad with adjacent municipalities and present the City of Carlsbad to persons entering and passing through the community Community Theme Corridors include

- El Camino Real
- Carlsbad Boulevard
- Palomar Airport Road
- La Costa Avenue
- Melrose Drive

Community Scenic Corridors - interconnect major subareas of the present and planned Carlsbad community Community Scenic Corridors include

- College Boulevard
- Cannon Road
- Carlsbad Village Drive
- Faraday Avenue
- Interstate 5
- La Costa Avenue
- Olivenhain Road/Rancho Santa Fe Road
- Poinsettia Lane/Carrillo Way

Natural Open Space and Recreation Corridors - offer spectacular views of waterscapes, land forms, wildlife, and the Pacific Ocean Natural Open Space and Recreation Corridors include

- Adams Street/Park Drive
- Batiquitos Drive
- Jefferson Street (portion adjacent to Buena Vista Lagoon)

Railroad Corridor - presents the City of Carlsbad to people passing through the City by rail The only Rail Corridor is

- San Diego Northern Railway

Include roadways as scenic routes which provide significant views of the ocean, lagoons, open space lands, back country and urban activity

3 1 4 Regional Circulation Considerations

Goals

- A City with a transportation system which helps minimize air pollution and traffic congestion and supports commerce and economic development

- A City which participates with other cities in the County, through the San Diego Association of Governments, in working toward the solution of regional transportation issues

Objective

- To participate with other cities in the County in developing the Regional Growth Management Strategy which addresses air quality transportation system management, and transportation demand management for San Diego County on a "regional community" basis

3 2 Carlsbad Open Space and Conservation Element

Under State law, cities must adopt both Open Space and Conservation Elements, which the City of Carlsbad chose to combine into one comprehensive element because of their strong interrelationship There is also a relationship between the Circulation and Noise Elements in that larger open space buffers and setbacks are encouraged along designated scenic roadway corridors, which not only provide visual open space, but help to mitigate noise from roadway traffic Such corridors are often feasible options for bikeway development as well, both because of their desirability as efficient and scenic bicycle routes and their generally ample right-of-way widths

The City of Carlsbad's Open Space and Conservation Element relates to its Parks and Recreation Element in that parks are considered necessary and beneficial open space uses Because parks are often considered to be activity centers, their inclusion is typically a concern in bikeway master planning It is often desirable to con nect parks with available open space corridors as part of recommended bikeway system development since neighborhood parks usually serve as localized recreational "hubs "

The Open Space and Conservation Element of the General Plan establishes policies for the development of a comprehensive, connected open space system and for the protection and conservation of the City's natural and historic resources The Open Space and Conservation Element divides open space types into five categories including Category 3 Open Space for Outdoor Recreation This category is further subdivided into eight sub categories, the applicable ones being Greenways, Pub lic Parks/Recreation Areas and Trails The inclusion of the Equestrian Facilities category could also be applicable

Public Parks/Recreation Areas are described as those parks and recreation areas for access to park and recreation sites, lake shores, beaches, lagoons, lakes, ponds, rivers, streams, estuaries and coastal bluffs and cliffs

Greenways are described as the links between major recreational and open space areas, including the recreational use of utility easements, railroad corridors, banks of rivers and streams or scenic highways

Trails are listed as areas for walking, hiking, biking, and skateboarding, including associated improvements such as staging areas, picnic areas and viewpoints

Category 4 Open Space for Aesthetic, Cultural and Educational Purposes, is defined as buffers between land uses, including larger setbacks and greenbelts providing separation from surrounding communities (Though not likely to be as important as Open Space for Outdoor Recreation for this study, such areas are another potential consideration and could provide critical connectivity)

3 3 Carlsbad Open Space and Conservation Resource Management Plan

The Open Space and Conservation Resource Management Plan deals almost exclusively with off-street trails as links between recreational opportunities such as park sites and key natural resource areas A secondary concern was to provide an alternative non-vehicular transportation system throughout the City On-street bikeways are included only where absolutely necessary to connect trail segments where no other method is feasible Though unpaved trails are likely to be a component of any bikeway master plan, the majority of proposed routes normally emphasize on-street facilities with due consideration of viable off-street paved routes and destinations

3 3 1 Introduction to the Plan

Over the past three years the City of Carlsbad has conducted a variety of studies aimed at defining a potential trail system and understanding what the implications of pursuing such a system would be The Carlsbad Trails Feasibility Study, completed in 1990, concluded that a trail system was physically and financially viable As a result, a proposed Carlsbad Trail System has been included as a major component of this Open Space and Conservation Resource Management Plan

3 3 2 Physical Implications

There are a number of landscape resources distributed throughout the City which have high intrinsic aesthetic quality and also form representative examples of the natural landscape of the City Protection of these resources within open space will serve to perpetuate the high quality environment to which the City aspires Access to these resources via a trail system will enhance the recreational opportunities for City residents while allowing them to retain a connection with and to develop an understanding of the natural landscape upon which their community is built

The City is undeveloped over enough of its land area that the majority of the trail system can be achieved through integration of trail needs with future development planning A large proportion of the trail segments in undeveloped areas pass through large single land ownerships or Master Plan areas In these cases, the implementation of the trail system should be especially easy provided trail needs are identified early enough in the planning and negotiation process

In those areas of the City which are already built up, potential exists to complete the citywide trail network through the improvement of existing open space corridors In a small number of cases, trail linkages will only be possible along sidewalks and through the use of bicycle lanes within the right-of-way

The City has a range of natural resources including water bodies, riparian habitat, chaparral and coastal sage scrub, and naturalized tree groves which have varying capacity to accommodate human land uses The trail system must be sited and designed so as to avoid negative impacts on these resources In particular, the wetland and riparian areas of the City and areas of chaparral and scrub with sensitive and/or rare and endangered species will be carefully treated In assessing the physical feasibility of the system, these resources were considered If the City decides to implement the trail system, full environmental review will have to be part of the planning and design process on each proposed project

3 3 3 Issues Summary

The City should monitor trail use and be prepared to restrict mixed bicycle and pedestrian use where the busiest areas of the trail system are determined to create adverse impacts due to mixed use

The City should establish and maintain periodic contact with surrounding jurisdictions to ensure that the linkages necessary to achieve a regionally connecting trail system are effected

3 4 Carlsbad Trail System

The 1990 Trails Feasibility Study commenced with the alignments indicated on the 1989 Comprehensive Open Space Network Map produced as part of the Citizen's Committee to Study Open Space The intention was to link together key recreational opportunities in the City including park sites and key natural resource areas A secondary concern was to provide an alternative non-vehicular transportation system throughout the City For all alignments, the first choice of location was to be in an unimproved open space corridor away from any roadway The second choice was to locate the trail within a power line easement Third choice was to locate the trail within its own right-of-way parallel to a roadway Only where none of these options was available does the trail system use sidewalks and bicycle lanes to connect together open space linkages

3 4 1 Trails and Community Parks

One of the objectives of the trail system was to connect to the various existing and proposed community parks located throughout the City The system developed in this plan connects all the following sites

- Hosp Grove Park
- Larwin Park*
- Calavera Park
- Veterans Memorial Park*
- Poinsettia Park
- Alga Norte Park*
- Carrillo Ranch
- Stagecoach Park

*Planned not yet existing

In addition, Hosp Grove and the area around Lake Calavera are under consideration as Special Resource Areas In both cases, the intent of a trails oriented Special Resource designation would be to provide an unimproved natural area for hiking and bike use

3 4 2 Classification

The trail system includes 74 miles of pedestrian, bicycle and joint use trails, of which 61 miles are unpaved hiking and bicycle paths

The proposed trail system indicates joint use by bicycles and pedestrians of both paved and unpaved paths The design standards for the paved paths show a minimum width of 12 feet which conforms to the Caltrans standard of joint use However, in some cases it is possible that joint use of the eight foot wide unpaved trails could be dangerous if, for example, particularly heavy use was made of a trail segment The City may need either to restrict use to pedestrians only, for example, or construct an additional parallel path within the right-of-way and use signage to keep pedestrians and cyclists separated

3 4 3 Signage and Interpretive Information

An important component of the trails improvement will be the provision of adequate signage Three primary types are envisioned for the Carlsbad trail system They include trail markers at one mile intervals and at trail junctions, signboards at staging areas, and interpretive signage at viewpoints In general, the City should develop a consistent signage standard for the trail system describing both what specific information will be communicated and the design of the signs and markers to be used

3 5 Surrounding Communities

The City of Carlsbad is bounded by the cities of Oceanside, Vista, San Marcos and Encinitas and by unincorporated sections of the County of San Diego (See Figure 3-1, Adjacent Communities) Each of these jurisdictions have their own trail planning efforts at different levels of detail and stages of implementation As part of the planning process, contact was made with all the surrounding jurisdictions to ensure the development of concepts and alignments which would be compatible with those of the surrounding areas A summary of the issues regarding each community is presented below The City should maintain periodic contact with surrounding jurisdictions to ensure that the linkages necessary to achieve a regionally connecting trail system are accomplished

