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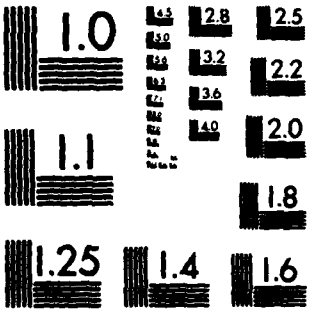

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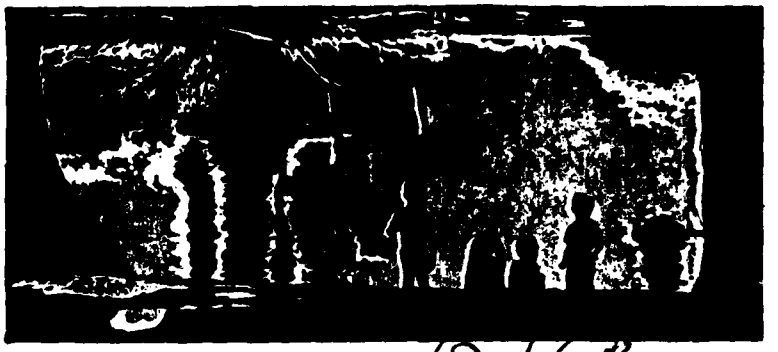

Santa Ana River

PHASE I GDM ON THE SANTA ANA RIVER MAIN STEM including Santiago Creek

APPENDIX G RECREATION

SEPTEMBER 1980

U.S. ARMY CORPS OF ENGINEERS • LOS ANGELES DISTRICT

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A136730	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) RECREATION APPENDIX TO THE PHASE I GENERAL DESIGN MEMORANDUM SANTA ANA RIVER MAIN STEM INCLUDING SANTIAGO CREEK AND OAK STREET DRAIN		5. TYPE OF REPORT & PERIOD COVERED 6. PERFORMING ORG. REPORT NUMBER
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)
This appendix is a preliminary study of recreation potentials that would be created by the proposed flood control projects. Included are demographic characteristics by the separate project areas; topographical, geological, and ecological features; market area analysis, both present and projected; inventory and analysis of existing costs, benefits and cost sharing projections; and identification of planning objectives for recreation and esthetic treatment and proposals for their accomplishment.

This volume of the six volume set of appendixes that accompany the *Main Report and Supplemental Environmental Impact Statement* to the Phase I General Design Memorandum for the Santa Ana River Main Stem including Santiago Creek and Oak Street Drain contains the Recreation Appendix (Appendix G).

This appendix discusses the proposed recreational development that would be built under the Recommended Plan. A description of the project area, recreation market analysis, plan descriptions and cost summaries are also included.

RECREATION APPENDIX G

to the

PHASE I GENERAL DESIGN MEMORANDUM

SANTA ANA RIVER MAIN STEM
INCLUDING SANTIAGO CREEK AND OAK STREET DRAIN

Counties of
Orange, Riverside, and San Bernardino,
California

U.S. ARMY ENGINEER DISTRICT
LOS ANGELES, CALIFORNIA

September 1980

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1. INTRODUCTION

PROJECT AUTHORIZATION.

The restudy of recreation development potential of the Santa Ana River main stem, its Santiago Creek and Oak Street Drain tributaries, and of the regional park development potential of the Prado and Mentone Reservoirs is authorized under the Federal Water Project Act of 1965, Public Law 89-72; and Water Resources Development Act 1976, Section 109. This project traverses the Santa Ana River Basin located, respectively, in the California counties of Orange, Riverside, and San Bernardino.

PURPOSE.

This study is intended to provide a general guide to the orderly and coordinated development and management of all Federal lands in the Prado and Mentone Reservoirs, Oak Street Drain, Santiago Creek, and the main stem of the Santa Ana River. The plan of physical development is designed to develop project lands and other resources in the best possible manner considering future recreational demand, the carrying capacity of project lands, and the potential cost of development.

PLANNING OBJECTIVES.

It shall be the general objectives of the plan to support the project purposes of flood control, and recreation; provide diverse recreation opportunities for quality recreation experiences which are compatible with the resource and which promote optimum, not necessarily maximum, use of the resource; and protect and conserve natural and cultural resources and mitigate for resources lost or degraded by the project.

SCOPE OF STUDY.

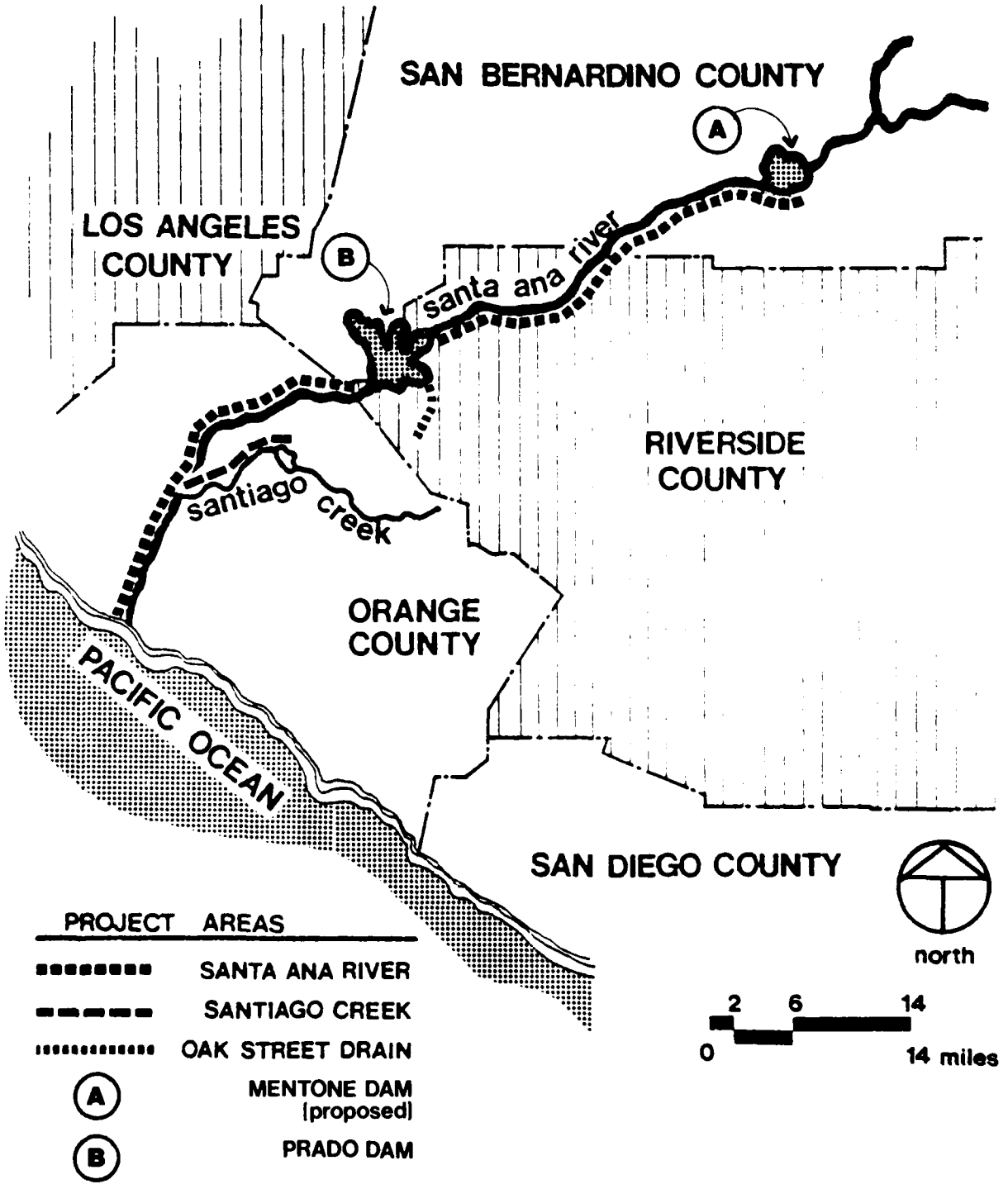
This appendix is a preliminary study of recreation potentials that would be created by the proposed flood control projects. Included are demographic characteristics by the separate project areas; topographical, geological, and ecological features; market area analysis, both present and projected; inventory and analysis of existing costs, benefits and cost sharing projections; and identification of planning objectives for recreation and esthetic treatment and proposals for their accomplishment.

BACKGROUND.

The Review Report on the Santa Ana River, Main Stem, and The Recreation Master Plan for Prado Dam Reservoir Area, prepared by the Los Angeles District, Corps of Engineers, in 1975 and 1976, respectively, presented a plan of trails and other recreation facilities to be developed with the Santa Ana River proposed flood control project.

BASIC ASSUMPTIONS.

The recreation plan should maintain continuity so all reaches of the Santa Ana River main stem can ultimately by developed as a complete recreation system. Local agencies will continue to participate in the funding, development and operation of recreational facilities within Corps' property. All recreational facilities should be developed in an efficient and economic manner to reduce maintenance and operation costs. Funding participation by the Corps for recreation improvements will continue to be limited to lands acquired for flood control purposes, and acquisitions or improvments required outside these limits will be the sole responsibility of the local entity.



PROJECT AREAS

PLATE 1

2. DESCRIPTION OF PROJECT AREAS

GENERAL.

The Santa Ana River study area encompasses approximately 70 miles from the river's mouth between the Cities of Huntington Beach and Costa Mesa, to the proposed Mentone Dam Reservoir area 5 miles east of San Bernardino at the base of the San Bernardino Mountains. The river flows roughly westward from the mountains to Anaheim, thence southward to the ocean. Also included in the study area are Santiago Creek and the Oak Steet Drain. Santiago Creek flows from the Santa Ana Mountains northeast of the city of Orange, through the cities of Orange and Santa Ana to the Santa Ana River. The Oak Street Drain Area is located in Corona starting at the Oak Street Drain Debris Basin proceeding northward to Temescal Creek along the Oak Street Drain. Because of severely restricted right-of-way and possible engineering problems within the development of an underpass at the Riverside Freeway, recreation along the Oak Street Drain area has been eliminated from consideration in this report. Further consideration will be given to recreation development along Oak Street Drain during the next planning phase.

MENTONE RESERVOIR.

Location and Physiographic Characteristics.

The proposed reservoir area is located in the upper Santa Ana River basin at the foot of the San Bernardino Mountains (see Plate 2) where Plunge and Mill Creeks join the Santa Ana River. These water courses form a wash which is over 2 miles wide at this point and is generally of flat terrain sloping in a westerly direction. The community of East Highland lies to the immediate northwest on the upper edge of the wash. The City of Redlands lies to the south.

Climate.

Summers are long, hot and dry. Temperatures often exceed 90°F. Winters have night time temperatures often in the low 20°F (see Table 1). During the fall, hot, dry winds from the north and east occasionally blow for several days at a time, causing unusually high temperatures in the area. Annual precipitation averages 12-16 inches (see Table 2). About 90 percent of this rain occurs from November to May.

Topography.

The area is bounded on the north and the east by rugged mountains that attain elevations in excess of 10,000 feet. To the southeast are low hills and on the south are the low "Badlands." At this point, the river bed is wide and rocky, with one-half foot of soil and well-established brush.

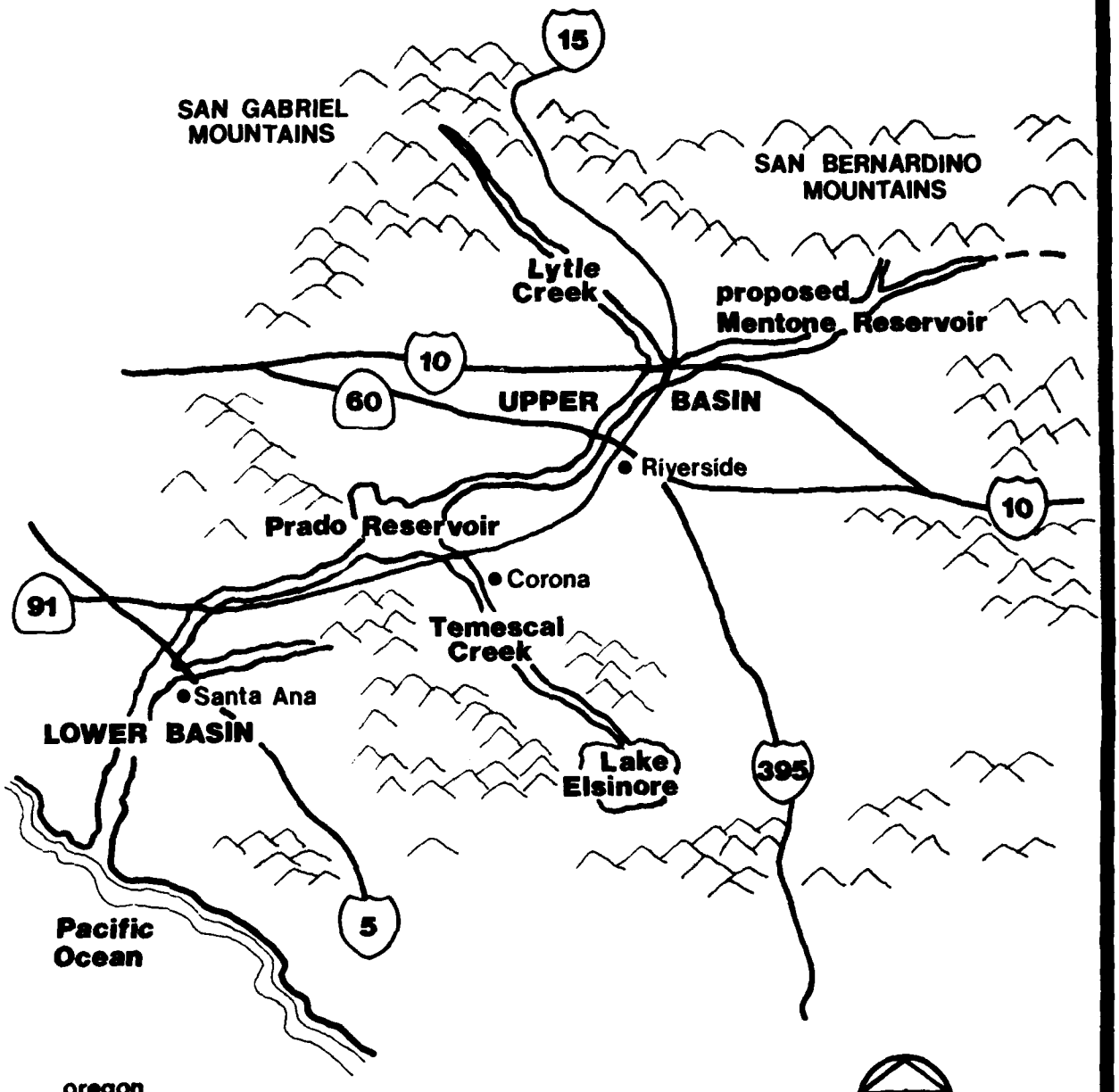
Geology and Soil Characteristics.

A review of seismicity of the site shows conclusively that the Mentone Dam site is in a zone of high seismic hazard. The dam would be located just south of the San Andreas fault, a dividing line which separates two major portions of the earth's crust.

Soils are crystalline rock and alluvial sediment. In general, younger alluvium is underlain by older alluvial deposits. The structure is quite rocky.

Existing Land Use.

The Mentone site is an undeveloped alluvial fan. It is immediately surrounded by gradual open space of alluvial wash. To the south and west of the proposed damsite are the urban developments of the Cities of Redlands and San Bernardino, respectively.



north
no scale

PHYSIOGRAPHY
santa ana river region

PLATE 2

TABLE 1
TEMPERATURE DATA (F DEG) FOR SELECTED STATIONS
IN THE SANTA ANA RIVER BASIN

Station	J	F	M	A	M	J	J	A	S	O	N	D	Ann.
Squirrel Inn 2[1] (1930-1960)													
Mean daily	38.7	39.8	43.4	48.3	53.5	60.9	69.1	68.7	65.1	55.1	46.7	41.6	52.6
Mean daily max.	48.4	49.8	54.2	60.2	66.1	73.4	80.4	79.8	77.1	66.7	58.2	51.5	63.8
Mean daily min.	29.1	29.9	32.6	36.2	41.0	48.3	57.8	57.5	53.0	43.7	35.4	31.8	41.4
Highest	71	71	79	82	85	93	97	97	95	88	79	74	97
Lowest	0	10	11	19	12	29	38	39	31	23	12	8	0
San Bernardino County Hospital (1901-1960)													
Mean daily	51.5	53.6	56.3	60.2	64.5	70.4	76.8	76.7	72.9	65.3	58.2	52.9	63.3
Mean daily max.	66.1	67.8	70.8	75.4	79.8	88.4	96.6	96.3	92.7	83.3	75.8	68.4	80.1
Mean daily min.	37.0	39.7	42.0	45.4	49.2	52.7	57.4	57.3	53.6	47.5	40.9	37.7	46.7
Highest	92	93	97	103	109	116	116	116	115	107	99	93	116
Lowest	17	21	26	27	33	37	42	42	36	29	24	19	17
Corona (1913-1960)													
Mean daily	51.8	53.4	56.4	60.3	64.3	69.4	74.9	74.7	72.0	65.3	59.0	53.8	62.9
Mean daily max.	64.4	66.3	70.4	74.8	79.2	85.8	92.6	92.1	89.3	80.9	73.8	66.5	78.0
Mean daily min.	39.2	40.6	42.4	45.8	49.4	53.0	57.2	57.3	54.8	49.7	44.3	40.9	47.9
Higest	92	93	95	100	106	118	116	113	114	106	99	94	118
Lowest	22	24	27	29	33	41	47	43	41	33	26	23	22

[1]Located near Crestline in the San Bernardino Mountains.
SOURCE: Final EIS - Review Report on the Santa Ana River Main Stem.

TABLE 2
AVERAGE PRECIPITATION (INCHES) FOR STATIONS
IN THE SANTA ANA RIVER BASIN

Station	J	F	M	A	M	J	J	A	S	O	N	D	Ann.
Squirrel Inn 1[1] 1930-1960	7.56	8.94	6.55	3.60	0.83	0.14	0.09	0.21	0.66	1.93	3.28	7.21	41.00
San Bernardino County Hospital 1901-1960	3.30	3.21	2.76	1.44	0.85	0.09	0.03	0.14	0.22	0.75	1.30	2.75	16.57
Corona 1913-1960	2.78	2.66	1.95	1.03	0.28	0.04	0.02	0.05	0.17	0.63	0.84	2.31	12.76
Yorba Linda 1912-1960	2.88	3.06	2.31	1.22	0.37	0.04	0.01	0.07	0.27	0.62	1.09	2.57	14.51
Newport Beach Harbor 1930-1960	2.27	2.63	1.71	1.19	0.20	0.08	0.01	0.07	0.19	0.45	1.01	2.17	11.88

[1]Located near Crestline in the San Bernardino Mountains.
SOURCE: Final EIS - Review Report on the Santa Ana River Main Stem.

Ecological Features.

The existing vegetation at the Mentone site is composed primarily of alluvial scrub and juniper woodland with strips of riparian species along present and previous stream courses. The juniper woodland is the largest of its kind on the Southern California Coastal plain and unique to a few alluvial fans of Southern California. The wooodland provides habitat for such common animals as mice, opossums, foxes, and coyotes. There are large mammalian and avian predators (foxes, coyotes, hawks, owls and golden eagles) that reside within the project area and in nearby canyons and mountains. (See Chapter IV, paragraphs 4.07 - 4.11 of the Supplemental Environmental Impact Statement for more detail.)

Access and Circulation.

Access is proposed in a wide section of the Santa Ana River wash at the foot of the San Bernardino Mountains. The existing access is Greenspot Road, a secondary highway. Connections can be made with the Barstow Freeway (Interstate 15), ten miles west of Mentone and six miles to the south with Interstate 10 in Redlands. An existing Atchison, Topeka, and Santa Fe Railroad line from San Bernardino to Redlands passes through the proposed reservoir basin in a north-south direction.

Recreational and Cultural Conditions.

There are no existing recreational facilities located at Mentone. Approximately five miles to the southeast is Yucaipa Regional Park, currently under development. This 360 acre park will feature picnic and day use areas. The Oak Glen to Mill Creek regional trail will link this park to the proposed Mentone Reservoir.

There are no known archaeological sites located within the Mentone Dam site and Flood Control Reservoir.

Utilties and Services.

Currently, there are no existing utilities at the Mentone Dam site. Sewage services, a domestic water supply, and electrical services would be a necessary development. Refer to "Special Problems".

UPPER SANTA ANA RIVER.

Although the upper Santa Ana River is not included as part of this project, its importance to the continuity and integrity of the total Santa Ana River recreation plan supports inclusion in study discussions. There are no flood improvements planned. This reach will be under flood plain management.

Location and Physiographic Characteristics.

This reach is the section of river between Mentone and Prado Dam sites. It begins 69 miles inland in the San Bernardino and San Gabriel

Mountains and progresses southwesterly to the mouth of the Santa Ana Canyon, which is formed by the Santa Ana Mountains and Chino Hills.

Climate.

The climate is mediterranean in nature; mild winters and hot summers. Dry, seasonal winds called the "Santa Anas", come from the desert areas to the northeast and east. Annual precipitation averages 12 to 16 inches per year, with 90 percent falling between November and April (see Table 1).

Topography.

The topography of this reach changes from the broad, rocky alluvial wash of the upper river to a sandy, more narrow course between Colton and Riverside at La Loma Hills. From the La Loma Hills to Mt. Rubidoux, the river is completely lined by levees to protect the densely populated Riverside area. Although levees and bank protection have been constructed, most of this upper river follows a natural course.

Geology and Soil Characteristics.

Granites, schists, and gneisses compose the San Gabriel, San Bernardino, San Jacinto and other mountains at the head of the basin. The Santa Ana Mountains and Chino Hills system, which divides the upper basin from the coastal plain, consists mainly of sedimentary sandstones and siltstones. All the materials have been affected, at least to some extent, by seismic activity and variations in sea level over geologic time.

Alluvial fill composed of gravel, sand and clay make up the soils of the upper basin. The alluvium exceeds a depth of over 1,000 feet in the middle and upper portions of this reach. In general, the alluvium becomes less coarse and permeable downstream from the mountains towards the valley's mouth at Prado Dam.

Existing Land Use.

The upper Santa Ana reach traverses primarily rural and agricultural lands and areas of light to moderate urban density. From Mentone to Colton, the river takes a course through rural and agricultural land. From Colton to Riverside, the south side of the river becomes lightly urbanized. The urbanization becomes heavier at Riverside, although it remains primarily on the south side, and remains constant through the City of Corona. The northern side of the river remains agricultural and rural in nature, with the exception of the community of Rubidoux which is to the northwest of Riverside.

Ecological Features.

Upper Santa Ana.

Vegetation in the upstream reach of the Santa Ana River from the proposed Mentone dam site to Mount Rubidoux consists primarily of opportunist weedy species. In contrast, the reach between Mount Rubidoux and Prado basin is biologically one of the most valuable reaches of the Santa Ana River supporting such vegetation as bulrushes, cattails, willows and cottonwoods. The high vegetation diversity and perennial water flow along this reach promotes excellent wildlife species diversity providing habitat for a large number of bird species. (See chapter IV, paragraphs 4-21-4.23 of the supplemental Environmental Impact Statement for more detail.)

Access and Circulation.

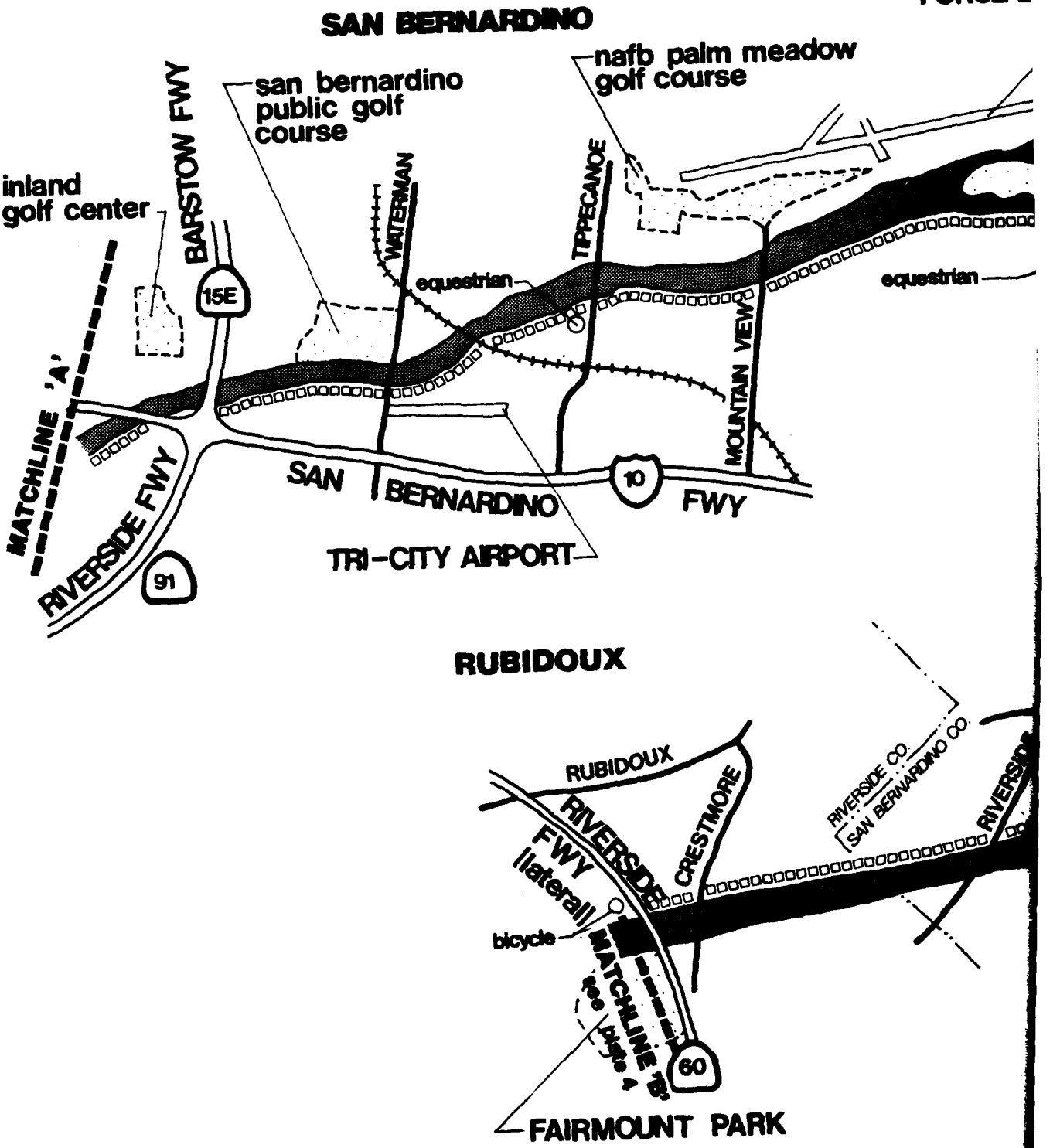
The most significant highway along this reach is the Riverside Freeway (Interstate 91), which becomes the Barstow Freeway (Interstate 15E) at the City of San Bernardino. The route runs roughly parallel to the river to the south. Secondary roads having connections to this freeway cross the river at 13 locations in the 32 mile reach. In very near proximity to the river at Colton is the interchange of the Riverside and San Bernardino Freeways (Interstate Highway 15E and 10). The status of the proposed freeway extension of Interstate Highway 15 that would cross the river near the town of Norco in Riverside County is in the final route selection phase at this time. Near the Prado Dam, State Highway 91 crosses State Highway 71, the Corona Expressway (see Plate 3).

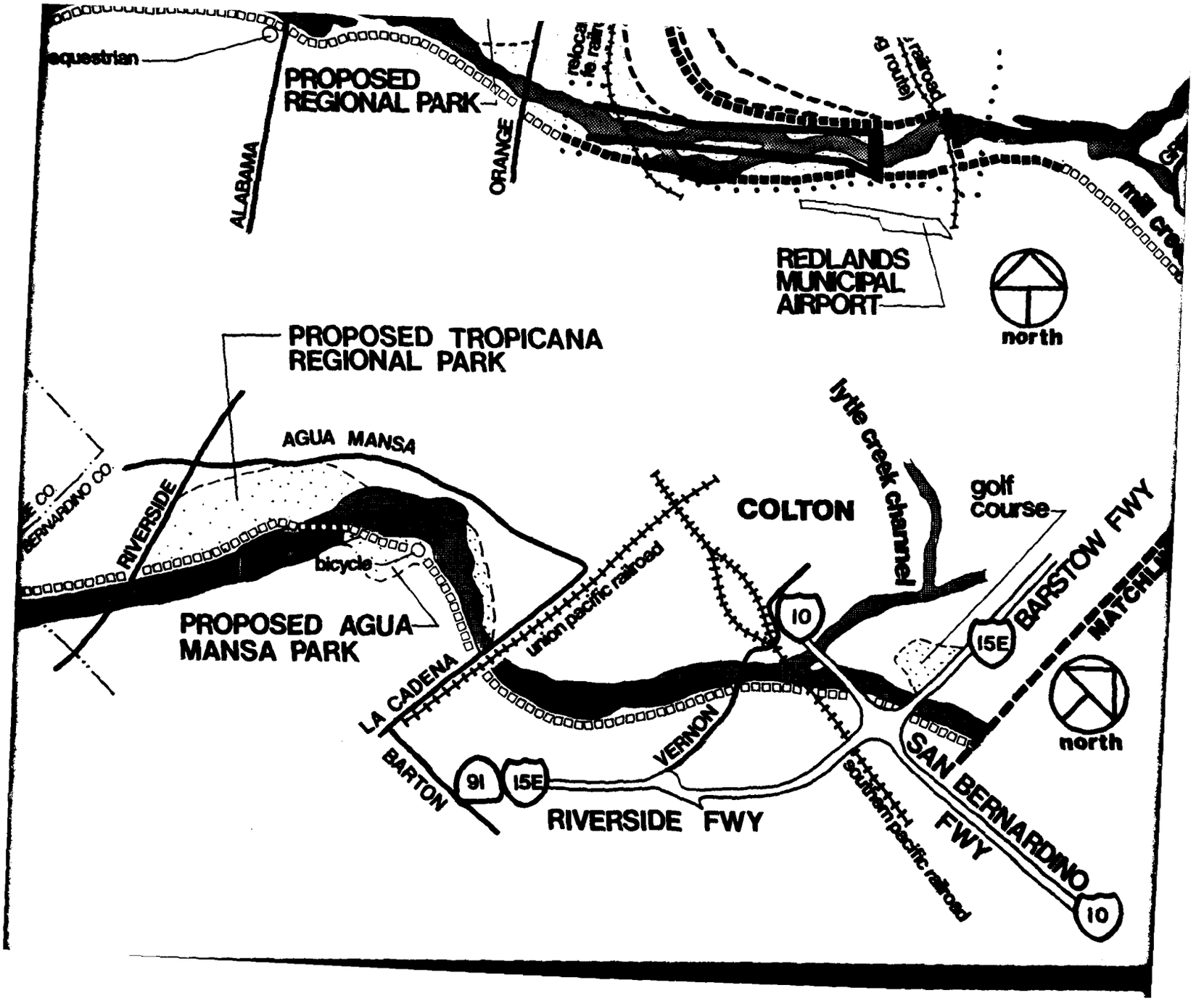
Recreational Conditions.

Equestrian and hiking trails along the river in Riverside County link several regional parks and will eventually connect to the Prado Reservoir. Riverside County has opened 12 miles of a 14 mile equestrian trail along the river which, when complete, will link the Prado Reservoir to Santa Ana and Fairmount Regional Parks and the proposed San Bernardino trail route (see Plates 3-4).

Other major types of public recreation facilities within the upper Santa Ana River Basin include regional and local parks, nature preserves and golf courses. Refer to Plate 5 for a summary of the adopted long range plans of Riverside and San Bernardino Counties for Regional Parks and Trails along the river. These County plans have been coordinated.

