

Department of Planning and Development
Services Director
City of Orange

An excerpt from the minutes of a Regular Meeting of the City Council,
City of Orange, California, held February 14, 1978:

IN RE APPROVAL OF CONCEPT OF LOWER SANTIAGO CREEK SPECIFIC PLAN:

The City Manager reported on memorandum dated February 14, 1978,
from Bert Yamasaki, Director of Planning and Development Services,
regarding Planning Commission's recommendation on Lower Santiago
Creek Specific Plan.

Moved by Councilman Hoyt, seconded by Councilman Perez, and duly
adopted, to uphold the recommendation of the Planning Commission,
and approval was given, in concept, the Lower Santiago Creek
Specific Plan with the stipulation of five areas of prioritized
concern:

1. Flood control and safety of people
2. Cost of continuing maintenance and security
3. The placing of zoning to preclude uses other than
recreational uses.
4. The reconsideration of bridle paths and trail links in
populated areas, particularly south of Chapman Avenue.
5. Financial aspects including:
 - a. Prospect of encouraging private sector involvement
with recreational facilities.
 - b. Consideration of user fees.

Further, staff was instructed to notify the County Environmental
Management Agency of City Council's action.

AYES: Councilmen, Barrera, Smith, Hoyt, Perez, Beam.

NOES: Councilmen, None. ABSENT: None.

Dated this 16th day of February, 1978.

Charlotte M. Johnston, OMC
City Clerk and ex-officio
Clerk of the Council
City of Orange, California

by: Wanda H. Moore
Deputy City Clerk

lro

CC: County Environmental Management Agency
County Service Director

FEB 14, 1978

AM
7,8,9,10,11,12,13,14

MEMORANDUM

February 14, 1978

To: Gifford W. Miller
From: Bert K. Yamasaki
SUBJECT: PLANNING COMMISSION RECOMMENDATION ON LOWER SANTIAGO CREEK SPECIFIC PLAN

On Monday, February 13, the Planning Commission held an adjourned meeting where they reviewed the Lower Santiago Creek Specific Plan which was presented to them by Mr. Jim Miller of the County Environmental Management Agency.

After presentation and general discussion, the Planning Commission adopted the following motion:

That the Planning Commission recommend approval, in concept, of the Santiago Creek Specific Plan with the stipulation of five areas of prioritized concern:

1. Flood control and safety of people
2. Cost of continuing maintenance and security
3. The placing of zoning to preclude uses other than recreational uses.
4. The reconsideration of bridle paths and trail links in populated areas, particularly south of Chapman Avenue.
5. Financial aspects including:
 - a. Prospect of encouraging private sector involvement with recreational facilities.
 - b. Consideration of user fees.

BKY:SSH:sjc

Bert K. Yamasaki

Mrs. Nanette Porter
1893 N. Shaffer Street
Orange, California 92665

An excerpt from the minutes of a Regular Meeting of the City Council,
City of Orange, California, held January 24, 1978:

IN RE PRESENTATION ON SPECIFIC PLAN FOR LOWER SANTIAGO CREEK:

Mr. Robert Rende, 25711 Sabina Avenue, Mission Viejo, Manager,
Project Planning Division of the Environmental Management Agency of
Orange County, introduced to Council the Specific Plan for Lower
Santiago Creek. He then deferred to Mr. Jim Miller, Project Manager,
to make the presentation.

Mr. Jim Miller, 2463 Peacock Lane, Corona, substantiated his
presentation with various maps of the project, and summarized the
proposal of the plan, remarking that they had been in contact with
the Staff of Orange on every development of this project.

Moved by Councilman Smith, seconded by Councilman Barrera, and duly
adopted, the Specific Plan for Lower Santiago Creek was referred to
the Staff, to the Parks, Recreation & Cultural Arts Advisory Commis-
sion and to the City Planning Commission.

AYES: Councilmen, Barrera, Smith, Hoyt, Perez, Beam.

NOES: Councilmen, None. ABSENT: Councilmen, None.

Dated this 30th day of March, 1978.

Charlotte M. Johnston, CMC
City Clerk and ex-officio
clerk of the Council
City of Orange, California

by: Wanda H. Moore
Deputy City Clerk

jc

Planning and Development Services
City of Orange

An excerpt from the minutes of a Regular Meeting of the City Council,
City of Orange, California, held September 20, 1977:

IN RE FORWARDING STAFF COMMENTS TO ENVIRONMENTAL MANAGEMENT AGENCY
ON SPECIFIC PLAN EIR FOR LOWER SANTIAGO CREEK:

The Director of Planning and Development Services explained that the County EMA had asked for comments on the draft EIR for Lower Santiago Creek Specific Plan by September 19, 1977 and because there was not enough time to conduct the necessary public hearings for certification of the EIR by Council, Staff is recommending that the comments be sent to the EMA as staff review only.

Moved by Councilman Smith, seconded by Councilman Barrera, and duly adopted, to receive the report dated September 15, 1977, City of Orange Staff Comments on Draft E.I.R. for Santiago Creek Proposed Specific Plan, and Staff was instructed to forward said report to the Environmental Management Agency as Staff review only.

AYES: Councilmen, Barrera, Smith, Hoyt, Perez, Beam. NOES: Councilmen, None. ABSENT: Councilmen, None.

Dated this 12th day of October, 1977.

Charlotte M. Johnston, CMC
City Clerk and ex-officio
clerk of the Council
City of Orange, California

by: Joan L. Neff
Intermediate Clerk/Deputy

jln

cc: Department of Public Works
Community Services

C. Charlotte Johnston

TRANSMITTAL

September 15, 1977

To: Gifford W. Miller

From: Bert K. Yamasaki

SUBJECT: LOWER SANTIAGO CREEK SPECIFIC PLAN - STAFF EIR REVIEW

The attached are the staff comments on our review of the draft EIR for the proposed Lower Santiago Creek Specific Plan.

We have been informed by the County EMA that a schedule has been set for processing which started on August 5, 1977, with the distribution of the suggested Plan to the cities and private groups for review of the adequacy of the EIR. The EMA have asked for City comments on the draft EIR by September 19th.

The attached staff review of the draft EIR should be sent to the EMA as staff review only. It should not be construed by anyone that the City has officially commented on the EIR since neither the Planning Commission or the City Council has held public hearings on said draft.

The remainder of the schedule includes a hearing by the County Planning Commission to approve the adequacy of the EIR (second or third week in October). The Orange County Board of Supervisors will then certify the EIR and approve the proposed Plan in concept and instruct the EMA to submit the Plan to the cities of Orange, Santa Ana and Villa Park for adoption. There would be public hearings before the City Planning Commissions and the City Councils on the EIR and the Plan. This is when official City action on the EIR and the Plan should occur (mid-November). Any changes to the Plan or supplement to the EIR along with the adoption action of the various cities would then be transmitted to the Orange County Planning Commission and Board of Supervisors for hearings and adoption of the Specific Plan.

Assuming future City and County adoption of a Specific Plan for the Creek, there will be a couple of alternatives available. The first is to adopt the Specific Plan as an element of the General Plan or as a portion of the Open Space and Conservation Element of the General Plan. This will have possible benefits to the City such as to assure future funding sources. If the City, however, does not completely agree with the final adopted Specific Plan, we have the option of adopting certain portions of the Specific Plan as an "implementation guide" as part of our Open Space and Conservation Element. This will at least provide a document for implementation by either the City or the County staffs or requirements for private developers who would be developing adjacent to the Creek.

BKY:sjc

cc: Al Ravera
Gary Johnson
Norvin Lanz

Bert K. Yamasaki

cc: Jeri Reeder, Chairman, City of Orange Greenbelt Committee
Carol Kawanami, Chairman, City of Villa Park Greenbelt Committee
Gene St. Amand, Chairman, County Area Santiago Creek Greenbelt Committee
Shirley Ralston, Chairman, City of Orange Park Recreational & Cultural
Arts Commission
Jore Murphy, Secretary, City of Orange Planning Commission
✓Charlotte Johnston, City Clerk for the City of Orange City Council

CITY OF ORANGE STAFF COMMENTS
ON DRAFT E.I.R. FOR SANTIAGO CREEK PROPOSED
SPECIFIC PLAN

September 15, 1977

Staff comments will be divided into two groups - the first being EIR adequacy and comments as it relates to environmental concerns; the second being technical notes detected in this EIR draft.

E.I.R. COMMENTS

Page 1, Item 1.0, Introduction and Summary, Section 1.21 Land Use, Item 3 Significant Impacts -- expresses concern for offensive odors and truck traffic from land fills. As referenced later in this memo, Class 3 inert materials (excluding Municipal refuse) is the suggested fill material rather than Class 2 materials (which include Municipal wastes) as referenced in Appendix F. The City does not envision odors from the material used in these fills. The City will require its approval of odoriferous uses prior to using such fill material. The City is also concerned about the frequency of truck traffic for Municipal waste as well as noise and dust problems.

Page 2, Item 1.24, Aesthetics, Mitigating Measures -- the City suggests that colored concrete with an earthy texture be explored for use in the channel as a mitigating measure. This would be particularly helpful on the 17 foot deep, 65 foot wide bypass channel visible from higher elevations at the proposed basin area.

Page 2, Item 1.25, Circulation and Traffic Significant Impacts -- it is felt proper to say that the addition of close-in recreational facilities accessed by 3 or more arterials east of the Newport Freeway should have the effect of dispersing traffic now experienced on one arterial - Chapman Avenue, each weekend. The present one arterial provides access to Irvine Park, Lake and all recreational facilities to the Modjeska Canyon area. As a further mitigating measure, it is suggested a traffic flow study be conducted for the proposed recreational development in the "Specific Plan" to assess the necessity of adding park and ride sites near the Newport Freeway end of the development to further alleviate unnecessary weekend traffic around this recreational area.

Page 6, Section 3.0, Existing Conditions, Impact, Mitigating Measures; 3.1 Land Use, paragraph A5 -- Reference is made of the use of Class 3 inert (old concrete, rock, soil and items that do not decompose) land fill at the Smith and Horowitz Pits. Local jurisdictions will wish to assess environmental impacts of the final project.

Page 8, Section 3.0, Mitigation Measures, Item 1, after second paragraph, the following sentence should be added: "All trail reaches extending through urbanized or future urbanized areas will be designed to protect the privacy of residents and the trail users."

Page 8, item 4 in the same section (Mitigation Measures), entitled "Roads" - in addition to reviewing the road and bridges for design, the City wishes to add "the City and County will study traffic and parking control alternatives on Hindes Drive to preclude the abuse of the circulation and parking along this street".

Page 25, Section 3.9 Noise, Item C, Mitigating Measure: -- please add "Noise level studies for each project within the 9.3 reach will be generated and mitigating measures imposed by lead agencies. Such assessments will be submitted to responsible and affected agencies surrounding each subsequent project for review and comment."

Page 27, Section 3.10, Relating to General Plans, B Impacts, paragraph 2 Circulation Element: -- please add, "The suggested plan is consistent with the adopted Circulation Element of the City of Orange General Plan."

Page 27, paragraph 3, entitled "Open Space and Conservation Elements": -- please add, "The suggested plan is consistent with the adopted Open Space and Conservation Element of the City of Orange General Plan."

Paragraph 5 on the same page, entitled "Land Use Element": -- please add, "The suggested plan is consistent with the adopted Land Use Element of the City of Orange General Plan."

On Page 29, Section 3.11 Municipal Service and Public Utilities, C Mitigating Measures, paragraph 2: -- please add the "City of Orange" to the statement that "The County's Fire Department allows no fires or smoking during high fire risk season."

Page 31, second paragraph under Item A Existing Conditions: -- please add public bus transportation is available to this area from Orange County as provided by the Orange County Transit District (OCTD). Within the City of Orange, the "Dial A Ride" system is also operated by the OCTD which picks up passengers at their residence and takes them to their destination; thus providing direct access to all but about 2 miles (in Santa Ana) of the 9.3 mile project.

Page 31, B Impact, Paragraph 2, please add: Provision of this nearby recreational facility on Santiago Creek with better arterial access should divert traffic and provide for better traffic flow resulting in reduced fuel consumption. However, some increased traffic may be experienced which will require assessment for significant impact. Availability of an existing public transportation system to this proposed project offers considerable fuel savings opportunity. Access to the inert fill sites in close proximity to urbanized areas will be provided prior to the construction of this recreational area offers fuel savings opportunity.

Page 32, Section 4.0 Unavoidable Adverse Impacts, Item 4.2 Air Quality -- suggest add: "until specific projects are assessed, the significance of this impact is unassessible".

Page 37, Section 7.0 Significant Irreversible Environmental Changes Should the Project be Implemented, first bubble: -- should be modified to read:" the alteration of "about one half of the 9.3 miles" of a semi-natural creek into a concrete line channel". the fourth bubble:" the attraction of people, and thus automobiles, will contribute to the deteriorating air quality County", should be softened to "may". The thought here is analysis has not yet been or cannot be conducted.

With the above additions it is felt this EIR when read by any subsequent funding agency will become aware of the cooperative spirit and general support of the affected agencies along this creek project. Many years can elapse before this is accomplished. Many future boards and councils of affected agencies will be involved. This EIR reflects the best vision possible at this time showing we find no unresolvable problem for any agency other than money which time should help to resolve.

TECHNICAL COMMENTS:

Certain technical things were noted in this draft EIR that may be helpful in revising it for the final draft.

1. The table of contents does not now have a section 3.12 titled "Energy". It is suggested it be expanded to include "minerals".

Page 6, Section 3.0 Existing Land Condition; Impacts; Mitigating Measures, 3.1 Land Use Existing and Proposed Conditions: The first paragraph should make some statement to the effect that "current land use of most of the project area is a flood plain intruded upon by urban uses; notably in the lower end of reaches #5 and #4 (northwest of the proposed basin) and the select areas south of existing Hart Park".

Page 12, Section 3.2 Land Form, Geology, Soils, B Impacts, 1 Land Form, a. second paragraph: It is stated the channel is realigned and shifted to "allow sufficient right-of-way width for trails". Shifting to provide for trails is not clear as trails are to be placed in the bed of the creek channel in this reach. It would appear that the channel alignment shifting is to provide hydraulic flow features in the channel. Perhaps the statement is correct but it should be rechecked.

Page 39, Section 9 Organizations and Persons Consulted: It appears that during the text on page 17 the Auburn Society was contacted and in Section 5.5 on page 35 the Orange County Water District was also contacted.

September 15, 1977

RECOMMENDATION:

City of Orange staff recommends the City Council make the following finding:

With the additions on the staff memorandum dated September 15, 1977, the City Council of Orange recommends a lead agency finding of adequacy of the Draft Environmental Impact Report Lower Santiago Creek Suggested Plan by the Orange County Board of Supervisors and recommends that a specific plan be developed to be reviewed and adopted by local jurisdictions prior to adoption by the County Board of Supervisors.

cc: Jeri Reeder, Chairman, City of Orange Greenbelt Committee
Carol Kawanami, Chairman, City of Villa Park Greenbelt Committee
Gene St. Amand, Chairman, County Area Santiago Creek Greenbelt Committee
Shirley Ralston, Chairman, City of Orange Park Recreational & Cultural
Arts Commission
Jere Murphy, Secretary, City of Orange Planning Commission
Charlotte Johnston, City Clerk for the City of Orange City Council

sjc

Lower santiago creek specific plan

ORANGE COUNTY BOARD OF SUPERVISORS

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Philip L. Anthony, First District Ralph A. Diedrich, Third District
Laurence J. Schmit, Second District Ralph B. Clark, Fourth District

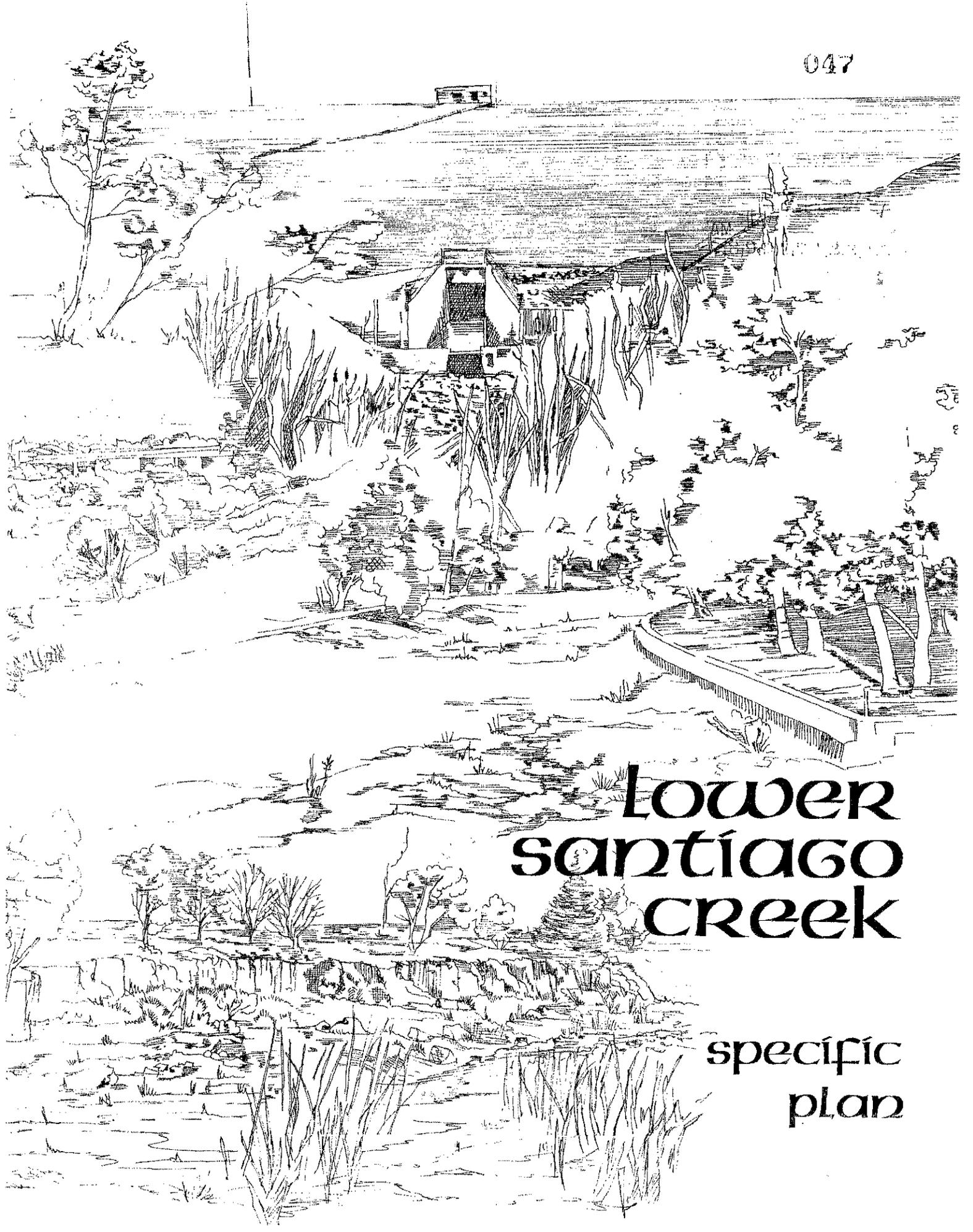
ORANGE COUNTY PLANNING COMMISSION

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Richard J. Footner, Second District Floyd Farano, Fourth District
William R. MacDougall, Fifth District

ENVIRONMENTAL MANAGEMENT AGENCY COUNTY OF ORANGE

H. G. Osborne, Director
Richard G. Munsell, Assistant Director, Advance Planning
Robert L. Rende, Manager, Project Planning Division
Hal Reitmeier and Jim Miller, Project Managers

April 1977



Lower santiago creek

specific
plan

Lower santiago creek specific plan

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April 1977

PUBL. NO.

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ENVIRONMENTAL IMPACT REPORT

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INTRODUCTION

PURPOSE OF STUDY

Lower Santiago Creek from the Santa Ana River to Villa Park Dam has been identified as a natural resource worthy of regional consideration. Previous planning efforts by the Santa Ana River/ Santiago Creek Greenbelt Commission, the County of Orange and the cities contiguous to the creek have identified various concepts for utilizing the creek as a regional trail linkage and a park/ open space corridor. The implementation of this planning has been piecemeal without a unified plan which considers recreation, flood control, and highway needs.

The purpose of this study is to provide planning continuity and to develop a specific plan for Lower Santiago Creek from the Santa Ana River to Villa Park Dam. A detailed analysis has been made of alternative flood control proposals, the location of recreational trails, water conservation proposals and highway alignments for proposed creek crossings. Various park and recreation opportunities have been conceptually explored. The study has reviewed and incorporated the existing and ongoing planning efforts of the Cities of Orange, Santa Ana and Villa Park; the Santa Ana River/ Santiago Creek Greenbelt Commission; the Environmental Management Agency's (EMA) Open Space/ Recreation and Road/ Flood Programs, and various proposals developed by local greenbelt committees. The intent of the study is to provide sufficient detail and guidance to enable appropriate public agencies to proceed with the acquisition of land and the construction of facilities with the assurance that these actions are in accord with an adopted plan. The "suggested plan" presented in this report is a long-range plan for Santiago Creek which will take many years to fully implement. The county and various local jurisdictions will implement portions of the plan as financial resources allow, probably over a period extending beyond the year 2000. During this time span, portions of the suggested plan may require updating to meet existing conditions at the time of implementation.

The proposed implementation plan is composed of improvements which appear to be the most economically realistic and acceptable to the public agencies having jurisdiction along the creek. The plan was developed through close coordination with the staffs of the various involved agencies.

This included several informal study sessions with city planning commission members and greenbelt committees. It is hoped that the suggested plan will be adopted as a guide for development of the Santiago Creek Greenbelt. Review by local governments and the public may, however, suggest some modifications before adoption.

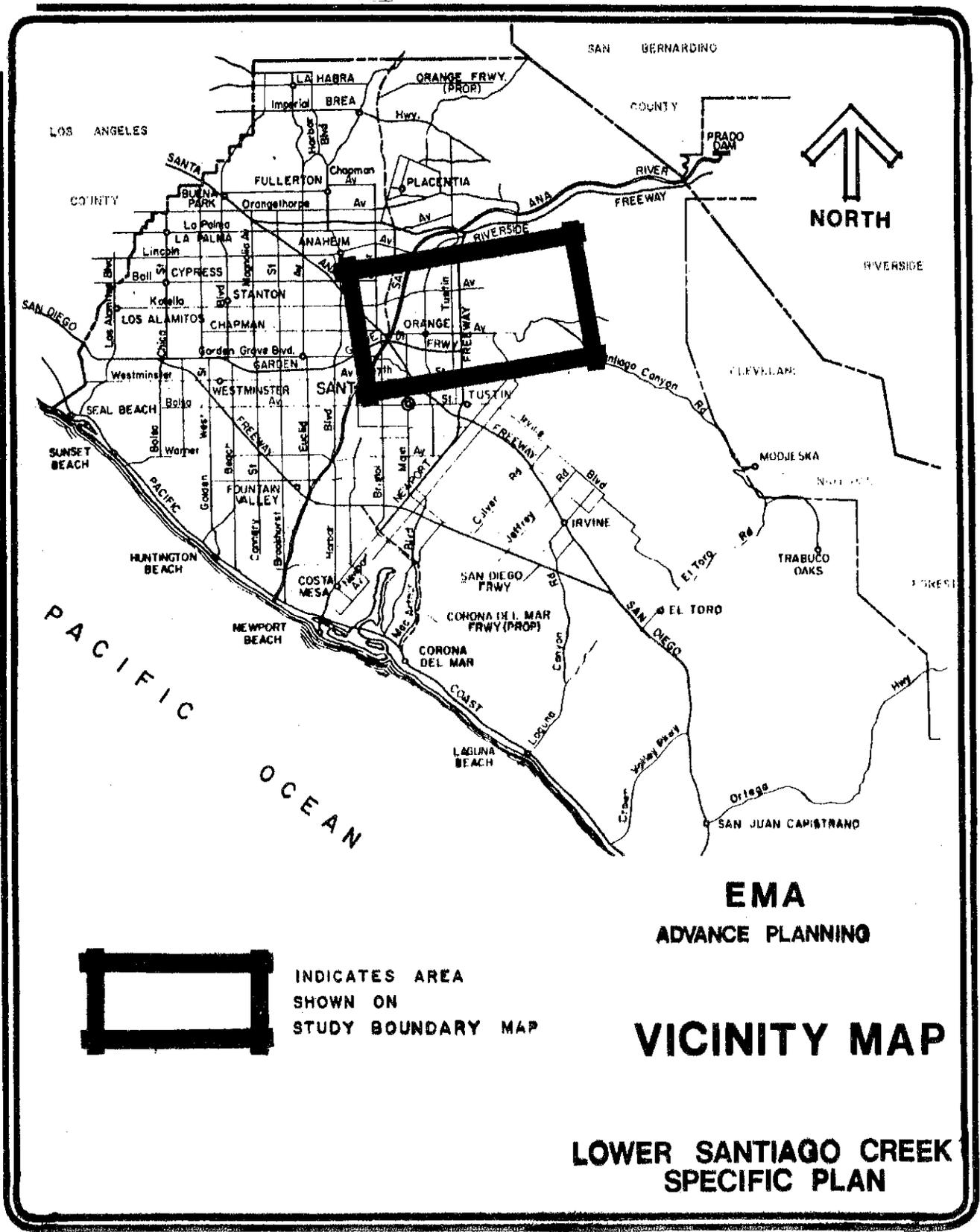
Alternatives to the suggested plan are included in the appendices of this report. If the reader does not concur with a portion of the suggested plan, he is invited to review the other alternatives studied to assist in evaluating the merits of the suggested plan or an appropriate alternative.

SCOPE OF STUDY

The analyses in this study, briefly identified above, have direct impact on several elements of the county's and cities' general plans. These are the land use, safety, conservation, circulation and recreation elements. The impact of the plan on elements other than those indicated is so slight as to not warrant further treatment in this study. It is not intended that this specific plan fully address any of the general plan elements. It is intended, however, that where recommendations herein conflict with adopted general plan elements, the elements in conflict should be amended to conform to the plan. This narrowness in scope has been necessary to keep the focus of the study on the principal issues along Santiago Creek and keep the plan manageable in size and complexity.

STUDY AREA

The general location of the study area is shown on *exhibit 1*. The boundary of the study area is outlined on *exhibit 2*, and generally includes the undeveloped land with recreation potential along the creek from the Santa Ana River to Villa Park Dam, a length of approximately 9.3 miles. The width of the study area at its narrowest point is approximately seventy feet and at its widest point approximately 4,000 feet. A cursory review of the region outside the study boundary has been made only when the existing or proposed use of this region affects the proposed plans for the immediate creek area.



INDICATES AREA
SHOWN ON
STUDY BOUNDARY MAP

EMA
ADVANCE PLANNING

VICINITY MAP

**LOWER SANTIAGO CREEK
SPECIFIC PLAN**

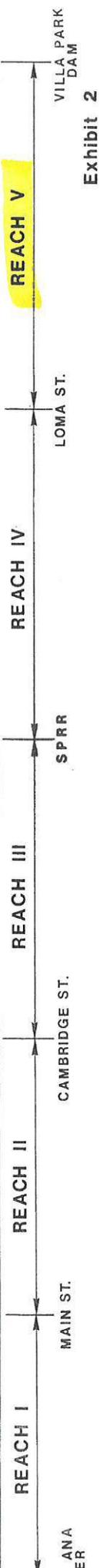


Exhibit 2

To facilitate in the organization of the study, the creek has been divided into five "reaches". The reach boundaries are based, for the most part, on zones with common opportunities and constraints and are shown on *exhibit 2*. The reaches are defined as follows:

Reach I – Santa Ana River to Main Street

This reach is highly urbanized and development has reduced the width of the creek down to a narrow thread ranging from seventy to 140 feet. The opportunity for greenbelt amenities is limited upstream from Bristol Street.

Reach II – Main Street to Cambridge Street

This reach runs through existing and proposed park areas, i.e., Santiago Park and Hart Park. Most of the creek in this area has been improved with rubble masonry channel walls constructed by the WPA in the 1930's.

Reach III – Cambridge Street to Southern Pacific Railroad (SPRR)

This reach is a mixture of varying types of development and existing open space use. Included is the Santiago Golf Course, Yorba Park, the YMCA and areas where encroaching urban development has narrowed the creek to a width of approximately 200 feet.

Reach IV – SPRR to Loma Street

This reach includes an area where existing sand and gravel extraction operations have dramatically altered the natural character of the creek, leaving it potholed and barren.

Reach V – Loma Street to Villa Park Dam

This reach is the only remaining semi-natural region within the study area. Although sand and gravel extraction is now occurring in the lower portion of this reach, the impact is not as significant as in Reach IV and will be less expensive to rehabilitate for park and open space use.

LOWER SANTIAGO CREEK TASK FORCE

To provide guidance to the Project Planning Division, EMA, during the preparation of the specific plan for Lower Santiago Creek, a task force was established to review the progress of the study and provide timely input as required. The task force met on five occasions during the development of the plan. (See minutes of task force in *appendix A.*) Members of the task force included:

Member	Organization
Jack Berger	Santa Ana River/ Santiago Creek Greenbelt Commission
Tom Scott	City of Villa Park
Bert Yamasaki	City of Orange
Robert Sundstrom	City of Santa Ana
Bob Rusby	EMA – Open Space/Trails
Tim Bingham	EMA – Environmental Services
Hal Reitmeier	EMA – Project Planning
Jim Miller	EMA – Project Planning
Richard Bailey	EMA – Community Plans
Bob Drennan	EMA – General Planning

In addition to the task force, a technical resource group was established to provide technical assistance to the project team as the study progressed. Members of the technical resource group included:

Nick Richardson
Bob Rende

Orange County Water District
EMA – Development

Input and comments received from the above participants provided valuable direction during the course of the study and provided avenues of contact for effective coordination.

PUBLIC PARTICIPATION

In order to obtain maximum input to the study effort, presentations were made to the following public groups and planning commissions during the preparation of the plan.

City of Orange Greenbelt Committee
City of Orange staff members
City of Villa Park Greenbelt Committee
City of Villa Park Planning Commission
Citizens Committee for the Unincorporated Area of Orange
County
Santa Ana River/Santiago Creek Greenbelt Commission
City of Santa Ana Planning Commission
City of Santa Ana Park and Recreation Board
City of Santa Ana staff members

In addition, a public meeting was held on May 11, 1976, in Santa Ana where EMA staff presented several flood control and trail alternatives for the Santa Ana segment of the creek (Santa Ana River to Garden Grove Freeway) to approximately seventy local residents. A citizen input package (*See appendix B*) was distributed at the meeting and comments regarding the alternatives presented were solicited. A summary of the responses to the questionnaire may also be found in *appendix B*. The majority of the people in attendance at the meeting live either bordering the creek or in

the immediate vicinity, and their concerns were for the impact of the project on their property. During the course of the meeting a "vote" was requested to determine the preferences regarding flood control and trail improvements. The result was unanimous in opposition to trails along the creek and approximately sixty-four to six in favor of some type of flood control improvement.

PREVIOUS STUDIES

GREENBELT PLANS

For many years the concept of a linear park and trail system running from the ocean to the mountains along the Santa Ana River and Santiago Creek has received active support by local greenbelt enthusiasts and various agencies whose jurisdictional boundaries interface with the corridor. In response to the public interest shown in the corridor and in an effort to develop a natural resource of regional importance, the County Board of Supervisors adopted, on June 23, 1971, the Santa Ana River, Santiago Creek Greenbelt Plan as a component of the Land Use Element of the Orange County General Plan.

The adopted plan encourages the maximization of the recreation/open space potential of the Santa Ana River/Santiago Creek Greenbelt Corridor and multi-purpose use of these riparian areas wherever possible.

The corridor goals, as set forth in the Greenbelt Plan, call for (1) the saving or restoring of the river-look and atmosphere (where possible) with an emphasis on vegetation, informal space and quiet; and (2) the achievement of a diversity of multiple-use with some zones of intensive use, some of natural preserve and many areas which vary between these two extremes.

Proposals for attainment of these goals on Santiago Creek, as set forth in the Greenbelt Plan, are (1) study flood control alternatives using the sand and gravel pits at the toe of the Peralta Hills to provide regional park and/or flood retention basins (would reduce the size and cost of channelization downstream); (2) preserve agriculture adjacent to the creek; (3) expand and link small parks along the creek with riding, hiking and cycling trails which capitalize on interconnections with trails to outlying areas and (4) preserve and protect the foothill setting upstream of Chapman Avenue. The conceptual plan for greenbelt amenities along Santiago Creek as proposed in the Greenbelt Plan is shown on *exhibit 3*.

Shortly after the adoption of the Greenbelt Plan, the County of Orange; Orange County Flood Control District; Orange County Water District; and Cities of Anaheim, Huntington Beach, Orange, Santa Ana, Villa Park and Yorba Linda joined together to form the Santa Ana River/Santiago Creek

Greenbelt Commission. The Commission functioned until its termination in March 1977 with the task of coordinating the general plan (specifically the component of the land use element entitled, Santa Ana River, Santiago Creek Greenbelt Plan) and other land use policies insofar as they pertained to the Santa Ana River/Santiago Creek corridor with the ultimate objective of providing the optimum amount of open space for public uses. In accordance with this stewardship, the commission developed a plan for the Santiago Creek Greenbelt which refined the original conceptual plan and reflects specific park locations and a trail network along the creek which ties to local trail systems. Shown on *exhibit 4* are potential projects proposed by the Greenbelt Commission. To further refine this plan, the Greenbelt Commission completed an implementation plan, dated 1976, in which the communities adjacent to the Santa Ana River and Santiago Creek contributed plans for those portions of the greenbelt corridor within their city limits.

The cities of Orange and Villa Park combined their efforts to provide input to the implementation plan. Projects they identified include those recommended by the Greenbelt Commission and the Hart Park extensions shown on *exhibit 4*. These projects have been combined into a greenbelt plan which was approved in concept by the Orange City Council May 18, 1976, and the Villa Park City Council May 20, 1976. Some of the more pronounced features include (1) a wilderness preserve natural park in the area immediately downstream of Villa Park Dam, (2) a trail staging area utilizing a future high school parking lot (Orange Unified School District), (3) a campground upstream of Loma Street, (4) a vista point and possible trail staging facility westerly of the Hurwitz/Buchheim gravel pits (phased to be developed after 1990), (5) a high activity park in the area of the existing Conrock batch plant (1985–1990), (6) a trail rest stop at Yorba Park (1985–1990), and (7) expansion of Hart Park onto property presently owned by the flood control district east of Cambridge Street (1980–1985).

The City of Santa Ana terminated their membership in the Greenbelt Commission in 1975; however, the city has proceeded with its own greenbelt proposals since its withdrawal. The city staff has prepared a draft greenbelt proposal upon which the city council has not yet acted. Incorporated in this proposal is a concept plan for improvements along the Santiago Creek Corridor (*See exhibit 4*). The principal features are: (1) trails along the entire reach of creek through Santa Ana (1975–1980), (2) a trail rest stop at Bristol Street reservoir (1975–1980), (3) a trail rest stop at Fisher Park (1975–1980), and (4) the expansion of Santiago Park into properties

adjacent to the creek between the Santa Ana Freeway and Main Street (1980-1990).

In 1960 the Orange County Board of Supervisors undertook the task of reducing the acute shortage of regional park space in the county. An outgrowth of their efforts was the development of a Master Plan of Regional Parks. One of the designated park sites is a 636.4 acre area located along Santiago Creek in the vicinity of the existing sand and gravel pits northeast of Chapman Avenue as shown on *exhibit 5*. Sketchy conceptual plans indicate the possible use of the park for water recreation, camping, horseback riding, picnicking and playing field activities. Lower Santiago Creek Regional Park has been designated one of the highest priority sites and is proposed for implementation before 1980.

RECREATION TRAILS

The concept of providing regional recreation trails along Santiago Creek was officially introduced in the report entitled "Master Plan of Riding and Hiking Trails" adopted by the Orange County Board of Supervisors on January 20, 1965, as an element of the Master Plan of Regional Parks. The plan delineates a trail along Santiago Creek from the Santa Ana River to Silverado Canyon Road which is located immediately upstream of Irvine Lake. Subsequent to the preparation and adoption of the above report, recreation trails along Lower Santiago Creek have been included in several planning and implementation documents adopted by the Board of Supervisors. These documents include:

1. "Santa Ana River, Santiago Creek Greenbelt Plan" adopted by the Board of Supervisors on June 30, 1971.
2. "A Feasibility Study of a Countywide Bicycle System in Orange County" adopted by the Board of Supervisors on September 29, 1971.
3. "Master Plan of Countywide Bike Trails" adopted by the Board of Supervisors on March 20, 1974.
4. "Countywide Cooperative Bikeway Financing Program" adopted by the Board of Supervisors on December 11, 1974.

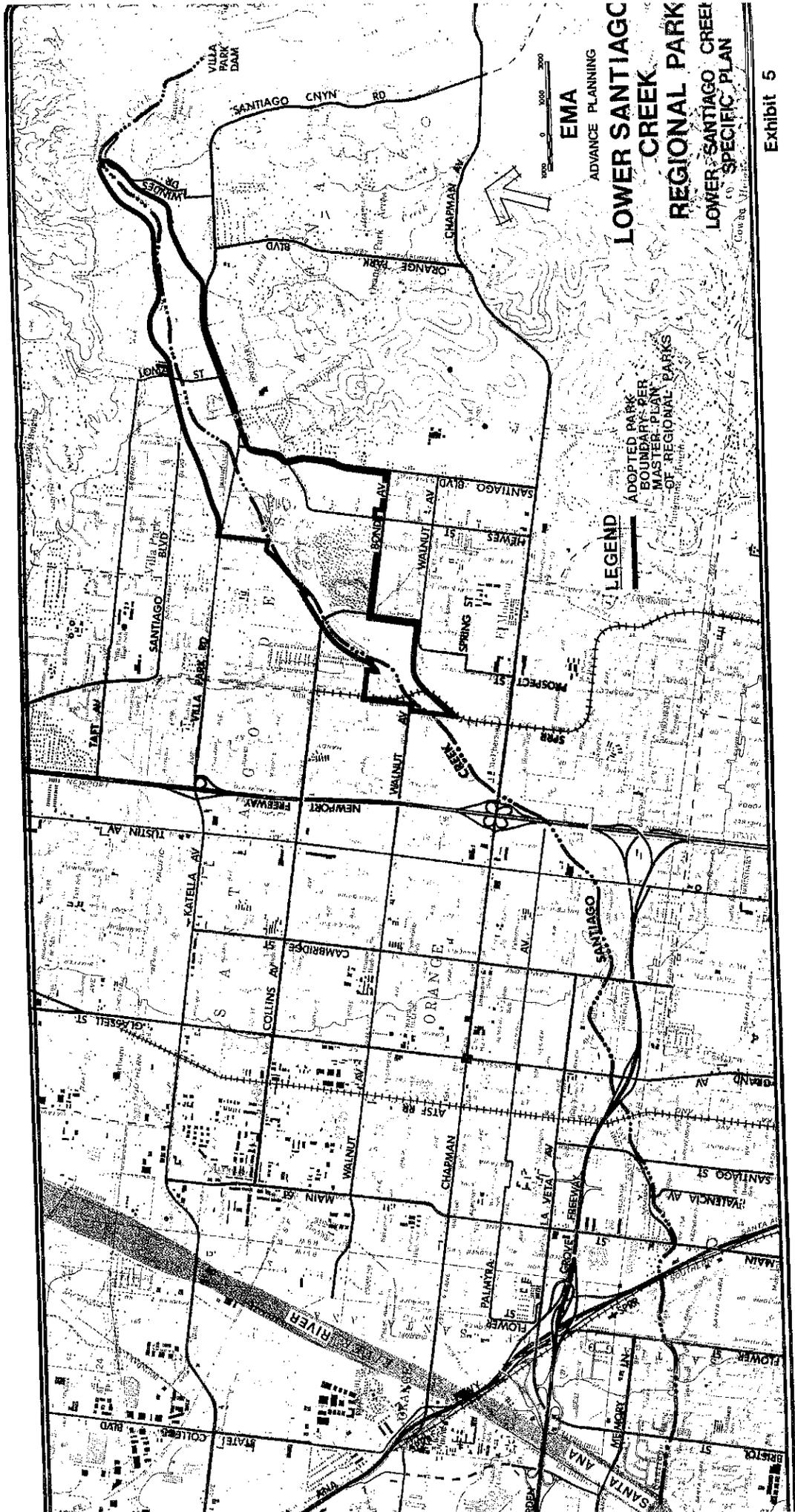
5. "Trails for the Orange Park Acres, Cowan Heights, El Modena Area" adopted by the Board of Supervisors on December 17, 1974.
6. "Arterial Bikeway System Financing and Implementation Plan and Detailed Fiscal Year 1975-76 Program" adopted by the Board of Supervisors on June 3, 1975.

Of the above plans, the one which provides the greatest impetus toward the implementation of recreation trails along Santiago Creek is the "Santa Ana River, Santiago Creek Greenbelt Plan". In this plan, a trail system along the creek is defined as the spine of the proposed greenbelt corridor, linking park nodes and significant open space areas. The Santa Ana River/Santiago Creek Greenbelt Commission in subsequent refinements of the original plan has continued to include a recreation trail running the length of Santiago Creek from the Santa Ana River to Villa Park Dam.

In addition to the county's plan for recreation trails, the three cities which are contiguous to the watercourse (Santa Ana, Orange and Villa Park) have, on several occasions, approved in concept recreation trails along the creek. On May 18 and 20, 1976, the City Councils for Orange and Villa Park, respectively, reaffirmed their prior commitment for trails along the creek when they approved in concept the cities' and Greenbelt Commission's implementation plan for the Santiago Creek Greenbelt Corridor through their cities. On November 19, 1973, the Santa Ana City Council adopted a city-wide bicycle plan which delineates a bike trail along Santiago Creek. In addition, the city recently reaffirmed the commitment to riding trails along the creek when, on February 3, 1975, the City Council adopted a "Scenic Corridors Plan" which proposes both bicycle and equestrian trails along Santiago Creek.

FLOOD CONTROL

The need to upgrade and increase the flow capacity of Santiago Creek was clearly exhibited in February, 1969, when Santiago Creek flood waters resulted in physical damage costing in excess of three million dollars. Over the years, several county studies have been undertaken to develop a comprehensive flood control plan for portions of the creek, however, no county plan for the entire creek has been adopted.



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**LOWER SANTIAGO
 CREEK
 REGIONAL PARK**
 LOWER SANTIAGO CREEK
 (C) SPECIFIC PLAN
 Cowi & Associates

ADOPTED PARK
 BOUNDARY PER
 MASTER PLAN
 OF REGIONAL PARKS

LEGEND

Due to the severe flood potential which exists along Santiago Creek, the Orange County Board of Supervisors requested the U. S. Army Corps of Engineers to prepare a flood plain information report for that portion of the creek below Villa Park Dam. The Corps' report, which was completed in June 1975, delineates those areas along the creek subject to inundation should a major storm occur today. The results of this report have been used by the county to establish the boundaries for flood plain (FP) zoning within unincorporated county areas. The FP zoning restricts development within the areas subject to inundation, thereby limiting the damage potential to any structure as well as the number of obstructions to flow which can cause flooding to spread. No FP zoning has to this date been implemented within the incorporated cities along the creek.

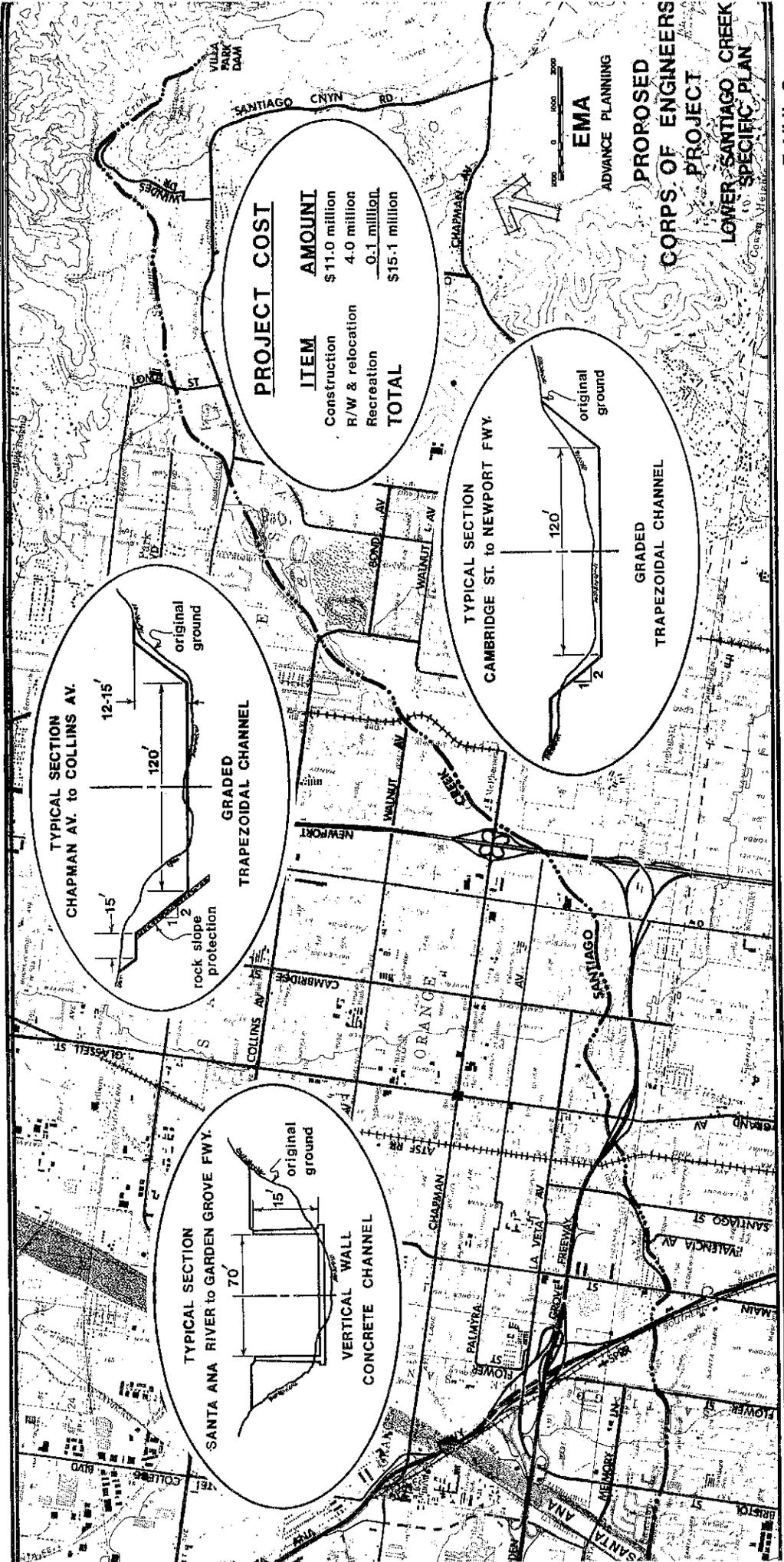
Because of the intense growth and continued flood hazard along the creek, the U. S. Army Corps of Engineers began in 1964 and has recently completed a plan for the creek which proposes channelization of portions of the watercourse. This plan, which is shown on *exhibit 6*, is only a small portion of the much larger Santa Ana River Basin Plan which was recently approved by Congress for design study. Under the approved plan, the Corps has estimated that the construction of protective works along Santiago Creek would occur in the late 1980's. The Corps has said that the Santa Ana River will be their first priority and will require an expenditure of about \$720 million. No more than \$80 million has ever been appropriated for all of California in one year. It appears that the Corps' plan is ambitious and Santiago Creek may be delayed considerably beyond the 1980's. The Corps' staff has indicated, however, that their plan is flexible and that an alternate plan developed by the county could be integrated into their project provided it offers the same level of flood protection at no additional federal cost.

WATER CONSERVATION

The concept of developing water conservation facilities in and along Lower Santiago Creek has been studied for some time. A number of previous studies have investigated to varying degrees the feasibility of such facilities; however, due to conflicting data, no firm commitment has been made by either the Orange County Flood Control District or the Orange County Water

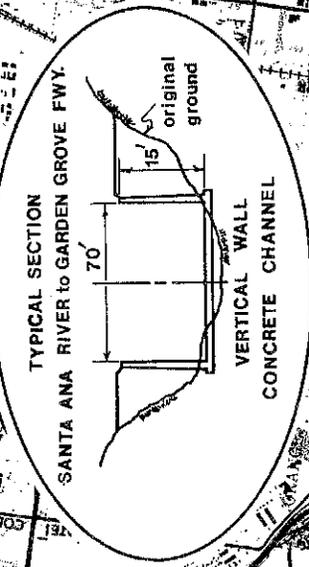
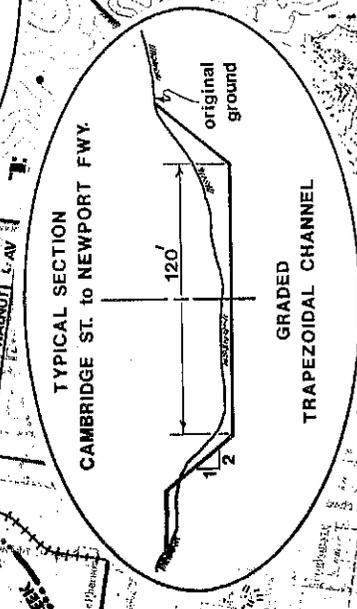
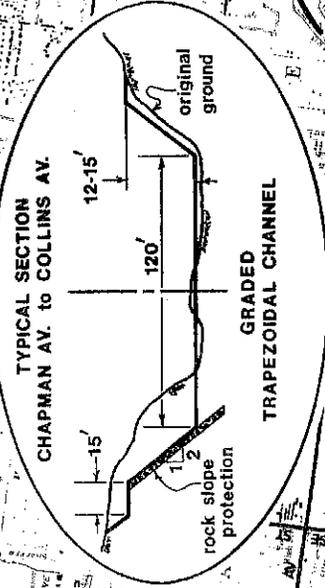
District toward the implementation of a water conservation project. A brief summary of the more significant reports which address the feasibility of ground water recharge along Lower Santiago Creek follows:

In late 1969, Conrock Co. filed with the Orange County Planning Department for a zone change on a sixty-eight acre parcel of land located north of Bond Avenue between Santiago Boulevard and Hewes Avenue. Conrock Co. requested that the property be rezoned to "Sand and Gravel" to enable them to mine the gravel reserves on the property. The ensuing public hearings resulted in the requirement that a rehabilitation plan be prepared for the site outlining an ultimate use for the property after completion of the mining operation. One of the proposed plans for rehabilitation calls for the development of a water conservation facility. At the direction of the Board of Supervisors, the Orange County Flood Control District retained the consulting firm of Converse, Davis and Associates to evaluate the feasibility of such a facility. Although the requested zone change was never granted, the report obtained from Converse, Davis and Associates provides insight into the geology of the area and general conclusions regarding the performance of a ground water recharge facility in this area. This information is also thought to be applicable to the existing gravel pits which are contiguous to the subject site. In general, the report concludes that although the sand and gravel deposits in the area have a high permeability, a number of relatively impermeable clay lenses exist between the gravel layers which would tend to impede recharge efforts. In all likelihood, these clay lenses exist below the bottom of the excavated pits and, therefore, make it difficult but not impossible to move water vertically for replenishment of the ground water body. Therefore, the majority of infiltration will occur in a horizontal direction through the gravel layers in the walls of the pit. The horizontal seepage of water will continue to move laterally until an equilibrium is reached wherein a sufficient area of clay is in contact with the water such that the low permeability clay can transmit as much water to the ground water body as is introduced into the excavation. The report concludes that such a condition is not the most efficient method of conducting a water replenishment operation because (1) a large investment in expensive water is used to saturate the sands above the clay lenses and (2) the time lag is probably not compatible with efficient ground water basin management. The report estimated that the vertical movement of water



PROJECT COST

ITEM	AMOUNT
Construction	\$11.0 million
R/W & relocation	4.0 million
Recreation	0.1 million
TOTAL	\$15.1 million



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through the bottom of the proposed pit would be on the order of ten to twenty acre-feet per year per acre of reservoir area.

In July 1972, the Orange County Flood Control District (OCFCD), the Orange County Water District (OCWD) and the Irvine Ranch Water District (IRWD) retained the engineering firm of Lowry and Associates to conduct a study on Santiago Creek investigating the feasibility of a ground water recharge facility below Santiago Dam and a perennial live stream in the water course running from above Irvine Park to Walnut Avenue in the City of Orange utilizing sewage effluent. At the time the report was prepared, the Irvine Ranch Water District anticipated a significant surplus of wastewater flow which could be used to create a live stream along Santiago Creek as ultimate build-out occurred within the district. However, recent discussions with IRWD staff indicate that surplus wastewater may not be available. The present land use plan for the City of Irvine will not result in the generation of as much wastewater as was previously projected. Under the present plan, all anticipated wastewater effluent will be used for agricultural purposes. Therefore, unless the density of land use within the Irvine Ranch Water District is increased it appears that an alternative source of water for the proposed live stream will need to be developed.

A soils and geologic investigation was conducted in June 1973 on two parcels of land located along Santiago Creek immediately downstream of Villa Park Road which were formerly mined for sand and gravel. The study was conducted by Maurseth-Howe-Lockwood and Associates for the Orange County Flood Control District in conjunction with the proposed acquisition of the property for flood control, water conservation and greenbelt uses. The principal conclusions in the report, should the existing pits be used for ground water recharge, were (1) submerged slopes should be graded to 3:1 inclination for stability and (2) the measured percolation rate in the existing wash water pit on the property was approximately 84 acre-feet per year per acre of reservoir. The report noted that the measured percolation rate may be low due to significant silt concentrations having partially sealed the seepage boundary.

The Orange County Water District in February 1975 prepared a report outlining a pilot project to measure the ground water recharge capabilities of the existing gravel pits adjacent to Villa Park Road utilizing excess Metropolitan Water District water. However, due to

problems concerning water rights in this area of the creek and the fact that much of the creek is under private ownership, the project did not materialize. At the present time, the Orange County Water District is not pursuing a pilot study in the pit area.

CIRCULATION

The Circulation Element of the Orange County General Plan, as presently constituted, indicates the future construction of three new highway crossings of Santiago Creek. The first is Orange Park Boulevard which is master-planned as a secondary highway and will span the creek upstream of Loma Street in the City of Orange. No time frame has been established for the construction of this highway.

The second proposed crossing is in the sand and gravel extraction area and is a secondary highway which will connect Walnut Avenue on the northwest side of the creek with Spring Street on the southeast side (Walnut Avenue extension). Again, no time frame has been established for the construction of the bridge and roadway.

The third bridging of the creek is affiliated with the construction of a Broadway Street overpass of Interstate 5 (Santa Ana Freeway) in the Santa Ana area. The overpass was a high priority project for the City of Santa Ana, with the design and construction to be the responsibility of CALTRANS. However, due to recent cutbacks in CALTRANS funding, the project has been reduced in priority in favor of a project which will widen the Main Street bridge over the Santa Ana Freeway and relocate the existing south bound onramp to Buffalo Street. Neither of these two projects will affect Santiago Creek.

The City of Orange is presently in the process of realigning Loma Street between the existing bridge over the creek and Santiago Canyon Road. The realignment requires that a portion of the existing abandoned gravel pit (Bucheim Pit) on the west side of the existing Loma Street alignment be filled. It is anticipated that the realignment will be completed in fiscal year 1977-78.

LANDFILLS

Several studies have been conducted which investigate the feasibility of utilizing the existing gravel pits along Santiago Creek as possible landfill sites. A report prepared by the Phase III Sand and Gravel Committee and presented to the Board of Supervisors on December 4, 1974, evaluated ten abandoned gravel pits in Orange County and recommended that three sites along Santiago Creek warrant further investigation. These are the Bond Pit north of Bond Avenue between Prospect Street and Hewes Avenue, the Smith Pit east of Villa Park Road and the Hurwitz/Bucheim Pit located west of Loma Street and north of Santiago Canyon Road (*See exhibit 9b*). In response to the recommendations made by the Phase III Sand and Gravel Committee, a task force was formed to reevaluate in greater detail the ten possible sites originally looked at by the Sand and Gravel Committee. A draft report has been prepared by the task force and is presently being finalized by the General Services Agency, County of Orange. The report states that of the ten sites originally investigated, only two appear to be feasible inert landfill sites. These two pits are the Hurwitz/Bucheim Pit and the Smith Pit. In addition, the report recommends that the county initiate the filling of the above pits with inert material and consider, upon completion of mining operations in the Bond Pit, acquiring that pit as a future refuse (municipal wastes) disposal site.