3 5 1 Oceanside

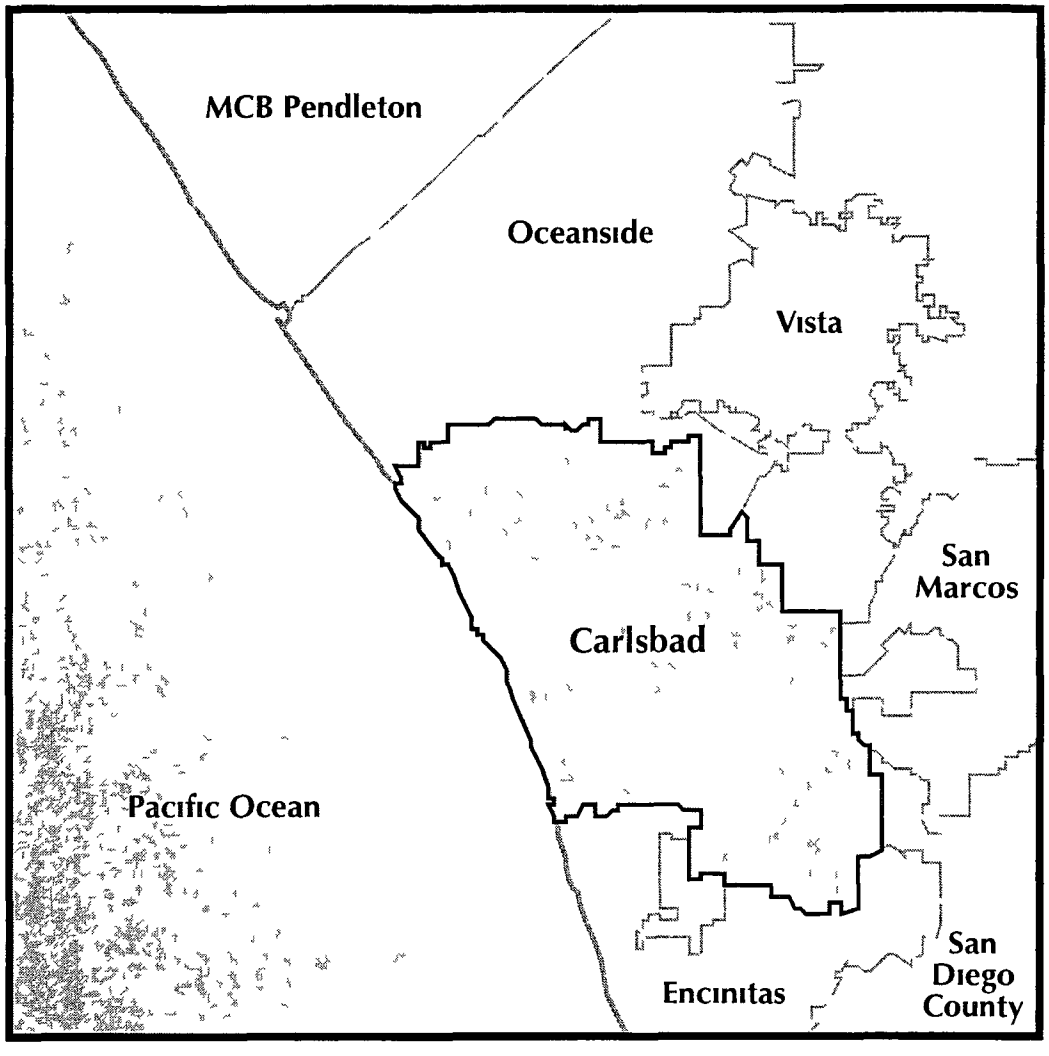
With the exception of the north south linkage along the coastal railroad corridor, there is only one strong trail linkage opportunity between the City of Carlsbad and the City of Oceanside The physical barriers presented by Route 78 and Buena Vista Lagoon effectively preclude any other possibilities The one linkage identified by the Open Space Plan, other than the regional link along the railroad right-of-way, connects Lake Calavera with a recently constructed neighborhood park in the Oceanside immediately south of Lake Boulevard, just beyond the northeast corner of the City of Carlsbad Additional linkages between the two cities have tentatively been identified within the rights-of-ways along Coast Highway, Jefferson Street, El Camino Real, Rancho del Oro and within the future alignment of College Boulevard These will be comprised of bicycle lanes and sidewalks and, as such, would not constitute the type of trail system being considered within the Open Space Plan It is recommended that the City of Carlsbad ensure that any future planning for bicycle circulation take into account linkages to Oceanside

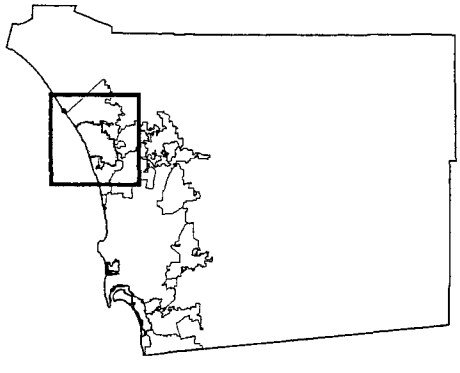
3 5 2 Vista

Exhibit "E" of the Bicycle, Hiking and Equestrian Trails Element of the Vista General Plan indicates a number of trail links running north and east from Lake Calavera into Vista All these alignments (which are shown very conceptually) run through already developed areas of the City of Oceanside Vista is also conceptually considering a trail linkage westward from Buena Vista Park into the City of Oceanside In this case, field investigation and assessment of ownership revealed the only physically feasible link would have to run across the top of a steep slope held under seven different ownerships from whom access rights would have to be ac-

ADJACENT COMMUNITIES
CITY OF CARLSBAD BIKEWAY MASTER PLAN

Figure 3-1





San Diego County

quired or dedication made by the property owners Given that the trail would provide visual access into the homes concerned, this whole linkage seemed very unlikely to succeed Moreover, with access to Squires Dam limited, and the views of the reservoir from afar being cluttered with large industrial structures, it was not felt that this linkage was worth pursuing The City of Vista also indicates on Exhibit "E" a link along Melrose Drive This could be connected to Segment No 26 of the Open Space Plan (See pages 245 and 246, Maps 10 and 11)

3 5 3 San Marcos

The City of San Marcos City Council adopted a Master Trails Plan which defines a proposed citywide trail system Four segments are shown in the San Marcos Plan which connect to Carlsbad Connection to the San Marcos trails is included in this Plan via Segments Nos 36, 47, 48, 53 and 58A (See pages 249, 252, 253, 256 and 257, Maps 14, 17, 18, 21 and 22) Trail Segment No 58A in Carlsbad is proposed to be a equestrian trail to link with systems in Encinitas and San Marcos

3 5 4 Encinitas

The City of Encinitas is proceeding with implementation of a trail system which potentially connects with Carlsbad's trails in a number of places Segment No 55 of this Plan has been aligned so as to create a connection with Encinitas which will lead into the proposed Escondido Creek Trail (the spine of the Encinitas trail system) which will eventually lead to the San Elijo Lagoon Segments Nos 55A and 56A have both been included in the proposed Carlsbad trail system following a request from Encinitas It is proposed that Trail Segment No 58A in Carlsbad allow equestrian use in order to connect the equestrian trail systems of Encinitas and San Marcos (See pages 255 and 256, Maps 20 and 21 of the City of Carlsbad Open Space and Conservation Resource Management Plan)

A potential linkage between the two cities may occur to the west of El Camino Real and the final alignment of the southern end of Segment No 50 of this Plan should be coordinated with Encinitas It is also possible that a connection could lead from the north end of Segment No 50 in a westerly direction into Encinitas Connective opportunity also lies along the coastal rail right-of-way, Segment No 40 (See page 250, Map 14) Bicycle lanes have already been striped and signed along El Camino Real from Garden View Road to Santa Fe Drive In addition, a northbound bicycle lane has been striped and signed from a point near Tennis Club Drive to Santa Fe Drive It is recommended that these bicycle lanes be extended north to a connection with Carlsbad bikeways at Olivenhain Road

Project L19 is located largely within the City of Carlsbad adjacent to Encinitas city limits (See Page 59, Figure 25 This is a bicycle lane along La Costa Avenue from Saxony Road eastward) It is mentioned in this study because it represents a significant link in the plan and would serve residents of Encinitas as well as those of Carlsbad The costs for this project would logically be paid for by the City of Carlsbad, but since this project is more significant to the Encinitas Bikeway System, Encinitas may need to pay for most or all of the cost to ensure its timely completion