NORTON
FORCE B




equestrian
PROPOSED
REGIONAL PARK
ALABAMA
ORANGE
REDLANDS
MUNICIPAL
AIRPORT
north
PROPOSED TROPICANA
REGIONAL PARK
AGUA MANSA
RIVERSIDE
bicycle
PROPOSED AGUA
MANSA PARK
COLTON
lytle creek channel
golf
course
union pacific railroad
10
15E
BARSTOW FWY
LA CADENA
VERNON
BARTON
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south pacific railroad
SAN BERNARDINO
FWY
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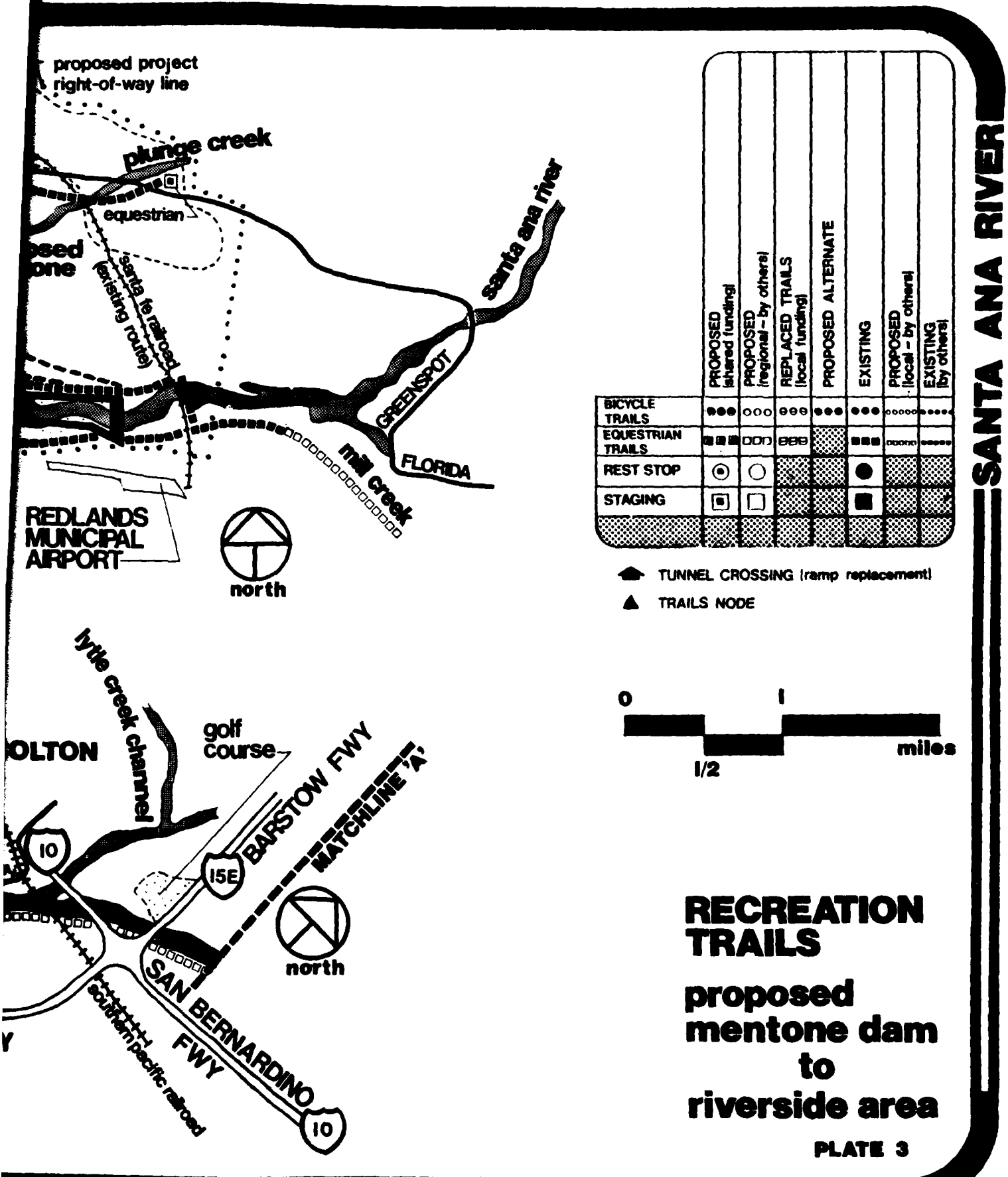
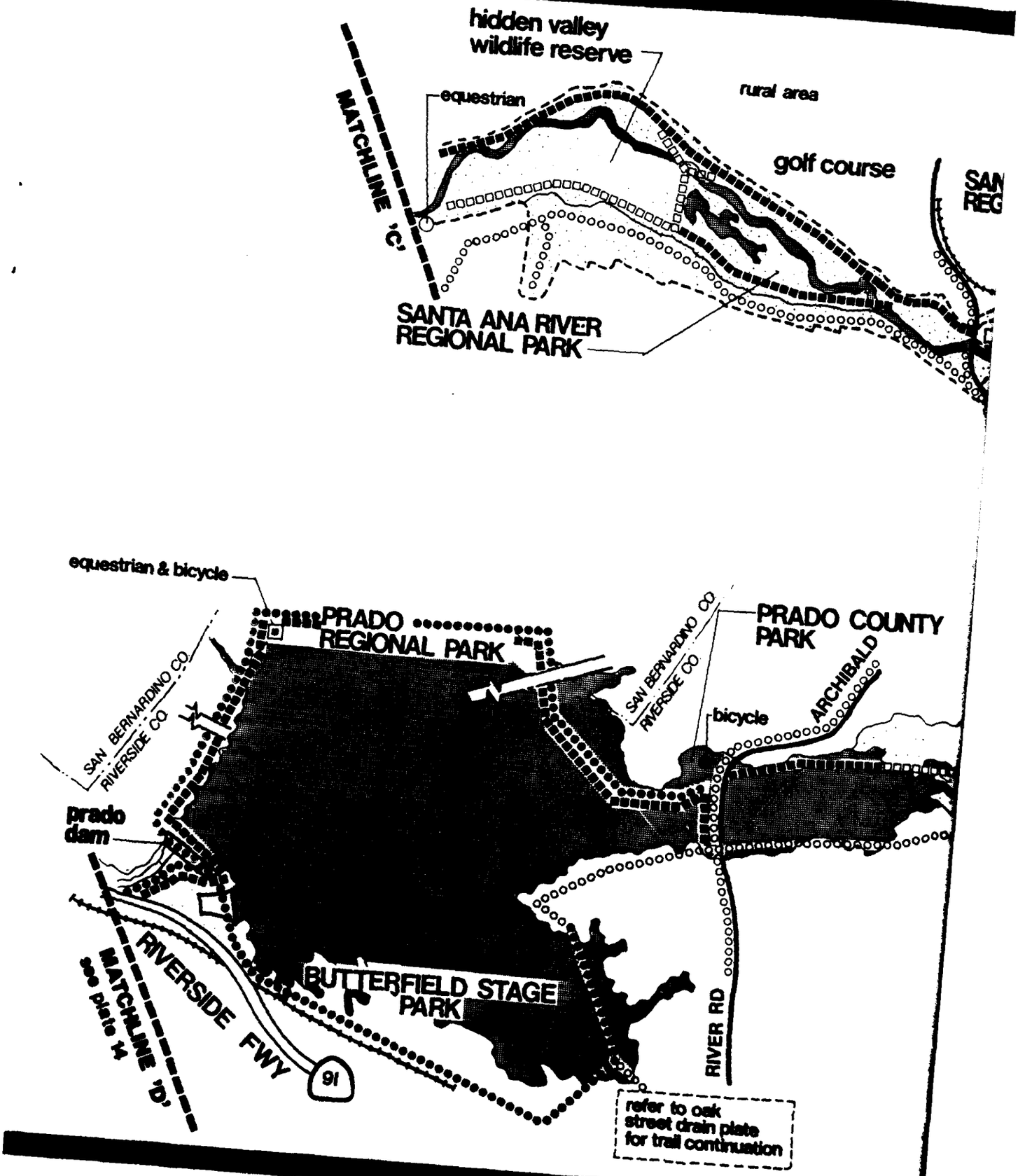
north

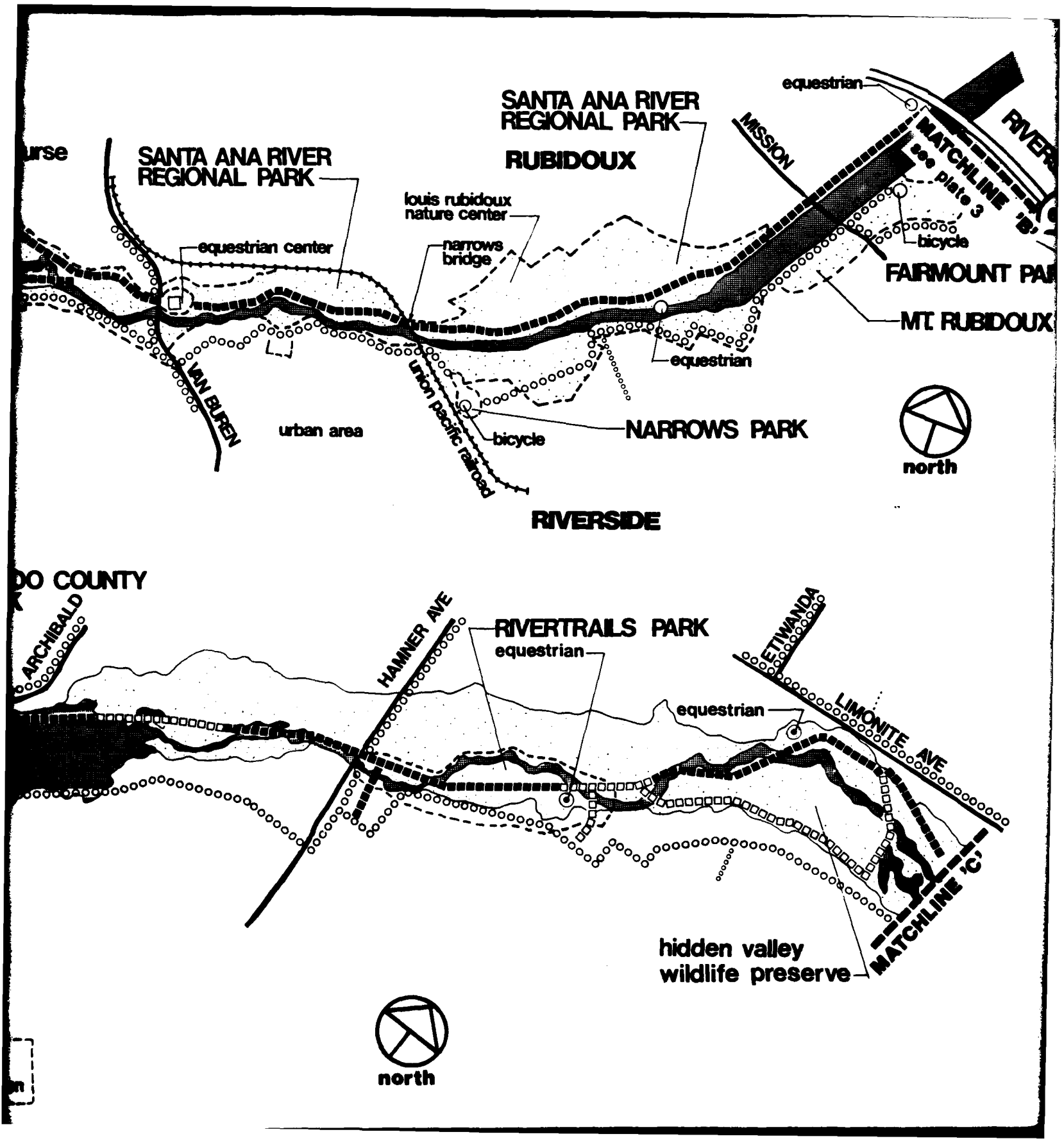


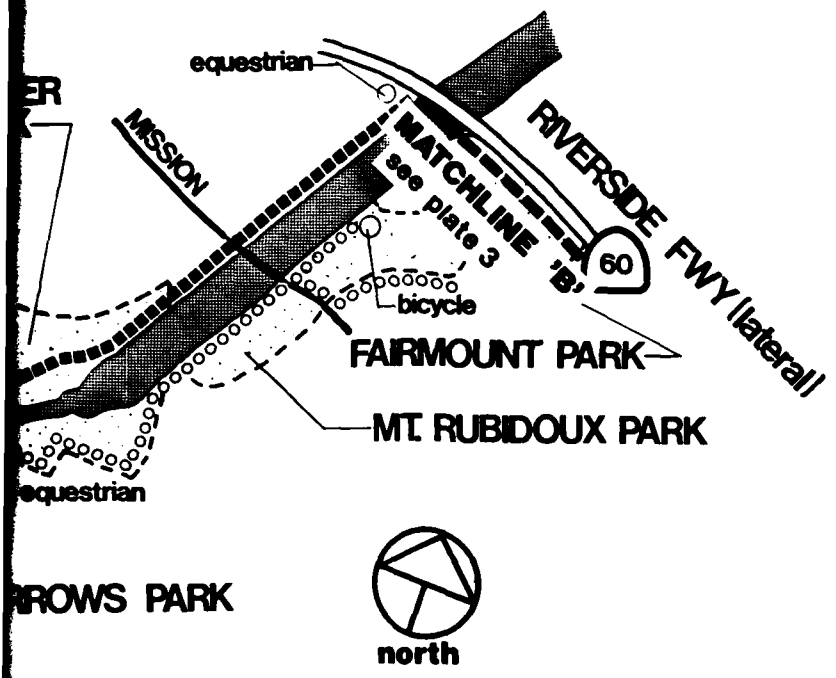
RECREATION TRAILS

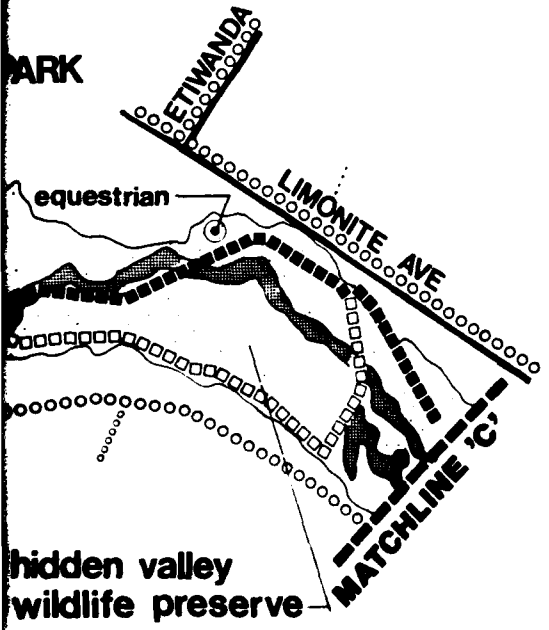
proposed mentone dam to riverside area

PLATE 3


hidden valley
wildlife reserve
equestrian
rural area
golf course
MATCHLINE 'C'
SANTA ANA RIVER
REGIONAL PARK
equestrian & bicycle
PRADO
REGIONAL PARK
SAN BERNARDINO CO
RIVERSIDE CO
PRADO COUNTY
PARK
ARCHIBALD
bicycle
prado
dam
RIVERSIDE FWY
91
MATCHLINE 'D'
see plate 14
BUTTERFIELD STAGE
PARK
RIVER RD
refer to oak
street drain plate
for trail continuation


SANTA ANA RIVER REGIONAL PARK
RUBIDOUX
SANTA ANA RIVER REGIONAL PARK
equestrian
MISSION
MATCHLINE 'B'
see plate 3
louis rubidoux nature center
equestrian center
narrows bridge
bicycle
FAIRMOUNT PA
MT. RUBIDOUX
equestrian
VAN BUREN
urban area
union pacific railroad
bicycle
NARROWS PARK
north
RIVERSIDE
DO COUNTY
ARCHIBALD
HAMNER AVE
RIVERTRAILS PARK
equestrian
ETIWANDA
equestrian
LIMONITE AVE
MATCHLINE 'C'
hidden valley wildlife preserve
north





	PROPOSED (shared funding)	PROPOSED (regional – by others)	REPLACED TRAILS (local funding)	PROPOSED ALTERNATE	EXISTING	PROPOSED (local – by others)	EXISTING (by others)
BICYCLE TRAILS	●●●	○○○	⊖⊖⊖	●●●	●●●	○○○○○	●●●●●
EQUESTRIAN TRAILS	■■■	□□□	⊟⊟⊟		■■■	□□□□□	■■■■■
REST STOP	⊙	○			●		
STAGING	▣	□			■		

TUNNEL CROSSING (ramp replacement)

TRAILS NODE

0 1 2 miles

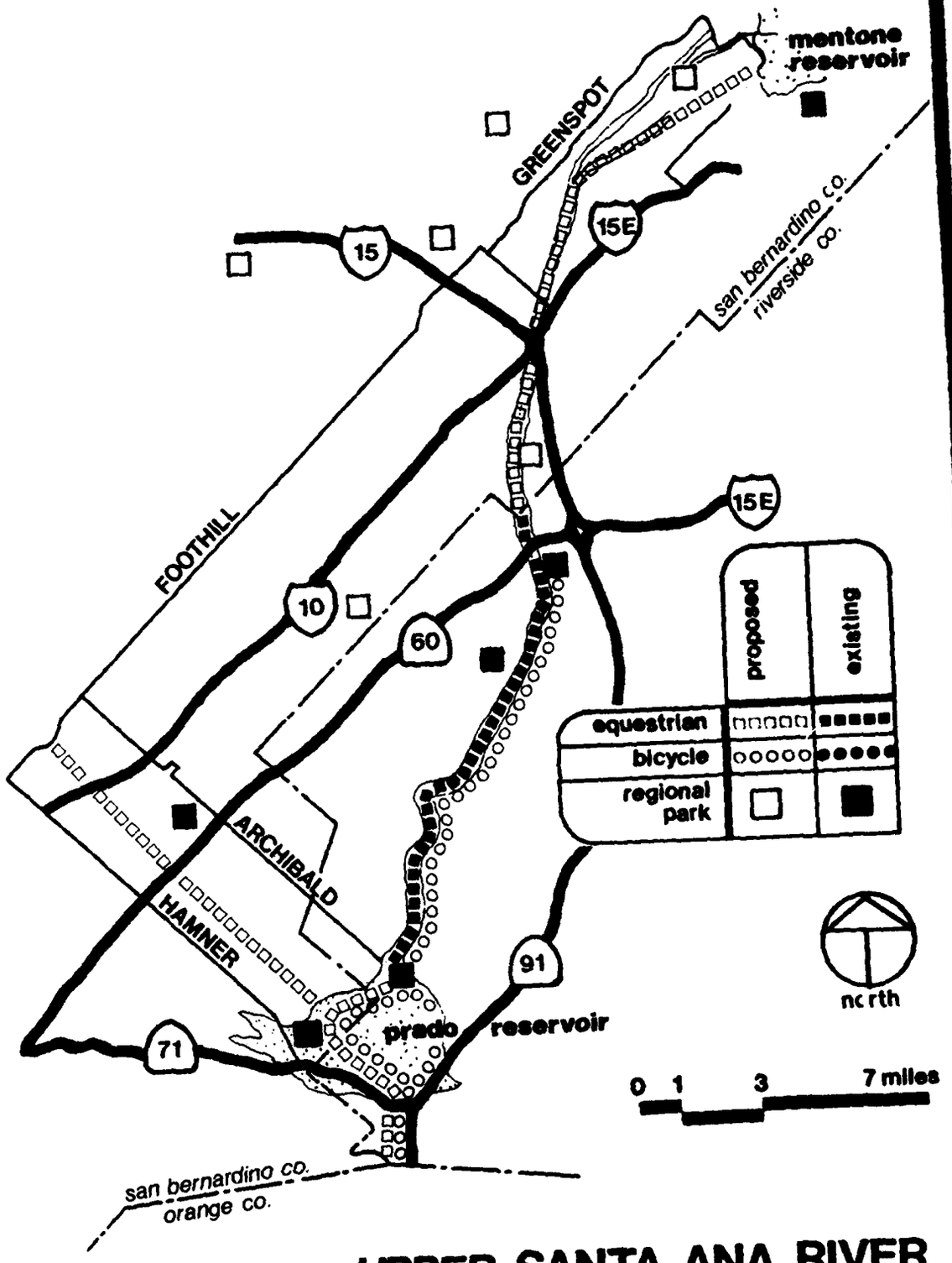
1/2

RECREATION TRAILS

riverside area to prado reservoir

PLATE 4

SANTA ANA RIVER



UPPER SANTA ANA RIVER
regional parks and trails

PLATE 5

Source: san bernardino & riverside county: general plan elements

PRADO RESERVOIR.

Location and Physiographic Characteristics.

The Prado Dam reservoir area is situated at the confluence of the Santa Ana River and the Cucamonga, Chino, and Temescal Canyon Creeks, about 4.5 mile west of the city of Corona and 45 miles east of downtown Los Angeles. Existing project boundaries are within the 556' elevation which falls both in Riverside and San Bernardino Counties. Project boundaries will be raised to the 566' elevation under the All-River Plan.

Climate.

The climate is typically mediterranean; long, hot, dry summers and mild, wet winters. The annual rainfall of 12-16 inches occurs between November and April (see Table 2). Dry, seasonal winds from the northeast and east approach velocities of 75 mph. The annual mean daily maximum and minimum temperatures, respectively, are 93°F in the summer and 40°F in the winter (see Table 1).

Topography.

The project is bordered on the west by the low Chino Hills, although slope gradients are steep. To the north and east are low flat lands. There are three general topographic areas within the Prado Dam; the lower reservoir area, the upland bluffs, and the tributaries.

Geology and Soil Characteristics.

The Santa Ana Mountains and Chino Hills system, which divide the upper basin from the coastal plain, consist mainly of sedimentary sandstones, siltstones, and other strata. Thus, the soil in this area is primarily alluvial fill consisting of sandstones and siltstones; however, lenses of sand and gravel also occur.

The northwest-southeast trending fault zone is the Whittier-Elsinore which passes through Santa Ana Canyon about 2 miles downstream from Prado Dam.

Existing Land Use.

Within the existing taking line of the Prado Dam reservoir area there are approximately 9,741 acres; of these lands, 6,641 acres are owned by the Corps of Engineers, with most of this leased for recreational purposes. About 17 percent of this leased land has been developed for recreation, with open public areas and concessions. Portions of these leased lands are sub-leased for agricultural purposes, utilized as dairy farms. The remaining 3,100 acres within the existing project taking line are covered by flowage easement only and are owned by private interests (see Plate 6).

Ecological Features.

The estimated 3,000-5,000 acres of riparian and wetland habitat within the Prado basin contain the largest stand of mature riparian Woodlands remaining in Southern California and provide high quality habitat for migratory fowl and permanent species of herons, flycatchers and raptors. The Federal and State designated endangered bald eagle and peregrine falcon have been sited within the basin. Much of the fringe area around Prado basin consists of agricultural lands and grasslands. Areas of greatest wildlife valves occur along the intermixed edges of riparian and aquatic habitat and where riparian habitats merge with grassland and agricultural areas. (See chapter IV, paragrphs 4.28-4.32 of the suppemental Environmental Impact Statement for more detail.)

Access and Circulation.

The Riverside (State Highway 91) and Corona Freeways (State Highway 71) generally border Prado Basin on the south and west side, respectively. Euclid and Archibald Avenues are major highways in the Counties' Circulation Elements. They provide linkages with the Corona and Riverside Freeways to the east and west sides of the basin respectively (see Plate 7).

Recreational and Cultural Conditions.

The major recreational concerns within the Prado Basin are Prado Regional Park and Prado County Park, two regional parks, and Butterfield Stage Park, a community park. Other nearby facilities include Corona Municipal Airport, a 10 acre pistol range, and Corona National Golf Course.

Fifteen cultural resource sites have been recorded within the Prado Basin. See Appendix I for futher discussion of cultural resources.

Utilities and Services.

Utility services in the Prado Reservoir do exist, but are somewhat limited and sporadic in nature. Refer to "Special Problems".

LOWER SANTA ANA RIVER AND SANTIAGO CREEK.

Location and Physiographic Characteristics.

The Lower Santa Ana River runs from the eastern end of the Santa Ana Canyon, which is 30 miles inland, in a southwesterly direction through Orange County to the Pacific Ocean at Huntington Beach. Santiago Creek rises on the western slopes of the Santa Ana Mountains and connects into the Santa Ana River in the City of Santa Ana just south of the Garden Grove Freeway (State Highway 22). At the mouth of the Santa Ana Canyon, the coastal plain begins. The lower reach is located within this plain.

Climate.

The climate is mediterranean in nature; mild winters and hot summers. Dry, seasonal winds called the "Santa Anas", come from the desert areas to the northeast and east. Annual precipitation averages 12 inches per year, with 92 percent of it falling between November and April (see Table 1).

Climate conditions in the immediate coastal area are directly influenced by the surrounding marine air conditions which produce moderate to hot summers and mild winters. There is moderate to heavy fog occurring primarily from mid-December to March. Low clouds are mainly restricted to the late afternoon to mid-mornings.

Topography.

Santa Ana Canyon is formed on the north by the low-lying Chino Hills and on the south by the Santa Ana Mountains. Canyons entering into it deposit alluvial fill. Channelization of the river starts approximately 2 miles upstream from Imperial Highway near the western edge of the Canyon. The remaining route of the river through the general level coastal plain has been channelized to protect the extensive urban developments in the region from flood.

Geology and Soil Characteristics.

The coastal plain was formed by alluvium of sedimentary origin that grade into older sedimentary strata underneath to probably as much as 20,000 feet deep. This alluvium was deposited by the Santa Ana River and its lower tributaries, carrying sediment from the upper basin and the Chino Hills and Santa Ana Mountains. Many of these sediments were deposited on the ocean floor that covered the region at different geologic times.

Existing Land Use.

In the Santa Ana Canyon, land use is open space. From Imperial Highway to the Pacific Ocean, the river courses through dense urbanization. A salt water marsh is located on the east side of the channel at the river's mouth. The areas along Santiago Creek are also primarily urbanized. In the same creek, between Prospect Street and Villa Park Road, there are two retention basins.

Ecological Features.

Lower Santa Ana.

Due to dense urbanization, natural habitat along the channelized reach fo the lower Santa Ana is practically non-existent. Santa Ana Canyon, however, supports relatively high value riparian habitat for diverse bird and animal life including herons, hawks, quail, mice racoons, coyotes and gray fox.) The mouth of the Santa Ana is

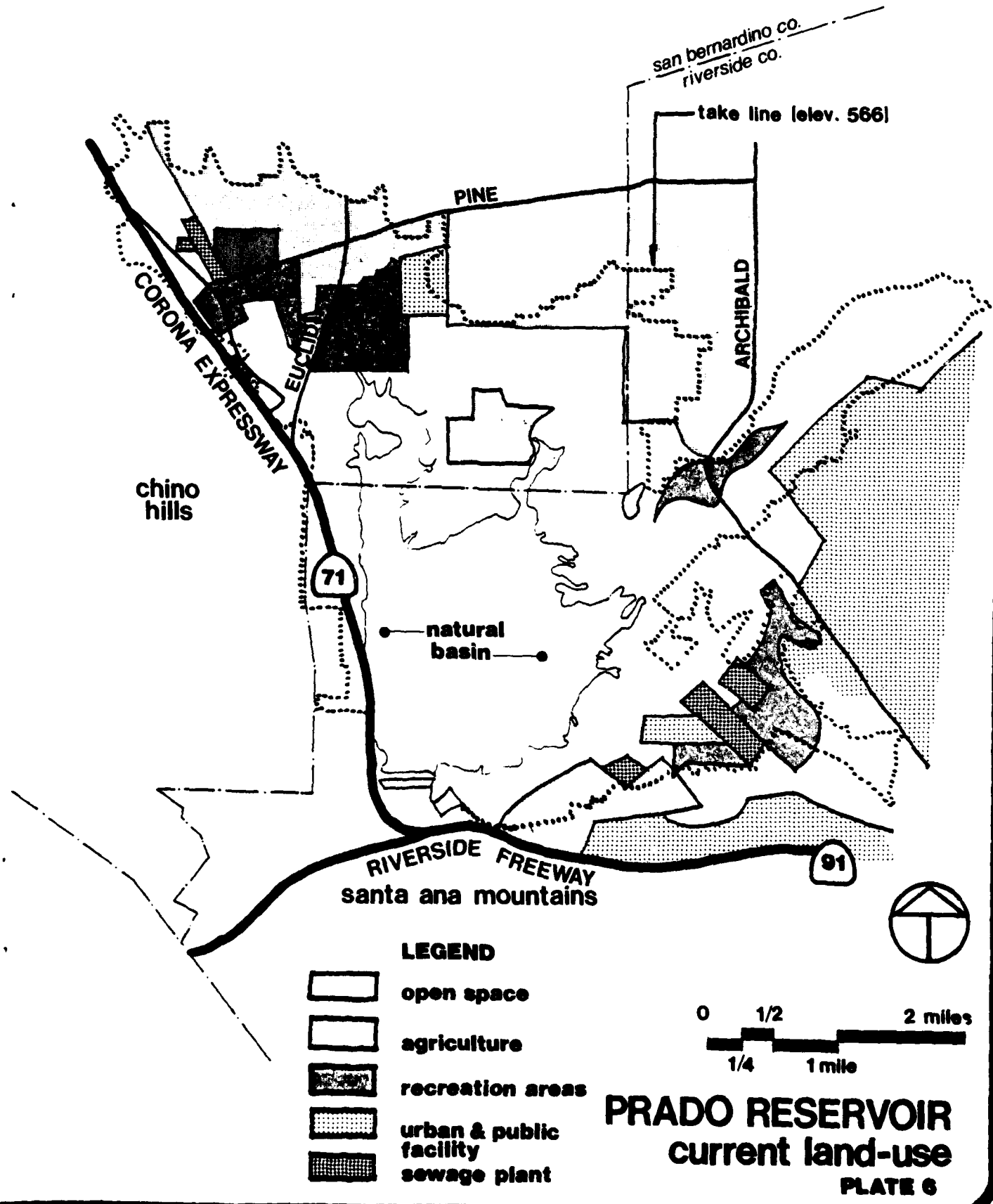
ecologically sensitive and therefore eliminated from recreation planning. Santiago Creek contains native and riparian vegetation just below Villa Park Dam with minimal habitat downstream of Villa Park Road. (See Chapter IV, paragraphs 4.39-4.44 and 4.63 of the Supplemental Environmental Impact Statement for more detail.)

Access and Circulation.

The urbanized section of the lower Santa Ana River is crossed by many arterial roads as well as a major highway (Pacific Coast Highway) and five freeways (Garden Grove, Orange, Riverside, Santa Ana, and San Diego). Santiago Creek has the same type of circulation system, but only is crossed by three freeways (Garden Grove, Newport, Santa Ana).

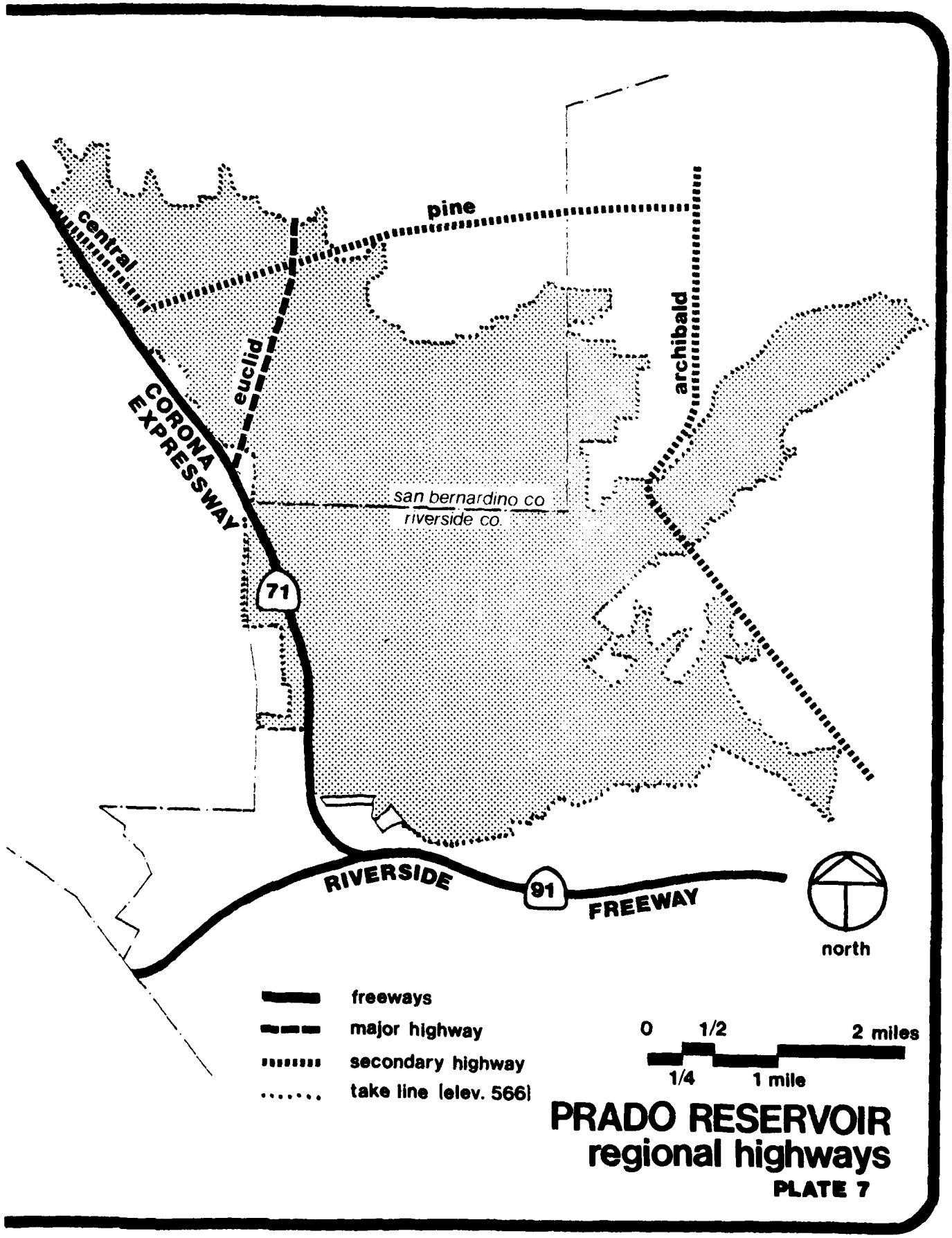
Recreational and Cultural Conditions.

Recreational trails, which are the predominant type of proposed and existing regional recreation facilities along the river and creek routes of this study, will be discussed more specifically in following sections. The major types of public recreation facilities, in addition to trails, within the Orange County urban core of the lower Santa Ana River and Santiago Creek Basins include: regional parks, beaches and harbors, preserves, golf courses, and local parks (see Plate 8).



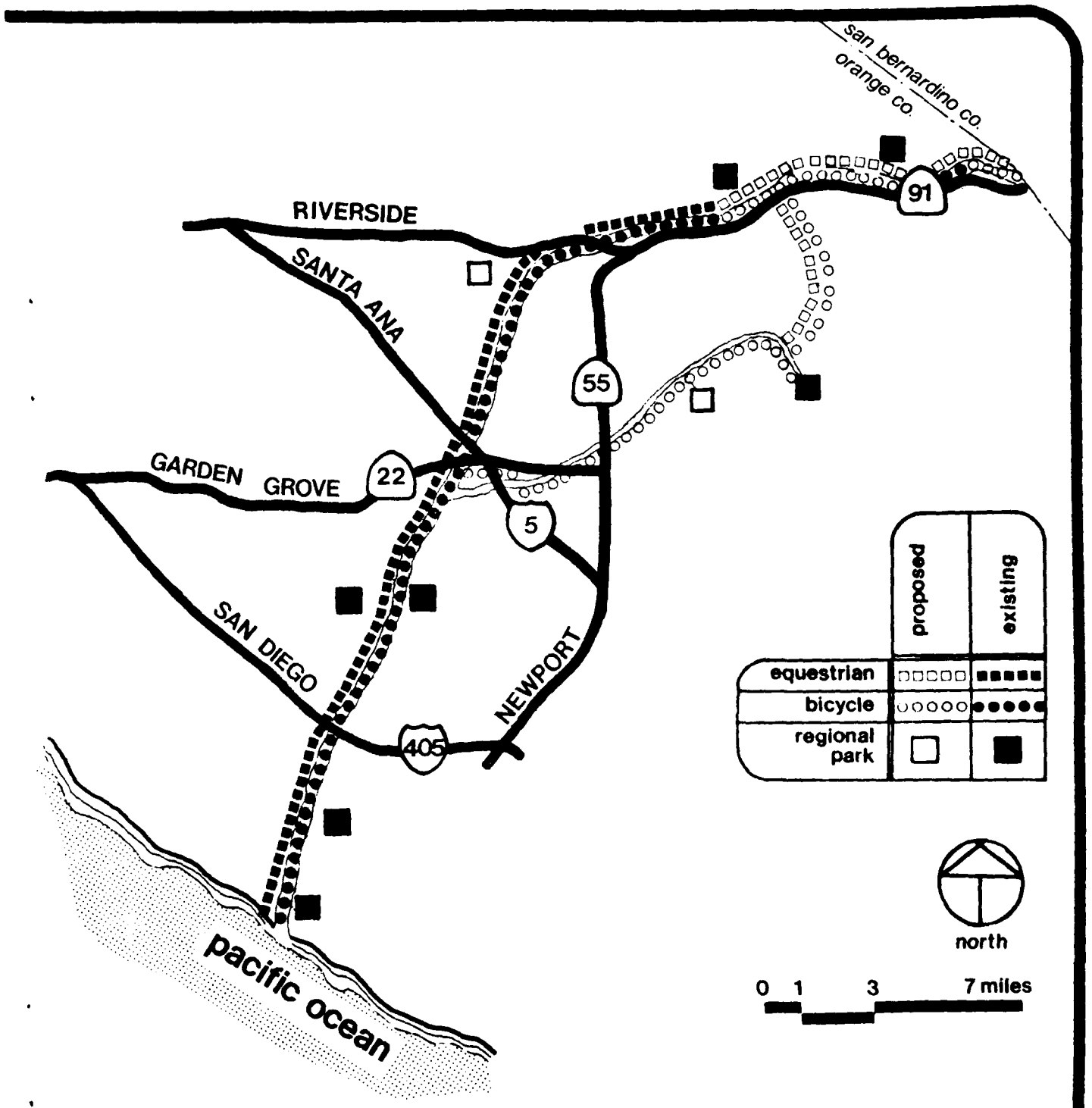
PRADO RESERVOIR
current land-use

PLATE 6



PRADO RESERVOIR
regional highways

PLATE 7



LOWER SANTA ANA RIVER
regional parks and trails

PLATE 8

Source: orange county - general plan elements

3. RECREATION MARKET ANALYSIS

MENTONE AND PRADO RESERVOIRS

Market Area.

Surveys of existing use of water-oriented recreational facilities within Southern California and similar to those proposed for Mentone and Prado indicate that a significant portion (76 percent - 96 percent) of total use of existing facilities originates within a 30 mile radius (see Table 4). The market area for the recommended facilities was therefore considered to be within 30 miles of those facitilies, although additional use will undoubtably come from beyond this distance. As 93 percent of the mountain area within the Mentone and Prado 30 mile radii is maintained as preserved acreage, much of which is owned by the U.S. Forest Service and used on a statewide and nationwide basis as a recreation resource, the project sites would not attract a significant number of users from these areas. Therefore, it was decided to terminate the Mentone and Prado market areas at the San Bernardino and San Gabriel Mountains which form a geographical boundary to the north of the project sites.

In order to avoid double counting of populations within those portions of the market areas that overlap, the service radius for each market area was divided into 20 mile (primary) and 30 mile (secondary) zones (see plate 9). Those areas within the secondary market area of Mentone and primary market area of Prado were included exclusively within the Prado market area. Those areas within the secondary market area of Prado and primary market area of Mentone were included exclusively in the Mentone market area. Areas where the primary market areas for both Mentone and Prado overlap were divided according to ease of access to the proposed facilities, that is, population centers closest in travel distance to either of the project areas were included exclusively in the market area for that facility.

The following table presents, 1980, 1990, and 2000 population projections for the Prado and Mentone market areas. The projections are based on Southern California Association of Government's data.