EXISTING CONDITIONS

PARKS AND PRIVATE RECREATION FACILITIES

Along Lower Santiago Creek there are presently four local parks. Hart and Yorba Parks are in the City of Orange and Fisher and Santiago Parks are in the City of Santa Ana (*See exhibit 4*).

Hart Park, located east of Glassell Street, was constructed in 1933 by the Works Progress Administration (WPA). The initial park encompassed 16.2 acres. A 1975 expansion of the park increased the total area to thirty-five acres. Facilities provided in the park include:

3 baseball diamonds (2 of which have lights)	2 concession stands
1 football-soccer multiple-use field	a horseshoe area
1 Olympic swimming pool	a tot lot play area
1 wading pool	extensive picnic facilities
3 roque courts	a clubhouse
1 croquet field	drinking fountains
2 tennis courts (both have lights)	restrooms

Parking for 425 vehicles is provided on the paved invert of Santiago Creek which bisects the park.

Yorba Park, located on the southeast corner of Chapman Avenue and Yorba Street, was built in 1968 on 8.3 acres of land formerly used as a municipal dump. The park has limited facilities, primarily oriented toward baseball activities. These include four baseball diamonds, a concession building and a tot lot. Parking is provided in an off-street facility for approximately 125 vehicles.

Fisher Park is located on 3.6 acres adjacent to the north side of Santiago Creek at Flower Street in Santa Ana. It was opened in 1932. Parking space is not provided on the site however, local street parking is available adjacent to the park. Facilities include wood stoves, tables, a playground, a log cabin clubhouse and restrooms.

Santiago Park stretches along both sides of the creek for almost a mile between Main Street and the Garden Grove Freeway. It is split into two use areas—Santiago Day Camp between Santiago Boulevard and the Garden Grove Freeway which consists of nine acres opened in 1957 for day use purposes, and the main park between Main Street and Santiago Boulevard which encompasses fourteen acres and was opened in 1936 (WPA construction). The main park has the following facilities:

- | | |
|-------------------------|------------------------|
| 2 lighted tennis courts | lawn bowling courts |
| 2 recreation buildings | lighted softball field |
| playground | football field |
| picnic tables, pits and | soccer field |
| electrical outlets | hiking trails |
| 2 restroom buildings | |

Parking is provided on the paved invert of the creek at Valencia Avenue and in other small lots throughout the park.

The day camp facilities include hiking trails, picnic tables and restrooms. On-site parking is available.

There are presently three private recreation facilities along Lower Santiago Creek and one proposed facility. The existing facilities include Santiago Golf Course, the YMCA of Orange and Villa Park County Club. The proposed facility is a tennis club. (*See exhibit 4*).

Santiago Golf Course, which is located in the City of Orange westerly of Tustin Avenue, is a nine-hole course consisting of twenty-six acres within the creek flood plain.

The YMCA facility, located immediately east of the Newport Freeway, is in an interim stage of development with the present facilities limited to a recreation center in which a number of indoor activities are made available. Future expansion is anticipated.

Villa Park Country Club, located on Windes Drive north of the creek, is an equestrian facility with stables and an arena area in which horsemanship skills may be developed. A swimming pool provides an alternate form of recreational enjoyment for the club members.

A proposed private tennis club has been planned for construction in the bottom of the old Fowler gravel pit adjacent to Hart Park in the City of Orange. The facility will have ten tennis courts, a swimming pool and a clubhouse. No completion date for the project has been established.

RECREATIONAL TRAILS

The development of regional recreational trails along Santiago Creek is just now beginning to emerge. Implementation of the planned trails has been delayed for various reasons including inadequate right of way, need to resolve flood control problems, and constraints related to trail access through existing private and public recreation areas.

At the present time, there are only three existing bicycle trails which tie to Santiago Creek. These are the Santa Ana River Trail, the Cambridge Street Trail and the trail which parallels Santiago Canyon Road from Santiago Creek to Orange Park Boulevard. Additional trail ties to Santiago Creek which have been proposed in a number of local trail documents are shown on *exhibit 7*.

The Santa Ana River Trail is the only existing equestrian trail tie to the creek west of Loma Street. However, above Loma Street and extending to Villa Park Dam, many local equestrian trails, which are heavily used by nearby residents, exist adjacent to and within the creek area. It should be noted that the use of these trails is severely limited during the drier times of the year due to fire hazard.

FLOOD CONTROL FACILITIES

The inadequacy of the existing flood control facilities on Lower Santiago Creek was conclusively proven during the flood of 1969. Photographs at selected locations on the creek showing the results of this flood are contained on *exhibits 8a through 8d*. Some photographs of localized major flood damage are also shown. The storm which occurred in February of that year resulted in flows which nearly exceeded the capacity of the existing channel in several locations and caused damage to physical improvements adjacent to the watercourse in excess of three million dollars. The storm which occurred in 1969 had a frequency of occurrence of once every thirty years. Because of the size of the Santiago Creek drainage area, the recommended design flow is the "project flood" which results from a storm estimated to have a frequency of occurrence of once every 200 to 500

years. For comparison purposes, the storm which occurred in February 1969 resulted in a peak flow of approximately 6,600 cubic feet per second (cfs) at Bristol Street in Santa Ana. The peak flow (See photo at Bristol Street Bridge in *exhibit 8*) at this location during a storm having a frequency of occurrence of once every 100 years has been estimated to be approximately 10,000 cfs and during a project flood the peak flow at that location would be approximately 21,000 cfs (assuming no change in the operation of the existing dams upstream).

The flow capacity of the existing channel in the Santa Ana area between Bristol Street and Flower Street is between 5,000 and 6,000 cfs. The February 1969 storm peak discharge exceeded this without extensive flooding because of the lateral erosion of the creek bed which increased the channel capacity. The U.S. Army Corps of Engineers has estimated that if a project flood were to occur on Santiago Creek today, it would cause \$87 million in damages. The bulk of this damage would be concentrated in the highly urbanized area downstream of Chapman Avenue. An area of approximately 6,500 acres would be flooded to an average depth of one foot in a storm of this size. This would involve an estimated 16,600 residential structures.

It should be noted that the design flows which are discussed above can and have occurred and are not outside the realm of possibility as can be seen by review of *table 1* which lists the historic peak flows which have occurred in Santiago Creek at a point immediately downstream of Villa Park Dam.

The existing creek between the Santa Ana River and Villa Park Dam varies widely in character and in its capacity to convey flood discharges. Protective works have been implemented in a piecemeal approach which provides no consistent identity to the watercourse.

The reach from the Santa Ana River to Flower Street was reconstructed to the present trapezoidal cross-section with compacted earth material after severe storm damage in 1969. A soft-bottom invert extends through this reach.

From Flower Street to the Santa Ana Freeway, the creek is semi-natural with numerous local encroachments in the form of backyard gardens, retaining walls, fences and trees. The watercourse remains soft-bottomed.

Upstream of the Santa Ana Freeway and extending to Glassell Street (thru Santiago Park), there are Works Progress Administration (WPA) constructed channel walls with a terraced cross-section. They are made of cement rubble masonry and, in some places, river cobble masonry. The



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 AND
 EXISTING
 RECREATIONAL TRAILS
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LEGEND

- REGIONAL Bike Trail
- REGIONAL Equestrian Trail
- LOCAL Bike Trail
- LOCAL Equestrian Trail

NOTE
 Regional Trails Along
 Santiago Creek Are
 Not Shown

**Table 1. Historic Peak Flows in
Santiago Creek Below Villa Park Dam**

Date	Discharge (cubic feet per second)	Source
February 17, 1884	6,000*	Estimated from historical records
March 6, 1884	16,000*	Estimated from historical records
February 23, 1891	9,000*	Estimated from historical records
January 27, 1916	12,000*	Estimated from historical records
February 16, 1927	11,000*	U.S. Geological Survey Gage
March 2, 1938	5,200**	U.S. Geological Survey Gage
February 25, 1969	6,000***	Orange Country Flood Control District

*Uncontrolled flow

**Controlled by Santiago Reservoir

***Controlled by Villa Park Dam and Santiago Reservoir

channel invert is natural except in one small area where paving has been added for parking purposes.

Through Hart Park (Glassell Street to Shaffer Street), the creek is channelized into a vertical wall WPA rubble masonry channel. The invert of the channel is paved with concrete and used as a parking lot.

Natural flood plain is characteristic of the creek from Shaffer Street to Cambridge Street. Near the downstream end of the reach, an abandoned sand and gravel pit is located adjacent to the south side of the creek. A poorly defined levee has been constructed between the creek and this pit to protect it from inundation, however, the levee is only two to four feet high in some locations and does not effectively serve this purpose. A steel culvert through a private road embankment constructed across the creek at one point creates adverse backwater conditions upstream. Extensive vegetation constricts the flow through portions of the reach.

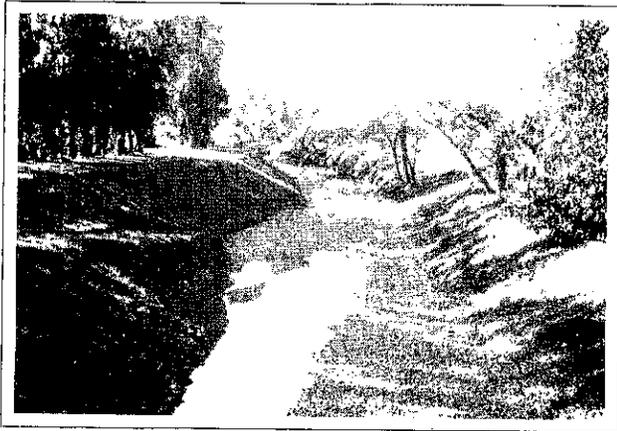
The creek flows through a semi-natural flood plain from Cambridge Street to Tustin Avenue. At approximately the midpoint of this reach the flood plain is reduced by encroaching development. The north bank is lined with riprap to protect houses located at the top of the slope. The south bank remains natural, although somewhat steeper than immediately upstream. The natural appearance beyond this restriction is modified by the turf slopes of Santiago Golf Course through which the creek flows. The cross-section is a mildly sloped vee.

Upstream of Tustin Avenue, the banks are protected with riprap. This form of channelization extends approximately half way to the Newport Freeway bridge. Upstream of this location, portions of the creek have been improved with uniformly graded earth channel slopes. The channel invert remains natural throughout the reach.

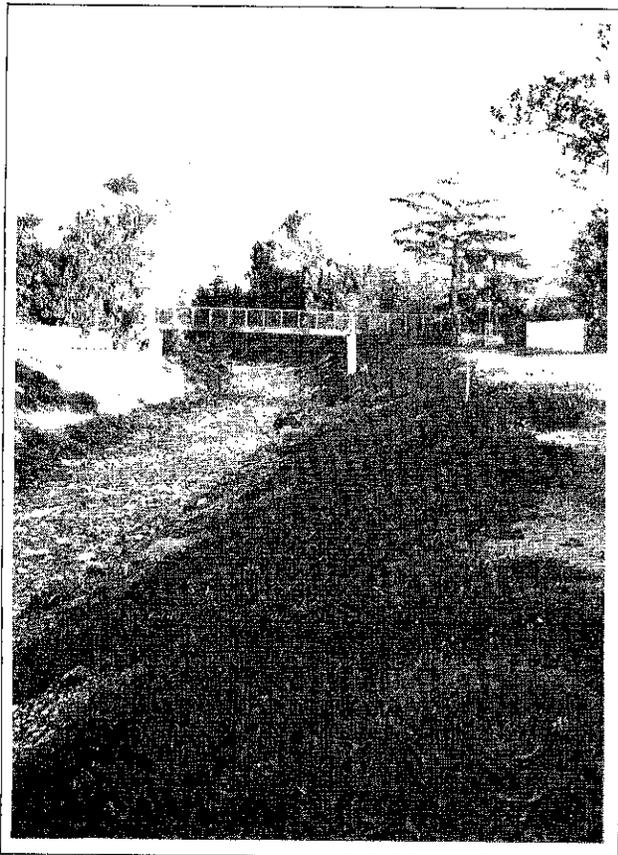
The short reach from the Newport Freeway to Chapman Avenue is semi-natural with some disruption to the original watercourse. The south bank in this reach is a bluff at the edge of an old dump site with concrete rubble responsible for the steepness of the embankment. The north bank is less bluff-like and is dotted with remains of old concrete channel pilasters. The freeway fill slope also encroaches on this side of the channel, thereby creating more of a smooth, regular slope than the natural stream.

Between Chapman Avenue and the abandoned Southern Pacific Railroad bridge, the creek remains a natural soft-bottom channel. On the south bank, the earth embankment gradually gives way to the natural stream bank which has ten to fifteen feet high bluffs bolstered in places with concrete rubble. Development has not encroached to this bank; and, consequently, the natural irregularity of an uncontrolled watercourse exists. Riprap slope protection has been installed on the north bank to protect adjacent residential development extending approximately 1,200 feet upstream from Chapman Avenue. Natural embankment continues to the railroad bridge from this location.

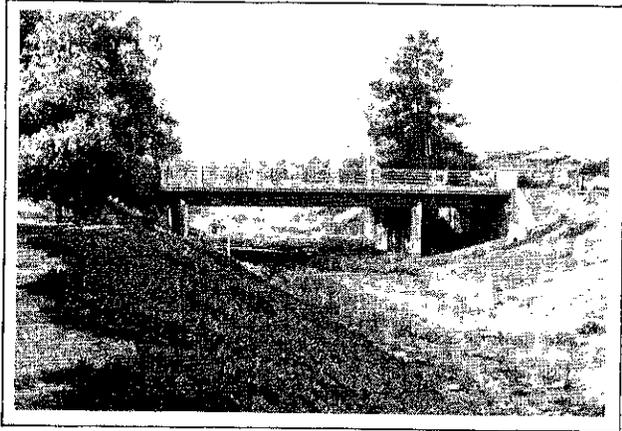
In the reach from the SPRR bridge upstream to Prospect Street, the creek is a semi-natural, soft-bottom channel. The south bank is an irregular earth embankment constructed by the sand and gravel companies to protect their plant operations from inundation. An abandoned pit filled with wash water fines lies adjacent to the north bank of the creek. Some earth levees exist along portions of this low-lying area but they are relatively ineffective due to the lack of continuity. Upstream of the abandoned pit area, concrete slope paving protects adjacent residential development.



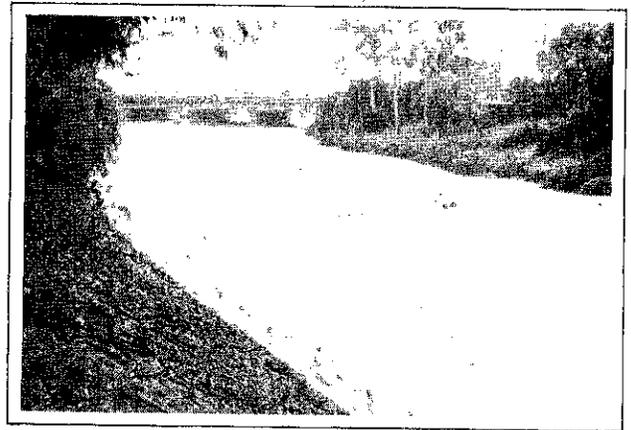
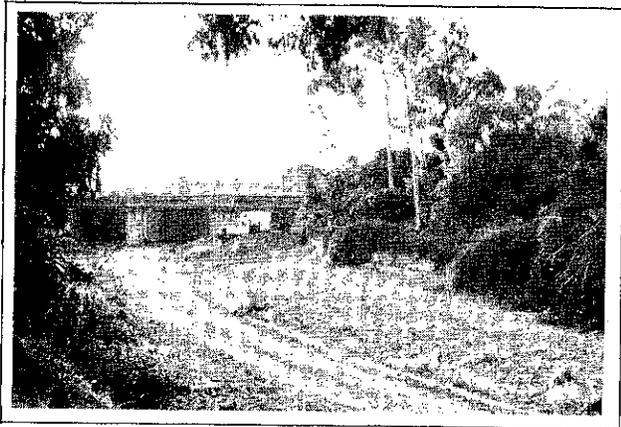
View downstream of Bristol St. bridge before and during flood (note extensive loss of embankment and vegetation on right side of creek).



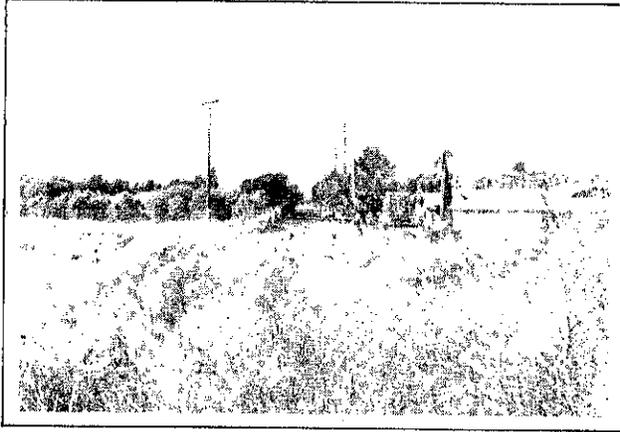
View upstream of Bristol St. bridge now and during flood.



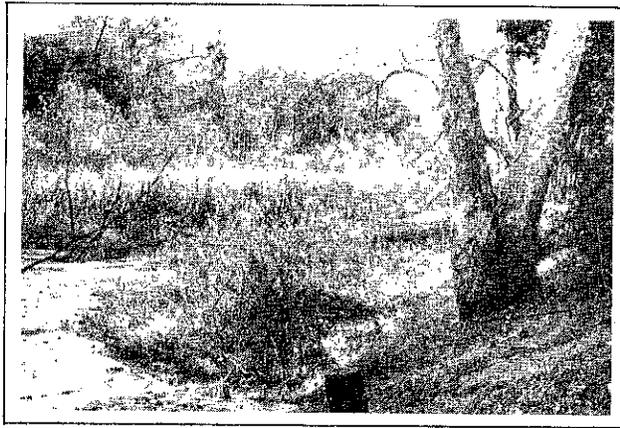
View of Bristol St. bridge looking downstream now and during flood.



View of Main St. bridge looking downstream now and during flood.



View looking westerly across creek at Walnut St. now and during flood.



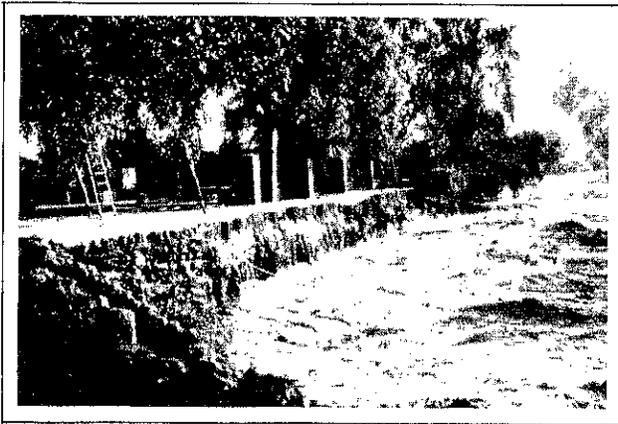
View upstream at end of Windes Drive now and during flood.



Damaged homes downstream of Bristol St. bridge (note undermined swimming pool).



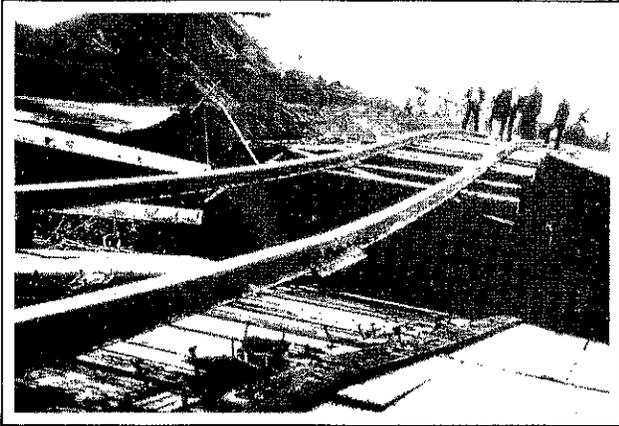
Destroyed pedestrian bridge at Baker St.



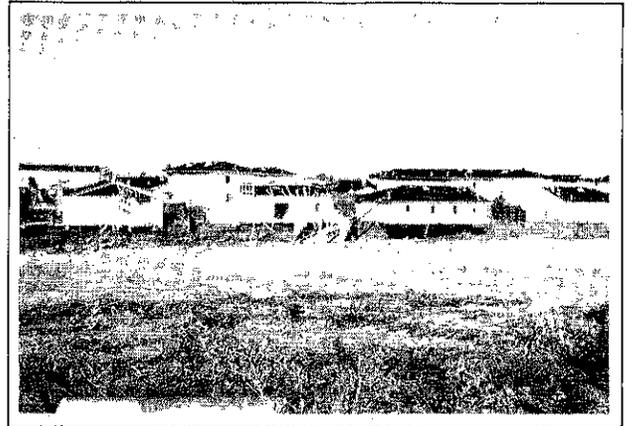
Severe lateral erosion at Jack Fisher Park.



Washed out parking lot and fairways at Santiago Golf Course.



Twisted rails on washed out S.P.R.R. bridge near Walnut Ave.



Undermined homes along Mallard St.



Destroyed culvert at Santiago Blvd. (note that paved road surface on top of culvert was at grade with road at top of bluff).



Villa Park Dam and reservoir during peak discharge (note erosion downstream of dam and spillway).

The configuration of Santiago Creek from Prospect Street to Loma Street has been drastically modified from its natural condition by the local sand and gravel operations. A number of producing and abandoned pits are near the creek. Some reach depths as great as 200 feet below the adjacent terrain. A few exhausted pits have been used for desilting basins for wash water and are now full or nearly full of silty fines. Some of the pits are along the alignment of the watercourse and thus in a storm would fill with water before any flow could continue downstream in the existing poorly defined channel. This channelization steers the flow to the northwest of most of the pits. It is uncertain what the former alignment of the creek was before sand and gravel operations began. A number of housing developments are perched atop the northwest slope adjacent to the creek.

Upstream of Loma Street and continuing to the approximate location where an extension of Orange Park Boulevard may cross the creek, there is additional sand and gravel mining activity. A mined-out pit adjacent to the creek at Loma Street has been filled with trash from the former operation of a county dump. The channel winds its way around the northwestern boundary of this dump and the remaining pits. The creek is overgrown with considerable vegetation and is confined by somewhat deteriorated earthen embankments. No formal improvements other than these poorly maintained banks have been added to the watercourse.

Upstream of the above-mentioned reach and extending to Villa Park Country Club the naturally deposited layer of alluvial sand and gravel has been stripped to bedrock. Natural processes have, for the most part, reestablished an alluvial blanket and dense native vegetation has covered any remaining scars. A few adjacent homeowners have constructed minor encroachments into the flood plain which have little restriction on the flow of flood waters other than to route them around their structural improvements.

From the country club to Villa Park Dam the creek remains relatively natural. Several locations support marsh plant and animal communities where surface water ponds exist throughout most of the year. On the northern alluvial terrace adjacent to the creek, there are several thousand exotic and citrus trees which enhance the appearance of the canyon environs.

WATER CONSERVATION FACILITIES

There presently exists only one functional water conservation structure on Lower Santiago Creek. The facility is located several hundred yards downstream of Villa Park Dam at what is commonly referred to as the Point of Rocks. Here the canyon is only 110 feet wide and the alluvium in the creek bottom is very shallow (less than twenty feet thick). In 1892 a submerged dam was constructed by the Carpenter and Serrano Irrigation Districts at this location for the purpose of forcing groundwater flow to the surface where it could be collected and diverted to their distribution systems for use in irrigating local orchards. The present dam, which was constructed to replace the original clay dam (built in 1879), is a submerged concrete and river cobble structure approximately nineteen feet high. The dam and appurtenant works are one of the oldest waterworks facilities in Orange County.

There is one other water conservation facility which should be mentioned even though it is outside the study area. This is the reservoir formed by Villa Park Dam. Here storm waters are retained for recharge of the groundwater basin. An infiltration system located beneath the reservoir collects the water which is ponded behind the dam into a pipe which extends beneath the dam to a location a few hundred feet downstream. At that point, the water is discharged to the ground surface through an open manhole. The water then travels above and through the alluvium for only a short distance before it reaches the submerged dam mentioned above. This uncontrolled infiltration system was constructed in accordance with an agreement between the Orange County Flood Control District, Carpenter Irrigation District and the Serrano Irrigation District to ensure the preservation of water rights.

CIRCULATION

The following is a listing of the existing highways which cross the creek and the present disposition as to whether they are ultimate or scheduled for replacement in the future:

Creek Crossing	Disposition
Bristol Street	To be replaced and widened
Baker Street pedestrian bridge	Ultimate
Flower Street	To be widened
S.P.R.R.	Ultimate
Santa Ana Freeway	Ultimate
Arnett Drive	Undetermined
Main Street	Ultimate
Valencia Avenue	Ultimate
Santiago Boulevard	Ultimate
Garden Grove Freeway	Ultimate
Glassell Street	Ultimate
Cambridge Street	Ultimate
Tustin Avenue	To be widened
Newport Freeway	Ultimate
Chapman Avenue	Ultimate
Collins Avenue-Prospect Street	To be reconstructed
Villa Park Road	To be reconstructed
Loma Street	Bridge to be widened and the road is presently being realigned on the south side of the creek by the City of Orange

LANDFILLS

There are presently no active landfill operations along Santiago Creek; however there are several abandoned sites which have been filled and have subsequently been reclaimed for other uses. The following is a listing of those landfill sites and their disposition:

Landfill Site	Present Use
Sully Miller Dump, east of Cambridge and north of Santiago Golf Course	Residential homes Tract No. 9006
La Veta Dump, northeast corner of Tustin Avenue and La Veta	Apartment complex
Orange Municipal Dump, southwest corner of Chapman Avenue and Yorba Street	Yorba Park and YMCA
Dump site behind Chapman General Hospital north of Chapman Avenue	Vacant
Dump site immediately west of abandoned Southern Pacific Railroad on south side of creek.	Asphalt batch plant
The Reeve Property on the northwest corner of Old Santiago Boulevard and Santiago Canyon Road	Vacant
County of Orange Dump on the northeast corner of Loma Street and Santiago Canyon Road	Vacant (methane gas problems)

ALTERNATIVE PROPOSALS

During the development of the Specific Plan for Lower Santiago Creek, several alternative proposals for flood control, recreation trails, park/open space, traffic circulation, water conservation and inert landfill projects have been considered. The following is a brief discussion of the various proposals and the methodology used to determine their suitability. For a more detailed discussion of the alternatives and the related cost factors associated with them, the reader is referred to the appendices.

GREENBELT

The analysis of open space greenbelt plans for the creek was limited to reviewing and evaluating conceptual plans previously prepared for the corridor and, where appropriate, identifying additional opportunities.

Due to existing constraints and infringing urban development between the Santa Ana River and Chapman Avenue, little opportunity exists for greenbelt expansion beyond the areas presently owned by the county and local cities. However, along the portion of the greenbelt extending from Chapman Avenue to Villa Park Dam, which includes the proposed Lower Santiago Creek Regional Park, there exist multiple opportunities for open space and recreation projects; therefore an analysis of the useability of this area was performed using conditions such as existing topography, soil quality, and proximity to arterial highway access as indicators of suitability. A discussion of this analysis is contained in the suggested plan section of this report.

TRAILS

Previously adopted trail plans have delineated recreation trails paralleling Santiago Creek from the Santa Ana River to Villa Park Dam. Therefore, in analyzing ultimate trail locations for this study, the trails have been placed

in the vicinity of the creek wherever feasible without an investigation of additional alternatives (See section on Previous Studies-Recreational Trails). At two locations along the creek there are existing constraints which make it very difficult to ultimately implement the trail as proposed in the adopted concept plans. Consequently, in these locations, alternatives to a trail paralleling the creek have been developed. The following is a brief summary of these alternatives, with a more detailed discussion contained in *appendix C*:

The first constraint exists in Reach I between the Santa Ana River and Main Street where the creek right-of-way is very narrow and provides little opportunity for recreation trails. Residential development abuts the creek and in certain areas extends into the watercourse. Adjacent residents are concerned about the potential nuisances that trails may create in their neighborhood. At a public meeting held May 11, 1976, and attended by approximately seventy persons, all of whom live in the immediate proximity of the creek, there was unanimous agreement that trails should not be placed in the creek area (a summary of responses to a questionnaire handed out at the public meeting is included in *appendix B*). An alternative to placing the trail in the creek would be to relocate it to Memory Lane. If this alternative were selected, the equestrian trail would have to be eliminated because of the impracticality of placing an equestrian trail along Memory Lane.

The second area of constraint exists in Reach III at the Santiago Golf Course. In evaluating the alignment of a trail through the golf course, it has been determined that sufficient room for trails does not exist without substantially reconstructing the golf course. Therefore, two additional alternatives have been developed. One alternative will only provide for a bike trail which will leave the creek at Cambridge Street and proceeded north to Palmyra Avenue, then easterly along Palmyra to the creek at the Newport Freeway. The second alternative proposes placing both trails within an existing drainage facility paralleling the Garden Grove Freeway between Hart Park and Tustin Avenue. At Tustin Avenue, the trail will cross to the easterly side and proceed northerly to Santiago Creek.

Elsewhere along the creek, it is possible to align the trails adjacent to the watercourse assuming adequate area is acquired concurrent with the acquisition of channel and park right-of-way. The discussion of the suggested trail plan in the next chapter of this report outlines in detail the location of the proposed trail.

This study addresses only the ultimate location of trails along the creek assuming full development of the greenbelt corridor. Until ultimate development occurs, it may be possible and desirable to develop interim trails which could be used by the public as connections between portions of the ultimate trail which now exist or will soon be implemented and existing local trails which interface with the creek. The development of such an interim trail system should be actively pursued by the county.

FLOOD CONTROL

Flood retarding alternatives

At the outset of this study, several flood retarding proposals were investigated to determine if the magnitude of the design flood discharge in the Santa Ana and Orange areas could be significantly reduced. The most tangible benefit of a flood retarding alternative is the reduction in the required size of channelization downstream of the retarding facility, particularly in Reach I, thereby providing savings in construction costs while concurrently providing more flexibility in the design of the necessary protective works.

Three hydraulic structures which can be constructed on Santiago Creek and which result in a reduction of the peak storm flow in the lower reaches of the creek have been investigated. Various combinations of the three structures were analyzed to determine which combination provides the greatest benefit. The following is a brief description of the three alternatives:

1. Raise Santiago Dam (Irvine Lake)

Under this alternative, the crest of Santiago Dam would be raised forty feet, thereby providing 17,000 acre-feet flood storage capacity and 25,000 acre-feet increased domestic and agricultural storage capacity. This concept has been the subject of a preliminary study undertaken by the Municipal Water District of Orange County.

Any construction would require joint funding from several entities. This facility will be capable of reducing the peak flow in the creek by retention of stream flow at the peak of the storm and subsequent release when the flow downstream of the dam has subsided.

2. Increase the Controlled Release at Villa Park Dam

Under this alternative, the controlled release of flood water from Villa Park Dam would be increased from 3,500 cfs. to 6,000 cfs. The proposed increase can be accomplished by modifying the size of the energy dissipating structure below the dam. By increasing the controlled release, a greater amount of water can be discharged from the reservoir earlier in the storm, thereby providing greater storage capacity when the peak inflow occurs at the reservoir.

3. Construction of a Retarding Basin Between Collins Avenue-Prospect Street and Villa Park Road

Under this alternative, a retarding basin would be constructed along Santiago Creek utilizing the existing gravel pits between Collins Avenue-Prospect Street and Villa Park Road. A bypass channel would be constructed adjacent to the northerly boundary of the site and would convey the low flow around the basin. Only during peak storms would the flood flow be spilled into the basin via a side weir in the channel wall. During large storms, flood water would be stored in the basin until the peak flow in the bypass channel had subsided, at which time the storm water would be released back into the channel to provide sufficient storage capacity in the basin should a subsequent storm occur.

A fourth alternative which would entail the raising of Villa Park Dam was considered but was determined not to be cost effective. For this alternative to be implemented, it would be necessary to increase the storage capacity of the existing dam by approximately 17,000 acre-feet. Several auxiliary dams along the westerly boundary of the reservoir would be required to confine this additional water. The auxiliary dams would have to be constructed in the area presently occupied by the Cemetery of the Holy Sepulchre and across Chapman Avenue at a point approximately 1,000 feet east of

Santiago Canyon Road. The raising of the dam would also result in Irvine Park being completely inundated during major storms. Because of the problems associated with constructing the auxiliary dams in the cemetery and the impact on Chapman Avenue and Irvine Park, this alternative was determined impractical (*See appendix D*).

Channelization alternatives

As discussed earlier in this report, Santiago Creek looms as a major flood threat to the residential and commercial improvements which presently line the creek. Channelization, as well as the previously mentioned retarding alternatives, provides a means of alleviating this threat. The channel alternatives range from maintaining the creek as it presently exists to constructing formal types of flood protective works in the form of concrete-lined and rock-lined channels. In determining the types of channel to be considered in a particular reach of the creek, the following factors were taken into consideration: (1) availability of right-of-way; (2) the surrounding environment (i.e. park, residential, etc.); (3) engineering feasibility; (4) economic feasibility; (5) concerns of local agencies and private citizens; and (6) compatibility with greenbelt, trail and open space proposals. The desirability of one alternative versus another is dependent on all of the above factors and in some instances the ultimate solution will need to be a compromise.

The following is a brief outline of the channel alternatives considered:

- Natural flood plain with no formal protective works, i.e. maintain existing conditions
- Vertical wall reinforced concrete channel
- A composite proposal consisting of a concrete covered conduit, WPA channel with newly paved invert, rock-lined channel, terraced concrete channel and greenbelt channel.

For the above alternatives, two channel sizes were developed; one of sufficient capacity to convey the project flood (design storm) and a second, smaller channel, which will convey the project flood assuming one or more of the upstream retarding alternatives is implemented. The small channel is of sufficient capacity to convey the 100-year flood without any upstream retarding.

In all of the above alternatives, the reach of the creek between Villa Park Road and Villa Park Dam is left in its existing condition with no formal flood protective works. The reason for so doing is that the existing natural watercourse is of sufficient capacity to convey the anticipated flood flow: Secondly, there are no structural improvements in this area of the creek which are subject to flood hazard, with the possible exception of the existing sand and gravel plants which will ultimately be removed upon completion of the gravel operation within the next five to eight years (*See appendix E*).

WATER CONSERVATION

No detailed field investigation of possible groundwater recharge sites on Santiago Creek has been made during the course of this study. However, three infiltrometer tests were made in the bottom of the gravel pit located immediately north of Bond Avenue (commonly referred to as the Bond Pit). The results of these tests indicate a varying vertical infiltration rate between twenty and 4,800 acre-feet per year per acre of reservoir area. Previous studies mentioned earlier in this report have indicated that the potential for a water conservation facility on Santiago Creek between Collins-Prospect and Villa Park Road may exist; however, its overall effectiveness is still questionable. During discussions with the staff of the Orange County Water District, it was indicated that the water district is very interested in pursuing the development of the Bond Pit as a ground water recharge basin. Therefore, in developing the suggested plan for Santiago Creek, flexibility has been provided to allow the implementation of a water conservation facility in this area.

The concept of developing a live stream on Santiago Creek, as previously proposed, is still viable provided an adequate source of water is available. The use of reclaimed sewage water appears to be remote due to the reduction in the anticipated amount of excess effluent. However, the development of a live stream using excess Metropolitan Water District water may be possible provided sufficient water is available and the cost of the water is not prohibitive. No other possible sources of water were investigated.

CIRCULATION

Preliminary alignments for the Walnut Avenue and Orange Park Boulevard extensions have been prepared in conjunction with this study. Profiles for the crossings have been determined and adequate clearance can be provided for the proposed channel improvements or, in the case of Orange Park Boulevard, to clear the natural flood plain.

In lieu of the east-west Walnut Avenue extension, it has been proposed by the City of Orange that a north-south connection from Prospect Street to Wanda Avenue be provided via the SPRR right-of-way. This crossing would result in approximately the same impact on the creek as the east-west connector; however, it would have a significant additional impact on existing development on the north side of the creek requiring the removal of fifteen apartment buildings.

A traffic analysis has not been conducted to determine whether the Walnut Avenue or Orange Park Boulevard crossing should be eliminated or whether additional crossings of the creek should be provided. This type of analysis is being performed by a consultant to Orange County in the Northeast Orange County Circulation Study (NEOCCS). The study is scheduled for completion by early October, 1977, and will provide the necessary data to make decisions regarding the addition or deletion of creek crossings.

LANDFILLS

Because of the interest in utilizing the abandoned gravel pits between Villa Park Road and Loma Street as inert landfill sites, three alternative grading plans have been prepared to evaluate the feasibility of such a project and to demonstrate how a landfill can be compatible with future greenbelt uses. The three alternatives differ in ultimate ground surface configuration and, consequently, the volume of inert material required. A discussion of the alternatives is contained in *appendix F*.

SUGGESTED PLAN

This section of the report outlines the "suggested plan" for Lower Santiago Creek. As indicated in the introduction to this report, the following plan has been developed through close coordination with the staffs of the various agencies and private groups interested in the creek area. In addition, several informal study sessions with city planning commission members and greenbelt committees have been held. The concepts presented herein as a suggested plan result from the analysis and comparison of several feasible alternatives. Review by local jurisdictions and the public may necessitate some modifications before the plan can be adopted as a guide for development of the Santiago Creek Greenbelt. Future changes in economic and social conditions may also dictate the nature and scheduling of greenbelt improvements. *Exhibits 12a through 12e* show the proposed channel and trail improvements for the five study reaches.

GREENBELT

Reach I

Santa Ana River to Bristol Street. A linear park is suggested for this subreach of the creek. The proposed flood control protective works will be constructed along the northerly side of the existing public right-of-way, thereby leaving a strip of right-of-way approximately eighty feet in width to the south of the channel for use as a linear park area. The recreation trails proposed for this reach would meander through this park.

Bristol Street to Baker Street. In this subreach the City of Santa Ana is encouraged to develop the Bristol Street Reservoir site

as a local park as outlined in the city's draft greenbelt report. The site also provides a convenient rest stop area for trail users (i.e. bike racks, hitching posts, drinking fountains; benches, etc.).

Baker Street to Santa Ana Freeway. The opportunity for elaborate greenbelt amenities in this subreach is limited. Except in the area of Fisher Park, the majority of the available right-of-way is required for the construction of flood control protective works, thereby leaving only narrow strips of land varying in width from five to fifteen feet on either side of the channel for landscaping purposes. Several of the residents who live adjacent to the creek in this subreach have expressed a desire to incorporate this additional area into their back yards. However, there is the need to ensure that landscaping along the creek is uniform, thereby maintaining the identity and character of the greenbelt. In an effort to respond to the above concerns and to assist in reducing the high public costs associated with maintaining the landscaping in this reach due to its poor accessibility, the following criteria should be followed when developing the greenbelt in this area:

1. When establishing the final alignment for the flood control protective works, every effort should be made to maintain a minimum five-foot offset between the top of the channel wall and existing property lines.
2. In areas where the offset is greater than five feet, the adjacent property owner should be given the opportunity to obtain a permit which would allow him to incorporate the area outside of the five-foot setback line as part of his yard. The permit should be conditioned such that should the property owner ever wish to relinquish his use of the excess area he will be responsible for relocating the corridor security fencing and relandscaping the area to county standards. The opportunity to obtain the permit should be provided only at the time the channel construction occurs.
3. Security fencing should be installed along the corridor following either existing right-of-way lines or the five-foot setback line in areas where the adjacent property owners opt to obtain a permit.

4. The open area between the top of channel wall and the security fencing should be landscaped in accordance with the Santa Ana River/Santiago Creek Greenbelt Landscape Guide and the following criteria:

Width of Offset Between Channel Wall and Security Fencing	Type of Landscaping
0-5 ft.	Ground cover only
5-10 ft.	Ground cover and shrubs
10 ft. or more	Ground cover, shrubs and trees

Wherever possible, drought resistant plant materials should be used to reduce maintenance costs. In certain areas, the ground cover should be allowed to hang over the channel walls, thereby reducing the harshness of the concrete channel from the vantage point of the trail users.

Santa Ana Freeway to Main Street. The City of Santa Ana is encouraged to proceed with the expansion of Santiago Park in this area as outlined in their draft greenbelt plan. Should the city elect not to expand the park, a minimum twenty-five foot wide strip of land should be provided adjacent to the south side of the channel for trail purposes and appropriate landscaping.

Reach II

Main Street to Atchison, Topeka and Santa Fe Railway. Santiago Park and Day Camp are located on both sides of the creek in this subreach. A rest stop area should be provided within the existing park for trail users.

Atchison, Topeka and Santa Fe Railway to Garden Grove Freeway. The City of Santa Ana should be encouraged to expand Santiago Day Camp into this subreach concurrent with their proposed redevelopment of Santiago Park and Day Camp.

Garden Grove Freeway to Glassell Street. The City of Orange should be encouraged to expand Hart Park into this subreach, thereby effectively connecting Santiago Park and Day Camp with Hart Park.

Glassell Street to Shaffer Street. Hart Park is located on both sides of the creek in this subreach. The city proposes to provide a rest stop within the park for trail users. The scheduled implementation of the rest stop is sometime between 1980 and 1985.

Shaffer Street to Cambridge Street. The City of Orange proposes to expand Hart Park into this area. The park extension is presently planned to occur between 1980 and 1985. The present concept is to develop this portion of the park as a passive area.

Reach III

Cambridge Street to Santiago Golf Course. The property in this reach of the creek is presently owned by the Orange County Flood Control District. The City of Orange has indicated a desire to expand Hart Park into this area. The county (EMA) and the city should investigate the proposal and if it is determined mutually desirable, proceed with the preparation of an agreement which will provide for the proposed park expansion.

Santiago Golf Course to Tustin Avenue. Santiago Golf Course is located in this reach of the creek. This existing use of creek area should be perpetuated.

Tustin Avenue to Newport Freeway. The area adjacent to the proposed channel protective works should be landscaped in accordance with the Santa Ana River/ Santiago Creek Landscape Guide. Consideration should be given to acquiring the Russell F. Rohrs prop-

erty (AP 390-141-14) for expansion of the greenbelt area and possible strip park.

Newport Freeway to Chapman Avenue. The YMCA and Yorba Park are located in this subreach along the east side of the creek. The YMCA has developed a master plan for the development of their property. Recent discussions with the YMCA indicate that they are in favor of trails and greenbelt along the creek provided every effort is made to interface these improvements in an acceptable manner with their master plan. Yorba Park has been developed up to the existing creek bank. Little opportunity exists to expand greenbelt uses beyond what is already proposed or exists in the park. However, a creek landscape plan should be developed in this subreach which would soften its harsh character and provide an attractive entrance to the upper creek area. An accessible and well landscaped creek environment may provide a pleasant extension to the recreation opportunities already provided by the YMCA and Yorba Park. A hitching post and rest area are proposed in the park for trail users. The City of Orange has scheduled the implementation of the rest stop between 1985-1990.

Chapman Avenue to the Southern Pacific Railroad. The proposed greenbelt channel and adjacent public right-of-way should be landscaped in accordance with the Santa Ana River/Santiago Creek Greenbelt Guide. The westerly end of Lower Santiago Creek Regional Park will extend to Chapman Avenue. Therefore, this reach will serve as the trail entrance to the park and should reflect the theme to be developed for the park. A discussion of the regional park is contained in a subsequent section.

Reaches IV and V

Southern Pacific Railroad to Villa Park Dam. Lower Santiago Creek Regional Park is proposed to be located contiguous to the creek

as shown on *exhibit 5*. The Santa Ana River/Santiago Creek Greenbelt Commission, the Cities of Orange and Villa Park and various citizen greenbelt groups have proposed several concepts within the park area as shown on *exhibit 4*, however, no definitive overall plan for the park has been developed.

Regional Park Analysis

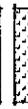
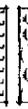
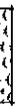
During the preparation of this report, an analysis of the area adjacent to the creek was made to conceptually identify activities which may occur within the park. The analysis consisted of two phases.

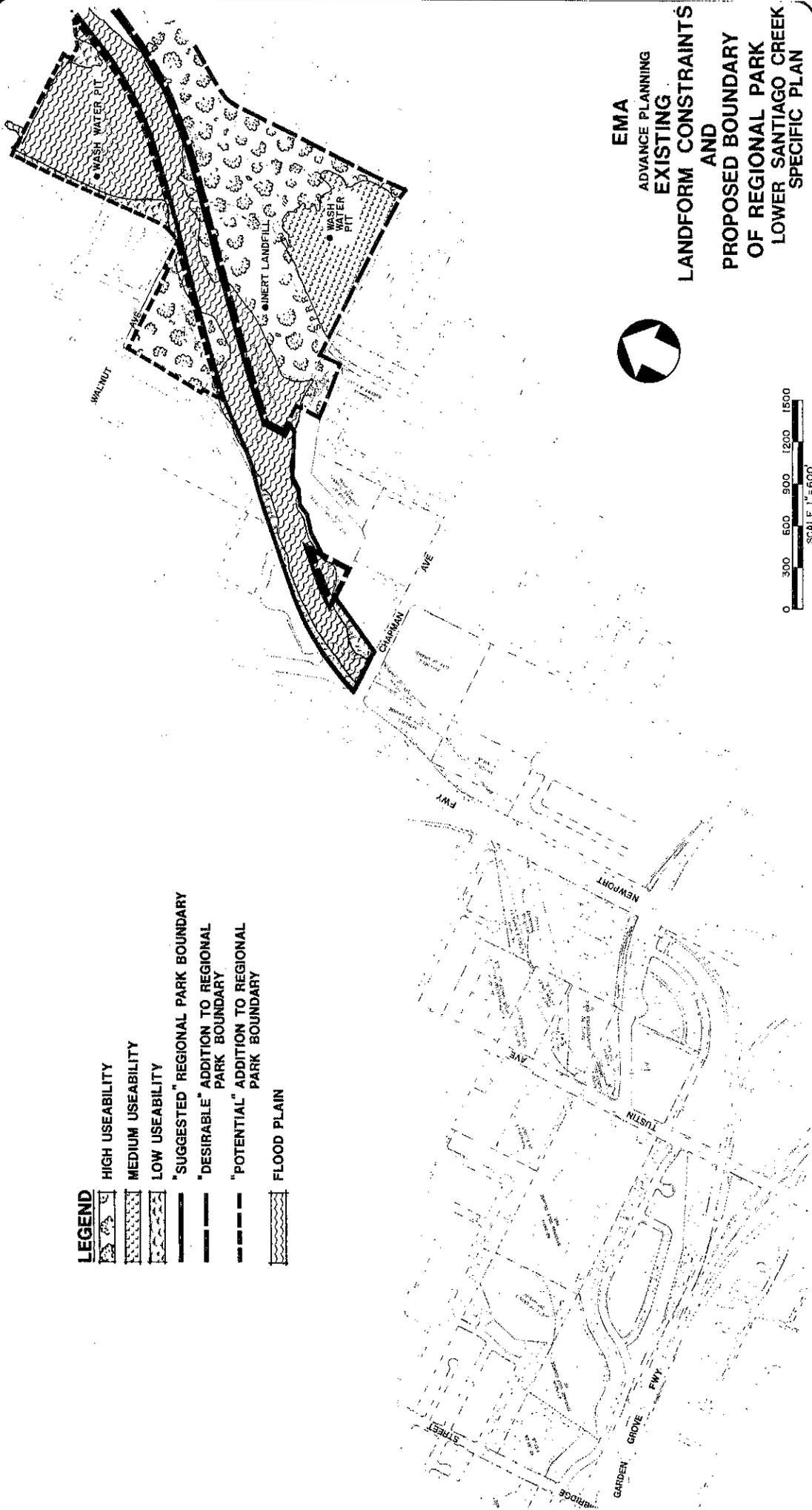
The first phase was an inventory of the area based on landform constraints to determine the existing useability of the vacant land adjacent to or within the creek. The results of the analysis are shown on *exhibits 9a through 9c*. The following paragraphs describe the distinguishing characteristics of the three useability categories shown on these exhibits:

High Useability. Areas which are included in this category have no major landform constraints which would limit the type of park improvements that could be developed. Generally the parcels are flat with adequate vehicular access, good soil conditions and free from flood hazard.

Medium Useability. Areas which are delineated in this category have varying constraints, none of which totally preclude park development, however, they do limit the types of facilities which can be installed. The areas included within this category may have one or more of the following constraints: mild to steep slopes which are not conducive to high recreational use, poor soil conditions, poor vehicular access, old abandoned dump sites, and hazardous flood plain location. The flood plain areas in this category are primarily those areas which are subject to flooding from Handy Creek rather than Santiago Creek.

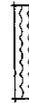
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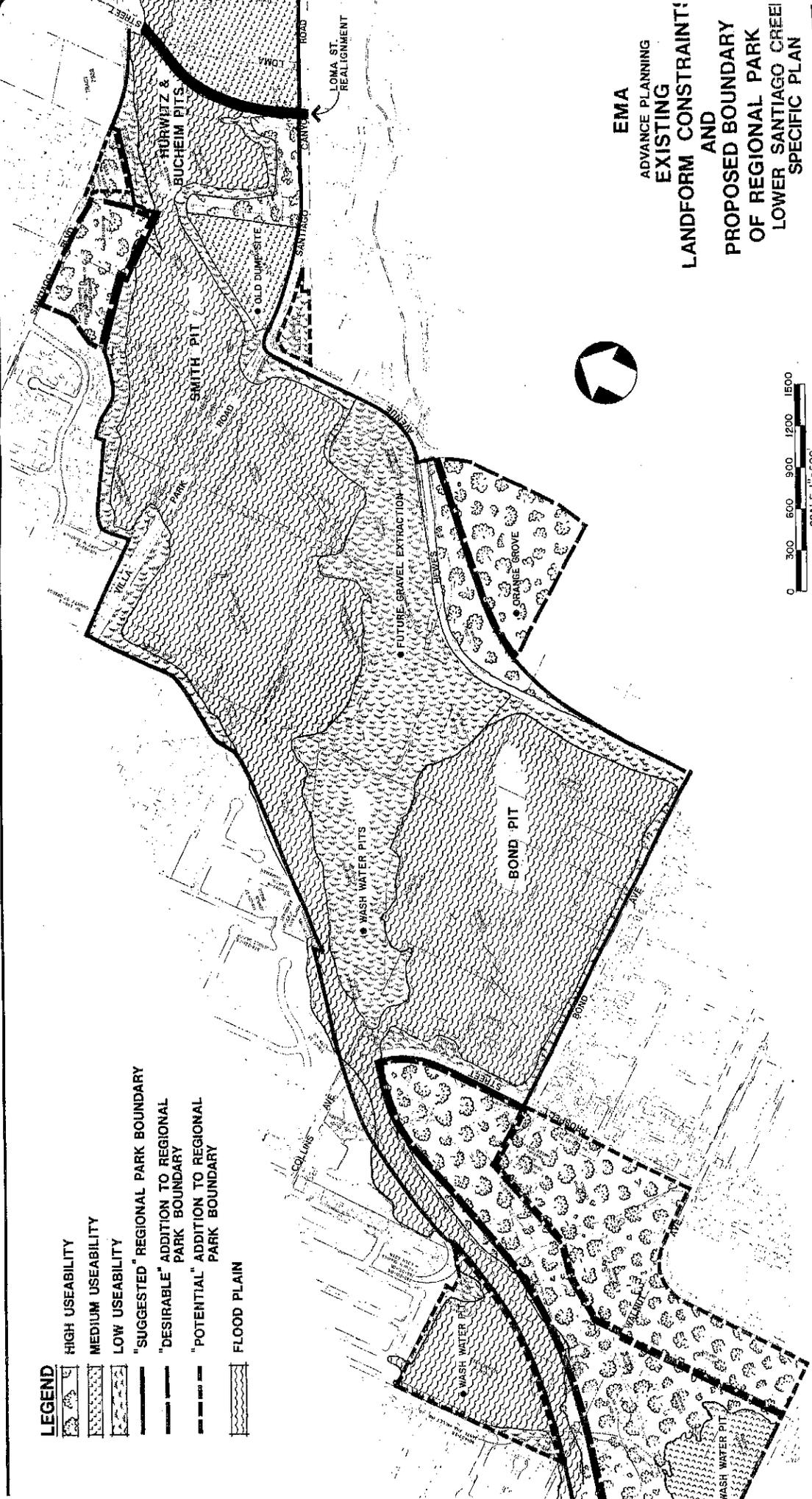
-  HIGH USEABILITY
-  MEDIUM USEABILITY
-  LOW USEABILITY
-  "SUGGESTED" REGIONAL PARK BOUNDARY
-  "DESIRABLE" ADDITION TO REGIONAL PARK BOUNDARY
-  "POTENTIAL" ADDITION TO REGIONAL PARK BOUNDARY
-  FLOOD PLAIN



**EMA
ADVANCE PLANNING
EXISTING
LANDFORM CONSTRAINTS
AND
PROPOSED BOUNDARY
OF REGIONAL PARK
LOWER SANTIAGO CREEK
SPECIFIC PLAN**

LEGEND

-  HIGH USEABILITY
-  MEDIUM USEABILITY
-  LOW USEABILITY
-  "SUGGESTED" REGIONAL PARK BOUNDARY
-  "DESIRABLE" ADDITION TO REGIONAL PARK BOUNDARY
-  "POTENTIAL" ADDITION TO REGIONAL PARK BOUNDARY
-  FLOOD PLAIN



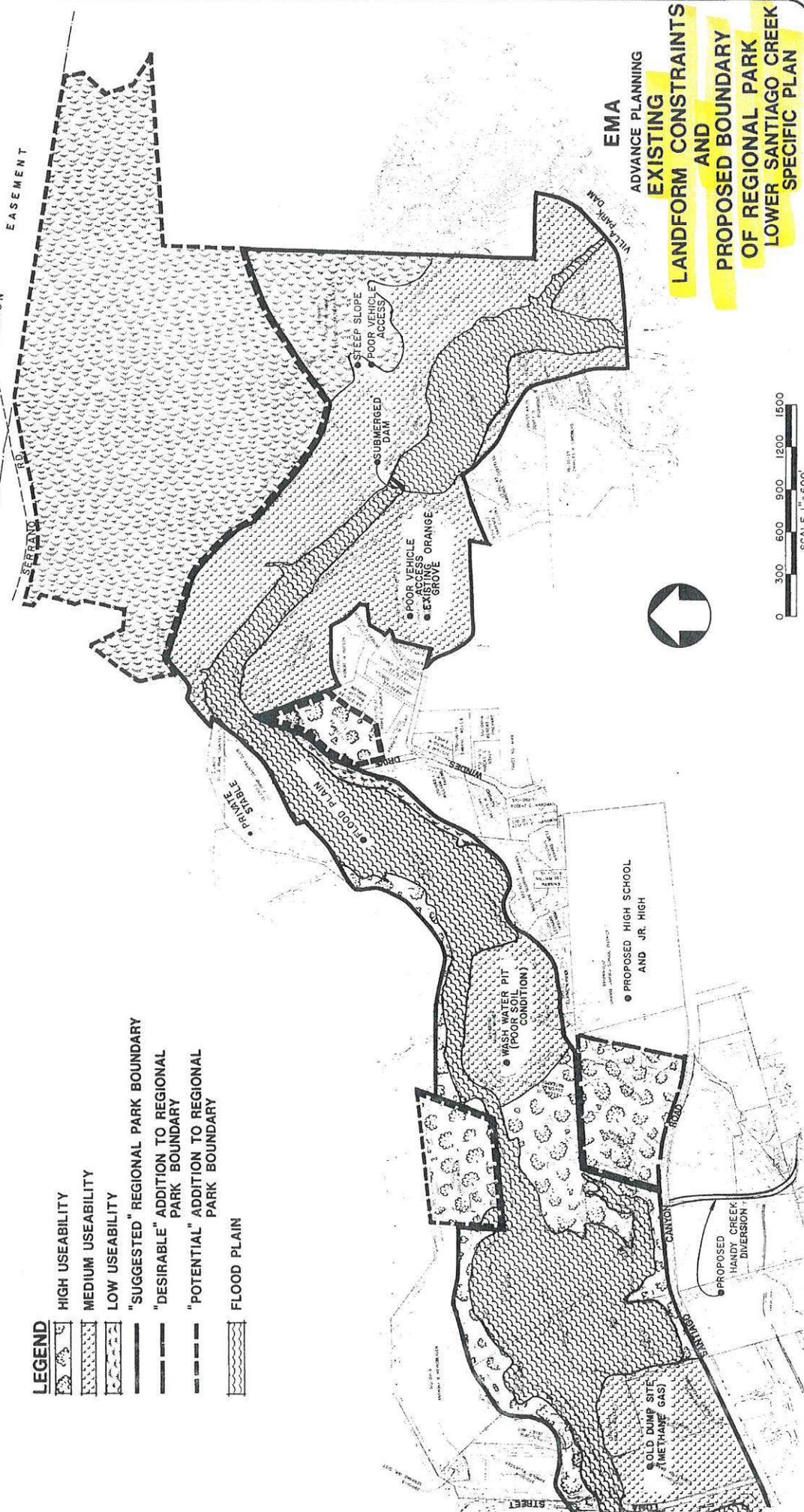
**EMA
ADVANCE PLANNING
EXISTING
LANDFORM CONSTRAINTS
AND
PROPOSED BOUNDARY
OF REGIONAL PARK
LOWER SANTIAGO CREEK
SPECIFIC PLAN**



EDISON
SERRANO RD
EASEMENT

LEGEND

-  HIGH USEABILITY
-  MEDIUM USEABILITY
-  LOW USEABILITY
-  "SUGGESTED" REGIONAL PARK BOUNDARY
-  "DESIRABLE" ADDITION TO REGIONAL PARK BOUNDARY
-  "POTENTIAL" ADDITION TO REGIONAL PARK BOUNDARY
-  FLOOD PLAIN



**EMA
ADVANCE PLANNING
EXISTING
LANDFORM CONSTRAINTS
AND
PROPOSED BOUNDARY
OF REGIONAL PARK
LOWER SANTIAGO CREEK
SPECIFIC PLAN**

Low Useability. Areas shown within this category will require major renovation to be made acceptable for any park use. The areas generally have extremely poor soil conditions or include the bank areas of the existing creek. The abandoned gravel pits between Collins Avenue-Prospect Street and Loma Street would fall within this category.