3 6 County Trail Efforts

The San Dieguito Community Planning Area Riding and Hiking Trails Plan (adopted as General Plan Amendment GPA 87-03, Item 4) indicates a proposed trail corridor crossing County land between the City of Carlsbad and the City of San Marcos If this connection could be implemented, it could have potential for linking into the Carlsbad system However, the County map was created with minimal field study and many of the indicated alignments are not practicable It has not been possible to confirm the validity of indicating a trail in this area If at some future date this County trail connection were to be completed, the short easterly spur of Segment No 53 is designed to make this connection (See pages 253 and 256, Maps 18 and 21)

3 7 NCTD Rail Trails

The San Diego Association of Governments (SANDAG) funded a study in 1989 to evaluate the feasibility of a Class I coastal corridor bicycle path between Oceanside and downtown San Diego running primarily within the existing rail right-of-way The rail trail concept was originally developed as an efficient way to adaptively reuse abandoned rail right-of ways, but has recently been extended to include functioning rights-of-way as well Rail trails provide a regional, multi-use, non motorized recreation and transportation facility that takes advantage of the ease of travel afforded by the minimal grades originally created to serve the needs of rail traffic

The SANDAG study's conclusions were preliminary, but for its entire alignment through the Carlsbad portion of the route, it proposed that the bikeway should run along the west side of the tracks However, field analysis for this project indicates that topographic constraints along much of the west side of track require that the rail trail be placed on the east side of the tracks throughout the Carlsbad portion of the route

This represents the long term solution to be implemented in conjunction with the installation of a planned second trackway In the short term prior to installation of the second trackway, two segments would be placed on the west side Topographic constraints on the east side and the limited availability of reasonably safe crossing points required these segments to be positioned on the west side of the rail right-of-way until installation of the second trackway occurs These diversions to the west side would be required to circumvent the lagoons in Carlsbad For this reason, a significant portion of the proposed rail trail at the southern end of the city and a shorter segment at the northern end would actually be on Carlsbad Boulevard This would be the case until the planned second trackway was installed, at which time new bridges with integral bicycle lanes would be built across the lagoons, allowing the rail trail to be constructed entirely within the rail right-of-way

An additional rail trail is currently in design just north of Carlsbad along the rail line between Oceanside and Escondido Though the trail will run somewhat north of the Carlsbad city limits within Oceanside, it is important to consider it in this study because it will connect with the Oceanside to San Diego rail trail that passes through Carlsbad, providing Carlsbad with a direct link to the regional rail trail system

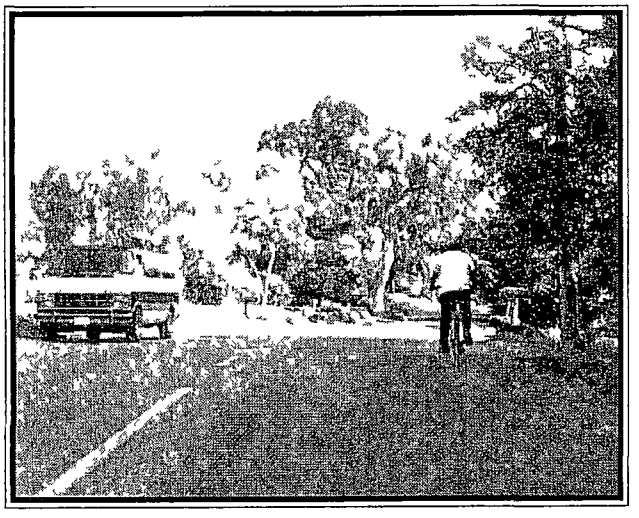
4-CIRCULATION SYSTEM

4.1 Roadway System

The City of Carlsbad's roadway system is in generally good condition and quite adequately serves the vehicular and bicycle needs of residents within the developed portions of the city However, there are still sizable areas, especially in the eastern half of the city, where paved roadway access has not been provided Reviewing a map of the entire city reveals that these areas are currently undeveloped and create considerable blocks of open space between the more distinct developed enclaves that make up the City of Carlsbad (See Figure 4-1, Existing and Programmed Roadways) This is one of Carlsbad's distinguishing characteristics, and is primarily the result of local topography and managed growth policies Land form also tends to limit the number of major north-south routes through the city, primarily due to the occurrence of lagoons that stretch a considerable distance inland from the coast

4 2 Programmed Roadways

The City of Carlsbad's roadway system is not complete since the city is not built out This accounts for substantial areas of the city that are not yet accessible by paved roadway This situation may cause some inconvenience for cyclists such as commuters because they do not have direct routes to their destinations This lack of roadways also limits bicycle access to and from communities adjoining Carlsbad's eastern limits It is likely that motorists do not feel particularly inconvenienced by the present roadway system However, the available routes around and through the hilly steep topography of the eastern half of the city almost certainly deters some users from other than recreational cycling (See Figure 4-1, Existing and Programmed Roadways)



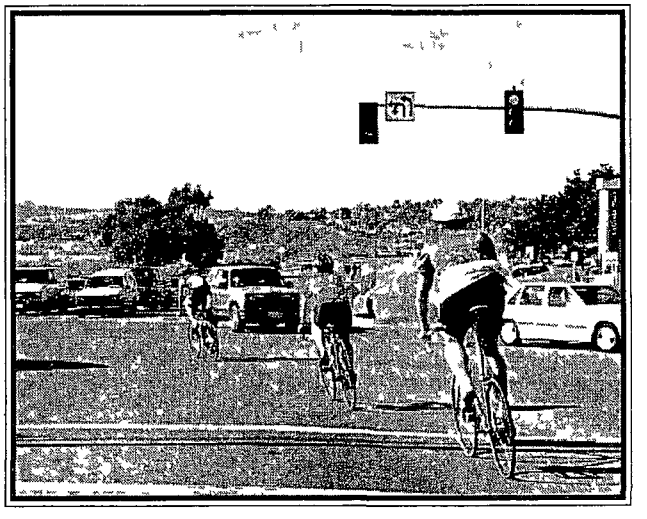
4.3 Existing Bicycle Facilities

The City of Carlsbad probably has the highest percentage of major roadways with bicycle facilities than any other city of comparable size in the region Virtually all major roadways have Class 2 facilities in place There are no designated Class 1 facilities, though several existing unpaved paths around the lagoons fulfill the purpose of unpaved off-street trails Class 3 facilities also exist in Carlsbad, but they are not likely to be proposed in the future

4 4 Programmed Bicycle Facilities

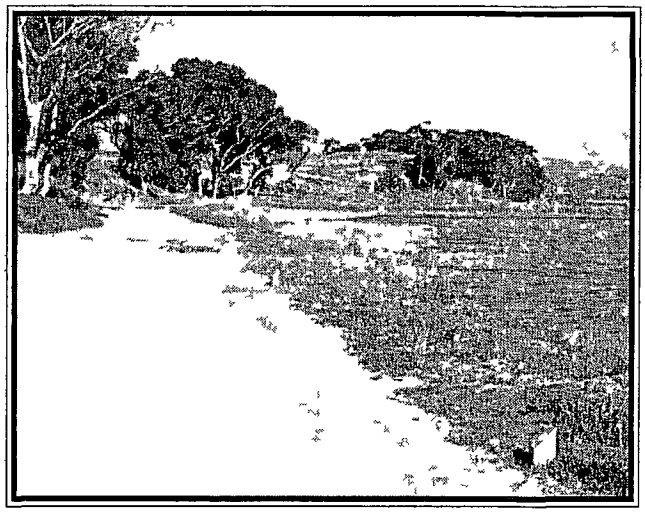
Virtually all proposed major roadways to be extended in Carlsbad are planned to include Class 2 bicycle facilities, according to the city's General Plan Circulation Element (See Figure 4-2, Existing and Programmed Bicycle Facilities)

Carlsbad has a variety of bike facilities including those that run along the coast, through neighborhoods and connect to other bike facilities to the south and north of Carlsbad