TABLE 3
PROJECTED POPULATION IN MENTONE
AND PRADO MARKET AREAS

	1980	1990	2000
Mentone	781,000	917,000	1,040,000
Prado	3,913,000	4,447,000	4,852,000

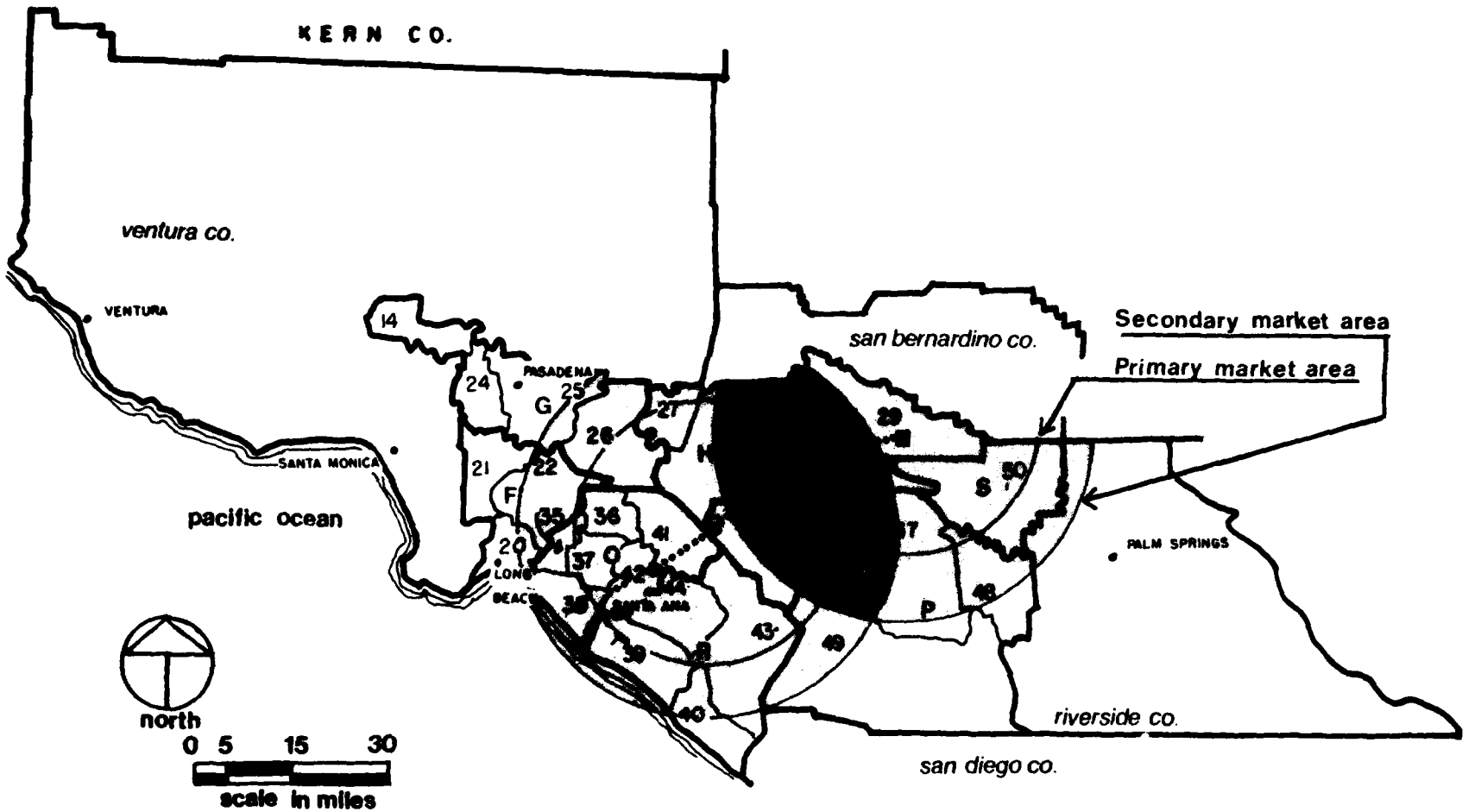
*Project based on Southern California Association of Governments Data.

TABLE 4
RADII WITHIN WHICH RECREATION VISITORS TO
SELECTED SOUTHERN CALIFORNIA RESERVOIR/LAKES RESIDE
1974-1976

Reservoirs/Lakes	Radii of Residence from Reservoir/Lake (percent)				
	0-20 Miles	20-30 Miles	30-40 Miles	Beyond 40 Miles	Total[1]
Bonelli Regional Park (@ Puddingstone Reservoir)					
1974[2]					
North Shore	78%	----------	22%	----------	100%
Swim Park	79%	----------	21%	----------	100%
1976[3]	76%	21%	4%	----------	100%
Castaic Lake Recreation Area					
1974[4]					
Boat Ramp	20%	41%	16%	23%	100%
After Bay	34%	41%	12%	14%	100%
1976[5]	17%	51%	11%	21%	100%
Whittier Narrow Dam Recreation Area - 1974[6]	96%	----------	4%	----------	100%

[1]Subtotals may not equal 100% due to independent rounding.
[2]License plate survey conducted over the weekend of June 22, 1974.
[3]License plate survey conducted on Saturday, February 14, 1976; low use day because of snow in the mountains and cool weather at the park. The swim park was not open.
[4]License survey conducted over the weekend of August 11, 1974.
[5]License survey conducted on Saturday, February 22, 1976. The weather conditions were excellent. Data not separately tabulated by the County of Los Angeles for boat ramp and after bay.
[6]License plate survey conducted during Memorial Day weekend, on Sunday, May 26, 1974; and Monday, May 27, 1974.

SOURCES: County of Los Angeles, Department of Parks and Recreation, Planning Research Section; and EDCON.



legend

- SANTA ANA RIVER
- MENTONE RESERVOIR
- PRADO RESERVOIR
- MARKET AREAS
- REGIONAL STATISTICAL AREA SUB GROUP
- REGIONAL STATISTICAL AREA

SANTA ANA RIVER PROJECT
reservoir market areas

PLATE 9

Socio-Economic Characteristics.

Socio-economic characteristics for the Mentone and Prado market areas are included in the Social Impact Appendix. For both market areas medium age is expected to grow from 29, in 1977, to 32 by 1989.

Inventory of Existing Recreation Facilities.

Major regional park facilities within the Mentone market area include the 360 acre Yucaipa Regional Park and the over 5000 acre Lake Perris State Recreational Area. Facilities provided at these parks include camping, picnicking, boating and swimming. Box Springs Mountain Park provides over 1000 acres of undeveloped land for nature study, horseback riding and hiking. There are almost 200 community and neighborhood parks supplying open play fields, playgrounds, picnicking and swimming facilities. Although not within the Mentone market area, United States Forest land, forming the backdrop to the Mentone site, provides extensive recreational facilities of statewide and national interest. Over 200 acres of developed forest land provides 1,400 picnic sites, 925 individual campsites and additional camping facilities for 1,600 people-of-one-time. Campsites are filled to capacity on summer weekends and reservations are required at least ten days in advance.

State recreational areas, State and county beaches and regional parks provide major recreation facilities within the Prado market area. State and county beaches extend along the length of the Orange County coastline providing over 9 miles of public swimming beach. Sunset and Newport Harbors are major boating centers with slips and buoys for almost 300 boats. There are over 50 regional and county parks for picnicking, open field games, hard court sports, camping, bicycling and horseback riding. Over 500 neighborhood and community parks feature playfields and multiple use areas.

Water-oriented parks within the Mentone and Prado areas are of primary interest since they provide facilities comparable to those proposed for the dam sites. Big Bear Lake, Lake Arrowhead, and Silverwood Lake are located in the San Bernardino Mountains. Additionally, Lake Perris is located within the Mentone market area approximately 10 miles southeast of Riverside. Boating, camping and picnic facilities are provided at these sites with the exception of boat access at Lake Arrowhead. There are three regional water-oriented recreation areas in the Prado area: Whittier Narrows, Lake Elsinore and Puddingstone Reservoir. Puddingstone and Whittier Narrows are most similar to the proposed Prado project because of their proximity to urban centers. Primary activities provided at these recreation areas include camping, picnicking, and boating. Swimming is also available at Puddingstone, and Whittier Narrows provides additional specialized activities such as skeet shooting, model airplane flying, model boating and a wildlife interpretive area. Boating is limited at Whittier Narrows to 24 rental row boats. Boating at Puddingstone is more extensive with 10 boat ramps and parking for 94 cars with boat trailers. Table 5 summarizes facilities and annual activity days at these water-oriented recreation areas.

Existing Facilities Within the Prado Basin.

There are a number of existing recreation facilities in Prado Reservoir, including 2 golf courses, 2 private hunting groups, a pistol range, and numerous picnic and camping areas. Table 6 shows the estimated recreation use of the major facilities.

TABLE 5
MAJOR PUBLIC INLAND WATER-BASED
RECREATION PROJECTS WITHIN MENTONE AND PRADO MARKET AREA
1979

Facility	Owners or Lessee	Area (acres) Land	Area (acres) Water	Recreation Elements: Campsites	Recreation Elements: Picnic Tables	Parking Spaces: Boat Ramps (lanes)	Parking Spaces: Cars	Parking Spaces: Cars w/Boat Trailers
Lake Arrowhead	U.S. Forest Service	86,000		317[1] 125 Cabins	31	-0-	na	-0-
Perris Lake	State of California	6,600	2,200	431 Indiv. 6 Group	645	10	3,200	350
Puddingstone Reservoir	Los Angeles County	1,650	250	220	1,000	10	3,105	94
Big Bear Lake	U.S. Forest Service	na	3,000	261 Indiv. 550 Group	na	4[2]	100	na
Lake Elsinore	State of California (private concessionire)	200	3,000	400	na	20	1,000	na
Whittier Narrows	Los Angeles County	na	10/37/30[5]	NA Indiv. 200 Group[6]	800	NA[7]	4,000	-0-
Silverwood Lake	State of California	2,200	1,000	100 Indiv. 120 Group	675	4	675	185
TOTAL	NA	NA	9,450	NA	NA	NA	NA	NA

Facility	Activity-Days (thousands): Day	Campers	Boaters	Total	No of Boats Using Lake (thousands)	Fees Per Day (per car/boat): Day	Camping
Lake Arrowhead	na	na	na	1,695.0	na	na	$2.00-$3.00
Perris Lake	1,069	196.0	na	1,265.0	64.0	na	na
Puddingstone Reservoir	na	na	na	2,706.0	28.0	$1.50 car-$2.00 boat	$3.00
Big Bear Lake	1,661.0	109.0	na	1,777.0[3]	na	NA	na
Lake Elsinore	na	na	na	75.0	NA[4]	na	$4.00-RV[8]
Whittier Narrows	1,666.0	na	-0-	1,666.0	-0-	na	$3.00-Tent
Silverwood Lake	250.0	281.0	na	531.0	na[9]	na	na
TOTAL	NA	NA	NA	9,715.0	NA	NA	NA

Note: NA means not applicable.
na means not available.
[1]Also six organizational campsites accommodating 350 people.
[2]Five private marinas around lake also.
[3]U.S. Forest Service facilities only.
[4]Because of flood damage no boats launched since 1978.
[5]Three lakes.
[6]These are currently being developed.
[7]24 rental row boats available.
[8]Hook ups provided.
[9]Estimated that 10-15% of campers bring a boat.
SOURCE: Owners and Lessees; and EDCON

TABLE 6
ESTIMATED RECREATION USE OF MAJOR FACILITIES
IN THE PRADO RESERVOIR
1978-1979

Facility	Recreation Use (thousands)	
Prado Regional Park-		
San Bernardino County		
Recreation-Days (1977 -1978 fiscal year)		
Camping	23.0	
Day	40.0	
Total	63.0	
Activity-Days (1977-1978 fiscal year)	126.0	1.0:2.0
El Prado Golf Course - Subleased from San Bernardino County		
Recreation-Days (1979)	92.0	
Richardson Dog Training Center - Subleased from San Bernardino County		
Recreation-Days (1979)	23.0	
Prado Park - Riverside County		
Recreation-Days		
Camping	2.0	
Day	59.0	
Sub-Total	61.0	
Visitor Center	21.0	
Total	82.0	
Activity-Days	105.0	1:1.3
Laughlin Duck Ponds - Subleased from Riverside County		
Recreation-Days (1979)	1.0	
Linc Raahaug Pheasant Club - Subleased from Riverside County		
Recreation-Days (1979)	41.0	
Butterfield Stage Trail Park - City of Corona		
Recreation-Days (1978-1979 fiscal year)		
Sports	64.0	
Day and Group Camping	1.0	
Pistol Range	30.0	
Flying	56.0	
Other Day	79.0	
Sub-Total	294.0	
TOTAL RECREATION-DAYS	596.0	

SOURCES: U.S. Army Corps of Engineers, Leasees; and EDCON.

Recreation Demand.

In order to determine net recreational needs within the Mentone and Prado market areas per capita demand and existing supply was analyzed for the activities of camping, picnicking, swimming, boating, bicycling and horseback riding. Because available data was insufficient to determine existing supply and use capacity for other activities similar to those provided by the proposed projects (open field sports, hard court games, play areas and fishing) an analysis of regional park land deficits within the market areas was also conducted. Net needs for the individual market areas were then compared with the recreational supply of the proposed facilities to determine the ability of the proposed projects to help satisfy unmet demand. The results of this analysis shows that the Mentone project would help meet 14 percent of 1980 unmet market area demand and the Prado alternatives would help meet 2 percent to 3 percent of 1980 unmet market area demand for the combined activities of picnicking, camping, boating, swimming and trail use. Additionally, the Mentone project would provide 3 percent, the Prado recommended plan (4-lake) would provide 1 percent and the Prado alternate plan (1-lake) would provide 2 percent of regional park land additions needed between 1975-1995. The analysis is explained in the following paragraphs.

Per Capita Demand.

Demand for recreational activities proposed for the Mentone and Prado sites was based upon the application of per capita participation rates to the market area populations. The following table shows per capita participation rates for peak summer season (from Memorial Day to Labor Day) for five major outdoor recreation activities expected to take place in the Mentone and Prado recreation areas. Participation rates were obtained from a recent survey undertaken for Orange County and identified in the Orange County Recreation Needs and Regional Park Study. Participation rates are applicable to the market area population five years of age and older.

TABLE 7
PER CAPITA PARTICIPATION RATES
DURING 1980 SUMMER SEASON
FOR MENTONE AND PRADO MARKET AREAS

Activity	Per Capita Participation Rate[1]/ in 1980	
	Mentone	Prado
Power Boating	.49	.49
Sailing and Canoeing	.62	.61
Swimming	6.14	6.12
Camping	.47	.43
Hiking	.34	.34
Horseback Riding	.52	.52
Bicycling	12.14	12.15
Picnicking	3.46	3.45

[1]/For population five years of age and older, which was generally 89% of the population for studied market areas.

Source: Orange County Recreation and Regional Parks Study, Interior Report No. 2, Current and future Recreation Patterns, PBQ & D, Inc., for the Orange County Envirionmental Management Agency.

Participation rates were applied to the market area populations five years of age and older to identify potential recreation demand during the peak summer season. This is illustrated in Table 8, Potential Demand for Mentone and Prado Market Areas.

TABLE 8
POTENTIAL DEMAND FOR MENTONE AND PRADO
MARKET AREAS FOR SUMMER SEASON[1]
1980 IN ACTIVITY DAYS

	Per Capita Participation Rates[2]		Population Five Years of Age and Over[3]		
			Mentone 695,000	Prado 3,482,570	Prado (trails)[4] 2,599,690
Activity	Mentone	Prado	Potential Demand in Market Area		
Power Boating	.49	.49	340,550	1,706,459	
Sailing and Canoeing	.62	.61	430,900	2,124,368	
Swimming	6.14	6.12	4,267,300	21,313,328	
Camping	.47	.43	326,650	1,497,505	
Hiking	.34	.34	236,300		883,894
Horseback Riding	.52	.52	361,400		1,351,839
Bicycling	12.14	12.15	8,437,300		31,586,233
Picnicking	3.46	3.45	2,404,700		12,014,866

1 Memorial Day through Labor Day
2 For population five years of age and over
3 Eighty-Nine percent (89%) of total population
4 Population within the lower Santa Ana River and Santiago Creek trail market areas have been excluded to avoid double counting of trails demand.

Existing Supply. Potential demand for the market areas during summer season was compared with the theoretical use capacity of existing facilities during the summer season to determine net before-project needs for recreation for the two market areas. Existing recreational facilities within the Mentone and Prado market areas were inventoried using the State of California Department of Parks and Recreation PARIS (Park and Recreation Information System) data. PARIS provides on extensive inventory of recreational facilities based upon a statewide survey conducted from 1974-1976. Agencies within the market areas were contacted regarding acquisitions and developments to update the 5-year old PARIS data. Existing facilities located within the overlap of market areas were divided according to proximity and ease of access to the Corps proposed facilities.

The recreation resource capacity of existing facilities within the Mentone and Prado market areas was determined by applying the land-capacity formula developed by the Sacramento District Corps of Engineers. This method is summarized in Chapter IX of this report, "Recreation Attendance and Benefit Analysis." The land capacity formula estimates maximum annual use. In order to calculate summer use capacity the formula was utilized to determine peak monthly recreation days then multiplied by 3.3 to establish peak use over the 101 days of the summer season. Calculations showing maximum capacity of existing facilities are illustrated in Table 9, Recreation Resource Capacity of Existing Facilities for the Mentone and Prado Market Areas, 1980.

The supply of ocean beaches within the Prado market area was modified to reflect a 20 percent usage from outside the Prado market area. This was based upon data provided by the Orange County Recreation Needs and Regional Parks Study 1980, which provides information on County of origin for beach users in Orange County. Surveys of over 2100 people and 49,000 license plates conducted during the summer of 1978 indicate that 53 percent of beach facilities are being utilized by out-of-county visitors. This data was adjusted to reflect market area boundaries by proportionment based upon percentage of population within each county that is within the market area.

Market Area	Activity	Density x	Units x	Turn- x over	Duplication = Ratio	# of Daily Days
MENTONE	Picnicking-Tables Groups[1]	4	2,207	1.5	.833	11 2
	Camping-Sites Groups[1]	4	472	1	.833	1
	Boating[2]	2.5	655	2.5	.833	3
	Swimming Lake	1/75 s.f.	18,295*	2.3	.833	35
	Trails--Equestrian	6	439	2	.833	4
*31.5 acres total						
PRADO	Picnicking-Tables Groups[1]	4	11,363	1.5	.833	5
	Camping-Temporary[2] Groups[1]	2.5	1,460	1	.833	
	Boating-Temporary[2]	2.5	3,478	2.5	.833	1
	Permanent[3]	2.5	298	1	.833	
	Swimming-Lake	1/75 s.f.	18,004*	2.3	.833	3
	Ocean	1/75 s.f.	232,320**	1.2	.833	23
	Trails-Bicycle	20	171	2	.833	
	Equestrian	10	401	2	.833	

* 31 acres total
** 400 acres total

1. Data provided for group activities refers to people-at-one time totals for group
2. Supply is based upon # of rental boats plus # of boat parking spaces.
3. Supply is based upon # of slips and buoys at marina facilities.

TABLE 9
RECREATION RESOURCE CAPACITY OF EXISTING
FACILITIES FOR THE MENTONE AND PRADO
MARKET AREAS, 1980

lication = io	# of Max. x Daily Rec. Days	Weekend = Days in Peak Month	Total Weekend = Use in Peak Month	% of = Peak Use on Weekends	Total Use x During Peak Month	# of Peak Months = in Summer Season (101 days)	Rec. Provi Exist Durin
.833	11,030	9	99,270	.5	198,540		
	2,337	9	21,033	.5	42,066		
					240,606	3.3	
.833	1,572	9	14,148	.5	28,296		
	839	9	7,551	.5	15,102		
					43,398	3.3	
.833	3,410	9	30,690	.5	61,380	3.3	
.833	35,051	9	315,459	.5	630,918	3.3	
.833	4,388	9	39,492	.5	78,984	3.3	
.833	56,792	9	511,128	.5	1,022,256		
	9,987	9	89,883	.5	179,766		
					1,202,022	3.3	
.833	4,864	9	43,776	.5	87,552		
	5,778	9	52,002	.5	104,004		
					191,556	3.3	
.833	18,107	9	162,963	.5	325,926		
.833	745		6,705	.5	13,410		
					339,336	3.3	
.833	34,493	9	310,437	.5	620,874	3.3	
.833	232,227	9	2,090,043	.5	4,180,086	3.3	
.833	5,697	9	51,273	.5	102,546	3.3	
.833	6,680	9	60,120	.5	120,240	3.3	

he totals for group areas.
spaces.
s.

TABLE 9

REATION RESOURCE CAPACITY OF EXISTING
ACILITIES FOR THE MENTONE AND PRADO
MARKET AREAS, 1980

Weekend = Days in Peak Month	Total Weekend ÷ Use in Peak Month	% of = Peak Use on Weekends	Total Use x During Peak Month	# of Peak Months = in Summer Season (101 days)	Rec. Days Provided by Existing Facilities During Summer Season
9	99,270	.5	198,540		
9	21,033	.5	42,066		
			240,606	3.3	793,999
9	14,148	.5	28,296		
9	7,551	.5	15,102		
			43,398	3.3	143,213
9	30,690	.5	61,380	3.3	202,554
9	315,459	.5	630,918	3.3	2,082,029
9	39,492	.5	78,984	3.3	260,647
9	511,128	.5	1,022,256		
9	89,883	.5	179,766		
			1,202,022	3.3	3,966,672
9	43,776	.5	87,552		
9	52,002	.5	104,004		
			191,556	3.3	632,134
9	162,963	.5	325,926		
	6,705	.5	13,410		
			339,336	3.3	1,119,808
9	310,437	.5	620,874	3.3	2,048,884
9	2,090,043	.5	4,180,086	3.3	13,794,283
9	51,273	.5	102,546	3.3	338,401
9	60,120	.5	120,240	3.3	396,792

2 3

The San Bernardino and Angeles National Forests, located just outside the northern boundary of the Mentone and Prado market areas, provide extensive recreational facilities that may modify unmet demand figures. However, because forest lands provide recreation facilities that are utilized by a broad-based market area, primarily all of southern California, extensive regional modeling would be required to evaluate percentage of this total supply being utilized by the project market areas. The resources, manpower and time required for such an analysis is beyond the scope of this study. It can be reasonably assumed, however, that because of competition throughout Southern California for these forest facilities (they are filled to capacity on summer weekends and reservations are required up to one month in advance) the project market areas utilize only a marginal amount of the forest supply. In order to avoid a misrepresentation of net before-project needs by comparing potential demand within the market areas with National Forest facilities of interstate importance, it was necessary to eliminate the facilities from the supply inventory.

However, should 5 percent of total camping supply in the San Bernardino Mountains be utilized exclusively by the Mentone market area, (camping would have the greatest impact of all facilities on market area demand), these facilities would provide 24 percent of total unmet demand and demand would still exceed supply by over 98,271 recreation days during the 1980 summer season.

Net Needs.

Potential demand in the market areas for the activities of picnicking, camping, boating, swimming, and trail use (Table 8) was compared with the recreation resource capacity of existing facilities (Table 9) to determine net before-project needs. This is shown as unmet demand in Table 10, Recreation Demand for Mentone and Prado Market Areas, Summer Season, 1980. Unmet demand was compared with maximum recreation days provided by the proposed projects to determine their ability to help satisfy unmet demand. This is also shown in Table 10 as percentage of unmet demand provided by project. Based upon this analysis the Mentone project would provide 14 percent, the Prado four-lake plan would provide 2 percent and the Prado one-lake plan would provide 3 percent of 1980 unmet demand for the combined activities of picnicking, camping, boating, swimming and trail use.

TABLE 10
RECREATION DEMAND FOR MENTONE AND PRADO MARKET AREAS
SUMMER SEASON, 1980

	Activity	Potential Demand in Recreation Days[1]/	- Max. Rec. Days Provided by Existing Facilities	= Unmet Demand	Max. Rec. Days - Provided by Project[2]/	= Net Demand	% Unmet Demand Provided by Project
MENTONE							
	Picnicking	2,003,115	793,999	1,209,116	64,270	1,144,846	5%
	Camping	272,099	143,213	128,886	30,109	76,561	16%
	Boating	642,617	202,554	440,063	18,532	421,531	4%
	Swimming	3,554,660	2,082,029	1,472,631	330,442	1,142,189	22%
	Horseback Riding	301,046	260,647	40,399	8,910	31,489	22%
	Total			3,291,095	452,263		14%
PRADO--4 LAKE (RECOMMENDED PLAN)							
	Picnicking	10,008,383	3,966,672	6,041,711	252,331	5,789,380	4%
	Camping	1,247,421	632,134	615,287	66,297	548,990	11%
	Boating	3,191,078	1,119,808	2,071,270	55,657	2,015,613	3%
	Swimming	17,754,002	15,843,167	1,910,835	330,442	1,580,393	17%
	Bicycling	26,311,332	338,401	25,972,931	43,540	25,929,391	2%
	Horseback Riding	1,351,839	396,792	955,047	9,860	945,187	1%
	Total			37,567,081	758,127		2%
PRADO--1 LAKE (ALTERNATE PLAN)							
	Picnicking	10,008,383	3,966,672	6,041,711	445,335	5,596,376	7%
	Camping	1,247,421	632,134	615,287	112,563	502,724	18%
	Boating	3,191,078	1,119,808	2,071,270	65,696	2,005,574	3%
	Swimming	17,754,002	15,843,167	1,910,835	330,442	1,580,393	17%
	Bicycling	26,311,332	338,401	25,972,931	43,540	25,929,391	.1%
	Horseback Riding	1,351,839	396,792	955,047	9,860	945,187	.9%
	Total			37,567,081	1,007,436		3%

[1]/ A standard .833 duplication factor was applied to potential demand in activity days from Table 8 for conversion to potential demand in recreation days.

[2]/ Total use during peak months for proposed activities was taken from Table 22, Recreational Average Annual Benefits, then multiplied by 3.3 to determine summer use.

Regional Parkland Needs.

The PARIS inventory of recreational facilities provides unit figures for the activities of picnicking, camping, boating, swimming, and trails. These five activities are most often provided by the State Park system and thus have been broken into units by the State for demand analysis. Although the inventory states whether individual parks provide such support facilities as open fields, hard courts, playgrounds and fishing, it does not include the number of facilities actually provided. Because of the difficulty in obtaining unit figures for the over 1,000 parks within the market areas that provide these activities, a demand analysis has been conducted based upon acreage deficits for regional parks. Facilities such as play areas, sportsfields, hardcourts, etc., provided by the proposed Mentone and Prado projects are common support facilities that park users seek and expect to find when visting a regional park. It can therefore be assumed that acreage deficits for regional parks reflect a demand for these types of activities.

The Southern California Association of Governments (SCAG) Conservation and Open Space Plan, 1977 aggregates Regional Statistical Areas (RSAs) into RSA subgroups to determine needed regional parkland additions between the years 1975-1995 (15 acres per 1,000 people x 1995 population - 1975 regional park supply). The standard of 15 acres per 1,000 people for regional parks is in keeping with other Areawide Planning Organizations in the State. The 1995 population is based upon the SCAG adopted population forecast. Federal and State operated facilites were not included as regional parks since they are of statewide or national interest. SCAG data was utilized to determine net needs for the Mentone and Prado market areas by disaggregating RSA subgroups according to percentage of total RSA subgroup population within the proposed projects' market areas. The following chart presents 1995 regional park needs for the Mentone and Prado market areas. Plate 9, Reservoir Market Areas, locates the pertinent RSA subgroups.

TABLE 11
1995 REGIONAL PARK NEEDS FOR
THE MENTONE AND PRADO MARKET AREAS
(15 ACRES PER 1,000 PEOPLE STANDARD, SCAG
ADOPTED POPULATION FORECAST)

RSA Subgroup	% Subgroup Population Within Market Area	x	Needed Park Additions for Subgroup 1975-1995 (in acres)	=	Needed Park Additions for Market Area 1975-1995 (in acres)	÷	Park Acreage Provided by Proposed Project	=	% of Needed Park Park Additions Provided by Proposed Project
MENTONE									
H	45%		4,951		2,228				
I	100%		4,319		4,319				
Q	50%		0		0				
R	85%		1,974		1,678				
S	100%		0		0				
			Total		8,225		235		3%
PRADO									
F	29%		28,812		8,355				
G	33%		14,178		4,726				
H	55%		4,951		2,723				
O	100%		25,069		25,069				
P	100%		4,506		4,506				
Q	50%		0		0				
			Total		45,379		625 (4-lake recommended plan)		1%
							1,060 (1-lake alternate plan)		2%

Based upon this analysis, the proposed Mentone project would provide 3 percent, the recommended four-lake plan for Prado would provide 1 percent, and the alternate one-lake Prado plan would provide 2 percent of total needed regional parkland additions within the separate market areas for 1975-1995.

Recreation Facilities Proposed By Others.

The only major proposed recreation facility that will have significant impact on recreation demand is the Chino Hills State Park located directly west of the Prado Basin. The State has funded $5 million dollars for acquisition of the proposed 12,500 acre recreation and natural heritage preserve area, with another $20 million dollars programmed over the next 5 years. More than one-half of the area is in slopes exceeding 30 percent, constraining intensive recreational development. It is expected that vehicular access will be limited on the interior of the park with the majority of concentrated developments occurring near park boundaries. The proposed system of trails, campsites, picnic areas and open space will form a land use interface with adjacent recreational areas, including Prado Dam and the Santa Ana River trails. The State Department of Parks and Recreation estimates that final development of the recreation facilities will be accomplished in 10 years and will include camping facilities for up to 2090 people-at-one-time (PAOT), developed picnicking for 1,100 PAOT, 42 miles of equestrian trails and 18 miles of bicycle trails. An interpretive-oriented wildlife area is also proposed with a ranger station and 15 acre lake for water-oriented nature study.

In order to assess the combined impact of Prado and Chino Hills on summer season recreation demand, use capacity of proposed facilities (based upon the land capacity formula) was compared with net demand for recreation. This is illustrated in Table 12, Impact of Future Development on 1980 Demand, Prado Market Area. Analysis shows that unmet demand is excessive in the Prado market area and that the combined development of the Prado and Chino Hills projects would accommodate 2 percent of 1980 unmet demand for the activities of camping, picnicking, boating, and trail use. Due to increasing population and expected growth of participation rates, potential demand by the expected completion year (1990) will be greater than calculations indicate in this 1980 analysis.

TABLE 12
IMPACT OF FUTURE DEVELOPMENT ON
1980 SUMMER SEASON DEMAND, PRADO MARKET AREA

Activity	1980 Unmet[1]/ Demand	Max. Rec. Days Provided by Prado Recommended Plan	Max. Rec. Days Provided by Chino Hills Start Park[2]/	Net Demand	% Unmet Demand Provided by Future Development
Picnicking	6,041,711	252,331	98,010	5,691,370	6%
Camping	615,287	66,297	124,027	424,963	31%
Boating	2,071,270	55,657	9,266	2,006,347	3%
Bicycling	25,972,931	43,540	35,046	25,894,345	3%
Horseback Riding	955,047	9,860	46,391	898,796	6%
Total	35,656,246	427,685	312,740		2%

1/ From Table 10, Recreation Demand for Mentone and Prado Market Areas
2/ Based on land capacity formula applied to proposed facilities

Importance of Project in Meeting Identified Needs.

The attractiveness of natural resources within the project areas, including the ocean, coastline and forests, combined with the proximity of recreational areas to over 10 million people within the Los Angeles metropolitan area, has placed a heavy demand on recreational resources.

A summary of findings by the State of California for Planning District 8 (comprising Ventura, Los Angeles, Orange, San Bernardino, Riverside and Imperial Counties) stresses a critical shortage of open space with recreational opportunities and recommends that local governments concentrate on development programs that will provide regional parks serving general day use needs.* Additionally, the Heritage Conservation and Recreation Service has identified in the 1977 National Urban Study a need to provide close-to-home recreation for the Los Angeles/Long Beach/Anaheim Standard Statistical Area.

Emerging travel patterns due to the increasing cost of gasoline is changing the willingness of recreationists to drive to distant parks and lakes. Use of remote facilities is declining with a commensurate increase in use of regional recreation sites within or on the edge of the metropolitan zone. The proposed Mentone and Prado projects offer regional recreation opportunities in close proximity to the heavily urbanized Los Angeles basin. Their development would support National and State-recommended priorities for recreational development and would help ease demand pressures on existing facilities.

LOWER SANTA ANA RIVER TRAIL.

General.

Corps participation in the lower Santa Ana River trail would be development of 6 miles of bicycle and equestrian trails in a total 31 mile system. Because the Corps development would be an integral part of the 31-mile proposed trail system, market area and demand have been analysed for the entire lower Santa Ana River trail corridor.

* Recreation Outlook in Planning District 8, California Department of Parks and Recreation, October 1979.

Market Area.

The market area for the lower Santa Ana River includes residents within five miles of the river's centerline, from the Orange County border to the Pacific Ocean. Five miles is considered reasonable travel distance for use of a regional trail. The following table presents 1980, 1990 and 2000 population projections for the lower Santa Ana River market area. The market area established for Santiago Creek (see Santiago Creek, Recreation Market Area) overlaps portions of the lower Santa Ana River market area and therefore has been netted out of the five mile service area.

TABLE 13
PROJECTED POPULATION WITHIN THE LOWER
SANTA ANA RIVER MARKET AREA
1980-2000

1980	1990	2000
821,500	1,082,500	1,136,000

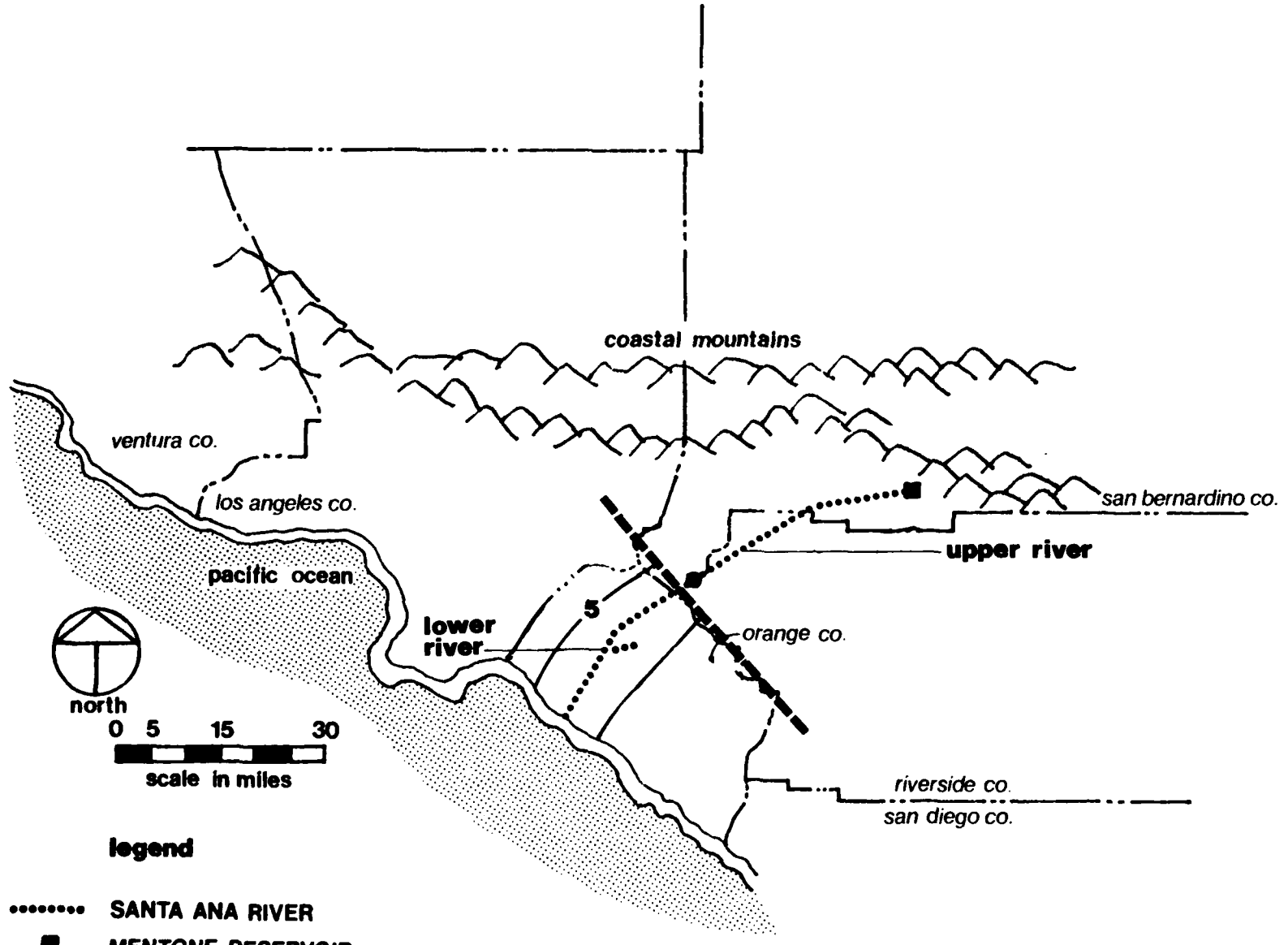
SOURCES: Orange County Planning Department; Southern California Association of Governments; EDCON

Socio-Economic Characteristics

Socio-economic characteristics for the Lower Santa Ana River market area is included in the Social Impact Appendix.

Inventory of Existing Recreation Facilities.

There is an existing 20 mile trail along the Santa Ana River, extending from the Pacific Ocean to Imperial Highway. The trail is heavily used by bicyclists and frequently used by hikers and joggers. Over 1,000 users per day have been counted on summer Sundays near the Adams Street underpass, which is approximately 3.5 miles from the ocean beaches. There are private horse rental and boarding stables adjacent to the equestrian trail at several locations in the Cities of Anaheim and Santa Ana Canyon. There is an existing 2.5 mile bicycle path and equestrian trail in Santa Ana Canyon. Outside the Santa Ana River corridor, the City of Yorba Linda has 12 miles of equestrian and hiking trails that could tie into the Santa Ana River Trail.



SANTA ANA RIVER PROJECT
river market areas

PLATE 10

Recreation Demand.

Demand for recreational activities proposed for the lower Santa Ana River is based upon the application of per capita participation rates to the market area population five years of age and older. The recreation market area will have a trails demand of over 9.2 million activity days during peak summer months in 1980 and 22.8 million activity days during peak summer months in 2000. This is based upon summer season per capita participation rates and growth factors provided in the Orange County Recreation Needs and Regional Park Study and is shown in the table below.