Upon completing the above analysis, three possible boundary configurations for the regional park were developed (See exhibits 9a through 9c). The first configuration incorporates the "suggested" minimum area which should be included within the regional park. This suggested boundary has a total area of approximately 625 acres. The second configuration includes the addition of approximately 145 acres of high useability park land to the suggested minimum park area. This addition will significantly increase the total utility of the park and has, therefore, been termed the "desirable" addition to the regional park. The third configuration will add approximately 190 acres to the park which includes most of the remaining available vacant land along the creek. This addition has been termed the "potential" park addition and represents the most ambitious park development plan.

The following is a summary of the total area included within each of the three proposed boundaries:

Park Configuration	Area Already Owned by County	Area to be Acquired	Total Area
Suggested minimum regional park	150 acres	475 acres	625 acres
Desirable regional park	150	620	770
Potential regional park	150	710	960

The second phase of the analysis consisted of the development of a conceptual plan for the potential regional park, taking into account existing constraints, the proposed flood control, trail, and landfill projects outlined in this report and the types of recreation facilities needed in this area of the county. The conceptual plan shown on exhibits 10a and 10b highlights the types of recreation opportunities which may be developed within Lower Santiago Creek Regional Park.

As a result of the above analysis and because of the county's present activity in acquiring property along the creek (approximately 150 acres acquired as of October 1, 1976), it is strongly recommended that a general development plan be prepared for the regional park in the very near future.

In addition, it is recommended that the county pursue the acquisition of the area within the suggested park boundary and consider expanding the park acquisition to include the high useability parcels outlined on *exhibits 9a through 9c* as desirable additions to the park area.

There is a private equestrian stable on Santiago Creek (*See exhibit 4*) which is not included within the regional park. The continued operation of this stable should be encouraged. However, should the present owners decide to terminate their operation, the county should consider acquiring the facilities for incorporation into the regional park and operation by a concessionaire.

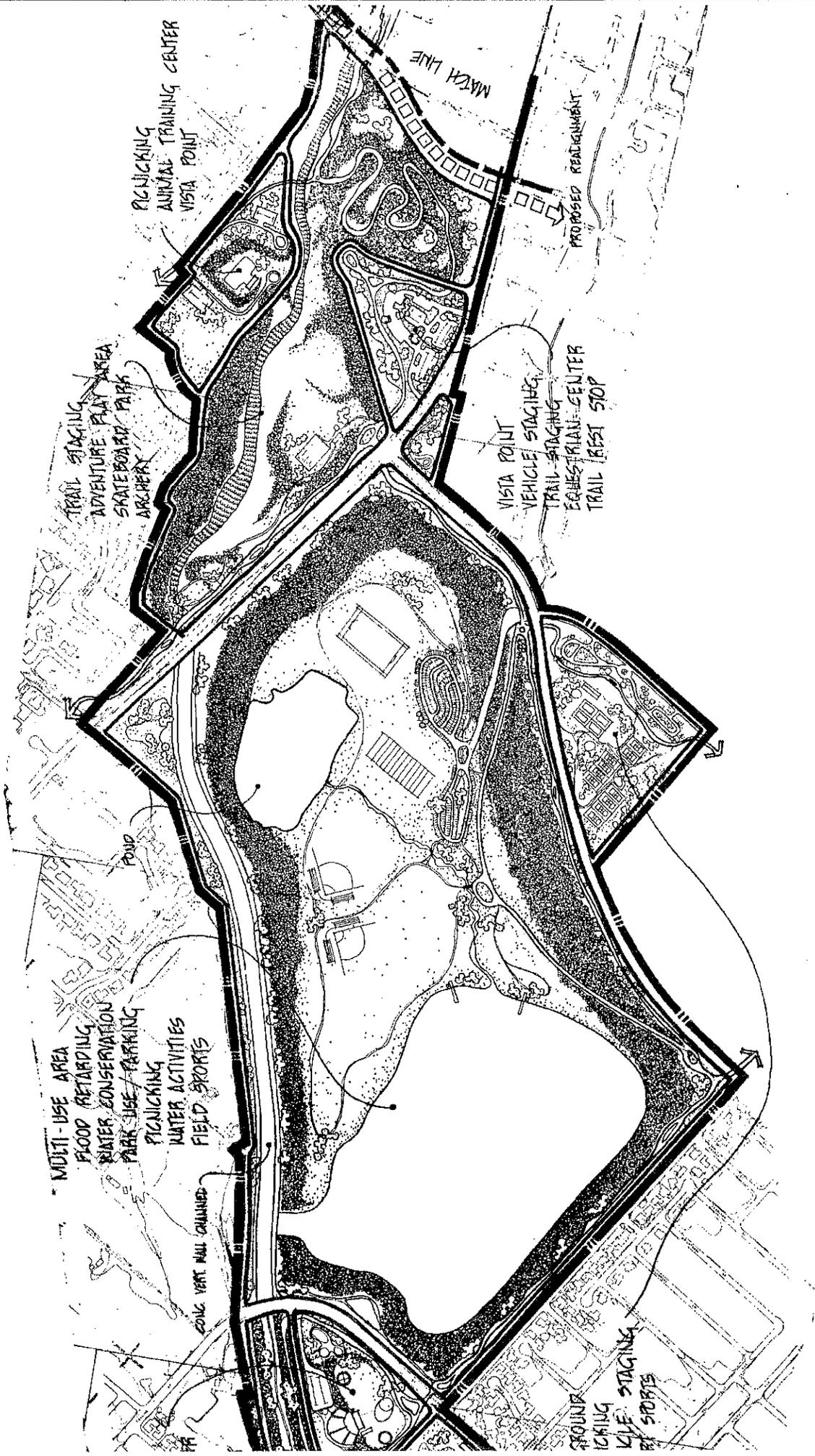
RECREATIONAL TRAILS

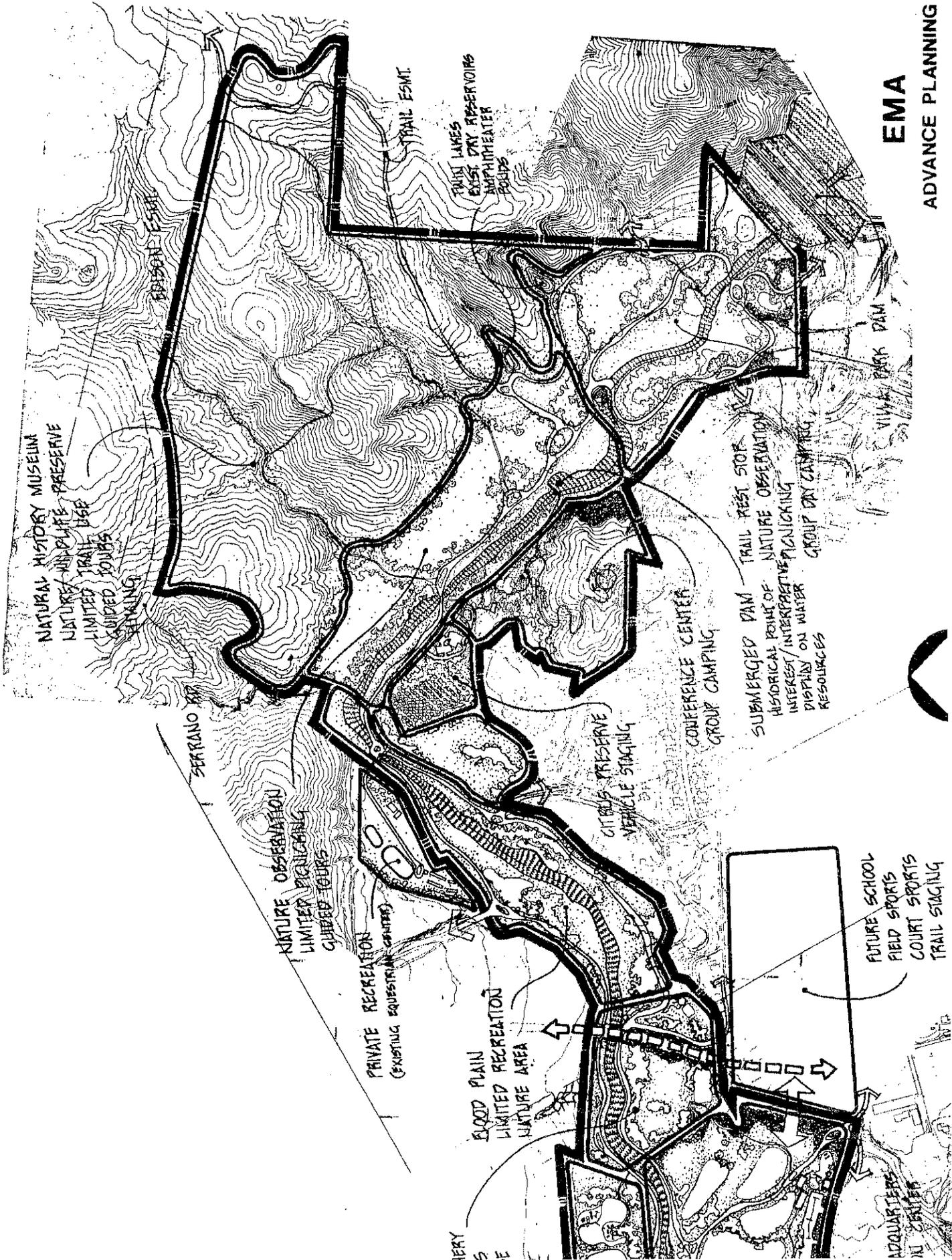
The suggested location for regional trails along Santiago Creek was based on input received from local agencies, the Santa Ana River/Santiago Creek Greenbelt Commission staff and the EMA Recreation/Open Space staff. Typical suggested trail cross sections are shown on *exhibit 11* and the trail plan is shown on *exhibits 12a through 12e*. The following is a brief summary augmenting the exhibits:

Reach I

Santa Ana River connection. The trail connection between the existing Santa Ana River Trail and Santiago Creek will cross the Santa Ana River at Memory Lane (via the river bottom) to the east levee of the river, thence, south along the east levee to Santiago Creek.

Santa Ana River to Bristol Street. Trail ramps to the bottom of the proposed concrete-lined channel will be provided at the mouth

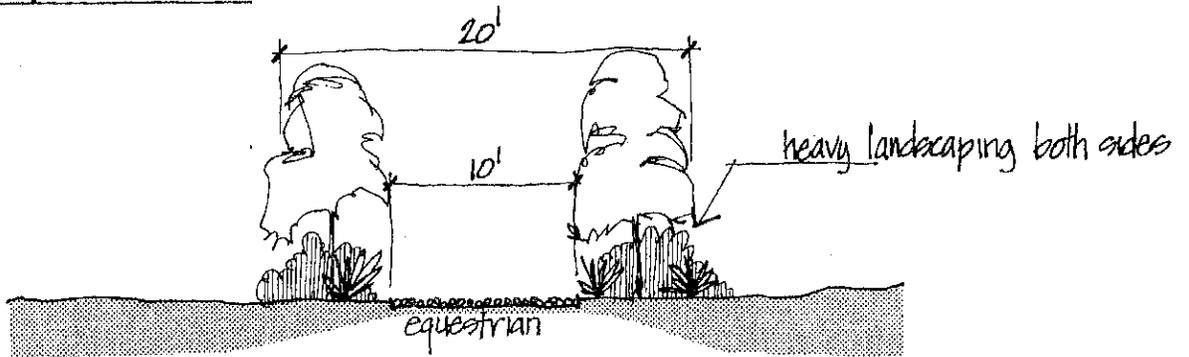




EMA
ADVANCE PLANNING

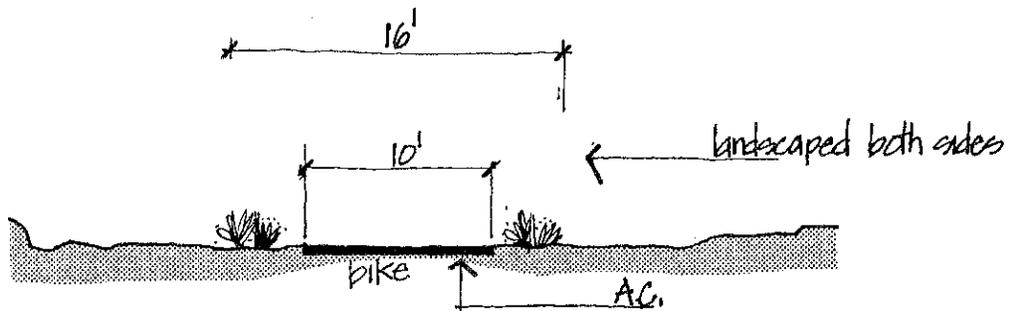
Lower Santiago Creek
Specific Plan
Typical Trail Sections and Estimated Costs

Typical Equestrian Trail



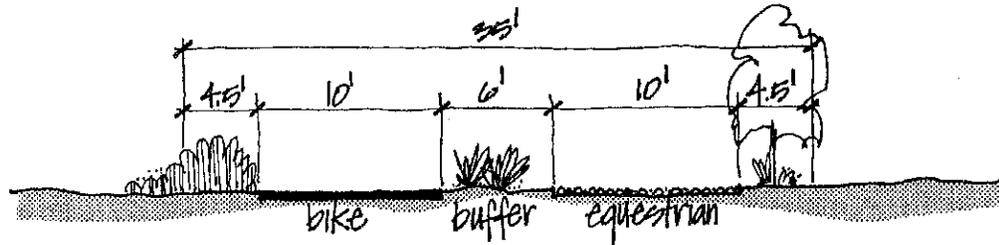
Estimated Cost = \$6.35/1.f.*

Typical Bike Trail



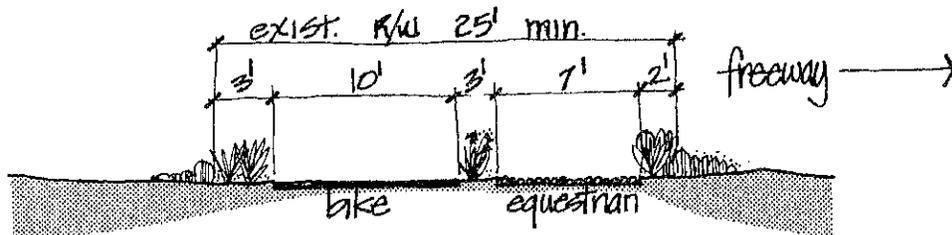
Estimated Cost = \$7.75/1.f.*

Typical Dual Trail - Bike and Equestrian



Estimated Cost = \$14.10/l.f.*

Typical Trail for Channel Maint. Roadway and Garden Grove Freeway
Right-of-Way



Estimated Cost = \$10.75/l.f.*

* Estimated cost includes:

1. Rough grading
2. Subgrade
3. Paving
4. Landscaping
5. Signing

of Santiago Creek to allow trail users to cross the creek to the trail on the south side of the channel. From the river to Bristol Street, the trail will remain on the south side of the creek within the proposed linear park area. At Bristol Street the trail will ramp to the channel bottom and pass under the roadway bridge. It should be noted that the proposed ramps at the mouth of the creek will also be utilized by the Riverview Golf Course as access across the creek.

Bristol Street to Santa Ana Freeway. In this reach, the trails will be in the channel on a benched area as shown in the typical section on *exhibit 12a*. Ramps to the channel bottom to allow access to and from the trail will be provided at the proposed Bristol Reservoir Park and existing Fisher Park. At Flower Street, the SPRR, the Santa Ana Freeway and Arnett Drive, the trail will pass under the bridges via the channel bottom. In this subreach special controls should be installed at access points to the creek trails which will limit the use of the trails to bicycles and equestrians. Local residents have expressed great concern that motor driven vehicles will use the trails, thereby causing noise and dust problems.

Santa Ana Freeway to Main Street. The trail will be located on the south side of the channel adjacent to the channel wall. Trail ramps will be provided at the Santa Ana Freeway and Main Street. This will provide trail user access to the portion of Santiago Park which Santa Ana plans to extend west of Main Street. If no park development plans are forthcoming, the trails could easily remain in the channel through the subreach.

Reach II

Main Street to Glassell Street. The trails through this subreach will be located on the south side of the existing WPA masonry walled channel. There presently exists a small bench area adjacent

to the top of the channel throughout this subreach. It is on this bench that the proposed trails will be located. The City of Santa Ana is presently considering the redevelopment of Santiago Park. This may somewhat alter the ultimate location of the trails within the park.

Glassell Street to Cambridge Street. At Glassell Street the two trails will separate. The bicycle trails will be located in the channel (parking lot) through Hart Park. The bicycle trail will leave the channel at the easterly boundary of the existing park area and proceed southerly along the easterly side of the existing baseball diamond to join the equestrian trail at the Garden Grove Freeway. The equestrian trail will follow the southerly boundary of Hart Park adjacent to the Garden Grove Freeway. At the southeasterly corner of the park (near the existing soccer fields) both trails will continue easterly within freeway right-of-way via an existing drainage bench to Cambridge Street. The trail crossing at Cambridge Street will be at street grade.

Reach III

Cambridge Street to Tustin Avenue. The trails will parallel the Garden Grove Freeway within existing freeway right-of-way. It will be necessary to underground an existing drainage channel to provide sufficient area for the trails. There is an existing sewerage easement along the rear of the houses to the north of the trails (Tract No. 4067) which will provide a buffer between the trail area and homes. If a buffer is not necessary or if the drainage channel right-of-way is not available, the sewerage easement may be a reasonable alternative trail location. The California Department of Transportation (CALTRANS) has been contacted regarding the feasibility of utilizing the freeway right-of-way for trail purposes. CALTRANS District Seven generally indicated that such a use would be possible provided adequate fencing is installed to protect trail users. They also indicated that any formal approval of the proposed trails will require a submittal to the Sacramento office showing the trail alignment, safety fencing,

landscaping, engineering data regarding storm drain design and maintenance provisions. The trails will cross Tustin Avenue at grade requiring the modification of the existing signal at the intersection of Tustin Avenue and the Garden Grove Freeway.

Tustin Avenue. After the trails cross to the east side of Tustin Avenue, they will parallel the freeway right-of-way for approximately 180 feet, then turn north and run along the rear of an existing vacant lot and a Union service station to Fairway Drive. The trails will cross Fairway Drive at grade and proceed northerly through property presently owned by the Easter Seal Foundation to La Veta Avenue. The trails will cross La Veta Avenue at grade utilizing the existing traffic signal and at that point rejoin the creek area.

Tustin Avenue to Newport Freeway. Trails will be on the southerly side of the creek utilizing the proposed channel maintenance roadway.

Newport Freeway to Chapman Avenue. In this reach the bicycle trail will remain on the top of the bank adjacent to the YMCA and Yorba Park. The equestrian trail will be located in the creek bottom. Ramps will be provided at the Newport Freeway and Chapman Avenue bridges to permit the trails to pass under the roadways. In addition, equestrian ramps will be provided at Yorba Park to permit access to the proposed rest stop.

Chapman Avenue to SPRR. The trails will be located along the southerly bank of the greenbelt channel. Due to the mild channel slopes in this reach (5:1), the trail may meander down the channel slope at various locations within this subreach. Trail ramps will be provided at Chapman Avenue and the proposed Walnut Avenue Extension.

The Master Plan of Bikeways shows a regional bicycle trail paralleling Walnut Avenue westerly of Santiago Creek. However, be-

fore reaching the creek, the trail turns north onto Hart Avenue and proceeds northerly to Katella Avenue where it continues easterly to the SPRR trail (Railroad Bikeway). Under the suggested plan, it is recommended that the trail on Hart Avenue and Katella Avenue be eliminated and the trail on Walnut Avenue be extended to Santiago Creek where a direct trail tie to the Railroad Bikeway and the creek trail can be made.

Reach IV

SPRR to Prospect Street. In this subreach the trails will parallel the south side of the proposed greenbelt channel. Should the boundaries of Lower Santiago Creek Regional Park be expanded in this area, the trails should be realigned to meander through the park area. The trail crossing at Prospect Street will be at grade.

Prospect Street to Hewes Street. The trails will be located along the northerly side of Bond Avenue within a fifty-foot wide greenbelt strip between the street right-of-way line and the top of slope for the retarding basin.

Hewes Street to Villa Park Road. Within this subreach the trails will parallel the proposed realignment of Hewes Street, being located between the street and the top of the proposed retarding basin. The trail crossing at Villa Park Road will be at grade.

Villa Park Road to Loma Street. The trails will pass through the proposed vista point (trail staging area) and proceed down the proposed trail ramp (landfill site) to the creek bottom. The trails will then follow along the south side of the creek to Loma Street where they will pass under the existing bridge.

Reach V

Loma Street to Windes Drive. Through this subreach of the creek the trails will meander through the regional park generally as shown on *exhibit 12e*. Basically, the bicycle trail will be on the south side of the creek and the equestrian trail on the north side. At ultimate build-out, the regional trails within the park will replace the trails which presently parallel Santiago Canyon Road between Hewes Street and Orange Park Boulevard.

Windes Drive to Villa Park Dam. Within this reach the trails will meander through the regional park, generally following the trails presently used by local equestrians. At Villa Park Dam the trails will utilize the existing ramp adjacent to the dam keeper's residence to pass over the dam. Once past the dam, the trails will join with regional trails within the reservoir area.

Several adopted trail plans show the regional trails passing around the northeasterly abutment of the dam. The feasibility of locating trails in this area is very doubtful due to the extremely steep slopes which would necessitate extensive grading. In addition, trails on the northeasterly side would have to pass through the debris pool area on the upstream side of the dam where the soil conditions are extremely poor and storm water is generally ponded. Due to the above constraints, trails in this area, as shown on previously adopted plans, are not proposed.

A major equestrian trail tie to the Anaheim Hills trail system is shown on *exhibit 12e*. The trail utilizes an existing fire road and will tie to the existing trail within the Edison easement northerly of the creek. A trail tie at the proposed location will require that an easement be obtained from the Anaheim Hills Company and the Carpenter Irrigation District.

A previously proposed trail tie to the Anaheim Hills area was shown in a canyon located northwesterly of the suggested trail location (*See exhibit 7*). Trails in this particular location would require grading within the existing pristine canyon. Also, the trails would terminate at the toe of a proposed 150 foot fill slope for Serrano

Road, requiring the construction of a series of extensive switch-backs in order to work the trails above the canyon floor to Serrano Road. Upon reaching Serrano Road, the trails would parallel the highway until reaching the existing Edison easement trail. The feasibility of trails along this alignment is highly questionable.

FLOOD CONTROL

The suggested flood control plan for Santiago Creek proposes the implementation of flood control protective works which best fit existing constraints yet provide a level of flood protection consistent with local and federal standards. The plan proposes the installation of a flood retarding facility in the area of the existing sand and gravel operations above Collins Avenue-Prospect Street and an increase in the controlled release from Villa Park Dam. The impact of these two facilities will be to reduce the required capacity of the channel in the Orange and Santa Ana areas, thereby providing greater flexibility in the type of protective works which can be installed.

The proposed flood retarding basin will have the general configuration as shown on *exhibit 12d*. The purpose of the basin will be to reduce the peak flow in Santiago Creek below Collins Avenue-Prospect Street during a general project flood from 17,200 cfs to approximately 10,000 cfs. The basin will be of sufficient size to impound approximately 3,400 acre-feet of water.

To accomplish this, a bypass channel is proposed along the north-westerly boundary of the project site from Villa Park Road to Collins Avenue-Prospect Street. The proposed channel will be a vertical wall reinforced concrete channel having a base width of approximately seventy feet and a depth of approximately seventeen feet. At the downstream end of the basin (approximately 400 feet upstream of Collins Avenue-Prospect Street), a channel side weir will be installed on the south side of the concrete channel section over which peak flood flows will be diverted into the basin area. The weir will be designed so that the maximum bypass flow will be approximately 10,000 cfs. The basin will receive flood water only when the channel flow exceeds 10,000 cfs.

The majority of the proposed basin site consists of sand and gravel operations with pits having a depth in some locations of approximately

150 feet. The available storage volume in the pits far exceeds the required flood storage volume (3,400 acre-feet). However, to effectively utilize the total pit area for flood control storage would require the construction of a pump station to drain the pits in a reasonable period of time. Because of the excessive cost associated with the construction of such a facility, it is proposed that only the top twenty-two feet of the basin area be utilized for effective flood storage (elevation 265 to 287). This concept allows the flood storage area of the basin to be drained by gravity flow through a pipe located at the southwest corner of the basin, thereby eliminating the need for a large pump facility.

In order to provide adequate flood storage volume, the high areas in the basin will be excavated to elevation 265. Portions of the excavated material will be used to stabilize the peripheral slopes of the basin. A preliminary soils investigation was prepared in conjunction with this study to determine the suitability of this material for slope stabilization. The report indicates that the material, the majority of which is fine silts and clays, will be suitable provided it is mixed on a 50-50 basis with a well graded material. To avoid the high cost of importing material, it is proposed that the area of the basin be expanded to include portions of the area southeasterly of Hewes Street, thereby providing adequate on-site material for the required blending. The expansion of the basin requires that Hewes Street be realigned between Santiago Boulevard and Bond Avenue. In determining the volume of material necessary to stabilize the slopes, it was assumed that the slopes would be constructed on a three horizontal to one vertical slope.

Since the storage area below elevation 265 is not being considered as effective flood storage, other uses such as water conservation, water reclamation or possibly a recreation lake may be feasible. During discharges of storm flow into the basin, the area below elevation 265 is assumed to be inundated and to remain so until either the excess water is pumped out or until it percolates into the ground water basin.

A 78 inch diameter reinforced concrete pipe will be installed from the southwest corner of the basin to a point approximately 2,000 feet downstream of Collins Avenue-Prospect Street to drain the flood waters out of the flood storage portion of the basin back into Santiago Creek. It is estimated that following a design flood, the flood storage area of the basin will be drained in approximately ten days. The outlet pipe will be gated and will be operated in accordance with a storm operation manual which will be developed during the final design of the basin.

Two road profiles will be modified to facilitate the basin construction. At the upstream end of the basin, the profile of Villa Park Road will be raised approximately five feet above its present low point in order to enable flood flows to enter the bypass channel without overtopping the road. At the downstream end of the basin, the profile of Collins Avenue-Prospect Street will be lowered approximately four feet to elevation 298 in order to provide an emergency over-flow area should the capacity of the basin be exceeded.

A report describing the proposed basin was submitted to the State of California Department of Water Resources, Division of Safety of Dams, for a determination as to whether the proposed facility would qualify as a dam. Their review concluded that the basin is not a dam and, therefore, not subject to state jurisdiction.

Concurrent with the implementation of the retarding basin it is proposed that the controlled release from Villa Park Dam be increased. The current operation schedule for the dam limits the maximum controlled release to 3,500 cfs. The dam is capable of releasing a much higher discharge provided the energy dissipator below the dam outlet is modified. Because of the minor cost associated with the necessary modification, it is proposed that the energy dissipator be reconstructed and the controlled release be increased to 6,000 cfs. By increasing the amount of water released from the reservoir earlier in a storm, greater storage capacity is reserved for use when the flood peak occurs. It is estimated that by increasing the controlled release the peak flow immediately below the dam for the general project flood can be reduced from 21,000 cfs to 17,200 cfs.

It should be noted that with the implementation of the retarding basin and the increase of the Villa Park Dam controlled release, the peak flow in the Santa Ana area during a general project flood will be reduced from 21,000 cfs to approximately 12,000 cfs. The proposed basin has little or no effect on the local project flood which would result in a peak flow of approximately 15,400 cfs in the Santa Ana area. However, because of the flatness of the drainage area in the Santa Ana and Orange areas and the limited capacity of local drainage facilities, it was considered reasonable not to use the local project flood as the design storm. For a more detailed explanation of the methodology used to determine design discharges for the creek, the reader is referred to *appendix D*.

In addition to the flood retarding measures described above, channel protective works are proposed at various locations along the creek where the existing improvements or natural watercourse are not of sufficient capac-

ity to convey the design flow. The proposed retarding facilities and protective works will provide general project flood protection (200 to 500-year flood). It should be noted that if the retarding basin is not constructed, the downstream channel protective works as suggested in this plan will still have sufficient capacity to convey the 100-year flood.

To preserve the flood plain necessary for implementing the suggested channelization and greenbelt, the adjacent cities are encouraged to adopt flood plain (FP) zoning along Santiago Creek. This will restrict development upon flood prone land which is an integral part of the suggested plan.

The following is a brief summary of the channel protective works proposed:

Reach I

Santa Ana River to Bristol Street. A vertical wall concrete channel is suggested for this subreach of the creek. The channel will have approximately a fifty-five foot base width and will be twelve feet deep. The channel will be aligned on the northerly side of existing right-of-way in order to provide area for a linear greenbelt on the south side of the channel.

Bristol Street to Santa Ana Freeway. A vertical wall concrete channel is suggested for this subreach. The channel will be constructed with an elevated bench area about four feet above the channel bottom and approximately thirteen feet in width. The bench will be located next to the channel wall and will provide a trail area for horses. A six to twelve inch thick wood chip or soil surface will be provided on the bench to make it suitable for horse travel. The channel will be fifty-six to sixty-one feet wide and will vary from twelve to sixteen feet in depth. The top of the channel wall will be roughly at the same elevation as the surrounding area. Special color and texture treatment are proposed as an essential aspect of the vertical wall channel construction in this subreach. The use of an earthy brown color additive and molded forms will make the concrete appear as stone masonry, thereby greatly enhancing the visual impact of the

channel. However, it should be noted that such treatment will increase the cost of the channel construction in this subreach by about \$680,000.

To provide adequate hydraulic capacity, the following bridges will be reconstructed: Bristol Street bridge, Baker Street pedestrian bridge and Southern Pacific Railroad bridge.

Santa Ana Freeway to Main Street. In this subreach a conventional vertical wall channel is suggested. The channel will have a training wall down the middle to control superelevation of the flood water which will occur in the sharp curves which are inherent to this subreach. The channel will be realigned from the existing flow path of the creek to reduce the severity of the sharp curves. The channel will be approximately seventy-five feet wide and twelve feet deep.

The new channel alignment is contingent upon the acquisition of right-of-way in conjunction with the City of Santa Ana's draft green-belt plan. This will require that Arnett Drive and Roe Drive be modified to cul-de-sacs. If the right-of-way is not obtained, the channel will need to be constructed within the existing public right-of-way with much sharper curves than those shown on *exhibit 12a*.

Reach II

Main Street to Santiago Avenue. From Main Street to a point approximately 400 feet upstream, the suggested plan proposes the construction of protective works identical to those proposed downstream of Main Street. The extension of the channel improvement to this point is necessary to effectively intercept the flow and direct it through the Main Street bridge. From the terminus of the above mentioned protective works to Santiago Avenue, no protective works other than the existing WPA channel are proposed. During the design

flood, the flow will exceed the capacity of the existing channel, however, the overflow will be limited to the park area. Adjacent residential and commercial structures will not be flooded. The anticipated amount of damage that would be sustained by the park during the design flood is considered minor compared to the negative impact the construction of a new channel in this area would have on the atmosphere of the park.

Santiago Avenue to Glassell Street. The suggested plan for this subreach calls for the lining of the bottom (invert) of the existing WPA channel. This improvement is necessary due to the steepness of the creek profile in this area which is causing degradation of the channel bottom and thereby endangering the integrity of the existing WPA lining. The lining of the channel bottom will somewhat improve the channel capacity; however, during the design flood, flow will still overtop the channel walls and inundate portions of the park. The extent of damage would be minimal and does not warrant the construction of a completely new channel.

Glassell Street to Shaffer Street. The suggested plan specifies no additional channel protective works in this subreach. The existing WPA channel will convey the bulk of the flow with some overtopping of the channel walls into adjacent Hart Park. City staff has indicated a willingness to contend with the slight damage this will cause in the park rather than to destroy the beauty of the old channel walls constructed of river rock masonry.

Shaffer Street to Cambridge Street. A trapezoidal turf-lined channel is proposed for this subreach. This type of channelization will provide moderate side slopes (five horizontal to one vertical) suitable for park use in conjunction with the city's proposed expansion of the park in this area. The slopes will be underlaid with riprap on a 2 to 1 slope which will prohibit lateral erosion should the turf and underlying soil be washed out during storm flows.

Reach III

Cambridge Street to Santiago Golf Course. The flood control protective works in this reach will be identical to those proposed between Shaffer Street and Cambridge Street.

Santiago Golf Course to Tustin Avenue. No flood control protective works are proposed for this subreach. During a design flood, the flow will be confined to the golf course area and no adjacent homes will be subject to inundation. Formal protective works through the golf course would severely hamper its present operations. The owner also has indicated that he feels protective works are not desirable.

Tustin Avenue to Newport Freeway. A trapezoidal channel with rock slope protection is suggested for this subreach. The channel will be approximately thirteen feet deep and have a seventy-foot base width. The riprap slopes will be inclined at a 2 horizontal to 1 vertical slope.

Newport Freeway to Chapman Avenue. No protective works will be implemented in this reach. The existing watercourse is well incised and the floodplain is contained within the existing creek area. Lateral erosion of the creek banks may occur during large storms; however, no existing structural improvements are close enough to the creek to warrant concern. Selectively placed rock slope protection may be required at certain locations which prove vulnerable during storms.

Chapman Avenue to Southern Pacific Railroad. A turf lined greenbelt channel is suggested for this subreach. It will consist of a trapezoidal channel with rock protection on the side slopes. The

rock will be covered with soil placed on a 5 horizontal to 1 vertical slope and planted with turf. The turf channel will be approximately nine feet deep and have a base width of approximately fifty-two feet. The mild side slopes will permit use of the channel for park activities. During major floods, the soil cover may wash away; however, the underlying rock banks will limit the extent of lateral erosion. Several longitudinal gradient control structures will be necessary to lower the profile of the greenbelt channel as it drops out of the foothills. The structures will range in height from four to seven feet and will be approximately 1,500 to 2,600 feet apart.

Reach IV

Southern Pacific Railroad to Prospect Street. The type of channel improvements in this reach are identical to those described above for the Chapman Avenue to SPRR subreach.

Prospect Street to Villa Park Road. The proposed retarding basin and bypass channel described earlier will be located in this subreach.

Villa Park Road to Loma Street. No formal type of flood control protective works are proposed in this subreach. Should the pits in this reach be utilized as an inert landfill site, an informal meandering naturalistic channel may be developed concurrent with that operation.

Reach V

Loma Street to Villa Park Dam. The watercourse in this reach will undergo no formal channelization. Localized slope protection

may be necessary in certain areas to protect existing structural improvements which are subject to damage by lateral erosion. In addition, some protective works may be installed at various locations along the creek to protect future park improvements. However, the major emphasis will be to leave this reach in as natural a condition as possible.

Water Conservation

The sand and gravel extraction area between Collins Avenue-Prospect Street and Loma Street, particularly the Bond gravel pit, remains questionable as a ground-water recharge site. Several earlier reports suggest that due to clay lenses which exist in the area, effective infiltration may not occur. In addition, previous infiltration tests have resulted in a wide range of percolation rates which lead one to question their validity. The long-term operation of a number of wells in the vicinity of the pits appears to indicate that a significant groundwater basin does exist. The continuity of the water-bearing aquifer with the aquifers interrupted by the pits remains in question. Boring logs of various wells do not answer the question. The logs reveal extensive interbedding of sandy-gravel and silty-clay layers throughout the region with no apparent continuity from one site to the next. The Orange County Water District, however, confirms that there is at least sufficient continuity to make the area a worthwhile ground-water recharge site. It would, therefore, seem highly probable that the interbedding detected in borings is the result of the penetration of lenses of various aquifers and/or aquicludes. It would be desirable to ascertain the continuity through a pilot study similar to that proposed by the Orange County Water District (Proposed Santiago Creek Recharge, February, 1975) on a large enough scale to determine what amount of recharge is occurring within the pumped aquifer by infiltration through the sand and gravel pits. Care should be taken, however, to ensure that the pilot study area is representative of the ultimate recharge site. Pilot study efforts should also be directed toward determining actual on-site permeability. If such a study can confirm satisfactory aquifer continuity and permeability, functional water conservation will be feasible.

Should a water conservation program on Santiago Creek be determined feasible, the retarding basin site appears to be the most beneficial location for recharge. This will provide extensive opportunity for a regional park theme which incorporates significant interface with surface water. The basin, as presently proposed, will have over 3,000 acre feet of storage available for water conservation without infringing upon the flood storage requirements.

In addition, the Orange County Water District staff has indicated that the Bond Pit appears to provide the greatest potential for effective recharge on Santiago Creek. One concept which has been proposed is to divert water, whether it be storm flow, reclaimed sewage water or excess MWD water, into the north end of the basin at Villa Park Road where it will enter a constant level desilting lake which could concurrently be used for recreational purposes. The desilted water will exit the lake via a small stream and flow south into the Bond Pit where it will be infiltrated into the groundwater basin (*See exhibit 12d*).

One means of conveying water to the basin would be to utilize Santiago Creek, thereby providing a continuous live stream along the creek which would augment the proposed regional park. The live stream concept, which was originally proposed in the Lowry Report (see Previous Studies), still has validity provided an adequate source of water can be found. The sources of water which have been previously considered include excess MWD water or reclaimed waste water. The cost of using MWD water, if any is available, may prove to be prohibitive and, therefore, not a viable source. The use of reclaimed waste water, provided excess effluent becomes available, may not be possible because of public health standards controlling its use in a park where public contact with the water may occur. Therefore, a careful investigation should be completed before any commitment is made toward developing a live stream along the creek. One additional source of water which may be utilized is the existing water wells along the creek. The production capacity of the wells has not been investigated; however, there may be sufficient capacity to develop a small stream which can be incorporated into the proposed park design with any excess water being returned to the groundwater basin via the proposed conservation facility.

In addition to developing new water conservation facilities on Santiago Creek, an effort should be made to preserve the existing facilities, in particular the Carpenter and Serrano Irrigation Districts' submerged dam

below Villa Park Dam. It warrants preservation by virtue of its historical significance and impact on the plants and animals which thrive in the area.

CIRCULATION

The suggested plan has included the extensions of Walnut Avenue and Orange Park Boulevard across the creek as indicated in the county's Master Plan of Arterial Highways. The alignments shown on *exhibits 12c and 12e* are preliminary and are subject to change depending on the conditions which exist at the time of implementation.

As mentioned previously in this report, a traffic analysis was not conducted to determine whether Walnut Avenue or Orange Park Boulevard should be eliminated or whether additional crossings of the creek should be provided. The results of the Northeast Orange County Circulation Study (NEOCCS) will answer these questions.

The Walnut Avenue extension will cross the creek near the abandoned Southern Pacific Railroad bridge. Fills will have to be provided for the roadway at the bridge overcrossing to ensure adequate clearance over the proposed flood control and trail improvements. In order to reduce the impact of the highway on the greenbelt corridor, the final design should consider such mitigation measures as heavy landscaping, mild (5:1 or flatter) fill slopes, and possible architectural treatment of the bridge. It should also be noted that the proposed road alignment passes through a presently active wash water pit on the south side of the creek. The soil conditions in this area are, undoubtedly, poor and will require special consideration during the design phase of the project.

Of the two proposed extensions, the Orange Park Boulevard crossing will have the greatest impact on the creek area. The alignment passes through the middle of the proposed regional park. Extensive fills (15 feet to 20 feet high) will be required which will have a significant visual impact on the greenbelt corridor and will detract from the desired open space effect. It will separate the proposed high school from the park and will increase the noise level in the area. Because of the severity of the above impacts, careful consideration relative to the need for the extension should be made during the NEOCCS study and, if the need is determined marginal from

a traffic standpoint, serious consideration should be given to its deletion from the county's Master Plan of Arterial Highways.

LANDFILLS

The Pit Rehabilitation Technical Task Force (County of Orange General Services Agency), which has investigated the desirability of utilizing abandoned gravel pits in Orange County as landfill sites, recommends in their draft report that the county should (1) pursue the acquisition of the Smith Pit and the Hurwitz-Buchheim Pit as Class III inert landfill sites, and (2) consider the ultimate acquisition, upon completion of gravel operations, of the Bond Pit as a sanitary landfill site.

During the preparation of this specific plan, an analysis has been made to review alternative public uses for the Smith Pit and the Hurwitz-Buchheim Pit. The result was that the best ultimate public use for the two pits is park land. However, the existing physical conditions are not conducive to such a use and, therefore, the pits should be partially filled in order to provide adequate drainage and safe public use. It appears the most economical way in which the filling could be accomplished would be to utilize the two pits as an inert landfill site. In this regard, three conceptual grading plans have been prepared for the two pits (*See appendix F*). The plans have been presented to various citizen greenbelt groups and other interested parties to determine their reaction to the concepts. The general indication was that the pits should not be completely filled, but rather only partially filled in order to maintain the existing "canyon effect." The suggested plan therefore recommends that the bench concept for filling of the pits be pursued. Under this concept the pits will be partially filled. The fill in the Hurwitz-Buchheim Pit will be ramped to provide trail access to the creek area from a proposed Vista Point to the west (*See exhibit 12d*).

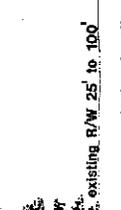
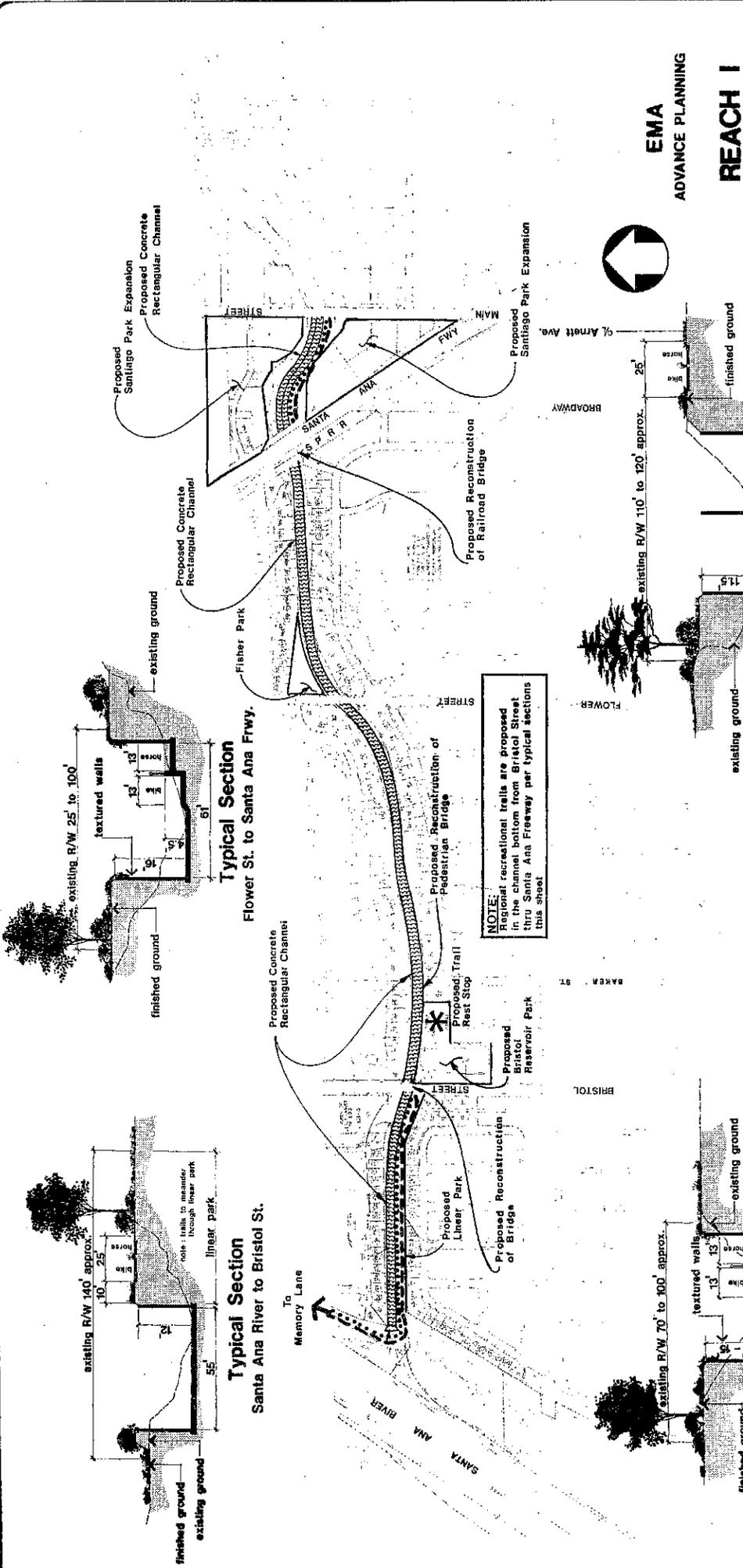
As a result of recommendations made by the EMA, the County Board of Supervisors authorized the General Services Agency to proceed with negotiations for the acquisition of the Hurwitz-Buchheim Pit. Acquisition of the Smith Pit has not been recommended by EMA but has been deferred until the Hurwitz-Buchheim Pit acquisition has been completed and an accurate assessment made as to whether both pits can be economically filled

with inert material. The main issue which still needs to be resolved regarding the use of inert material for fill purposes is the quantity of inert material available and consequently the time required to fill the pits.

The alternative public uses for the Bond Pit that were reviewed during this study included a refuse disposal site, flood control retarding basin, groundwater recharge basin and public park. Of the uses reviewed, the landfill alternative appears to be the least desirable because of:

1. The close proximity of the site to existing residential development;
2. Limited vehicular access;
3. Possible contamination of the groundwater basin if municipal wastes are used to fill the pits;
4. The length of time required to fill the pit if only inert fill materials are used; and
5. Possible odor problem if municipal wastes are used.

Due to the above problems the suggested plan for the creek proposes that the Bond Pit be used for flood control and water conservation facilities; both of which could be tied into possible regional park uses in lieu of a sanitary landfill project.



Typical Section
Flower St. to Santa Ana Fwy.



Typical Section
Santa Ana River to Bristol St.



Typical Section
Bristol St. to Flower St.

NOTE:
Regional recreational trails are proposed in the channel bottom from Bristol Street thru Santa Ana Freeway per typical sections this sheet

- LEGEND**
- REGIONAL BICYCLE TRAIL
 - LOCAL BICYCLE TRAIL
 - REGIONAL EQUESTRIAN TRAIL

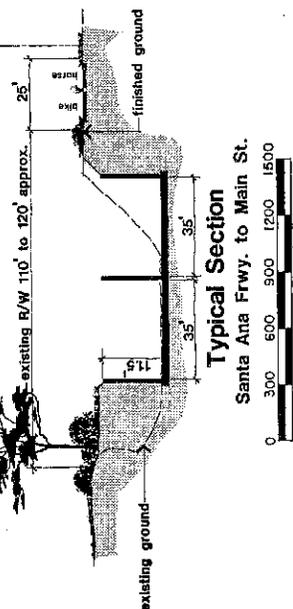


EMA
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**REACH I
SUGGESTED PLAN**

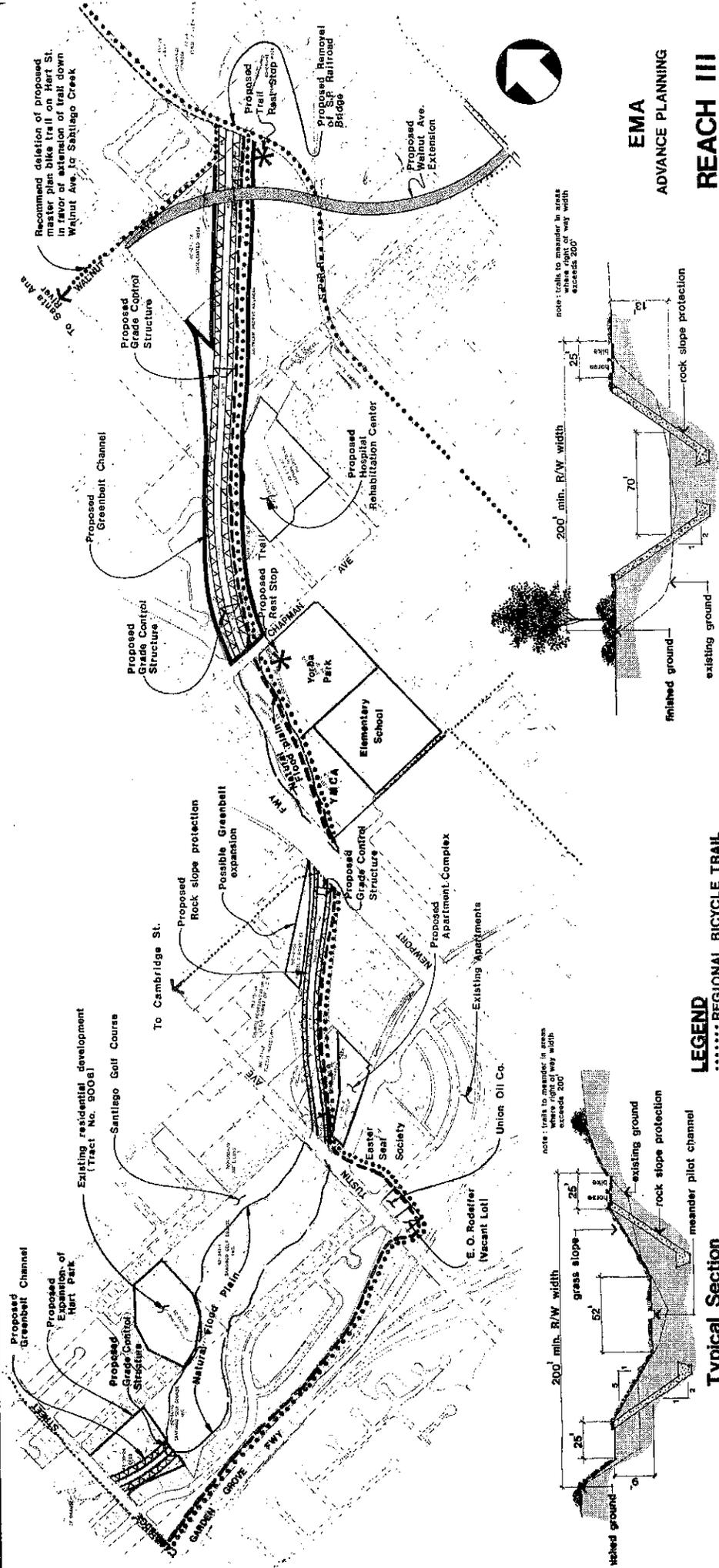
**LOWER SANTIAGO CREEK
SPECIFIC PLAN**

Exhibit 12a



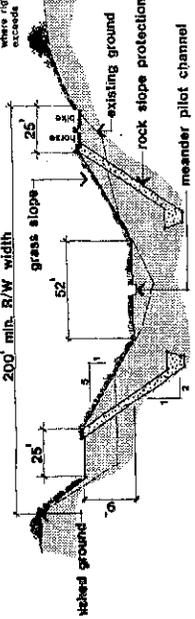
Typical Section
Santa Ana Fwy. to Main St.

0 300 600 900 1200 1500
SCALE: 1"=600'



Recommended deletion of proposed master plan bike trail on Hart St. in favor of extension of trail down Walnut Ave. to Sabalago Creek

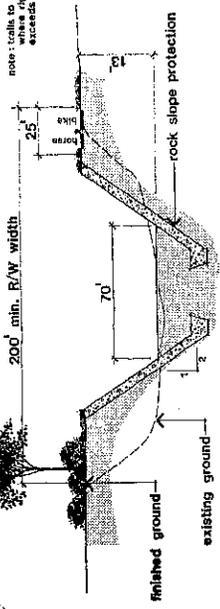
note: trails to meander in areas where right-of-way width exceeds 200'



Typical Section
Cambridge St. to Santiago Golf Course
Chapman Ave. to S.P.R.R.

- LEGEND**
- REGIONAL BICYCLE TRAIL
 - LOCAL BICYCLE TRAIL
 - REGIONAL EQUESTRIAN TRAIL
 - LOCAL EQUESTRIAN TRAIL
 - SUGGESTED REGIONAL PARK BDRY

note: trails to meander in areas where right-of-way width exceeds 200'

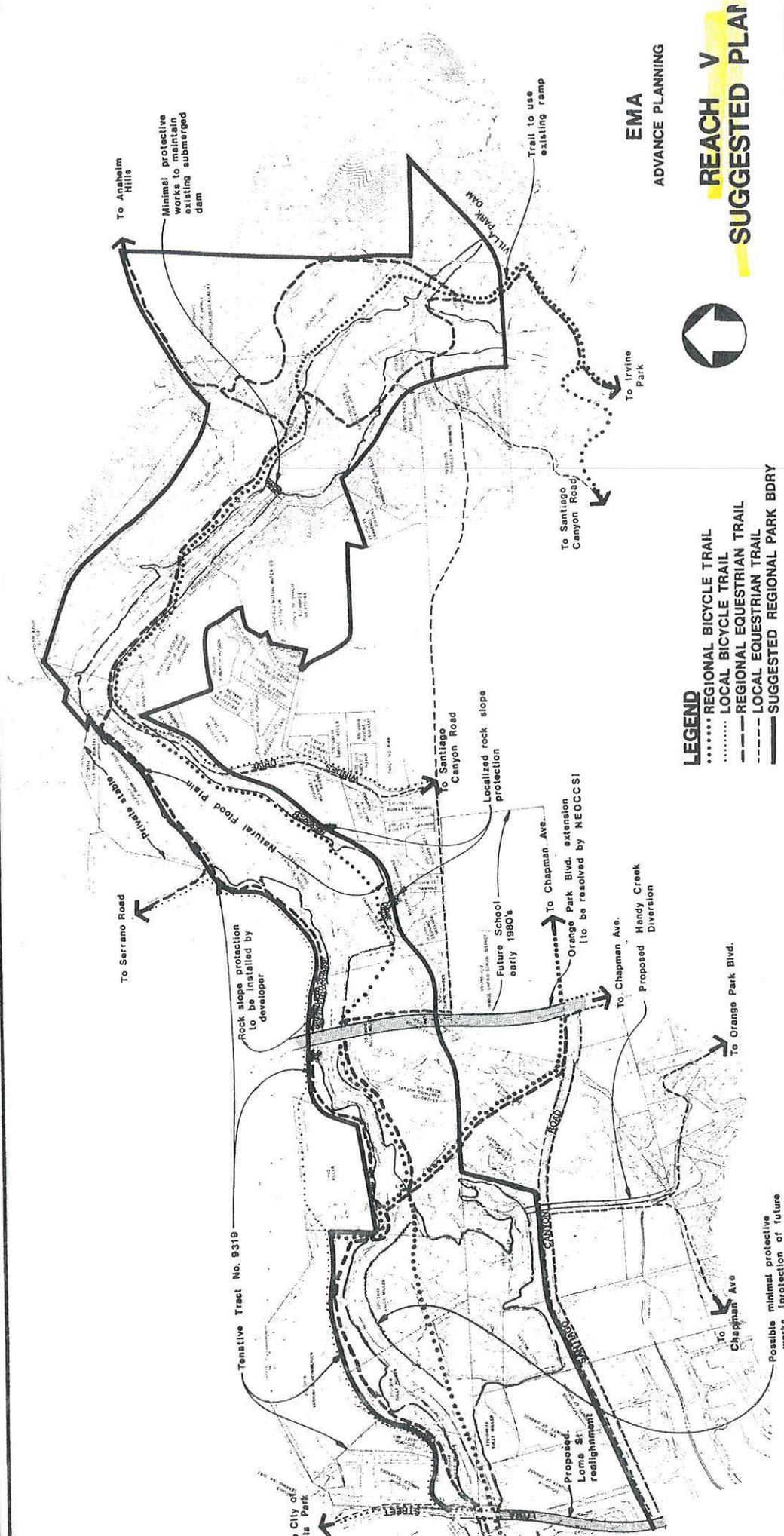


Typical Section
Tustin Ave. to Newport Frwy.