4.5 Trail Systems

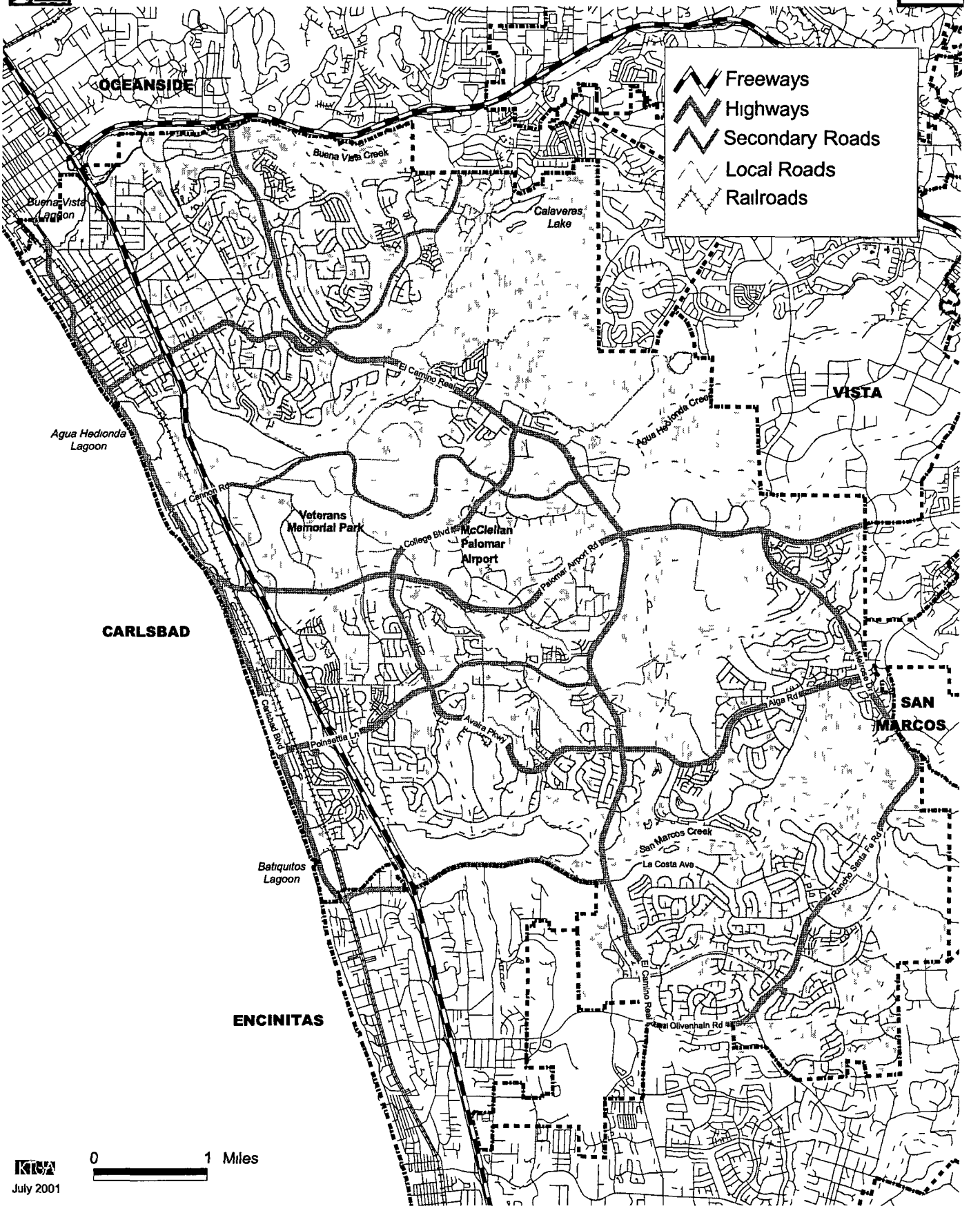
Since the City of Carlsbad will be developing a trails master plan, discussion of trail systems should appropriately be addressed in such a document However, due to the increasing popularity of off-road bicycling, the trails master plan should consider the needs of off-road cyclists, as well as other recreational users, and examine where connections between on-street and off-street facilities can benefit of all users



A City of Carlsbad trails system may some day include trails within natural open space systems, such as around Batiquitos Lagoon

EXISTING AND PROGRAMMED ROADWAYS
CITY OF CARLSBAD BIKEWAY MASTER PLAN

Figure 4-1



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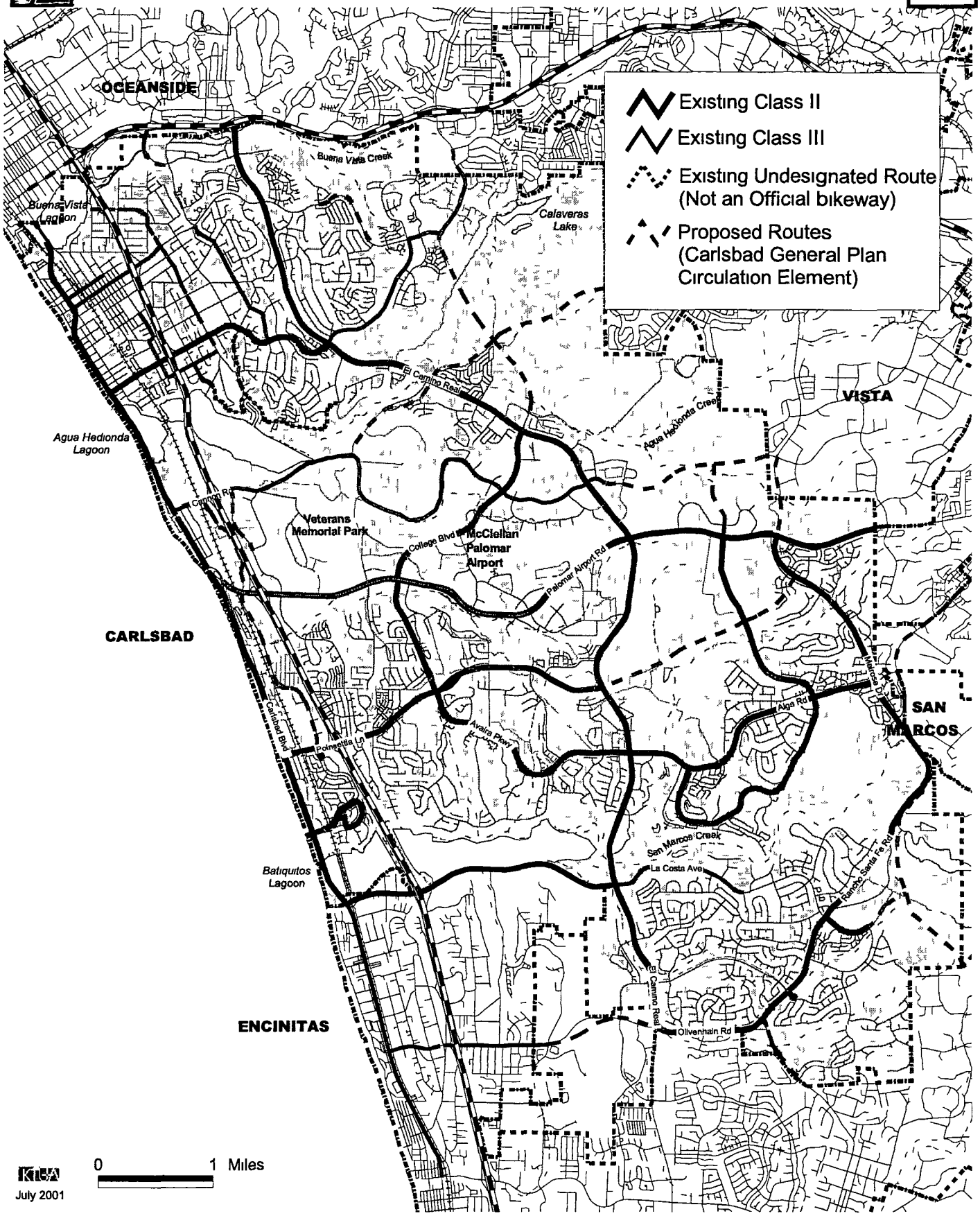
EXISTING AND PROGRAMMED BICYCLE FACILITIES
CITY OF CARLSBAD BIKEWAY MASTER PLAN

Figure 4-2



5-TRIP ORIGIN ANALYSIS

In the context of a bikeway master plan analysis, "trip origins" are defined as those areas or specific locations from which the majority of bicycle usage is likely to come Determining where these trip origins are now or will be in the future is important in guiding the design and implementation of a cost-effective bicycle facility system that will maintain its usefulness over time This includes tracking projected changes in land use, population density and housing data, but defining the trip origins for a particular city is usually not so straightforward Extracting useful information from some of the data described in the following sections sometimes required evaluating data from other sources and synthesizing the results Other sources of information were reviewed based on well known principles employed in most bikeway master plan projects For instance, residential areas are, in general, trip origin points In all cases, the primary information sought was how and where changes are projected to occur in Carlsbad in the near future

5 1 Existing Land Use

SANDAG provided much of the data needed to produce the maps used in the trip origin analysis and produced for this chapter These maps represent demographic information derived from data collected for the 1990 census as well as other land use data developed from remotely sensed imagery