TABLE 14
Potential Trails Demand for Lower Santa Ana River
Market Area for Summer Season[1]
1980 AND 2000

	Per Capita Participation Rates[2]		Market Area	
	1980	2000	1980	2000
Population Five Years of Age & Over (thousands)[3]	NA	NA	731,135	1,022,400
Activities				
Bicycling	12.15	21.50	8,832,290	21,981,600
Horseback Riding	.52	.83	380,190	848,592
Total Trails Demand			9,212,480	22,830,192

1Memorial Day through Labor Day

2For Population Five Years of Age and Older

3 89% of Total Population in 1980, 90% in 2000

The lower Santa Ana River trails could accommodate approximately .6 percent of unmet trails demand in 1980 and .2 percent of unmet demand in 2000. This is based upon a maximum peak season use of 55,242 shown in the following table.

TABLE 15

MAXIMUM USE DURING PEAK
SUMMER SEASON FOR LOWER SANTA ANA RIVER TRAIL
(FROM PRADO BASIN TO THE PACIFIC OCEAN)

ACTIVITY	DENSITY	x UNITS	x TURN-OVER	x DULPI-CATION RATIO	= # OF MAX DAILY RECREATION DAYS	x WEEK-END DAYS IN PEAK MONTH	= TOTAL WEEKEND USE IN PEAK MONTH	÷ % OF PEAK USE ON WEEKEND	= TOTAL USE DURING PEAK MONTH	x # OF PEAK MONTHS IN SUMMER SEASON	= TOTAL USE DURING PEAK SEASON
bicycling	20	31	1	1	620	9	5,580	.5	11,160	3.3	36,828
horseback riding	10	31	1	1	310	9	2,790	.5	5,580	3.3	18,414
											55,242

A comparison of maximum summer use of the lower Santa Ana River trails with potential market area demand is shown in Table 16, Recreation Demand for Lower Santa Ana River Trails for Summer Season 1980 and 2000. Maximum recreation days provided by existing facilities was based upon the application of the land capacity formula to the 12 miles of existing equestrian trails in the City of Yorba Linda. At this time there are no planned class 1 trail facilities within the market area that would compete with the lower Santa Ana River trails.

TABLE 16
RECREATION DEMAND FOR LOWER SANTA ANA RIVER
TRAILS FOR SUMMER SEASON 1980 and 2000

Activity	Potential Demand in Market Area	- Max. Rec. Days Provided by Existing Facilities	= Unmet Demand	- Max. Rec. Days Provided by Project	= Net Demand	Project
	1980					
Bicycling	8,832,290	--	8,832,290	36,828	8,795,462	.4%
Horseback Riding	380,190	14,256	365,934	18,414	347,520	5%
Total	9,212,480		1,198,224	55,242		.6%
	2000					
Bicycling	21,981,600	-	21,981,600	36,828	21,944,772	.2%
Horseback Riding	848,592	14,256	834,336	18,414	815,922	2%
Total	22,830,192		22,815,936	55,242		

Importance of Project in Meeting Identified Needs.

The proposed lower Santa Ana River trails would provide direct off-road access to major recreational facilities at the Pacific Ocean and proposed facilities at the Prado Basin and Chino Hills State Park. The trail is a significant element in a comprehensive recreation plan consisting of a mountains-to-sea trail corridor, extending from the Pacific Ocean to the San Bernardino National Forest, and tying into the proposed Prado Basin and Mentone Dam recreation areas, the Pacific National Trail and various local and community parks adjacent to the trail corridor. The trail would support national and state goals to reduce energy consumption by helping to minimize dependence on motor vehicle transportation to recreation areas.

SANTIAGO CREEK.

General.

Corps participation in the Santiago Creek trail would be development of a 1.7 mile link in a total 8.2 mile bicycle and equestrian trail under proposal for development by local agencies. Because the Corps development would be an integral part of the proposed trail system, market area and demand has been analyzed for the entire Santiago Creek trail corridor.

Market Area.

The Santiago Creek market area incorporates residents within approximately two miles of the creek's centerline from Villa Park Dam to the Santa Ana River. This was considered a reasonable distance for recreationists to travel to use the proposed bicycle and equestrian trails. The following table presents 1980, 1990 and 2000 population projections for the Santiago Creek market area. The projections are based on Southern California Association of Government's data for Regional Statistical Area (RSA) 42, Greater Santa Ana. Approximately 1/2 of the heavily populated areas within the RSA are within the 2 mile service radius of Santiago Creek. The rest of the RSA would be serviced by the Santa Ana River Trail and has been included in its market area (see Lower Santa Ana River market area).

TABLE 17
PROJECT POPULATION IN SANTIAGO CREEK MARKET AREA
1980-2000

1980	1990	2000
170,500	193,500	211,000

Based on Southern California Association of Governments Data.

Socio-Economic Characteristics.

Socio-economic characteristics for the Santiago Creek market area is included in the Social Impact Appendix.

Recreation Demand.

Demand for recreational activities proposed for Santiago Creek is based upon the application of per capita participation rates to the market area population five years of age and older. The recreation market area will have a trails demand for over 1.9 million activity days during peak summer months in 1980 and over 4.2 million activity days during peak summer months in 2000. This is based upon summer season per capita participation rates provided in the Orange County Recreation Needs and Regional Park Study and is shown in the following table.

TABLE 18
POTENTIAL TRAILS DEMAND FOR SANTIAGO CREEK
MARKET AREA FOR SUMMER SEASON[1]
1980 and 2000

	Per Capita Participation Rates[2]		Market Area	
	1980	2000	1980	2000
Population Five Years of Age & Over (thousands)[3]	NA	NA	151,745	189,900
Activities				
Bicycling	12.15	21.50	1,843,701	4,082,850
Horseback Riding	.52	.83	78,907	157,617
Total Trails Demand			1,922,608	4,240,467

[1]Memorial Day through Labor Day
[2]For Population Over Five Years of Age and Older
[3]89% of Total Population in 1980, 90% in 2000

The Santiago Creek trails could accommodate approximately 3 percent of trails market demand in 1980 and 1 percent of demand in 2000. This is based upon a maximum peak season use of 60,885 shown in the following table.

TABLE 19
MAXIMUM USE DURING PEAK
SUMMER SEASON FOR SANTIAGO CREEK TRAILS

ACTIVITY	DENSITY	x UNITS	x TURN-OVER	x DULPI-CATION RATIO	= # OF MAX DAILY RECREATION DAYS	x WEEK-END DAYS IN PEAK MONTH	= TOTAL USE IN PEAK MONTH	+ % OF PEAK USE ON WEEKEND	= TOTAL USE DURING PEAK MONTH	x # OF PEAK MONTHS IN SUMMER SEASON	= TOTAL USE DURING PEAK SEASON
bicycling	20	8.2	5	1	820	9	7,380	.5	14,760	3.3	48,708
horsebacking riding	10	8.2	2.5	1	205	9	1,84	.5	3,690	3.3	12,177
											60,885

A comparison of maximum summer use of the Santiago Creek trails with potential market area demand is shown in Table 20, Recreation Demand for Santiago Creek Trails for Summer Season, 1980 and 2000. At this time there are no existing nor planned Class 1 trail facilities within the market area that would compete with the Santiago Creek trails.

TABLE 20
RECREATION DEMAND
FOR SANTIAGO CREEK TRAILS FOR
SUMMER SEASON 1980 AND 2000

Activity	Potential Demand in in Market Area 1980	2000	Max. Use During Summer Season Provided by Project	% Rec. Demand Met by Project 1980	2000
Bicycling	1,843,701	4,082,850	48,708	3	1
Horseback Riding	78,907	157,617	12,177	15	8
Total	1,922,608	4,240,467	60,885	3	1

Importance of Project in Meeting Identified Needs.

The Santiago Creek project would provide convenient access to the proposed Santa Ana River regional trail system. It would establish a link between recreational facilities along the Santa Ana River and local parks located along the course of Santiago Creek. The proposed project would make efficient use of the channel right-of-way and encourage alternate transportation modes within the urban area. The project would help reduce deficiencies of trail facilities in the market area.

4. RECOMMENDED PLAN OF PHYSICAL DEVELOPMENT

MENTONE RESERVOIR

Resource Use Objectives.

The development of Mentone Dam and Reservoir provides additional land and water resources to expand needed recreation opportunities to serve the present and future residents of the San Bernardino-Redlands metropolitan area. Moreover, the recreation and esthetic enhancement improvements will provide significant mitigation to the disruption of the drainage course caused by the project.

Resource use objectives of the plan are:

(1) To provide a variety of general recreation opportunities of a regional nature that serve the interests of a broad segment of the populations.

(2) To provide maximum landscape cover and wildlife habitat within the project lands and to buffer adjoining natural areas to protect and enhance existing wildlife habitats.

(3) To maintain adequate separation between non-compatible recreation uses and to avoid conflict with adjacent properties.

(4) To provide for adequate and convenient access to circulation within the project area for vehicles, bicyclists, equestrians and pedestrians.

Proposed Park Development.

Recreation facilities proposed for Mentone Dam would be located on a 235 acre site within the flood control reservoir. The proposed regional recreation area would feature a 50 acre multi-use lake with 35 acres allotted to recreation and 15 acres reserved for fish and wildlife. The 15 acres reserved for fish and wildlife are regarded as a mitigation feature of the project. Water-oriented recreation proposed for the lake would include shoreline fishing, non-power boating, and swimming. Recreation facilities proposed for development around the lake would consist of the following:

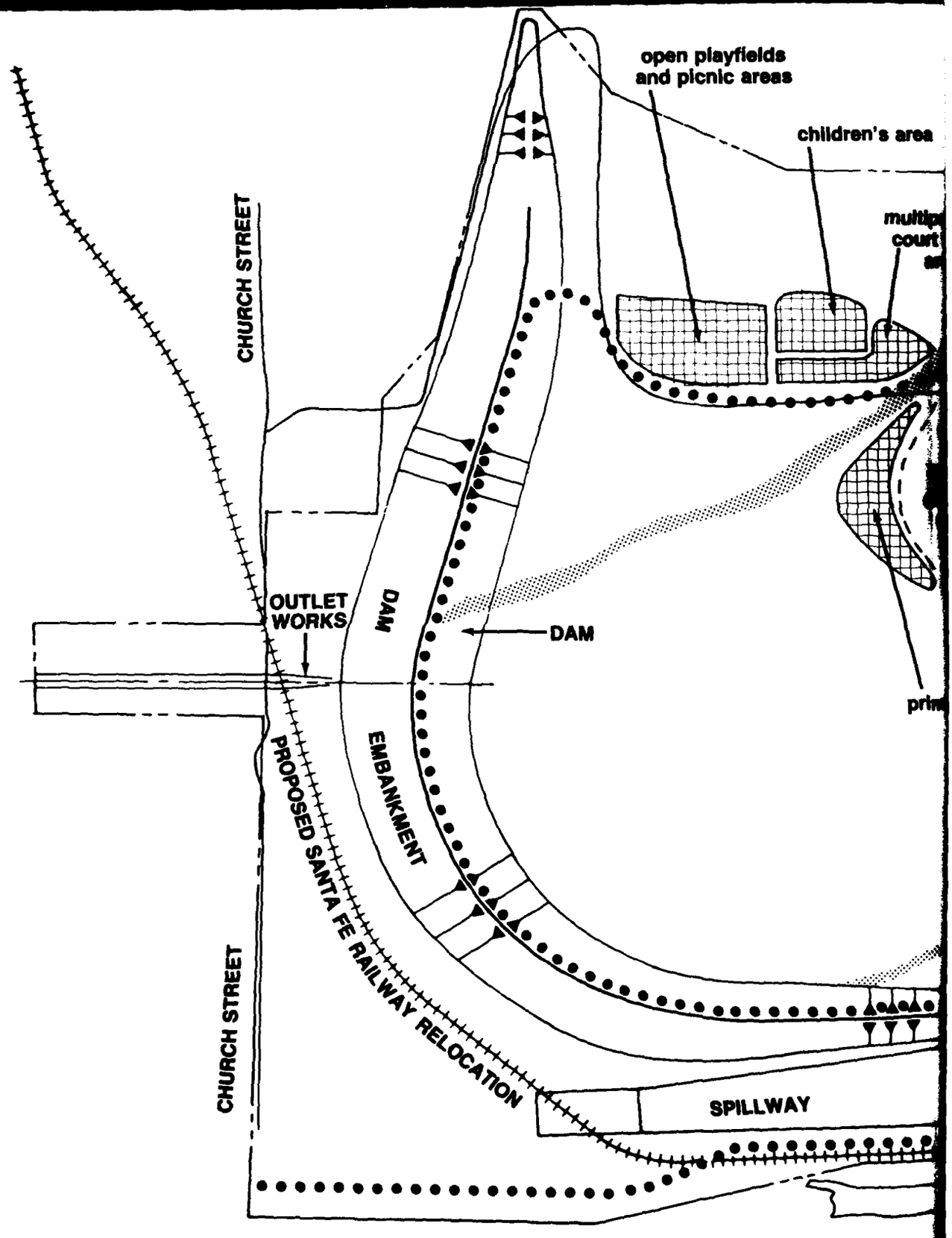
(1) A family and group picnic area of 80 acres would be provided with 200 individual picnic sites, 2 (two) 50-person group picnic ramadas, 2 restrooms, a children's play area, and parking for 200 cars.

(2) A swimming beach of 5 acres would be provided adjacent to the lake, with parking for 400 cars, and additional overflow parking for 200 cars. A restroom/first-aid station with changing areas, and 4 lifeguard stations would also be provided. An underground chlorination system would be installed to ensure water quality compliance with public health standards.

(3) An 80 acre camping area would be provided with 50 individual campsites, 8 group campsites, 60 trailer or recreational vehicle campsites, 2 restrooms and 1 restroom-shower room.

(4) A 10 acre multipurpose game area would be provided with 6 hard surface courts and 4 playing fields. Lighting would not be provided for either the courts or the playing fields. A childrens play area would be provided adjacent to the game area to facilitate participation of individuals with young children.

(5) A 10 acre equestrian and interpretive area would be provided with an interpretive center of approximately 2,400 square feet and a 1 mile long interpretive trail. The interpretive trail would provide access to the wildlife areas and would be operated in conjunction with the interpretive center. The equestrian area would serve as a rest area and service point for the Santa Ana Equestrian Trail. Approximately six miles of equestrian and hiking trails would be developed within the reservoir basin.


open playfields
and picnic areas
children's area
CHURCH STREET
OUTLET
WORKS
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DAM
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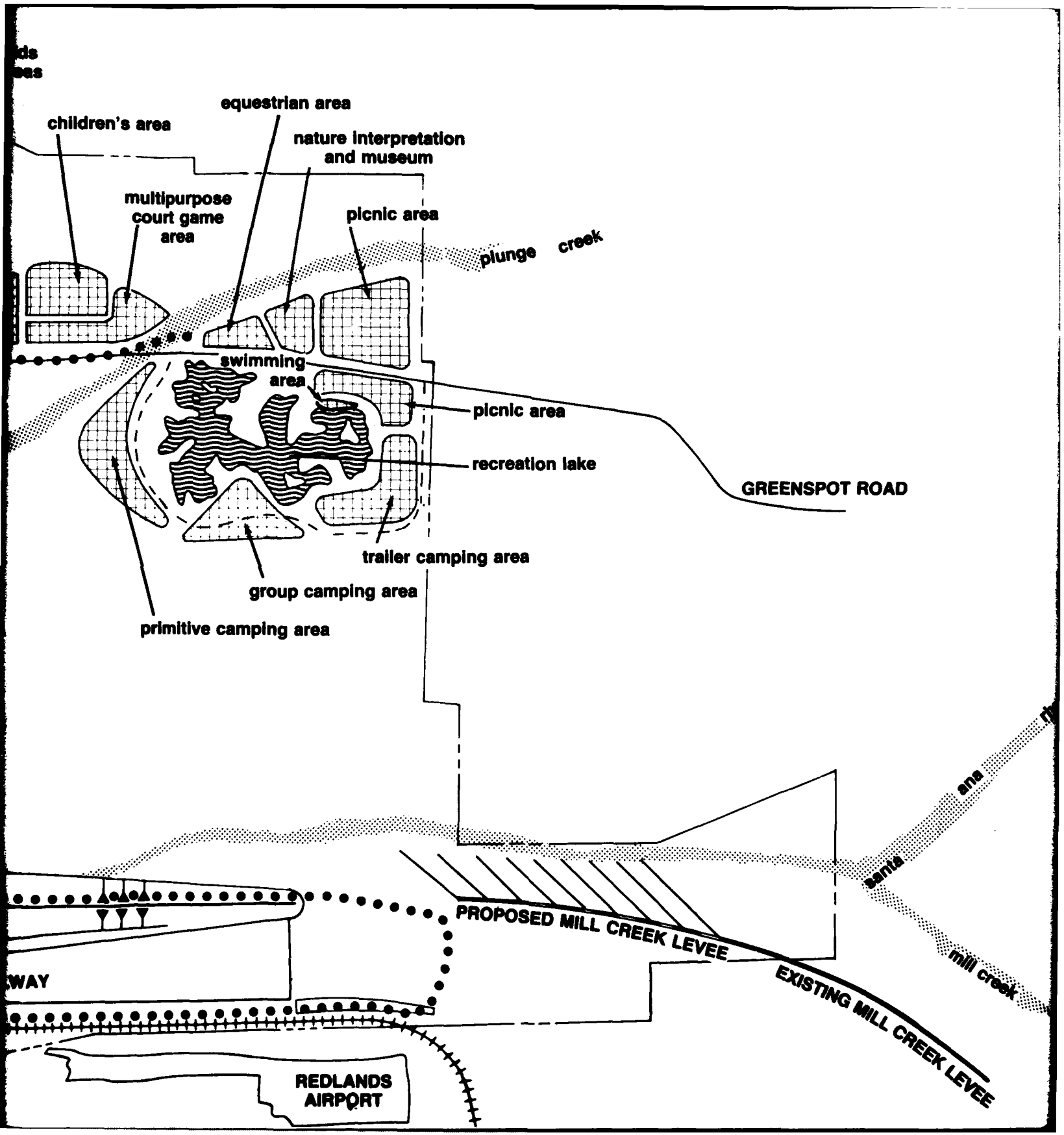
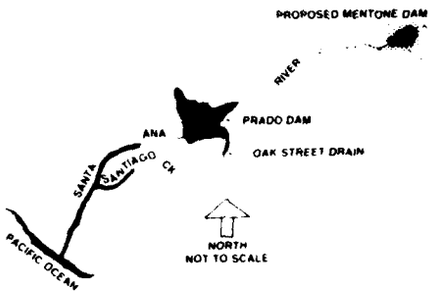
PROPOSED SANTA FE RAILWAY RELOCATION
CHURCH STREET
SPILLWAY


ds
eas
children's area
equestrian area
nature interpretation and museum
multipurpose court game area
picnic area
plunge creek
swimming area
picnic area
recreation lake
GREENSPOT ROAD
trailer camping area
group camping area
primitive camping area
santa ana
mill creek
PROPOSED MILL CREEK LEVEE
EXISTING MILL CREEK LEVEE
WAY
REDLANDS AIRPORT

SANTA ANA RIVER

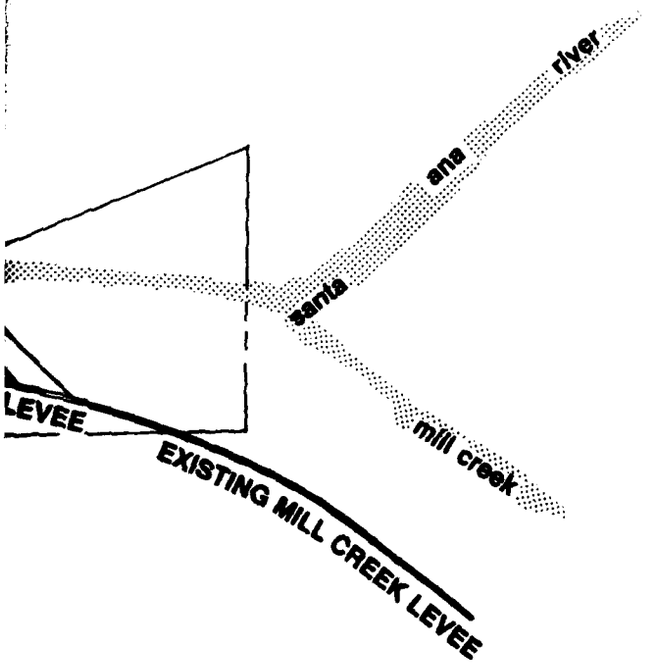
location



legend

- PROPOSED RECREATIONAL DEVELOPMENT
- PROPOSED RECREATIONAL LAKE
- HIKING AND RIDING TRAIL
- RECREATION ROAD
- TAKING LINE

GREENSPOT ROAD



north

1000' 0 1000'

RECREATION PLAN MENTONE RESERVOIR

PLATE 11

A 3

PRADO RESERVOIR FOUR LAKES--(RECOMMENDED PLAN).

Resource Use Objectives.

The Prado Reservoir covers more than 9,700 acres of land near the convergence of the Southern California Counties of San Bernardino, Riverside, Orange and Los Angeles. By the year 2000 over 12,000,000 people will reside within one hour's driving time of this facility. The critical location of Prado emphasizes the need for careful allocation of available recreation resources to provide a maximum of leisure opportunities to the residents of this metropolitan area.

Resource use objectives for this proposed recreation development are:

(1) To provide unique and specialized recreation opportunities of a regional nature that serve the broadest range of leisure interests;

(2) To provide a wide diversity of general recreation opportunities to expand and enhance the quality of the recreation experience for all participants;

(3) To maintain maximum landscape cover and wildlife habitat consistent with project scope and to preserve natural open space where possible throughout the project;

(4) To protect existing archaeological and cultural resources;

(5) To maintain adequate separation between non-compatible recreation uses and to avoid conflict with adjacent private properties. Buffer areas would provide visual and noise separations of sufficient content and scope to maintain optimum recreation environment and mitigate adverse impacts on private properties;

(6) To provide fish and wildlife resource management with particular attention to the preservation of habitats of endangered species;

(7) To provide for effective vehicular circulation within the project to assure safe and convenient access to recreation activity areas; and

(8) To provide an opportunity for energy resource savings by the Los Angeles metropolitan recreationists who would use the Prado Reservoir recreation facilities rather than travel to more remote parts of the Southern California region for similar recreation experiences.

Proposed Park Development.

Recreation facilities proposed for Prado Dam are designed to make optimum use of available resources of the reservoir area while maintaining public safety and the reservoir area's primary purpose of

flood control. A joint planning effort by the Riverside County Parks Department, the San Bernardino County Regional Parks Department, the City of Corona Parks Department and the Corps of Engineers has been used to formulate a unified recreation plan for the reservoir area. The proposed regional recreation area would feature 4 multi-use lakes. Lakes L-1, L-2, and L-3 of 15 acres, 20 acres, and 40 acres, respectively, would be developed by constructing a dam across an existing canyon. Lake L-4 (20 acres), would be developed by rehabilitating a previously existing lake that was abandoned in the late 1920s. Water-oriented recreation proposed for the lakes would include shoreline fishing, non-power boating and swimming. Recreation facilities proposed for development around the lakes would consist of the following:

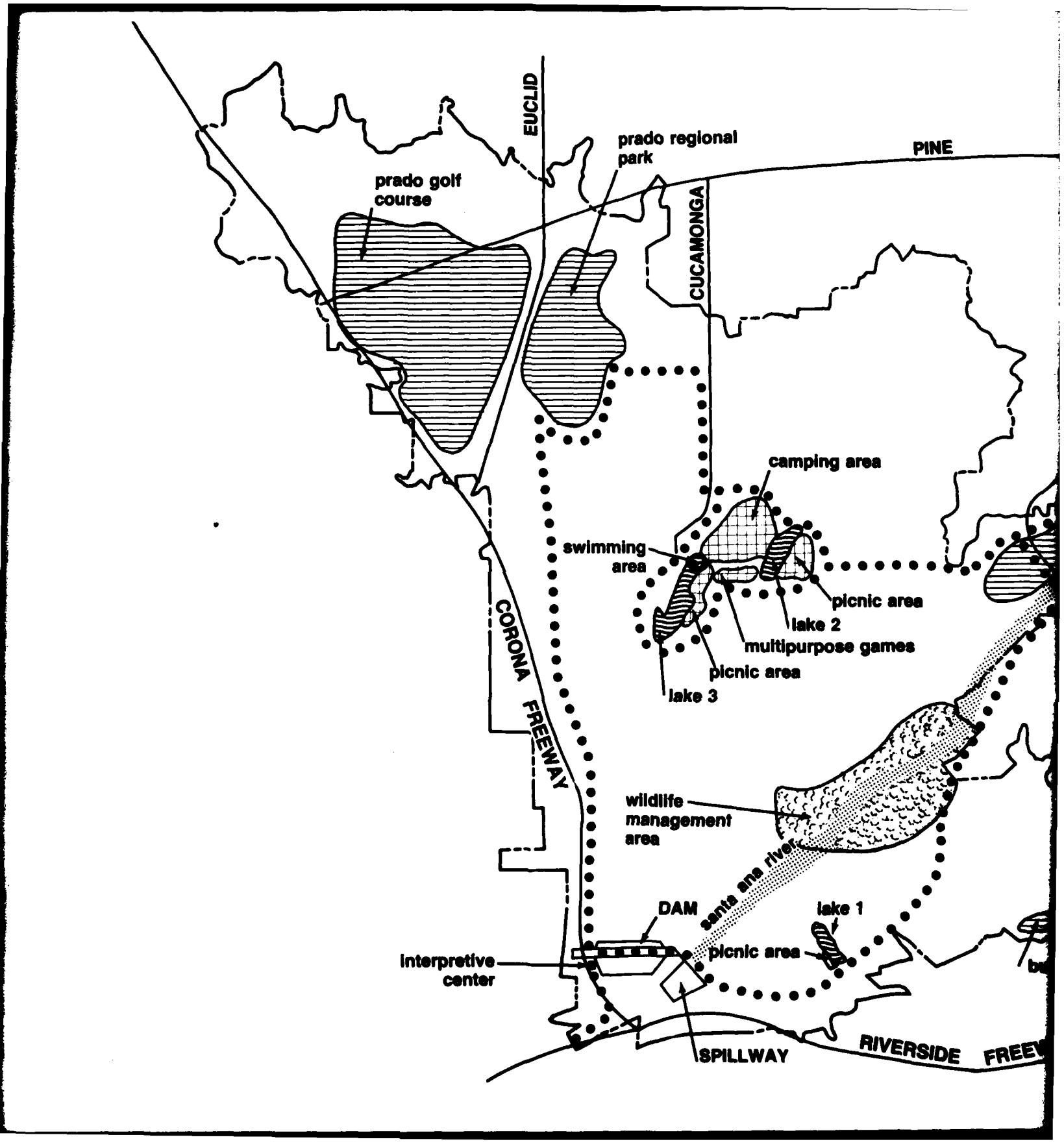
(1) Family and group picnic areas totaling 80 acres would be provided with 800 individual picnic sites, 4 (four) 50-person group picnic ramadas, 1 (one) 100-person ramada, 4 restrooms, 4 children's play areas, and parking for 600 cars. Lake L-1 would provide 10 acres of picnicking, L-2 and L-3 would provide 50 acres of picnicking, and lake L-4 would provide 20 acres of picnicking. All group picnic ramadas would be located in the lake L-2 and L-3 complex.

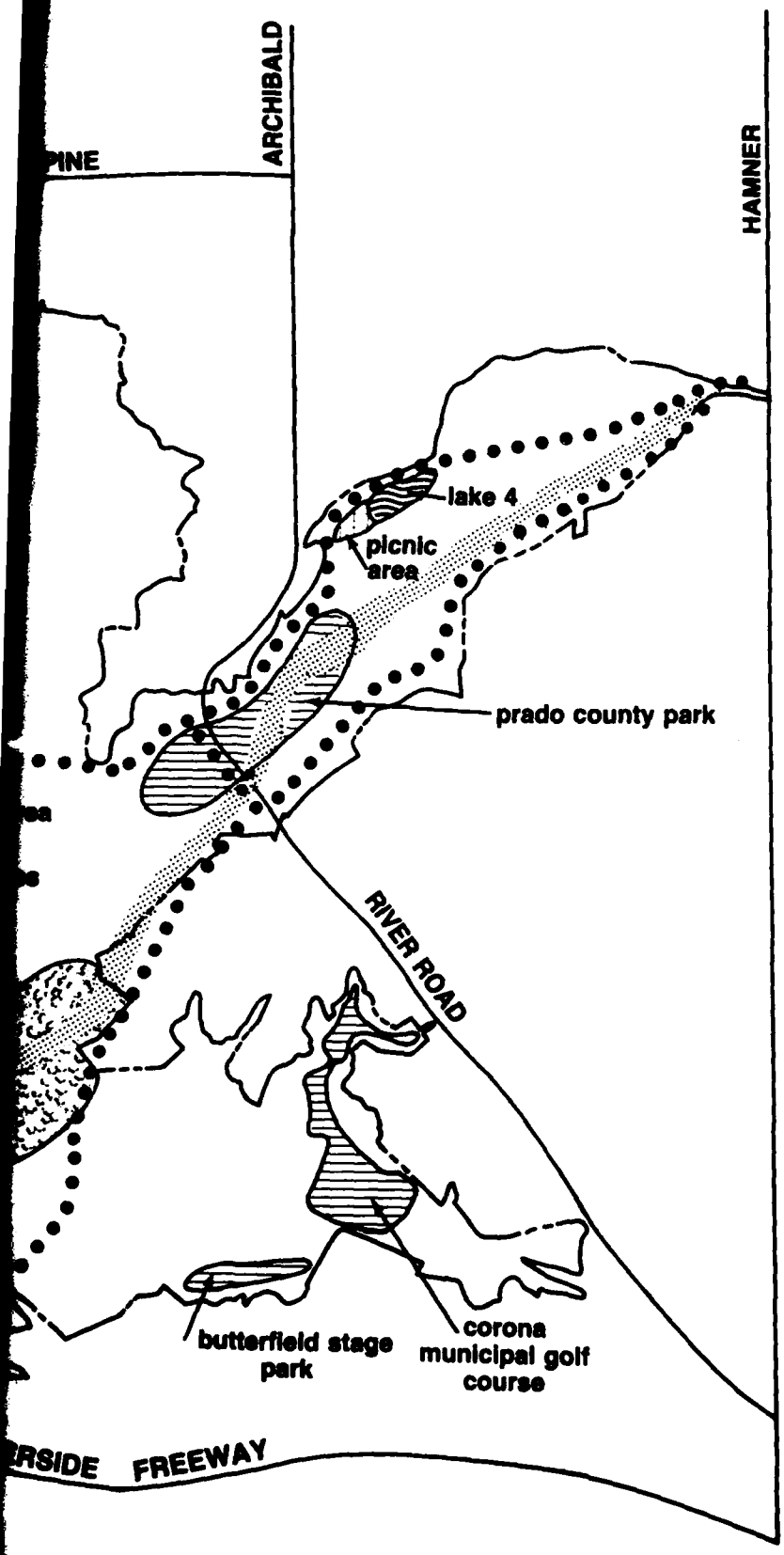
(2) A swimming beach of 5 acres would be provided adjacent to lake L-3 with parking for 400 cars and additional overflow parking for 200 cars. A restroom first-aid station with changing area and 4 lifeguard stations would also be provided. An underground chlorination system would be installed to ensure water quality compliance with public health standards.

(3) An 80 acre camping area would be provided adjacent to lake L-2 and L-3 with 100 individual campsites, 16 group campsites, and 200 trailer or recreational vehicle campsites, 3 restrooms, and 1 restroom-shower room.

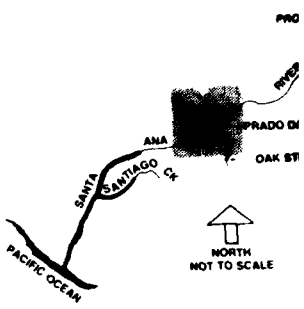
(4) A 20 acre multipurpose game area would be located adjacent to lake L-2 and L-3 and would provide 8 hard surface courts and 20 playing fields, 8 of which would be lighted to provide extended recreation use. A children's play area would be provided adjacent to the game area to facilitate participation of individuals with young children.

(5) A 350 acre wildlife managment area would be provided with an interpretive center of approximately 2,400 square feet and a 1.5 mile long interpretive trail. Exact location of wildlife management area and interpretive center will be determined during Phase II planning. Approximately 8 miles of equestrian trails and 11 miles of bicycle trails would be developed within the reservoir basin.


EUCLID
prado regional park
PINE
prado golf course
CUCAMONGA
camping area
swimming area
picnic area
lake 2
multipurpose games
picnic area
lake 3
CORONA FREEWAY
wildlife management area
santa ana river
DAM
lake 1
picnic area
interpretive center
SPILLWAY
RIVERSIDE



location



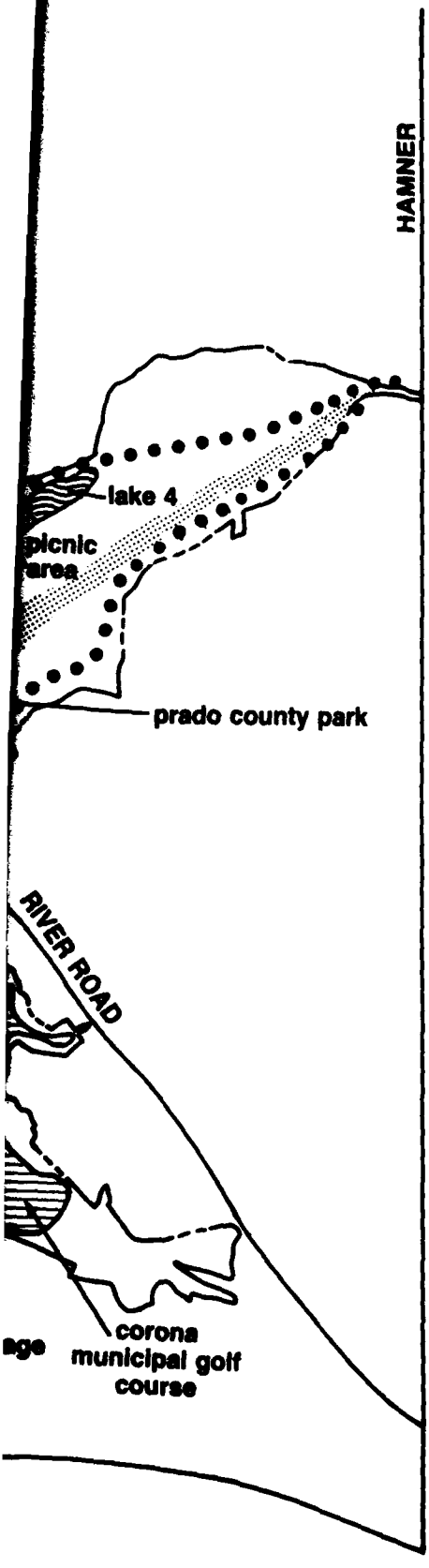
legend

- EXISTING RECRE DEVELOPMENT
- PROPOSED REC DEVELOPMENT
- PROPOSED REC LAKE
- RECREATIONAL
- TAKING LINE

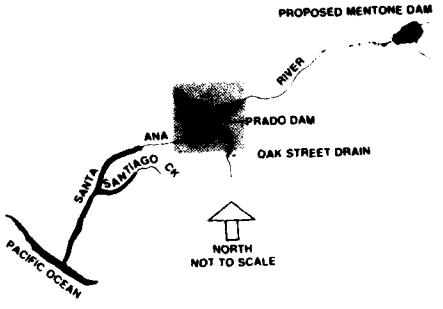
0

north

RECREATION
PRADO RESE
four-lake



location



legend

- EXISTING RECREATIONAL DEVELOPMENT
- PROPOSED RECREATIONAL DEVELOPMENT
- PROPOSED RECREATIONAL LAKE
- RECREATIONAL TRAIL
- TAKING LINE

0 5000'

north

RECREATION PLAN PRADO RESERVOIR four-lake concept

PLATE 12

SANTA ANA RIVER

2 1 3

PRADO RESERVOIR ONE LAKE (ALTERNATIVE PLAN).