EMA
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REACH III
SUGGESTED PLAN

LOWER SANTIAGO CREEK
SPECIFIC PLAN



EMA
ADVANCE PLANNING



REACH V
SUGGESTED PLAN

LOWER SANTIAGO CREEK
SPECIFIC PLAN

- LEGEND**
- REGIONAL BICYCLE TRAIL
 - LOCAL BICYCLE TRAIL
 - REGIONAL EQUESTRIAN TRAIL
 - LOCAL EQUESTRIAN TRAIL
 - SUGGESTED REGIONAL PARK BDRY



To Ashbalm Hills
Minimal protective works to maintain existing submerged dam

Trail to use existing ramp

To Irvine Park

To Santiago Canyon Road

To Santiago Canyon Road

Localized rock slope protection

To Chapman Ave.
Orange Park Blvd. extension (to be resolved by NECCS)

To Chapman Ave.
Proposed Handy Creek Diversion

To Orange Park Blvd.

To Serrano Road

Rock slope protection to be installed by developer

Tentative Tract No. 9319

To City of Iita Park

To Chapman Ave

Possible minimal protective works (protection of future park improvements)

Proposed Lome St. realignment

COST ESTIMATE

The costs discussed within this chapter of the report are those costs relevant to the suggested plan. Additional detailed cost information pertaining to all the alternatives investigated may be found in *appendix E*.

Table 2 reflects unit costs upon which this estimate is based. They are representative of 1975 prices and, therefore, adjustments will be necessary to account for the inflation between 1975 and the implementation date for each phase of the suggested plan.

For ease of identification and consistency with the previously established reach format, the cost of constructing the suggested alternative has been broken down into six logical development tasks for each of the five defined reaches. These are: park improvements, landscaping, trail improvements, flood control facilities, highway improvements, and acquisition of right-of-way. *Table 3* enumerates these costs. A detailed explanation to facilitate proper interpretation of the cost summary follows.

PARK IMPROVEMENTS

Park improvement costs reflect the expense of constructing park facilities and landscaping park areas within the "suggested" minimum regional park and local city parks included within the limit of the specific plan area. The development cost has been determined on a basis of ultimate use. High activity parks are priced at \$19,000 per acre, quasi-wilderness parks at \$17,000 per acre, and wilderness parks at \$8,000 per acre.

The following list indicates which park areas are proposed for each of the above-mentioned levels of development:

PARK	AREA	TYPE
Linear Park (Santa Ana River to Bristol Street)	2.75 ac.	High Activity
Bristol Street Reservoir Trail Rest Stop	4.66 ac.	High Activity

PARK	AREA	TYPE
Santiago Day Camp	4.26 ac.	High Activity
Hart Park (downstream of Glassell Street)	0.70 ac.	High Activity
Hart Park (downstream of Cambridge Avenue)	15.05 ac.	High Activity
Hart Park (upstream of Cambridge Avenue)	4.48 ac.	High Activity
Linear Park (downstream of Newport Freeway)	1.47 ac.	High Activity
Lower Santiago Creek Regional Park	215.0 ac.	High Activity
Lower Santiago Creek Regional Park	255.0 ac.	Quasi-wilderness
Lower Santiago Creek Regional Park	155.0 ac.	Wilderness

The cost of park improvements in Lower Santiago Creek Regional Park does not include the estimated \$910,000 associated with the proposed inert landfill between Loma Street and Villa Park Road (Smith Pit and Hurwitz-Bucheim Pit).

LANDSCAPING

For the purpose of this analysis, landscaping costs include those plantings necessary to buffer any proposed channel protective work from adjacent development. Where protective works are located in proposed park areas, the cost of developing the area outside of the channel area has been considered under park improvement cost. No landscaping is suggested where existing channelization is not to be changed. This will include areas like Santiago Golf Course and the existing portions of Santiago Park and Hart Park. Landscaping to be installed with channel protective works has been estimated to cost four percent of the cost of the proposed channelization. This cost estimating procedure is slightly modified in Reach IV where four percent of the bypass channel cost is used in that part of the reach upstream of Collins Avenue-Prospect Street. No landscaping cost is reflected in Reach V because of the absence of any substantial flood control improvements other than the modification of the Villa Park Dam outlet structure.

Table 2. Summary of Unit Cost Factors for Lower Santiago Creek Specific Plan (1975 Prices)

PROPERTY ACQUISITION	\$4,000--160,000/ac.
	Dependent upon accessibility, slope suitability, flood plain proximity, existing improvements, size, etc.
PARK DEVELOPMENT	
High Activity	\$19,000/ac.
Quasi-wilderness	17,000/ac.
Wilderness	8,000/ac.
EARTHWORK	
Channel Excavation	\$1.50/cu. yd.
Channel (Compacted) Fill	2.00/cu. yd.
Structure Excavation	5.00/cu. yd.
Loose Fill	1.00/cu. yd.
Greenbelt Fill	1.50/cu. yd.
Structure Backfill	5.00/cu. yd.
Retarding Basin and Bypass Channel Earthwork	0.70/cu. yd.
STONE AND GRAVEL	
Facing Stone	\$9.00/ton
Derrick Stone	9.00/ton
Filter Blanket	10.00/cu. yd.
Filter Gravel	6.50/cu. yd.
CLEARING	\$4.00/linear ft.
STEEL	\$0.25/lb.
CONCRETE	
Colored and Textured Concrete	\$125.00/cu. yd.
Benched Channel Concrete	85.00/cu. yd.
Plain Concrete	65.00/cu. yd.
R. C. B. Concrete	70.00/cu. yd.
CONCRETE DROP STRUCTURES	\$1,000.00/ft. of width
FENCING (Chain Link)	\$3.50/linear ft.
R. C. P. 78" diameter	\$78.00/linear ft.
BRIDGE REMOVAL	\$15.00/sq. ft.
BRIDGE CONSTRUCTION	
Highway	\$40.00/sq. ft.
Railroad	120.00/sq. ft.
Footbridge	15.00/sq. ft.
A. C. PAVING	\$15.00/ton
GREENBELT LANDSCAPING	4% of adjacent channel cost
UTILITY PROTECTION & RELOCATION	7% of total reach improvement cost
CONTINGENCIES	15% of total reach improvement cost

*NOTE: Numerous items were estimated as a lump sum where appropriate.

TRAIL IMPROVEMENTS

The trail cost in each reach reflects the construction of a bicycle and equestrian trail. In most locations it is suggested that these trails be of conventional design with appropriate landscape buffers (*See exhibit 11*). There are a few notable exceptions.

In Reach I the trails between Bristol Street and the Santa Ana Freeway are located in the bottom of a concrete channel. The equestrian trail is elevated on a concrete bench above the remainder of the channel invert. Bicyclists will be allowed to cycle on the channel bottom. The cost of trail construction in this area has been considered to be the difference in the cost of constructing an ordinary vertical wall channel and the cost of constructing this benched alternative. The cost is therefore far in excess of the cost per foot used elsewhere within the project area. The Reach I trail cost also includes the cost of a trail connection between Memory Lane and Santiago Creek via the Santa Ana River levee.

Another exception is the construction of trails along the Garden Grove Freeway in Reaches II and III. These trails are to be located on a strip of state right-of-way which is presently used for drainage purposes. In certain areas, this existing ditch will need to be replaced with a buried conduit to provide adequate surface area for trails. The cost of constructing the pipe drain is included in the respective reach costs. Where the trails cross Tustin Avenue, a modification of the existing signal will be necessary. This cost is included in Reach III trail improvement costs.

FLOOD CONTROL FACILITIES

The suggested channelization as previously mentioned is a composite of several of the alternatives initially investigated. The wide variation in the cost of channelization improvements from reach to reach is the result of this factor and the inequality of reach length. The extensive cost attributed to Reach IV flood control improvements is a result of the retarding basin construction designated within this area. A large portion (approximately

four million dollars) of this (more than nine million dollars) is for the grading of the retarding basin slopes to provide a surface which will be compatible with landscaped park use and provide a reasonable factor of safety against slope failure. These reasons for slope improvements are equally applicable to the use of the site as a regional park without implementing the proposed retarding basin. Therefore, the cost should be borne-in-mind as not only an expenditure for flood control, but also as a contribution to the improvement of the area for park use.

Only a minimal cost for the construction of flood control protective works is indicated in Reach V because of the desire to retain this area of the creek as a natural flood plain. Some areas will require localized bank protection in the form of rock slope protection. The extent of protection will vary in relation to adjacent development outside the regional park boundary; therefore, no cost has been estimated for these improvements. The cost which appears under the flood control facilities heading for Reach V represents the expenditure necessary to modify the outlet works at Villa Park Dam to provide for the increased release of controlled flood flow necessary to improve peak flood storage potential in the reservoir behind the dam.

The total cost for implementing the suggested flood control plan including channel construction, bridge reconstruction, MPAH bridge construction and channel right-of-way acquisition is \$24,230,000. This includes the costs associated with the retarding basin acquisition and construction in Reach IV. To make a fair comparison of this cost with the cost of implementing a channelization alternative in which no retarding basin is used, the cost of slope stabilization and right-of-way acquisition within the retarding basin area must be included in the "no-basin" alternative. This is reasonable by virtue of the fact that the basin area will be acquired for regional park no matter what flood control channel alternative is implemented. This area will require remedial work (i.e., slope stabilization) to make it safe for general public use. Based on these limitations, the cost of design storm channelization with no upstream flood retarding is \$27,990,000. This cost comparison readily shows the viability of the suggested plan from an economic standpoint. For a detailed discussion of the above analysis, the reader is referred to *appendix D*.

An undetermined potential for water conservation through the implementation of groundwater recharge may ultimately be developed as a multiple use aspect of the proposed retarding basin and ancillary water conveyance structures. No cost is presently suggested for this application due to its uncertainty.

CIRCULATION

The costs associated with highway improvements include bridge removal, bridge construction, highway realignment, highway profile adjustment and implementation of master planned arterial highway connections across Santiago Creek.

Reach I improvements include the removal and reconstruction of the Bristol Street (vehicular), Baker Street (pedestrian) and Southern Pacific Railroad bridges across the creek. Bristol Street and Baker Street reconstruction is necessary due to the width of the suggested channel beneath these bridges. The financial impact of the Bristol Street bridge is somewhat mitigated by the fact that the bridge must ultimately be expanded to accommodate six-lanes of traffic to comply with the Master Plan of Arterial Highways and to alleviate the severe traffic restriction which it currently presents. The reconstruction of the Southern Pacific Railroad bridge is required due to its massive piers and the fact that they are skewed to the direction of flow thereby causing a major obstruction to the flow of storm waters in the creek.

The bridges across Santiago Creek in Reach III are all compatible with the channelization specified in the suggested plan. One bridge structure, the abandoned Southern Pacific Railroad bridge upstream from Chapman Avenue is designated for removal because it has served no useful purpose since it was damaged in the February, 1969 flood.

The cost of the proposed Walnut Avenue extension is included in the highway implementation cost for Reach III. A resolution of the necessity for this highway connection across the creek is anticipated from the NEOCCS study.

The cost of transportation implementation in Reach IV includes a number of highway projects closely related to the construction of the required retarding basin. The embankment which elevates Collins Avenue-Prospect Street above the surrounding sand and gravel pits is the westerly boundary of the proposed retarding basin. To assure that flow remains within the creek if the design capacity of the basin is exceeded, the profile of this embankment must be lowered. This will allow flows to inundate the roadway and continue downstream rather than into the homes south of Bond Avenue. In addition, the temporary multi-plate arch culvert which is presently under the road must be replaced with a permanent bridge structure which will allow the passage of the design discharge beneath the roadway.

At the other end of the basin, a similar temporary culvert at Villa Park Road must be replaced with a permanent bridge. In addition, to ensure that flood flows do not overtop the roadway, it is necessary to raise the profile of Villa Park Road by approximately five feet above its present low point.

A final factor contributing to the cost of highway construction in Reach IV is the realignment of Hewes Street from Bond Avenue to Santiago Boulevard. This realignment is necessary to provide the opportunity to stabilize the retarding basin slopes adjacent to Hewes Street by excavating rather than importing costly fill material. The benefits are multi-faceted: less expensive basin earthwork; increased flood storage; and realignment of Hewes Street to a level commensurate with county standards.

The cost of Reach V transportation improvements is attributable to one master plan highway connection. This is the extension of Orange Park Boulevard across Santiago Creek. A resolution of the final disposition of this highway proposal is anticipated from the NEOCCS study. Careful consideration will need to be given to (1) the need for a north/south arterial highway, (2) the impact the extension will have on the Mabury Ranch development which it bisects, and (3) the impact this connection will have on Lower Santiago Creek Regional Park.

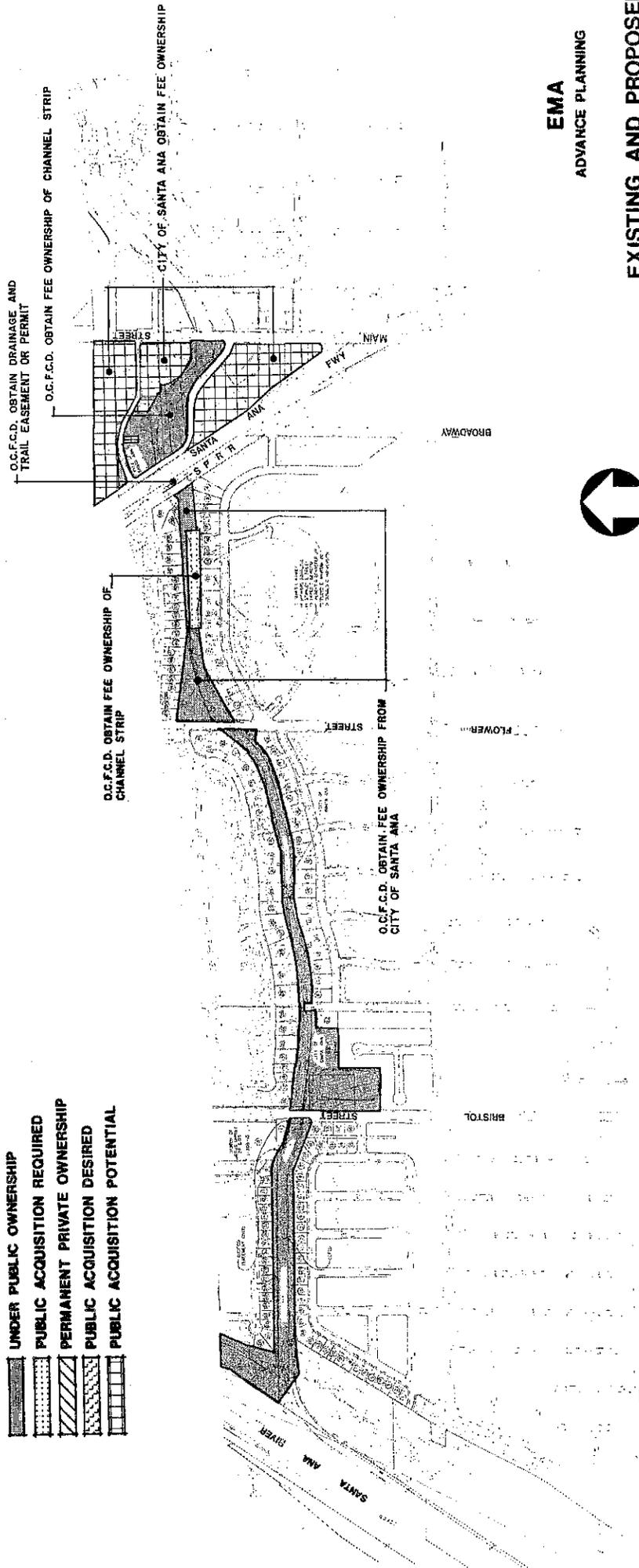
A highway cost not reflected in the table is the realignment of Loma Street which is presently being pursued by the City of Orange. This realignment cost will be financed with funds from the city and the county's Arterial Highways Financing Program.

RIGHT-OF-WAY ACQUISITION

The right-of-way acquisition necessary for implementation of the suggested plan requires the purchase of 490 acres of private property; easement or permits on 17 acres of publicly owned property; and quitclaiming of 12 acres of property owned by the cities of Santa Ana and Orange to the Orange County Flood Control District for drainage and trail purposes (*See exhibits 13a to 13e*). *Table 4* lists the reach location, assessors parcel number, owner, costs, responsible agency and other useful information regarding those parcels which must be purchased to implement the suggested plan. The table includes only those parcels where the need for acquisition is readily discernible. Acquisition of very small parcels adjacent to the Santiago Creek corridor which "may" be required for channel or trail construction have not been included in this estimate.

LEGEND

-  UNDER PUBLIC OWNERSHIP
-  PUBLIC ACQUISITION REQUIRED
-  PERMANENT PRIVATE OWNERSHIP
-  PUBLIC ACQUISITION DESIRED
-  PUBLIC ACQUISITION POTENTIAL



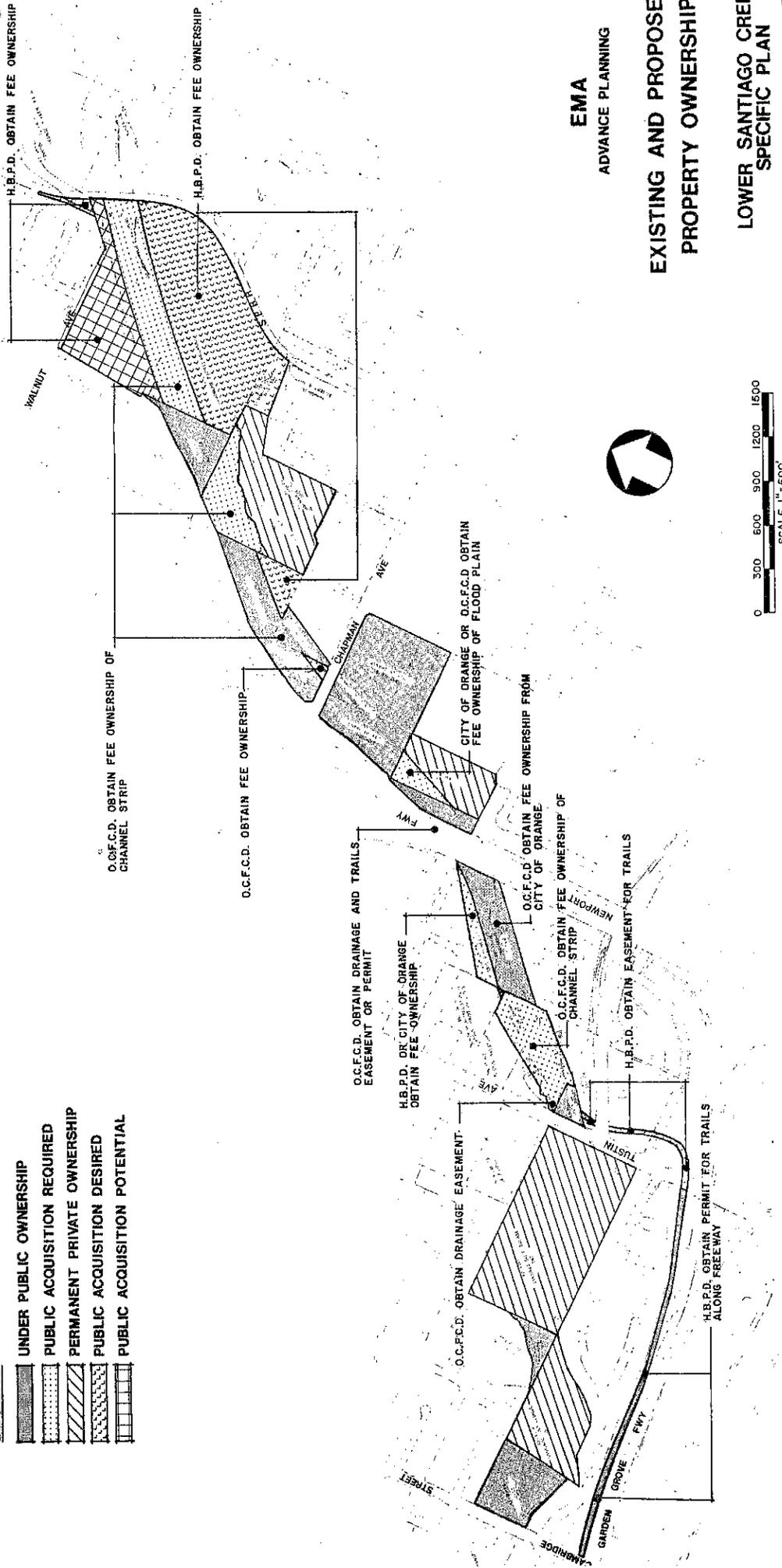
O.C.F.C.D.: ORANGE COUNTY FLOOD CONTROL DISTRICT
 O.C.R.D. : ORANGE COUNTY ROAD DEPARTMENT
 H.B.P.D. : ORANGE COUNTY HARBORS, BEACHES AND PARKS DISTRICT



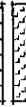
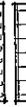
EMA
 ADVANCE PLANNING
**EXISTING AND PROPOSED
 PROPERTY OWNERSHIP**
**LOWER SANTIAGO CREEE
 SPECIFIC PLAN**

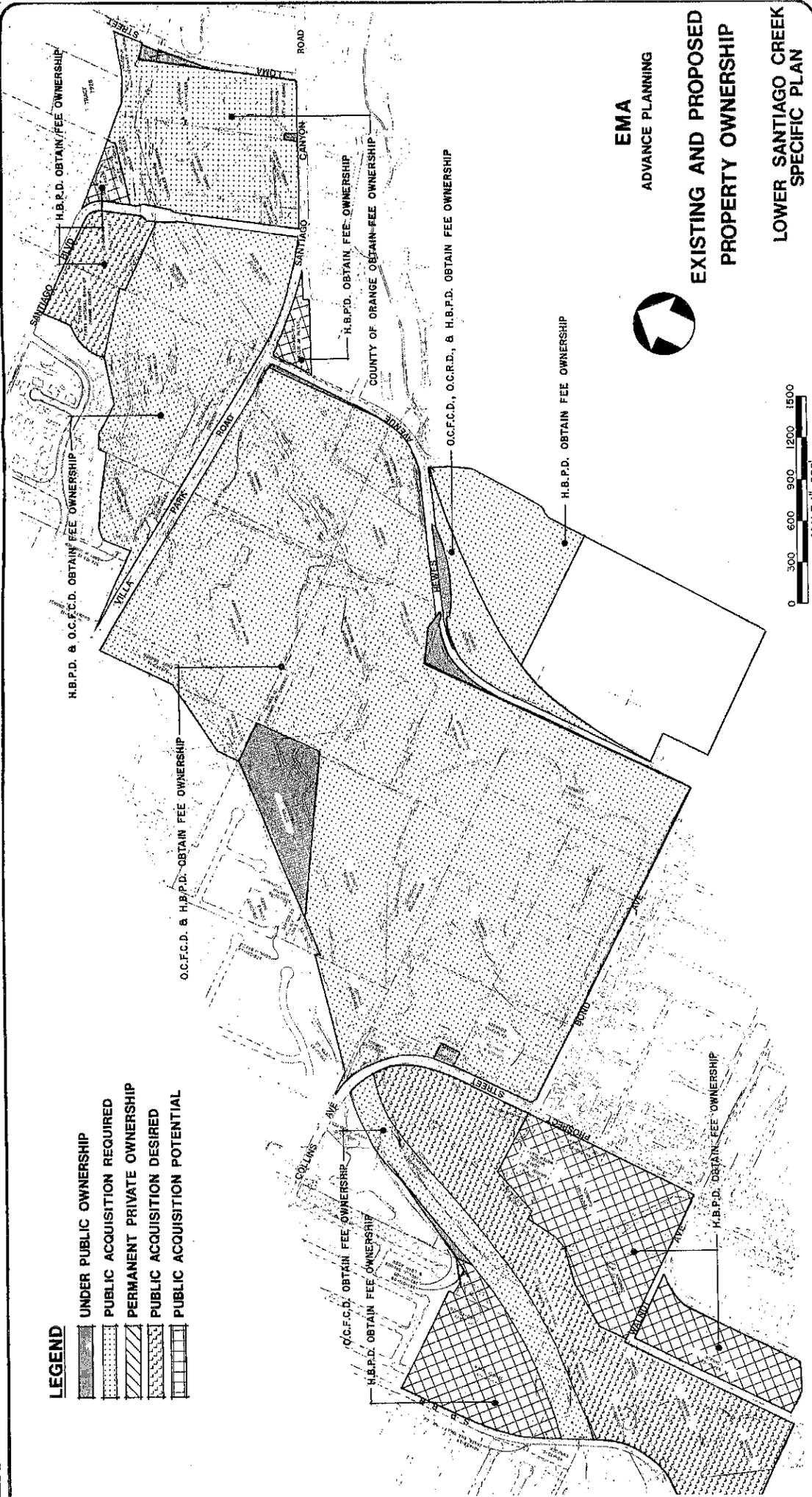
LEGEND

-  UNDER PUBLIC OWNERSHIP
-  PUBLIC ACQUISITION REQUIRED
-  PERMANENT PRIVATE OWNERSHIP
-  PUBLIC ACQUISITION DESIRED
-  PUBLIC ACQUISITION POTENTIAL



LEGEND

-  UNDER PUBLIC OWNERSHIP
-  PUBLIC ACQUISITION REQUIRED
-  PERMANENT PRIVATE OWNERSHIP
-  PUBLIC ACQUISITION DESIRED
-  PUBLIC ACQUISITION POTENTIAL



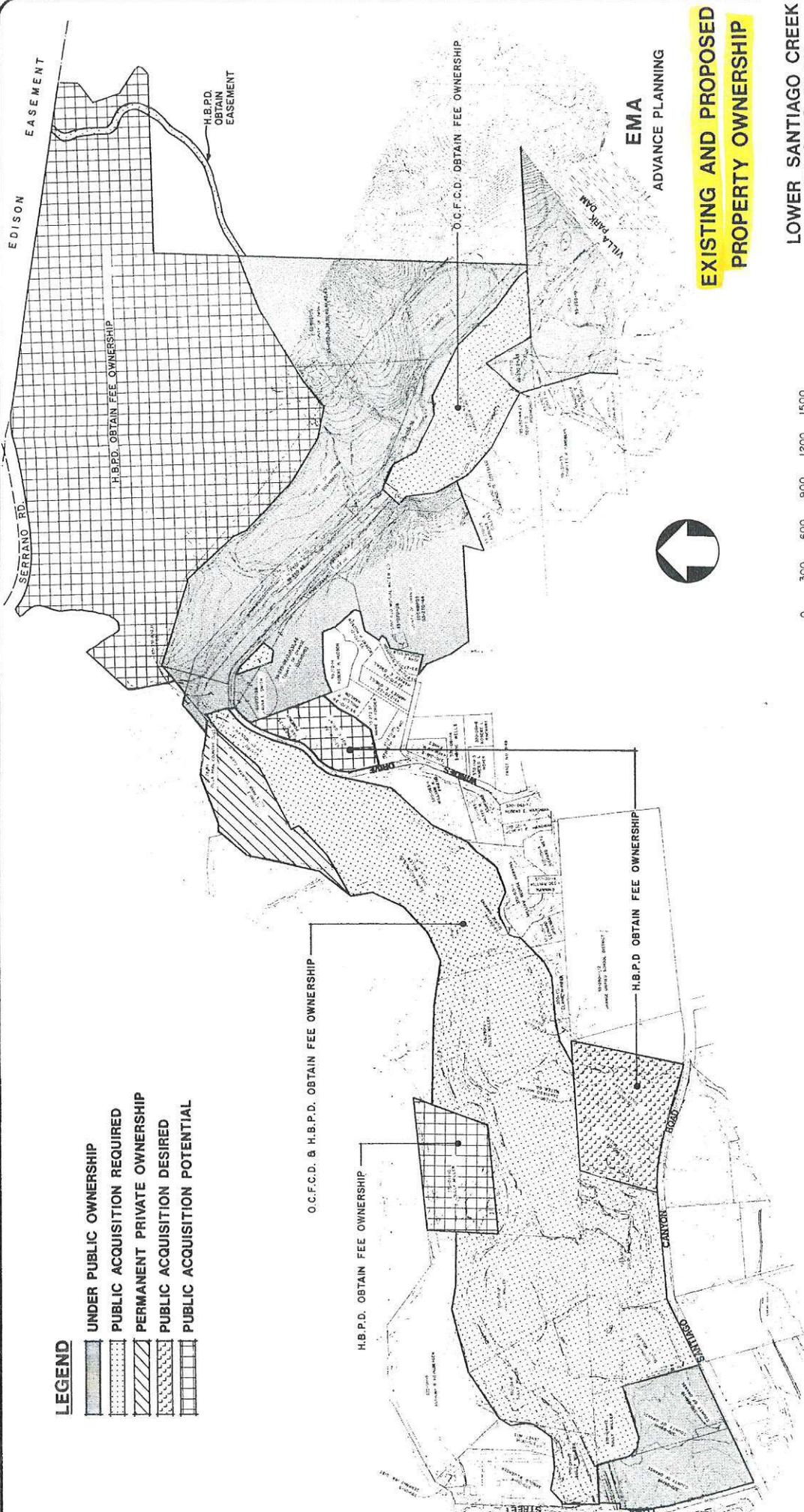
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ADVANCE PLANNING

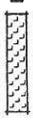
**EXISTING AND PROPOSED
PROPERTY OWNERSHIP**

**LOWER SANTIAGO CREEK
SPECIFIC PLAN**





LEGEND

-  UNDER PUBLIC OWNERSHIP
-  PUBLIC ACQUISITION REQUIRED
-  PERMANENT PRIVATE OWNERSHIP
-  PUBLIC ACQUISITION DESIRED
-  PUBLIC ACQUISITION POTENTIAL

**EXISTING AND PROPOSED
PROPERTY OWNERSHIP**

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LOWER SANTIAGO CREEK
SPECIFIC PLAN



Table 4. Suggested Plan Required Right of Way Acquisition Summary

REACH	ASSESSOR'S PARCEL NO.	OWNER	SIZE	PORTION TO BE ACQUIRED	USE				UNIT COST	COST	RESPONSIBLE AGENCY
					FLOOD	PARK	TRAIL	ROAD			
I	2-050-09	Halterson	0.28 ac.	0.10 ac.	x		x		\$ 4,000/ac.	\$ 400.	O.C.F.C.D.
I	2-050-10	Schaefer	0.28 ac.	0.10 ac.	x		x		4,000/ac.	400.	O.C.F.C.D.
I	2-050-11	Bailey	0.57 ac.	0.22 ac.	x		x		4,000/ac.	880.	O.C.F.C.D.
I	2-050-12	Ramey	0.69 ac.	0.35 ac.	x		x		4,000/ac.	1,400.	O.C.F.C.D.
I	2-050-14	Barrutia	0.46 ac.	0.19 ac.	x		x		4,000/ac.	760.	O.C.F.C.D.
I	2-050-15	Newcom	0.30 ac.	0.13 ac.	x		x		4,000/ac.	520.	O.C.F.C.D.
I	2-050-16	Morgan	0.52 ac.	0.25 ac.	x		x		4,000/ac.	1,000.	O.C.F.C.D.
II	41-220-34	A.T.&S.F.R.Y.	1.79 ac.	all	x	x	x		10,000/ac.	17,900.	Santa Ana
II	41-220-68	A.T.&S.F.R.Y.	2.47 ac.	all	x	x	x		10,000/ac.	24,700.	Santa Ana
III	390-151-20	Conrock	3.17 ac.	1.58 ac.	x		x		4,000/ac.	6,330.	O.C.F.C.D.
III	42-251-02	Conrock	1.58 ac.	0.11 ac.	x		x		4,000/ac.	450.	O.C.F.C.D.
III	390-151-19	Metropolitan Water District	1.94 ac.	1.30 ac.	x		x		4,000 ac.	5,280.	O.C.F.C.D.
III	390-151-16	Abbey	1.58 ac.	all	x		x		4,000/ac.	6,340.	O.C.F.C.D.
III	390-141-14	Rohrs	1.47 ac.	all		x			10,000/ac.	14,710.	Orange or O.C.H.B.P.D.
III	392-071-02	Y.M.C.A.	5.04 ac.	1.68 ac.	x		x		4,000/ac.	6,720.	Orange or O.C.F.C.D.
III	93-010-54	Cecil	0.22 ac.	all	x		x		4,000/ac.	880.	O.C.F.C.D.
III	93-010-36	Chapman General Hospital	10.01 ac.	2.30 ac.	x		x		4,000/ac.	9,200.	O.C.F.C.D.
III	40-230-10	S.P.R.R.	10.00 ac.	2.55 ac.	x		x		10,000/ac.	2,550.	O.C.F.C.D.
III	40-230-08	Conrock	9.55 ac.	1.92 ac.	x		x		30,000/ac.	57,510.	O.C.F.C.D.
III	93-031-01	S.P.R.R.	14.75 ac.	2.59 ac.	x		x		25,000/ac.	64,850.	O.C.F.C.D.
III	40-453-28	Santa Ana Valley Irrigation Co.	0.17 ac.	all		x	x		4,000/ac.	680.	O.C.H.B.P.D.
III	40-453-61	Conrock	1.04 ac.	0.49 ac.	x		x		4,000/ac.	1,950.	O.C.F.C.D.

O.C.F.C.D.—Orange County Flood Control District
O.C.H.B.P.D.—Orange County Harbors, Beaches & Parks District
O.C.R.D.—Orange County Road Department

Table 4. Suggested Plan Required Right of Way Acquisition Summary (Cont'd)

REACH	ASSESSOR'S PARCEL NO.	OWNER	SIZE	PORTION TO BE ACQUIRED	USE				UNIT COST	COST	RESPONSIBLE AGENCY
					FLOOD	PARK	TRAIL	ROAD			
III	Abandoned R/W Strip	S.P.R.R.	-	0.23 ac.	x	x	x		\$10,000/ac.	\$ 2,300.	O.C.F.C.D.
IV	40-240-15	Veeth	16.00 ac.	1.29 ac.	x	x	x		10,000/ac.	12,920.	O.C.F.C.D.
IV	40-240-16	Conrock	7.62 ac.	2.55 ac.	x	x	x		12,000/ac.	30,650.	O.C.F.C.D.
IV	40-240-24	Santa Ana Valley Irrigation Co.	10.22 ac.	2.30 ac.	x	x	x		20,000/ac.	45,920.	O.C.F.C.D.
IV	383-071-01	Gulden	1.79 ac.	0.33 ac.	x	x	x		50,000/ac.	16,550.	O.C.F.C.D.
IV	383-071-02	Conrock	4.06 ac.	4.06 ac.	x	x	x		10,000/ac.	40,600.	O.C.F.C.D.
IV	40-240-44	Conrock	25.38 ac.	3.38 ac.	x	x	x		25,000/ac.	84,380.	O.C.F.C.D.
IV	378-251-33	Veta Co.	0.07 ac.	all	x	x			4,000/ac.	280.	O.C.H.B.P.D. & O.C.F.C.D.
IV	40-240-45	Conrock	0.93 ac.	all	x	x			10,000/ac.	9,300.	O.C.H.B.P.D. & O.C.F.C.D.
IV	378-251-32	Conrock	5.00 ac.	all	x	x			10,000/ac.	50,000.	O.C.H.B.P.D. & O.C.F.C.D.
IV	93-070-16	Conrock	4.14 ac.	all	x	x	x		10,000/ac.	41,400.	O.C.H.B.P.D. & O.C.F.C.D.
IV	93-070-17	Conrock	4.48 ac.	all	x	x	x		10,000/ac.	44,800.	O.C.H.B.P.D. & O.C.F.C.D.
IV	93-070-18	Conrock	27.84 ac.	all	x	x	x		10,000/ac.	278,400.	O.C.H.B.P.D. & O.C.F.C.D.
IV	93-070-19	Conrock	39.94 ac.	all	x	x	x		10,000/ac.	399,400.	O.C.H.B.P.D. & O.C.F.C.D.
IV	92-350-06	Conrock	19.02 ac.	all	x	x			10,000/ac.	190,200.	O.C.H.B.P.D. & O.C.F.C.D.
IV	92-350-20	Sully-Miller	8.64 ac.	all	x	x			10,000/ac.	86,400.	O.C.H.B.P.D. & O.C.F.C.D.
IV	92-350-32	Sully-Miller	13.17 ac.	all	x	x			10,000/ac.	131,700.	O.C.H.B.P.D. & O.C.F.C.D.
IV	92-350-26	Conrock	0.02 ac.	all	x	x			10,000/ac.	200.	O.C.H.B.P.D. & O.C.F.C.D.

O.C.F.C.D.--Orange County Flood Control District
O.C.H.B.P.D.--Orange County Harbors, Beaches & Parks District
O.C.R.D.--Orange County Road Department

Table 4. Suggested Plan Required Right of Way Acquisition Summary (Cont'd)

REACH	ASSESSOR'S PARCEL NO.	OWNER	SIZE	PORTION TO BE ACQUIRED	USE				UNIT COST	COST	RESPONSIBLE AGENCY
					FLOOD	PARK	TRAIL	ROAD			
IV	92-340-34	MacMullan	28.86 ac.	all	x	x			\$10,000/ac.	\$288,600.	O.C.H.B.P.D. & O.C.F.C.D.
IV	92-350-12	Serrano Irrigation District	1.12 ac.	all	x	x			10,000/ac.	11,200.	O.C.H.B.P.D. & O.C.F.C.D.
IV	378-212-14	Sully-Miller	2.67 ac.	all	x	x			10,000/ac.	26,700.	O.C.H.B.P.D. & O.C.F.C.D.
IV	92-340-13	Warren	4.50 ac.	all	x	x			10,000/ac.	45,000.	O.C.H.B.P.D. & O.C.F.C.D.
IV	92-340-16	Sussdorff	30.81 ac.	all	x	x			10,000/ac.	308,100.	O.C.H.B.P.D. & O.C.F.C.D.
IV	92-360-75	Conrock	22.41 ac.	all	x	x	x		10,000/ac.	224,100.	O.C.H.B.P.D. & O.C.F.C.D.
IV	92-360-84	Conrock	7.51 ac.	all	x	x			10,000/ac.	75,100.	O.C.H.B.P.D. & O.C.F.C.D.
IV	92-360-82	Sully-Miller	6.39 ac.	all	x	x	x		15,000/ac.	95,850.	O.C.H.B.P.D. & O.C.F.C.D.
IV	92-340-15	Sully-Miller	1.67 ac.	all	x	x			10,000/ac.	16,700.	O.C.H.B.P.D. & O.C.F.C.D.
IV	92-360-78	Sully-Miller	17.74 ac.	all	x	x			10,000/ac.	177,400.	O.C.H.B.P.D. & O.C.F.C.D.
IV	92-360-65	Conrock	4.89 ac.	all	x	x			10,000/ac.	48,900.	O.C.H.B.P.D. & O.C.F.C.D.
IV	92-360-68	Conrock	11.02 ac.	all	x	x			10,000/ac.	110,200.	O.C.H.B.P.D. & O.C.F.C.D.
IV	387-103-19	Murdock	4.80 ac.	all	x	x			10,000/ac.	48,000.	O.C.H.B.P.D. & O.C.F.C.D.
IV	92-360-70	Reeve	6.82 ac.	all		x	x		15,000/ac.	102,300.	O.C.H.B.P.D. & O.C.F.C.D.
IV	370-041-03	Sully-Miller	2.24 ac.	all		x			10,000/ac.	22,400.	Orange Co.
IV	370-041-04	Sandberg	0.38 ac.	all	x	x			10,000/ac.	3,800.	Orange Co.
IV	370-041-05	Hurwitz	14.77 ac.	all	x	x	x		10,000/ac.	147,700.	Orange Co.

O.C.F.C.D.—Orange County Flood Control District
 O.C.H.B.P.D.—Orange County Harbors, Beaches & Parks District
 O.C.R.D.—Orange County Road Department

Table 4. Suggested Plan Required Right of Way Acquisition Summary (Cont'd)

REACH	ASSESSOR'S PARCEL NO.	OWNER	SIZE	PORTION TO BE ACQUIRED	USE				UNIT COST	COST	RESPONSIBLE AGENCY
					FLOOD	PARK	TRAIL	ROAD			
IV	370-041-06	Sully-Miller	0.67 ac.	all		x	x		\$10,000/ac.	\$ 6,700.	Orange Co.
IV	370-041-07	Hurwitz	0.42 ac.	all		x			30,000/ac.	12,600.	Orange Co.
IV	370-041-19	Sully-Miller	12.05 ac.	all	x	x	x		10,000/ac.	120,500.	Orange Co.
IV	370-081-31	Security Housing	1.17 ac.	all	x	x			4,000/ac.	4,680.	Orange Co.
IV	383-071-06	Lincoln Savings	0.30 ac.	all	x	x			4,000/ac.	1,200.	O.C.F.C.D.
IV	93-081-22	Conrack	2.24 ac.	0.14 ac.		x		x	50,000/ac.	6,900.	O.C.F.C.D., O.C.R.D. & O.C.H.B.P.D.
IV	93-081-25	Conrack	10.27 ac.	2.30 ac.		x		x	50,000/ac.	115,150.	O.C.F.C.D., O.C.R.D. & O.C.H.B.P.D.
IV	92-350-23	Conrack	0.50 ac.	all		x			50,000/ac.	25,000.	O.C.F.C.D. & O.C.H.B.P.D.
IV	92-350-29	Conrack	4.29 ac.	all		x			50,000/ac.	214,500.	O.C.F.C.D. & O.C.H.B.P.D.
IV	92-350-31	Conrack	<0.01 ac.	all		x			50,000/ac.	200.	O.C.F.C.D. & O.C.H.B.P.D.
IV	92-360-73	Conrack	25.73 ac.	9.91 ac.		x		x	50,000/ac.	495,250.	O.C.F.C.D., O.C.R.D. O.C.H.B.P.D.
V	370-011-17	Sully-Miller	3.85 ac.	all	x	x	x		7,500/ac.	28,875.	O.C.F.C.D.
V	370-011-08	Sully-Miller	12.76 ac.	all	x	x	x		7,500/ac.	95,700.	O.C.F.C.D.
V	370-011-18	Sully-Miller	15.61 ac.	all	x	x	x		7,500/ac.	117,075.	O.C.F.C.D.
V	370-041-12	Sully-Miller	3.18 ac.	all		x	x		15,000/ac.	47,700.	O.C.H.B.P.D.
V	370-011-11	Sully-Miller	14.58 ac.	all	x	x			7,500/ac.	109,350.	O.C.F.C.D.
V	370-041-13	Sully-Miller	5.37 ac.	all	x	x			7,500/ac.	40,275.	O.C.F.C.D.
V	93-280-21	Sully-Miller	30.66 ac.	all	x	x			15,000/ac.	459,900.	O.C.F.C.D. & O.C.H.B.P.D.
V	93-280-16	Sully-Miller	29.89 ac.	all	x	x			7,500/ac.	224,175.	O.C.F.C.D.
V	93-280-17	Sully-Miller	0.05 ac.	all	x	x			7,500/ac.	375.	O.C.H.B.P.D.

O.C.F.C.D. - Orange County Flood Control District
O.C.H.B.P.D. - Orange County Harbors, Beaches & Parks District
O.C.R.D. - Orange County Road Department

Table 4. Suggested Plan Required Right of Way Acquisition Summary (Cont'd)

REACH	ASSESSOR'S PARCEL NO.	OWNER	SIZE	PORTION TO BE ACQUIRED	USE				UNIT COST	COST	RESPONSIBLE AGENCY
					FLOOD	PARK	TRAIL	ROAD			
V	93-280-18	Sully-Miller	0.01 ac.	all		x	x		\$ 7,500/ac.	\$ 75.	O.C.H.B.P.D.
V	93-280-19	Sully-Miller	0.01 ac.	all		x	x		\$ 7,500/ac.	\$ 75.	O.C.H.B.P.D.
V	93-280-20	Sully-Miller	0.01 ac.	all		x	x		\$ 7,500/ac.	\$ 75.	O.C.H.B.P.D.
V	93-280-02	Sully-Miller	0.27 ac.	all	x	x	x		\$ 7,500/ac.	\$ 2,025.	O.C.F.C.D.
V	93-270-38	Smith	0.56 ac.	all		x	x		160,000/ac.	89,600.	O.C.H.B.P.D.
V	93-250-04	Carpenter-Serrano Irrigation Dist.	14.36 ac.	all		x	x		10,000/ac.	143,600.	O.C.F.C.D.
V	93-250-06	Carpenter-Serrano Irrigation Dist.	<0.01 ac.	all	x	x			10,000/ac.	20.	O.C.F.C.D.
V	93-250-07	Carpenter-Serrano Irrigation Dist.	<0.01 ac.	all	x	x			10,000/ac.	20.	O.C.F.C.D.
V	93-250-08	Carpenter-Serrano Irrigation Dist.	<0.01 ac.	all	x	x			10,000/ac.	20.	O.C.F.C.D.

O.C.F.C.D.—Orange County Flood Control District
 O.C.H.B.P.D.—Orange County Harbors, Beaches & Parks District
 O.C.R.D.—Orange County Road Department

NOTE: A number of the parcels are located in areas where development has recently occurred resulting in an update in the Assessor's map numbers. Therefore, several of the parcel numbers shown in this table have been changed. Due to the difficulty in trying to reflect all recent changes, the parcel numbers shown are only current as of June, 1975.

The unit costs used to determine the price of acquisition of real property are estimates based on observations of similar property acquisitions within the local area and similar mined-out sand and gravel pits in Orange County. The estimates are not intended to represent an official appraisal of real property value but only a guideline for evaluating the impact of right-of-way costs on the project.

There are a number of locations within the study boundary where public acquisition of property is pending. This estimate has been developed under the assumption that none of these acquisitions are complete.

It should be noted that the large purchase of property suggested in Reaches IV and V is unrelated to any specific channel alternative. Regardless of whether the suggested plan is approved, the bulk of this acquisition is necessary for the core of the regional park. Some redistribution of purchasing responsibility could, however, feasibly occur if some of this property were to be removed from the floodplain by any specific alternative.

As previously mentioned in the greenbelt section of the suggested plan, three possible boundary configurations for the regional park have been investigated. The cost of property acquisition required for the "suggested" regional park has been included in *table 4* as previously mentioned. Additional cost data pertaining to property within the "desirable" regional park boundary is provided in a similar summary, *table 5*. The "potential" regional park cost information is in *table 6*.

A significant property acquisition cost not thoroughly investigated in the preparation of this specific plan is the cost associated with Santa Ana's proposed redevelopment plan along Santiago Creek in the vicinity of Main Street. This designated redevelopment area is shown on *exhibit 13a* as a "potential" greenbelt addition which is consistent with the city's proposal to develop it as park land. The City of Santa Ana in its draft greenbelt plan has estimated the cost of acquisition to be approximately \$1,046,000.

Table 5. Suggested Plan Desirable Right of Way Acquisition Summary

REACH	ASSESSOR'S PARCEL NO.	OWNER	SIZE	PORTION TO BE ACQUIRED	USE			UNIT COST	COST	RESPONSIBLE AGENCY
					FLOOD	PARK	TRAIL			
III	93-010-53	State of Calif.	1.38 ac.	all		x		\$ 25,000/ac.	\$ 34,500.	O.C.H.B.P.D.
III	Abandoned R/W Strip	S.P.R.R.	-	1.84 ac.		x		10,000/ac.	1,840.	O.C.H.B.P.D.
III	40-230-1B	S.P.R.R.	10.00 ac.	7.00 ac.		x		10,000/ac.	7,000.	O.C.H.B.P.D.
III	40-230-08	Conrock	9.55 ac.	0.28 ac.		x		30,000/ac.	8,490.	O.C.H.B.P.D.
III	93-030-01	S.P.R.R.	14.75 ac.	11.34 ac.		x		25,000/ac.	283,450.	O.C.H.B.P.D.
III	93-351-02	Chapman General Hospital	1.30 ac.	all		x		10,000/ac.	13,000.	O.C.H.B.P.D.
IV	93-030-09	Conrock	9.96 ac.	all		x		25,000/ac.	249,000.	O.C.H.B.P.D.
IV	93-030-03	Conrock	9.83 ac.	all		x		10,000/ac.	98,300.	O.C.H.B.P.D.
IV	40-240-16	Conrock	7.62 ac.	4.49 ac.		x		12,000/ac.	53,900.	O.C.H.B.P.D.
IV	40-240-24	Santa Ana Valley Irrigation Co.	10.22 ac.	6.99 ac.		x		20,000/ac.	139,800.	O.C.H.B.P.D.
IV	40-240-44	Conrock	25.38 ac.	22.01 ac.		x		25,000/ac.	550,130.	O.C.H.B.P.D.
IV	93-081-04	Conrock	0.45 ac.	all		x		50,000/ac.	22,500.	O.C.H.B.P.D.
IV	93-081-06	Conrock	2.50 ac.	all		x		50,000/ac.	125,000.	O.C.H.B.P.D.
IV	93-081-22	Conrock	2.24 ac.	2.10 ac.		x		50,000/ac.	105,100.	O.C.H.B.P.D.
IV	93-081-25	Conrock	10.27 ac.	7.97 ac.		x		50,000/ac.	398,350.	O.C.H.B.P.D.
IV	93-081-27	Conrock	4.56 ac.	all		x		50,000/ac.	228,000.	O.C.H.B.P.D.
IV	93-081-28	Conrock	6.27 ac.	all		x		50,000/ac.	313,500.	O.C.H.B.P.D.
IV	93-081-07	Conrock	9.18 ac.	all		x		50,000/ac.	459,000.	O.C.H.B.P.D.
IV	93-081-05	Miller	2.31 ac.	all		x		50,000/ac.	115,500.	O.C.H.B.P.D.
IV	378-192-10	First National Bank of Orange County	5.04 ac.	all		x	x	20,000/ac.	100,800.	O.C.H.B.P.D.
IV	92-360-73	Conrock	25.73 ac.	15.82 ac.		x		50,000/ac.	791,000.	O.C.H.B.P.D.
IV	92-360-59	Sully-Miller	5.69 ac.	all		x	x	15,000/ac.	85,350.	O.C.H.B.P.D.
IV	93-081-31	Thorman	0.02 ac.	all		x		50,000/ac.	850.	O.C.H.B.P.D.
V	93-280-07	Sully-Miller	6.24 ac.	all		x		25,000/ac.	156,000.	O.C.H.B.P.D.
V	93-280-13	Sully-Miller	7.87 ac.	all		x		25,000/ac.	196,750.	O.C.H.B.P.D.

O.C.F.C.D.—Orange County Flood Control District
 O.C.H.B.P.D.—Orange County Harbors, Beaches & Parks District
 O.C.R.D.—Orange County Road Department

Table 6. Suggested Plan Potential Right of Way Acquisition Summary

REACH	ASSESSOR'S PARCEL NO.	OWNER	SIZE	PORTION TO BE ACQUIRED	USE				UNIT COST	COST	RESPONSIBLE AGENCY
					FLOOD	PARK	TRAIL	ROAD			
III	Abandoned R/W Strip	S.P.R.R.	—	1.42 ac.		x			\$10,000/ac.	\$ 1,420.	O.C.H.B.P.D.
III	40-230-10	S.P.R.R.	10.00 ac.	0.46 ac.		x			10,000/ac.	460.	O.C.H.B.P.D.
III	40-230-08	Conrock	9.55 ac.	7.35 ac.		x			30,000/ac.	220,500.	O.C.H.B.P.D.
III	93-030-01	S.P.R.R.	14.75 ac.	0.82 ac.		x			25,000/ac.	20,450.	O.C.H.B.P.D.
III	40-453-61	Conrock	1.04 ac.	0.55 ac.		x			4,000/ac.	2,210.	O.C.H.B.P.D.
IV	93-051-05	Conrock	11.32 ac.	all		x			30,000/ac.	339,600.	O.C.H.B.P.D.
IV	40-240-16	Conrock	7.62 ac.	0.57 ac.		x			12,000/ac.	6,890.	O.C.H.B.P.D.
IV	40-240-13	Conrock	10.91 ac.	all		x			25,000/ac.	272,750.	O.C.H.B.P.D.
IV	40-240-53	Conrock	8.57 ac.	all		x			25,000/ac.	214,250.	O.C.H.B.P.D.
IV	40-240-24	Santa Ana Valley Irrigation Co.	10.22 ac.	0.93 ac.		x			20,000/ac.	18,680.	O.C.H.B.P.D.
IV	40-491-20	Santa Ana Valley Irrigation Co.	0.09 ac.	all		x			20,000/ac.	1,800.	O.C.H.B.P.D.
IV	40-240-15	Veeh	16.00 ac.	14.71 ac.		x			10,000/ac.	147,100.	O.C.H.B.P.D.
IV	40-491-21	Veeh	0.02 ac.	all		x			20,000/ac.	400.	O.C.H.B.P.D.
IV	40-240-55	Gunther	0.87 ac.	all		x			50,000/ac.	43,500.	O.C.H.B.P.D.
IV	40-240-07	Orange Park Acres Mutual Water District	3.60 ac.	all		x			30,000/ac.	108,000.	O.C.H.B.P.D.
IV	40-240-54	Gunther	0.22 ac.	all		x			15,000/ac.	3,300.	O.C.H.B.P.D.
IV	370-041-01	Ersek	1.05 ac.	all		x			20,000/ac.	21,000.	O.C.H.B.P.D.
IV	370-041-02	Benzie	1.09 ac.	all		x			20,000/ac.	21,800.	O.C.H.B.P.D.
IV	92-360-77	Reeve	1.87 ac.	all		x			30,000/ac.	56,100.	O.C.H.B.P.D.
V	370-011-10	Sully-Miller	9.94 ac.	all		x			30,000/ac.	298,200.	O.C.H.B.P.D.
V	85-551-09	Texaco Anaheim Hills	397.70 ac.	~91 ac.		x			20,000/ac.	1,820,000.	O.C.H.B.P.D.
V	85-581-33	Texaco Anaheim Hills	221.16 ac.	~19 ac.		x			20,000/ac.	380,000.	O.C.H.B.P.D.
V	93-270-34	Gaunt	4.54 ac.	all		x			80,000/ac.	363,200.	O.C.H.B.P.D.
V	93-270-35	Pomeroy	1.17 ac.	all		x			120,000/ac.	140,400.	O.C.H.B.P.D.

O.C.F.C.D.—Orange County Flood Control District
O.C.H.B.P.D.—Orange County Harbors, Beaches & Parks District
O.C.R.D.—Orange County Road Department

IMPLEMENTATION PLAN

The construction of more than \$39 million of public works projects constitutes a large outlay of public funds on a single project. It is necessary that an implementation schedule be provided to identify the funding sources for the acquisition of right of way and the development of public facilities. *Exhibits 14a to 14c* are bar charts which attempt to accomplish this task in logically sequenced phases which span a period of time in excess of twenty-five years. The project designation and precise time of implementation are not rigidly fixed. It is well within the realm of possibility that changes could occur due to the appearance of new opportunities or the disappearance of existing opportunities at some future date. The length of time required for most of the phased activities will be considerably less than the time allotted in the bar graph. This intentional excess will allow flexibility to achieve the proper coordination of the various interdependent phases. It also provides an opportunity whereby "desired" or "potential" regional park acquisitions and subsequent development may be readily added into the suggested plan without disruption to the balance of timing and funding. The idiosyncrasies of some of the tasks shown on *exhibits 14a to 14c* warrant further discussion.

Channel and trail construction in Santiago Park, and Day Camp, *exhibits 14b and 14c*, is scheduled for 1982-86. This appears to be the most logical time for the implementation of this segment of the suggested plan. The City of Santa Ana is planning to redevelop the park area but has been unable to apply the resources needed to complete the redevelopment plan. If at all possible, the channel and trail construction should be timed to coincide with the redevelopment of the park by the city.

The timing of right of way acquisition in the sand and gravel pit areas of Reaches III, IV and V must be carefully assessed. It has been suggested that the property in the area of the proposed retarding basin be acquired immediately to retain as much of the extractable minerals as possible. This will minimize the need for importing fill material to stabilize the retarding basin slopes. However, because of the existing gravel reserves on the property, immediate acquisition would result in an increased purchase cost. In order to adequately evaluate when to purchase these sand and gravel properties, an economic analysis should be made of alternative land

acquisition strategies. It is, therefore, recommended that such an analysis be prepared immediately after the adoption of the suggested plan.