The land use map reveals a striking pattern within the City of Carlsbad, one that repeats itself throughout the maps in this chapter Development is fragmented into specific areas, with large areas of open space separating the developed areas from each other The arrangement makes more sense when topography is taken into account The development pattern has evolved to accommodate the steep hills of the eastern half of the city and the lagoons cutting across the center, north and south ends, while the ocean on the west also creates a definitive boundary The result is that development has occurred in a predictable and constrained manner in Carlsbad (See Figure 5-1, 1990 Land Use) Carlsbad's development pattern is markedly different than its neighboring communities The adjoining cities of Oceanside, Vista, San Marcos and Encinitas have a much lower percentage of remaining open space compared to the City of Carlsbad These other cities also have a more dispersed development pattern Carlsbad's development is unique to cities in the area because it has created a much more distinct clustered development pattern surrounded by large contiguous areas of open space

In terms of bicycle facility planning, significant concentrations of housing or employment can better support the costs of bicycle facilities because potential users are clustered Higher housing or employment densities tend to be the most cost-effective situations for bicycle facilities because they provide the most potential users for a given area Carlsbad's clustered development arrangement could be even more advantageous to recreational and commuting cycling because the open spaces separating the developed areas can provide locations for off-street facilities with minimal exposure to high speed vehicular traffic

5 2 Future Land Use

Comparison of the 1990 and projected 2000 land uses reveals several noteworthy changes First, after having occupied a substantial portion of central Carlsbad, the year 2000 data indicate that agriculture will no longer be represented at all The agricultural land use has been replaced by open space and low density housing Another trend that commonly occurs as a city matures is that changes in land uses tend toward conglomeration, creating fewer but larger blocks of similar land uses This trend is clearly visible in the land use maps (See Figure 5-2, 2000 Land Use)

The changes in land use noted above indicate a trend toward more concentrated development, in general, and more housing, in particular, in the central portion of the city This will tend to create new demands for bicycle facilities where no concentrated land uses had existed before Among the new more concentrated land uses is the large Legoland development in west central Carlsbad, where agricultural land uses are being converted to tourist resort and golf uses There will be ample remaining open space contiguous with the Agua Hedionda Lagoon to the immediate north Recreational bicycling demand can be expected to increase in this area

Another land use change which will affect demand for bicycle facilities is the significant parcel of agricultural land between El Camino Real and Lake Calaveras slated to become low density housing, while an adjoining sizable section surrounding the lake will be open space There will also be a new school site in the center of the new housing development area These three new land uses will all create greater bicycle facility demand where little had existed before Notable amounts of travel connecting these three uses is likely, as well as travel from this area to other parts of Carlsbad, especially westward to the downtown area and the coastal strip

Finally, the year 2000 land use map indicates large areas of industrial land use immediately adjacent to the Palomar Airport and extending east and west from the airport along Palomar Airport Road Much of this de-

velopment was coded as vacant or under construction in the year 1990 data, but sizable areas of agricultural land south of Palomar Airport Road and east of El Camino Real will also be affected This agricultural land is destined to become open space and low density housing, like much of the agricultural land in the year 1990 data The industrial areas north, east and west of the airport will create a corridor of employment destinations stretching from the eastern boundary of the Legoland development to the City of Vista The corridor anchored by Palomar Airport Road will continue to grow as the primary employment center of Carlsbad Its importance in terms of bicycle planning is based on its centrally located position within the city as a major bicycle commuting destination point The demand for bicycle facilities can be expected to grow with increases in employment density, especially for amenities favored by commuters such as secure bicycle parking, bike lockers and showers at their destination points

5 3 Existing Residential Areas

Residential land uses are by far the most common origin points for bicycle trips within a community, followed by those bicycle trips originating in the residential areas of immediately adjacent communities The bicycling trips originating in residential areas typically terminate at schools and employment centers, retail and entertainment centers, parks and open space, as well as at other residential areas For this reason, the sizes, densities and locations of residential developments and their relationships to other land uses such as schools, employment centers and parks and open space are crucially important to bicycle facility planning

Like all development in Carlsbad, residential areas are clustered in specific areas throughout the city (See Figure 5-3, 1990 Housing Density) The largest one is "Old Carlsbad", the city "center" in the northwestern corner It extends eastward past I-5 and beyond El Camino Real where it ends at the edge of large expanses of open space separating Carlsbad and adjoining communities This housing center is bounded on the north and south by river valleys and lagoons and on the west by ocean

The next largest housing center is in the southeast corner bounded by San Marcos and Encinitas on the east and south Open space bounds the northern edge of this area and Batiquitos Lagoon forms a boundary on the west This area is projected to expand considerably in the near future (See Figure 5-4, 2000 Housing Density) The coastal strip between the Agua Hedionda and Batiquitos Lagoons is a third residential area of note SANDAG indicates that it will expand considerably east of I-5 It also displays the greatest per capita increase in housing density of the three primary housing areas

In general, the existing residential land use areas will increase in density, based on the year 2000 data, but the increases are not nearly as significant a factor as the projected increases in housing area The existing housing areas will expand beyond their immediate boundaries, in many cases into areas previously coded as vacant or agricultural The northwestern and coastal housing clusters will spread eastward, while the southeastern cluster will experience in-fill and spread northward

5.4 Existing Population Density

The highest population density occurs in the "downtown" Carlsbad, the city "center" in the northwestern corner This population center extends beyond El Camino Real where densities are lower than downtown, but still contain pockets of higher density The southeast population center's density resembles that of the northwestern population density east of I-5 Overall, the southeastern center has the lowest population density in Carlsbad The coastal strip population center between the Agua Hedionda and Batiquitos Lagoons has moderate densities with a distinct zone of high densities around the intersection of Poinsettia Lane and Paseo del Norte (See Figure 5-5, 1990 Population Density)

5.5 Future Population Density

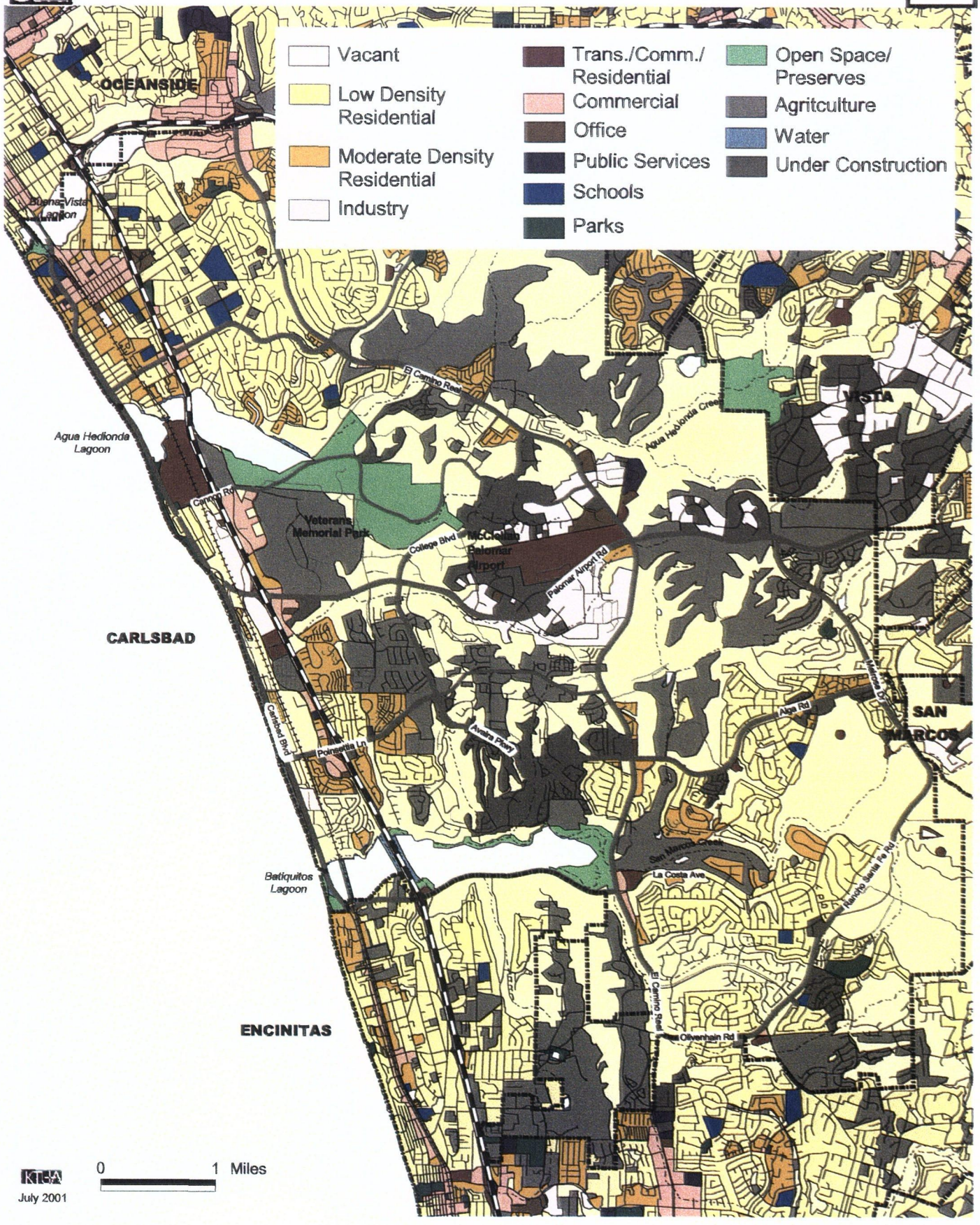
Population density for all three population centers in Carlsbad exhibit the expected trend of moderate increases in the year 2000 data compared to 1990 The areas of highest density display a trend to outward expansion while remaining essentially contiguous The development of additional high density centers is not indicated in the year 2000 data (See Figure 5-6)