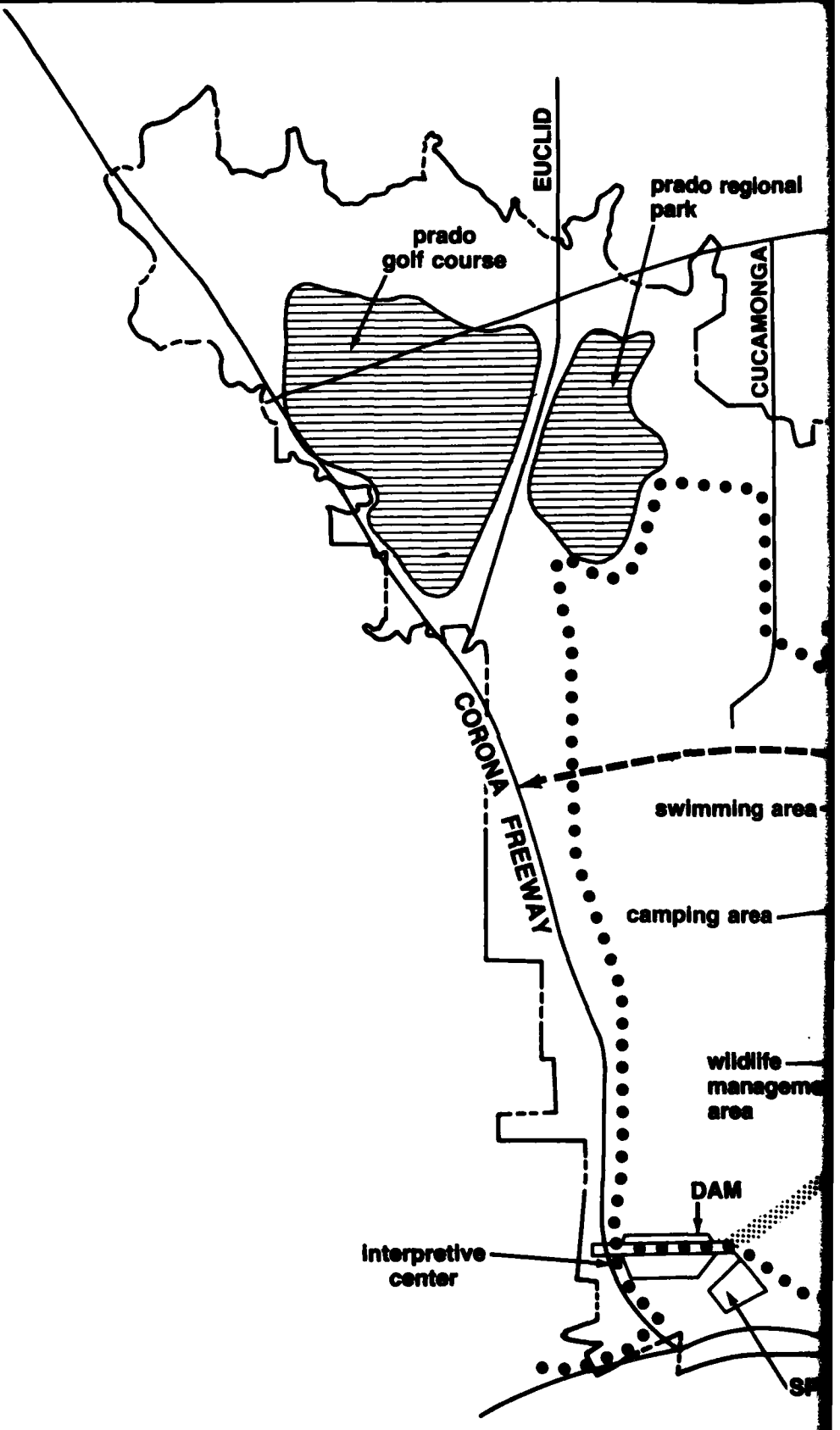
Proposed Park Development.

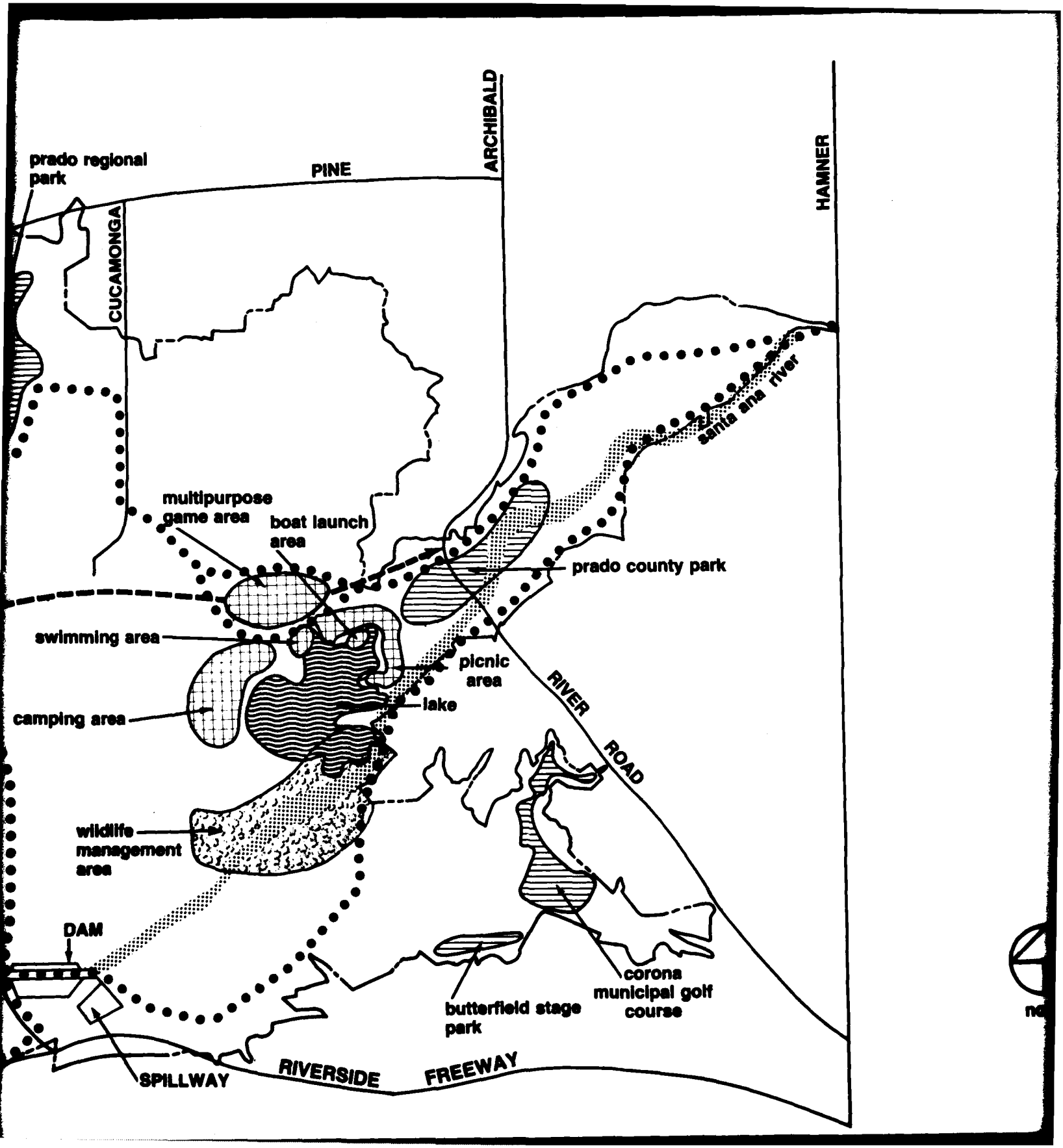
The alternative plan for Prado Reservoir is presented as the optimum plan for recreational development of the flood control reservoir and would afford maximum practical use of the recreation resource. Implementation of this plan is dependent on two factors:

(1) 10,000,000 cubic yards would be excavated from the Prado Reservoir to be used as core material for Mentone Dam creating a natural lake as groundwater came to the surface.

(2) As a result of the large initial demand for funds for capital development this plan would require either creation of a joint powers agreement between the several local agencies, or a major role in development carried out by the State of California.

The alternative plan would provide the same basic activities as outlined in the proposed plan; however all activities would be located adjacent to a large 400 acre lake featuring boating, sailing, waterskiing, fishing, and swimming. Additional recreation facilities provided by the alternative plan beyond those considered under the recommended plan would include boat launching facilities for power boats, 87 additional acres of picnic area with 600 individual picnic sites, 2 (two) 50-person group picnic ramadas, 2 (two) 100-person group picnic ramadas, 4 restrooms, and parking for 600 cars. Additional camping facilities would include 120 acres with 50 individual campsites, 14 group campsites and 150 trailer or recreational vehicle campsites. Additional multipurpose sports area facilities would include 20 acres with 10 hard surface courts, 10 lighted hard surface courts, and 2 unlighted sports fields.


EUCLID
prado regional park
prado golf course
CUCAMONGA
CORONA FREEWAY
swimming area
camping area
wildlife
DAM
interpretive center


prado regional park
PINE
ARCHIBALD
HAMNER
CUCAMONGA
santa ana river
multipurpose game area
boat launch area
prado county park
swimming area
picnic area
lake
camping area
RIVER ROAD
wildlife management area
DAM
corona municipal golf course
butterfield stage park
SPILLWAY
RIVERSIDE FREEWAY

SANTA ANA RIVER

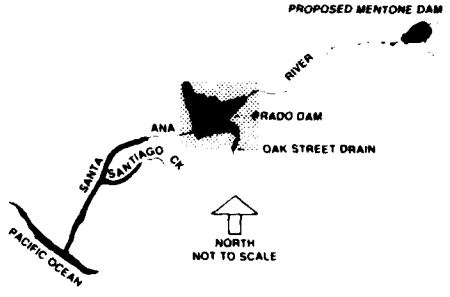
HAMNER

santa ana river

nty park

bra
al golf
rse

location



legend

- EXISTING RECREATIONAL DEVELOPMENT
- PROPOSED RECREATIONAL DEVELOPMENT
- PROPOSED RECREATIONAL LAKE
- RECREATION TRAIL
- MAJOR ACCESS
- TAKING LINE

0 5000'

north

RECREATION PLAN
PRADO RESERVOIR
one-lake concept

PLATE 13

LOWER SANTA ANA RIVER

Resource Use Objectives.

This reach of the river from Prado Dam to the ocean is channelized through the lower 20 of its 31 mile course. The upper portion of this reach starts in the Santa Ana Canyon, where the river course is natural. This area provides an outstanding example of a riparian community. The principal objectives for the use of this resource are:

(1) To provide a high quality experience for bicycling, hiking and equestrian riding opportunities through a well planned trail system. Those sections within the flood control right-of-way not stipulated for channelization or as prime floodways are excellent resource areas for trail development. Esthetic treatment, provision for convenient comfort facilities, multi-seasons use capability and convenient public access are necessary for a quality experience.

(2) To locate trails and ancillary facilities with respect to resources sensitive to human use.

(3) To interpret the project resources to the public. Public education of the value of the lower Santa Ana River's natural ecological systems would be increased through personal interactions and experiences with the natural environment.

(4) To limit incompatible development. Trails would be built in a manner which is in harmony with surrounding and abutting uses. Landscaping would provide shade and screening. General esthetic treatments would benefit both the trail users and the abutting land users. Architectural standards on structures and signage would create consistency in appearance of any structures to be built within the project area. These standards would be sensitive to the surrounding environment.

Existing Facilities.

Existing trail development in the lower reach of the Santa Ana River (from Prado Basin to the Pacific Ocean) includes 20 miles of bicycle and equestrian trails from Imperial Highway to the ocean, 2.5 miles of bicycle and equestrian trails in Santa Ana Canyon between Gypsum Canyon Road in Featherly Regional Park and the Green River Golf Course entrance, and approximately 1.5 miles of bicycle and equestrian trails paralleling the Santa Ana River within Yorba Regional Park. Additionally the construction of approximately one mile of bicycle and equestrian trails extending from Imperial Highway to Yorba Park is expected to be completed by the time of project construction (see plates 14 and 15).

The existing trails include underpasses at all bridges and access to trails at all street crossings. Portions of the existing trails were at least partially funded under the Land and Water Conservation Fund Act of

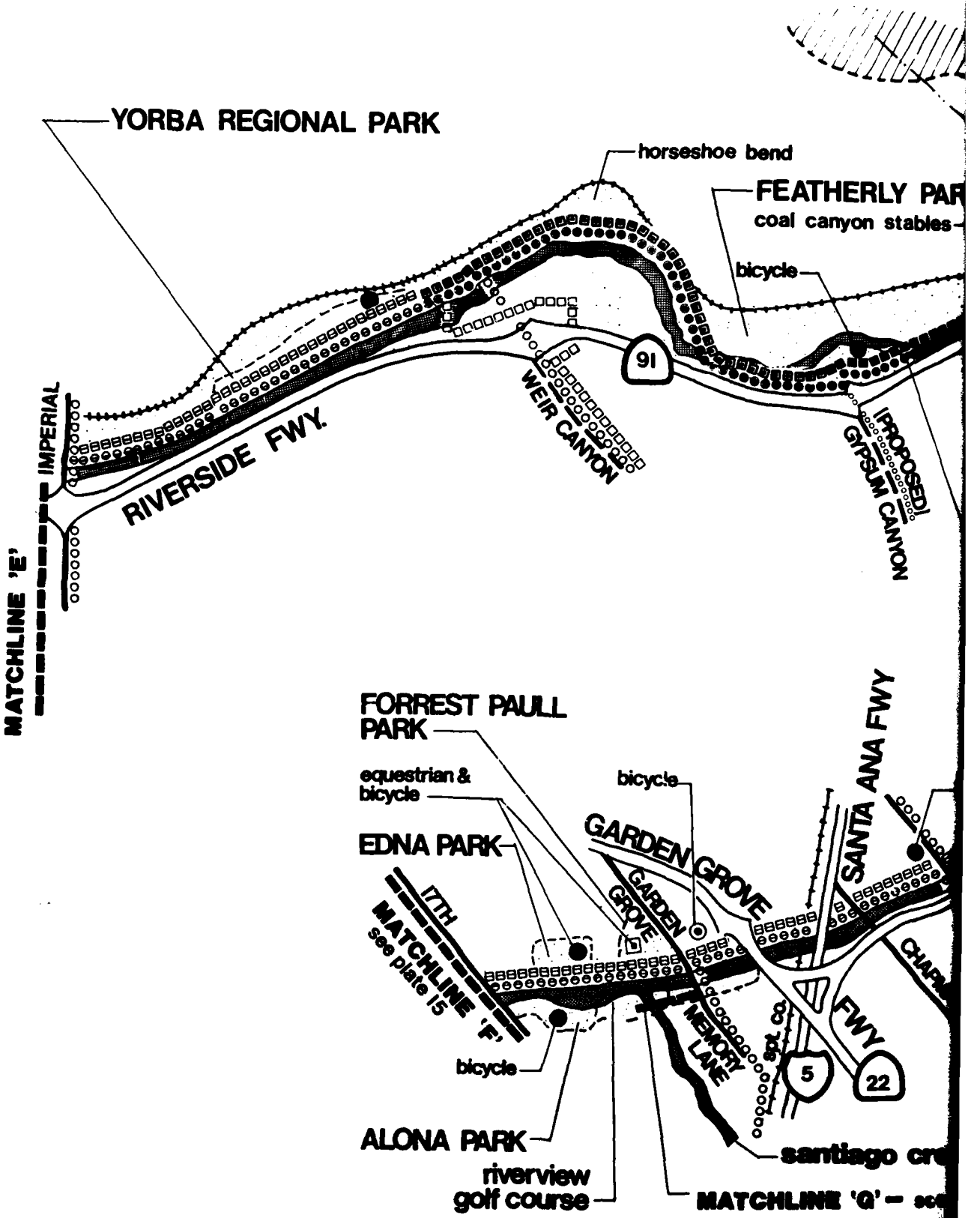
1965. This act requires that any removed facilities be replaced with ones of equal value and utility (Section 5F of Public Law 88-579). Since most of the lower Santa Ana River trails and bridge underpasses will be destroyed from the proposed channel rebuilding and widening (excluding the 2.5 mile segment adjacent to Featherly Park) they will be replaced as part of the flood control project. These trails are considered a utility and their replacement will be treated as a relocation cost (see page 91, costs).

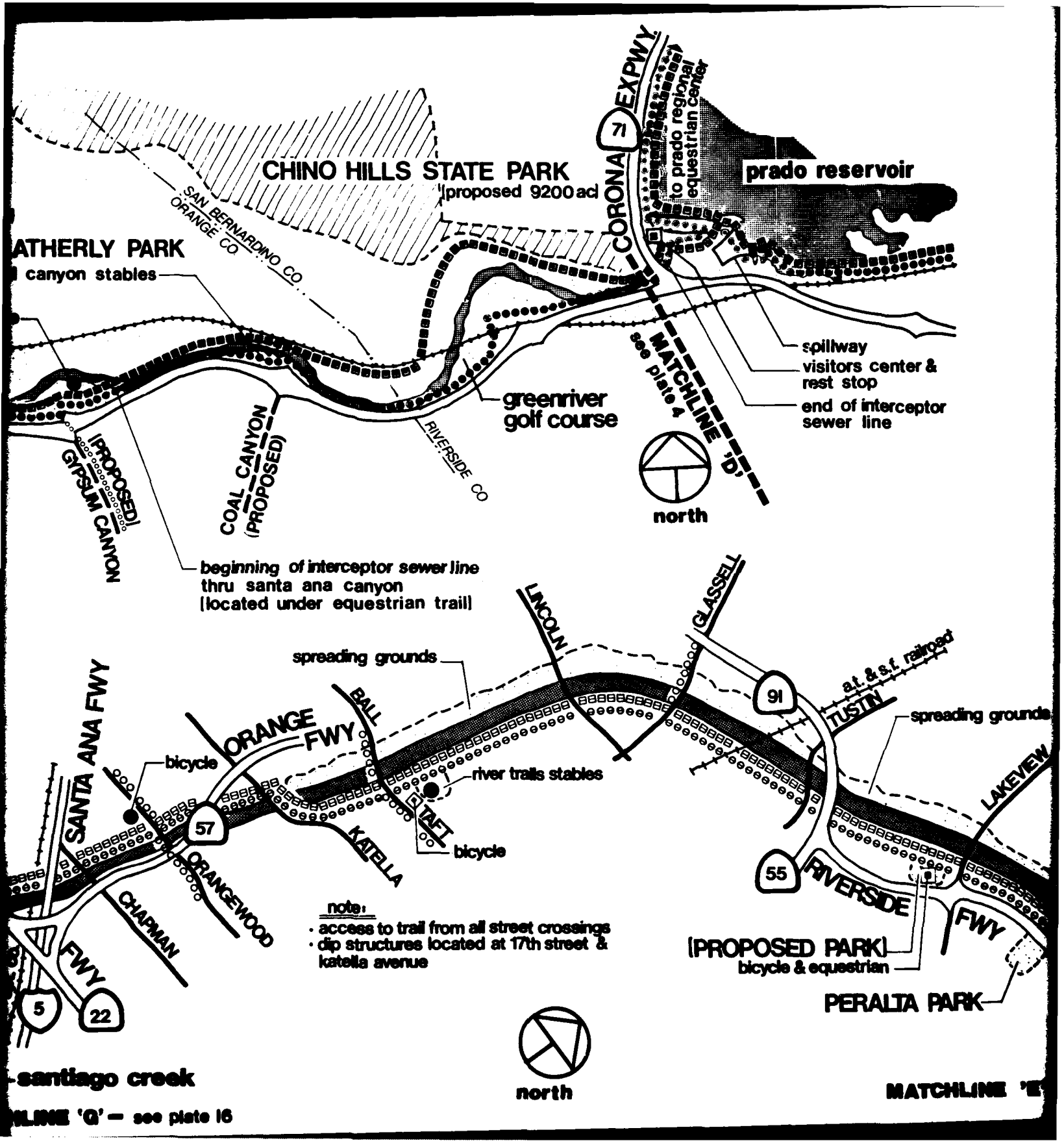
For purposes of this report, the 22 mile lower Santa Ana River trail system from Yorba Regional Park to the Pacific Ocean is considered strictly replacement. Possible locations for rest stops are indicated on plates 14 and 15, however, any improvements to the trail will be investigated during Phase II planning.

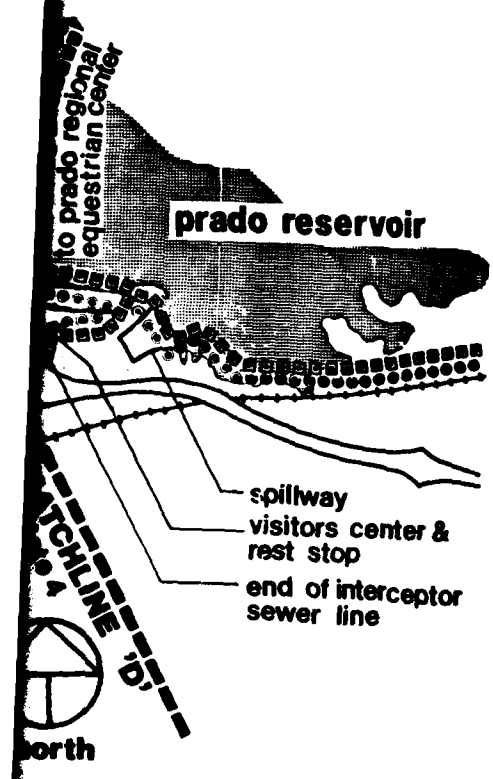
Proposed Trail System.

The recommended plan for the lower reach of the Santa Ana River is development of approximately 6 miles of equestrian and bicycle trails from Prado Dam through Santa Ana Canyon to Yorba Regional Park. The 2.5 miles of existing bicycle and equestrian trails near Featherly Park will be retained as part of this 9 mile trail. The proposed trail would connect to 22 miles of replaced trail extending from the east end of Yorba Regional Park to the Pacific Ocean. The entire system would provide a 33-mile reach in the state designated mountains-to-sea trail corridor.

The proposed plan would include 6 miles of paved bicycle trail, 6 miles of graded equestrian trail and an equestrian staging area/rest stop. Three culvert crossings would be included for crossing the river.


YORBA REGIONAL PARK
horseshoe bend
FEATHERLY PAR
coal canyon stables
bicycle
91
WEIR CANYON RD.
PROPOSED GYPSUM CANYON
IMPERIAL
RIVERSIDE FWY.
MATCHLINE 'E'
FORREST PAULL PARK
equestrian & bicycle
bicycle
EDNA PARK
GARDEN GROVE
GARDEN GROVE
SANTA ANA FWY
17TH
MATCHLINE 'F'
see plate 15
bicycle
MEMORY LANE
FWY
5
22
ALONA PARK
riverview golf course
santiago cr
MATCHLINE 'G' – sc


CHINO HILLS STATE PARK
(proposed 9200 ac)
SAN BERNARDINO CO
ORANGE CO
ATHERLY PARK
canyon stables
CORONA EXPWY
to prado regional equestrian center
prado reservoir
spillway
visitors center & rest stop
end of interceptor sewer line
MATCHLINE 'D'
see plate 4
north
greenriver golf course
RIVERSIDE CO
COAL CANYON (PROPOSED)
(PROPOSED) GYPSUM CANYON
beginning of interceptor sewer line thru santa ana canyon (located under equestrian trail)
spreading grounds
LINCOLN
GLASSELL
a.t. & s.f. railroad
TUSTIN
91
spreading grounds
LAKEVIEW
SANTA ANA FWY
ORANGE FWY
BALL
bicycle
river trails stables
TAFT
bicycle
57
KATELLA
ORANGEWOOD
CHAPMAN
FWY
5
22
note:
· access to trail from all street crossings
· dip structures located at 17th street & katella avenue
55
RIVERSIDE FWY
(PROPOSED PARK)
bicycle & equestrian
PERALTA PARK
north
santiago creek
MATCHLINE 'E'
LINE 'G' — see plate 16

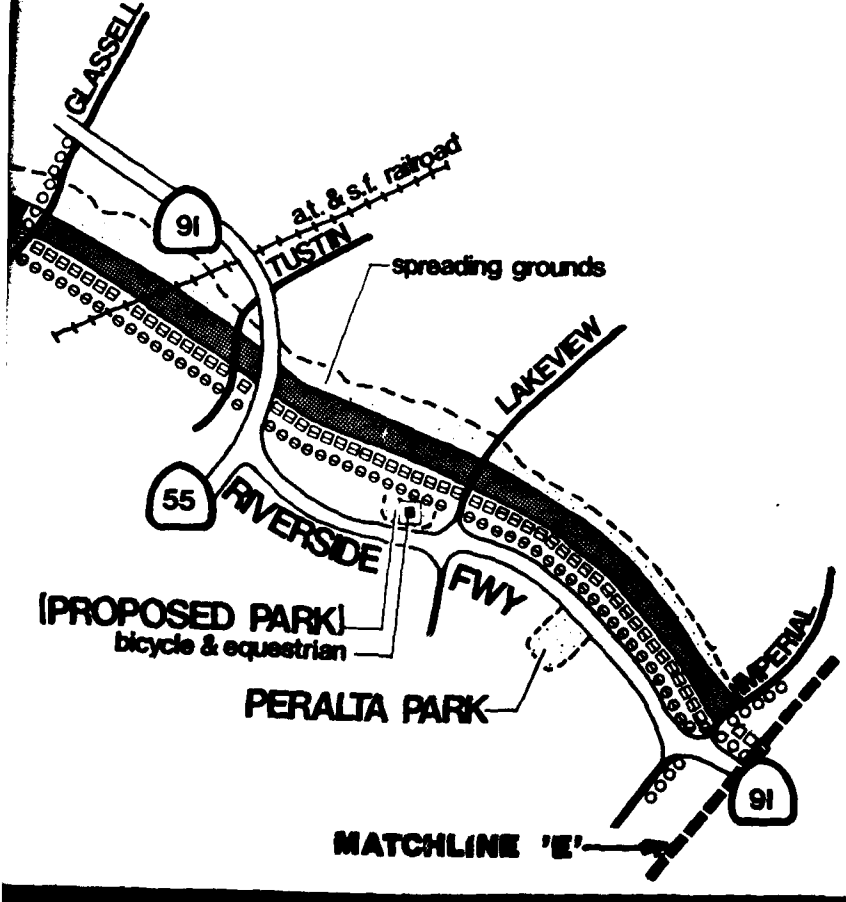


	PROPOSED (shared funding)	PROPOSED (regional – by others)	REPLACED TRAILS (local funding)	PROPOSED ALTERNATE	EXISTING	PROPOSED (local – by others)	EXISTING (by others)
BICYCLE TRAILS	●●●	○○○	⊖⊖⊖	●●●	●●●	○○○○○	●●●●●
EQUESTRIAN TRAILS	▣▣▣	□□□	⊟⊟⊟		■■■	□□□□□	▬▬▬▬▬
REST STOP	⊙	○			●		
STAGING	▣	□			■		

TUNNEL CROSSING (ramp replacement)

TRAILS NODE

0 1/2 1 2 miles

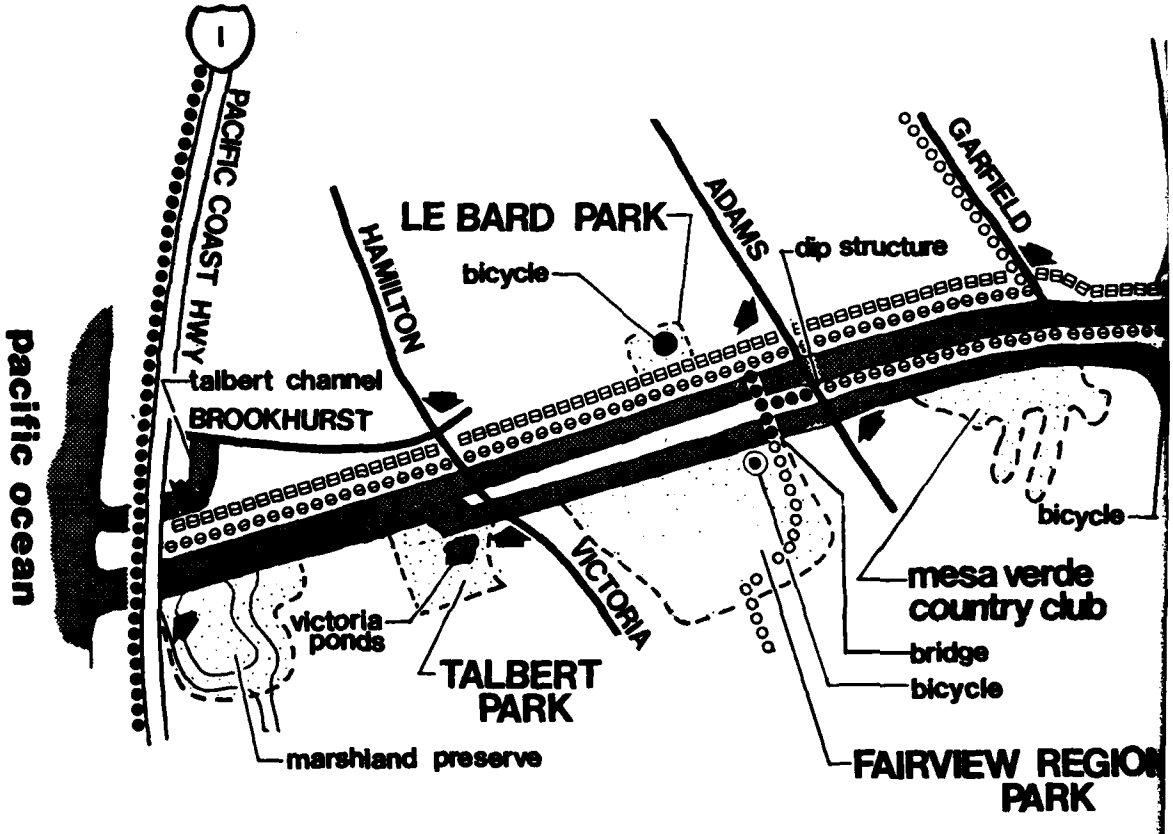


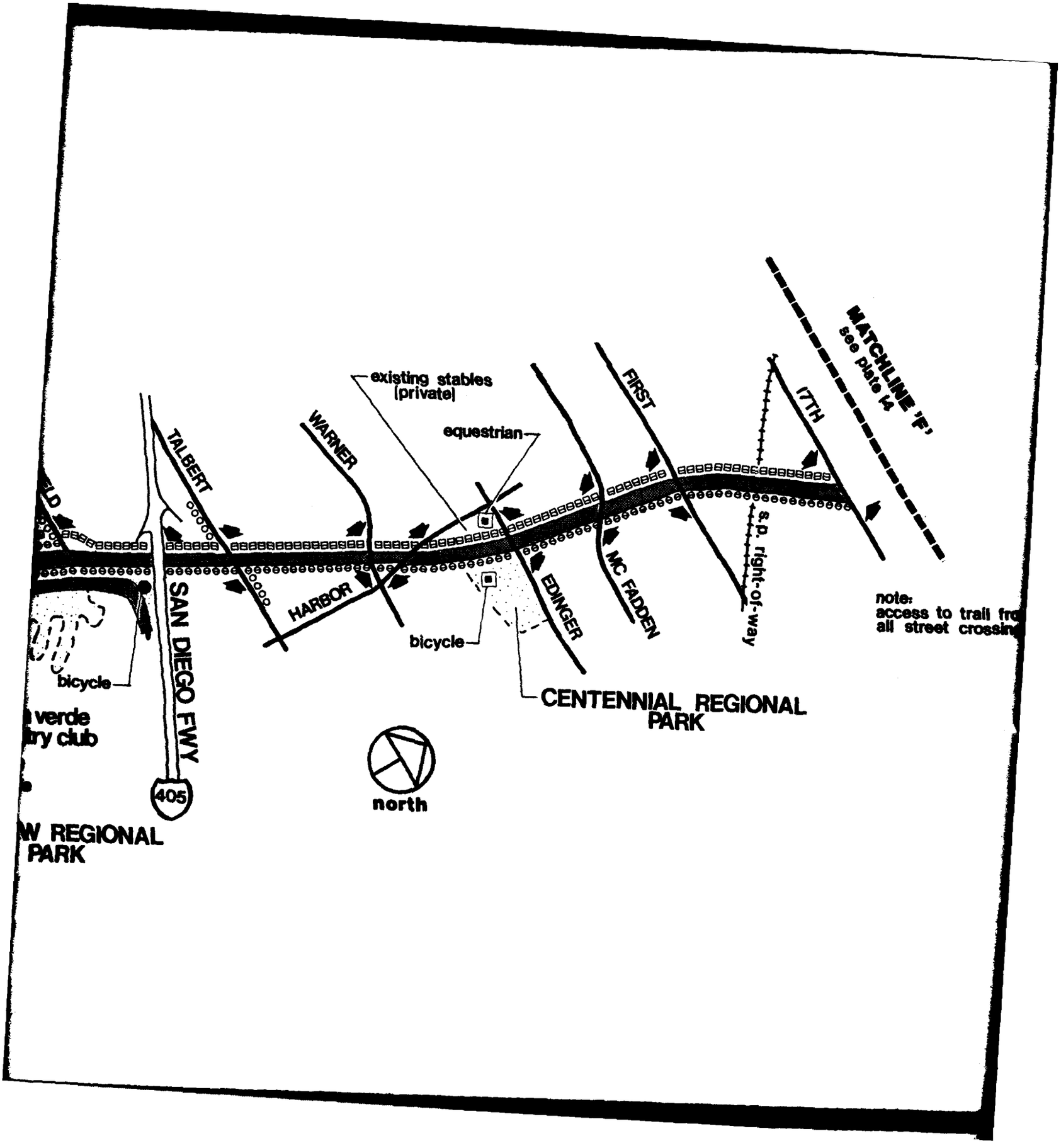
RECREATION TRAILS PLAN

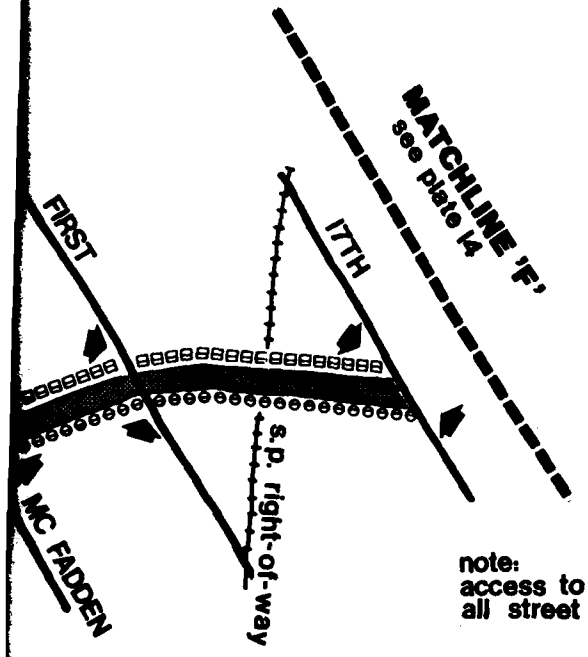
prado reservoir to 17th street

PLATE 14

SANTA ANA RIVER


PACIFIC COAST HWY
pacific ocean
talbert channel
BROOKHURST
HAMILTON
LE BARD PARK
bicycle
ADAMS
dip structure
GARFIELD
bicycle
mesa verde
country club
bridge
bicycle
VICTORIA
victoria
ponds
TALBERT
PARK
marshland preserve
FAIRVIEW REGION
PARK


existing stables
(private)
equestrian
TALBERT
WARNER
FIRST
17TH
MATCHLINE 'F'
See Plate 14
HARBOR
EDINGER
MC FADDEN
s.p. right-of-way
bicycle
bicycle
SAN DIEGO FWY
405
CENTENNIAL REGIONAL
PARK
north
note:
access to trail fro
all street crossin
verde
try club
W REGIONAL
PARK



note:
access to trail from
all street crossings

TENNIAL REGIONAL
PARK

	PROPOSED (shared funding)	PROPOSED (regional – by others)	REPLACED TRAILS (local funding)	PROPOSED ALTERNATE	EXISTING	PROPOSED (local – by others)	EXISTING (by others)
BICYCLE TRAILS	●●●	○○○	⊖⊖⊖	●●●	●●●	○○○○○	●●●●●
EQUESTRIAN TRAILS	■■■	□□□	⊟⊟⊟		■■■	□□□□□	■■■■■
REST STOP	⊙	○			●		
STAGING	▣	□			■		

TUNNEL CROSSING (ramp replacement)

TRAILS NODE

0 1/2 1 2 miles

SANTA ANA RIVER

RECREATION TRAILS PLAN

17th street to pacific ocean

PLATE 15

SANTIAGO CREEK

Resource Use Objectives.

Several local strip parks, operated by the Cities of Santa Ana and Orange, and a natural park at the base of the Villa Park Dam, operated by Orange County, are located along the course of the Santiago Creek from Villa Park Dam to the Santa Ana River. Although this reach of the creek is primarily surrounded by urban areas, there are some large gravel pit mining operations along the creek, north of Bond Avenue. These pits are projected to become part of the proposed flood system as retarding basins. One or several of the pits may be used as disposal sites for excavated soil from the Santa Ana River rebuilding project. The principal objectives for the use of this resource are:

(1) To provide a high quality experience for bicycling, hiking and horse-back riding opportunities through a well-planned trail system;

(2) To maximize the use of flood control rights-of-way and improvements for park and recreational trail activities;

(3) To expand recreational trail opportunities by providing linkages to the Santa Ana River and Irvine Regional Park;

(4) To locate trails and ancillary facilities with respect to resources sensitive to human use;

(5) To limit incompatible development. Trails would be built in a manner which is in harmony with adjacent uses. Landscaping would provide shade, screening and general esthetic treatment to benefit both the trail users and adjacent land users. Architectural standards on structures and signage would create consistency of appearance of any structures to be built within the project area.