The parcels where Sully-Miller Company presently operates a sand and gravel processing plant (AP Nos. 93-280-07 and 93-280-21) and maintenance yard east of Loma Street (AP No. 370-041-12) should be earmarked for acquisition by the county as soon as Sully-Miller completes their mining operations in Lower Santiago Creek. Tentative indications from the company management are that this should occur around 1983. The timely acquisition of these parcels will ensure the phased implementation of Lower Santiago Creek Regional Park facilities in accordance with the proposed schedule.

The activities shown in the bar chart cover only park, trail and flood control projects; however, there are a number of other specific plan features which certainly must be considered from an implementation standpoint. These features include master-planned arterial highway improvements, water conservation facilities and the implementation of inert landfills.

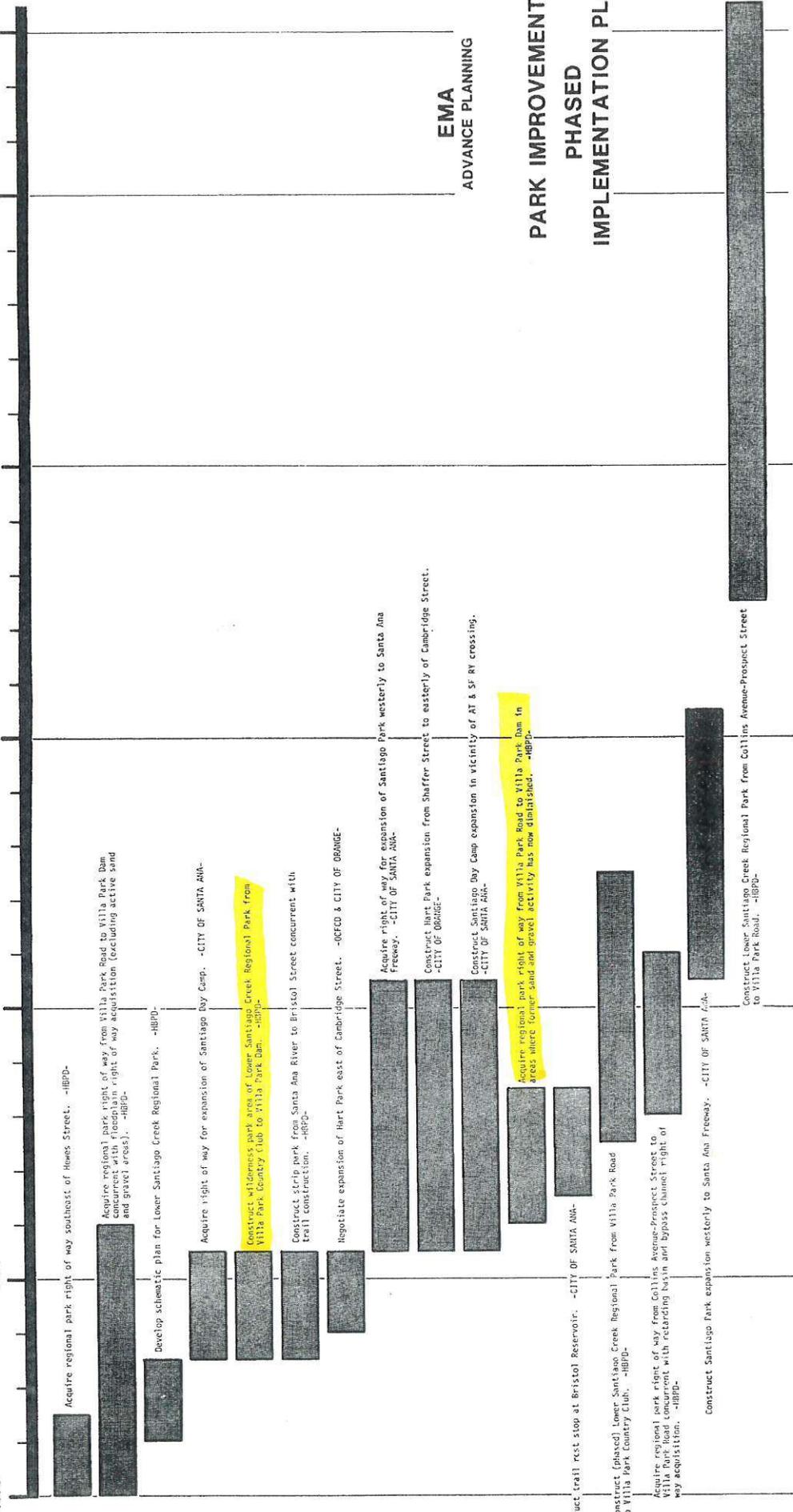
The arterial highway phasing is not addressed because of the great uncertainty about the actual need for the extension of Walnut Avenue or Orange Park Boulevard. The NEOCCS study currently in progress should resolve this issue and open the way for any appropriate modifications to the suggested plan.

Water conservation opportunities, as previously mentioned, are still to a great extent unknown. The construction of any groundwater replenishment facilities should be delayed until a pilot study can demonstrate the feasibility of such a facility.

The implementation of inert landfills in the sand and gravel pit area depends on a number of factors: (1) Is there sufficient material available to fill any specific site in a reasonable period of time? (2) Will the local community approve of such an operation? and, (3) Can any landfill site be economically constructed to conform to the suggested plan? These and other important concerns must be considered in the development of any county operated landfill facility. A decision must be reached shortly so that if landfills are to be implemented they can be initiated as soon as possible. All potential landfill operations should be completed by around mid-1984 if the time frame suggested for the development of the regional park and recreational trails is not to be delayed.

The time constraint on highway improvements and water conservation facilities is not as severe. The decision regarding these items can be delayed until such time as construction of park and flood control facilities becomes imminent.

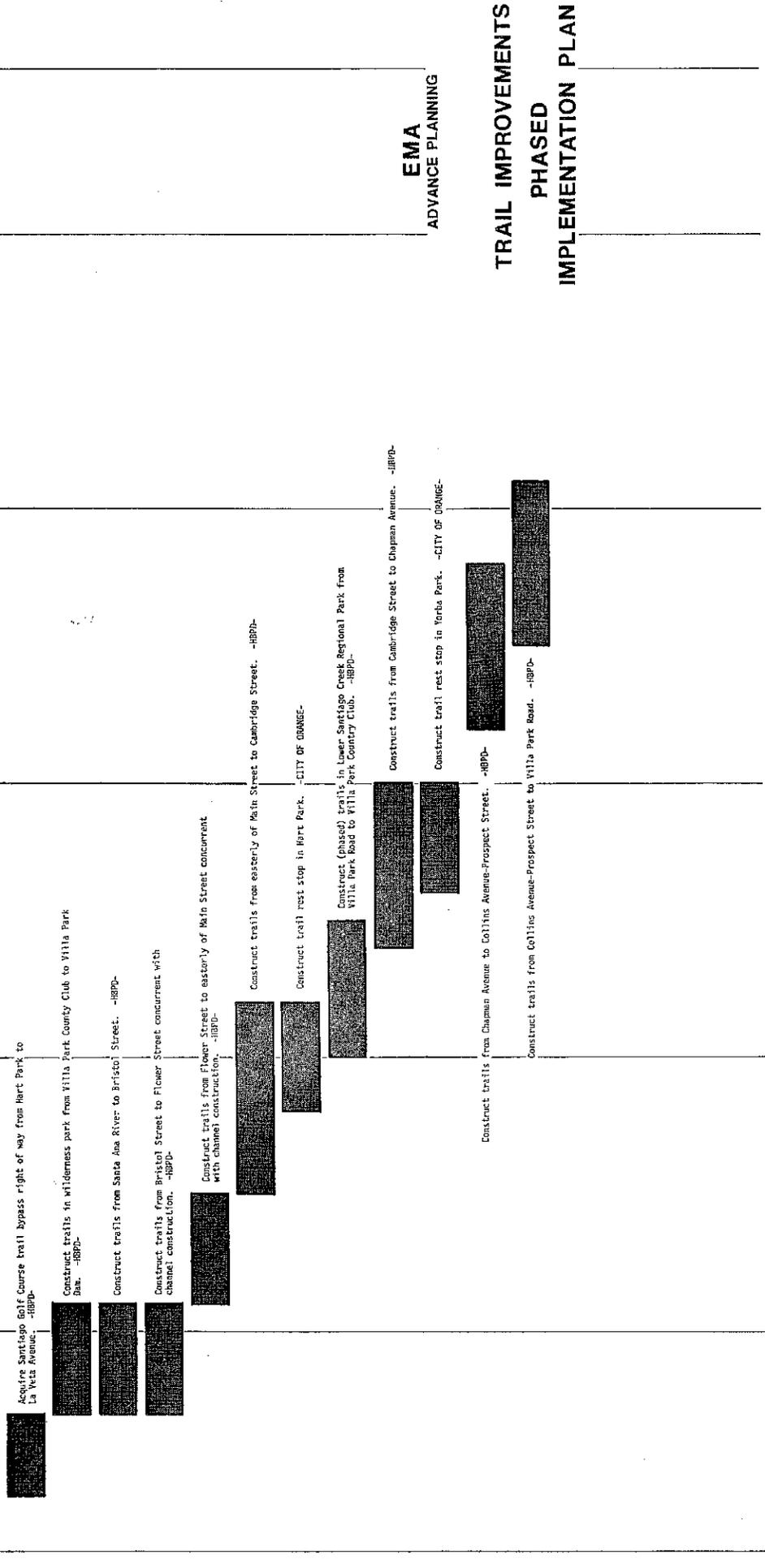
1976 1980 1985 1990 1995 2000 2003



**PARK IMPROVEMENTS
PHASED
IMPLEMENTATION PLAN**

**LOWER SANTIAGO CREEK
SPECIFIC PLAN**

1976 1980 1985 1990 1995 2000 2003

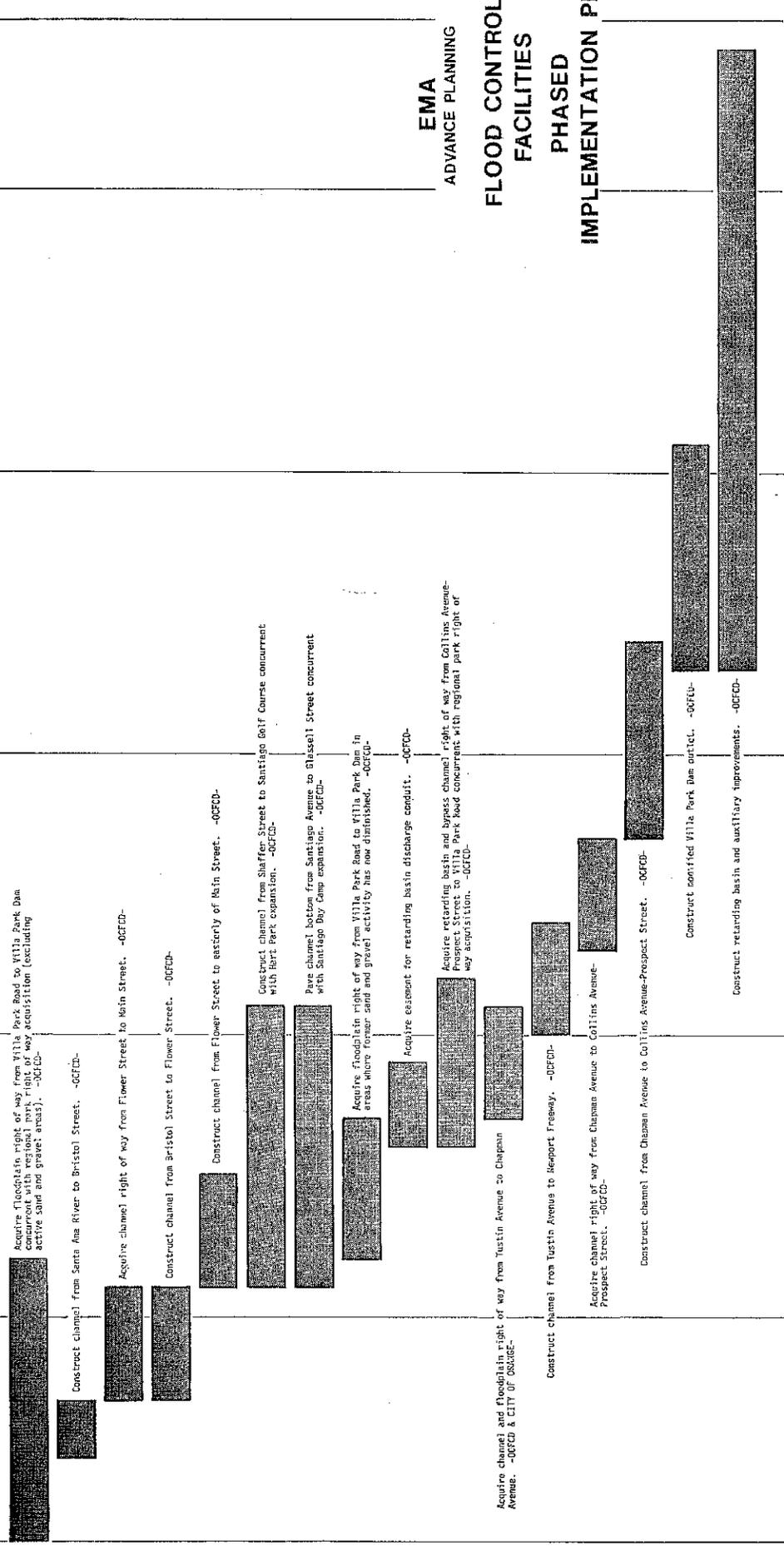


EMA
ADVANCE PLANNING

TRAIL IMPROVEMENTS
PHASED
IMPLEMENTATION PLAN

LOWER SANTIAGO CREEK
SPECIFIC PLAN

1976 1980 1985 1990 1995 2000 2003



LOWER SANTIAGO CREEK SPECIFIC PLAN

The extensive natural open expanse north of the creek near the end of Windes Drive should be given early consideration for "potential" acquisition. The advance planning efforts of the owners dictate some residential development in the area. This will constitute a significant adverse impact on the visual experience of the proposed nature/wildlife preserve along the adjacent portions of Santiago Creek.

Trail maintenance will need coordination after the trail system is completed. The trails will, in some locations, pass through existing local parks where the respective city and county must determine which jurisdiction is responsible for upkeep. It must also be decided whether this jurisdictional responsibility will be consistent for all local parks along the creek within each city or be handled on an individual park basis. A resolution of this concern should be made prior to trail construction within local parks so that any design variations which will facilitate maintenance by the authorized jurisdiction can be worked into the plans.

The acquisition of private property and the obtaining of necessary permits, easements and quitclaim deeds for implementation of the suggested plan must be completed well in advance of project development. *Exhibits 13a to 13e* depict the ownership status and the necessary acquisitions, permits, easements and quitclaimed ownerships for project implementation.

Permits which will be required are primarily in those locations where the State of California is the property owner of record, i.e., freeways. The most critical permit will be for trail right of way along the Garden Grove Freeway in Reaches II and III. This acquisition must be arranged as soon as possible to guarantee the viability of the trail bypass around Santiago Golf Course so that trail easements on private property along Tustin Avenue can be procured before residential or commercial development makes this alternative unattractive or infeasible. The route selected for the trails in this area was judged most feasible at this time because of the difficulty of routing trails through Santiago Golf Course. A change in the status of the golf course may allow a change in the trail route in this area.

Easements or quitclaim deeds from the City of Orange and City of Santa Ana will be required at several locations. No difficulty is anticipated with these transactions which can be completed with a relatively short lead time preceding the construction of public works facilities. Cities should also be consulted for their authorization where the suggested plan improvements intersect existing streets crossing Santiago Creek.

Other easements will be needed from the AT&SF Railway and Metropolitan Water District of Southern California. A major AT&SF route crosses Santiago Creek in Santiago Day Camp. The easement rights requested in

this vicinity will be for flood control and recreation trails. An easement will be necessary east of Tustin Avenue where a Metropolitan Water District discharge structure abuts the creek. Again, no rigid time constraint must be adhered to in either of these easement acquisitions.

There are considerable differences in the proposals put forth in the suggested plan when compared to the U.S. Army Corps of Engineers' proposals in the "All-River Protection" plan for the Santa Ana River and its major tributaries (*See exhibit 6*). These differences must be resolved by coordination with the Corps during its design memorandum phase of project implementation to maximize federal participation in funding the project. Preliminary indications from the Corp's local office reveal a willingness to make the necessary revisions to their plan in response to the desires of the cities and county provided the same level of flood protection is provided at no additional federal cost. As soon as local governing bodies agree upon an alternative for Lower Santiago Creek, an active liaison with the Corps of Engineers should be established.

Even if an adopted county plan is approved by the Corps, a large expenditure of local funds on the creek could precede any federal funding by a number of years because of the cities' and county's eagerness to begin acquisition and construction. The Corps of Engineers may not be prepared for construction along Santiago Creek until the main stem of the Santa Ana River is completed. This probably will not occur until the late 1980's. The county and the Cities of Orange, Santa Ana and Villa Park should immediately weigh the advantages and disadvantages of early implementation of specific projects within the Santiago Creek corridor and establish a policy to govern funding.

The responsibility for initiation of county-funded public works projects identified in the suggested plan shall be vested in the Road/Flood and Open Space/Recreation Programs of EMA. All county public works projects are coordinated through the efforts of these programs.

In the interim period between now and the ultimate completion of the necessary public works facilities along Santiago Creek, a procedure for the review of development proposals within the impact zone of the Santiago Creek corridor needs to be adopted to ensure conformance with the approved specific plan. It is suggested that Advance Planning staff be delegated to perform this duty. The Cities of Santa Ana, Orange and Villa Park should make certain that projects within their respective jurisdiction are subject to this review. Sound control of the development of any remaining open space adjacent to the creek is essential to the ultimate effectiveness of the Lower Santiago Creek greenbelt and recreation experience.

SUMMARY OF PRINCIPAL RECOMMENDATIONS

Many recommendations have been made within this specific plan. Several are critical to the timely implementation of the suggested alternative. These are listed below to assure that they receive early attention.

- A. Concurrent with the acceptance of this report, the governing bodies of the agencies identified in parentheses should:
 1. Adopt the suggested plan in concept as an interim development guide and adopt an interim review procedure to ensure that development within the specific plan area is in conformance with the suggested plan (county and cities)—see Implementation Plan.
 2. Authorize the preparation of general plan amendments to include the suggested plan (county and cities)—see Suggested Plan.
 3. Authorize the preparation of a general development plan for Lower Santiago Creek Regional Park (county)—see Suggested Plan.
 4. Authorize the acquisition of the necessary permits and easements to provide adequate right of way for the regional trails bypass around Santiago Golf Course (county)—see Implementation Plan.
 5. Authorize an economic analysis of sand and gravel pit acquisition to determine acquisition timing (county)—see Implementation Plan.
 6. Authorize an inert landfill feasibility study including an evaluation of the time required to initiate and complete the landfill (county)—see Implementation Plan.
- B. In addition, at the earliest appropriate time the governing body or agency identified in parentheses should:
 1. Authorize implementation of the suggested plan in advance of federal funding which is expected to be several years away (county and cities)—see Implementation Plan.

2. Continue liaison with the Corps of Engineers subsequent to the adoption of a locally acceptable plan to ensure that the Corps' plan is responsive to local planning (Orange County EMA)—see Implementation Plan.
3. Prepare and adopt maintenance agreements for regional trails through local parks (county and cities)—see Implementation Plan.
4. Adopt flood plain zoning to restrict development of flood prone land within incorporated portions of the specific plan area (cities)—see Suggested Plan.
5. Acquire property in accordance with the phased implementation plan giving special attention to those parcels mentioned hereafter (county and cities)—see Implementation Plan.
 - a. Determine whether the natural hilly open expanse north of the creek near the end of Windes Drive should be acquired to protect the wilderness effect of this park area.—see Implementation Plan.
 - b. Acquire property for expansion of Santiago Park west of Main Street (City of Santa Ana)—see Suggested Plan.
 - c. Acquire Sully-Miller parcels, assessor's parcel numbers 93-280-07, 93-280-21 and 370-041-12 as soon as mining activity is complete, estimated to be 1983, to assure that there will be adequate property suitable for regional park structural facilities—see Implementation Plan.
6. Develop an interim trail system where necessary to be used until regional trails can be completed (county)—see Alternative Proposals.
7. Conduct a pilot study to ascertain the feasibility of groundwater recharge in Bond Pit (county and Orange County Water District)—see Suggested Plan.
8. Construct trail and channel improvements in Santiago Park and Day Camp to coincide with Santa Ana's redevelopment of the park, if feasible (county and City of Santa Ana)—see Implementation Plan.

appendices

APPENDIX A

TASK FORCE AND DIRECTORS MEETING MINUTES

The materials included in this appendix summarize the proceedings of the five task force and two Environmental Management Agency directors meetings held during the course of this study. A number of exhibits are referred to in several of these summary reports. They have not been included in the appendix for a number of reasons; (1) used as an exhibit elsewhere in the body of the report, (2) used in another appendix and (3) no longer valid due to modifications in alternatives.

The reader should be aware that cost and quantity figures reported in these minutes may not be in agreement with the main body of the report. This occurrence is due to the continual revision of alternatives throughout the study process. The correct estimates are those shown in the text of the report.

MEMORANDUM

County of Orange

DATE: May 27, 1975

TO: Task Force Members

DEPT/DIST: _____

FROM: Hal Reitmeier

DEPT/DIST: Advance Planning/EMA

SUBJECT: Meeting No. 1 - Lower Santiago Creek Task Force

The task force held its first meeting on May 21, 1975, at 811 North Broadway, Santa Ana.

Task Force members present:

Bert Yamasaki
Jack Berger
Tom Scott
Ed James
Tim Bingham
Stan Fuhr
Bob Rusby
Hal Reitmeier
Hal Krizan

City of Orange
Greenbelt Coordinator
City of Villa Park
City of Santa Ana
EMA/Environmental Services
EMA/Environmental Services
EMA/Harbors, Beaches and Parks
EMA/Project Planning
EMA/Project Planning

Technical Resource Group members present:

Bob Rende

EMA/Flood Control

Other persons in attendance:

Gary Johnson
Jim Miller
Rob Patterson

City of Orange
EMA/Flood Control
EMA/Project Planning

1. Hal Krizan opened the meeting by introducing the members of the Project Planning Branch (PPB) and by briefly summarizing the organizational structure of EMA. He then indicated that PPB will be preparing long-range planning studies (Specific Plans) for County public works projects and that the present study on Lower Santiago Creek is PPB's first attempt at preparing such a plan. It is anticipated that for the projects on which the PPB Section will be working, task forces similar to the present one will be formed with the intent that they will be a vehicle to insure proper coordination between affected parties.
2. The writer then discussed the proposed study for Lower Santiago Creek, indicating that the intent of this initial meeting was to inform the participants as to what PPB will be studying and to solicit any initial reactions to the proposed plan of attack. Subsequent to the meeting, the PPB staff will contact each individual member to discuss in greater detail any information or studies concerning the creek area which they may be aware of, i. e., land use, recreation use, etc. It is the intent of the study to investigate alternate flood control treatment of Santiago Creek and, if possible, resolve any related problems which can be effectively addressed, i. e., trail locations,

open space areas, boundary for Lower Santiago Creek Regional Park, sanitary land fills, water conservation, etc. To facilitate an orderly review of the creek, the study area has been divided into five reaches:

- I. Santa Ana River to Main Street
- II. Main Street to Cambridge Street
- III. Cambridge Street to Railroad
- IV. Railroad to Loma Street
- V. Loma Street to Villa Park Dam

A preliminary work schedule indicating the time frame of the study and a tentative sequence of events necessary to obtain approval of the plan from each of the jurisdictions was presented. Comments were then solicited.

3. In reviewing the work schedule, Ed James said that presentations should be made to the citizens groups on a more frequent basis, possibly after the study of each reach has been completed. A lengthy discussion then followed regarding the steps that should be followed to insure that the final results and recommendations of the study will be acceptable to all parties. It was generally stated that it is important to involve the decision makers, i. e., Greenbelt Commission and city councils, as early in the study as possible.
4. Bert Yamasaki indicated that it would be necessary to obtain City Council approval for the portion of the plan within the City of Orange. In addition, he said that the proposed schedule was optimistic because of the many controversial areas that the study could encompass.
5. Ed James suggested that one way to insure city council involvement early in the game would be to prepare a policy statement and study directive which could be presented to the city councils for preliminary approval.
6. Hal Krizan and Bob Rende both commented that it was hoped that the city staff through participation on the task force could keep the respective councils informed, thereby minimizing the need for frequent contact by the County staff. The general comment then followed that it may be better for the County staff to assume the lead role.
7. Jack Berger stated that the purpose of the Santa Ana River/Santiago Creek Greenbelt Commission was to provide the coordination that was previously alluded to and that frequent presentations to the Commission should provide the guidance and coordination desired. An alternate to that would be to make an initial presentation to the city councils but all subsequent review would go through the Greenbelt Commission.
8. Tom Scott stated that ultimately it would be necessary to obtain approval from the city council since they are the political body with the final jurisdiction.
9. Bert Yamasaki summarized his understanding of how the task force would function. In essence, he stated the following:

- a. Outside agencies would provide PPB with information regarding present proposals for the greenbelt.
- b. PPB would take that information and incorporate it into the Lower Santiago Creek study.
- c. After PPB has reached a tentative resolution to the problems, incorporating all available data, the outside agencies will be asked to comment and offer guidance as to how the plan might be improved or areas where additional study should be pursued.

Hal Krizan concurred with that synopsis.

10. The limits of the study reaches were discussed. Bob Rende said that Reach II should be extended up to Tustin Avenue. Ed James suggested that Reach I include the total portion of the creek within the City of Santa Ana. Bert Yamasaki said that the divisions appeared logical.

HHR:pb

MEMORANDUM

County of Orange

DATE: JUL 28 1975

Participants
TO: Lower Santiago Creek Task Force DEPT/DIST: _____
FROM: Hal Reitmeier, Project Planning DEPT/DIST: Environmental Management Agency
SUBJECT: Meeting No. 2 - Lower Santiago Creek Task Force

The task force held its second meeting on July 16, 1975, at 811 North Broadway, Suite 400, Santa Ana.

Task Force members present:

Ed James	City of Santa Ana
Bert Yamasaki	City of Orange
Tom Scott	City of Villa Park
Jack Berger	Greenbelt Commission
Bob Rusby	EMA/Open Space Trails
Tim Bingham	EMA/Environmental Services
Hal Krizan	EMA/Project Planning
Jim Miller	EMA/Project Planning
Hal Reitmeier	EMA/Project Planning

Technical Resource Group members present:

Bob Rende	EMA/Flood Control
Franzicka Wirth	Orange County Water District

Other persons in attendance:

Gary Johnson	City of Orange
Steve Malone	Supervisor Clark's Office
George Osborne	Director, EMA
Carol Kawanami	Villa Park Citizen
	Greenbelt Committee
Novel B. James	Riverview Golf Course
Dick Munsell	Assistant Director Advance Planning, EMA

1. Hal Krizan opened the meeting by briefly summarizing the intent of the Lower Santiago Creek study and by introducing the staff members of EMA who have been directly working on the study.
2. Hal Reitmeier made a presentation covering Reach I (Santa Ana River to Main Street) of the study area. The following data was presented:
 - a. A general review of existing conditions along Reach I pointing out (1) the type of existing channel improvements and (2) the fact that the majority of this reach is surrounded by existing single family development.

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Memo to Participants Lower Santiago Creek Task Force
Re Meeting No. 2

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- b. The previously established goals and policies stated in the Santa Ana River/Santiago Creek Greenbelt Plan and in the city of Santa Ana's draft greenbelt plan will provide the framework for the present study. An additional goal of providing an adequate level of flood protection will be incorporated with the above goals.
 - c. The draft Santa Ana Greenbelt plan and this study are basically in agreement regarding the boundary of the greenbelt area (principally, the area presently owned by the city and the Flood Control District), the location of proposed bike trails, and the proposed Broadway overcrossing of Santa Ana Freeway.
 - d. A review of the constraints which exist in this reach:
 - (1) Minimal right-of-way
 - (2) Concern for maintaining privacy of existing adjacent homes which back up to the study area
 - (3) Hydraulic requirements at the confluence with the Santa Ana River.
 - e. The different flood control alternatives, and the level of flood protection to be provided (100 year vs. project flood). The channel alternatives shown on the attached Exhibit A were reviewed. Alternatives A and B do not appear feasible because additional right-of-way would be required in order to provide adequate channel capacity. A detailed study of alternate C and D was made in order to determine project costs and provide a standard which could be used to compare the economic impact of various proposals. A preliminary cost comparison is shown on Exhibit B.
3. The following comments were made during the above presentation:
- a. The method used to determine the preliminary planning discharges for the creek should be discussed in greater detail and a map showing the drainage area for Santiago Creek should be prepared.
 - b. A decision should be made as early as possible concerning the level of flood protection to be provided by the channel improvement.
 - c. The possibility of providing upstream flood retarding for the 100 year flood should be investigated. If such retarding is possible, the alternate types of feasible flood control improvements within Reach I would be increased (i.e., possibly Alternate A shown on Exhibit A could be implemented).

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- d. What would be the right-of-way required if alternate B was implemented?
 - e. What would be the cost if no channel improvements were installed in Reach I and the adjacent residences within the resulting floodplain were to purchase flood insurance?
 - f. It was generally agreed that the constraints discussed in 2. d. are valid.
 - g. Great interest was expressed in the feasibility of implementing upstream flood retarding in order to benefit the lower reaches of Santiago Creek.
4. Jim Miller made a presentation covering the feasibility of flood retarding facilities in Reach IV (S.P.R.R. to Loma Street). The following data was presented:
- a. Background information explaining that flood retarding is desirable due to the large discharges created in the creek by various flood levels and the inability of the "flow-through" sand and gravel pits' retarding system to remove discharge peaks.
 - b. Brief explanation of a previous proposal to raise Santiago Dam to attain required flood storage. The approximate cost of \$2,272,000 was estimated to be the difference between alternate A which provides no flood storage, and alternate B which provides the necessary storage. This cost was used as a maximum limit for the consideration of any retarding basin concept in Reach IV.
 - c. Alternatives were investigated which would reduce the creek discharge in a general project flood from 21,000 cfs at Prospect Street to approximately 9,400 cfs, which is equivalent to the local 100-year flood discharge. This would create a peak discharge at the confluence of Santiago Creek with the Santa Ana River of 10,400 cfs. To attain such a flow reduction will require a retarding basin storage capacity of 6000 ac-ft.
 - d. Several alternatives were rejected after a tentative investigation due to excessive cost. These included: (1) the construction of a dam at Prospect Street (2) a retarding basin approximately 200 ac in surface area (bounded by Santiago Creek on the north, Loma Street on the east, existing streets along bluffs on the south and Prospect Street on the west) which would be drained by pumping, and (3) a similar basin which would be drained by a gravity discharge conduit extending to the point downstream at which the required stream bed elevation could be attained.
 - e. An acceptable alternative would require a basin the same size as stated above with a gravity discharge conduit to an excavated stream bed immediately downstream of Prospect Street at an approximate conduit cost of \$700,000.

JUL 28 1975:

Memo to Participants Lower Santiago Creek Task Force

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- f. Multiple land uses of the proposed alternative include: (1) water conservation in the lower portion of Bond Street Pit, (2) type III (inert solids) refuse disposal in the Smith Pit vicinity, (3) park lands in the basin and downstream of Prospect Street with vast potential for water and open land uses, (4) continued availability of sand and gravel material within the basin and downstream of Prospect Street until mining has reduced the landforms to the required retarding basin size, and (5) a high level of flood protection.
 - g. Anticipated problems may include (1) the design configuration of the retarding basin may still be within the definition of a dam and therefore fall under State Division of Dam Safety jurisdiction, (2) the height and steepness of the slopes may pose an unacceptable safety problem, (3) the bypass channel in the vicinity of the basin must be constructed of a material more durable than turf (such as rock) due to the high water velocities, (4) traffic and dust nuisance created by land fill, and (5) phasing of construction to provide a functional waterway at all times.
5. The following comments were made during the above presentation:
 - a. Why not extend the limits of the retarding basin further downstream than Prospect Street?
 - b. Why not construct a basin to reduce the bypass flow to something compatible with a greenbelt channel in Reach I which would be roughly the size of the existing channel in that reach?
 - c. A general expression of approval of a multiple use retarding basin concept was voiced and further investigation was encouraged.
 6. Because of limited time during the meeting, the locations of trails within Reach I were not discussed. This matter will be carried over to the next task force meeting.
 7. General comments and discussion:
 - a. Favorable attitude was voiced about the direction the initial investigation has taken.
 - b. Tim Bingham indicated that the cities will be shortly receiving a letter from the EMA Environmental Services Group requesting data from them pertaining to previous EIR's in the project area which may be of assistance to him in the preparation of the EIR for this project.
 - c. A meeting should be arranged with the OCWD to discuss groundwater recharge within Reach IV.

JUL 28 1975

Memo to Participants Lower Santiago Creek Task Force

Re Meeting No. 2

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- d. Questions or recommendations about the concepts presented in this task force meeting should be directed to Hal Reitmeier or Jim Miller. Individual input is a valuable aspect of this task force and will help to further our common goals.

HR:bd

MEMORANDUM

County of Orange

DATE: November 3, 1975

TO: Participants, Lower Santiago Creek
Task Force

DEPT/DIST: _____

FROM: Jim Miller, Project Plans

DEPT/DIST: EMA/Advance Planning Division

SUBJECT: Meeting No. 3 - Lower Santiago Creek Task Force

The task force held its third meeting on October 24, 1975, at 811 North Broadway, Suite 400, Santa Ana.

Task force members present:

Richard Bailey - EMA/Community Plans
Jack Berger - Greenbelt Commission
Tim Bingham - EMA/Environmental Services
Bob Drennan - EMA/General Plans
Stan Fuhr - EMA/Environmental Services
Hal Krizan - EMA/Project Plans
Jim Miller - EMA/Project Plans
Jere Murphy - City of Orange
Hal Reitmeier - EMA/Project Plans

Technical resource group members present:

Jim Hogg - EMA/Flood Control
Bob Rende - EMA/Flood Control
Bill Whittenberg - Orange County Water District

Other persons in attendance:

Gary Johnson - City Engineer, City of Orange
Carol Kawanami - Villa Park Citizen Greenbelt Committee
Steve Malone - Supervisor Clark's Office
Dick Munsell - Assistant Director, Advance Planning Division, EMA

1. Hal Reitmeier opened the meeting by indicating that subsequent to the previous task force meeting on July 16 the Project Plans staff has been investigating numerous flow reduction alternatives along Lower Santiago Creek. This investigation was made partially because of the interest in reduced flow possibilities expressed at the preceeding task force meeting. Several viable alternatives have emerged from this investigation. A presentation of the concepts and costs reviewed at this meeting was made to the directors of the EMA on October 16, 1975.

Lower Santiago Creek Task Force Meeting No. 3
November 3, 1975

2. Jim Miller described the physical features of three hydraulic structures being investigated for possible use in retarding the peak flood flow. These are: (1) Raise Santiago Dam, (2) increase controlled discharge capability of Villa Park Dam and (3) construct retarding basin and ancillary structures utilizing the existing gravel pits upstream of Collins-Prospect.
3. Hal Reitmeier presented a review of the flood reduction capabilities of all possible combinations of the previously described structures (see Exhibit I). Four design storms (general project storm, local project storm, general 100-year storm, local 100-year storm) were used to evaluate the combinations' effectiveness. Based on the results of this evaluation, an economic comparison was made between the three most effective flood retarding combinations and a fourth alternative in which no flood retarding is proposed (Alternative I). The three flood retarding alternatives are: (1) Raise Santiago Dam and construct 100-year channel downstream of Prospect Street neglecting the effects of the local project flood (Alternative II); (2) raise Santiago Dam, construct retarding basin and construct 100-year channel downstream of Prospect Street adequate to control all four design storms (Alternative VII) and (3) increase controlled discharge capability of Villa Park Dam, construct retarding basin and construct 100-year channel downstream of Prospect Street neglecting the effects of the local project flood (Alternative VIII).
4. Jim Miller reviewed the results of the economic analysis. A summary of the cost, by reach, for reduced flow and general project flood flow channels was presented (see Exhibit II). This summary includes only the costs downstream of Prospect Street due to a lack of similarity in the various alternatives upstream of that point. The total cost for a general project flood channel is \$15.9 million and for the reduced flow channel is \$10.3 million. A second summary table was presented showing the total cost comparison of the four alternatives considered (see Exhibit III). In order to fairly compare the costs, those alternatives in which no retarding basin is proposed have additional costs for slope stabilization and right of way deemed to be necessary for creating a usable park site in the sand and gravel pit area. These costs are inherent in those alternatives which propose using the retarding basin. The total cost of each of the four alternatives is as follows:

Alternative I	- \$18.7 million
Alternative II	- \$15.4 million
Alternative VII	- \$17.0 million
Alternative VIII	- \$14.9 million

5. Hal Reitmeier handed out and discussed a summary of the advantages and disadvantages of each of the four alternatives considered (see Exhibit IV). He then opened the meeting to discussion. The more significant remarks were:
 - o Steve Malone/Hal Reitmeier - individual conversations with Tom Dawes, EMA/Flood Control, have indicated that the Army Corps of Engineers will permit changes in their proposed Santiago Creek Plan to bring it more into line with local proposals for improvement. It was indicated that the

Lower Santiago Creek Task Force Meeting No. 3
November 3, 1975

request for these changes should be made during the design memorandum phase of the Corps project rather than now, since any major change in the Corps project now may delay the total Santa Ana River Plan of which Santiago Creek is only a small part.

- o Bob Rende - suspects the soil to be excavated from the retarding basin site is of unsuitable quality for use in fill embankments for slope stabilization and channel construction. A significant part of this material is fine clay which has been deposited in a depleted pit. This fine clay is the waste material of adjacent sand and gravel mining operations.
- o Tim Bingham - questioned the adequacy of the specific plan study boundary. Tim expressed concern that the boundary should be expanded to include the visual impact area defined by the Santa Ana River/Santiago Creek Greenbelt Commission. Jere Murphy responded that he felt the study boundary was adequate so far as the City of Orange was concerned. Hal Reitmeier indicated that the main intent of the study was to develop a plan for the main greenbelt corridor which will result in implementation of greenbelt development in the near future.
- o Bill Whittenberg - indicated that OCWD has budgeted funds for purchase of water spreading property in the sand and gravel pit area.
- o Gary Johnson - indicated the City of Orange would like a channel, between the existing Hart Park channel and Cambridge Street, similar to the existing WPA channel in Hart Park.
- o Jim Miller - voiced opinion that the suitability of the available soil in the proposed retarding basin is not really a factor which will reduce the viability of any of the four preferred alternatives. Each alternative will experience roughly the same cost increase thereby effecting no change in the comparison of cost among the four, assuming that future park development in the gravel pits will require some type of soil stabilization measures regardless of whether that area is used for flood retarding.

Any further questions or recommendations about the concepts presented at this task force meeting should be directed to Jim Miller or Hal Reitmeier at centrex 5394 and 5390, respectively. Please don't hesitate to comment if you have a suggestion.

JM:pb

MEMORANDUM

County of Orange

DATE: January 28, 1976

Participants
TO: Lower Santiago Creek Task Force DEPT/DIST: _____

FROM: Hal Reitmeier *HJR* DEPT/DIST: Project Plans, EMA

SUBJECT: Meeting No. 4 - Lower Santiago Creek Task Force

The task force held its fourth meeting on January 16, 1976, at 811 North Broadway, Suite 400, Santa Ana.

Task Force members present:

Robert Sundstrom	City of Santa Ana
Bert K. Yamasaki	City of Orange
Jack Berger	Greenbelt Commission
Tom Scott	City of Villa Park
Hal Reitmeier	EMA - Project Plans
Jim Miller	EMA - Project Plans
Bob Drennan	EMA - General Plans
Richard Bailey	EMA - Community Plans
David Cousins	EMA - Environmental Services
Hal Krizan	EMA - Project Plans

Technical Resource Group members present:

Bob Rende	EMA - Development
Nereus L. Richardson	Orange County Water District

Other persons in attendance:

Frank Yang	City of Santa Ana
Dick Smith	City of Santa Ana
Gary Johnson	City of Orange
Steve Malone	Supervisor Clark's Office
Carol Kawanami	City of Villa Park

1. The meeting was opened with a slide presentation showing the existing condition of Santiago Creek in Reaches I and II with selected views showing the creek during the 1969 floods.
2. Hal Reitmeier briefly reviewed the proposed flood retarding alternatives for the creek which were discussed in detail in previous meetings.
3. Exhibits were handed out which showed the alternate channel sections which had been reviewed to date for Reach I. Hal Reitmeier briefly reviewed the exhibits discussing possible areas where some clarification appeared warranted.

Memo - Meeting No. 4 - Lower Santiago Creek Task Force
January 28, 1976

4. Jim Miller reviewed the alternate channel proposals that are presently being investigated for Reach II of the creek. Exhibits similar to those that were handed out for Reach I are attached to this memo showing the proposed sections being considered and the channel construction costs for each. Comments from the task force members were solicited as to other possible channel proposals which should be considered.
5. Hal Reitmeier reviewed the proposed boundary for Lower Santiago Creek Regional Park and the present status of land acquisition within the park area. In addition, a study performed by the Project Plans Division establishing use potential level for the area within the park boundary was presented. It was explained that the study was very cursory in nature and since PPD was not qualified to do a detailed park study the intent of this study was not to delineate specific uses. However, uses which have already been proposed by various citizen groups and the Greenbelt Commission would be delineated and discussed in the final report. Prior to actual park implementation, a detailed park study would be necessary. General comments were solicited as to the adequacy of such an approach and whether a more detailed analysis of the park should be conducted at this time. It was generally concurred that the approach proposed was adequate.
6. The following general comments were made during the course of the meeting:
 - a. Bert Yamasaki indicated that he would like to review the channel alternatives for Reach II with city staff with the intent of providing more detailed information as to the type of channel improvements the city would desire.
 - b. Gary Johnson pointed out that the Fowler gravel pit is presently being considered for development as a private tennis club.

HHR:pb

MEMORANDUM

County of Orange

DATE: April 21, 1976

TO: Participants, Lower Santiago Creek,
Task Force

DEPT/DIST: _____

FROM: Hal Reitmeier

DEPT/DIST: Project Plans

SUBJECT: Meeting No. 5 - Lower Santiago Creek Task Force

The Task Force held its fifth meeting on April 2, 1976 at 811 North Broadway, Suite 400, Santa Ana.

Task Force members present:

Tom Scott	City of Villa Park
Bob Fisher	EMA/Development
Jack Berger	Greenbelt Commission
Bert Yamasaki	City of Orange
Jim Miller	EMA/Project Plans
Hal Reitmeier	EMA/Project Plans
Hal Krizan	EMA/Project Plans
Bob Drennan	EMA/General Plans
Tim Bingham	EMA/Environmental Services

Technical resource group members present:

Bob Weddle	EMA/Program Development
Nick Richardson	Orange County Water District

Other persons in attendance:

Steve Malone	Supervisor Clark's Office
Michele Becker	EMA/General Plans

1. Exhibits were handed out showing the alternate channel sections which have been developed for Reach III of the Creek. Jim Miller briefly reviewed the exhibits. Comments were solicited regarding other alternatives which should be considered. Jim Miller pointed out that for the improvements through Santiago Golf Course, the rectangular channel and terraced channel alternatives were sized wide and shallow in an attempt to minimize the required fill within the golf course. Upstream of Tustin Avenue to Chapman Avenue the proposed improvements for those two alternatives were sized as narrow and deep as existing topography would permit in order to provide more open space for trails, etc. Jim noted that the narrow-deep channel was probably not the most cost effective design. In a response to a question by Bob Fisher, Jim indicated that there would be approximately a 150' wide strip of land available for trails between Tustin Avenue and Chapman Avenue. Bob commented that a wider channel should be considered if it would result in a cost savings, because 150' of R/W for trails only is more than adequate.
2. Hal Reitmeier reviewed alternate grading plans which have been developed for the Hurwitz-Buchheim gravel pits and the Conrock-Smith pit. The grading plans were

prepared by the Project Plans staff in conjunction with a study to determine the feasibility of rehabilitating the pits for recreational use. As a result of the study, and a subsequent letter requesting Board of Supervisor's authorization, approval was granted on April 20, 1976 by the Board to initiate negotiations for the acquisition of the parcels with revenue sharing funds.

3. Hal Reitmeier reviewed the limits of the natural flood plain for Reach V. Two locations on the south side of the creek were pointed out as needing possible localized slope protection in order to protect existing residential structures. On the north side of the creek there are no existing improvements which require protection. However, when development does occur on the Mabury, Heinsbergen, and Kluender properties, the City of Orange should consider the advisability of requiring a buffer zone or frontage road between the creek and any proposed improvements in order to insure that no formal type of channel improvement would have to be installed. Bert Yamasaki indicated that the city is presently communicating with the developers of those properties and that he will attempt to incorporate the buffer concept into those developments where feasible.
4. Hal Reitmeier reviewed the outcome of recent meetings held with the owners of the gravel pits upstream of Collins-Prospect in Reach VI and V. The purpose of the meetings was to inform the owners about the Specific Plan Study and to solicit any comments they may have. The general response was that County planning (such as the subject study) tends to "cloud" their property, thereby making it difficult for them to independently develop a rehabilitation plan. Both Conrock and Sully Miller indicated that they were interested in possibly developing a sanitary landfill project in some of the existing abandoned pits. They also mentioned that the material in the area of the existing Flintkote plant will ultimately be mined out.
5. Hal Reitmeier outlined the results of a preliminary soils report on the wash material in the area of the proposed retarding basin. The wash material was originally proposed to be used to stabilize the peripheral slopes of the basin. The report indicated that the material was not suitable and it appears that borrow material may have to be imported. One possible borrow site would be the Conrock property presently being acquired by HB&P. If the 68 acres were lowered 10 ft, approximately one million yards of suitable material could be generated. The following comments summarize the ensuing discussion:
 - (1) Possibly the County should consider buying the property where the Flintkote plant is presently located and use that material for slope stabilizing instead of the park site material.
 - (2) Use of the top layers of park site material will necessitate the removal of the existing vegetation. This may be contrary to the ultimate park design.
 - (3) If imported material is necessary, possible the County should consider setting up a "soil bank" near the retarding basin site where excess material could be stockpiled now for future use when the basin is constructed.
6. Hal Reitmeier briefly reviewed the following projects which the Project Plans staff has/or is providing support information on:
 - (a) Proposed tennis club east of Hart Park in the Fowler gravel pit.
 - (b) Flood Plain dedication in conjunction with the Chapman General Hospital Cardiac Rehabilitation Facility.
 - (c) Proposed trail connections and open space dedication in Anaheim Hills area.

7. Hal Reitmeier closed the meeting by briefly outlining the direction of the study. He indicated that the next step will be to take a detailed look at the location of trails along the creek. Then a plan will be prepared for a composite flood control and trail alternative for the creek which addresses the inputs from the EMA Director and Assistant Director, Task Force members and County/City greenbelt groups. This plan will then be presented to interested groups and property owners for comment and review. It is anticipated that the study will be completed by late May or early June.

Accompanying these minutes are the projected cost estimates for channel construction of the indicated alternatives in Reach IV from S.P.R.R. to Prospect St. It should be noted that these alternatives are identical to those considered at the upstream end of Reach III. The costs reflect only channel construction. Bridge modification will be necessary at Prospect St. if any of the proposals are implemented.

Please call Hal Reitmeier at 834-5390 or Jim Miller at 834-5394 as soon as possible if you have any questions or comments concerning the information.

mlt

MEMORANDUM

County of Orange

DATE: October 28, 1975

TO: DISTRIBUTION LIST

DEPT/DIST: _____

FROM: Jim Miller, Project Plans

DEPT/DIST: EMA/Advance Planning

SUBJECT: Meeting of October 16, 1975, regarding specific plan study for Lower Santiago Creek

The Advance Planning Division held a meeting in the EMA conference room at 811 North Broadway, Suite 400, to review the present status of the specific plan study for Lower Santiago Creek.

Those in attendance:

Dave Cousins - Advance Planning Division
Jim Hogg - Development Division
Hal Krizan - Advance Planning Division
Larry Leaman - Development Division
Jim Miller - Advance Planning Division
Dick Munsell - Assistant Director, Advance Planning Division
Joe Natsuhara - Development Division
Carl Nelson - Assistant Director, Development Division
George Osborne - Director, Environmental Management Agency
Hal Reitmeier - Advance Planning Division
Bob Rende - Development Division
Murray Storm - Assistant Director - Regulation Division
Jim Williams - Development Division
Bill Zaun - Development Division

1. Hal Reitmeier opened the meeting by briefly describing the study boundary, objectives and structure of the task force study group. Hal also listed the recommendations being made as a result of the study to date to provide optimum exposure at this meeting. These were:
 - A. Project Plans Branch expedite completion of specific plan study with the intent that EMA proceed in near future to construct 100-year flood control channel improvements on Santiago Creek assuming upstream re-tarding in the future.
 - B. County (EMA) actively pursue study of feasibility and possible implementation of flood control alternative No. VII and/or flood control alternative No. VIII assuming local project flood has low probability of occurrence below Villa Park Dam and therefore will not be considered as design storm.
 - C. Prepare summary report outlining alternatives VII and VIII which will accompany EMA's response to Army Corps of Engineers regarding their Santa Ana River project report, requesting Corps investigate and possibly change their proposed project for Santiago Creek to Alternative VII or VIII.

Meeting of October 16, 1975 - Specific Plan Study for Lower Santiago Creek
October 28, 1975

- D. Contact State Division of Dam Safety to determine whether the proposed retarding basin will fall under their jurisdiction.
- E. Retain soils consultant or EMA materials lab to investigate suitability of soils in gravel pit area for future use in slope stabilization and channel fill.
2. Jim Miller described the physical features of three hydraulic structures being investigated for possible use in retarding the peak flood flow. These are: (1) Raise Santiago Dam, (2) increase controlled discharge capability of Villa Park Dam and (3) construct retarding basin and ancillary structures utilizing the existing gravel pits upstream of Collins-Prospect.
3. Hal Reitmeier presented a review of the flood reduction capabilities of all possible combinations of the previously described structures. Four design storms (general project storm, local project storm, general 100-year storm, local 100-year storm) were used to evaluate the combinations' effectiveness. Based on the results of this evaluation, an economic comparison was made between the three most effective flood retarding combinations and a fourth alternative in which no flood retarding is proposed (Alternative I). The three flood retarding alternatives are: (1) Raise Santiago Dam and construct 100-year channel downstream of Prospect Street neglecting the effects of the local project flood (Alternative II); (2) raise Santiago Dam, construct retarding basin and construct 100-year channel downstream of Prospect Street adequate to control all four design storms (Alternate VII) and (3) increase controlled discharge capability of Villa Park Dam, construct retarding basin and construct 100-year channel downstream of Prospect Street neglecting the effects of the local project flood (Alternative VIII).
4. Jim Miller reviewed the results of the economic analysis. A summary of the cost, by reach, for reduced flow and general project flood flow channels was presented. This summary included only the costs downstream of Prospect Street due to a lack of similarity in the various alternatives upstream of that point. The total cost for a general project flood channel is \$15.9 million and for the reduced flow channel is \$10.3 million. A second summary table was presented showing the total cost comparison of the four alternatives considered. In order to fairly compare the costs, those alternatives in which no retarding basin is proposed have additional costs for slope stabilization and right of way deemed to be necessary for creating a usable park site in the sand and gravel pit area. These costs are inherent in those alternatives which propose using the retarding basin. The total cost of each of the four alternatives is as follows:
- | | |
|------------------|------------------|
| Alternative I | - \$18.7 million |
| Alternative II | - \$15.4 million |
| Alternative VII | - \$17.0 million |
| Alternative VIII | - \$14.9 million |
5. Hal Reitmeier handed out and discussed a summary of the advantages and disadvantages of each of the four alternatives considered. He then opened the meeting to discussion. The more significant remarks were:

Meeting of October 16, 1975 - Specific Plan Study for Lower Santiago Creek
October 28, 1975

- o Carl Nelson - We should proceed with the specific plan study in a manner such that our investigation does not imply the pursuit of a particular alternative in advance of the EIR procedure.
- o Carl Nelson - We can reasonably neglect the local project flood as a design storm due to the inability of the local drainage systems within the relatively flat drainage area below Villa Park Dam to deliver the high discharges resulting from a local storm to the major watercourse.
- o Carl Nelson - Route the design storms through the existing gravel pits assuming no antecedent flow has filled the pits to determine if they can be used, as they now exist, as an effective means of flood retarding.
- o Carl Nelson - Expressed doubt the soil in the sand and gravel pit area is suitable for slope stabilization use due to its silty-clay nature (spoil material from previous sand and gravel excavation).
- o Carl Nelson - Questioned suitability of Bond Street Pit as a groundwater recharge basin due to limited permeability of the soil.
- o George Osborne - Suggested we may have to apply a clay sealer in Bond Street Pit and use it strictly for recreation purposes should its use for water conservation prove infeasible.
- o Carl Nelson - Suggested we contact the Army Corps of Engineers about changes to the Santa Ana River-Santiago Creek Plan during the design memorandum phase rather than at this time so as to avoid delay of the entire Santa Ana River project at this critical time.
- o Bob Rende - Recommended that we contact the Army Corps of Engineers to determine the feasibility of waiting to suggest changes in the Santa Ana River-Santiago Creek Plan until the design memorandum phase.
- o General Comment - Contact the State Division of Dam Safety to determine whether the retarding basin concept would fall under their jurisdiction.
- o General Comment - Everyone in attendance tended to agree that we should obtain a preliminary soils report investigating the suitability of the soils in the gravel pit area for use in stabilizing the basin slopes and for channel fill.
- o Larry Leaman - Questioned the feasibility of using the proposed water conservation lake for recreational purposes. His experience has indicated that the large fluctuation in water surface inherent in conservation facilities makes them poor recreational facilities.

JM:pb

Distribution List:

Dave Cousins	George Osborne
Jim Hogg	Bob Rende
Larry Leaman	Murray Storm
Dick Munsell	Jim Williams
Joe Natsuhara	Bill Zaun
Carl Nelson	

MEMORANDUM

County of Orange

DATE: July 7, 1976

TO: FILE

DEPT/DIST:

FROM: J. A. Miller ^{AM}

DEPT/DIST: Project Plans, EMA

SUBJECT: Minutes of Directors Meeting - Santiago Creek Specific Plan

On June 30, in the EMA conference room at 811 North Broadway, a meeting was held to inform the EMA directors and staff concerning the progress made to date on the Santiago Creek Specific Plan and to obtain their comments regarding the proposed format for preparation of the draft report.

Those in attendance at the meeting included:

C. R. Nelson	EMA - Development
J. W. Williams	Development - Design
J. M. Natsuhara	Development - Design
R. L. Rende	Advance Planning - Project Plans
H. J. Krizan	Development - Engineering Services
W. L. Zaun	Development - Flood/Road Program
E. Schneider	Administrative Assistant to Director, EMA
H. H. Reitmeier	Advance Planning - Project Plans
J. A. Miller	Advance Planning - Project Plans
Hank Parada	Advance Planning - Project Plans
Tim Bingham	Advance Planning - Environmental Services
Tim Neely	Regulations
Gil Martinez	Advance Planning - Project Plans
Rob Patterson	Advance Planning - Project Plans

The following is a summary of the meeting. Hal Reitmeier and Jim Miller, the project team, made the presentation:

Hal prefaced the detailed discussion of the project by updating the directors about a number of significant events which have taken place subsequent to the last meeting with the directors on October 16, 1975. These items include 1) several meetings with the Lower Santiago Creek Task Force which is composed of all public agencies believed to have a direct concern in the project, 2) meetings with the major private property owners (Conrock, Sully-Miller, Santiago Golf Course), 3) special presentations of project proposals to the Cities of Villa Park and Santa Ana Planning Commissions, 4) several study sessions with the Cities of Orange and Villa Park staff to discuss channel and trail alternatives, 5) a public meeting with Santa Ana residents adjacent to the creek (questionnaire results provided on exhibit), 6) completion of soil report by the EMA lab regarding the feasibility of the proposed retarding basin, 7) receipt of a reply from the State Division of Dam Safety stating that the proposed retarding basin does not fall under their jurisdiction as the basin is not a dam and 8) meetings with county and city greenbelt commissions to seek input and concurrence with the plan as it developed.

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Minutes of Directors Meeting - Santiago Creek Specific Plan
July 7, 1976

Hal proceeded to briefly review the flood retarding concepts previously presented at the October meeting with the directors. It was emphasized that a number of combinations are available which will result in a reduction in the peak discharge for the project flood in the Santa Ana area.

Subsequent to the development of the flood retarding alternatives, the main emphasis of the flood control portion of the study has been to develop alternative channel improvements for the creek. Two channel sizes were developed--one to convey the project flood discharge and a second which would convey the reduced flow discharge assuming upstream retarding occurs.