5.6 Summary of Trip Origins

Based on the foregoing analysis of housing density, population density and land use, most future bicycle activity is likely to originate from within the distinct clustered residential areas of Carlsbad These areas will become large enough in terms of population density and physical size to generate some bicycle traffic that originates and terminates within them, as well as supplying users for the citywide bicycle system Questionnaire results also indicated that a substantial number of commuting cyclists currently come from neighboring communities As employment densities increase, especially along the expanding Palomar Airport Road industrial corridor, the number of commuting cyclists from neighboring communities can also be expected to grow as well This employment center's position is equidistant from the neighboring communities of Vista, San Marcos and Encinitas The boundaries of these communities and, more importantly, residential areas within them, all lie within two miles of this employment center

1990 LAND USE
CITY OF CARLSBAD BIKEWAY MASTER PLAN

Figure 5-1



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2000 PLANNED LAND USE
CITY OF CARLSBAD BIKEWAY MASTER PLAN

Figure 5-2

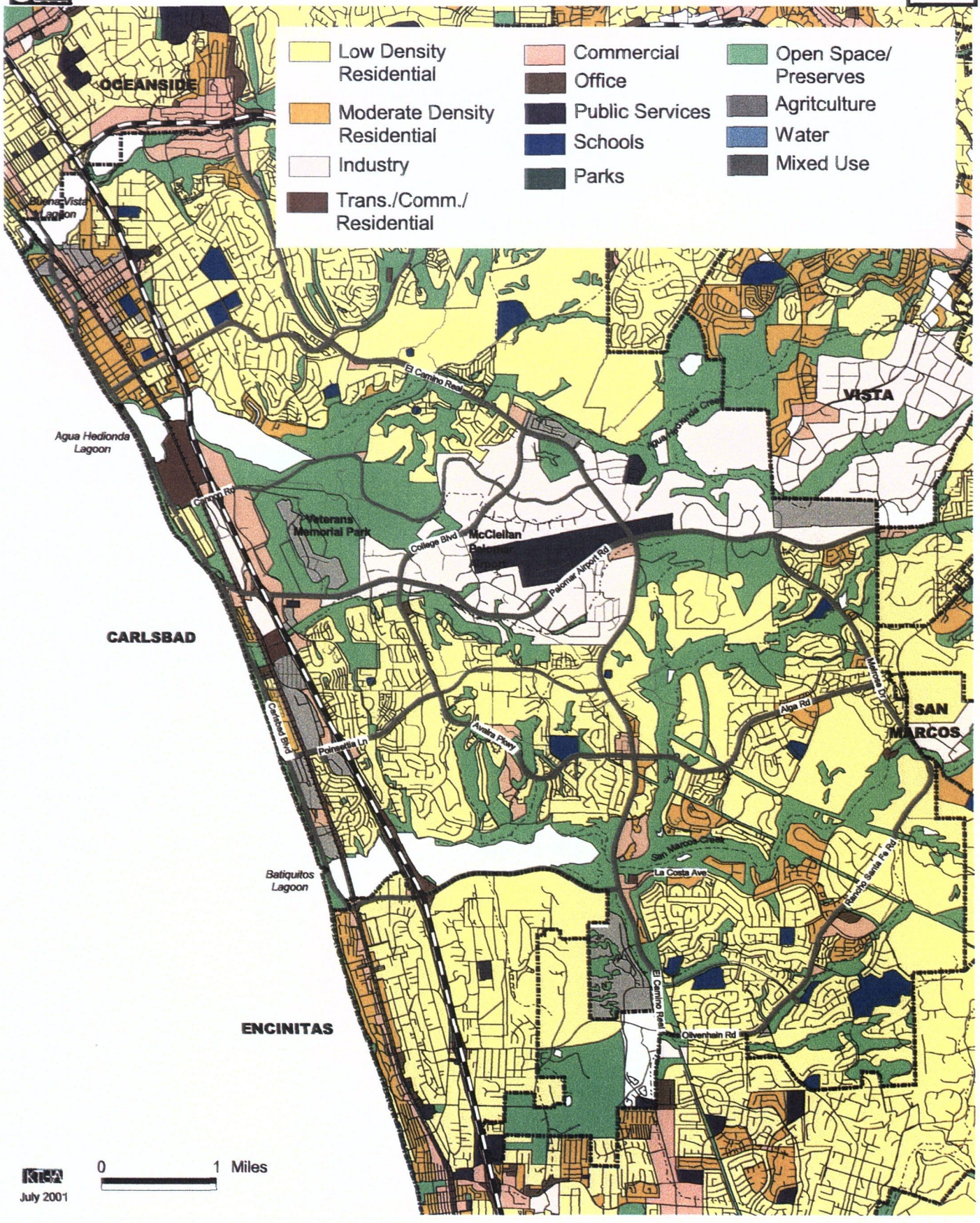


Figure 5-3

1990 HOUSING DENSITY
CITY OF CARLSBAD BIKEWAY MASTER PLAN

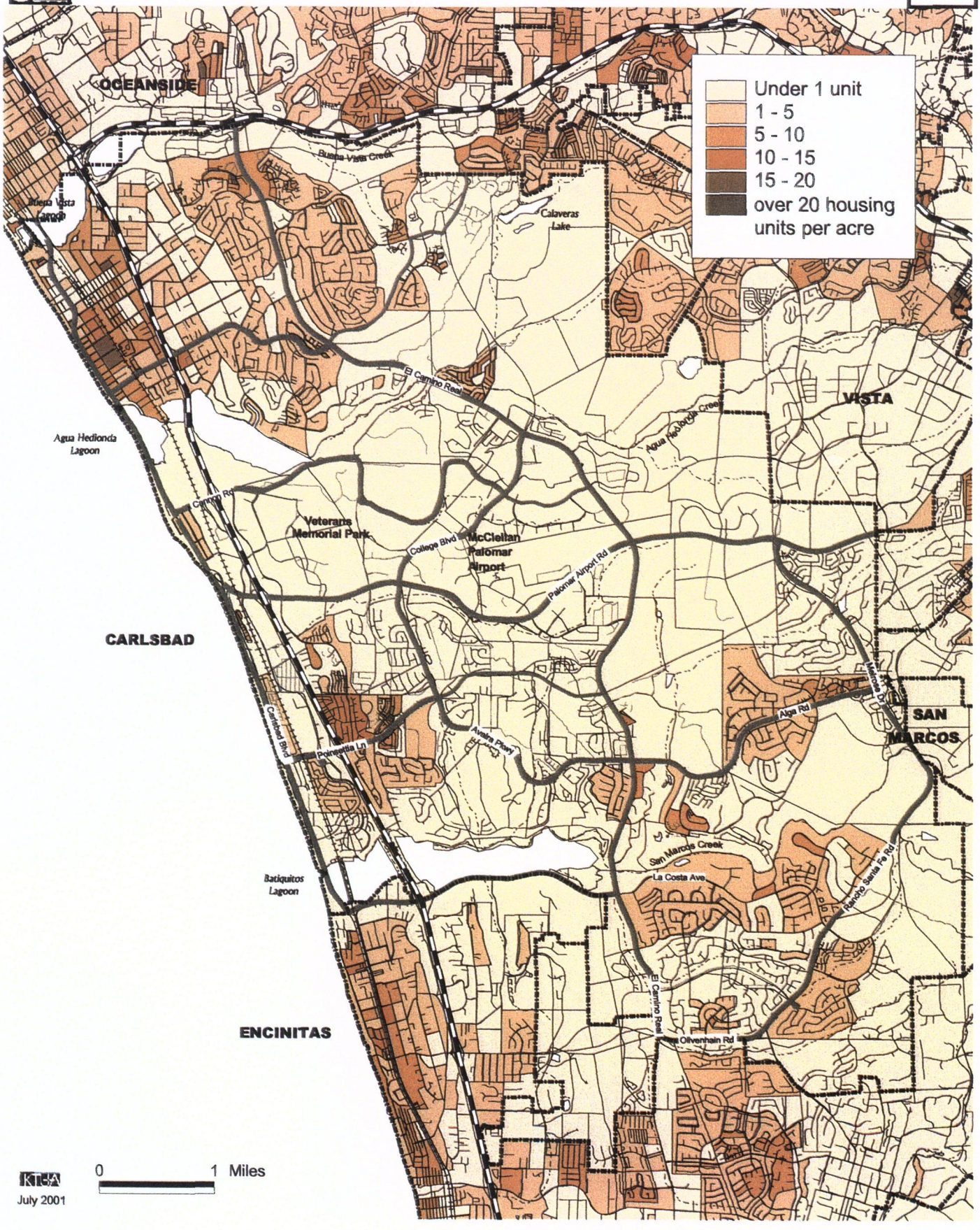


Figure 5-4

2000 HOUSING DENSITY
CITY OF CARLSBAD BIKEWAY MASTER PLAN

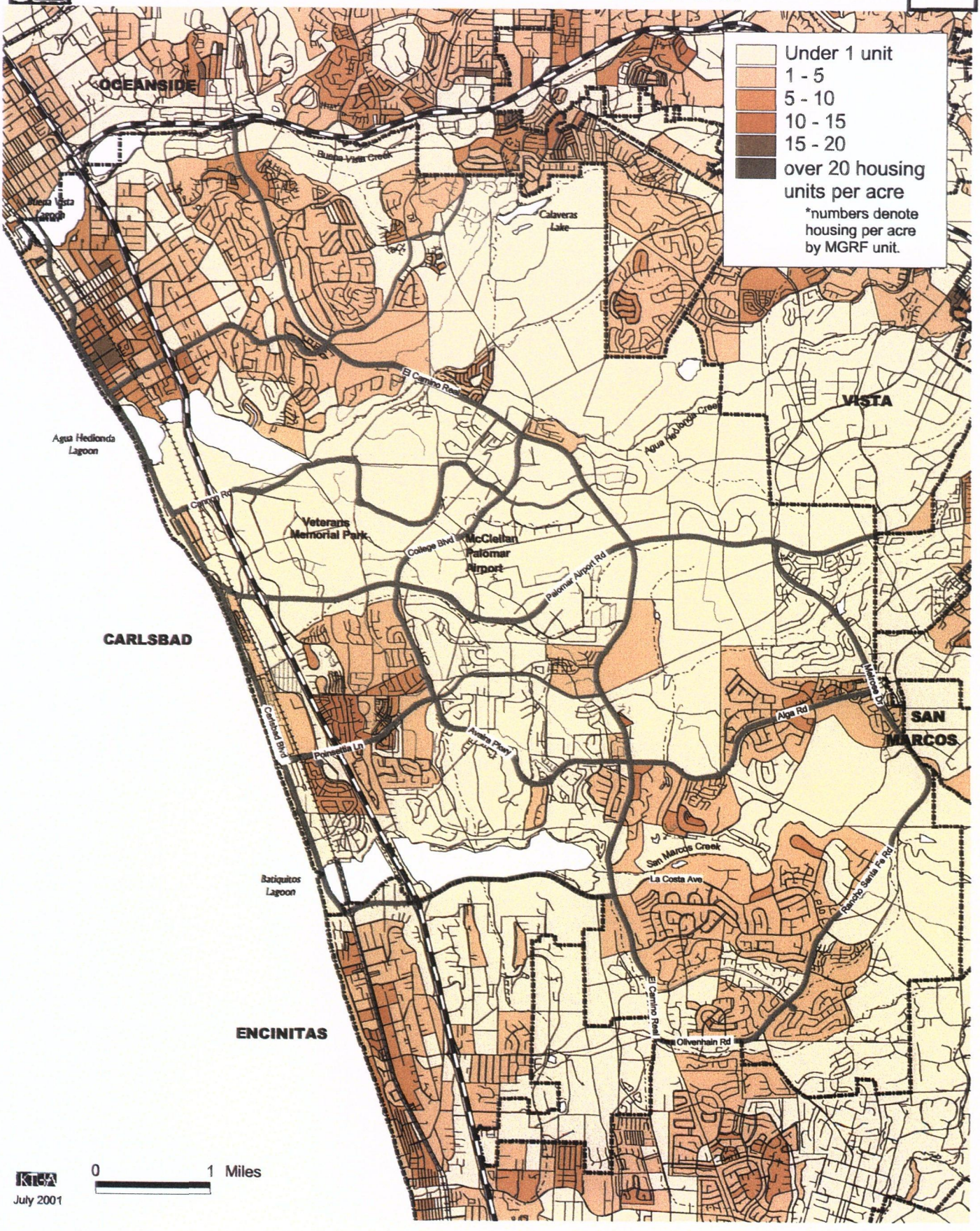


Figure 5-5

1990 POPULATION DENSITY
CITY OF CARLSBAD BIKEWAY MASTER PLAN

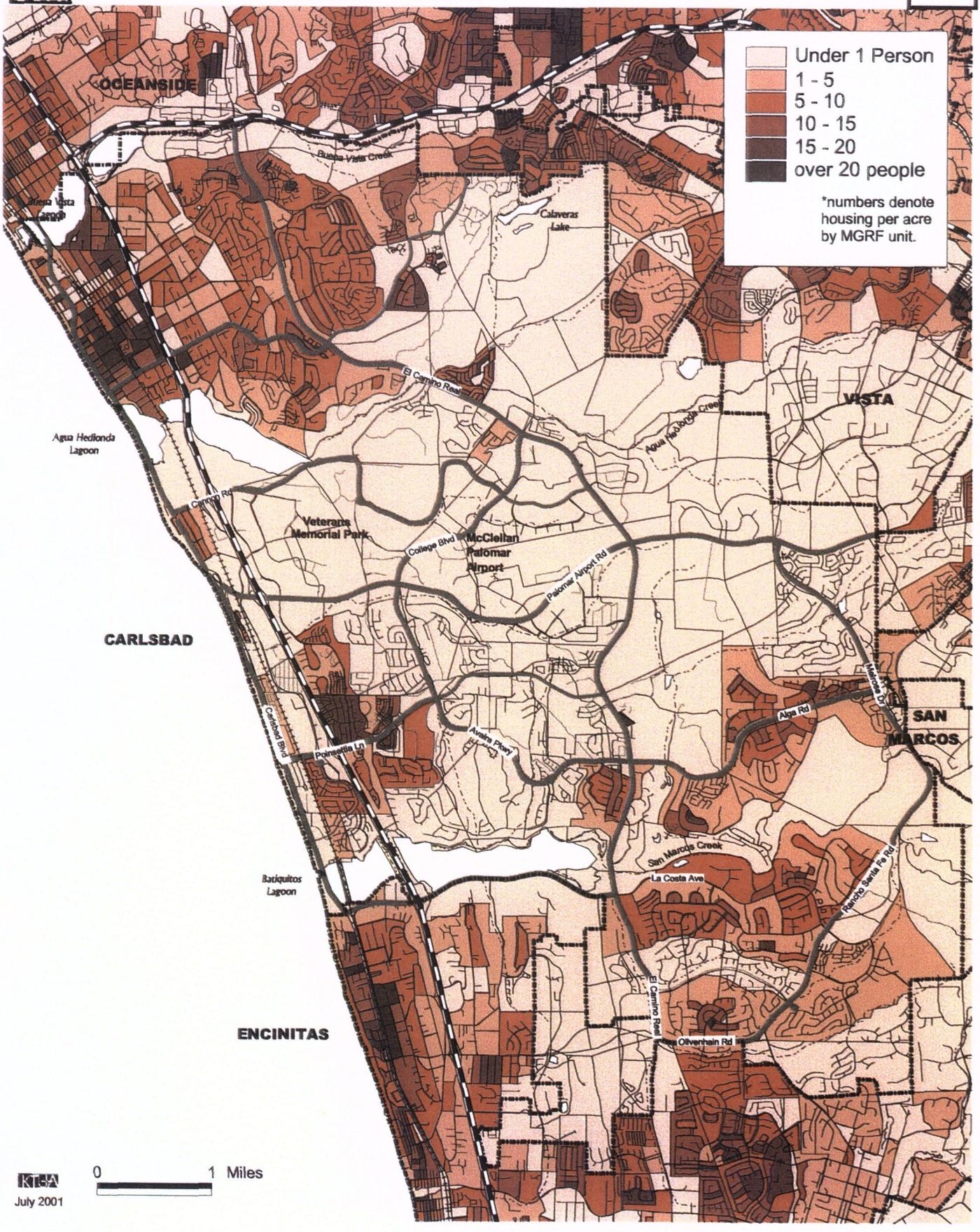
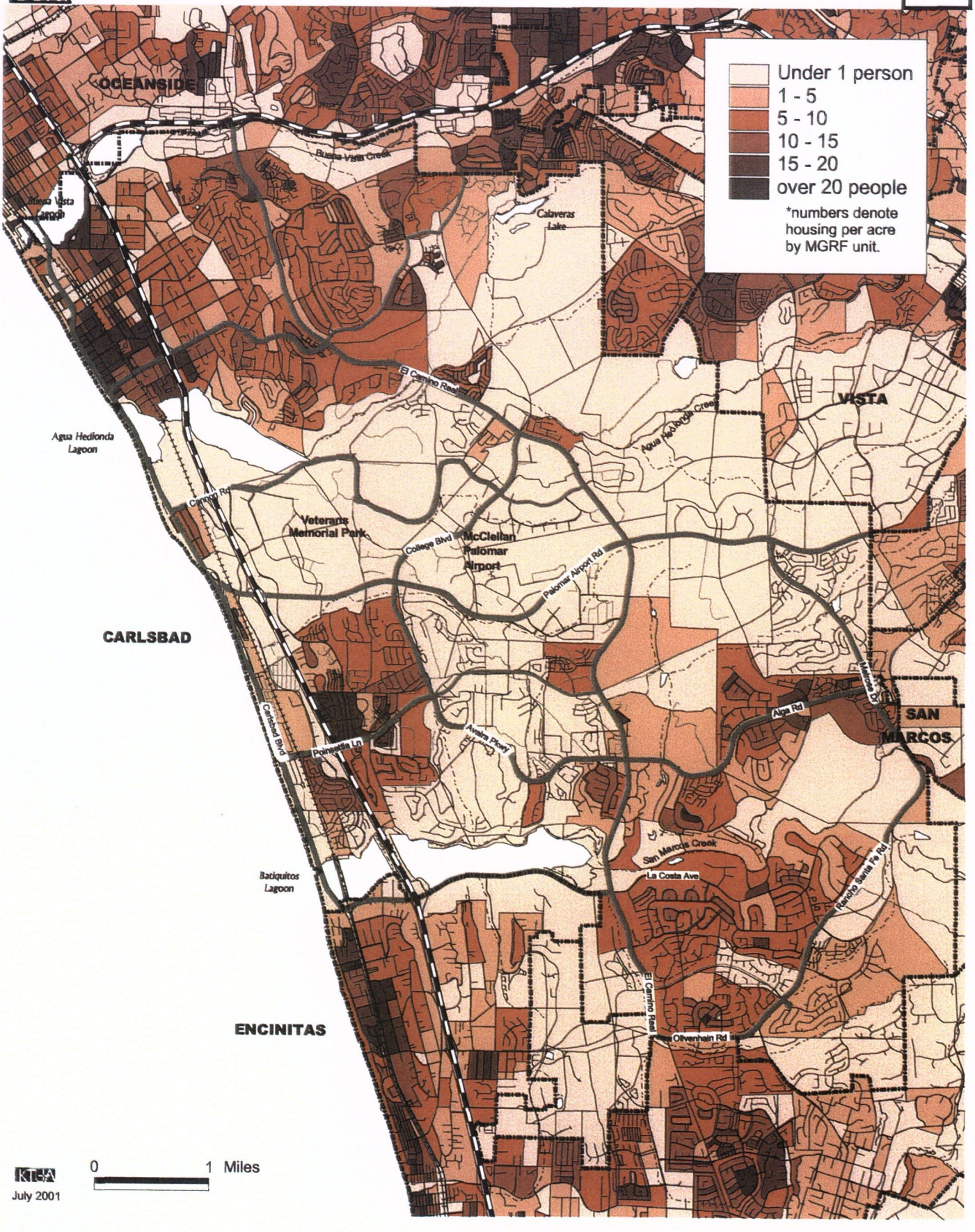