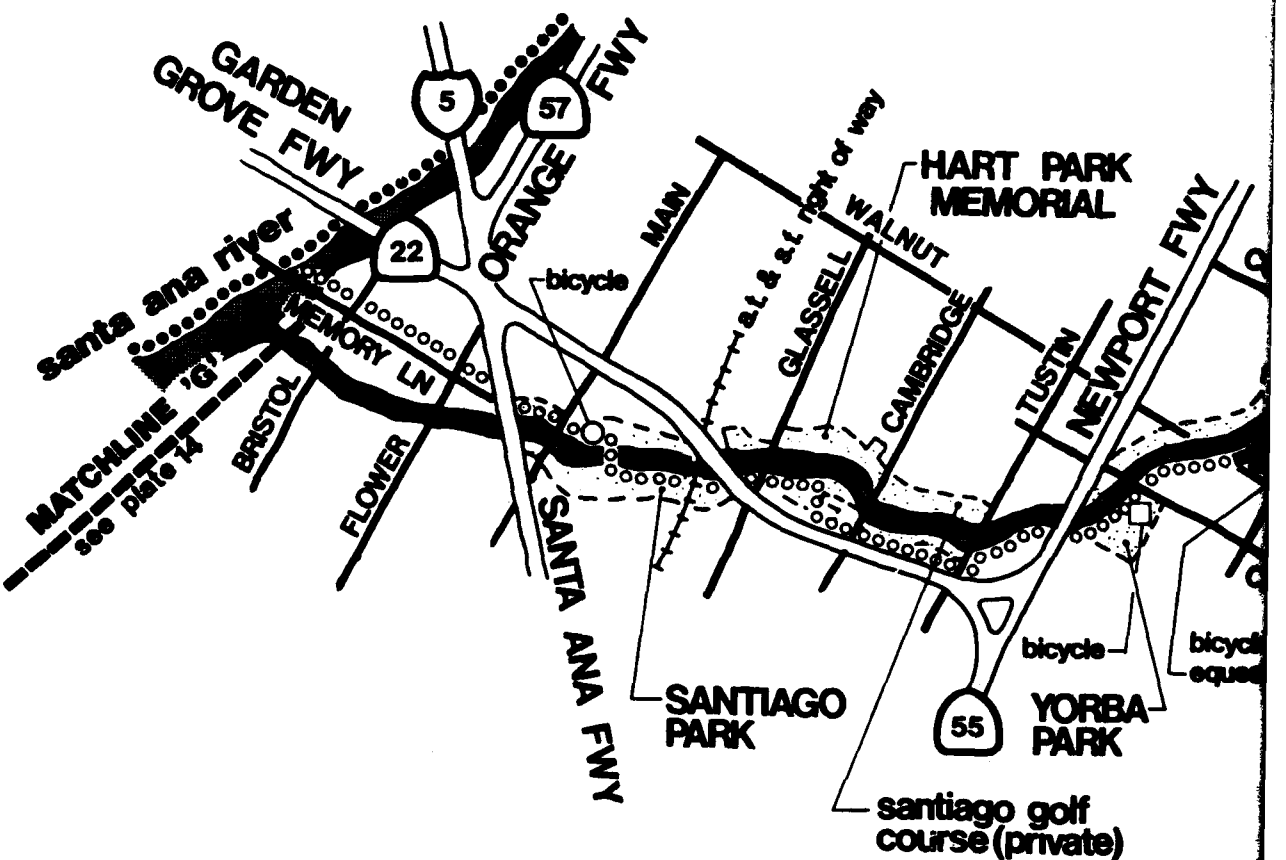
Proposed Trail System.

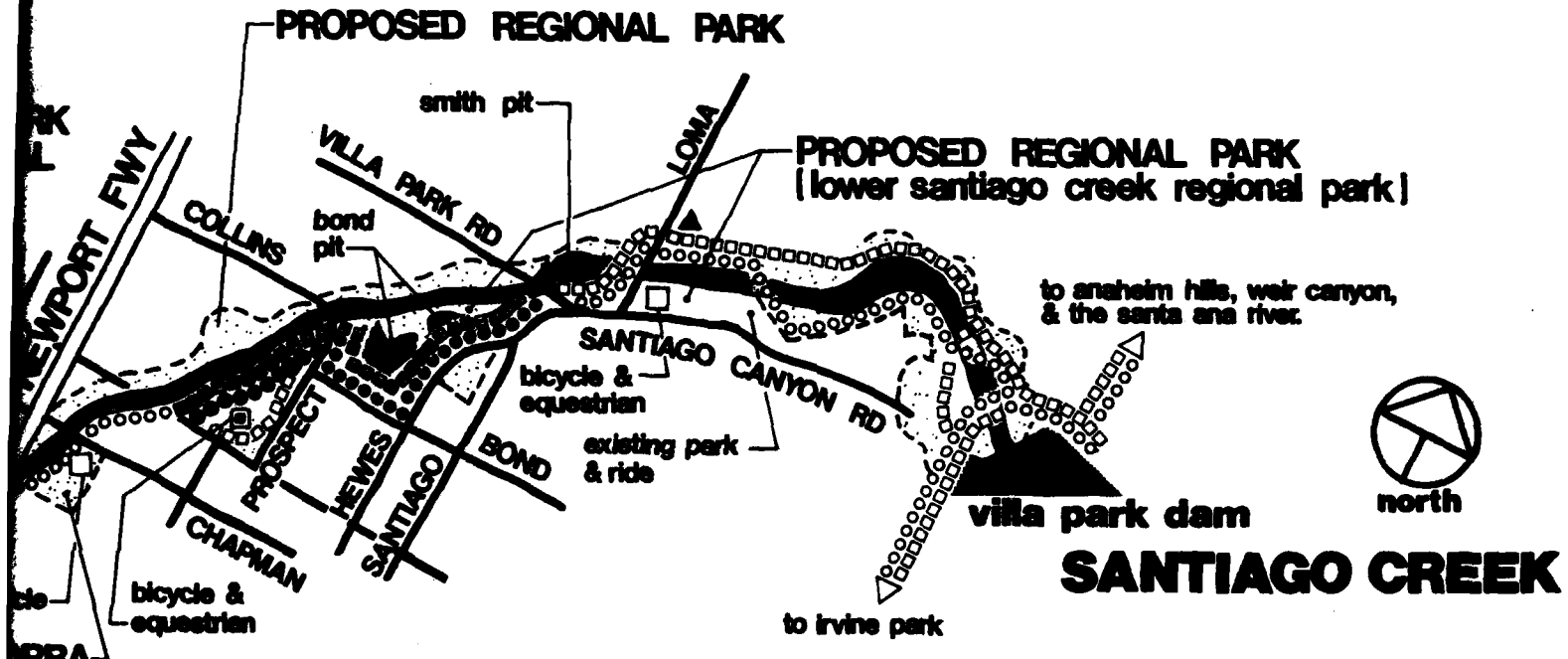
The recommended recreational development proposals are limited to the Santiago Creek corridor between Walnut Street and Villa Park Road, where flood control improvements will be provided. Plate 16 illustrates the proposed bicycle and equestrian trail to be installed on a graded bench along the east and west sides of the Bond Avenue gravel pits. This proposed 1.7 mile trail link would be a part of the proposed regional bicycle route which connects to the Santa Ana regional trails at Memory Lane and Weir Canyon Road. The equestrian trail would connect to a proposed regional route via Weir Canyon to the Santa Ana River trails. Local city bicycle routes and equestrian trails could make connections to the regional trails at either end of the proposed project (see Plate 16).

If the Smith gravel pit area north of Villa Park Road becomes a part of the flood control project, the recommended plan would be continuation of the recreational trail through this area.

Proposed Park Development.

Recreational development of the 240 acre "Bond Pit", a unit of the proposed 625 acre Lower Santiago Regional Park, is dependent upon the usability of the land areas and water bodies created for the flood control retarding basin in the pit area. If the lake or lakes have significant seasonal water level fluctuations, the recreation opportunities will be minimal. However, if a fairly stable water level lake and filled or benched areas of usable size are available in the pit, recreation opportunities can be developed. The park and lake would provide for fishing, non-power boating, picnicking and day camping, and possibly, game courts and sports fields. The park would also have the previously discussed recreational trails sytem. Further study would be required during the Phase II GDM to determine if recreational use of the Bond Pit is compatible with the reformulated flood control plan.


GARDEN GROVE FWY
5
57
FWY
ORANGE
MAIN
HART PARK MEMORIAL
WALNUT
GLASSELL
CAMBRIDGE
TUSTIN
NEWPORT FWY
santa ana river
22
bicycle
MEMORY LN
BRISTOL
FLOWER
MATCHLINE 'G'
see plate 14
SANTA ANA FWY
SANTIAGO PARK
55
YORBA PARK
bicycle
santiago golf course (private)


PROPOSED REGIONAL PARK
smith pit
LOMA
PROPOSED REGIONAL PARK
(lower santiago creek regional park)
VILLA PARK RD
COLLINS
bond pit
to anaheim hills, weir canyon, & the santa ana river.
SANTIAGO CANYON RD
bicycle & equestrian
existing park & ride
PROSPECT
HEWES
BOND
SANTIAGO
CHAPMAN
villa park dam
north
SANTIAGO CREEK
bicycle & equestrian
to irvine park

SANTA ANA RIVER

	PROPOSED (shared funding)	PROPOSED (regional – by others)	REPLACED TRAILS (local funding)	PROPOSED ALTERNATE	EXISTING	PROPOSED (local – by others)	EXISTING (by others)
BICYCLE TRAILS	●●●	○○○	⊖⊖⊖	●●●	●●●	▫▫▫▫	▪▪▪▪
EQUESTRIAN TRAILS	▣▣▣	□□□	▣▣▣		■■■	▫▫▫▫	▪▪▪▪
REST STOP	⊙	○			●		
STAGING	▣	□			■		

TUNNEL CROSSING (ramp replacement)

TRAILS NODE

0 1 2 miles

1/2

RECREATION TRAILS PLAN

santiago creek

PLATE 16

GIONAL PARK
creek regional park)

o anaheim hills, weir canyon,
the santa ana river.

north

park dam

SANTIAGO CREEK

5. COORDINATION WITH OTHER AGENCIES.

LOCAL

Citizen Groups (Work Group on Flood Protection Planning for Santiago Creek).

Coordination was conducted with this group to reaffirm local policies and development proposals for the recreation trail and regional park concepts for Santiago Creek incorporated in this Appendix.

Cities of Orange, Santa Ana and Villa Park.

Coordination was conducted with park planning and public work agencies' representatives on several occasions to review local policies, plans, and programs for an integrated recreational trail and regional park concept in the Santiago Creek.

Cities of Huntington Beach and Costa Mesa.

Contacts were made concerning the "Local Coastal Program" relation to the Santa Ana River mouth recreation proposals.

Cities of Santa Ana, Anaheim, Norco and Riverside.

Contacts were made concerning local planning and policies for recreational trail development along the Santa Ana River.

City of Corona Parks and Recreation Department.

Coordination was conducted with this agency regarding city policies and programs for recreational use of the Oak Street Drain and the Butterfield Stage Park sector of the Prado Reservoir. Representatives of the Planning Agency were also contacted for recreational use data.

Counties of Orange, Riverside and San Bernardino.

Coordination was conducted with planning and park development agencies and was maintained on a continuing basis during the planning process.

Orange County Water District and Santa Ana Water Project Authority.

Coordination was conducted with these agencies regarding recreational lake and regional park development concepts for the Prado Reservoir.

STATE.

California State Parks and Recreation Department was contacted for information regarding the proposed Chino Hills State Park and general recreation planning data for Southern California. Coordination was also conducted with the California Transportation Department relative to the design and construction schedule of the Pacific Coast Highway bridge at the mouth of the Santa Ana River. Information was further received from this agency regarding the route planning for I-15, I-30, and the redevelopment of the Corona Expressway.

6. SPECIAL PROBLEMS AND SUGGESTED SOLUTIONS

MENTONE RESERVOIR.

Sewage Disposal.

There is currently no existing sewage disposal system available within the proposed Mentone Reservoir site. Investigation reveals that there are three methods that are presently acceptable. These include:

(1) Providing a gravity line to the Redlands treatment plant, a distance of approximately 3.9 miles;

(2) Constructing a mini-sewage treatment plant as part of initial developments; or

(3) Providing septic tanks with leach fields as necessary.

There are no approved plans to restrict sewage treatment or capacity north of Redlands at the present time; however, plans will have to be submitted to the Regional Water Quality Control Board for actual approval.

Flood Protection.

It is important that all recreation improvements be located out of the path of storm run-off. Severe damage could result to landscaping and structural facilities due to the excessive velocity of water coming out of the Santa Ana Wash. All facilities should be designed to withstand periodic inundation of relatively short duration; however, protection against debris, scouring and erosion should be given priority in design stage.

Habitat Protection.

Recreational development can result in negative impacts on the wildlife habitat of this area. Siting of recreational facilities should avoid key habitat areas to the maximum extent possible. This effort needs to be coordinated with Fish and Wildlife interests.

UPPER SANTA ANA RIVER

Trail Route Protection.

Although the Upper Santa Ana River is not part of this project, its importance to the continuity and integrity of the total "River" recreation plan requires that trail alinements and connections at the Prado and Mentone Reservoir trails systems be fully and continually coordinated with County official plans.

AD-A136 730 SANTA ANA RIVER MAIN STEM INCLUDING SANTIAGO CREEK AND OAK STREET DRAIN P..(U) ARMY ENGINEER DISTRICT LOS ANGELES CA SEP 80 2/2

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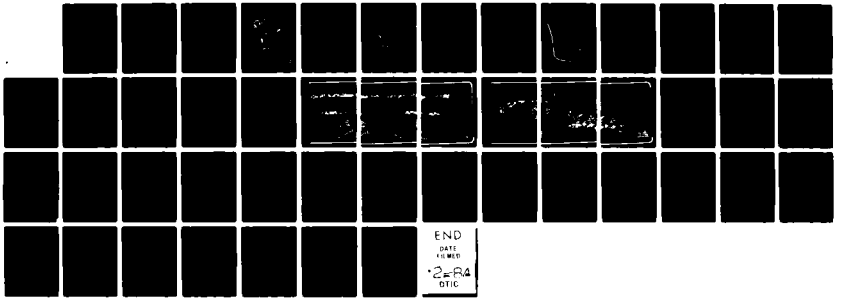

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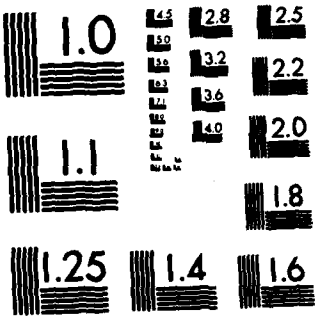


PRADO RESERVOIR

Facility Management.

The ever-increasing scope and complexity of the proposed Prado Reservoir recreation area, recent limitations to the funding potential for local governments in California, and the obvious need for a central authority to guide and direct the implementation of a cohesive plan of development and operation, all contribute to the need for a comprehensive review of management policies within Prado.

The current plan includes the ultimate acquisition of over 9,700 acres of land (more than 15 square miles), or an area roughly equivalent to the City of Pomona. Prado Reservoir occupies parts of Riverside and San Bernardino Counties and the City of Corona. It lies within thirty miles of the center of the Los Angeles and Orange Counties' metropolitan area. By the year 2000, it will be within a one hour drive for over 12,000,000 people.

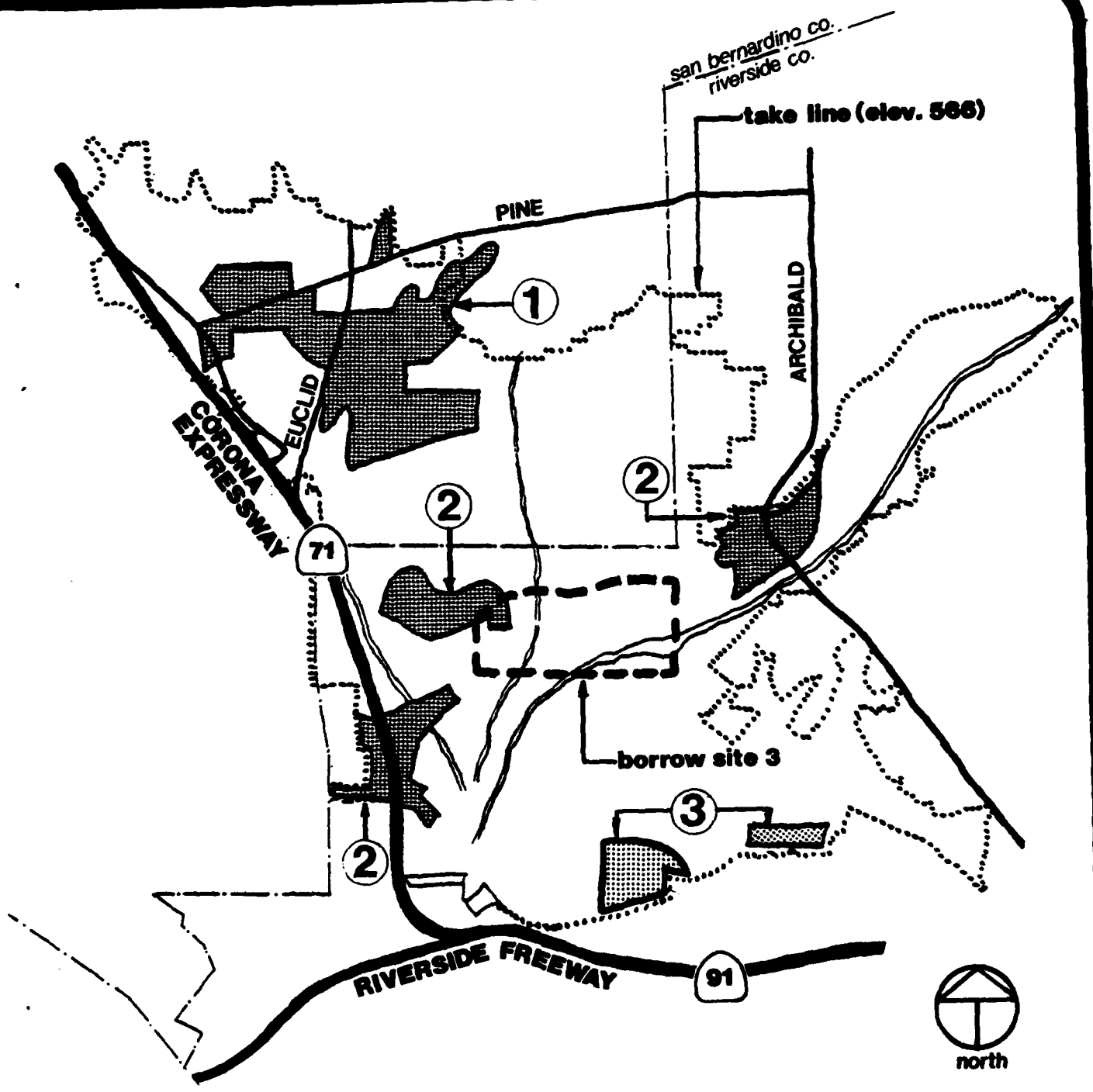
Currently, development and operation for recreation purposes is administered by the three local agencies through standard recreation leases with the Corps. The Riverside and San Bernardino counties' leases lie within that portion of the reservoir located north of the Santa Ana River. The City of Corona leases a part of the southeast section of the reservoir west of the dam and near the Riverside Freeway (see Plate 17).

All of the existing regionally-oriented facilities are located north of the river within areas leased by the Counties. Moreover, all proposed major developments, including the single lake, are planned for areas north of the river between Highway 71 and Archibald Avenue. The section leased by the City of Corona for recreation use is physically separated from other existing and proposed developments, with no connection contemplated or proposed. Because of the isolation and lack of regional use potential of the area under lease to the City of Corona, it is suggested that the existing recreation lease be retained.

The northern portion of the reservoir generally enjoys higher elevations and encompasses well over 4,000 acres of developable land. This section is currently divided between the Riverside County Parks Department and the San Bernardino Regional Parks Department along the boundary between the two counties. The relationship of this jurisdictional separation of responsibility to any factors pertaining to the efficient management of the resource is coincidental at best. If this area is to reach its ultimate potential as a major regional recreation resource, a unified approach to fiscal management is absolutely essential. Moreover, the coordination of development priorities; the consolidation of administrative policies; and adoption of a comprehensive plan for internal control, circulation (vehicle, bicycle, etc.), sewage disposal and other utilities, would increase efficiency, expedite completion and avoid controversy.

These objectives could best be achieved through the creation of a new authority or the acceptance of the responsibility by a higher level of government.

A joint powers authority could be created with some minor adjustment of existing statutes. This new entity could either contract with an existing jurisdiction for operational services or it could establish its own program. An authority would retain local policy control with the basic financing established through revenue derived from use fees and ground leases or contributions from local entities. Increased efficiency and a more comprehensive program of use fees and ground leases could develop a more viable fiscal program without the encumbrances of the traditional forms of local government.



RECREATIONAL LEASES

1 san bernardino county
2 riverside county
3 city of corona

0 1/2 2 miles
1/4 1 mile

PRADO RESERVOIR
recreational leases

PLATE 17

A second method could entail the creation of a regional park district. Although the California constitution prohibits the establishment of a special tax for this purpose, the entity would retain other rights and privileges granted to special districts.

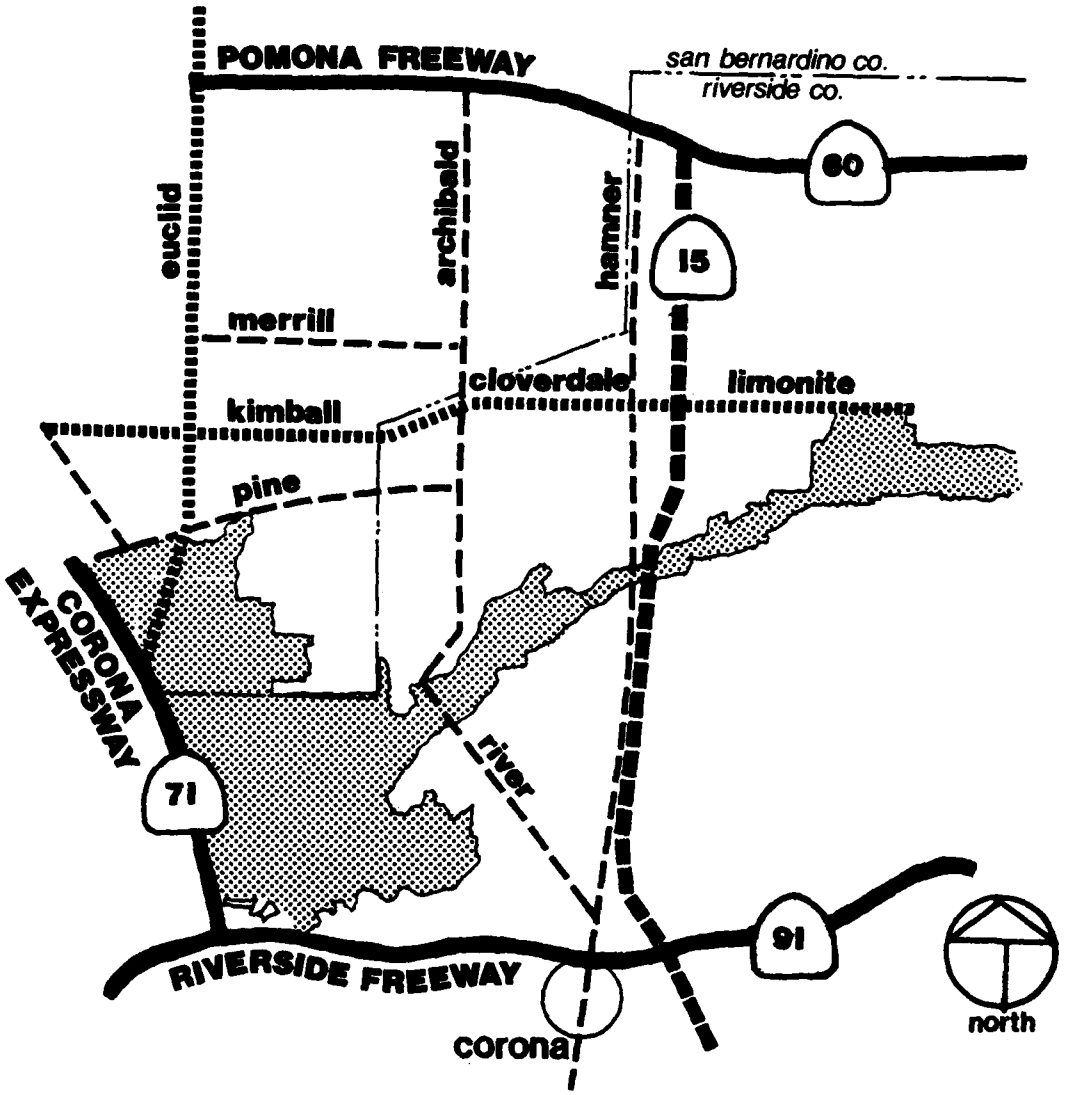
Consideration could also be given to requesting the State of California to operate this facility as an element of the State Park System, with operation and development responsibilities assumed by that agency. The proposed park development appears to meet their standards in scope and attraction capability.

Sewage Disposal.

One of the limiting factors in the development of recreation facilities within a flood control reservoir is the problem of sewage disposal. It is estimated that the recreation area could ultimately produce approximately 600,000 to 750,000 gallons of sewage on peak days. Adequate disposal would require either the development of a new waste water plant capable of tertiary treatment or the pumping of all sewage out of the reservoir to existing plants to the north. Either of these solutions appears practical at this time.

Access and Interior Circulation.

Current access into Prado Reservoir is extremely limited and circulation within the area is practically non-existent. The 91 Freeway and the 71 Expressway provide relatively good access to the general area of Prado Dam from Los Angeles and Orange Counties. The proposed extension of the 15 Freeway, roughly parallel to Hammer Avenue, will complete the major access routes and serve San Bernardino and Riverside (see Plate 18).



LEGEND

- I-15 ADOPTED ALIGNMENT
- FREEWAY
- MAJOR HIGHWAY
- SECONDARY HIGHWAY

PRADO RESERVOIR
major access routes

PLATE 18

A primary restraint of any proposed development of Prado is the absence of a planned circulation pattern into and through the Prado Reservoir. Access routes to and within this proposed facility will primarily be the responsibility of the local governmental entities. A coordinated program of planning among local entities should be initiated as soon as practical.

Fish and Wildlife.

The proposed lake facility encroaches significantly into the riparian growth near the confluence of the Chino, Cucamonga and Santa Ana River Washes.

In siting recreation facilities, fish and wildlife habitat areas will be impacted. Wherever possible, key areas should be avoided to minimize these impacts.

ONE LAKE DEVELOPMENT

Background and Assumption.

The alternative plan of physical development of the River Project includes a borrow pit within Prado Reservoir to obtain core material for the construction of Mentone Dam. If this location is selected, a total of 10,000,000 cubic yards of soil would be removed from the Prado Reservoir as a part of the dam construction. It has been recommended that a single recreation lake be developed as part of this excavation project.

The location of the alternative borrow pit is near the center of the reservoir, south of the promontory separating Mill Creek and the Santa Ana River drainage courses. Approximately 1,000 acres of land has been designated suitable for this purpose. The site is relatively flat, ranging in elevation from 490 feet above sea level to about 520.

There has also been a proposal to allow retention of surplus water behind the Reservoir dam to an elevation of 512. This conservation effort would not only retain storm water, but also import and store surplus water from the State Water Project when available. If this proposal is implemented, approximately 2,500 acres of the total Prado Reservoir could be inundated during a significant portion of each year.

The following assumptions form the basis for lake development concepts:

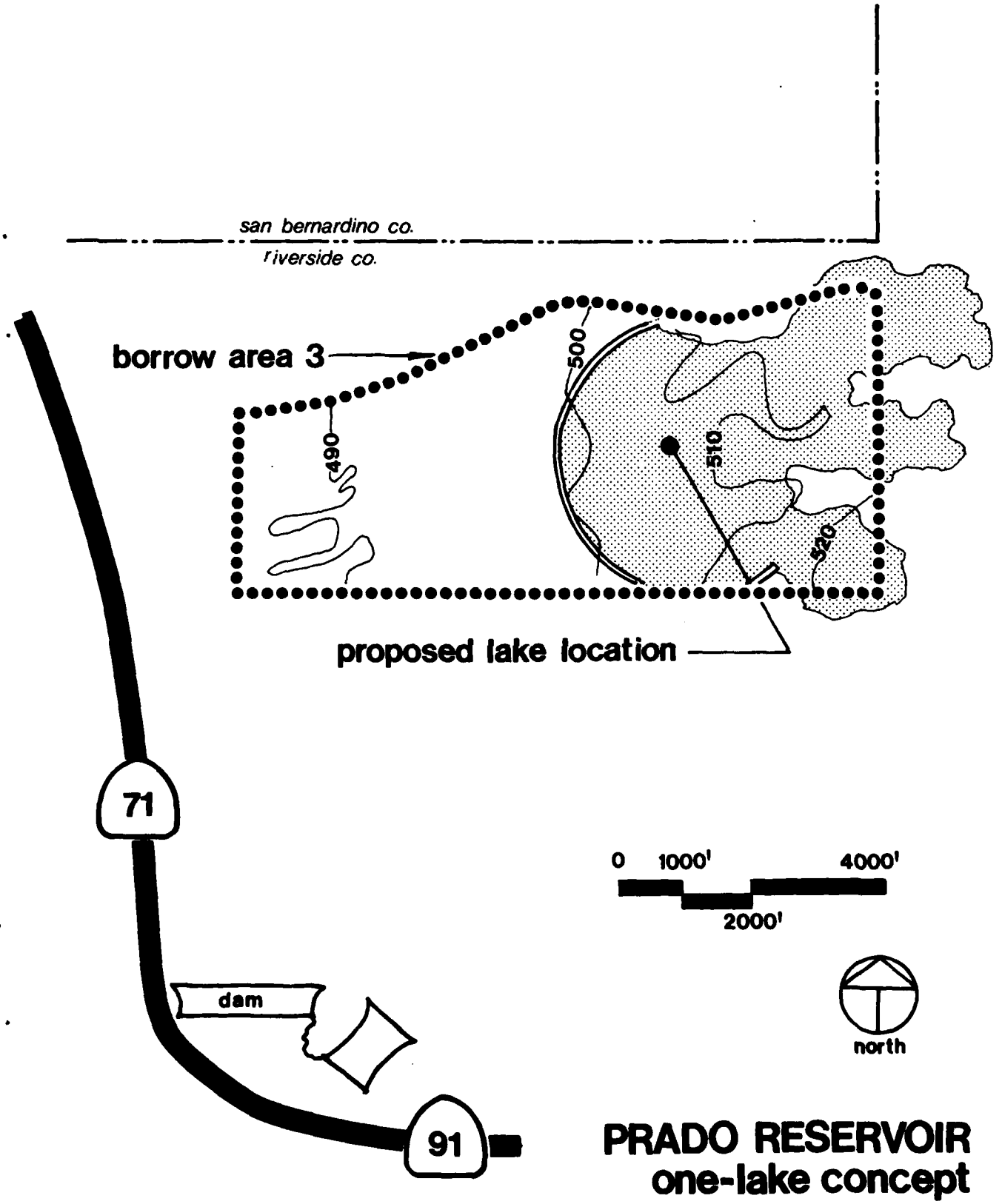
(1) The borrow site within Prado Reservoir is selected; and

(2) The water conservation program is implemented with a maximum storage pool to elevation 512.

Concept.

The establishment of the water conservation pool creates a problem with the proposed recreation lake. The borrow site has an average elevation of approximately 500 feet prior to any soil removal. Normally, a 400 acre lake, excavated to an average depth of 13 to 14 feet, would produce a borrow of about 10,000,000 cubic yards as programmed; however, to accomplish this within the designated borrow site, the water surface elevation would approximate 490 feet to a maximum of 500 feet, dependent on the location of the lake within the borrow area.

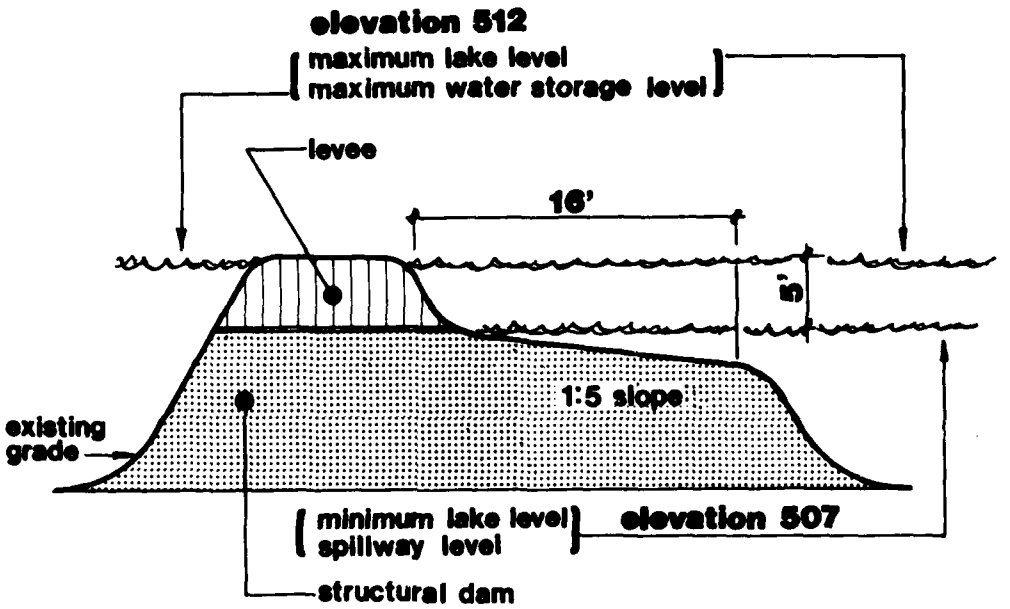
To maintain a stable water level consistent with the proposed retention pool, the lake surface elevation would have to be raised to an elevation of 512. Assuming the lake was located in the most easterly section of the borrow area (see Plate 19), this elevation would require a structurally designed dam of 1-1/2 miles in length to an average height of 10 feet above the existing grade. Moreover, the dam itself would have to be based at least at the natural soil level below the alluvial deposits.



PRADO RESERVOIR
one-lake concept

PLATE 19

If water retention to elevation 512 is not anticipated between June 15 and September 15 of each year, the working elevation of the recreation lake could be lowered to the maximum level of storage anticipated for this period, thus lowering the height of the required dam. Under this concept, the beach use would be the only recreation use retaining a stable water level with fishing, boating and water skiing operating at a variable water level. A double spillway structure would be required that would permit filling of the lake above the minimum water level to elevation 512. This would be necessary to maintain equal water levels on either side of a levee built above the dam structure. (See illustration below.)



CONCEPTUAL SECTION THRU LAKE DAM

no scale

PLATE 20

Flood Protection.

There will be some need to protect the lake from scouring, erosion and debris associated with flooding. Areas where storm conditions could produce high velocity flows should be protected. Existing drainage courses should be re-routed, if practical, particularly to bypass initial flows. Initial storm impact normally involves the greatest pollution with lower water quality and the most debris. If practical, the Santa Ana River primary flow should be re-routed to the secondary alinement upstream. Secondary flows into the lake would have a much less impact. Design should attempt to concentrate debris deposits to simplify cleanout.

Water Retention.

Under this concept, a portion of the lake capacity would be available for water conservation purposes. The actual amount of storage will be dependent on the level of anticipated maximum storage between June 15th and September 15th each year. This coordinated approach to water retention appears to produce as much capacity as is possible with the recreation lake located within the borrow pit.

Wildlife.

The proposed lake development within the major borrow area severely restricts the development of adequate fish and wildlife habitats along the shoreline. This is particularly true when considering the 512 elevation of the proposed water conservation pool. Over 1-1/2 miles of the lake's shoreline will consist of an impervious dam that would prohibit natural areas of any consequence. The dam will occupy approximately one third of the entire shoreline.

LOWER SANTA ANA RIVER.

Trail Continuity.

In the Santa Ana Canyon sector of the 31 mile reach of the Santa Ana River from Prado Dam to the ocean, there are significant gaps in the bicycle and equestrian trails system. Generally from Yorba Park to Prado Dam, a distance of approximately 9 miles, there is no continuous established equestrian trail. Although in the vicinity of Featherly Regional Park there are several miles of trail, the major equestrian trail linkage through much of the Santa Ana Canyon must still be decided. The most promising route follows the Orange County Sanitation District Sewer Interceptor easement. This will require a separate easement. The proposed bicycle trail will require construction of a path from the upper end of the existing bike path along the north side of the Riverside Freeway at Green River Golf Course to the Dam, and also from Featherly Regional Park to Yorba Regional Park.