Jim presented the channel alternative which have been investigated. In all cases the alternative investigated provided that Reach V of the creek (Loma Street to Villa Park Dam) remain in a natural state with only minimal protective works. This approach for Reach V was judged to be most compatible with the tentative proposals for maintaining this portion of the creek as a semi-natural wilderness area.

A flood plain alternative (i.e. do-nothing) was investigated for both a reduced flow and project flood level discharge. In both instances, the creek is incapable of conveying the flow without flooding some adjacent residential structures. Based on figures obtained from the U. S. Army Corps of Engineers regarding the number of structures which would be subject to inundation, the present worth of flood plain insurance premiums over a ten-year period was determined. It was noted the the premium cost of \$87 per year is a maximum amount paid by a homeowner; however, this only reflects approximately 10% of the total cost of the insurance. The other 90% of the cost is subsidized by the Federal government. A ten-year premium period may not be directly comparable with the cost for actual channel construction alternatives due to the much longer life span which may be associated with formal channelization. It does, however, provide the pertinent observation that flood insurance is not an inexpensive alternative and over a prolonged period will easily exceed the cost of any construction alternative investigated.

Alternative channel proposals which have been investigated to date include (1) vertical wall concrete channel, (2) trapezoidal rock-sloped channel, (3) terraced concrete channel, (4) reinforced concrete box conduit, (5) paved invert of existing WPA channel, (6) dual channel with a greenbelt channel over a reinforced concrete box conduit channel, and (7) greenbelt channel superimposed over trapezoidal rock-sloped channel. These various proposals were combined to form the four alternatives presented in the meeting.

Two of the alternative proposals for Reach I of the creek (Santa Ana River to Main Street), the rock-lined channel and the dual channel, were not costed out because of the excessive right of way requirement associated with these alternatives which necessitated the removal of adjacent homes.

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July 7, 1976

Jim also explained in considerable detail the analysis of the retarding basin which is affiliated with the reduced flow channel alternatives. Refinements in the recent analysis reveal the cost is appreciably higher than formerly indicated. The two principal reasons being (1) the use of a concrete bypass channel instead of trapezoidal rock-sloped channel and (2) the adjustment of earthwork quantities to reflect the ultimate extraction of sand and gravel material from the basin area. The cost, although about \$3 million higher, still remains within the realm of economic feasibility when compared with the full project flood channelization alternative.

A modification of the basin shape was also investigated in an attempt to achieve a closer balance in earthwork quantities. This required the acquisition of approximately twelve acres of Conrock property southeast of Hewes Street. This is the property presently being acquired by the county for inclusion in the Lower Santiago Creek Regional Park. The proposed basin modification would require full realignment of Hewes Street.

Jim discussed the use of the sand and gravel pits in an as-is condition for flood peak retention. Several design hydrographs were routed through the pits as they presently exist; however, under all flow conditions, the pits fail to contain the project flood without incurring uncontrolled flow over Prospect Street into the adjacent development near Bond Street. The peak discharge is roughly 12,500 cfs. It would therefore appear futile to use the sand and gravel pits as a flow-through flood retention device.

Hal led the remainder of the discussion and related the progress made in trail alternative proposals. A number of staff meetings with Orange and Santa Ana have provided local interface with the development of the trail network alternatives. Consideration has been given to linkage with all existing and proposed local and regional trails which approach Santiago Creek. A number of areas of unresolved conflict still exist. These include: Trails through or around Santiago Golf Course, trails over Villa Park Dam, and trails through the Santa Ana area from the Santa Ana River to Main Street. Alternatives have been proposed in these areas but will need refinement as the draft report approaches finalization. A proposal which alleviates some of these problem areas is the elimination of the equestrian trail between the Santa Ana River and Chapman Avenue and the construction of the bicycle trail on public roads adjacent to the creek in those areas such as Santiago Golf Course and the Santa Ana area. A linkage to the Santa Ana River trail system can be accomplished for both trail systems through the Anaheim Hills development at the upper end of the study area.

Typical trail costs for the alternatives were also presented. It is significant to note that if a vertical wall channel bench is implemented the trail cost in Reach I (Santa Ana River to Main Street) are considerably higher than other more conventional trail construction.

In response to the project team's request for comment, there was apparent agreement regarding the general progress of the study. A number of specific details

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Minutes of Directors Meeting - Santiago Creek Specific Plan
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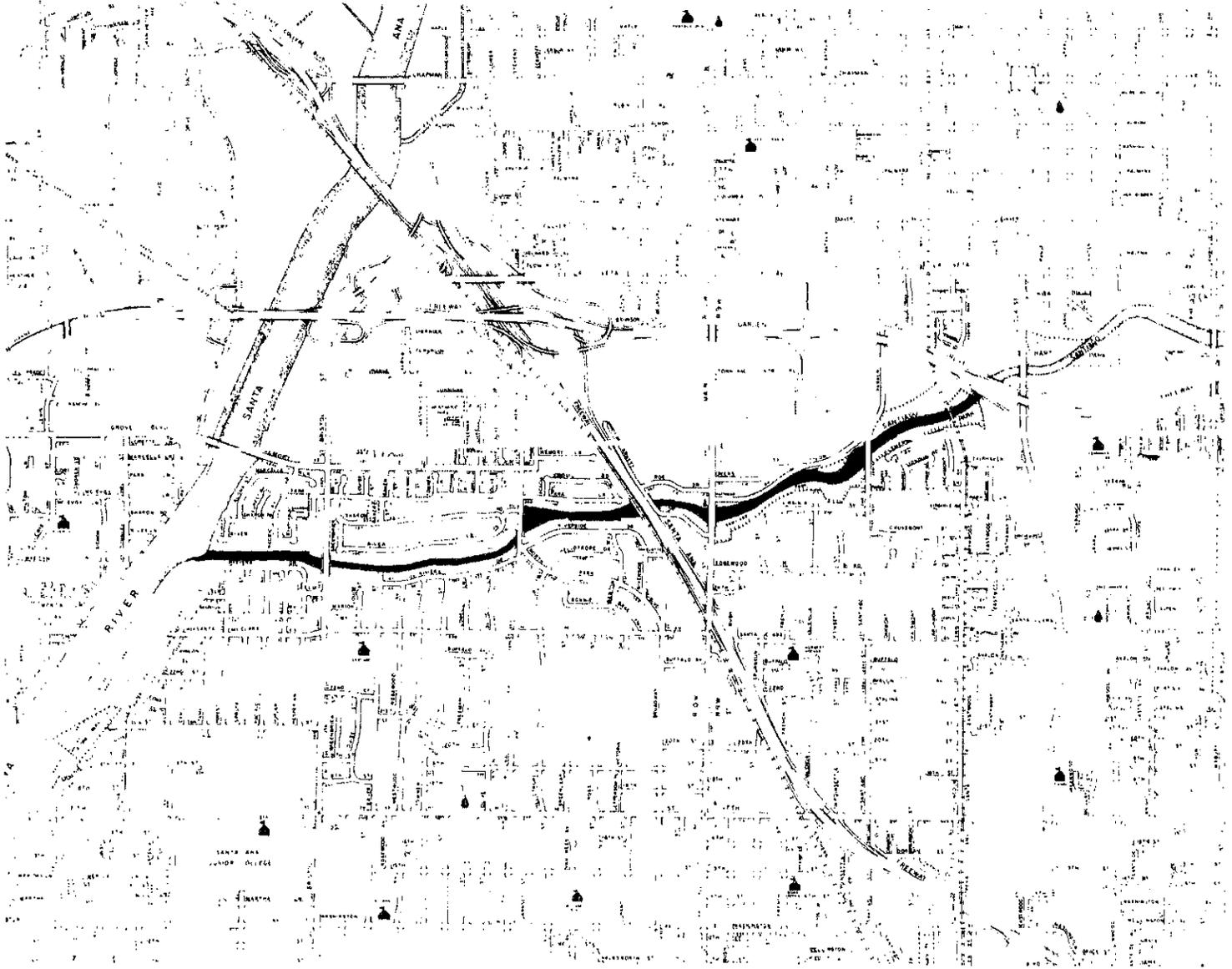
were discussed without any real conclusion, i.e., trail crossing of Villa Park Dam, lowering of bypass channel through the retarding basin, use of concrete vs. rock-sloped earthen bypass channel and the retarding basin configuration. It is the opinion of the project team that the majority of these items should be resolved in the project report or final design stage rather than during the specific plan process.

Hal indicated that he felt a "suggested alternative" would be a valuable tool in the draft report to help sort out the implementation plan which presently appears to be the most economically realistic and most acceptable to the public and other public agencies which are involved. Agreement was expressed with the qualification that the suggested alternative be presented only as a guideline, subject to change as the report draft is reviewed by the controlling agencies and modified to meet their specific needs.

It was recommended that a phasing schedule be generated as part of the report and that it should assume the EMA proceeding unilaterally to implement the plan. At the same time, we should bear in mind that the U. S. Army Corps of Engineers has included Lower Santiago Creek in its proposal for improvements on the Santa Ana River. Any opportunity to assure the Corps of Engineers that the county's proposal will provide flood protection equivalent to their proposal for Santiago Creek should be capitalized upon to help assure that our plan will ultimately be acceptable and will consequently qualify for Federal funding (even though the county may already have constructed several phases of the Santiago Creek ultimate channelization).

JAM:pb

ENVIRONMENTAL MANAGEMENT AGENCY



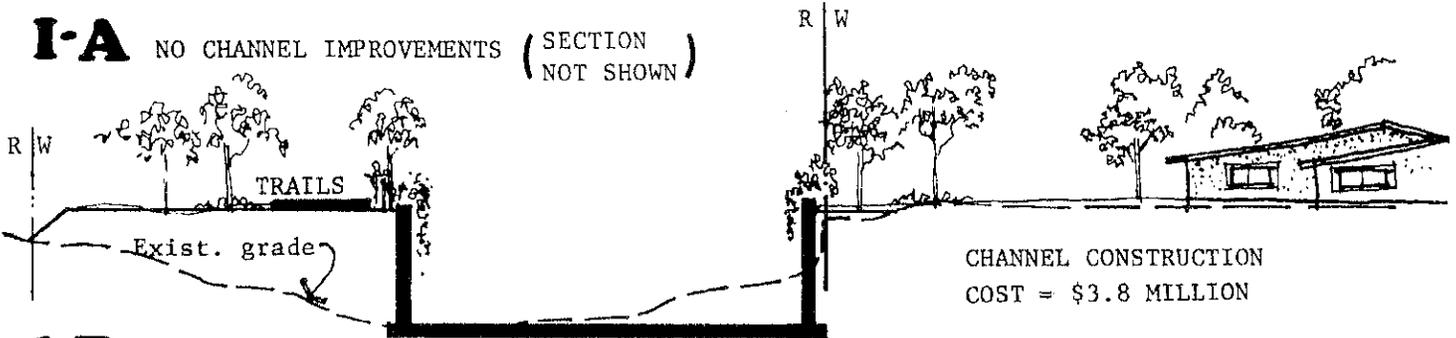
**LOWER SANTIAGO CREEK
SPECIFIC PLAN
• SANTA ANA AREA •**

CITIZEN INPUT PACKAGE

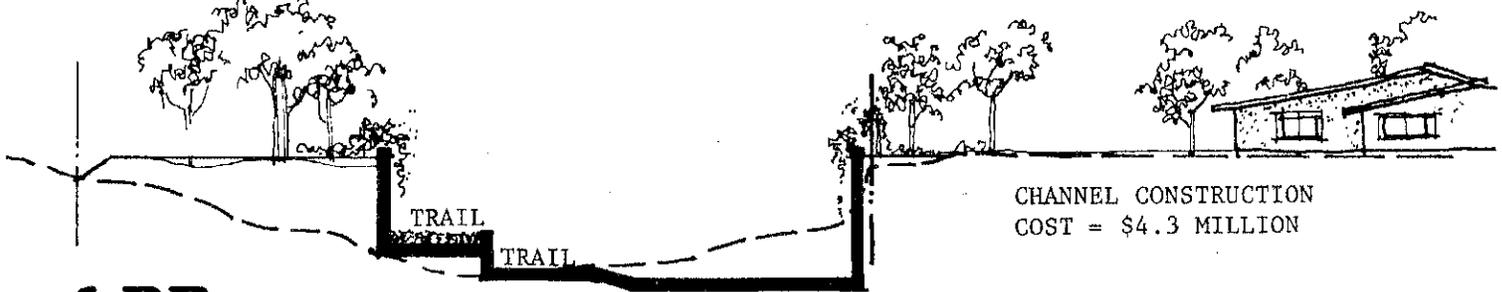
LOWER SANTIAGO CREEK SPECIFIC PLAN

Alt. Channel Types . Santa Ana River to Main St.

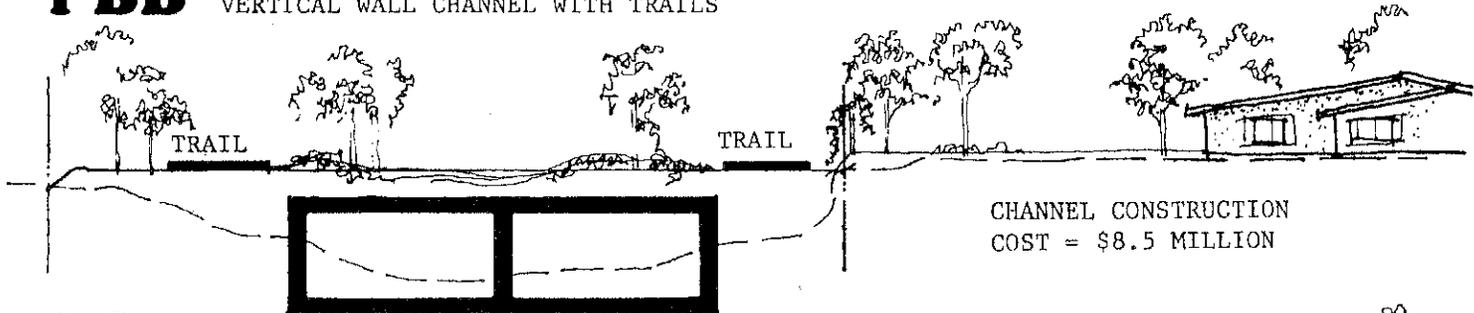
I-A NO CHANNEL IMPROVEMENTS (SECTION NOT SHOWN)



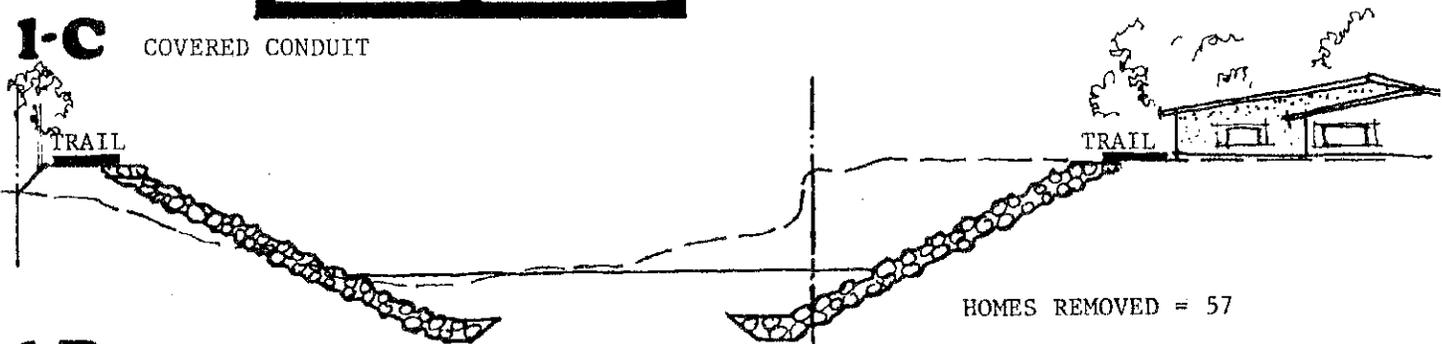
I-B VERTICAL WALL CHANNEL



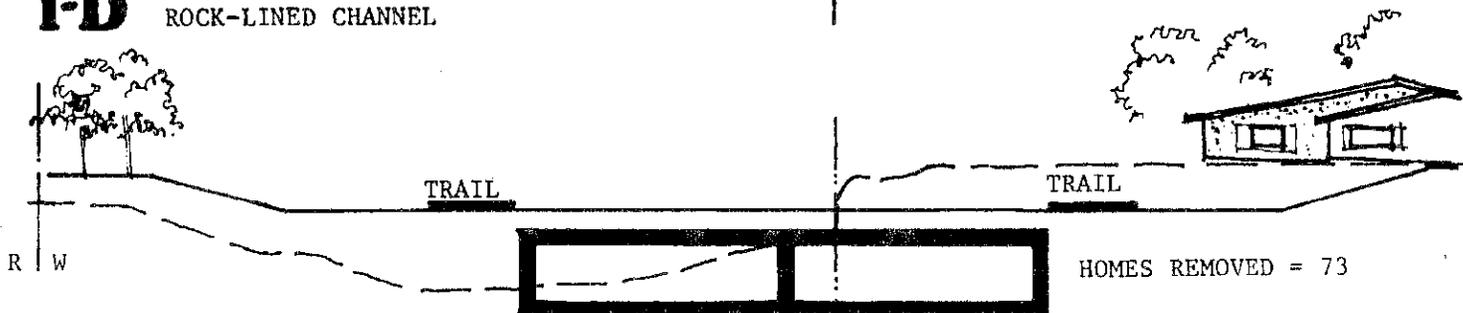
I-BB VERTICAL WALL CHANNEL WITH TRAILS



I-C COVERED CONDUIT



I-D ROCK-LINED CHANNEL

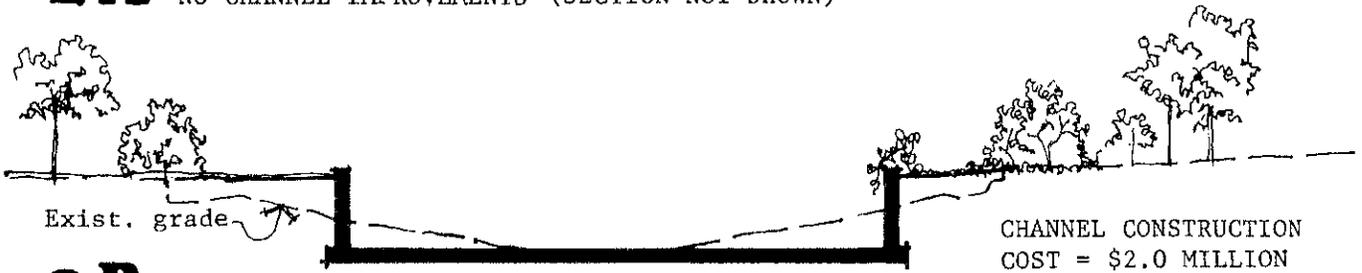


I-E DUAL CHANNEL

LOWER SANTIAGO CREEK - SPECIFIC PLAN

Alt. Channel Types . Main St. to G.G. Frwy.

2-A NO CHANNEL IMPROVEMENTS (SECTION NOT SHOWN)



2-B VERTICAL WALL CHANNEL



2-C PAVED INVERT



2-D TERRACED CHANNEL

BACKGROUND

Santiago Creek is one of the major watercourses within Orange County. The total drainage area tributary to the creek where it empties into the Santa Ana River is approximately 102 square miles. Although dry in the summer months, the creek looms as a major flood hazard during the winter. This was exemplified by the extensive flood damage which occurred during the floods of February, 1969. The need for improved flood capacity is critical.

Because of its summer passiveness, the creek offers opportunity for a regional recreational facility. The existing parks which line the creek (Jack Fisher Park, Santiago Park and Hart Park) provide high activity nodes for a corridor running from the Santa Ana River to Irvine Park. As an endorsement of this corridor concept, the County Board of Supervisors, in 1971, adopted a greenbelt plan for the creek which is a far-reaching planning effort to preserve and enhance this important resource within Orange County. The present study, which is attempting to define in detail the opportunities and constraints along the creek, is an offspring from the need to resolve the flood hazards on the creek and to refine the original greenbelt plan adopted by the Board of Supervisors.

THE SPECIFIC PLAN

The Lower Santiago Creek Specific Plan is a study which analyzes alternative flood control improvements, trail locations and park and recreational areas on Santiago Creek from the Santa Ana River to Villa Park Dam. Incorporated in the study are the previous and ongoing planning efforts of the Cities of Orange, Santa Ana and Villa Park and the Santa Ana River/Santiago Creek Greenbelt Commission. The final plan will be of sufficient detail to evaluate the project costs for different alternatives and to provide a potential schedule of implementation. The major intent of the study is to provide adequate detail and guidance to enable the appropriate public agency to proceed with the acquisition of land and the construction of development projects along the creek.

PLAN APPROVAL

Upon completion of a draft report, the findings will be presented to the EMA directors for preliminary approval. Successive opportunities for comment and approval will be provided to citizen groups, City Planning Commissions (Orange, Santa Ana and Villa Park), City Councils (Orange, Santa Ana and Villa Park), the Santa Ana River/Santiago Creek Greenbelt Commission, the County Planning Commission and the County Board of Supervisors. As comments arise which are of value to the plan, further investigation and analysis will be conducted so that these comments may be considered in the final planning effort.

County of Orange
Project Plans, Advance Planning, EMA
Hal H. Reitmeier (Project Leader)
811 North Broadway, Room 444
Post Office Box 4108
Santa Ana, California 92702
Phone: 834-5390

Lower Santiago Creek Specific Plan Questionnaire

Comments by respondents:

C. A. Horger, 1518 River Lane, Santa Ana, Calif. 92706

Would prefer trail to start at Santiago Park and go up to Villa Park Dam. We feel that this should be jointly funded by the government and the county. As this creek provides drainage for the national forest and also drainage for many homes and cities along the route.

Alice A. Marsile, 1515 Riviera Drive, Santa Ana, Calif. 92706

This is my "home." If I had wanted to live by a recreation trail, I would have bought a house close to one!

No name, 1530 W. River Lane, Santa Ana, Calif. 92706

If trails are provided, some provisions should be made to prevent use of motorized vehicles.

We very much appreciated the time and effort you put forth for the public meeting and hope it will be possible to have more of these in the future.

Harold T. Segerstrom, Jr., 1129 Riviera Drive, Santa Ana 92706

I am sorry for the delay in returning this questionnaire, but we have had illness in the family. We are very concerned about the proposal for hiking, equestrian and bicycle trails along the Santiago Creek due to the fact that the Board of Supervisors has initiated a green belt area. I know some form of green belt will be provided or forced upon us on the Santiago Creek area. That is why I have selected proposal 1-b so that if horse trails and bicycles are forced upon us it would keep them in the lower extremities of the channel. The biggest concern of all of the residents within my area is the surplus property from the property lines to the side wall of the channel. We understand from the meeting that this is to be a green belt area, but we vehemently protest picnic or hiking trails behind our property lines. If you will check the records with the Santa Ana Police Department, vandalism, theft and molestation have been the greatest concern along this area. We do not feel that we should have outsiders intruding on our privacy. That is why we purchased this property years ago. I, myself, would be willing to purchase the surplus property up to the channel and maintain it myself.

Mr. and Mrs. David A. Wyneken, 1150 Riviera Drive, Santa Ana, Calif. 92706

Being new property owners in this area, we would like to be kept informed of any meetings we might attend to learn more about the various proposals. Are especially interested about the specific areas where homes would be removed in plans 1-D and 1-E, and in finding out just how great a danger flooding would be if no channel improvements were made.

Lower Santiago Creek Specific Plan Questionnaire - comments

No name

What happened to the prior planning?

Do the retarding basin.

NO MATTER WHAT YOU DO, DON'T PUT IN THE TRAILS. KEEP
PEOPLE OUT.

NO TRAILS, KEEP BURGLARS, RAPISTS, VANDALS, OUT.

KEEP OUT SKATEBOARDERS - NOISE POLLUTION

No name, 927 Riviera Drive, Santa Ana, Calif. 92706

Has Villa Park Dam repaired since 1969? Wasn't it damaged along one corner or side? How can you keep motorcycles out of the Creek bed?

Willis S. Clemons, 1026 River Lane, Santa Ana, Calif. 92706

If you are going to put in trails, start the trails at Main Street. The residential district from the Santa Ana River to Main Street on the creek is too valuable to be ruined by trails. The houses along the creek from Santa Ana River to Main Street are also located close to the edge of the creek.

Carl Schulz, 1150 River Lane, Santa Ana, Calif. 92706

I feel strongly opposed to trails of any kind from the Santa Ana River to Main (Santiago Park).

C. A. Marcus, 1230 River Lane, Santa Ana, Calif. 92706

Privacy is my main concern. I oppose anything that will take away privacy.

E. Derdzinski, 2371 Riverside Drive, Santa Ana, Calif. 92706

None of the alternatives of the proposed lower Santiago Creek flood control channel will resolve the flooding problem without rebuilding several bridges (Bristol Street, Flower, railroad and Santa Ana freeway bridges). The present bridges are a bottleneck accumulating debris and allowing water to back up, causing damage as evidenced by 1969 floods.

If the bridges will not be rebuilt, I recommend no channel improvement except to keep it clear of debris. Access to the creek by trucks and cars dumping trash should be blocked adding locked gates along the railroad trucks (only a few days ago several truckloads of trash was dumped under the railroad bridge).

If a vertical channel will be built, adjoining property owners should have the right to use the space between their property line and the trail (or the channel if the trail is on the other side). This will give more privacy and reduce vandalism.

Lower Santiago Creek Specific Plan Questionnaire - comments

Mrs. C. T. Baker, no address

It is obvious some additional help is needed to control flood waters on rare occasions. We've lived here 23 years and have only witnessed ONE flood. Therefore I would like to suggest OUR money be used in a manner to do the most good for our community.

No one really benefits from a deeper channel except on rare occasion.

Would it be possible to build another dam above the Villa Park Dam and with two holding basins our creek could be left in its natural state?

We built our homes here because we like the natural setting. A deep cement flood control would spoil all we love.

A holding basin could provide water sports for this area which we badly need. As example, Perris Dam in Riverside Co. Many people have boats and have to travel long distances to use them. Lets get the most for our money.

Roy Russell, Jr., 410 W. Park Lane, Santa Ana, California 92706

I feel that many improvements can be made without losing the natural beauties of the creek. With the cement sides and bottom you reduce the water entered into the water tables and create a sterile atmosphere in place of a natural one. Leave the creek alone or make the improvement natural. Good maintenance may be the real answer.

I hope we will continue to be informed as to what the plans are.

No name, 410 W. Park Lane, Santa Ana, Calif. 92706

Trails would raise a lot of problems, i.e., #7, and the construction here proposed would, from what I can envision, ruin a natural area that is already pretty and accessible to the public for enjoyment by walking through. I don't feel that the expense projects proposed are necessary or justified and I would hate to see the creek turned into a mass of concrete.

Mr. W. L. Downing, Jr., 907 E. Clemenson Ave., Santa Ana, Calif. 92701

I feel that the public is most apt to abuse the trail privileges by littering, using the improvement for improper purposes and creating a general nuisance to adjacent property owners unless constantly supervised. Our law enforcement is spread too thin for this extra load.

Special provisions will be required to keep motorcycles out whether trails are constructed or not.

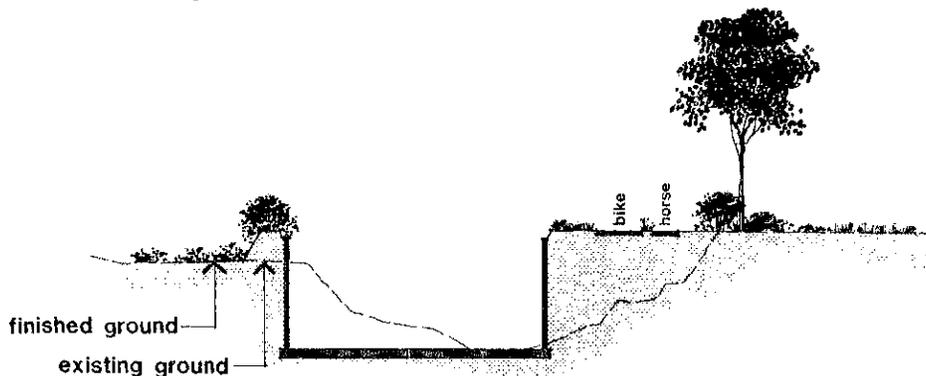
APPENDIX C RECREATIONAL TRAIL ALTERNATIVES

Previously adopted trail plans for Santiago Creek show regional recreational trails paralleling the creek from the Santa Ana River to Villa Park Dam. In determining the ultimate alignment for the trails, every effort has been made to place the trails adjacent to the creek wherever feasible and where this is possible no alternative alignments have been investigated. However, there are two locations where existing constraints make it very difficult to implement the trails adjacent to the creek as proposed in previously adopted conceptual trail plans. The locations where problems exist are (1) in the Santa Ana area between the Santa Ana River Trail and the Santa Ana Freeway and (2) in the Orange area at the Santiago Golf Course (Cambridge Street to Tustin Avenue). At these two locations, alternatives to the trails paralleling the creek have been developed. The following is a discussion of the alternatives considered.

1. Recreational Trail Alternatives—Santa Ana River Trail to Santa Ana Freeway

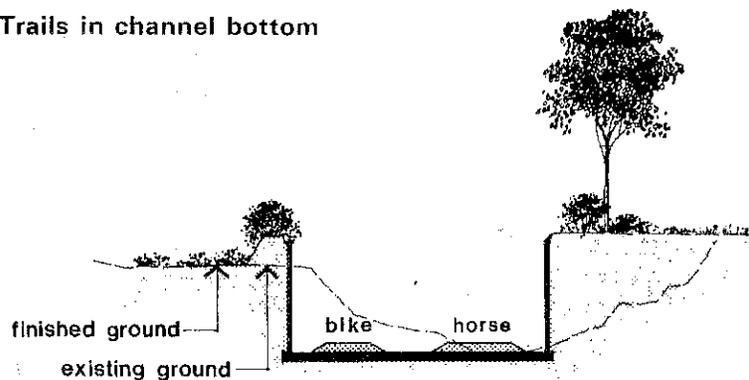
The existing creek right of way is very narrow from Bristol Street to the Santa Ana Freeway and provides little opportunity for the construction of recreation trails. Residential development abuts the creek and in certain of these areas backyard landscaping extends into the watercourse. Many of the local residents who live adjacent to the creek have voiced strong opposition to recreational trails in their backyards. Because of the above concerns, the following trail alternatives were considered:

a. Trails adjacent to the top of channel wall



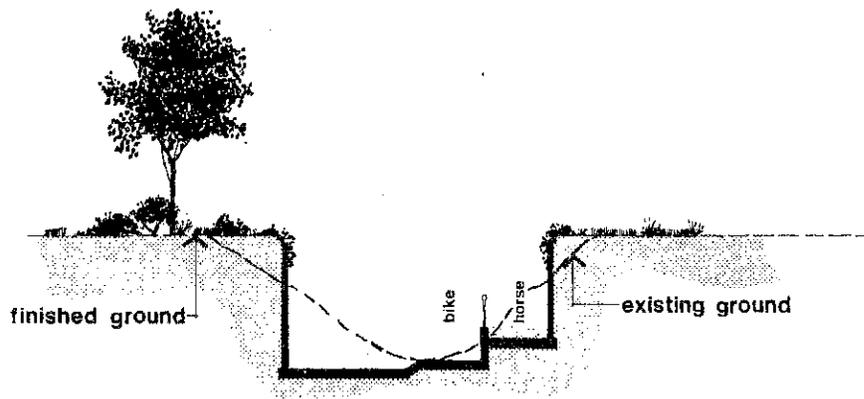
Under this alternative the trails would parallel the top of the channel throughout Reach 1. At certain locations it would be necessary to acquire additional right of way for the trails. In addition, the privacy of adjacent property owners would be violated. The cost of trail improvements from the Santa Ana River Trail to the Santa Ana Freeway under this alternative would be minimal compared to other alternatives considered. Estimated cost, not including right of way is \$121,000.

b. Trails in channel bottom



Under this alternative the trails from the Santa Ana River Trail to Bristol Street would parallel the top of the channel and from Bristol Street to the Santa Ana Freeway would be in the channel bottom. The visual experience from the point of view of the trail user would be bleak. Privacy of adjacent homeowners would be preserved and no additional right of way would be required. The trail construction costs would be minimal. Practicality of using the channel bottom for an equestrian trail is questionable.

c. Trails on channel bench



Under this alternative the trails from the Santa Ana River to Bristol Street would parallel the top of the channel and from Bristol Street to the Santa Ana Freeway would be located on special benches constructed in the channel bottom. A special trail base would be provided for the equestrian trail. No additional right of way would be required. The visual experience from the point of view of the trail user would still be limited. Again, the privacy of adjacent homeowners would be preserved. The cost of trail construction would be very high; estimated at approximately \$329,000 for trails from the Santa Ana River Trail to the Santa Ana Freeway.

d. Realign trail out of creek and down Memory Lane

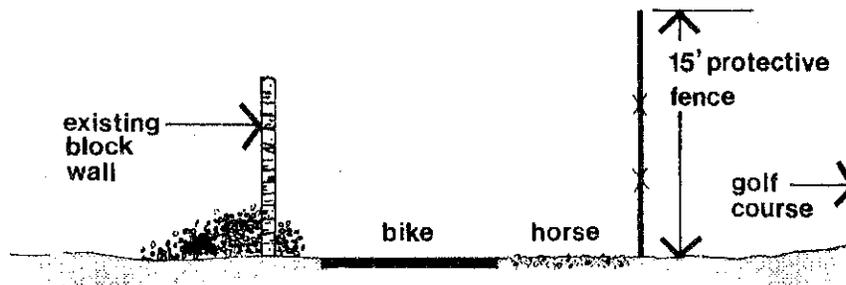
Under this alternative the trail would not be constructed along the creek but would be aligned along Memory Lane as shown on *exhibit C1*. The equestrian trail would be eliminated because of the incompatibility between equestrians and automobiles. The bikeway improvements would require the signing and stripping of the existing roadway. Estimated cost of trail construction from the Santa Ana River Trail to the Santa Ana Freeway is approximately \$7,000. Attempts were made to identify other alternative alignments for the trails in this area. However, no apparent opportunity exists to provide an operable trail tie to the Santa Ana River except those mentioned above. The City of Santa Ana was contacted for assistance in developing other routes. They responded by identifying the Memory Lane bike trail alternative.

2. Recreational Trail Alternatives through Santiago Golf Course (Glassell Street to Newport Freeway)

Exhibit C2 shows the alternative trail alignments considered between Glassell Street and the Newport Freeway via or around Santiago Golf Course. The layout of the golf course is such that almost every square foot of available area is utilized. Adjacent development surrounds the course leaving little opportunity for redesign of the facility to provide sufficient trail right of way. The owner of the golf course was approached with the concept of possibly exchanging right of way for trail purposes through the golf course for a portion of the property which the flood

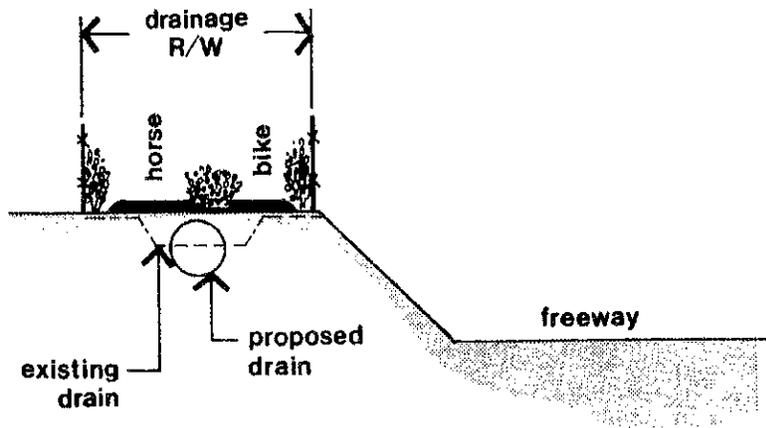
control district owns adjacent to the golf course at Cambridge Street. The owner indicated that such an exchange would not increase the useability of his facility and, therefore, he was not interested. The following is a summary of the three alternatives considered:

a. Recreational trails through the golf course



Under this alternative the trails would be aligned along the northerly boundary of the golf course. Because of limited area, the combined trail was assumed to be sixteen feet wide (eight feet for bicycles, three feet for buffer and four feet for equestrians) and would be protected by a fifteen-foot high chain link fence. To construct the trail it is necessary to relocate four putting greens and reduce the width of three fairways. Although a fifteen-foot high protective fence is proposed, the trail users could still be hit by stray golf balls at several locations along the trail. The owner of the golf course has indicated that a trail through his property would severely hamper his operation and may force him to consider terminating the golf course use. The trail would run along the rear of the property line of approximately twenty-five residential homes which presently front on the golf course. The estimated construction cost under this alternative for recreational trails (equestrian and bike) running from Glassell Street to the Newport Freeway is approximately \$245,000.

b. Recreational trails around Santiago Golf Course via Garden Grove Freeway right of way



In lieu of construction of trails through the golf course, this alternative proposes aligning the trails around the golf course via the Garden Grove Freeway as shown on *exhibit C2*. The two trails would leave Hart Park at the southeast corner of the existing park development and enter the Garden Grove Freeway right of way. There is a freeway drainage facility which parallels the freeway from Hart Park to Tustin Avenue. It is proposed to use this drainage bench for the trails. In certain locations it will be necessary to underground the drainage facility to provide sufficient area for the trails. CALTRANS was contacted regarding the feasibility of the above concept. Staff at the District Seven office had no apparent objections; however it was indicated that a formal submittal by EMA to the Sacramento office would be required before final approval could be obtained. At Tustin Avenue the existing traffic signal would be modified to provide a safe at-grade crossing. Once on the east side of Tustin Avenue, the trails would proceed easterly to the rear of an existing vacant lot at which point they would turn northerly and proceed along the rear of that lot and the adjacent Union service station. The trails would cross Fairway Drive at-grade and then proceed through the Easter Seal Foundation property at La Veta Avenue. The crossing of La Veta would be at-grade through an existing signalized intersection. After crossing La Veta the trails would rejoin the creek. Between Cambridge Street and Tustin

Avenue (along the Garden Grove Freeway) the trails would parallel the rear of approximately sixteen homes. However, it is proposed to maintain a ten-foot buffer (existing sewer easement) between the rear of those homes and the trail improvements. It is estimated that this alternative will cost approximately \$310,000.

**c. Bicycle trail around Santiago Golf Course via Cambridge Street-
/Palmyra Avenue**

Under this alternative the equestrian trail would be eliminated and only a bicycle trail would be provided. The trail would leave Hart Park at Cambridge Street and proceed northerly along Cambridge Street to Palmyra Avenue. At Palmyra Avenue the trail would turn easterly and proceed along Palmyra Avenue, across Tustin Avenue and back to Santiago Creek at the Newport Freeway. The trail consists of signed and stripped roadway. The equestrian trail would be eliminated because of the conflict with automobile traffic. The estimated construction cost is \$17,000.

APPENDIX D

SUMMARY OF ALTERNATE FLOOD RETARDING PROPOSALS FOR LOWER SANTIAGO CREEK

At the outset of this study, several flood retarding proposals were investigated to determine if the magnitude of the design flood flow in the Santa Ana and Orange areas could be significantly reduced. The most tangible benefit of a flood retarding alternative is the reduction in the size of flood protection works downstream of the retarding facility, particularly in Reach I of Lower Santiago Creek; thereby providing savings in flood control construction costs while concurrently providing more flexibility in the design of the necessary protective works.

Three hydraulic structures which can be constructed on Santiago Creek and which result in a reduction of the peak storm flow in the lower reaches of the creek have been investigated. Eight combinations of the three structures were analyzed to determine which combination provided the greatest benefit. The following is a brief description of the physical characteristics of the three structures considered:

A. Raise Santiago Dam (Irvine Lake)

An investigation of this proposal was conducted from 1969 to 1974 at the request of the Orange County Municipal Water District. The investigation was made by Boyle Engineering and the ensuing report was entitled, "Preliminary Feasibility Study for the Raising of Santiago Dam." In this report, two alternatives were investigated, however, only one of the two provides additional flood storage. That particular alternative requires the dam crest be raised forty feet with added earth fill construction. The resulting impoundment

would have a water conservation capacity of 50,000 acre feet, double the existing capacity. In addition, flood storage capacity would be provided for 17,000 acre feet of storm water. This flood storage would be retained by seven eleven-foot by twenty-foot vertical wheel gates installed above the spillway crest. The release of flood water may be controlled by one of several gate operation schedules. The cost of reconstructing the dam would be borne by those agencies which benefit directly from the project, i.e., Irvine Ranch Water District, Serrano Irrigation District, Orange County Flood Control District and, possibly, the Orange County Municipal Water District. This facility would be capable of reducing the peak discharge in the creek by retention of the stream flow at the peak of the hydrograph and later releasing it when the flow downstream of the dam has subsided.

B. Increase the controlled release at Villa Park Dam from 3,500 cfs to 6,000 cfs.

The current control gate operation schedule at Villa Park Dam limits the controlled release to 3,500 cfs. The gate structure is capable of releasing a much higher discharge when there is sufficient depth of water in Villa Park Reservoir. There is, however, a current flow limitation of 3,500 cfs in the energy dissipator structure. Flows exceeding this discharge could result in structural damage to the dam. To increase the controlled discharge to 6,000 cfs., it is necessary to make a relatively simple modification to the chute blocks and stilling basin portion of the energy dissipator. By increasing the controlled release, a greater amount of water is released from the reservoir earlier in the storm, thereby providing greater storage capacity which can be used to contain the flood peak when it occurs.

C. Construct a retarding basin on the creek between Collins Avenue-Prospect Street and Villa Park Road.

The proposed flood retarding basin requires the acquisition of approximately 240 acres of right of way along Santiago Creek be-

tween Collins Avenue-Prospect Street and Villa Park Road. The proposed basin site consists of sand and gravel operations with pits having a depth in some locations of approximately 150 feet. The basin would have an effective flood storage capacity of approximately 3,400 acre feet of water. The purpose of the basin would be to retain flood water during peak flows and then release the water after the storm flow below the basin has receded.

To accomplish this, a bypass channel is proposed along the northwesterly boundary of the project site from Villa Park Road to Collins Avenue-Prospect Street. The proposed channel would be a vertical walled concrete-lined channel having a base width of approximately seventy feet and a depth of approximately seventeen feet. At the downstream end of the basin (approximately 400 feet upstream of Collins Avenue-Prospect Street), a channel side weir would be installed on the south side of the concrete channel section over which peak flood flows would be diverted into the basin area. The top of the weir would be at elevation 287.00, which is 5.99 feet above the proposed channel invert elevation below Collins Avenue-Prospect Street.

The available storage volume in the pits far exceeds the required flood storage volume (3,400 acre feet). To effectively utilize the total pit area for flood control storage would require the construction of a pump station to drain the pits in a reasonable period of time. Because of the excessive cost associated with the construction of such a facility, it is proposed that only the top twenty-two feet of the basin area be utilized for effective flood storage (elevation 265 to 287). This concept allows the flood storage area of the basin to be drained by gravity flow, thereby eliminating the need for a large pump facility.

In order to provide adequate storage volume, the high areas in the basin would be excavated to elevation 265. Portions of the excavated material would be used to stabilize the peripheral slopes of the basin. It has been assumed in this study that the peripheral

slopes would be stabilized at a slope of three horizontal to one vertical.

Since the storage area below elevation 265 is not being considered as effective flood storage, other uses such as water conservation, water reclamation or a recreation lake are possible. During discharges of storm flow into the basin, the area below elevation 265 is assumed to be inundated and would remain so until either the excess water is pumped out or until it percolates into the groundwater basin.

A 78-inch reinforced concrete pipe would be installed from the southwest corner of the basin to a point approximately 2,000 feet downstream of Collins Avenue-Prospect Street to drain the flood waters out of the flood storage portion of the basin back into Santiago Creek. It is estimated that following a design flood, the flood storage area of the basin would be drained in approximately ten days. The outlet pipe would be gated and would be operated in accordance with a storm operation manual which would be developed during the final design of the basin.

Two road profiles would be modified to facilitate the basin construction. At the upstream end of the basin, the profile of Villa Park Road would be raised approximately five feet above its present low point in order to enable flood flows to enter the bypass channel without overtopping the road. At the downstream end of the basin, the profile of Collins Avenue-Prospect Street would be lowered to elevation 298 to provide emergency overflow area should the capacity of the basin be exceeded.

A fourth alternative which would entail the raising of Villa Park Dam was considered but was determined not to be cost effective. For this alternative to be implemented, it would be necessary to increase the storage capacity of the existing dam by approximately 17,000 acre feet. Several auxiliary

dams along the westerly boundary of the reservoir would be required to confine this additional water. The auxiliary dams would have to be constructed in the area presently occupied by the Cemetery of the Holy Sepulchre and across Chapman Avenue at a point approximately 1,000 feet east of Santiago Canyon Road. The raising of the dam would also result in Irvine Park being completely inundated during major storms. Because of the problems associated with construction, the auxiliary dams in the cemetery and the impact on Chapman Avenue and Irvine Park, this alternative was determined impractical.

The above three hydraulic structures were analyzed to determine their effectiveness in reducing peak flood flows on Santiago Creek under four design storm conditions. The flood conditions considered included (1) the general project flood, (2) the local project flood, (3) the general 100-year flood and (4) the local 100-year flood.

A detailed explanation of these floods is contained in the Orange County Flood Control District's Hydrology Manual. However, for the purpose of clarity, a brief description of the four follows:

1. General Project Flood

This flood results from a severe general storm of record which is reasonably characteristic of the region and which has been observed and recorded in the Southern California area. This record storm is transposed to the watershed under investigation and the resulting run-off from the storm is determined. A storm of this type occurs over the total watershed and is affected by the topographic features within the study area. An exact statistical frequency for this type of storm has not been determined, however, it is probable that the peak flow rate determined by this method approximates the peak flow likely to occur at a statistical recurrence interval of once every 200 or more years. In the case of the Lower Santiago Creek watershed, a peculiar situation occurs with this flood discharge. Contrary to the normal occurrence of increased peak discharge near the mouth of the creek, the watershed shape

and drainage characteristics create approximately the same peak discharge throughout the lower reaches of the creek below Villa Park Dam.

2. Local Project Flood

This flood results from a high intensity thunderstorm which has been recorded in the Southern California area. The storm occurs over a small localized portion of the watershed and the influence of topography on the magnitude of the local storm is assumed minor. (For this study, the local storm was assumed to occur over the drainage area below Villa Park Dam.) As in the case for the general project flood, the local project flood is considered to have a statistical recurrence interval of once every 200 or more years.

In determining whether a particular storm can produce the flood flows which are predicted by acceptable hydrology practices, one must consider the physical characteristics of the watershed and how those characteristics affect the storm runoff resulting from a major storm. In the case of Santiago Creek, there is some question as to whether the runoff normally resulting from a local project storm would ever reach Santiago Creek. The reason is that the area over which the local project storm is centered (drainage area contributing to Santiago Creek below Villa Park Dam) is a highly urbanized flat area which has existing local storm drains which are not capable of conveying the local flows which would occur during such a major storm. Therefore, the water would pond in the streets (i.e. mini retarding basins) and not reach Santiago Creek until long after the flow had receded in the creek and sufficient flow capacity existed. For the above reason, the local project flood was not considered a viable design storm for Santiago Creek, but was reviewed in this analysis only for comparison purposes.

3. General 100-year Flood

This flood results from a storm having a general rainfall pattern similar to the general project storm described earlier but utilizes

rainfall amounts which have a statistical recurrence interval of once in one hundred years. The storm occurs over the total watershed and is affected by the topographic features of the study area.

4. Local 100-year Flood

This flood results from a storm having a rainfall pattern similar to the local project thunderstorm described above but utilizes rainfall amounts having a statistical recurrence of once in one hundred years. The storm occurs over a small localized area and it is assumed that the influence of topography on the magnitude of the local storm is minor.

Table D1 outlines eight retarding alternatives which were analyzed and summarizes the resulting preliminary design discharges which would be used to design downstream channel improvements should that particular alternative be implemented. By comparing the design discharges, one can determine the flow-reducing effectiveness of that particular proposal. For comparison purposes, the first alternative (Alternative I) shown on *table D1* assumes that none of the three hydraulic structures are implemented and, therefore, represents the flood flows which would occur under existing conditions. Under this alternative, it was assumed that a channel large enough to convey the peak flood flows would be constructed in the areas where the existing creek does not have sufficient capacity to convey the quantity of water anticipated.

The following is a brief description of the eight flood retarding alternatives considered:

Alternate II: Raise Santiago Dam

Under this alternative, Santiago Dam would be raised to provide an additional 17,000 acre feet of flood storage. The increased storage would result in the reduction of the peak discharges for the general project flood and the general 100-year flood. However, this alterna-

tive has no effect on the local storms which occur below Villa Park Dam. It should be noted that the local 100-year flood (10,400 cfs.) is greater than the general project flood (9,300 cfs.) under this alternative. This would indicate that the proposed flood storage at Santiago Dam could be reduced to something less than 17,000 acre feet provided the reduction does not increase the discharge for the general project flood to some value greater than 10,400 cfs.

Alternate III: Increase the Controlled Release from Villa Park Dam

Under this alternative, the controlled release from Villa Park Dam would be increased from 3,500 cfs to 6,000 cfs. This change would decrease the design discharge for the general project flood from 21,000 cfs to 17,000 cfs. However, conversely, it would generally increase the design discharges for the local project flood and the local 100-year flood.

Alternate IV: Retarding Basin Upstream of Collins Avenue-Prospect Street with a Bypass Discharge of 9,000 cfs.

Under this alternate, a retarding basin would be constructed upstream of Collins Avenue-Prospect Street. The basin would be similar to the one described at the beginning of this appendix except the size of the basin area would be increased to include the abandoned gravel pits between Villa Park Road and Loma Street. Construction of the basin would require the removal and reconstruction of Villa Park Road, construction of a bypass channel from Collins-Prospect to Loma Street requiring extensive filling at the gravel pits upstream of Villa Park Road, deepening of the Hurwitz/Buchheim Pits by twenty to thirty feet and removal of the remaining portions of the old Santiago Boulevard crossing of Santiago Creek. The basin would bypass all flows up to approximately 9,000 cfs. and would result in a general project flood discharge at the Santa Ana River of approximately 11,000 cfs. The proposed basin would have no beneficial effect on the other

three design floods. The basin would store between 6,000 to 7,000 acre feet of water with the bottom of the flood storage being elevation 260 and with a maximum water surface elevation during flood stage of around 290±.

In studying this alternative, the general project flood hydrograph was reviewed to determine if an earlier peak occurs in the hydrograph which would not be affected by the retarding basin, yet would result in a peak discharge greater than 11,000 cfs at the Santa Ana River. This review showed that an early peak does bypass the basin; however, it only results in a peak flow at the Santa Ana River of around 9,400 cfs.

This alternative was not investigated in great detail since Alternative VIII, which is described below, provides the same level of flood protection as this alternate, yet with a much smaller basin area and, consequently, a much lower cost.

**Alternate V: Retarding Basin Upstream of Collins
Avenue-Prospect Street with a Bypass Discharge
of 3,500 cfs.**

The main objective of this alternate was to produce the lowest possible 100-year discharge which can be obtained at the Santa Ana River by constructing a retarding basin in the gravel pit area. The controlling storm for these circumstances is the local 100-year storm.

In accordance with the Orange County Flood Control District's Hydrology Manual, a local 100-year storm was centered over the drainage area below the basin (7.24 square miles). The resulting 100-year discharge in the Santa Ana area was determined to be approximately 8,500 cfs assuming a base flow of 3,500 cfs being contributed by the drainage area above the basin. This base flow was selected after reviewing the possible conditions which could reasonably exist within the total watershed during the occurrence of a 100-year local

**TABLE D1.
SUMMARY OF ALTERNATE FLOOD CONTROL PROPOSALS FOR LOWER SANTIAGO CREEK**

ALTERNATIVES	FLOOD CONTROL PROPOSALS			RESULTING PRELIMINARY DISCHARGES ON SANTIAGO CREEK AT SANTA ANA RIVER					FLOOD PROTECTION LEVEL**
	RAISE SANTIAGO DAM	INCREASE CONTROLLED RELEASE FROM VILLA PARK DAM	RETARDING BASIN AT COLLINS- PROSPECT	GENERAL PROJECT FLOOD	LOCAL PROJECT FLOOD	GENERAL 100-YR. FLOOD	LOCAL 100-YR. FLOOD	FLOOD PROTECTION LEVEL**	
I	Channelization only			21,000 c.f.s.	15,400 c.f.s.	7,900 c.f.s.	10,400 c.f.s.	All	
II	●			9,300	15,400	—	10,400	All but L.P.F.	
III		●		17,200	15,400 +	10,200	10,400 +	G.&L. 100-yr. Only	
IV			●	11,000* (6,500 ac.-ft.)	15,400	7,900	10,400	All but L.P.F.	
V			●	21,000 (1,700 ac.-ft.)	10,600 (1,700 ac.-ft.)	7,900— (1,300 ac.-ft.)	8,500 (550 ac.-ft.)	All but G.P.F.	
VI	●	●		11,800	15,400 +	10,200	10,400 +	All but L.P.F.	
VII	●		●	7,000 ±* (3,000 ac.-ft.)	10,600 (1,700 ac.-ft.)	7,900— (1,300 ac.-ft.)	8,500 (550 ac.-ft.)	All	
VIII		●	●	12,000 (3,100 ac.-ft.)	15,400	10,200	10,400	All but L.P.F.	
IX	●	●	●	Alternative not realistic					

* Estimated discharge, flood hydrograph was not routed

** The flood protection level of Alternates II through IX are based on the construction of a channel downstream of Prospect Street with a capacity of approximately 10,500 c.f.s. which may be increased to 12,000 c.f.s. by use of freeboard area. Alternate I requires the construction of a channel with a capacity of 21,000 c.f.s.

storm. It is highly probable that a general storm above Villa Park Dam having a frequency of occurrence of once in thirty years would occur simultaneously with the more concentrated local 100-year storm below the dam. This would result in a release from Villa Park Dam of 3,500 cfs for approximately five and one-half days. If the bypass channel discharge for the basin were reduced to 3,000 cfs, the basin would need to have an additional 4,700 acre feet of storage capacity. The cost for such a basin would far exceed the benefit obtained by reducing the design discharge by 500 cfs.

The basin under this alternative would require a storage capacity of only 1,300 acre feet (general 100-year storm). At this size, the basin would not effectively retard storms larger than a 100-year flood, and, consequently, this alternative will not provide effective flood retarding during a project flood.

Alternate VI: Raise Santiago Dam and Increase the Controlled Release from Villa Park Dam

This alternative is a combination of Alternatives II and III. The effect of combining these alternatives is to increase the general project flood discharge of 9,300 cfs under Alternate II to a discharge of 11,800 cfs. Since the increasing of the controlled release from Villa Park Dam negates the benefits gained by raising Santiago Dam, this alternative was not considered a viable flood retarding option.

Alternate VII: Raise Santiago Dam and Construct a Retarding Basin above Collins Avenue-Prospect Street with a Bypass Discharge of 3,500 cfs.

Under this alternative, Santiago Dam would be raised and a retarding basin would be constructed upstream of Collins Avenue-Prospect Street. The retarding basin would have a 3,500 cfs bypass channel and adequate storage volume for 3,000–3,500 acre feet of water.

This alternative is the only flood retarding proposal which provides effective flood retarding for all four storms and it is the only alternative which provides a level of flood protection comparable to Alternate I where full channel improvements are proposed.

Alternate VIII: Increase the Controlled Release from Villa Park Dam and Construct a Retarding Basin above Collins Avenue-Prospect Street with a Bypass Discharge of 10,000 cfs.

Under this alternative a retarding basin, as described earlier, would be constructed adjacent to the creek between Collins Avenue-Prospect Street and Villa Park Road. The bypass channel and channel side weir would be designed to allow a maximum bypass discharge of 10,000 cfs. The storage volume required in the basin would be approximately 3,400 acre feet. In addition to the basin construction, the controlled release at Villa Park Dam would be increased from 3,500 cfs to 6,000 cfs. This alternative reduces the peak flow in the Santa Ana area during the general project flood from 21,000 cfs to approximately 12,000 cfs; however, it has no effect on the other three floods.