Figure 5-6

2000 POPULATION DENSITY
CITY OF CARLSBAD BIKEWAY MASTER PLAN



KTA
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6-TRIP DESTINATIONS

Trip destination points in terms of bicycle facility planning are generally referred to as a community's "activity" centers. In the context of a bicycle master plan analysis, the term "activity" specifically refers to bicycling usage generated as a result of the particular trip destination. A list of a community's activity centers can include its schools, parks, open spaces, athletic facilities, libraries, community centers, retail complexes and employment centers. The types and locations of these activity centers within a community reflect the amount and types of bicycle usage they can be expected to generate. This is especially true in terms of their proximity to residential areas.

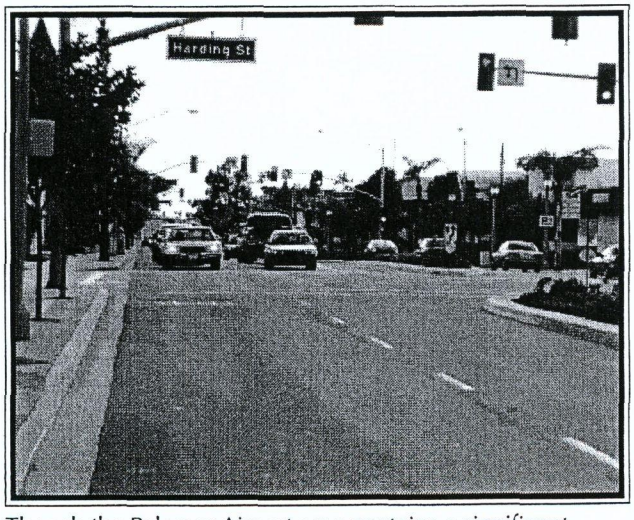
6.1 Existing Activity Centers

The SANDAG data defines activity centers as a community's major employers, office buildings, industrial sites, government sites, retail centers, hospitals, major attractions, colleges, universities, schools or parks. The commercial and retail activity centers can also be regarded as employment centers because, in addition to the customers that constitute the typical activity center users, they also represent significant numbers of employees. Carlsbad's major retail centers are represented in SANDAG's data within the highest employment density category. The civic activity centers include Carlsbad's parks and schools, which are discussed in a following section.

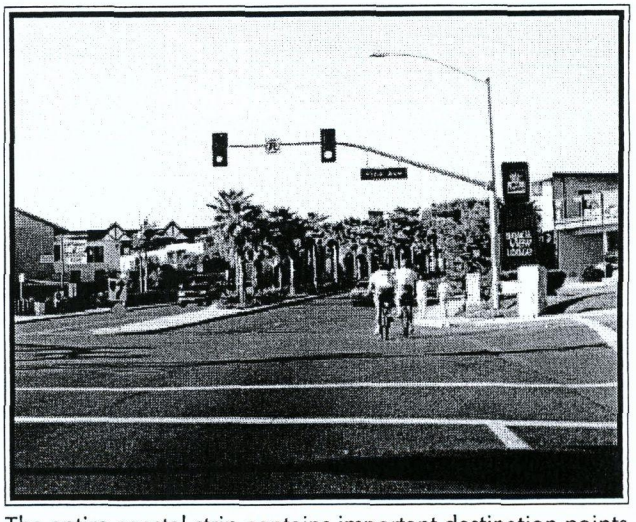
Reviewing a map of the existing activity centers (See Figure 6-2, Activity Centers) confirms that there is an abundance of major employers, office buildings and industrial sites clustered in the area immediately around Palomar Airport. Based solely on this map, it appears to be the commercial and office hub of Carlsbad. However, comparing the activity center information map with the existing employment density map from the previous section (See Figure 6-1, Employment Density) reveals that the employment density is just as high in four other areas of Carlsbad. These other areas have few office buildings or major employers, but still have high employment density, which indicates that they encompass large numbers of smaller businesses. Employment density is an indicator of bicycle facility demand in general, but more specifically, it is an indicator for shopping trips to areas with numerous small businesses versus commuting trips to areas with major employers.

6.2 Employment Centers

In most cases, the City of Carlsbad's employment centers tend to coincide with the intersections of the city's major roadways. For this reason, they are scattered throughout the city, but are distinct enough to be easily discernible on a map. (See Figure 6-1, Employment Density and Figure 6-2, Activity Centers.) There are five discrete employment areas, including the downtown area west of I-5, at the intersections of SR 78 and El Camino Real, the largest zone immediately around Palomar Airport, at La Costa Avenue and El Camino Real, and a zone on either side of I-5 centered on Palomar Airport Road. The zone around the airport also contains the largest concentration of major employers. The new Legoland theme park site lies between this zone and the coastal zone centered on Palomar Airport Road. Essentially, all the employment center locations in Carlsbad lie along I-5, El Camino Real or Carlsbad Boulevard.



Though the Palomar Airport area contains a significant number of large employers, downtown Carlsbad also has significant employment density.



The entire coastal strip contains important destination points for both commuters and recreational cyclists.