Upgrading and Rebuilding Existing Trail Facilities.

For purposes of this report, trail development from Yorba Regional Park to the Pacific Ocean is considered strictly replacement. The following is a list of trail improvements that should be considered in Phase II planning studies.

(1) Generally from Yorba Regional Park to the Ocean, there is little shade available for trail users; this is particularly true from Katella Street to the Ocean where much of the existing trail system is located on the river levees. Except for trail rest facilities at the three adjoining regional parks, Featherly, Yorba and Centennial, and two local parks, located, respectively, in Santa Ana and Huntington Beach, the level of amenity development at rest stops on existing trails is minimal. The distribution of such facilities is inadequate.

Trails south of 17th Street would cross under bridges in the service road tunnels which would replace the existing service road-trail ramp undercrossing. These tunnels should be designed for full safety and security of trail users.

(2) Trail rests, at a minimum of every four miles, should be provided adjacent to the trail or within a short distance from it. These facilities should have 2-5 acres and should be developed for shared use when equestrian and bicycling trails are jointly developed in the same right-of-way. Minimum development should include shade, drinking fountains, benches, toilets, water troughs, hitching rails and bicycle parking.

(3) Except for parks with access points to the trail, there are few access points with off-street parking; there should be more staging/rest areas to encourage more evenly spread use along the full reach of the river. An access should be provided from the east levee bicycle trail service road over Greenville channel via a service road bridge to the proposed Fairview Regional Park, and also from this levee to the west levee below Hamilton-Victoria Street bridge via a special pedestrian-bicycle bridge.

Convenient and safe trail access points should be provided at every arterial street crossing and particular attention should be given to providing safe transitions from bike lanes of the regional bikeway routes to the river lake paths. Wherever possible, some automobile parking should be provided near the access points.

(4) The levees located on the Lower Santa Ana River running generally from Imperial Highway to Katella Street are proposed to be raised from one to three feet. This section has the most complete existing landscaping along the river (Imperial Wood Trail) and includes some fairly mature trees and shrubs. The moving and replanting of these trees and shrubs in this arid region would be impractical. New plantings will require many years to reach the existing size and character, therefore, it is preferable that the channel levee be raised

without disrupting the developed trail and its landscape treatment. There appears to be adequate right-of-way along the left bank of this reach to accomplish this.

(5) The use of trails in winter months is interrupted periodically by water flows that prevent use of the river bed dip crossings at Katella, 17th, and Adams. In places where special recreational trail bridges are not feasible alternatives, this problem can be mitigated by prompt clearance of sand and debris as soon as water level drops. The design of crossings to accommodate an ambient streamflow without impairing the use of the crossing is important.

(6) Another, and probably more significant disruption to trail use, will occur during reconstruction of the river channel, bridges, and bridge ramp underpasses, which may effectively close trails for years. During construction periods, bypass routes should be provided to assure the maximum interim use possible of the public trail facilities.

Landscape Treatment.

(1) The lack of shade along the southerly portion of the lower reach is but one manifestation of the lack of landscaping along the levees. Another is the need to provide landscape screening between the trail and adjacent objectionable industrial uses, and to thereby provide visual variety to the very flat and endless vistas of the wide channel and its service and installations in the southern Orange County section of the river.

(2) Due to the sandy nature of the soil and general arid climate along the river corridor, landscape plantings are slow to establish and require some long term irrigation to assure stable growth patterns. This is also true with native plantings. Many conventional methods have been tried. According to Orange County landscape maintenance personnel drip irrigation systems seem to be most satisfactory. These systems minimize the amount of water used and also greatly lessen the opportunities of vandalism and theft of equipment.

(3) Weed growth along some reaches of the channel levees has been controlled by applying herbicides. Over a period of years, these herbicides have provided an effective control of unwanted vegetation; however, the continued use of these products may have created a soil condition that could make the establishment of new landscape plantings difficult or impossible. Levee soils should, therefore, be analyzed for agricultural suitability and growth potential. The soil laboratory reports should also include recommendations for corrective actions that would be required to establish landscaping plantings.

SANTIAGO CREEK

Regional Equestrian Trail Classification.

The proposed Santiago Creek equestrian trail will connect to the proposed Weir Canyon link from Irvine Regional Park to the Santa Ana River regional trails. The regional classification of this trail network is dependent upon the Weir Canyon link being developed.

Use of Gravel Pits for Flood Control.

Until the flood control design for the use of the gravel pits north of Collins Avenue is set, it is not practical to project a recreation development for this resource area. Therefore, it is recommended that the recreational development concepts of Orange County's Specific Plan for Lower Santiago Creek be reassessed when the flood control plan for this area is decided.

7. MANAGEMENT AND COST SHARING

General.

Local recreation development of flood control rights-of-way is financed under a matching funds program between the responsible local agency and the Corps of Engineers. The local agency must also agree to operate and maintain any recreation facilities so created. The Corps of Engineers' responsibilities are set forth in Section 1 of the Flood Control Act of 1944 and in the DAEN-CWP-DAEN-CWO-R Principles Governing Financial Participation by the Corps of Engineers in Recreation Developments of Local Flood Control Projects.

Development of new parks and trails as proposed in the Plan of Development for the project areas would be eligible for funding between Federal and local agencies. Trails to be rebuilt following the reconstruction of the lower Santa Ana River channel would be funded by the local agencies. This funding arrangement may be modified by a proposed new presidential policy which would provide funding on a 75 percent Federal, 20 percent state, and 5 percent local basis.

The following chart summarizes the recreation projects and local responsible jurisdictions, each of whom has participated in the federally shared funding for new recreation developments, either in the Prado Reservoir or along the lower Santa Ana River.

Summary.

RECREATION PROJECT	RESPONSIBLE JURISDICTION
MENTONE RESERVOIR Regional Park and Trails	County of San Bernardino
PRADO RESERVOIR Regional Parks and Trails	Counties of Riverside and San Bernardino or Joint Powers Management Agency (proposed)
PRADO RESERVOIR Butterfield Stage Park and Pistol Range	City of Corona

8. ESTHETIC TREATMENT

General.

Although various areas along the project will have their own specific areas in need of esthetic treatment, there are treatments that can be assumed to be typical recommendations. These treatments fall under two categories--landscaping and structural. Both are designed to help integrate the flood control project with adjacent site features.

MENTONE RESERVOIR IMPROVEMENTS.

Landscaping.

Construction of the Mentone Dam will provide a large, prominent, west-sloping dam face, rising 230 feet from the river's alluvial fan. This slope has an overall "boomerang" shape and measures approximately 4 miles in length. Outcroppings of native boulder masses in conjunction with native or drought tolerant trees and shrubs arranged along the face would mitigate the vast barren expanse.

Plant materials could be planted a minimum of 600 feet away from the crest of the dam. Additional soil applied to the proposed constant dam face slope of 6.5:1 could be contoured into natural forms. The overall area could be hydroseeded with a mixture of native grasses and wildflowers that would annually self-reseed.

Rather than hiding the adjacent levees, their change in form from the surrounding landscape can provide a backdrop for drought-tolerant plant materials. Nearby Redlands has an interesting skyline of promenades planted in palms. These levees could be planted to provided the same promenade effect with lower shrubs planted and interspersed in clumping through the palms.

Structural.

Structural members of the dam and levees could be constructed of colored concrete that would match or blend with the existing desert color scheme.

PRADO RESERVOIR IMPROVEMENTS.

Landscaping.

The Prado dam face is the third side of a triangle formed by the junction of the Interstate Highways 91 and 71. When driving along these highways, surrounded by mountains on two sides, the triangular structure contributes to the appearance of a strip mining pit. To ameliorate this situation, the Prado Dam face could be treated with massings of large scale trees, such as some species of eucalyptus, ash, and indigenous materials.

Contoured berming with additional planting would add topography, thereby relieving the pit look. Hydroseeding the general area with annual grasses and wildflowers would soften the effect. This low understory would reseed itself from year to year.

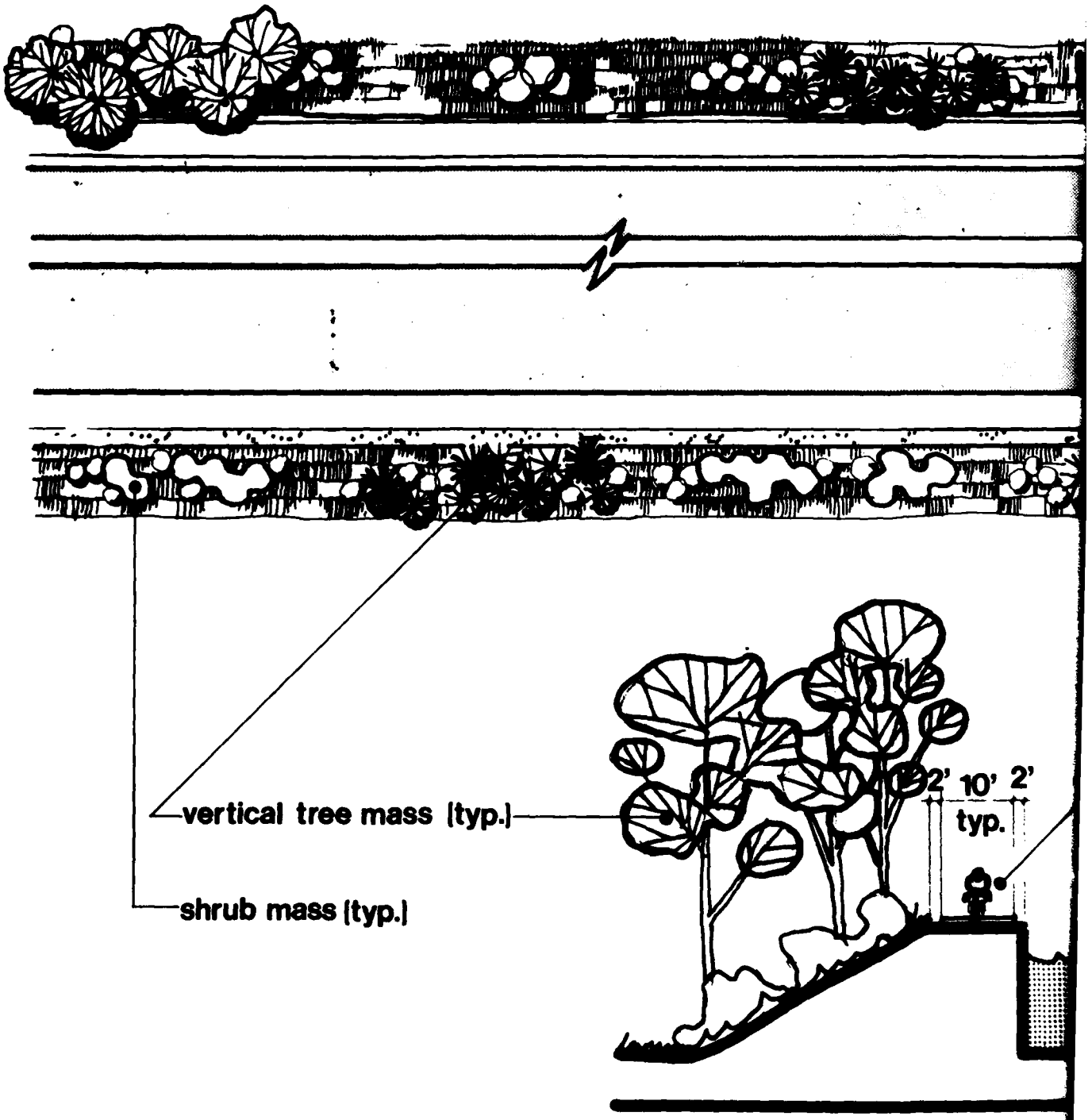
SANTA ANA RIVER FLOOD CONTROL IMPROVEMENTS

Landscaping.

Solutions for esthetic treatment of the lower Santa Ana River would be similar to the Mentone and Prado sections. Additional planting, i.e., a hierarchy of trees, shrubs, and ground cover is required along the length of the river to mitigate visual impacts of channelization on the surrounding community and to provide a sense of greenbelt tranquility. The manner in which they are planted and the types of plant materials will vary with the needs of particular sections. See Plate 21 for an illustration of landscape planting concept along a typical leveed section of the proposed reconstructed lower Santa Ana River flood control channel south of 17th Street. Existing landscaping of the lower Santa Ana trail that will be destroyed by channel improvements will be replaced as a relocation cost. Esthetic treatment applies to additional landscaping required for visual improvement of the project structure.

Structural.

The potential and need for esthetic treatment to structural elements is greater in the more highly urbanized section of the project because of its high visibility. Earth tone colored concrete can be used in areas where channel replacement is required. Scoring patterns placed into channel walls along with a slight change in ground texture or color would provide interest.


vertical tree mass (typ.)
shrub mass (typ.)
2'
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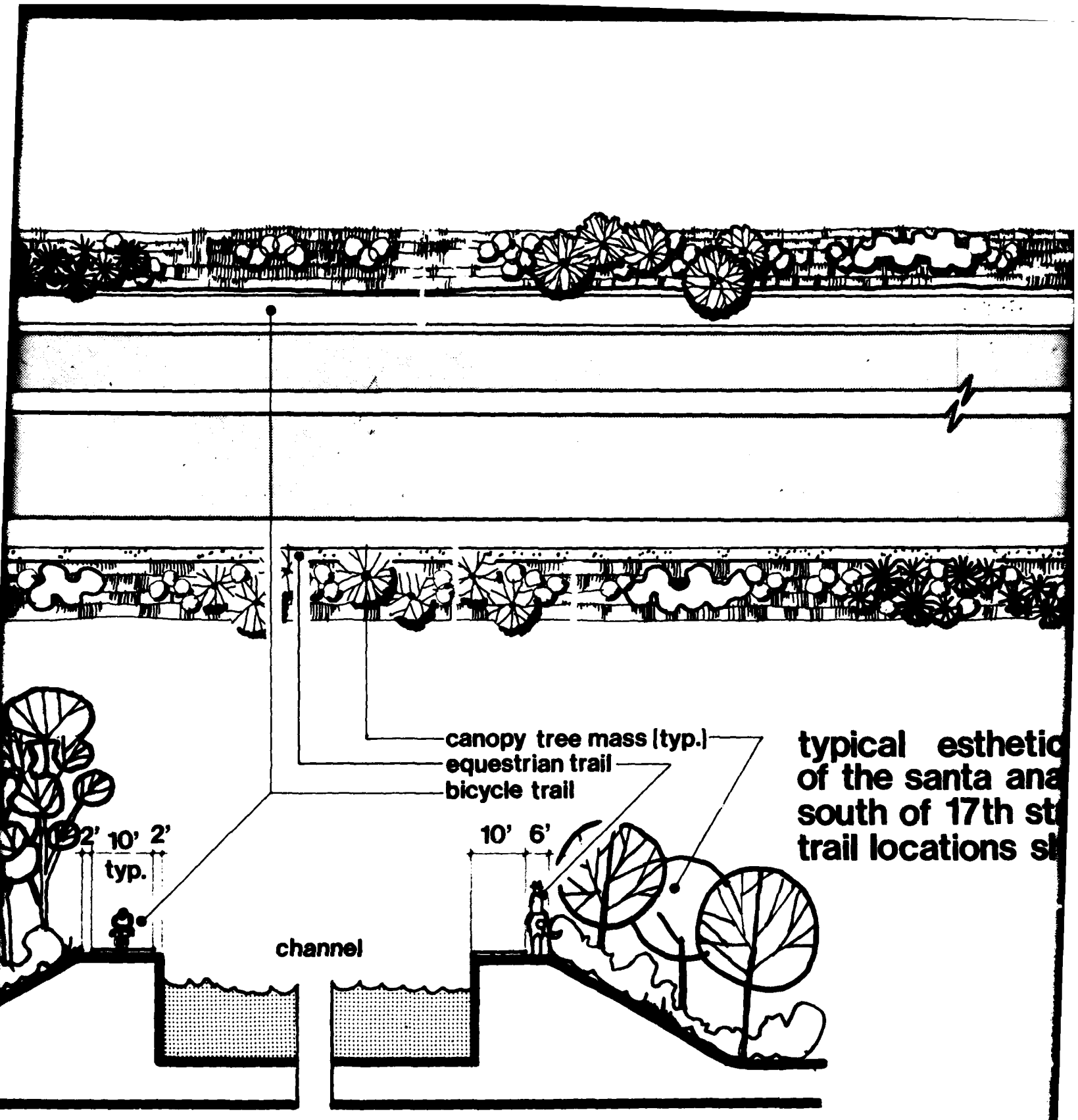
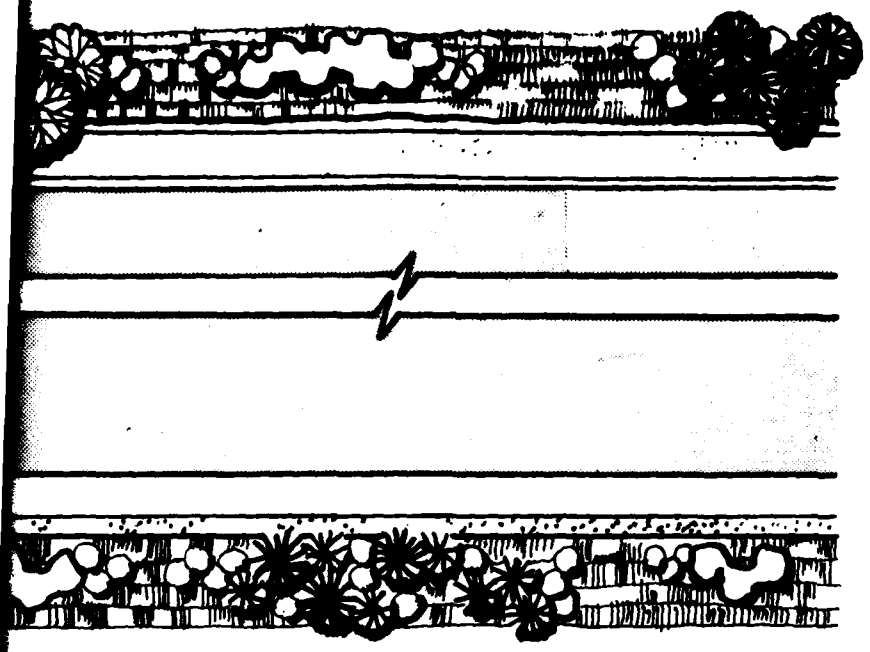


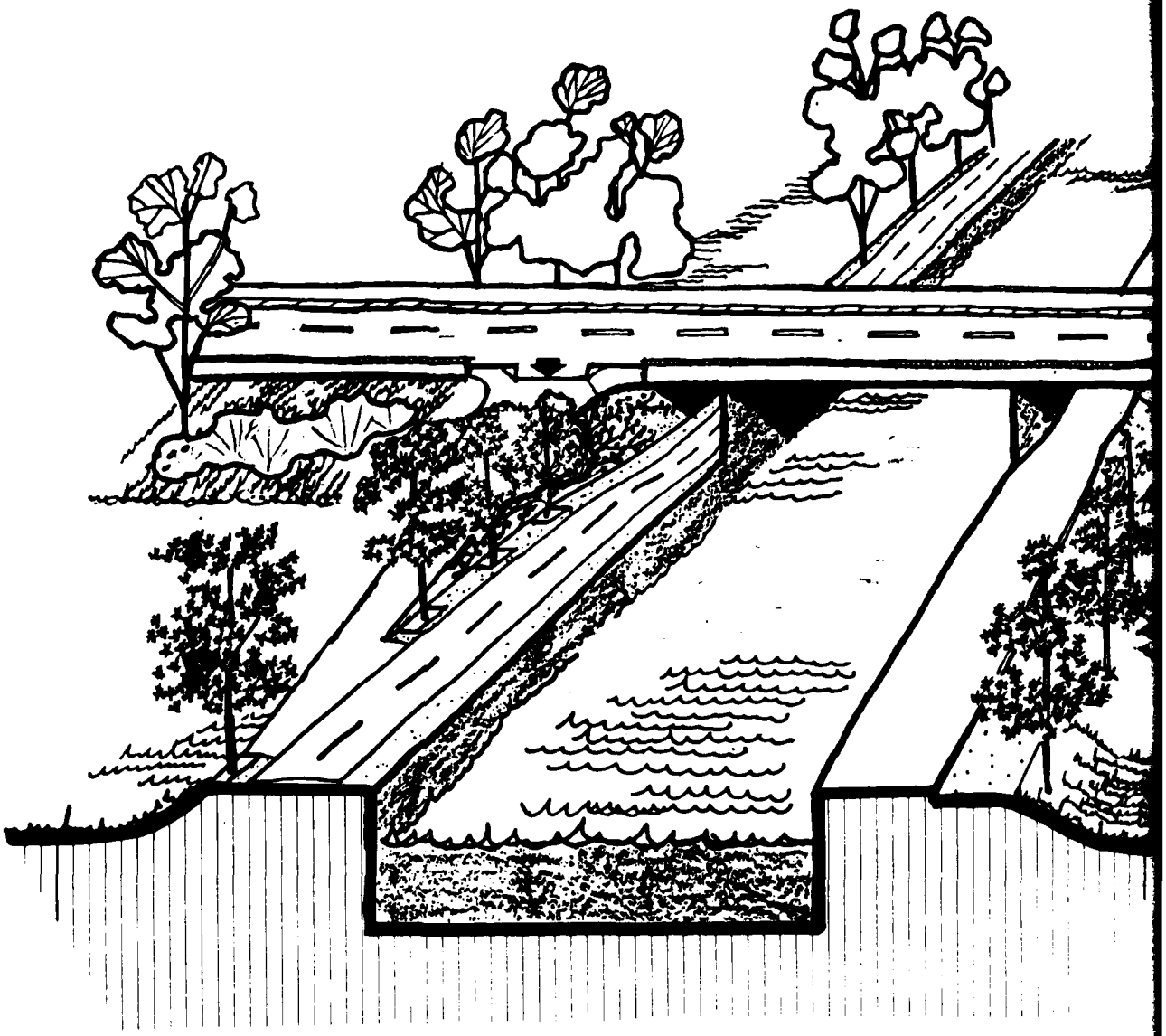
typical esthetic
of the santa ana
south of 17th st
trail locations s

SANTA ANA RIVER

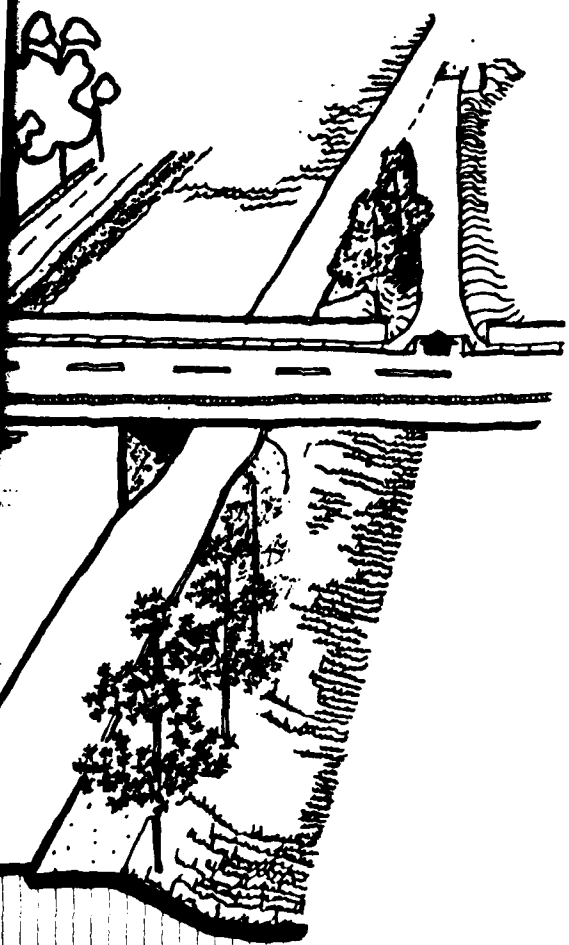


typical esthetic treatment of the santa ana river levees south of 17th street - with trail locations shown

ESTHETIC TREATMENT
lower reach
PLATE 21



typical esthetic treatment
of trail/service road underpass
and street access concept
along the santa ana river
south of 17th street



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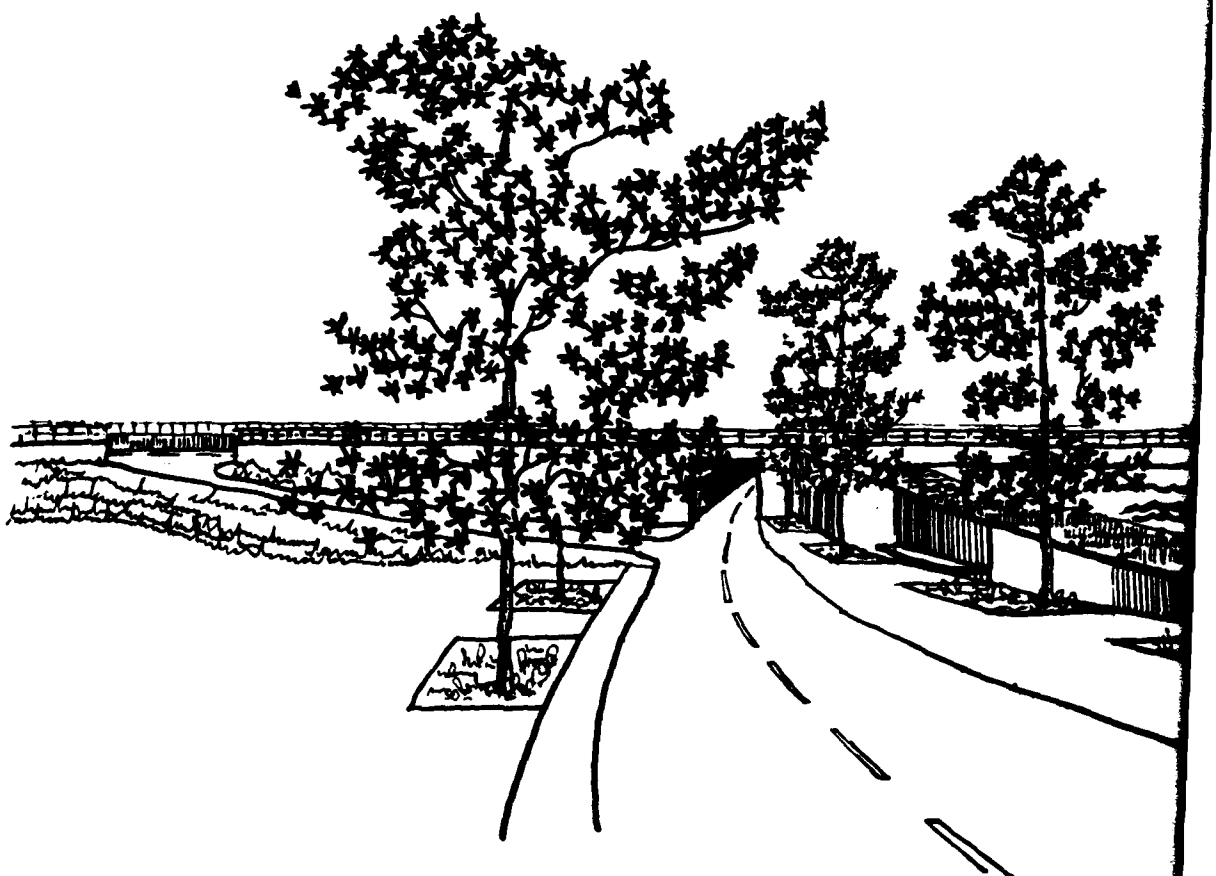

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SANTA ANA RIVER

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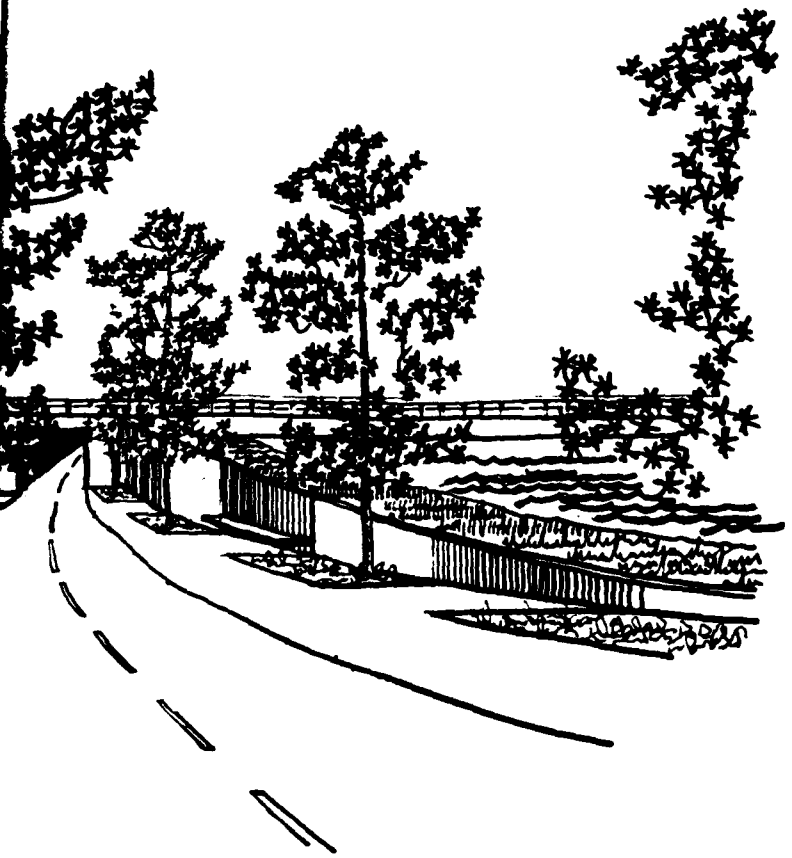


ESTHETIC TREATMENTS OF STREET UNDERPASSES
lower reach

PLATE 22

Land Capacity Formula.

ER-1120-403 outlines the procedures of estimating recreational use at reservoirs. Because the proposed flood control projects will operate without a pool or reservoir, ER-1120-2-403 provides no comparable project for use rate projections and is not applicable. Consequently, analysis of recreational use is based on the land capacity method developed by the Sacramento District Corps of Engineers. This method is summarized in the following table.

TABLE 21
LAND-CAPACITY FORMULA

Maximum Peak Daily Activity Days (AD)	= Density x Units x Turnover
Maximum Peak Daily Recreation Days (RD)	= AD x Ratio of Duplication of Activities (R)
Maximum Peak Monthly Recreation Days (MRD)	= RD x Number of Weekend Days During Peak Month (N) ÷ Percent of Peak Month Use Occurring on Weekends (W)
Maximum Annual Recreation Days (ARD)	= MRD ÷ Percent of Annual Use During Peak Month (M)

R = .833 standard factor to convert activity days to recreation days.
N = 9 days
W = 50 percent
M = variable depending on the activity

Recreation Day (RD) = A statistical unit of recreational use consisting of a visit by one person for all or a portion of one 24-hour period. One RD may consist of one or several activity days by the same person. An activity day is one person in pursuit of one recreational activity for all or part of one 24-hour period.

The first three factors of the land use capacity formula compute the daily carrying capacity of the facility. Density and turnover rates were determined using "Guidelines for Understanding and Determining Optimum Recreation Carrying Capacity" (Bureau of Outdoor Recreation, Jan. 1977).

Percent of peak month use on weekends and percent of annual use during peak month were based on available attendance data for recreation projects in the area adjusted to fit the design and expected uses of the proposed project and the state of California's Park and Recreation Information System (PARIS).

Recreation Attendance.

Based upon this formula, maximum annual recreation days provided by the proposed projects have been calculated as follows:

Mentone 752,700	
Prado recommended plan (Four Lake)	1,424,800
Prado alternative plan (One Lake)	2,013,574
Santiago Creek 38,400	
Lower Santa Ana River	93,461

Computations using the land capacity formula are shown in Table 22, Recreation Average Annual Benefits. This table also shows net annual benefits which represent the dollar value for annual use of each activity. Net annual benefits were determined by multipying maximum annual recreation days provided by the project by the unit day value. Unit values per recreation day were based on the ranges presented in Appendix 3 to Subpart K of "Procedures for Evaluation of National Economic Development (NED) Benefits and Cost in Water Resources Planning" (Federal Register, Volume 44, Number 242, Dec. 14, 1979). Net annual benefits were adjusted by a 5-year maximization factor, which reflects growth in attendance as the project matures and becomes more well-known. This factor assumes that initial use will be half that which would occur after 5 years time. The results of these computations yield equivalent annual benefits. These will be compared in Chapter XI with equivalent annual cost to determine the benefit/cost ratio.