The design hydrograph for the general project flood has a small early peak which precedes the main peak flow of the storm. This smaller peak is not affected by the retarding basin proposed under this alternative since it is less than 10,000 cfs (peak is 8,500 cfs). However, upon routing this smaller peak downstream, it results in a peak discharge in the Santa Ana area of approximately 12,000 cfs. Therefore, this early peak is the controlling factor in determining the project flood design discharge. In order to reduce the peak flow in the Santa Ana area to below 12,000 cfs it would be necessary to reduce the bypass discharge to something less than 8,500 cfs. To accomplish this it would be necessary to provide flood storage in the retarding basin in excess of 4,500 acre feet (i.e. for a bypass of 8,000 cfs, storage in excess of 5,000 acre feet would be required). The basin, as proposed, does not have sufficient capacity for this amount of water while still maintaining the capability of draining the basin by

gravity flow. The purpose for setting the bypass discharge at 10,000 cfs and not higher results from the need, even if the retarding basin is not constructed, to provide adequate channel capacity to convey the 100-year flood discharge of 10,400 cfs.

Alternate IX Raise Santiago Dam, Increase the Controlled Release from Villa Park Dam and Construct a Retarding Basin

Under this alternative all three flood retarding structures would be constructed. However, the effect of implementing all three proposals results in the benefits gained by one being offset by the other. As an example, if Santiago Dam is raised, the general project flood discharge of 21,000 cfs will be reduced to 9,300 cfs. However, by increasing the controlled release from Villa Park Dam, the resulting discharge is increased to 11,000 cfs, thereby negating the effect of the raising of the dam and resulting in the need for a larger retarding basin.

One additional alternative which was investigated considered utilizing the existing gravel pits between Collins Avenue-Prospect Street and Loma Avenue as a retarding basin in their "as-is" condition without constructing a bypass channel through the area. In performing the analysis, it was assumed that channel improvements would be constructed downstream of Collins Avenue-Prospect Street which would limit the maximum release from the pit area to 10,000 cfs. The general project flood hydrograph was routed through the area assuming no antecedent flow. The results indicated that the existing pits do not have sufficient capacity to control the flow and that flood flows would overtop Collins Avenue-Prospect Street.

The results of the above analysis indicate that the three most effective flood retarding proposals relative to reducing the peak flood flow in the creek below the Newport Freeway are Alternatives II, VII and VIII.

The next step in the analysis was an economic comparison of the cost of these three flood retarding alternatives with the cost of Alternative I in which full project flood channel protective works would be constructed assuming no upstream retarding. *Table D2* shows the comparison. The values shown in this table indicate that from an economic standpoint flood retarding alternatives compare favorably with Alternate I. The costs for slope stabilization and regional park right of way acquisition are included to provide an equal basis for judging the merits of each alternative. It should be noted that in making the above analysis it was assumed that under Alternate I no flood control protective works would be constructed between Collins Avenue-Prospect Street and Villa Park Dam except to improve the flow capacity of the existing culvert under Villa Park Road. The reason for that assumption being that the existing creek in that area has sufficient capacity to convey the design flood flows without endangering existing developed areas adjacent to the creek. The same assumption was made for the flood retarding alternatives except in the area where the protective works would be installed in conjunction with the proposed retarding basin.

TABLE D2.
COST COMPARISON OF MOST BENEFICIAL ALTERNATIVES
(In millions of dollars)

ALT.	CHANNEL CONST. and R/W COST ¹	BASIN COST ²	DAM COST	BASIN R/W COST	SUB- TOTAL	SLOPE STAB.	REG. PARK R/W ⁵	TOTAL
I	19.81	0	0	0	19.81	5.02	3.16	27.99
II	14.13	0	2.30 ⁴	0	16.43	5.02	3.16	24.61
VII	13.13	7.74	2.30 ⁴	3.16	26.33	0	0	26.33
VIII	13.33 ²	7.74	0	3.16	24.23	0	0	24.23

1. Includes related bridge and road work. Right of way only as far upstream as Villa Park Road. Alternative I assumes implementation of reach alternatives I-B, II-B, III-C, IV-C and V-A with project flood channelization as described in Appendix E. Alternatives II, VII and VIII assume suggested plan channelization.
2. Includes cost of modifying outlet works of Villa Park Dam.
3. Includes bypass channel and other basin related structures.
4. Cost obtained from feasibility report prepared by Boyle Engineering for MWDOC (1974 costs).
5. Regional park right of way coterminous with the retarding basin.

In addition to the above economic comparison of the three flood retarding alternatives, there are several intangible factors associated with each which warrant consideration. There is no effective way to quanti-

tatively compare these factors; however, to ensure that they are not overlooked, *Table D3* was prepared as a list of the various advantages and disadvantages of each alternative. Based on the above consideration, Alternative VIII was selected as the most effective overall flood retarding alternative.

Table D4 compares the cost of channel improvements for the reduced flow channel (suggested plan) with the cost of a project flood channel. This comparison verifies the economic feasibility of the suggested plan.

TABLE D3.
ADVANTAGES AND DISADVANTAGES OF MOST BENEFICIAL FLOOD CONTROL ALTERNATIVES FOR LOWER SANTIAGO CREEK

ALTERNATE I - PROJECT FLOOD CHANNEL

ADVANTAGES

- Highest level of flood protection
- Minimal interagency cooperation required

DISADVANTAGES

- Reduced environmental and greenbelt opportunities
- Severely limits trail system feasibility, particularly in Reach I
- Provides no protection of proposed water conservation facilities in Bond Pit
- Provides no protection of regional park area within sand and gravel pits
- Highest cost
- Severely disrupts atmosphere of Santiago and Hart Parks
- Incompatible with Santiago Golf Course

TABLE D3. (CONT'D).
ALTERNATE II - RAISE SANTIAGO DAM

ADVANTAGES

- Provides ample right of way for trail system
- Next to lowest in cost
- Provides increased flood protection for area between proposed retarding basin and Santiago Dam

DISADVANTAGES

- Reduced level of flood protection
- Major interagency cooperation required
- Provides no protection of proposed water conservation facilities in Bond Pit
- Provides no protection of regional park area within sand and gravel pits
- May not be compatible with Santiago Golf Course
- Analysis of dam requires further study

TABLE D3. (CONT'D)
ALTERNATIVE VII - RAISE SANTIAGO DAM AND CONSTRUCT
RETARDING BASIN

ADVANTAGES

- Provides most right of way for trail system
- High level of flood protection
- Protects proposed water conservation facilities in Bond Pit
- Protects regional park area within sand and gravel pits
- Provides water sports opportunities
- Increases land useability and consequently value within retarding basin
- Local interests favor retarding basin concept
- OCWD may contribute funds for development of water conservation facility
- Most compatible with Santiago Golf Course
- Provides increased flood protection for area between proposed retarding basin and Santiago Dam

DISADVANTAGES

- Next to highest cost
- Major interagency cooperation required
- Analysis of dam requires further study

TABLE D3. (CONT'D)
ALTERNATE VIII
INCREASED CONTROLLED RELEASE FROM VILLA PARK DAM AND
CONSTRUCT RETARDING BASIN

ADVANTAGES

- Provides greatest protection of regional park area within sand and gravel pits
 - Provides ample right of way for trail system
 - Protects proposed water conservation facilities in Bond Pit
 - Provides water sports opportunities
 - Increases land useability and consequently value within retarding basin
 - Lowest cost
 - Minimal interagency cooperation required
 - Local interests favor retarding basin concept
- OCWD may contribute funds for development of water conservation facility

DISADVANTAGES

- Reduced level of flood protection
 - May not be compatible with Santiago Golf Course
 - Increases level of flooding in Reach V
-

TABLE D4.
COST COMPARISON OF REDUCED AND FULL FLOW CHANNEL ALTERNATIVES
 (Rounded to nearest ten thousands dollars)

REACH	CHANNEL CONSTRUCTION COST		BRIDGE CONSTRUCTION COST		CHANNEL RIGHT OF WAY COST	
	REDUCED	FULL	REDUCED	FULL	REDUCED	FULL
I	\$4,430,000	\$5,320,000	\$ 550,000	\$ 910,000	\$ 10,000	\$ 10,000
II	1,220,000	3,740,000	—	—	40,000	40,000
III	2,070,000	4,040,000	980,000 ⁵	980,000 ⁵	180,000	680,000
IV	9,040,000 ³	6,450,000 ⁴	1,230,000	1,670,000	3,390,000 ⁷	3,260,000 ^{7, 8}
V	200,000	—	890,000 ⁶	890,000 ⁶	— ⁹	— ⁹
TOTAL	\$15,960,000	\$19,550,000	\$3,650,000	\$4,450,000	\$3,620,000	\$3,990,000

TOTAL COST: Reduced = \$24,230,000
 Full = \$27,990,000

1. Represent suggested plan cost
2. Assumes I-B, II-B, III-C, IV-C and V-A channel alternatives
3. Includes retarding basin construction cost
4. Includes slope stabilization cost of regional park area continuous with the retarding basin
5. Includes bridge across the creek for the master-planned extension of Walnut Avenue
6. Includes bridge across the creek for the master-planned extension of Orange Park Boulevard
7. Neglects flood plain cost from Villa Park Road to Loma Street
8. Includes regional park right of way continuous with the retarding basin
9. Flood plain

APPENDIX E

CHANNEL ALTERNATIVES

Alternative channel types have been investigated to ascertain the limits of feasible channel construction on Santiago Creek. Each reach of the creek has been evaluated for those alternative channel types regarded as having some degree of feasibility when existing constraints are taken into consideration.

A no improvement alternative has been assessed for each of the five study reaches and is designated Alternative A. The limits of the flood plain with no improvements for two flood discharges have been determined; the 100-year flood and the general project flood. Costs associated with this "no-build" alternative can be approached in two ways; by cost for flood insurance and by actual cost to repair flood damage if a design storm should occur.

Further investigation of the first case reveals that the present mandatory flood insurance premium on homes located within the 100-year flood plain as designated on flood hazard boundary maps is \$0.25 per \$100 of market value per year up to a maximum market value of \$35,000. It is reasonable to assume that every home within the Santiago Creek flood plain is worth \$35,000 or more, therefore \$87.50 is the annual premium paid by these homeowners. According to the Corps of Engineers information presented in the *Technical Information* appendix to the *Review Report on the Santa Ana River Main Stem, including Santiago Creek and Oak Street Drain*, 8,900 single-family homes along Santiago Creek would be flooded by a 100-year storm under the present conditions of watershed development. To use this information in a fair comparison with a channel improvement alternative, the effective life of channel improvements must be taken into account as

well as the time value of money. Concrete channel improvements have a reasonable service life of fifty years. Assuming a prevailing interest rate of 5½%, the present worth of fifty years of flood insurance premiums on 8,900 homes is \$13,186,000. When compared with channelization costs, this figure approaches the cost of improvements. A number of factors not accounted for by this analysis result in making the channel alternatives much more viable flood protective measures. These include (1) the limits of the 100-year flood will undoubtedly increase as future development in the watershed occurs; (2) the contents of homes are not covered in the above stated insurance premiums; (3) a soon to be implemented regular flood insurance program will more accurately assess flood hazard and insurance rates will undoubtedly be escalated; (4) the inundated area includes commercial and high-density residential development that has not been considered in the analysis and which requires a higher mandatory premium than the single-family residences; (5) if a flood were to occur today, approximately 90% of the payment on any claim would be with federal funds, not the funds of the private insurance brokers who are offering flood insurance policies; and (6) the channelization alternatives provide protection from a larger flood than that for which insurance premiums are paid.

In the above-mentioned Corps of Engineers report, an estimate is made of the present-day damage costs if a standard project flood (Corps of Engineers equivalent of general project flood) or a 100-year flood were to occur in the Santiago Creek watershed. For a standard project flood, the cost is estimated to be \$87 million and for a 100-year flood, \$14 million. Again it can be seen that these costs shed favorable light on the concept of improved channelization along Santiago Creek.

No exhibits are included to depict the approximate extent of flooding with the general project or 100-year flood in each reach of the creek; however, this information is available in the Project Planning Division of EMA Advance Planning.

The exhibits which appear in this appendix, *E1 through E13*, show the various alternative channel configurations which have been investigated in the first four reaches of the creek. Each alternative is shown for a reduced

flow and a project flood flow. This is to facilitate the understanding of what impact a retarding basin will have on the reduction of channel size and cost in each reach. No precise alignment is shown; however, representative cross-sections are included to aid the reader in identifying how the proposed channel will impact the existing watercourse environs.

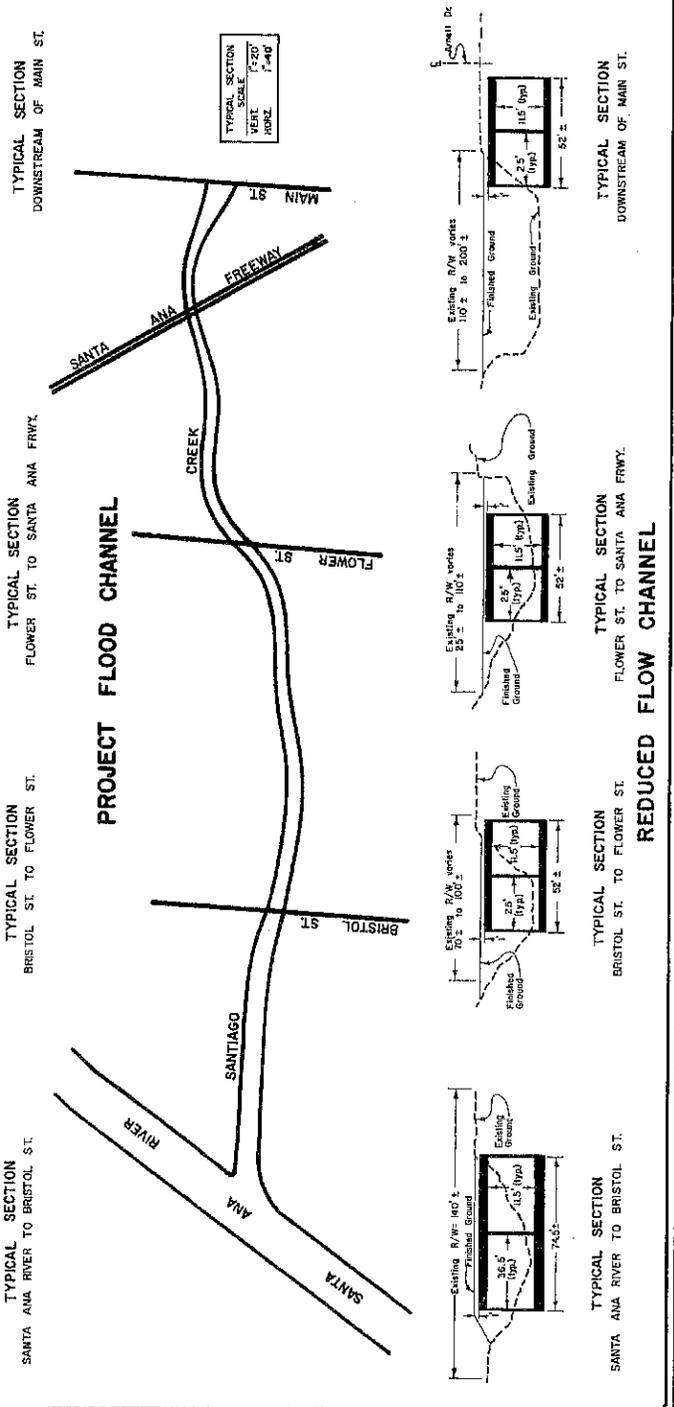
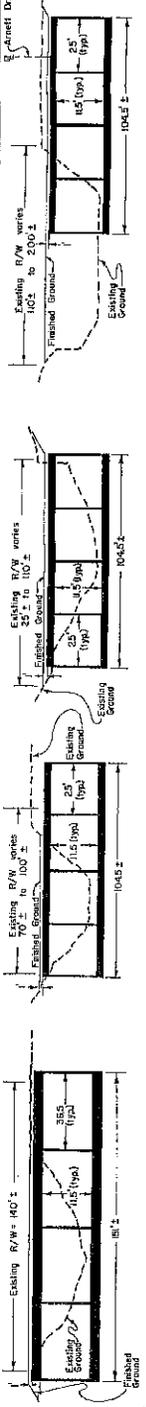
Alternative flood control protective works for Reach V were not investigated because it was assumed that the creek in this reach would remain as a natural flood plain in keeping with greenbelt concepts. Minimal protective works in this reach may be required to protect future park improvements. Should protective works be required, every effort should be made to carefully blend them into the natural environment of the creek.

The estimated cost of each alternative is broken down into five basic categories; channel construction, bridge construction, channel right of way, landscaping and trail construction. No attempt has been made to identify park improvement costs for each alternative due to the relatively minor impact that channel type will have on the type and area of park development.

The same alternatives have not been evaluated in each reach. For example, Reach I, Alternative I-C, addresses a covered conduit, yet in Reach II this alternative has not been considered. This reflects the initial evaluation made by the study team regarding which alternatives are reasonable or desirable in each specific area. As an example, Santiago Creek adds significant character to Santiago Park and a removal of its visual impact by undergrounding the creek would detract from the park's appeal. Therefore, this alternative was not considered in Reach II. Some readers may voice disagreement with the omission or inclusion of specific alternatives; however, it remains obvious that to develop proposals one must select a reasonable number of the most likely alternatives and then proceed with the analysis. The opportunity still exists for further alternative assessment if responsible decision-makers feel there is a need.

The dimensions of channel sections shown in the alternatives are most often controlled by two constraints; (1) the desire to make all existing bridges

hydraulically adequate wherever possible and (2) the desire to minimize right of way necessary for the channel. Therefore, it may be found advantageous in some areas during final design to reassess the channel dimensions to obtain the most economic channel section. For the purpose of this planning study, however, the stated dimensions are representative of what would be required.



Project Flood Channel

Estimated Project Cost (millions)	
Channel construction	\$ 17.64
Channel R/W	0.17
Channel R/W	0.59
Landscaping	0.60
Total	\$19.00

Bridges To Be Reconstructed
Bristol St.
Southern Pacific R.R.

Homes To Be Removed
4 to 6 homes
(40 back yards will be affected)

Reduced Flow Channel

Estimated Project Cost (millions)	
Channel construction	\$ 8.32
Channel R/W	0.01
Channel R/W	0.30
Landscaping	0.30
Total	\$ 8.96

Bridges To Be Reconstructed
Bristol St.
Southern Pacific R.R.

Homes To Be Removed
None

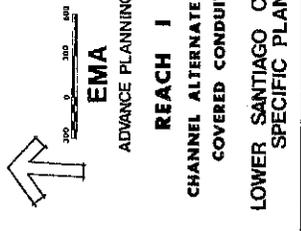


Exhibit E2

Project Flood Channel

Channel construction	\$ 3.32
Bridge construction	0.01
Landscaping	0.19
Total	\$ 3.52

Bridges To Be Reconstructed
 Bristol St.
 Flower St.
 Santa Ana Freeway
 Southern Pacific R.R.

Reduced Flow Channel

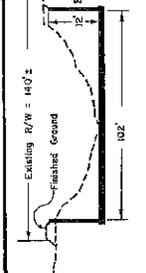
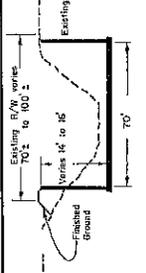
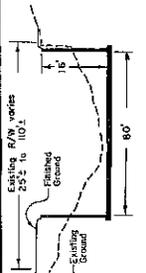
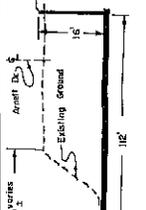
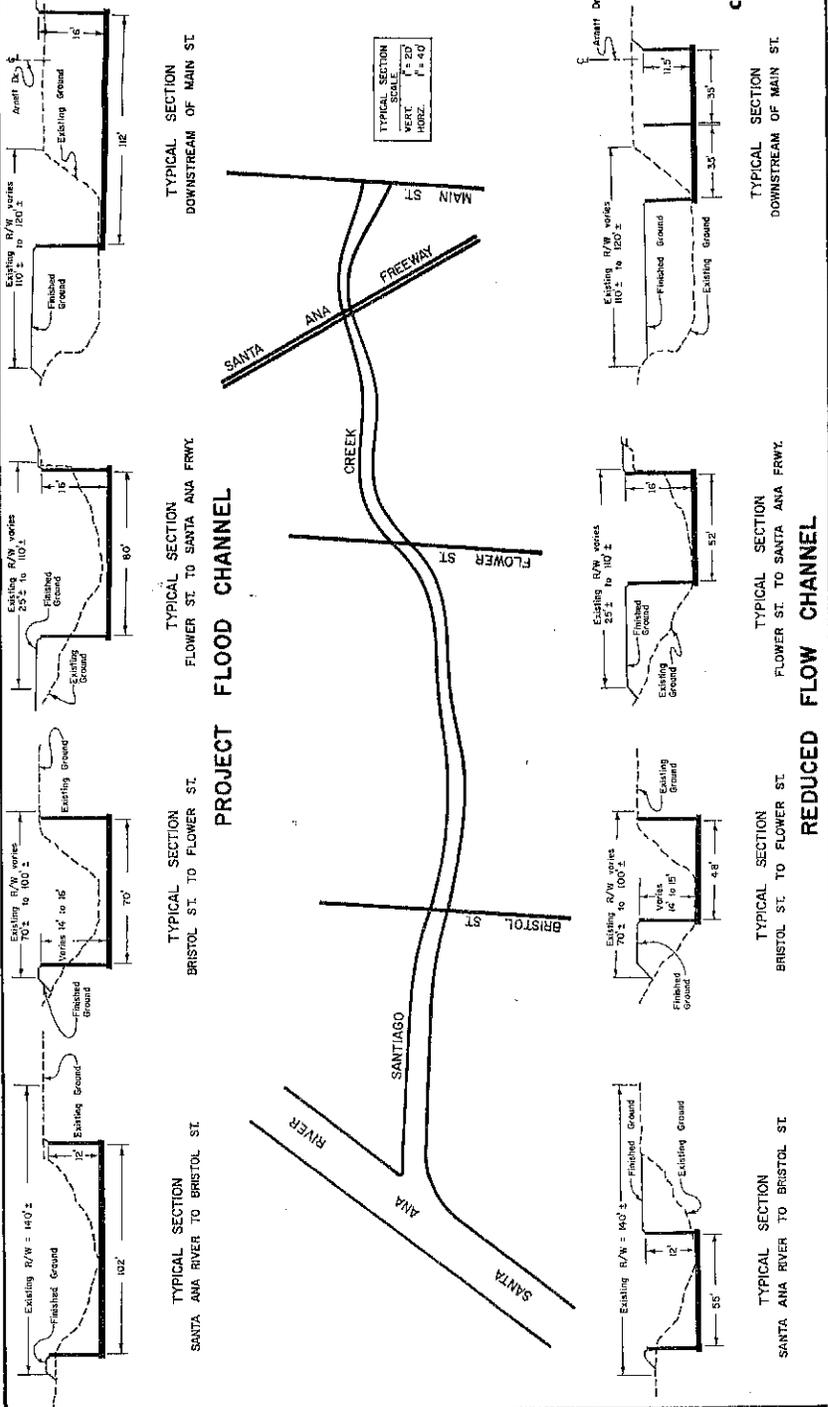
Channel construction	\$ 3.75
Bridge construction	0.01
Landscaping	0.13
Total	\$ 4.13

Bridges To Be Reconstructed
 Southern Pacific R.R.



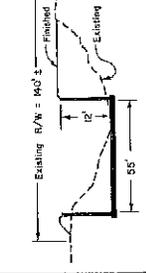
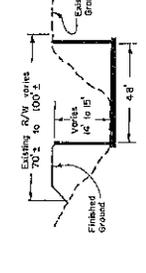
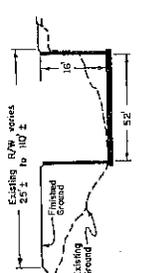
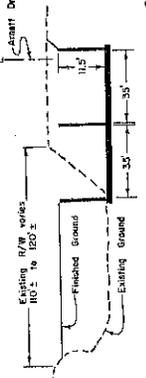
EMA
 ADVANCE PLANNING
REACH I
 CHANNEL ALTERNATE I-B
 CONCRETE RECTANGULAR CHANNEL
 LOWER SANTIAGO CREEK
 SPECIFIC PLAN

Exhibit E1



TYPICAL SECTION
 SANTA ANA RIVER TO BRISTOL ST

VERT. SCALE	F = 20
HORIZ. SCALE	F = 40



Project Flood Channel

Estimated Project Cost (millions)	
Channel construction	---
Bridge construction	---
Channel R/W	---
Landscaping	---
Total	---

Bridges To Be Reconstructed

- Baker St. Overbridge on Baker St.
- Flower St. Main St.
- Southern Pacific R.R.

Homes To Be Removed

65 homes

Reduced Flow Channel

Estimated Project Cost (millions)	
Channel construction	---
Bridge construction	---
Channel R/W	---
Landscaping	---
Total	---

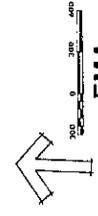
Bridges To Be Reconstructed

None

Homes To Be Removed

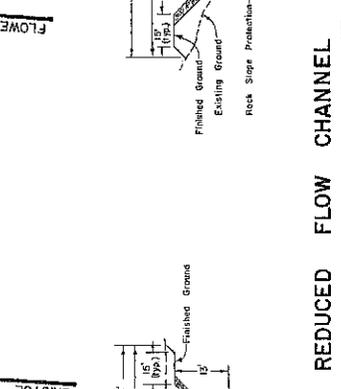
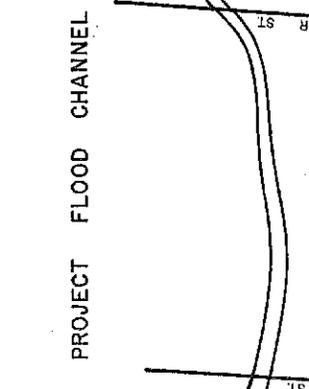
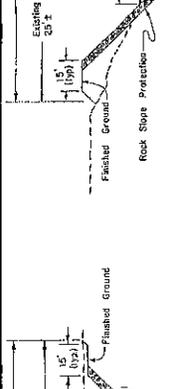
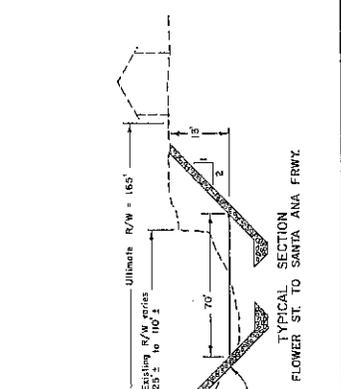
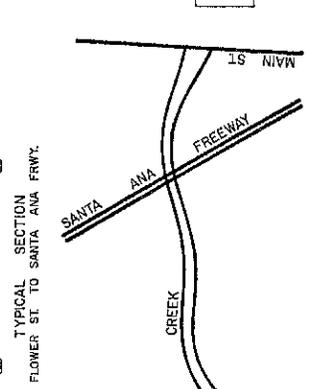
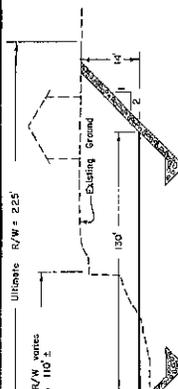
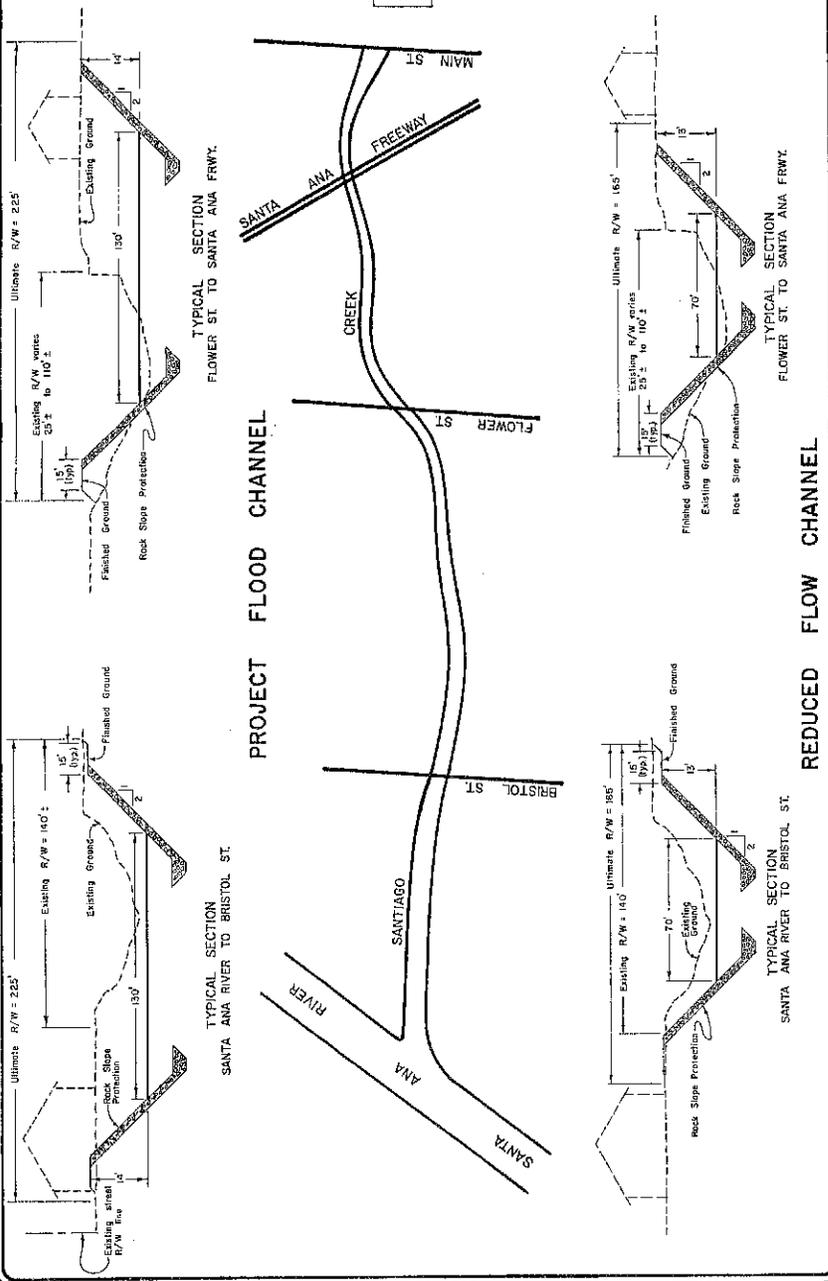
57 homes

NOTE: Costs not determined due to unacceptible number of homes affected by this alternative



EMA
ADVANCE PLANNING
REACH I
CHANNEL ALTERNATE 1-D
ROCK LINED CHANNEL
LOWER SANTIAGO CREEK
SPECIFIC PLAN

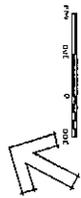
Exhibit E3



TYPICAL SECTION
 VERT. SCALE: 1"=20'
 HORZ.: 1"=40'

Project Flood Channel	
Channel construction	\$ 2.74
Bridge construction	\$ 0.00
Channel R/W	0.04
Landscaping	0.13
Total	\$ 3.91
Bridges To Be Reconstructed	
NONE	

Reduced Flow Channel	
Channel construction	\$ 2.62
Bridge construction	0.00
Channel R/W	0.04
Landscaping	0.09
Total	\$ 2.75
Bridges To Be Reconstructed	
NONE	



EMA

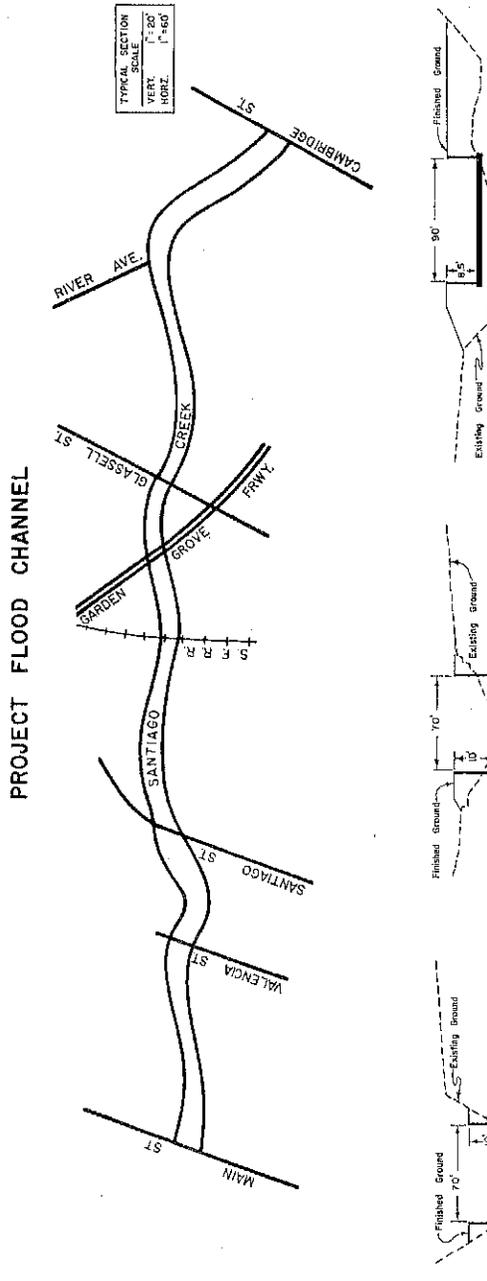
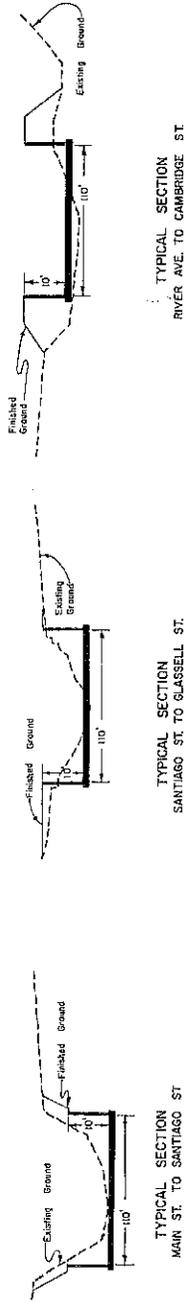
ADVANCE PLANNING

REACH II

CHANNEL ALTERNATE II-B
CONCRETE RECTANGULAR CHANNEL

LOWER SANTIAGO CREEK
SPECIFIC PLAN

Exhibit E5



TYPICAL SECTION SCALE	
VERT.	1" = 20'
HORIZ.	1" = 60'

Project Flood Channel

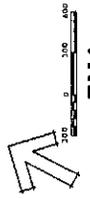
Estimated Project Cost (millions)	
Channel construction	\$ 1.30
Bridge construction	0.00
R/W	0.00
Landscaping	0.05
Total	\$ 1.35

Bridges To Be Reconstructed
NONE

Reduced Flow Channel

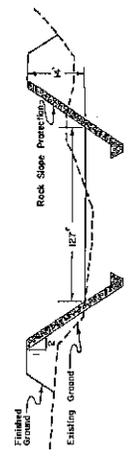
Estimated Project Cost (millions)	
Channel construction	\$ 1.45
Bridge construction	0.00
Channel R/W	0.04
Landscaping	0.05
Total	\$ 1.54

Bridges To Be Reconstructed
NONE

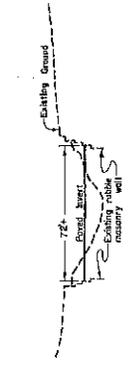


EMA
ADVANCE PLANNING
REACH II
CHANNEL ALTERNATE II-C
PAVED INVERT OF W.P.A.
CHANNEL AND ROCK
LINED CHANNEL
LOWER SANTIAGO CREEK
SPECIFIC PLAN

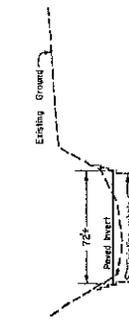
Exhibit E6



TYPICAL SECTION
RIVER AVE. TO CAMBRIDGE ST.

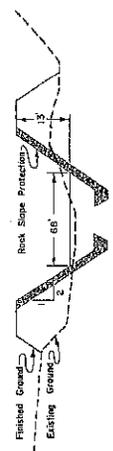
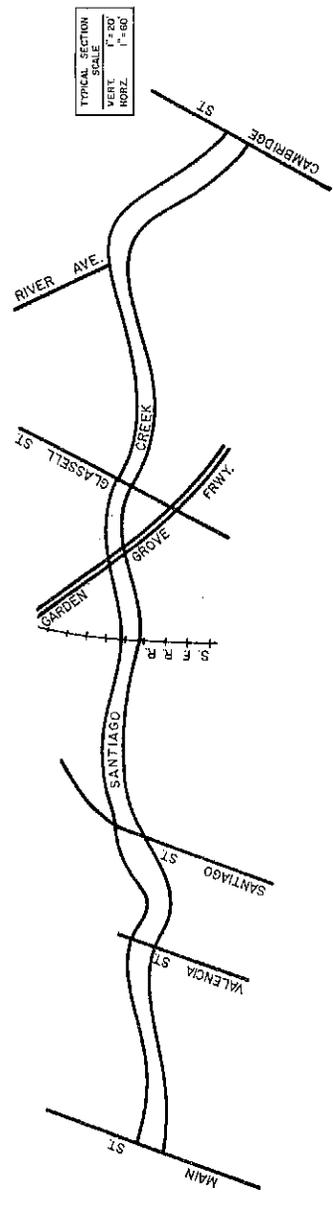


TYPICAL SECTION
SANTIAGO ST. TO GLASSELL ST.

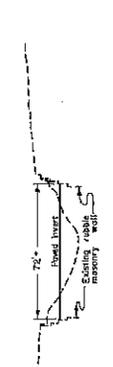


TYPICAL SECTION
MAIN ST. TO SANTIAGO ST.

PROJECT FLOOD CHANNEL



TYPICAL SECTION
RIVER AVE. TO CAMBRIDGE ST.



TYPICAL SECTION
SANTIAGO ST. TO GLASSELL ST.



TYPICAL SECTION
MAIN ST. TO SANTIAGO ST.

REDUCED FLOW CHANNEL

Project Flood Channel

Estimated Project Cost (millions)	
Channel construction	\$ 2.90
Bridge construction	0.00
Channel R/W	0.00
Landscaping	0.10
Total	\$ 3.04

Bridges To Be Reconstructed: NONE

Reduced Flow Channel

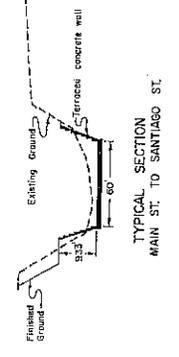
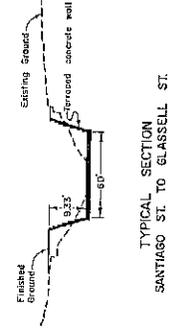
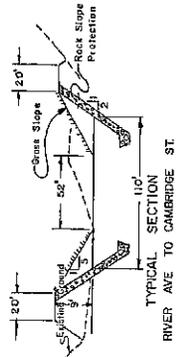
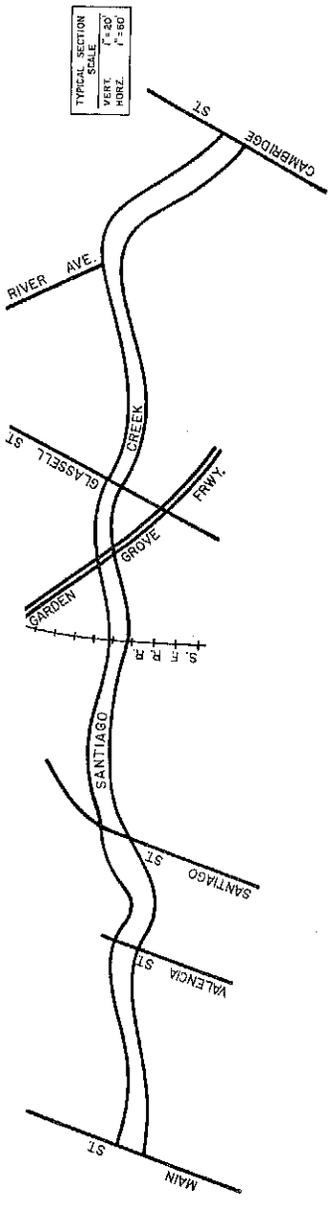
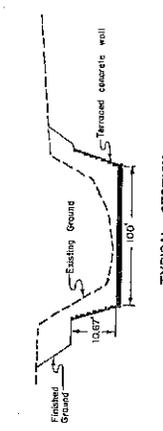
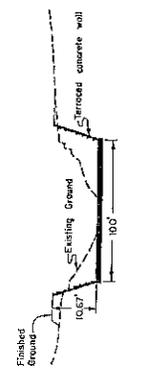
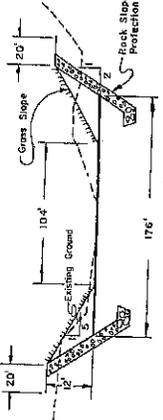
Estimated Project Cost (millions)	
Channel construction	\$ 2.00
Bridge construction	0.00
Channel R/W	0.04
Landscaping	0.07
Total	\$ 2.11

Bridges To Be Reconstructed: NONE



EMA
 ADVANCE PLANNING
REACH II
 CHANNEL ALTERNATE II - D
 TERRACED CONCRETE CHANNEL
 AND GREENBELT CHANNEL
 LOWER SANTIAGO CREEK
 SPECIFIC PLAN

Exhibit E7



TYPICAL SECTION
 VERT. SCALE 1" = 20'
 HORZ. SCALE 1" = 80'

Project Flood Channel

Estimated Project Cost (millions)	
Channel construction	\$ 3.98
Bridge construction	0.00
Channel R/W	0.21
Landscaping	0.21
Total	\$ 6.65

Bridges To Be Reconstructed
NONE

Reduced Flow Channel

Estimated Project Cost (millions)	
Channel construction	\$ 5.11
Bridge construction	0.00
Channel R/W	0.22
Landscaping	0.16
Total	\$ 5.69

Bridges To Be Reconstructed
NONE

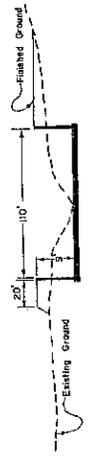
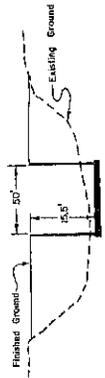
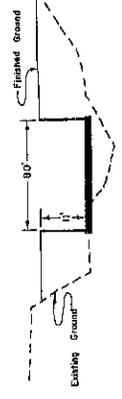
TYPICAL SECTION
VERT. SCALE
HORIZ. SCALE



EMA
ADVANCE PLANNING
REACH III
CHANNEL ALTERNATE III-B
CONCRETE RECTANGULAR CHANNEL

LOWER SANTIAGO CREEK
SPECIFIC PLAN

Exhibit E8

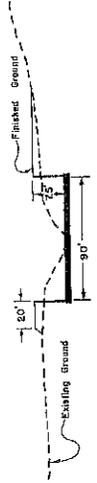
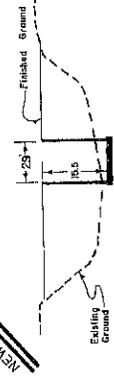
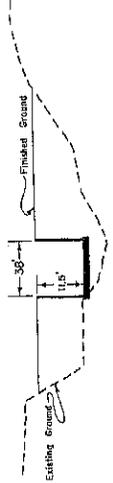
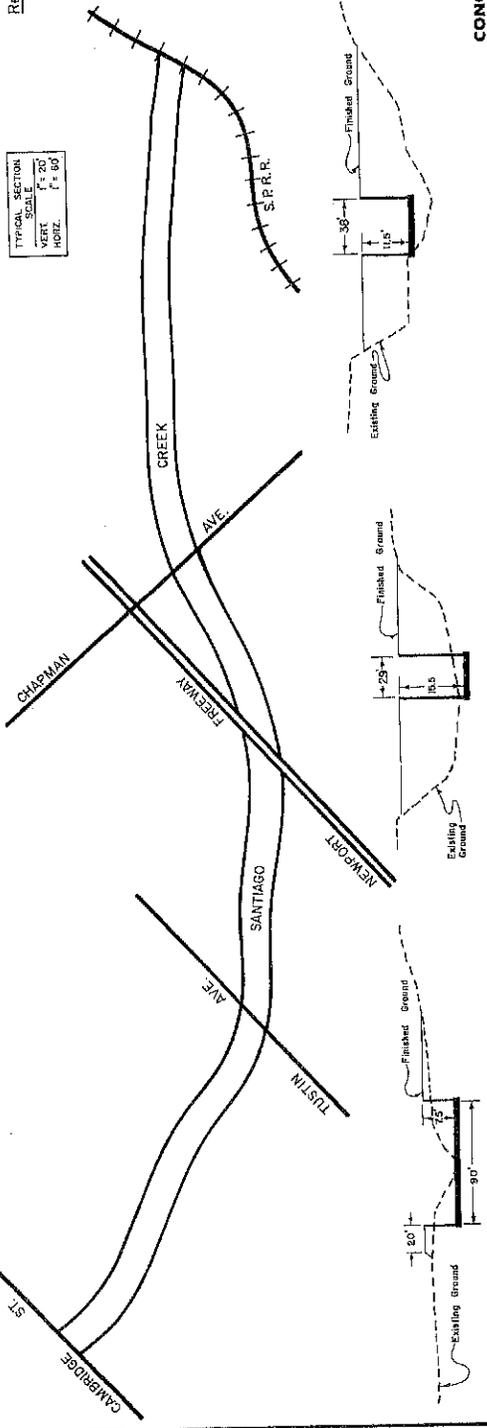


TYPICAL SECTION
CHAPMAN AVE. TO S.P.R.R.

TYPICAL SECTION
TUSTIN AVE. TO CHAPMAN AVE.

TYPICAL SECTION
CAMBRIDGE ST. TO TUSTIN AVE.

PROJECT FLOOD CHANNEL



TYPICAL SECTION
CHAPMAN AVE. TO S.P.R.R.

TYPICAL SECTION
TUSTIN AVE. TO CHAPMAN AVE.

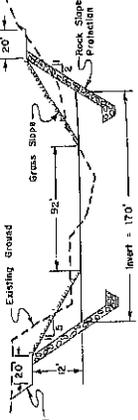
TYPICAL SECTION
CAMBRIDGE ST. TO TUSTIN AVE.

REDUCED FLOW CHANNEL

Project Flood Channel

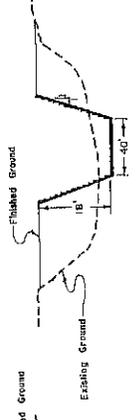
Estimated Project Cost (millions)	
Channel construction	\$ 5.13
Bridge construction	0.00
Channel R/W	0.98
Landscaping	0.16
Total	\$ 6.27
Bridges To Be Reconstructed	
NONE	

Reduced Flow Channel	
Estimated Project Cost (millions)	
Channel construction	\$ 3.35
Bridge construction	0.00
Channel R/W	0.47
Landscaping	0.12
Total	\$ 3.94
Bridges To Be Reconstructed	
NONE	

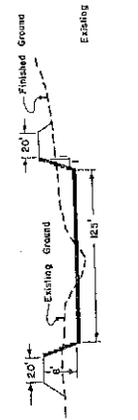


TYPICAL SECTION
CHAPMAN AVE. TO S.P.R.R.

TYPICAL SECTION
SCALE: HORIZ. 1" = 20'
VERT. 1" = 60'

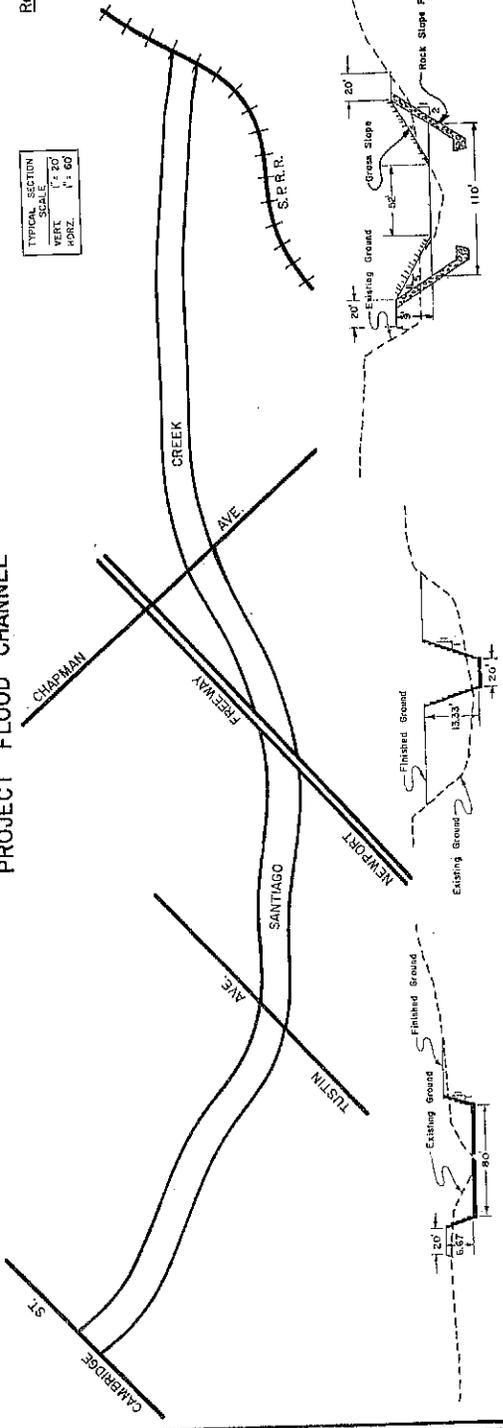


TYPICAL SECTION
TUSTIN AVE. TO CHAPMAN AVE.



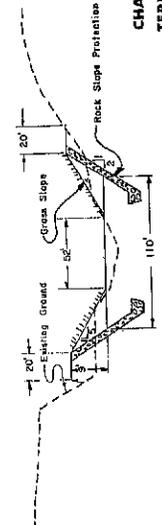
TYPICAL SECTION
CAMBRIDGE ST. TO TUSTIN AVE.

PROJECT FLOOD CHANNEL

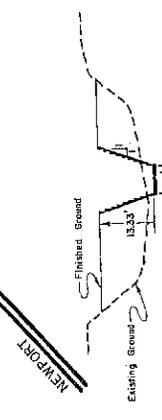


EMA
ADVANCE PLANNING
REACH III

CHANNEL ALTERNATE III - D
TERRACED CONCRETE CHANNEL
AND GREENBELT CHANNEL
**LOWER SANTIAGO CREEK
SPECIFIC PLAN**



TYPICAL SECTION
CHAPMAN AVE. TO S.P.R.R.



TYPICAL SECTION
TUSTIN AVE. TO CHAPMAN AVE.



TYPICAL SECTION
CAMBRIDGE ST. TO TUSTIN AVE.

REDUCED FLOW CHANNEL

Exhibit E10

Project Flood Channel

Estimated Project Cost (millions)	
Channel construction	\$ 2.88
Bridge construction	1.46
Channel R/W	0.15
Landscaping	0.10
Total	\$ 4.59

Bridges To Be Reconstructed
Prospect Ave.
Villa Park Rd.

Reduced Flow Channel

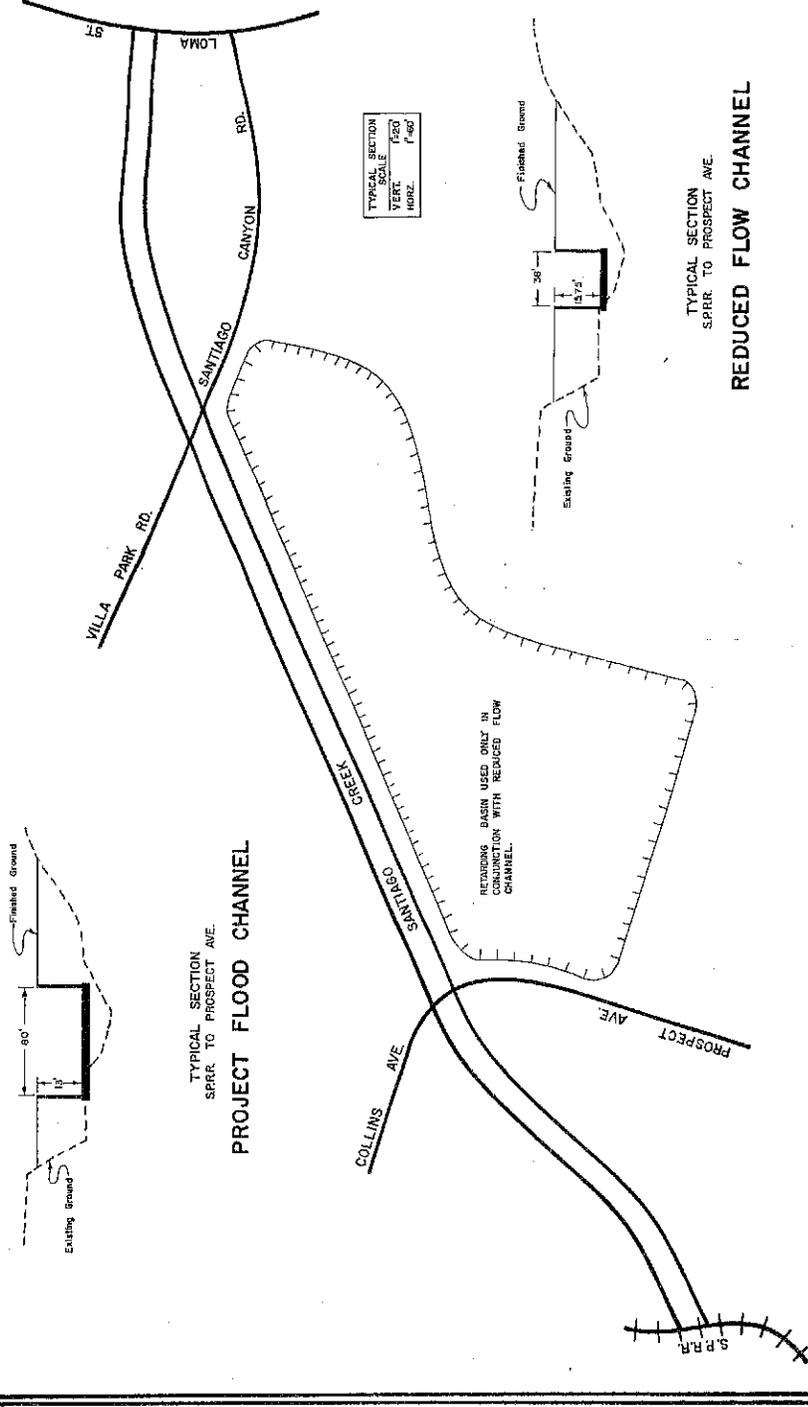
Estimated Project Cost (millions)	
Channel construction	\$ 1.85
Bridge construction	0.95
Channel R/W	0.06
Landscaping	0.06
Total	\$ 2.92

Bridges To Be Reconstructed
Prospect Ave.
Villa Park Rd.

NOTE: PROJECT COSTS ARE FROM S.P.R.R. TO PROSPECT AVE.



EMA
ADVANCE PLANNING
REACH IV
CHANNEL ALTERNATE IV-B
CONCRETE RECTANGULAR
CHANNEL
**LOWER SANTIAGO CREEK
SPECIFIC PLAN**



Project Flood Channel

Estimated Project Cost (millions)	
Channel construction	\$ 1.43
Bridge construction	1.54
Channel R/W	0.10
Landscaping	0.05
Total	\$ 3.12

Bridges To Be Reconstructed
Prospect Ave.
Villa Park Rd.