Project / ACTIVITY / FACILITY	DENSITY	x UNITS	x TURN-OVER	x DULPI-CATION RATIO	= # OF MAX. DAILY RECREATION DAYS	x WEEK-END DAYS IN PEAK MONTH	= TOTAL WEEKEND USE IN PEAK MONTH	? % OF PEAK USE ON WEEKEND	= TOTAL US DURIN PEA MONT	RECREA 100 YEAR PE
Mentone										
nonpower boating	2.5/boat	60*	2.5	.833	312	9	2,808	.5	5,61	
swimming	1/75sf	2904**	2.3	.833	5,563	9	50,067	.5	100,13	
fishing	1/301f	246***	1.7	.833	348	9	3,132	.5	6,26	
camping individual	4	50	1	.833	166	9	1,494	.5	2,98	
group	25	8	1	.833	166	9	1,494	.5	2,98	
trailer	3.5	60	1	.833	175	9	1,574	.5	3,14	
picnicking	4	200	1.5	.833	999	9	8,991	.5	17,98	
group ramadas	50	2	1	.833	83	9	747	.5	1,49	
play areas	10	1	6	.833	50	9	450	.5	90	
courts	5	6	4	.833	100	9	900	.5	1,80	
sportsfields	18	4	2	.833	120	9	1,080	.5	2,16	
equestrian trails	10/m	6	3	.833	150	9	1,350	.5	2,70	
interpretive center	15	1	6	.833	75	9	675	.5	1,35	
interpretive trail	7/m	1	6	.833	35	9	315	.5	63	
* 30 water surface acres, 2 boats per acre			** 5 water surface acres				*** 7380 linear feet of shoreline			
Prado Reservoir - Four Lakes (Proposed Plan)										
nonpower boating	2.5/boat	180*	2.5	.833	937	9	8,433	.5	16,86	
swimming	1/75sf	2904**	2.3	.833	5,563	9	50,067	.5	100,13	
fishing	1/301f	67***	1.7	.833	95	9	855	.5	1,71	
camping individual	4	100	1	.833	333	9	2,997	.5	5,99	
group	15	16	1	.833	200	9	1,800	.5	3,60	
trailer	3.5	200	1	.833	583	9	5,247	.5	10,49	
picnicking individual	4	800	1.5	.833	3,998	9	35,982	.5	71,96	
group ramada	100	1	1	.833	83	9	747	.5	1,49	
group ramadas	50	4	1	.833	167	9	1,503	.5	3,00	
courts	5	8	4	.833	133	9	1,197	.5	2,39	
unit sportsfields	18	12	2	.833	360	9	3,240	.5	6,48	
lit sportsfields	18	8	3	.833	360	9	3,240	.5	6,48	
play areas	10	5	6	.833	249	9	2,241	.5	4,48	
equestrian trails	10/m	8	2.5	.833	166	9	1,494	.5	2,98	
bicycle trails	20/m	11	4	.833	733	9	6,597	.5	13,19	
* 90 water surface acres; 2 boats per acre			** 5 water surface acres				*** 2000 linear feet of shoreline			
Prado Reservoir - One Lake (Alternative Plan)										
power boating	2.5/boat	71*	2.2	.833	325	9	2,925	.5	5,85	
nonpower boating	2.5/boat	150**	2.5	.833	781	9	7,029	.5	14,05	
swimming	1/75sf	2904***	2.3	.833	5,563	9	50,067	.5	100,13	
waterskiing	3/boat	28****	2.2	.833	154	9	1,386	.5	2,77	
fishing	1/301f	316*****	1.7	.833	447	9	4,023	.5	8,04	
camping individual	4	150	1	.833	500	9	4,500	.5	9,00	
group	15	30	1	.833	375	9	3,375	.5	6,75	
trailer	3.5	350	1	.833	1,020	9	9,180	.5	18,36	
picnicking individual	4	1,400	1.5	.833	6,997	9	62,975	.5	125,95	
group ramadas	100	3	1	.833	250	9	2,250	.5	4,50	
group ramadas	50	6	1	.833	250	9	2,250	.5	4,50	
unlit sportsfields	18	14	2	.833	420	9	3,778	.5	7,55	
lit sportsfields	18	8	3	.833	360	9	3,238	.5	6,47	
unlit courts	5	18	4	.833	300	9	2,700	.5	5,40	
lit courts	5	10	5.5	.833	229	9	2,061	.5	4,12	
play areas	10	5	.6	.833	249	9	2,241	.5	4,48	
equestrian trails	10/m	8	2.5	.833	166	9	1,494	.5	2,98	
bicycle trails	20/m	11	4	.833	733	9	6,597	.5	13,19	
* 214 water surface acres; 1 boat per 3 acres			** 75 water surface acres; 2 boats per acre				*** 5 water surface acres			
Lower Santa Ana River										
bicycle trails	20/m	6	4	1	480	9	4,320	.5	8,64	
equestrian trails	10/m	6	3	1	180	9	1,620	.5	3,24	
Santiago Creek										
bicycle trails	20/m	1.7	6	1	204	9	1,836	.5	3,67	
equestrian trails	10/m	1.7	4	1	68	9	612	.5	1,22	

TABLE 22
RECREATION AVERAGE ANNUAL BENEFITS
100 YEAR PROJECT LIFE (7-1/8 interest rate)

...N ...ION ...E	x WEEK-END DAYS IN PEAK MONTH	= TOTAL WEEKEND USE IN PEAK MONTH	x % OF PEAK USE ON WEEKEND	= TOTAL USE DURING PEAK MONTH	x % OF ANNUAL USE IN PEAK MONTH	= MAX. ANNUAL REC. DAYS TO BE PROVIDED BY PROJECT	x DAILY BENEFIT UNIT VALUE (DEC. 1979)	= NET ANNUAL BENEFITS	x FIRST YEAR BENEFITS (1/2 NET)	x AVERAGE ANNUAL EQUIVALENT VALUE	+ 1st YEAR BENEFIT (.875407)	= EQUIVALENT ANNUAL BENEFIT
12	9	2,808	.5	5,616	.19	29,557	$2.40	70,937	35,468	31,049	35,468	66,517
53	9	50,067	.5	100,134	.23	435,365	2.40	1,044,876	522,438	457,345	522,438	979,783
48	9	3,132	.5	6,264	.16	39,150	2.30	90,045	45,023	39,413	45,023	84,436
66	9	1,494	.5	2,988	.17	17,576	1.96	34,449	17,224	15,078	17,224	32,302
66	9	1,494	.5	2,988	.17	17,576	1.99	34,976	17,488	15,309	17,488	32,797
75	9	1,574	.5	3,148	.17	18,517	2.10	38,885	19,442	17,020	19,492	36,462
99	9	8,991	.5	17,982	.16	112,387	2.00	224,774	112,387	98,384	112,387	210,771
83	9	747	.5	1,494	.16	9,337	2.00	18,674	9,337	8,173	9,337	17,510
50	9	450	.5	900	.16	5,625	1.93	10,856	5,428	5,428	5,428	10,180
00	9	900	.5	1,800	.11	16,363	1.90	31,090	15,545	13,608	15,545	29,153
20	9	1,080	.5	2,160	.11	19,636	1.90	37,308	18,654	16,329	18,654	34,983
50	9	1,350	.5	2,700	.14	19,285	2.20	42,427	21,214	18,570	21,214	39,784
75	9	675	.5	1,350	.16	8,437	2.40	20,249	10,125	8,863	10,125	18,988
35	9	315	.5	630	.16	3,937	2.30	9,055	4,528	3,963	4,528	8,491
						752,748		1,708,601				1,602,157
*** 7380 linear feet of shoreline												
37	9	8,433	.5	16,866	.19	88,768	$2.48	220,145	110,072	96,357	110,072	206,429
563	9	50,067	.5	100,134	.23	435,365	2.30	1,001,339	500,669	438,289	500,669	938,958
95	9	855	.5	1,710	.16	10,687	2.40	25,649	12,824	11,226	12,824	24,050
33	9	2,997	.5	5,994	.17	35,259	2.04	71,928	35,964	31,483	35,964	67,447
00	9	1,800	.5	3,600	.17	21,176	2.08	44,046	22,023	19,279	22,023	41,302
83	9	5,247	.5	10,496	.17	61,741	2.12	130,891	65,446	57,292	65,443	122,735
998	9	35,982	.5	71,964	.16	449,775	2.04	917,541	458,770	401,610	458,770	860,380
83	9	747	.5	1,494	.16	9,337	2.04	19,047	9,523	8,336	9,523	17,859
67	9	1,503	.5	3,006	.16	18,788	2.04	38,327	19,164	16,776	19,164	35,940
33	9	1,197	.5	2,394	.11	21,763	1.96	42,656	21,328	18,670	21,328	39,998
60	9	3,240	.5	6,480	.11	58,909	1.93	113,694	56,847	48,764	56,847	106,611
60	9	3,240	.5	6,480	.11	58,909	2.00	117,818	58,909	51,569	58,909	110,478
49	9	2,241	.5	4,482	.16	28,012	1.93	54,063	27,031	23,663	27,031	50,694
66	9	1,494	.5	2,988	.12	24,900	2.08	51,792	25,896	22,669	25,896	48,565
733	9	6,597	.5	13,194	.13	101,492	2.08	211,103	105,552	92,401	105,552	197,953
						1,424,881		3,060,039				2,869,399
*** 2000 linear feet of shoreline												
325	9	2,925	.5	5,850	.20	29,250	$2.61	76,342	38,171	33,415	38,171	66,830
781	9	7,029	.5	14,058	.19	73,989	2.48	183,492	91,746	80,315	91,746	172,061
5,563	9	50,067	.5	100,134	.23	435,365	2.30	1,001,339	500,669	438,289	500,669	938,958
154	9	1,386	.5	2,772	.23	12,052	2.61	31,455	15,727	13,767	[illegible]	29,494
447	9	4,023	.5	8,046	.16	50,287	2.40	120,688	60,344	52,825	[illegible]	113,169
500	9	4,500	.5	9,000	.17	52,941	2.04	107,999	53,999	47,271	53,999	101,270
375	9	3,375	.5	6,750	.17	39,705	2.08	82,586	41,293	36,148	41,293	77,441
1,020	9	9,180	.5	18,360	.17	108,000	2.16	233,280	116,640	102,107	116,640	218,747
6,997	9	62,975	.5	125,950	.16	787,185	2.08	1,637,344	818,672	712,671	818,672	1,535,343
250	9	2,250	.5	4,500	.16	28,125	2.08	58,500	29,250	25,605	29,25[illegible]	54,855
250	9	2,250	.5	4,500	.16	28,125	2.08	58,500	29,250	26,605	29,250	54,855
420	9	3,778	.5	7,557	.11	68,699	1.96	132,589	66,294	58,034	66,294	124,328
360	9	3,238	.5	6,477	.11	58,885	2.00	117,770	58,885	51,548	58,884	110,433
300	9	2,700	.5	5,400	.11	49,090	1.93	96,216	48,108	42,114	48,108	90,222
229	9	2,061	.5	4,122	.11	37,472	2.00	74,944	37,472	32,803	37,472	70,275
249	9	2,241	.5	4,482	.16	28,012	1.93	54,063	27,031	23,663	27,031	50,694
166	9	1,494	.5	2,988	.12	24,900	2.08	51,792	25,896	22,669	25,896	48,565
733	9	6,597	.5	13,194	.13	101,492	2.08	211,103	105,551	92,400	105,551	197,951
						2,013,574		4,330,002				4,055,491
ts per acre		*** 5 water surface acres			**** 106 water surface acres; 1 boat per 3.75 acres				***** 9500 linear feet of shoreline.			
480	9	4,320	.5	8,640	.13	66,461	$2.20	146,214	73,107	63,998	73,107	137,105
180	9	1,620	.5	3,240	.12	27,000	2.08	56,160	28,080	24,581	28,080	52,661
						93,461		202,374				189,766
204	9	1,836	.5	3,672	.13	28,246	$2.08	58,751	29,375	25,715	29,375	55,090
68	9	612	.5	1,224	.12	10,200	2.08	21,216	10,608	9,286	10,608	19,894
						38,446		79,967				74,984

10. COSTS

GENERAL COST SUMMARIES

Costs for the proposed Santa Ana River recreation development project are given separately for Mentone Reservoir, Prado Reservoir, Lower Santa Ana River, and Santiago Creek. All separable costs attributed to new recreation development would be on a 50-50 cost sharing basis. Existing trails on the lower Santa Ana River are considered a utility and their replacement will be included as relocation costs for the proposed flood control project. Under the existing cost-sharing policy, replacement would be a 100% local cost. Under the proposed President's cost-sharing policy, replacement would be cost shared 75% Federal and 25% local. A 5 percent State contribution would further reduce the local portion to 20 percent. Recommended cost sharing for proposed recreation development would be 45 percent Federal, 5 percent State, and 50 percent Local. Esthetic treatment costs would be 100 percent Federal. Esthetic treatment costs relate entirely to visual improvements of the flood control project and are exclusive of landscaping for recreational activities. Tables 23-25 summarize the construction, operation and maintenance, and 100-year replacement costs by project; Table 26 summarizes the recommended Federal-non-Federal cost sharing. Operation and maintenance, and 100-year replacement costs are based on 3 percent of construction first cost and $.30 per annual recreation day.

TABLE 23
RECREATION DEVELOPMENT-COST SUMMARY

PROJECT	CONSTRUCTION	O&M, 100-YEAR REPLACEMENT
Mentone Reservoir	$ 6,070,000	$ 408,000
Prado Reservoir-4-lake	13,149,000	822,000
Lower Santa Ana River		
Prado Dam-Yorba Regional Park	740,000	50,000
Yorba Regional Park to Pacific Ocean (replacement)	3,481,000	206,000
Santiago Creek	410,000	24,000
TOTAL	23,850,000	1,510,000
	ALTERNATE PLAN	
Prado Reservoir-1 lake	21,912,000	1,261,000
TOTAL	32,613,000	1,949,000

TABLE 24
ESTHETIC TREATMENT--COST SUMMARY

PROJECT	CONSTRUCTION	O&M 100-YEAR REPLACEMENT
Mentone Reservoir	$ 1,077,000	$ 32,000
Prado Reservoir	1,776,000	53,000
Lower Santa Ana River	2,309,000	70,000
Santiago Creek	312,000	9,000
Oak Street Drain	118,000	4,000
TOTAL	5,592,000	168,000

TABLE 25
ESTHETIC TREATMENT--COST ESTIMATE

Stem	Unit	Quantity	Unit Cost	Amount
Mentone Reservoir				
Landscaping - irrigated	Acre	10	24,000.00	240,000
Landscaping - non-irrigated	Acre	40	8,000.00	320,000
Hydroseed	Acre	40	6,000.00	240,000
Subtotal				800,000
Prado Reservoir				
Landscaping - irrigated	Acre	10	24,000.00	240,000
Landscaping - non-irrigated	Acre	60	8,000.00	480,000
Hydroseed	Acre	100	6,000.00	600,000
Subtotal				1,320,000
Santa Ana River				
Prado Dam - Orange County Line				
Landscaping - non-irrigated	Acre	4	8,000.00	32,000
Orange County Line - Imperial Highway				
Landscaping - irrigated	Acre	2	24,000.00	48,000
Landscaping - non-irrigated	Acre	6	8,000.00	48,000
Hydroseed	Acre	10	6,000.00	60,000
Imperial Highway - 17th Street				
Landscaping - irrigated	Acre	20	24,000.00	480,000
Landscaping - non-irrigated	Acre	20	8,000.00	160,000
Hydroseed	Acre	60	6,000.00	360,000
17th Street - Ocean				
Landscaping - irrigated	Acre	8	24,000.00	192,000
Landscaping - non-irrigated	Acre	12	8,000.00	96,000
Hydroseed	Acre	40	6,000.00	240,000
Subtotal				1,716,000
Santiago Creek				
Landscaping - irrigated	Acre	2	24,000.00	48,000
Landscaping - non-irrigated	Acre	8	8,000.00	64,000
Hydroseed	Acre	20	6,000.00	120,000
Subtotal				232,000

TABLE 25 (Continued)

Oak Street Drain				
Landscaping - irrigated	Acre	2	24,000.00	48,000
Landscaping - non-irrigated	Acre	2	8,000.00	16,000
Hydroseed	Acre	4	6,000.00	24,000
Subtotal				88,000
Subtotal Esthetic Treatment				
Construction first cost				4,156,000
Subtotal Construction Cost				
Contingencies				623,000
Total Construction Cost				4,779,000
Engineering and Design				478,000
Supervision and Administration				335,000
TOTAL ESTHETIC				
TREATMENT FIRST COST				5,592,000
100-Year				
Capital Recovery .071323				399,000
Annual Operations, Maintenance,				
and Replacement Cost				168,000
AVERAGE ANNUAL COST				567,000

TABLE 26
RECOMMENDED COST SHARING

Project	Construction Cost	Federal	Local	State
Mentone Reservoir	$ 6,070,000	$ 2,732,000	$ 3,035,000	$ 303,000
Prado Reservoir - 4-Lake	13,149,000	5,917,000	6,574,000	657,000
Lower Santa Ana River				
Prado Dam - Yorba Regional Park	740,000	333,000	370,000	37,000
Yorba Regional Park to Pacific Ocean (replacement)	3,481,000	2,611,000	696,000	174,000
Santiago Creek	410,000	185,000	205,000	20,000
Total	23,850,000	11,778,000	10,880,000	1,191,000
ALTERNATE PLAN				
Prado Reservoir - 1 Lake	21,912,000	9,860,000	10,956,000	1,096,000
Total	32,613,000	15,721,000	15,262,000	1,630,000

DETAILED ESTIMATE OF RECREATION FIRST COSTS

Detailed estimates of construction costs for recreation facilities by project are presented in Tables 27-33. Cost estimates are based on current construction costs for similar developments within the Southern California area, and are not adjusted for inflation or annual escalation.

Mentone Reservoir

TABLE 27

Item	Unit	Quantity	Unit Cost	Amount
Recreation Lake - 50 Acres				
Clearing and Grubbing	Acre	50	$ 800.00	$ 40,000
Finish Grading	Acre	50	1,600.00	80,000
Lake Lining - Clay	CY	161,350	1.40	226,000
Earth Embankment - 1000 Ft.	CY	35,000	1.40	49,000
Shoreline Protection	LF	5,000	7.50	37,000
Soil Cement	SF	50,000	.56	28,000
Spillway	Each	1	15,000.00	15,000
Lake Aeration System	Each	1	25,000.00	25,000
Well and Pumping System	Each	1	75,000.00	75,000
Subtotal				575,000
Less 30% Mitigation				-173,000
Subtotal				402,000
Swimming Beach - 5 Acres				
Sand	CY	18,000	7.00	126,000
Gravel Lining	CY	1,900	8.50	16,000
Chlorination System	Each	1	80,000.00	80,000
Lifeguard Stands	Each	4	5,500.00	22,000
Restroom - First Aid Station	Each	1	120,000.00	120,000
Parking - 400 Cars	Each	400	320.00	128,000
Landscaping - Irrigated	Acre	2	24,000.00	48,000
Utilities	Each	1	100,000.00	100,000
Subtotal				640,000

TABLE 27 (Continued)

Picnic Area - 80 Acres				
Clearing and Grubbing	Acre	80	800.00	64,000
Finish Grading	Acre	80	1,600.00	128,000
Landscaping - Irrigated	Acre	20	24,000.00	480,000
Landscaping - Non-Irrigated	Acre	60	8,000.00	480,000
Parking - 200 Cars	Each	200	320.00	64,000
Picnic Ramadas - 50 Person	Each	2	50,000.00	100,000
Restrooms	Each	2	70,000.00	140,000
Childrens Play Area	Each	1	28,000.00	28,000
Picnic Tables	Each	200	600.00	120,000
Braziers	Each	100	130.00	13,000
Litter Control Stands	Each	50	80.00	4,000
Walkways - Concrete	SF	80,000	.98	78,000
Drinking Fountains	Each	20	1,000.00	20,000
Signs	Each	10	100.00	1,000
Utilities	Each	1	100,000.00	100,000
Subtotal				1,820,000
R.V. and Primitive Camping - 80 Acres				
Clearing and Grubbing	Acre	80	800.00	64,000
Finish Grading	Acre	80	1,600.00	128,000
Access and Circulation Raod	SF	137,280	.60	84,000
Camping Sites - R.V.	Each	60	1,200.00	72,000
Camping Sites - Tent	Each	50	500.00	25,000
Camping Sites - Group	Each	8	2,000.00	16,000
Landscaping - Irrigated	Acre	2	24,000.00	48,000
Restroom - Shower Facilities	Each	1	120,000.00	120,000
Restroom	Each	2	70,000.00	140,000
Signs	Each	10	100.00	1,000
Utilities	Each	1	100,000.00	100,000
Subtotal				798,000
Multipurpose Game Area - 10 Acres				
Clearing and Grubbing	Acre	10	800.00	8,000
Finish Grading	Acre	10	1,600.00	16,000
Multipurpose Courts	Each	6	24,000.00	144,000
Multipurpose Sportsfields	Acre	4	80,000.00	320,000
Restrooms	Each	1	70,000.00	70,000
Childrens Play Area	Each	1	28,000.00	28,000
Signs	Each	10	100.00	1,000
Utilities	Each	1	50,000.00	50,000
Subtotal				637,000

TABLE 27 (Continued)

Equestrian and Interpretive Area				
Clearing and Grubbing	Acre	10	800.00	8,000
Finish Grading	Acre	10	1,600.00	16,000
Landscaping - Irrigated	Acre	.5	24,000.00	12,000
Interpretive Center	Each	1	80,000.00	80,000
Interpretive Trail	Each	1	40,000.00	40,000
Equestrian Facilities	Each	1	8,000.00	8,000
Equestrian Trail	Mile	6	4,500.00	27,000
Utilities	Each	1	50,000.00	50,000
Subtotal				214,000
Subtotal Mentone Dam Construction First Cost				4,511,000
Subtotal Construction Cost Contingencies				677,000
Total Construction Cost				5,188,000
Engineering and Design				519,000
Supervision and Administration				363,000
TOTAL RECREATION FIRST COST				6,070,000

TABLE 28
PRADO RESERVOIR--COST ESTIMATE
RECOMMENDED PLAN

Item	Unit	Quantity	Unit Cost	Amount
Recreation Lake L-1 15 Acres				
Clearing and Grubbing	Acre	15	$ 800.00	$ 12,000
Finish Grading	Acre	15	1,600.00	24,000
Lake Lining - Clay	CY	48,405	1.40	68,000
Earth Embankment - 400 Ft.	CY	14,000	1.40	20,000
Shoreline Protection	LF	1,500	7.50	11,000
Soil Cement	SF	15,000	.56	8,000
Spillway	Each	1	15,000.00	15,000
Lake Aeration System	Each	1	25,000.00	25,000
Well and Pumping System	Each	1	75,000.00	75,000
Subtotal				258,000
Recreation Lake L-2-20 Acres				
Clearing and Grubbing	Acre	20	800.00	16,000
Finish Grading	Acre	20	1,600.00	32,000
Lake Lining-Clay	CY	64,540	1.40	90,000
Earth Embankment - 400 Ft.	CY	14,000	1.40	20,000
Shoreline Protection	LF	2,000	7.50	15,000
Soil Cement	SF	20,000	.56	11,000
Spillway	Each	1	15,000.00	15,000
Lake Aeration System	Each	1	25,000.00	25,000
Well and Pumping System	Each	1	75,000.00	75,000
Subtotal				299,000
Recreation Lake L-3-40 Acres				
Clearing and Grubbing	Acre	40	800.00	32,000
Finish Grading	Acre	40	1,600.00	64,000
Lake Lining-Clay	CY	129,080	1.40	181,000
Earth Embankment -400 Ft.	CY	14,000	1.40	20,000
Shoreline Protection	LF	4,000	7.50	30,000
Soil Cement	SF	40,000	.56	22,000
Spillway	Each	1	15,000.00	15,000
Lake Aeration System	Each	1	25,000.00	25,000
Well and Pumping System	Each	1	75,000.00	75,000
Subtotal				464,000
Recreation Lake L-4-20 Acres				
Clearing and Grubbing	Acre	20	800.00	16,000
Finish Gradding	Acre	20	1,600.00	32,000
Lake Lining-Clay	CY	64,540	1.40	90,000
Earth Embankment - 400 Ft.	CY	14,000	1.40	20,000
Shoreline Protection	LF	2,000	7.50	15,000
Soil Cement	SF	20,000	.56	11,000
Spillway	Each	1	15,000.00	15,000
Lake Aeration System	Each	1	25,000.00	25,000
Well and Pumping System	Each	1	75,000.00	75,000
Subtotal				299,000

TABLE 28 (Continued)

Swimming Beach - 5 Acres				
Sand	CY	18,000	7.00	126,000
Gravel Lining	CY	1,900	8.50	16,000
Lifeguard Stands	Each	1	80,000.00	80,000
Restroom - First Aid Station	Each	4	5,500.00	22,000
Parking - 400 Cars	Each	400	320.00	128,000
Landscaping - Irrigated	Acre	2	24,000.00	48,000
Utilities	Each	1	100,000.00	100,000
Subtotal				520,000
Picnic Area - 80 Acres				
Clearing and Grubbing	Acre	80	800.00	64,000
Finish Grading	Acre	80	1,600.00	128,000
Landscaping - Irrigated	Acre	30	24,000.00	720,000
Landscaping - Non-Irrigated	Acre	50	8,000.00	400,000
Parking 600 Cars	Each	600	320.00	192,000
Picnic Ramadas - 50 Person	Each	4	50,000.00	200,000
Picnic Ramadas - 100 Person	Each	1	75,000.00	75,000
Restrooms	Each	4	70,000.00	280,000
Childrens Play Area	Each	4	28,000.00	112,000
Picnic Tables	Each	800	600.00	480,000
Braziers	Each	400	130.00	52,000
Litter Control Stands	Each	200	80.00	16,000
Walkways - Concrete	SF	80,000	.98	78,000
Drinking Fountains	Each	20	1,000.00	20,000
Signs	Each	20	100.00	2,000
Security Lighting	Each	1	100,000.00	100,000
Utilities	Each	1	100,000.00	100,000
Subtotal				3,019,000
R.V. and Tent Camping - 80 Acres				
Clearing and Grubbing	Acre	80	800.00	64,000
Finish Grading	Acre	80	1,600.00	128,000
Access and Circulation Road	SF	137,280	.60	82,000
Camping Sites - R.V.	Each	200	1,200.00	240,000
Camping Sites - Tent	Each	100	500.00	50,000
Camping Sites - Group	Each	16	2,000.00	32,000
Restroom - Shower Facilities	Each	1	120,000.00	120,000
Restroom	Each	3	70,000.00	210,000
Landscaping - Irrigated	Acre	2	24,000.00	48,000
Signs	Each	10	100.00	1,000
Utilities	Each	1	120,000.00	120,000
Subtotal				1,095,000

TABLE 28 (Continued)

Multipurpose Game Area - 20 Acres				
Clearing and Grubbing	Acre	20	800.00	16,000
Finish Grading	Acre	20	1,600.00	32,000
Multipurpose Courts	Each	8	24,000.00	192,000
Sports Fields	Each	12	80,000.00	960,000
Sports Fields - Lighted	Each	8	140,000.00	1,120,000
Landscaping - Irrigated	Acre	2	24,000.00	48,000
Restrooms	Each	4	70,000.00	280,000
Children Play Area	Each	1	28,000.00	28,000
Signs	Each	10	100.00	1,000
Utilities	Each	1	200,000.00	200,000
Subtotal				2,877,000
Wildlife Management Area - 350 Acres				
Interpretive Center	Each	1	120,000.00	120,000
Interpretive Trails	Each	1	60,000.00	60,000
Signs	Each	10	100.00	1,000
Utilities	Each	1	20,000.00	20,000
Subtotal				201,000
Recreation Trail System				
Equestrian Trail	Miles	8	4,500.00	36,000
Bicycle Trail	Miles	11	64,000.00	704,000
Subtotal				740,000
Subtotal Prado Dam				9,772,000
Construction First Cost				
Subtotal Construction Cost				1,467,000
Contingencies				11,238,000
Total Construction Cost				1,124,000
Engineering and Design				787,000
Supervision and Administration				13,149,000
TOTAL RECREATION FIRST COST				

TABLE 29
PRADO RESERVOIR--COST ESTIMATE
ALTERNATE PLAN

Item	Unit	Quantity	Unit Cost	Amount
Recreation Lake - 400 Acres				
Clearing and Grubbing	Acre	400	$ 800.00	$ 320,000
Finish Grading	Acre	400	1,600.00	640,000
Earth Embankment 5000 Ft.	CY	100,000	1.40	140,000
Embankment Impervious Core	CY	75,000	2.40	180,000
Shoreline Protection	LF	40,000	7.50	300,000
Soil Cement	SF	400,000	.56	224,000
Spillway	Each	2	15,000.00	30,000
Lake Aeration System	Each	2	25,000.00	50,000
Well and Pumping System	Each	1	75,000.00	75,000
Subtotal				1,959,000
Swimming Beach - 5 Acres				
Sand	CY	18,000	7.00	126,000
Gravel Lining	CY	1,900	8.50	16,000
Chlorination System	Each	1	80,000.00	80,000
Lifeguard Stands	Each	4	5,500.00	22,000
Restroom - First Aid Station	Each	1	120,000.00	120,000
Parking - 400 Cars	Each	400	320.00	128,000
Landscaping - Irrigated	Acre	2	24,000.00	48,000
Utilities	Each	1	100,000.00	100,000
Subtotal				640,000
Picnic Area - 167 Acres				
Clearing and Grubbing	Acre	167	800.00	134,000
Finish Grading	Acre	167	1,600.00	267,000
Landscaping - Irrigated	Acre	80	24,000.00	1,920,000
Landscaping - Non-Irrigated	Acre	87	8,000.00	696,000
Parking 1,200 Cars	Each	1,200	320.00	384,000
Picnic Ramadas - 50 Person	Each	6	50,000.00	300,000
Picnic Ramadas - 100 Person	Each	3	75,000.00	225,000
Restrooms	Each	8	70,000.00	560,000
Childrens Play Area	Each	4	28,000.00	112,000
Picnic Tables	Each	1,400	600.00	840,000
Braziers	Each	700	130.00	91,000
Litter Control Stands	Each	350	80.00	28,000
Walkways - Concrete	SF	160,000	.98	157,000
Drinking Fountains	Each	40	1,000.00	40,000
Signs	Each	30	100.00	3,000
Security Lighting	Each	1	120,000.00	120,000
Utilities	Each	1	200,000.00	200,000
Subtotal				6,077,000

TABLE 29 (Continued)

R.V. and Tent Camping - 200 Acres				
Clearing and Grubbing	Acre	200	800.00	160,000
Finish Grading	Acre	200	1,600.00	320,000
Access and Circulation Road	SF	274,560	.60	165,000
Camping Sites - R.V.	Each	350	1,200.00	420,000
Camping Sites - Tent	Each	150	500.00	75,000
Camping Sites - Group	Each	30	2,000.00	60,000
Restroom - Shower Facilities	Each	2	120,000.00	240,000
Restroom	Each	6	70,000.00	420,000
Landscaping - Irrigated	Acre	8	24,000.00	192,000
Signs	Each	20	100.00	2,000
Utilities	Each	1	250,000.00	250,000
Subtotal				2,304,000
Multipurpose Game Area - 40 Acres				
Clearing and Grubbing	Acre	40	800.00	32,000
Finish Grading	Acre	40	1,600.00	64,000
Multipurpose Courts	Each	18	24,000.00	432,000
Multipurpose Courts - Lighted	Each	10	40,000.00	400,000
Sports Fields	Each	14	80,000.00	1,120,000
Sports Fields - Lighted	Each	8	140,000.00	1,120,000
Landscaping - Irrigated	Acre	8	24,000.00	192,000
Restrooms	Each	4	70,000.00	280,000
Children Play Area	Each	1	28,000.00	28,000
Signs	Each	10	100.00	1,000
Utilities	Each	1	200,000.00	200,000
Subtotal				3,869,000
Boat Launching Facilities				
Ramp	Each	1	200,000.00	200,000
Kiosk	Each	1	20,000.00	20,000
Parking - 400 Cars	Each	400	320.00	128,000
Restroom	Each	1	70,000.00	70,000
Docking Facility	Each	1	20,000.00	20,000
Fish Cleaning Station	Each	1	12,000.00	12,000
Landscaping - Irrigated	Acre	1	24,000.00	24,000
Signs	Each	10	100.00	1,000
Utilities	Each	1	20,000.00	20,000
Subtotal				495,000
Wildlife Management Area - 350 Acres				
Interpretive Center	Each	1	120,000.00	120,000
Interpretive Trails	Each	1	60,000.00	60,000
Signs	Each	10	100.00	1,000
Utilities	Each	1	20,000.00	20,000
Subtotal				201,000

TABLE 29 (Continued)

Recreation Trail System				
Equestrian Trail	Miles	8	4,500.00	36,000
Bicycle Trail	Miles	11	64,000.00	704,000
Subtotal				740,000
Subtotal Prado Dam				
Construction First Cost				16,285,000
Subtotal Construction Cost				
Contingencies				2,443,000
Total Construction Cost				18,728,000
Engineering and Design				1,873,000
Supervision and Administration				1,311,000
TOTAL RECREATION FIRST COST				21,912,000

TABLE 30
SANTA ANA RIVER--COST ESTIMATE

Item	Unit	Quantity	Unit Cost	Amount
Prado Dam - Orange County Line				
Bicycle Trail	Mile	3	$ 64,000.00	$192,000
Equestrian Trail	Mile	3	4,500.00	14,000
Staging Area	Each	1	120,000.00	120,000
Subtotal				326,000
Orange County Line - Yorba Regional Park				
Bicycle Trail	Mile	3	64,000.00	192,000
Culvert Crossing	Each	3	6,000.00	18,000
Equestrian Trail	Mile	3	4,500.00	14,000
Subtotal				224,000
Subtotal Prado Dam to Yorba Regional Park				
Construction First Cost				550,000
Contingencies				83,000
Subtotal				633,000
E & D				63,000
S & A				44,000
Total				740,000
Yorba Regional Park - 17th Street (replacement)				
Bicycle Trail	Mile	12.5	64,000.00	800,000
Bicycle Access Nodes	Each	10	12,000.00	120,000
Equestrian Trail	Mile	12.5	4,500.00	56,000
Equestrian Staging Area	Each	2	120,000.00	240,000
Subtotal				1,216,000
17th Street - Ocean (replacement)				
Bicycle Trail	Mile	9.5	64,000.00	608,000
Bridge - Santa Ana River	Each	1	500,000.00	500,000
Bridge - Greenville Banning	Each	1	100,000.00	100,000
Bicycle Access Nodes	Each	10	12,000.00	120,000
Equestrian Trail	Mile	9.5	4,500.00	43,000
Subtotal				1,371,000
Subtotal Yorba Regional Park to Ocean (replacement)				
Construction First Cost				2,587,000
Contingencies				388,000
Subtotal				2,975,000
E & D				298,000
S & A				208,000
Total				3,481,000

TABLE 31
SANTIAGO CREEK--COST ESTIMATE

Item	Unit	Quantity	Unit Cost	Amounts
Santiago Creek Trail				
Bicycle Trail	Mile	1.7	$ 64,000.00	$ 109,000
Bicycle Staging Area	Each	1	40,000.00	40,000
Restroom	Each	1	70,000.00	70,000
Landscaping - irrigated	Acre	1.5	24,000.00	36,000
Equestrian Staging Area	Each	1	20,000.00	20,000
Equestrian Trail	Mile	1.7	4,500.00	8,000
Signs	Each	10	100.00	1,000
Utilities	Each	1	60,000.00	20,000
Subtotal Santiago Creek Construction First Cost				304,000
Subtotal Construction Cost Contingencies				46,000
Total Construction Cost				350,000
Engineering and Design				35,000
Supervision and Administration				25,000
TOTAL RECREATION FIRST COST				410,000

TABLE 32
RECREATION DEVELOPMENT--COST SUMMARY

PROJECT	CONSTRUCTION COST	AVERAGE ANNUAL COST
Mentone Reservoir		
Construction	$ 6,070,000	-
Capital Recovery (.071323)	-	$ 433,000
Maintenance, Operation, Replacement	-	408,000
Subtotal	6,070,000	841,000
Prado Reservoir - Proposed Plan		
Construction	13,149,000	-
Capital Recovery (.071323)	-	938,000
Maintenance, Operation, Replacement	-	822,000
Subtotal	13,149,000	1,760,000
Lower Santa Ana River		
Prado Dam to Yorba Regional Park		
Construction	740,000	-
Capital Recovery (.071323)	-	53,000
Maintenance, Operation, Replacement	-	50,000
Subtotal	740,000	103,000
Lower Santa Ana River (replacement)		
Yorba Regional Park to Pacific Ocean		
Construction	3,481,000	-
Capital Recovery (.071323)	-	248,000
Maintenance, Operation, Replacement	-	206,000
Subtotal	3,481,000	454,000
Santiago Creek		
Construction	410,000	-
Capital Recovery (.071323)	-	29,000
Maintenance, Operation, Replacement	-	24,000
Subtotal	410,000	53,000
TOTAL - PROPOSED PLAN	23,850,000	3,211,000
Prado Reservoir - Alternate Plan		
Construction	21,912,000	-
Capital Recovery (.071323)	-	1,563,000
Maintenance, Operation, Replacement	-	1,261,000
Subtotal	21,912,000	2,824,000
TOTAL - ALTERNATE PLAN	32,613,000	4,275,000

11. BENEFIT/COST ANALYSIS

TABLE 33
FIVE-YEAR FACTOR COMPUTATION FOR AVERAGE ANNUAL BENEFITS

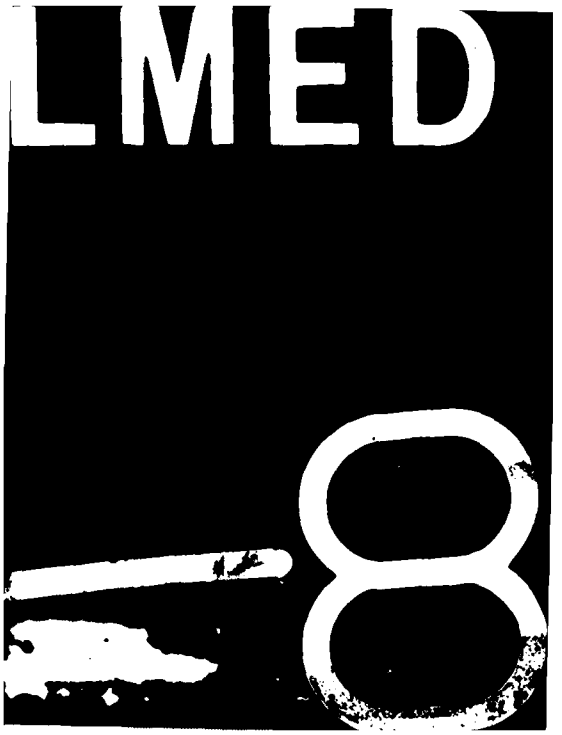
Mentone Reservoir	
Net Annual Benefit	$ 1,708,000
First Year Benefits (1/2)	854,000
Difference	854,000
Average Annual Equivalent Value Based on a 5-Year Factor at 7-1/8 Percent (0.875407)	748,000
Add First-Year Benefits	854,000
Average Annual Benefit	1,602,000
Prado Resevoir - Proposed Plan	
Net Annual Benefit	3,060,000
First Year Benefits (1/2)	1,530,000
Difference	1,530,000
Average Annual Equivalent Value Based on a 5-year Factor at 7-1/8 Percent (0.875407)	1,339,000
Add First-Year Benefits	1,530,000
Average Annual Benefit	2,869,000
Prado Reservoir - Alternate Plan	
Net Annual Benefit	4,330,000
First Year Benefits (1/2)	2,165,000
Difference	2,165,000
Average Annual Equivalent Value Based on a 5-Year Factor at 7-1/8 Percent (0.875407)	1,895,000
Add First-Year Benefits	2,165,000
Average Annual Benefit	4,060,000

TABLE 33 (Continued)

Lower Santa Ana River	
Prado Dam to Yorba Regional Park	
Net Annual Benefit	202,000
First Year Benefits (1/2)	101,000
Difference	101,000
Average Annaul Equivalent Value	
Based on a 5-Year Factor at	
7-1/8 Percent (0.875407)	88,000
Add First-Year Benefits	101,000
Average Annual Benefit	189,000
Santiago Creek	
Net Annual Benefit	80,000
First Year Benefits (1/2)	40,000
Difference	40,000
Average Annual Equivalent Value	
Based on a 5-Year Factor at	
7-1/8 Percent A (0.875407)	35,000
Add First-Year Benefits	40,000
Average Annual Benefit	75,000

TABLE 34
BENEFIT/COST RATIOS

PROJECT	AVERAGE ANNUAL COST	AVERAGE ANNUAL BENEFIT	B/C RATIO
Mentone Reservoir	$ 841,000	$ 1,602,000	1.9
Prado Reservoir - Proposed	1,760,000	2,869,000	1.6
Prado Reservoir - Alternate	2,824,000	4,060,000	1.4
Lower Santa Ana			
Prado Dam to Yorba Regional Park	103,000	189,000	1.8
Santiago Creek	53,000	75,000	1.4
Total - Proposed Plan	2,757,000	4,735,000	1.7
Total - Alternate Plan	3,821,000	5,926,000	1.5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