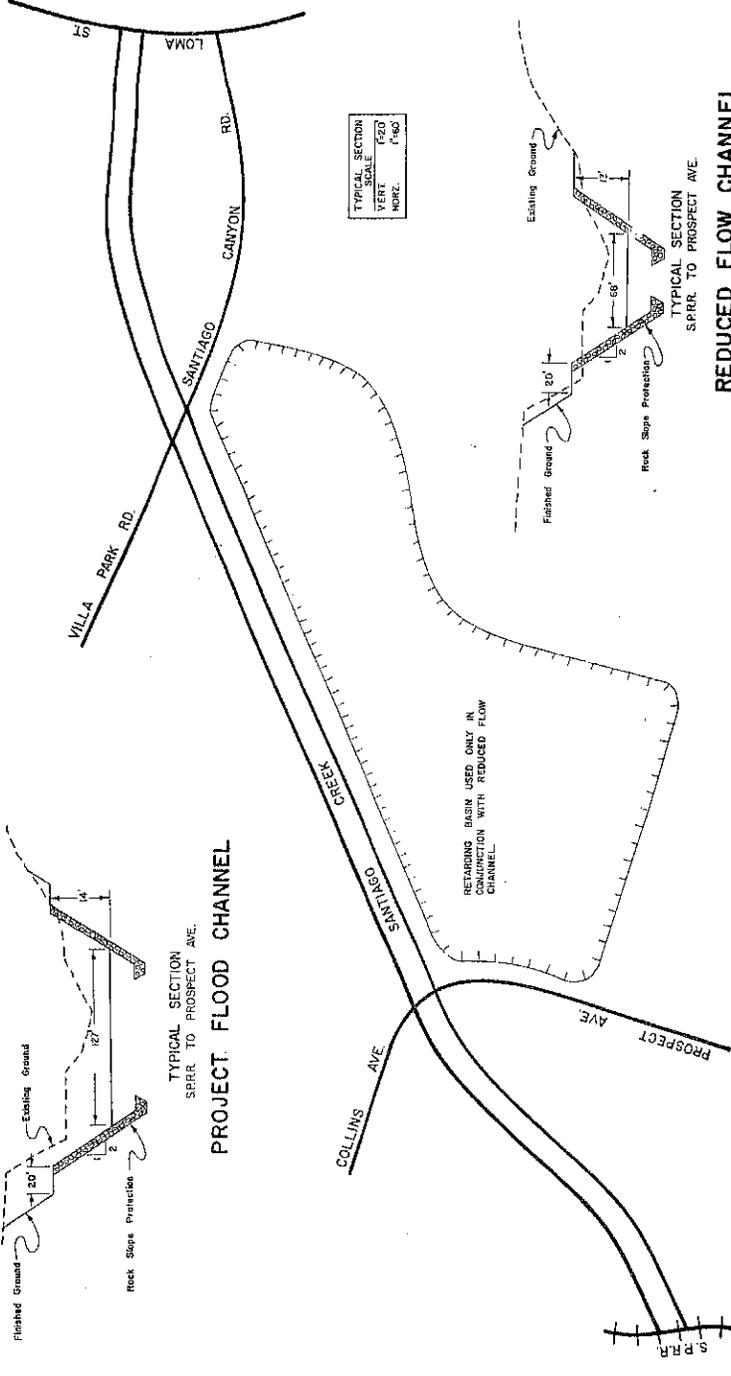
Reduced Flow Channel

Estimated Project Cost (millions)	
Channel construction	\$ 1.15
Bridge construction	1.16
Channel R/W	0.07
Landscaping	0.04
Total	\$ 2.42

Bridges To Be Reconstructed
Prospect Ave.
Villa Park Rd.

NOTE: PROJECT COSTS ARE FROM SURVEY TO PROSPECT AVE.

EMA
ADVANCE PLANNING
REACH IV
CHANNEL ALTERNATE IV-C
ROCK LINED CHANNEL
LOWER SANTIAGO CREEK
SPECIFIC PLAN



TYPICAL SECTION
VERT. SCALE 1"=20'
HORIZ. SCALE 1"=60'

REDUCED FLOW CHANNEL

Project Flood Channel

Estimated Project Cost (millions)	
Channel construction	\$ 1.87
Storage construction	1.61
Channel R/W	0.11
Landscaping	0.07
Total	\$ 3.76

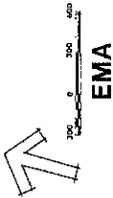
Bridges To Be Reconstructed
Prospect Ave.
Villa Park Rd.

Reduced Flow Channel

Estimated Project Cost (millions)	
Channel construction	\$ 1.25
Storage construction	0.68
Channel R/W	0.05
Landscaping	0.05
Total	\$ 2.07

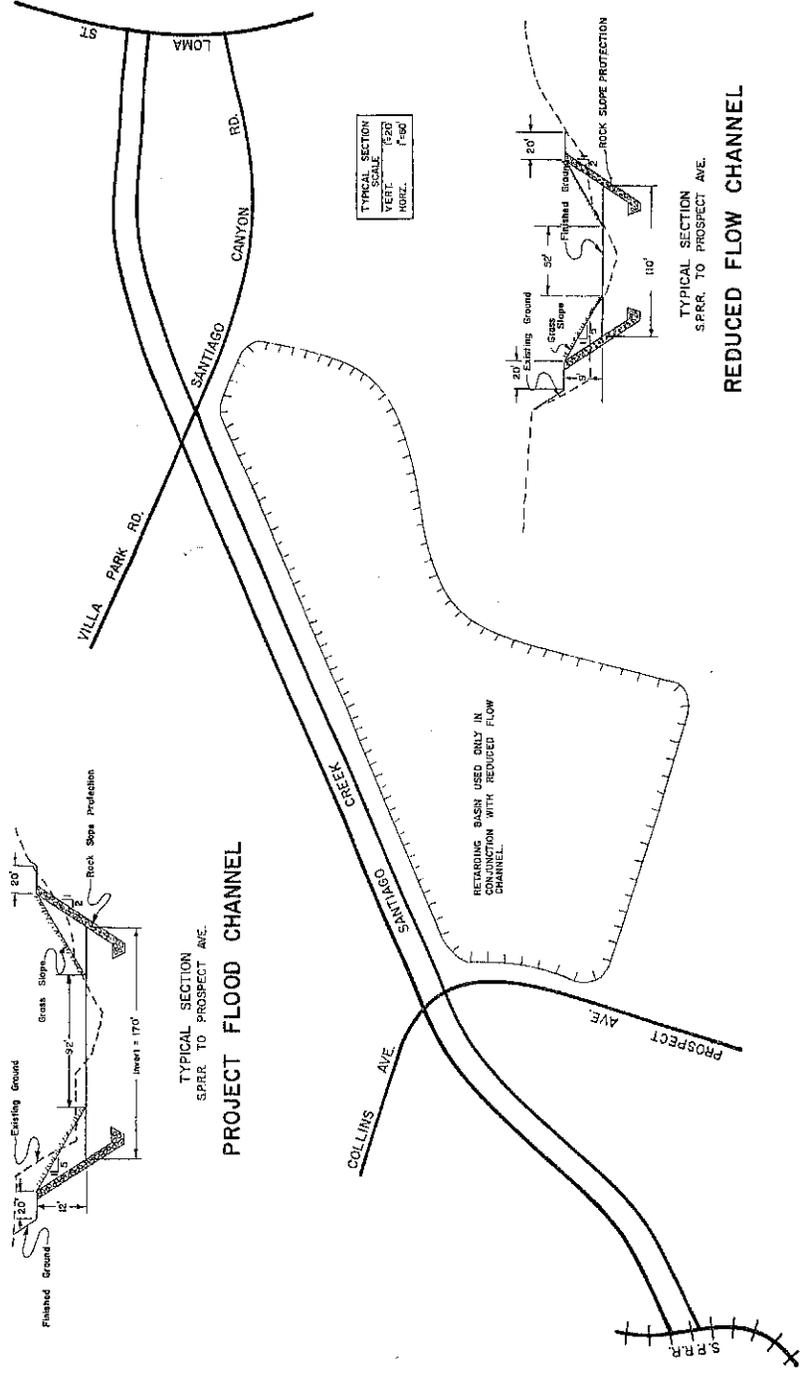
Bridges To Be Reconstructed
Prospect Ave.
Villa Park Rd.

NOTE: CHANNEL COSTS ARE FROM S.F.R.R. TO PROSPECT AVE.



EMA
ADVANCE PLANNING
REACH IV
CHANNEL ALTERNATE IV-D
GREENBELT CHANNEL
LOWER SANTIAGO CREEK
SPECIFIC PLAN

Exhibit E13



REDUCED FLOW CHANNEL

TYPICAL SECTION
S.F.R.R. TO PROSPECT AVE.

PROJECT FLOOD CHANNEL

TYPICAL SECTION
S.F.R.R. TO PROSPECT AVE.

RETARDING BASIN USED ONLY IN
CONJUNCTION WITH REDUCED FLOW
CHANNEL

MEMORANDUM

County of Orange

TO: H. G. Osborne, Director
R. G. Munsell, Assistant Director

DATE: March 5, 1976
Environmental Management Agency

FROM: H. J. Krizan, Manager *HJK*

DEPT/DIST: Advance Planning, EMA

DEPT/DIST: Project Plans, EMA

SUBJECT: Acquisition of Abandoned Gravel Pits in Santiago Creek

Reference is made to H. G. Osborne's letter of December 10, 1975, to R. I. Morris regarding the report of the Pit Rehabilitation Task Force. The attached memo summarizes our study and preliminary recommendations for the interim and ultimate use of the abandoned gravel pits. Our recommendations were to have been submitted to Mr. Morris in February.

It is my conclusion that the county should immediately commence acquisition of the Hurwitz-Bucheim pit. The City of Orange is presently negotiating with Sully-Miller for interim use as a fill site and ultimate acquisition for relocation of Loma Street. The pit is within a proposed county regional park. Some properties in the vicinity have or are being purchased by the county. Finally, the apparent general desire is that the abandoned pits be ultimately converted to public use.

The manner in which the pits are rehabilitated (inerts, Class II wastes, etc.) can, in my opinion, be considered as part of the Santiago Creek or an independent study or decision.

I suggest the following actions:

1. Submit the attached memo to R. I. Morris for his information with an indication that EMA is going to request that the Board of Supervisors authorize the purchase of the Hurwitz-Bucheim pit.
2. Request a Negative Declaration by ESD and the city for the purchase of the property. The ND would probably be conditioned to future environmental analyses when ultimate land uses and interim rehabilitation processes are proposed.
3. Request the Board of Supervisors to authorize acquisition of the pit jointly with the city on the basis of the preliminary information contained in the attached report.
4. EMA and RPS negotiate with the city.
5. RPS prepare the county-city agreement and acquire the property.
6. Determine the ultimate use of the abandoned pits through the approval of the Santiago Creek study or more detailed park studies. Determine the rehabilitation process through the approval of the Santiago Creek study and other studies. With respect to the latter, technical investigations by others will be required to resolve the feasibility of using inerts, Class II wastes, etc.

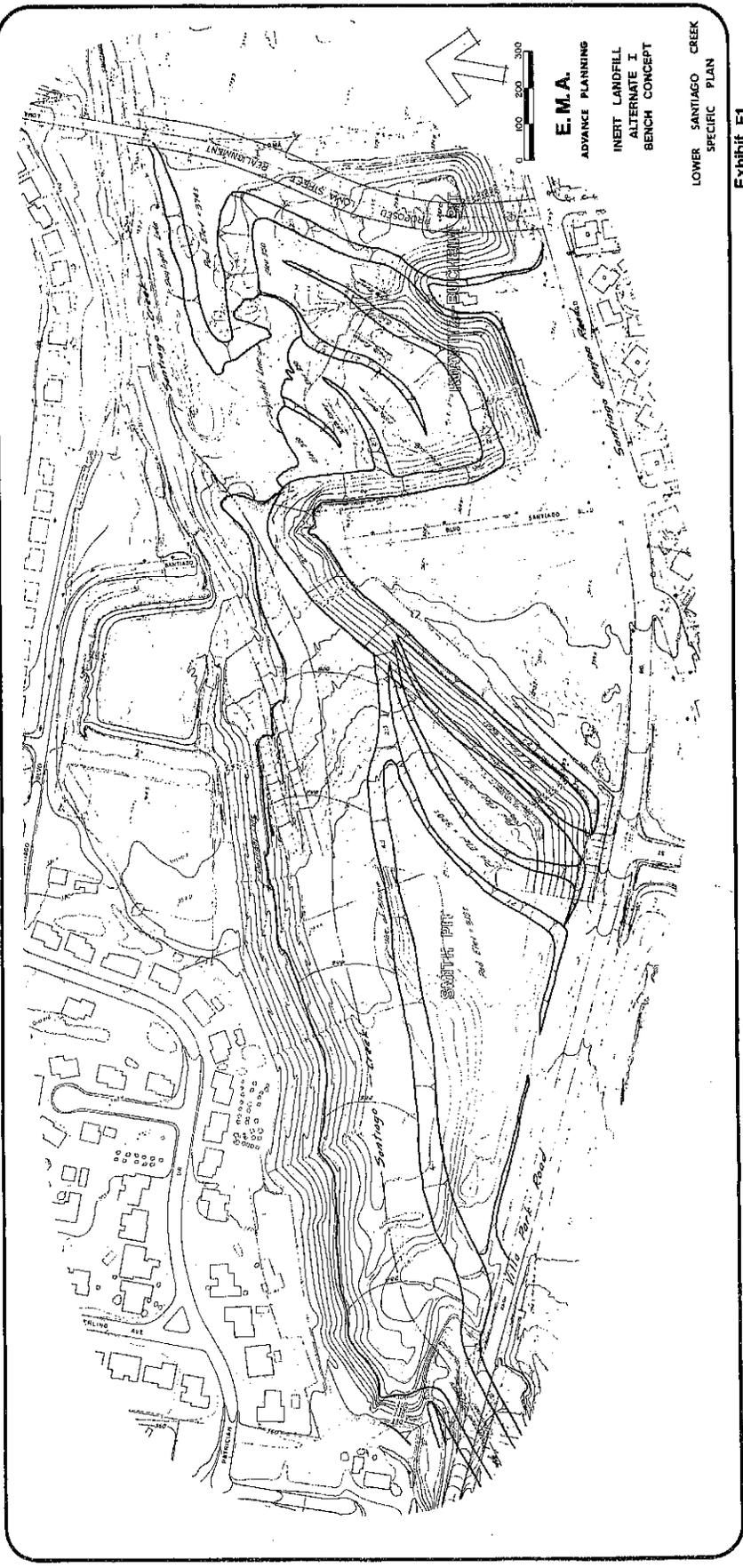
HJK:pb
Attachment

cc: Larry Leaman

APPENDIX F

LANDFILL ALTERNATIVES

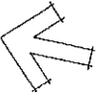
Concurrent with the efforts of this task force, another county initiated task force has been investigating the rehabilitation of sand and gravel pits within Orange County. Because a number of sand and gravel pits occur within the Lower Santiago Creek study area, some interface has taken place between the task forces. The principal interchange of ideas pertains to the potential for landfill operations in the Hurwitz-Buchheim and Smith Pits (*See exhibits F1 and F2*). The memoranda in this appendix address this potential. Some discussion of a General Services Agency (GSA) alternative for pit rehabilitation is included without the benefit of a description of what this alternative constitutes. A simplified explanation is that the GSA alternative for an inert landfill reflects the greatest amount of inert waste disposal which could reasonably be expected to take place. The above mentioned pits would be completely filled with inert material to the elevation of the surrounding terrain. Only that area necessary to provide a flow path for Santiago Creek would remain unfilled.



E. M. A.
ADVANCE PLANNING
INERT LANDFILL
ALTERNATE I
BENCH CONCEPT

LOWER SANTIAGO CREEK
SPECIFIC PLAN

Exhibit F1



E. M. A.
ADVANCE PLANNING
INERT LANDFILL
ALTERNATE II
PAD CONCEPT

LOWER SANTIAGO CREEK
SPECIFIC PLAN

Exhibit F2



MEMORANDUM

County of Orange

DATE: March 4, 1976

TO: H. G. Osborne, Director DEPT/DIST: Environmental Management Agency

FROM: R. G. Munsell, Assistant Director DEPT/DIST: Advance Planning, EMA

SUBJECT: Abandoned Gravel Pits in Lower Santiago Creek

The draft report of the Pit Rehabilitation Task Force included recommendations that the abandoned Consolidated Rock (Smith) and Hurwitz-Buchheim gravel pits should be considered as possible inert landfill sites. This memo is in response to your request for recommendations regarding alternate uses for those pits as part of the Lower Santiago Creek study.

ALTERNATIVE ULTIMATE PUBLIC USES

1. Ground water recharge site

The subject area was previously considered as a possible ground water recharge site. Recent discussion with the Orange County Water District and a review of documentation of percolation rates for the area indicate that the subject site is not a prime location for such a use. If a ground water recharge project were to be developed on Lower Santiago Creek, the most cost-effective location may be in the area of the Bond Street gravel pit. Representatives of the Orange County Water District have indicated a willingness of that agency to financially participate in the development of the Bond Street pit for such use.

2. Flood retarding basin

Preliminary feasibility studies performed by PPD indicated that the subject sites may be needed as part of a flood retarding basin incorporating all the gravel pits in the creek between Collins Avenue and Loma Street. Subsequent studies by PPD have indicated that the area above Villa Park Road is not required for such use.

3. Park and greenbelt uses

The subject pit area is included within the boundary of Lower Santiago Creek Regional Park in the county's Master Plan of Regional Parks. Detailed planning of potential park uses has not been previously conducted; however, several concepts have been considered by city and county greenbelt groups. Those uses include a proposed vista point on the flat area on the south side of the creek between the Smith and Hurwitz-Buchheim pits. It is envisioned that the area would also be developed as a staging area (park and ride) for equestrians, bicyclists and hikers who will be using the trails along the creek. The general

MEMO

Abandoned Gravel Pits in Lower Santiago Creek

March 4, 1976

consensus of the greenbelt groups is that they would like to generally maintain the existing ("hole-in-the-ground") appearance of the pits in order to complement the vista point concept. However, they did indicate that, if possible, they would like to expand the proposed park and ride facility into the pit area, provided the pits could be made safe for public use.

4. Loma Street realignment

The City of Orange is planning to realign Loma Street through the easterly half of the Bucheim pit which will require a fill to the existing grade of Santiago Canyon Road (required fill 300,000 c.y.).

ANALYSIS

Based on the above, the only two ultimate public uses of the area which need to be considered are greenbelt-park and Loma Street realignment. The interim use of the pits as inert landfill sites may help achieve the ultimate uses.

The City of Orange is proceeding with the project for the realignment of Loma Street and has requested the county to participate. Because of the apparent certainty of the Loma Street project, the studies performed by PPD have assumed the realignment as a given control.

The PPD staff considered the compatibility of an inert landfill project with the greenbelt proposals. After discussions with representatives of various greenbelt groups, the attached preliminary grading plans (*Exhibits F1 and F2*) were developed along the concept of only partially filling the pits in order to make them safe for greenbelt use, yet still maintaining a generally existing effect. The required fill and cost for the two proposals are shown on *Exhibit F3* with a detailed cost estimate for the bench alternate shown on *Exhibit F4*.

In developing the grading plan for the Smith pit, it was assumed that a downstream channel improvement would be constructed beginning at Villa Park Road. This would not be the case should the present proposal for a flood retarding basin in that area not be implemented. If the improved channel is not constructed, the amount of fill in the Smith pit may be somewhat reduced, depending upon the design of the culvert or bridge constructed for Villa Park Road at Santiago Creek. In addition, it should be noted that the estimated fill rates for the pits (3000 c.y. per week) shown on *Exhibits F3 and F4* may be optimistic based on the fact that there are existing inert disposal sites at other locations within the county (one in the Smith pit) and several processing plants in Orange County presently reclaiming inerts for reuse as subbase material for road construction. Should those sites and plants continue operation, the amount of material available for county inert landfill projects could be substantially reduced.

The two grading plans were presented at a City of Villa Park Planning Commission study session on February 5, 1976. At that meeting, there were no negative comments regarding the proposed inert landfill. The two plans were also recently presented to Jack Berger of the Greenbelt Commission. He indicated that he generally favors the bench alternative in the Hurwitz-Buchheim pit since it would provide an ideal access to the creek from the previously mentioned park and ride facility.

COMPARISON OF ALTERNATE PROPOSALS FOR
INERT FILL SITE
LOWER SANTIAGO CREEK

ALTERNATE	Fill Volume (C.Y.)			Time to Fill @ 3000 C.Y./week			Cost to County @ \$1000/week		
	ConRock (Smith Pit) (40 acres)	Hurwitz/ Bucheim Pit* (27 acres)	Total (67 acres)**	ConRock (Smith Pit)	Hurwitz/ Bucheim Pit	Total	ConRock (Smith Pit)	Hurwitz/ Bucheim Pit	Total
CSA Alt.	2,600,000 c.y.	1,100,000 c.y.	3,700,000 c.y.	17 yrs.	7 yrs.	24 yrs.	\$890,000	\$360,000	\$1,250,000
Bench Alt.	1,800,000 c.y.	900,000 c.y.	2,700,000 c.y.	11.5 yrs.	6 yrs.	17.5 yrs.	\$600,000	\$310,000	\$910,000
Pad Alt.	1,700,000 c.y.	770,000 c.y.	2,470,000 c.y.	11 yrs.	5 yrs.	16 yrs.	\$570,000	\$260,000	\$830,000

*Of this amount 300,000 c.y. is required for Loma Street Realignment

**Acquisition cost @ \$3000/acre = 67 acres x \$3000 = \$200,000
Value of property after fill = 67 acres x \$15,000 = \$1,005,000

COST COMPARISON
 LOWER SANTIAGO CREEK
 INERT LANDFILL SITE
 BENCH ALTERNATE

HURWITZ-BUCHEIM PIT

Area = 28 acres. Time required to fill pit = 5-3/4 years.

Cost of Land - 28 acres @ \$3000/acre	= \$ 84,000
Operational cost to fill pit with inerts @ \$1000/week assuming 3000 c.y./week fill rate (900,000 c.y.)	= <u>\$300,000</u>
COST TO PUBLIC AGENCY	= \$384,000
Value of reclaimed park land 28 acres @ \$15,000/acre	= <u>\$420,000</u>
RESULTING FINAL BENEFIT TO PUBLIC AGENCY	= \$ 36,000

If the fill rate in the above estimate were reduced to 1500 c.y. per week, the resulting final cost to public agency would be \$246,000 and the time required to fill the pit would be doubled to 11.5 years.

CONSOLIDATED ROCK (SMITH) PIT

Area = 40 acres. Time required to fill pit = 11½ years.

Cost of Land - 40 acres @ \$3000/acre	= \$120,000
Operational cost to fill pit with inerts @ \$1000/week assuming 3000 c.y./week fill rate (1,800,000 c.y.)	= <u>\$600,000</u>
COST TO PUBLIC AGENCY	= \$720,000
Value of reclaimed park land 40 acres @ \$15,000/acre	= <u>\$600,000</u>
RESULTING FINAL COST TO PUBLIC AGENCY	= \$120,000

If the fill rate in the above estimate were reduced to 1500 c.y. per week, the resulting final cost to public agency would be \$720,000 and the time required to fill the pit would be doubled to 23 years.

NOTE: Estimate does not reflect the following costs:

1. Reduced travel distance to disposal site (cost savings)
2. Reduced inert material received at county Class II disposal sites (possible cost increase)

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*Reference is made throughout this EIR to numerous exhibits contained in the "Project Report". Those exhibits are numerically labeled. Exhibits contained in the EIR are lettered.

1.0 INTRODUCTION AND SUMMARY

1.1 INTRODUCTION (To be provided at Final EIR stage)

1.2 SUMMARY (Existing Conditions, Significant Impacts, Mitigation Measures)

<u>Existing Conditions</u>	<u>Significant Impacts</u>	<u>Mitigation Measures</u>
1.21 <u>Land Use:</u> 9.3 mile length of project meanders through various types of land use. Generally, westerly area is highly urbanized adjacent to creek; central area less urbanized with sand and gravel mining operations predominating; easterly area is relatively undeveloped, open space.	Suggested Plan will: (1) Provide flood control protection for Standard Project flood level, thus reducing risk factor to adjacent urban development. (2) Provide Regional park and bicycle/equestrian trails. In developed areas, adjacent residences will be impacted (privacy) by trail users. (3) Provide inert landfill. Use will impact adjacent residential use by offensive odors and truck traffic. (4) Provide extension of arterial highways across creek, impacting visual character of creek and imposing design constraints on future regional park.	(1) Beneficial Impact. (2) Regional Park beneficial Impact Landscaping will be provided along creek banks to minimize privacy intrusion. Lighting will be strategically located to discourage vandalism. (3) Further environmental analysis will be required to determine viability of this land use. (4) Road designs (i.e., fill slopes) shall be contoured and landscaped to respect the intent of the greenbelt corridor concept.
1.22 <u>Landform/Geology:</u> Except for the most easterly area of the project, the topography basically conforms to the trapezoidal shape of the creek which flows through a very gentle sloping alluvial plan. The easterly area is quite different. Large, deep gravel pits	Construction of flood channels will alter existing landform. Some gravel pits will be filled in conjunction with the inert landfill. Slope stabilization will occur in the largest pit construction of roads, trails, and regional park will require grading.	Cut-fill slopes will be contoured and landscaped. Concrete channel lining will be textured to minimize visual impact.

Existing Conditions

Significant Impacts

Mitigation Measures

line the creek while upstream surrounding topography is quite mountainous. The potentially active El Modena Fault runs through the easterly area.

1.23 Vegetation/Wildlife:

Except for the most easterly area of the project, the vegetation is limited to ornamental landscaping; wildlife is practically non-existent except for birds, rodents and reptiles. In the easterly area, nature riparian vegetation chaparral, and coastal scrub is present. Wildlife is abundant, specifically avifauna.

Ornamental landscaping will be removed where channelization trails, and parks are to occur. The wilderness park concept will preserve significant vegetation and wildlife.

Landscaping will be provided along creek banks, in the regional park, and fill slopes for road construction.

1.24 Aesthetics:

Except for the sand and gravel mining operations in the middle project area where the environment has been highly disturbed, the remaining area contains varying degrees of aesthetic quality. The most easterly area contains numerous scenic vistas, while the creek in the westerly project is rustic.

Channelization (i.e., concrete box) will severely impact visual quality in the westerly project area.

Channel wall texturing will help break up the unvarying appearance of concrete channel.

1.25 Circulation and traffic:

Due to the large area of this project many arterial highways and freeways cross the creek. Most of the traffic occurs westerly of the Newport Freeway.

Implementation of the regional park will attract a high number of automobile trips. Three roads will be extended across the creek.

None.

2.0 DESCRIPTION OF PROJECT

2.1 PURPOSE OF PROJECT

The purpose of the project is to provide a coordinated planning effort for Lower Santiago Creek (Villa Park Dam to the Santa Ana River), with major emphasis on flood control and recreation facilities.

The need for improved flood control protection along portions of the creek was exhibited during the early months of 1969 when flooding resulted in physical damage to the creek banks and some adjacent residential structures. More than three million dollars of damage was caused by this flood.

The linear shape of the creek and its physical linkage with the Santa Ana River and the Santa Ana Mountains makes it a desirable recreation-transportation corridor for riding and biking enthusiasts. The availability of large parcels of land in the upper reaches of the creek provides opportunity for regional, recreation activities. The Santa Ana River/Santiago Creek Greenbelt Commission was established to coordinate initial planning efforts. In conjunction with the local Cities of Santa Ana, Orange, and Villa Park the Santiago Creek Greenbelt Plan was developed. The recreation facilities of this plan (Lower Santiago Creek Specific Plan) reflects much of the Greenbelt's planning efforts.

2.2 SCOPE AND PURPOSE OF EIR

The purpose of this EIR is to report the environmental effects to the existing environment as a result of the proposed specific plan. The level of specificity of the Final EIR will allow decisions to be made relative to the extent and type of flood control improvements the extent of regional park acquisition, and the locations of bicycle and equestrian trails.

This EIR is prepared in accordance with the Guidelines for Implementation of the California Environmental Quality Act (CEQA) of 1970, incorporating all amendments through September 30, 1976, and with the Environmental Impact Procedures for the County of Orange, January 21, 1975.

2.3 PHASING

Action on this EIR is expected in early 1977. Since the Specific Plan represents a long range planning effort, the County and various local jurisdictions will implement portions of the plan as financial resources allow, probably extending beyond the year 2000.

2.4 FORMAT OF EIR

As a result of the environmental survey and literature search conducted for the preparation of this EIR, distinct spatial patterns of existing environmental conditions emerged. These patterns reflect areas where the quantity, quality, and complexity of existing environmental conditions vary. That is, from the Santa Ana River to the Newport Freeway the creek is very constricted with intense, adjacent urban development, little vegetation and wildlife habitats; whereas, the area between Villa Park Dam and Loma Street is rich in vegetation and wildlife habitat, contains varying topography, scenic vistas, and remote wilderness areas;

between these two areas extensive sand and gravel mining operations have been occurring for the last 50 years, and as a consequence, the environment is highly disturbed. Therefore, the format of this EIR will generally describe the existing conditions of the entire study area, while focusing its analysis on those areas of environmental significance.

The EIR will utilize most of the exhibits contained in the attached Project Report to relate existing conditions and expected impacts.

The project sponsor has developed numerous alternatives of which one is the "Suggested Plan" and is fully evaluated in this EIR as the "project". The remaining alternatives are fully described in the Appendix section of the Project Report and are generally analyzed in the Alternative section of this EIR.

The following sections will be combined into one section of the Draft EIR to allow ease of reading and continuity: Existing Conditions, Impacts, and Proposed Mitigation Measures.

2.5 DESCRIPTION OF SUGGESTED PLAN

A. Location.

The proposed project is located in central Orange County, as shown on exhibit 1 of the project report. The boundary limits of the study area closely corresponds to the existing channel of Santiago Creek, from the Santa Ana River to Villa Park Dam 9.3 miles (exhibit 2 of the project report). The corridor's length has been segmented into five reaches for study purposes. Reach I begins at the Santa Ana River and Reach V ends at Villa Park Dam.

In addition to the County of Orange, the overall study area affects three cities: Santa Ana, Orange, and Villa Park.

B. Project.

The proposed project is the development of a Specific Plan for Lower Santiago Creek. Primary land use proposals are: provision of flood protection consistent with local and federal standards, and a coordinated recreation corridor from the Santa Ana River to Villa Park Dam, including riding and biking trails, and regional recreation facilities (i.e., camping, football, soccer, tennis, baseball, and picnicking).

1. Flood Control Facilities. Implementation of this plan will provide General Project Flood protection (i.e., storm having a frequency of occurrence of once every 250 to 500 years or more) for the Lower Santiago Creek watershed. To accomplish this, three types of flood protective facilities are proposed.

- o Installation of a flood retarding basin in the existing sand and gravel pits near Collins Avenue - Prospect Street.
- o Increase in the amount of "controlled water release" from Villa Park Dam. This will increase the water storage volume behind the dam for use when peak flooding occurs.

- o Installation of protective channel lining along portions of the creek. In some cases, this may involve complete reshaping of the channel, while at other locations the application of concrete to existing channel walls or bottom is necessary.

Most of the protective channel lining will occur in Reaches I, II, and portions of III (exhibit B).

2. Recreation and Greenbelt Facilities. The plan proposes a combination bicycle/equestrian trail system along the entire portion of the creek. At some locations the trail may deviate from the channel limits due to physical constraints. Other local and regional trail systems will tie into the creek corridor. Refer to exhibit 4 of the project report.

As shown on exhibit 4 of the project report, numerous local parks are existing or proposed adjacent to the creek. Within the creek boundaries, the "Lower Santiago Creek Regional Park" is conceptually proposed as shown on exhibit 5 of the project report. Thus, the creek corridor is concentrating toward recreational goals.

Along portions of the creek where channel limits are severely constricted, linear greenbelt areas are proposed, within these areas, bicycle trails will meander.

3.0 EXISTING CONDITIONS; IMPACTS; MITIGATION MEASURES

3.0

Due to the comparative large size, complexity, and variability of the project's study area, a complete description of all existing conditions and impacts is not feasible; however, a general description will be provided for those areas not considered significant in content or impact, while areas which are significant will be analyzed in greater detail.

3.1 LAND USE (Refer to exhibits 12a through 12e of the Project Report)

A. Existing and Proposed Conditions.

The 9.3 mile length of this project meanders through varying degrees of land use. From the Villa Park Dam area where urban development is practically non-existent and orange groves reminiscent of this areas agricultural past can still be seen the study area changes downstream to intensive sand and gravel mining operations within the creeks floodplain. In the lower reaches intense urban development exists immediately adjacent to the channel.

Most of the urban development within the Cities of Santa Ana and Orange consist of single family detached dwelling units. Where arterial highways overpass the creek, some commercial uses exist.

Except for Santiago Golf Course in Reach III and the sand and gravel mining operations in Reach IV, no other urban land uses exist within the creek's channel.

Proposed uses adjacent to the creek include: residential, local parks and trails, and some commercial. These uses are not necessarily proposed by this plan.

Uses proposed by the plan are: "Lower Santiago Creek Regional Park" (exhibits 10a and 10b of the Project Report); Class III inert landfill at the Consolidated Rock Smith Pit and the Hurwitz-Buchheim Pit (exhibit 12 of the project report); Groundwater Recharge Basin at the sand and gravel extraction area between Collins Avenue - Prospect Street and Loma Street; Vehicle Circulation Plan (extension of Walnut Ave, and Orange Park Blvd. across the creek). For detailed description of these proposals, refer to pages 66-70 of the Project Report.

Note: City of Orange is proposing to realign Loma Street (Reach IV).

B. Impacts.

Implementation of this Specific Plan will effect both positive and negative impacts to existing and proposed land use.

1. Provision of proposed flood control facilities will greatly lessen the probability of flood damage to adjacent land uses, especially the single family residences in Reaches I and II. Additionally, these facilities may "free-up" parcels adjacent to the creek for development as risk factor is reduced.

2. Provision of bicycle and equestrian trails in the creek bed or on the banks in Reaches I and II may impact the privacy and security of adjacent residents. During a public meeting on this project, residents along the creek were surveyed as to their desire to have trails in the creek area. A unanimous opinion against trail installation was expressed. Contact was made on January 19, 1977, with the City of Santa Ana Police Department regarding the issue (i.e., intrusion of privacy and potential resident burglary) expressed by the local citizens. According to Lieutenant William T. Weatherly, Jr. the primary area of concern along the creek is between the Santa Ana River and Main Street as residential development is immediately adjacent to the creek. He indicated that this area has a low incident of crime rate and he didn't expect any significant increase in crime rate due to trail users. He noted that general pedestrian traffic (which exists now) would be the most suspect for criminal activity. He anticipates no real problem with trails but recommends precautionary design measures, such as increasing the visibility of rear yard fences, planting of protective screening, and locating the trails within the creek bed.
3. Development of a Class III Inert Landfill may conflict with existing residential development. Offensive odors, visual degradation, increased noise levels, and haul truck traffic are potential impacts associated with this use.
4. Depending on the phasing schedule of the regional park development plan, potential land use conflict may result between sand and gravel mining operations and regional park activities. Most of the conflict will result from traffic mix on local circulation and safety hazards to trail users. The designated wilderness zone of the regional park (Blome-Rinker) will impact residences which front Windes Drive. As this use provides no off-street parking facilities and proposes parking along the shoulder of Windes Drive, impact will result to adjacent residential land use in the form of traffic congestion, noise, and traffic-pedestrian safety hazards.
5. Extensions of Walnut Avenue and Orange Park Blvd. will impact the greenbelt corridor concept of the plan. Primary effects are visual impact to greenbelt corridor concept and physical constraints to regional park design opportunities. Although not part of this plan, the Loma Street realignment project proposed by the City of Orange will have similar impacts as above.
6. Other beneficial Land use impacts provided by this plan are:
 - o Provides groundwater recharging basin
 - o Provides bicycle trails off of congested streets
 - o Provides field sport area (soccer, football, baseball, etc.)
 - o Eliminates unstable steep slopes with abandoned sand and gravel pits.
 - o Provides sanctuary of birds and other wild life populations.

C. Mitigation Measures.

1. Impact on privacy and security to residences adjacent to the creek. To minimize the visibility of residential backyards, and hence,

intrusion of privacy, it is recommended that vegetative screening be provided along the rear yard fences of those residences where trail locations are on the channel banks (particularly from the Santa Ana River to Bristol Street, Santa Ana Freeway to Main Street, Santiago Street to Glassell Street, Tustin Avenue to the Newport Freeway).

To minimize the vulnerability of residences to vandalism, it is recommended that rear yard fence areas be lighted to meet "Illumination Engineers Standards (IES)" while not disturbing the rear yard residence area. It is recommended that design features be reviewed by the Santa Ana Police Department to insure maximum security effectiveness. Additionally, it is recommended that security patrol be contracted to perform routine surveillance of those areas deemed most susceptible. Such a program has been instituted for the Santa Ana River trail system. Additionally, certain types of vegetation can be planted on or near rear yard fences which serve to deter access. Therefore, if vegetative screening is desired, it is further recommended that the species selected serve a dual function: to act as a visual barrier and access barrier.

2. Inert Landfill. At the initial planning stage for this project a detailed environmental analysis must be performed to determine its feasibility to surrounding land use and environmental conditions.
3. To mitigate the on-street (Windes Dr.) parking impact to adjacent residences, it is recommended that a minimum of 50 parking spaces (4 passengers per vehicle, 200 person carrying capacity, e.g. 200/4) be provided. The location of the parking facility may be: a portion of the citrus orchard (westerly of the Blome residences) which is proposed for preservation by this wilderness plan, a parcel owned by Roy E. Gaunt, or a parcel owned by Anna E. Smith. It appears that as a short term facility, the orange grove would suffice; however, that approach would require removal of some orange trees (although eventually the area could be replanted). A longer term approach would be the acquisition of Anna E. Smith's parcel (Life Estate purchase) which would not only provide off-street parking but would also serve as an "entrance point" to the wilderness park, thus an effective access control mechanism. This acquisition would also eliminate any "in-holdings" within the park and would give the County sole control over the area.
4. Roads. To minimize visual impact to the creek, alternative slope designs (i.e., flatter, undulating, landscaping, etc.) are recommended. Additionally, to insure design of road and bridges are compatible with greenbelt/regional park concept, it is recommended that site plans be reviewed by the Santiago Creek Greenbelt Commission, the City Council of Orange, and County Planning Commission.

3.2 LANDFORM, GEOLOGY, SOILS, AND SEISMICITY.

A. Existing Conditions.

1. Landforms. Except for Reaches IV and V, the topography of the remaining study area generally conforms to the shape of the channel. That is, the channel shape is basically trapezoidal, with 2:1 sidewalls, flat bottoms

(invert), and an average depth of 15 feet. The width of the channel, however, varies significantly along the creek, from its narrowest point, 25' in Reach I, to over 200 feet in Reach III. The area adjacent to the creek is relatively level with no unique features.

In Reach IV, the topography has been significantly altered by previous and existing sand and gravel mining operations (exhibit 9b). In this area, expansive pits line the bottom of the channel, from Prospect Street to Loma Street. One of these pits is over a half mile wide, mile long and over 150 feet deep (exhibit 9b project report). It is also in this Reach that nearby landform begins to change from low, level terraces to semi-rolling hills. In Reach V, the creek narrows again as it passes through the very steep topography of the Peralta Hills and Anaheim Hills. Local relief in this area is quite steep. Near Villa Park Dam the elevation on the channel floor is 465'; and on the nearest peak elevation is approximately 842'.

Thus, the topography for the project varies significantly. In the upper reaches, landform is mountainous with a constricted channel width and steep gradient; in the middle reaches, 3 and 4, topography begins to level-off with massive pits within the wider channel limits and in the lower reaches, 1 and 2, landform is extremely flat, with a very narrow channel.

2. Soils, Geology, and Seismicity. (exhibit A)

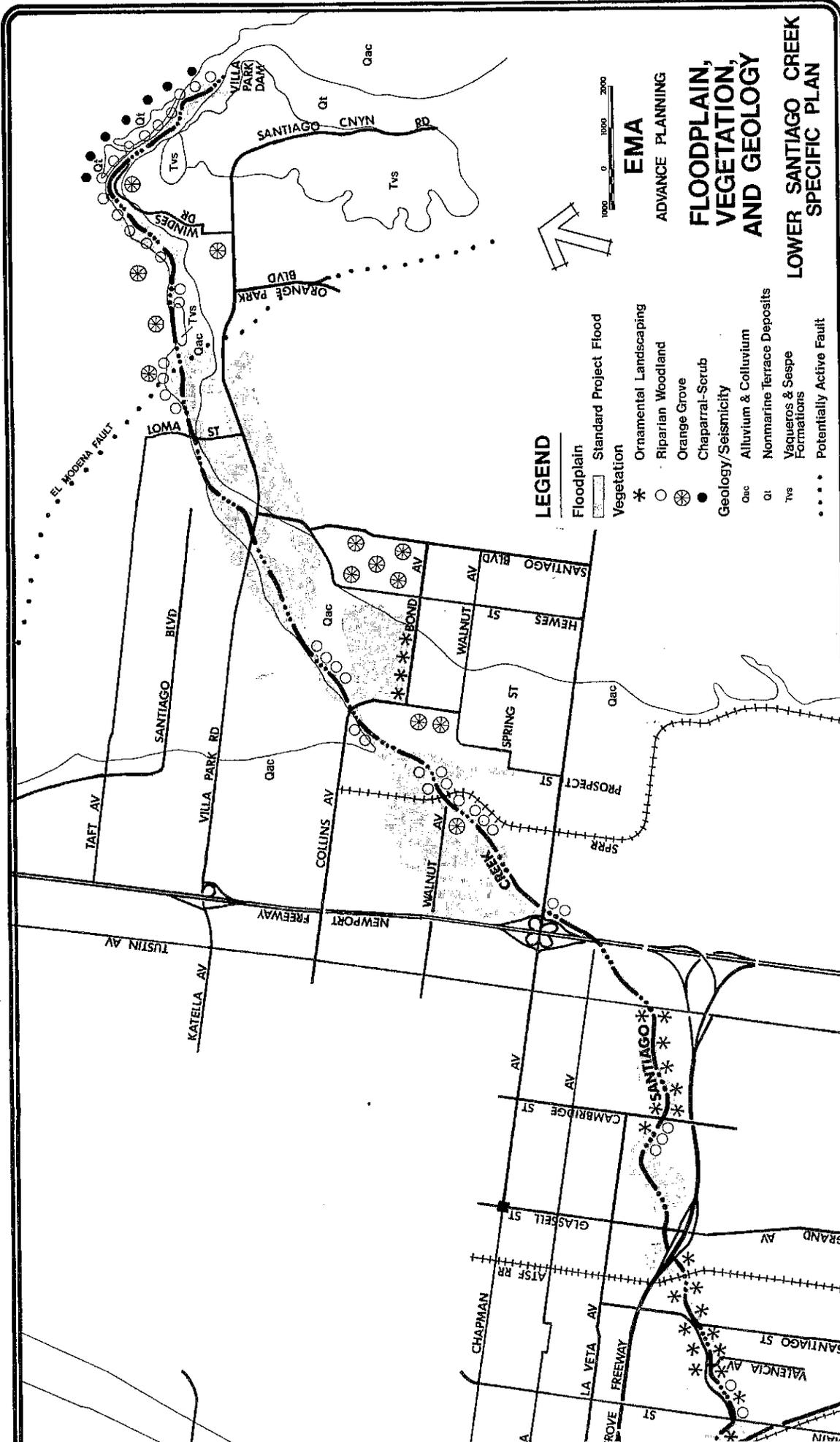
According to the "Geologic Map of Orange County, California" prepared by the California Division of Mines and Geology (1973), the entire study area is designated "Qac", that is, of the Quaternary epoch consisting of Alluvium and Colluvium materials. This designation is typically associated with areas affected by stream deposition and erosion. The resulting soils are normally sandy-silts, rich in minerals, and particularly well suited for agricultural uses and sand and gravel mining operations.

Bedrock underlying this material may be one or more of several formations found in Orange County (i.e., Monterey, Topanga, Vaqueros, Sespe, Santiago, Silverado), however, due to the thickness of the overlying soils (5,000 to 10,000 feet), precise identification of these formations is not possible. In Reach 5 adjacent to the Channel, there are some Non-marine Terrace Deposits (QT).

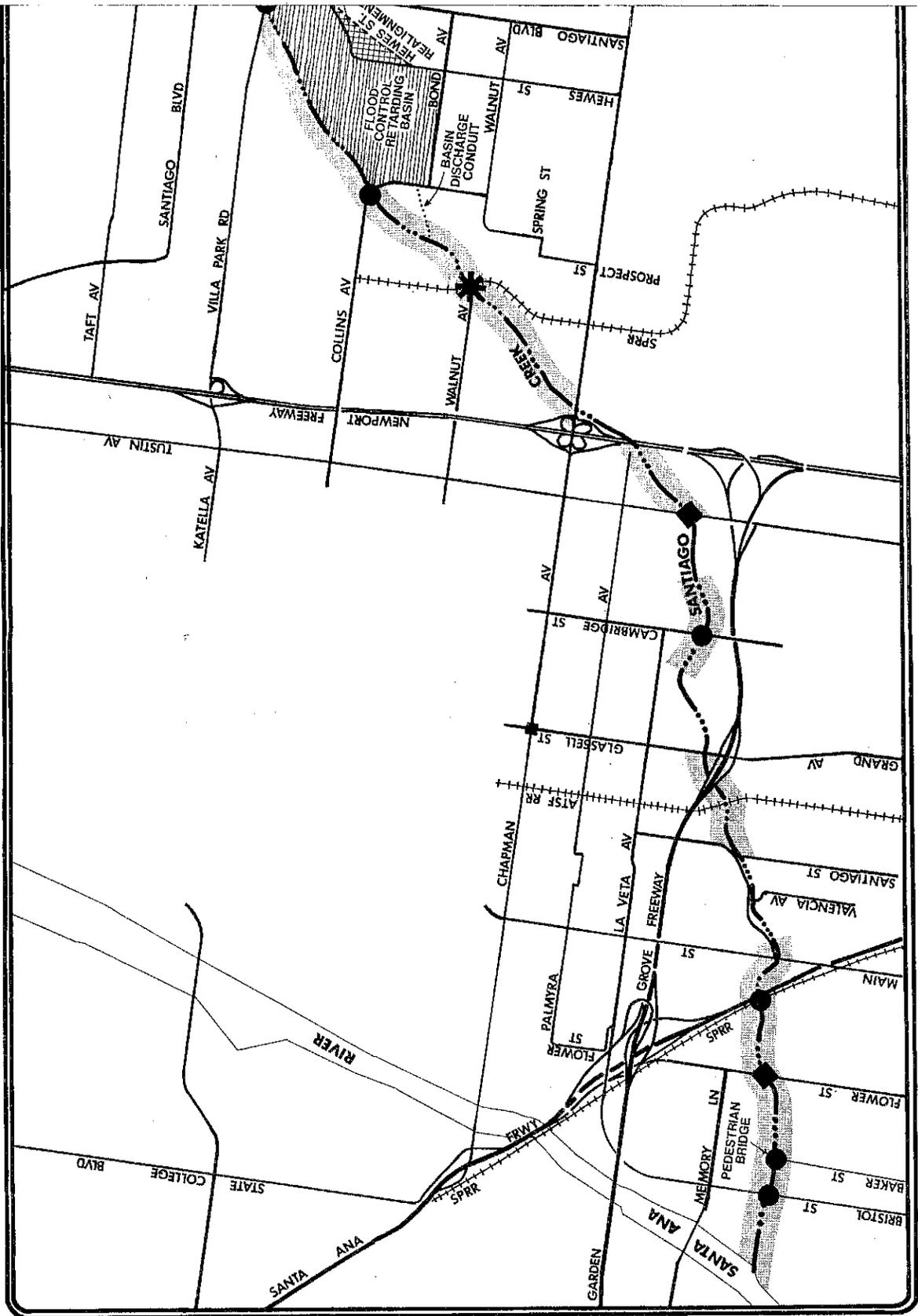
There are no landslides within the study area. There are, however, two fault systems within or adjacent to the creek. One of the faults (El Modena Fault) is clearly identified in Reach 5, near the Blome Ranch. As this system exhibits "off-set terrace" deposits which may be attributed to the severe earthquake of 1769 near Olive, Ca., it is considered at least "Potentially Active" and could be classified "Active" (if it was the cause of the Olive earthquake).

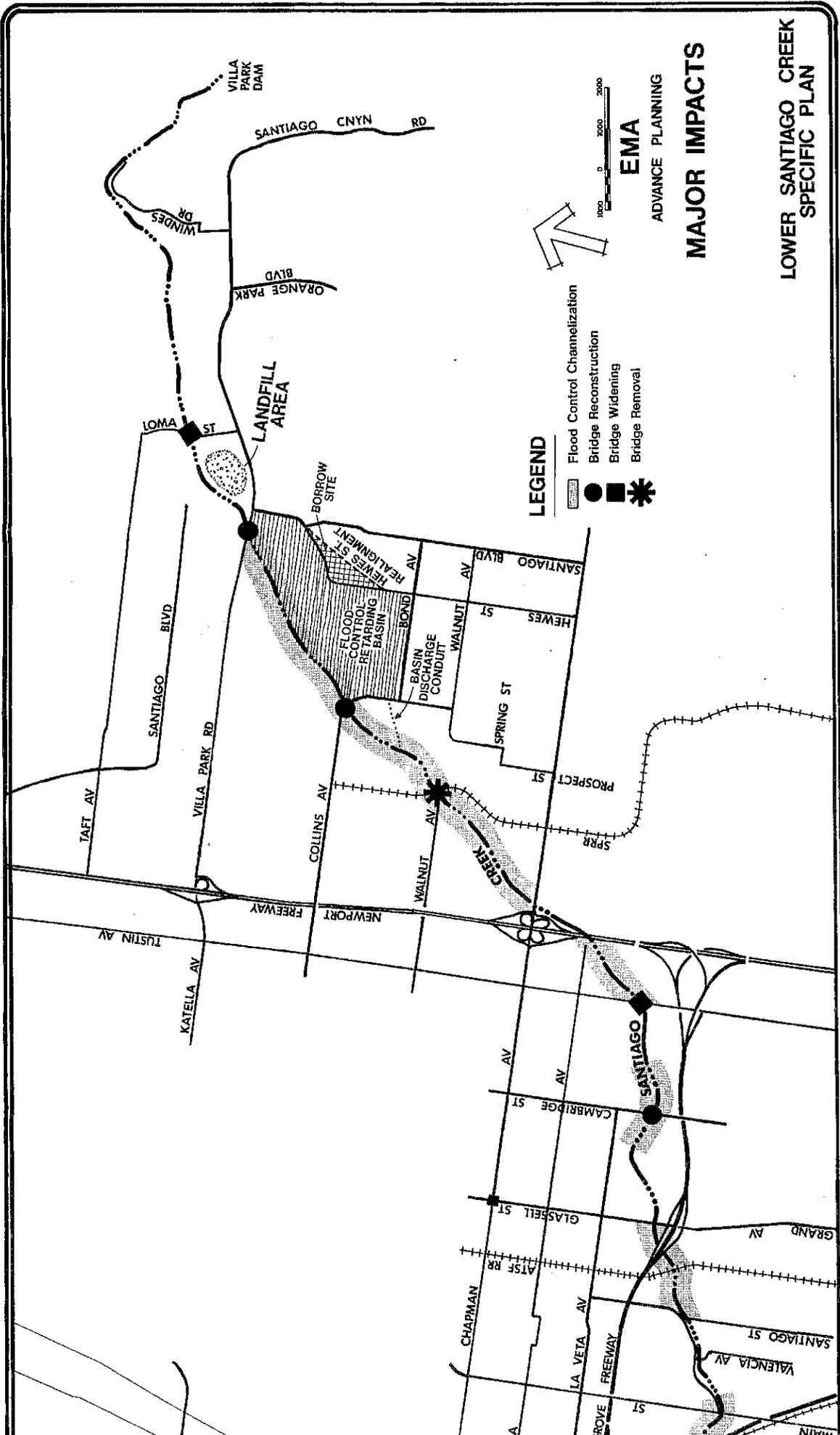
B. Impacts.

1. Landform. The construction of flood control, recreation, road, and solid waste disposal facilities will result in significant impact to existing



REACH I REACH II REACH III REACH IV REACH V Exhibit A





landform. Table 1 compares the earthwork quantities "suggested plan" to each alternative proposed in the Project Report.

- a. **Flood Control Facilities.** Of the facilities proposed, the flood control retarding basin will require the largest quantity of earthwork. Approximately, 5,626,000 cubic yards of earth will be moved to provide adequate slope stabilization. Existing slopes are less than 1:1; proposed slopes will be at 3:1. Perhaps the most significant impact resulting from this project is the excavation required for fill material. Approximately 5,626,000 cubic yards of earth will be removed from the proposed park site near Hewes Street and Bond Ave.

Proposed flood control channel improvements will impact existing landform in Reaches 1, 2, and portion of 3 and 4. These "improvements" consist of channel reshaping and relining with concrete materials (Refer to Table 1 for specific earthwork quantities). Exhibits 12a through 12d of the Project Report indicate where channel work will occur, and reflects existing and proposed landform. Note that in some areas along the creek, the channel will be shifted to allow sufficient right-of-way width for trails. As indicated for Reach 1, the entire channel will be modified from a trapezoidal, earthen wall and bottom to a concrete vertical wall channel. Figure C is a recent photograph of selected points along Reach 1 which depict existing and proposed channel conditions (Note: the "after" photos are intended for conceptual use only, and are not to be considered exact or true-to-scale).

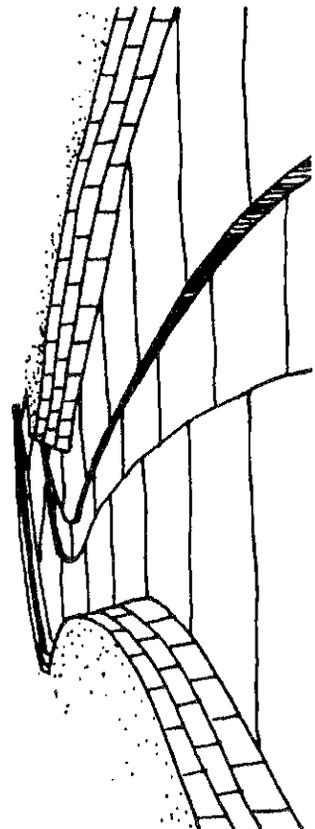
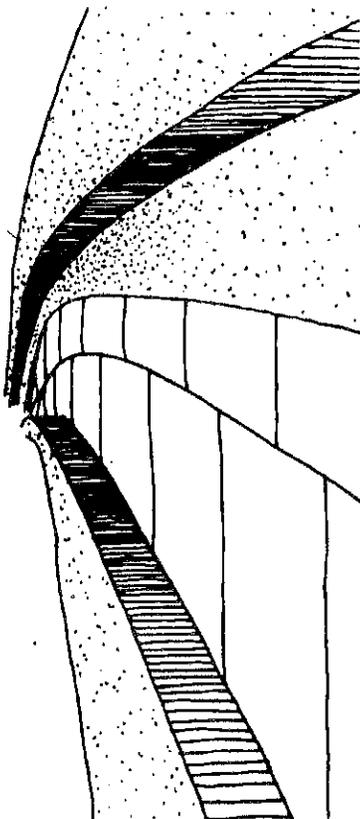
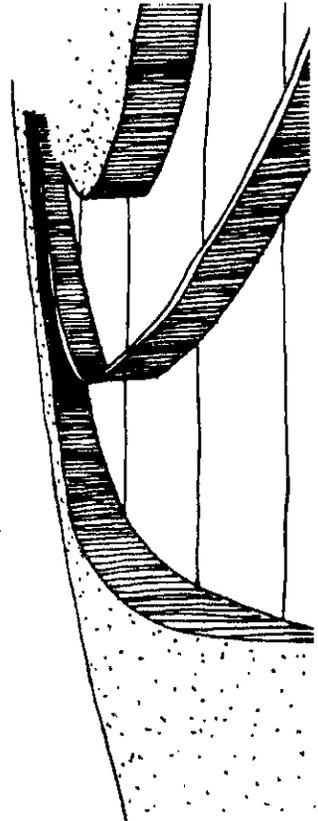
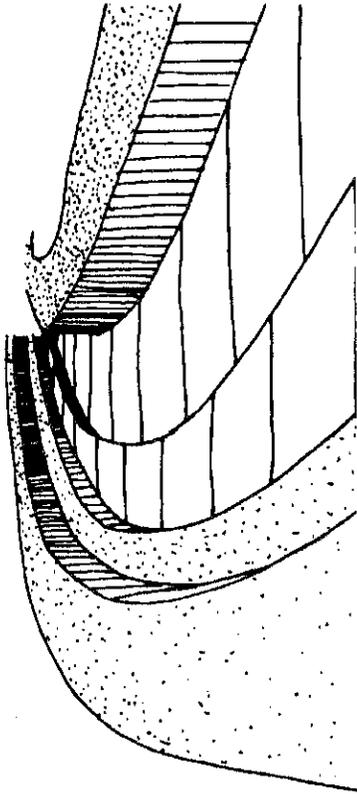
Except for a portion of the channel just upstream from Main Street, all remaining channel improvements will conform to a basic trapezoidal shape. Various wall textures (i.e., step, rock, grass slopes) are proposed, and channel bottom will vary from concrete to earthen lined.

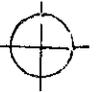
In Reach 4 a concrete, rectangular by-pass channel is proposed along the northwesterly side of the retarding basin. Also, excavation is proposed for the installation of a 1200' retarding basin discharge conduit.

In Reach 5 minimal flood protective facilities are required. As shown on exhibit 12e of the Project Report, some rock slope protection is required.

- b. **Recreation.** Landform alteration will also result from bicycle/equestrian trails and regional park facilities. In the lower reaches, trails will be located within and adjacent to "improved" channel facilities. In these areas, most landform modification will result during the channel construction phase; however, in areas where channel improvements are not required, trail construction will have direct impact to landform.

Development of Lower Santiago Creek Regional Park will impact existing landform. Intensive recreation facilities (i.e., tennis

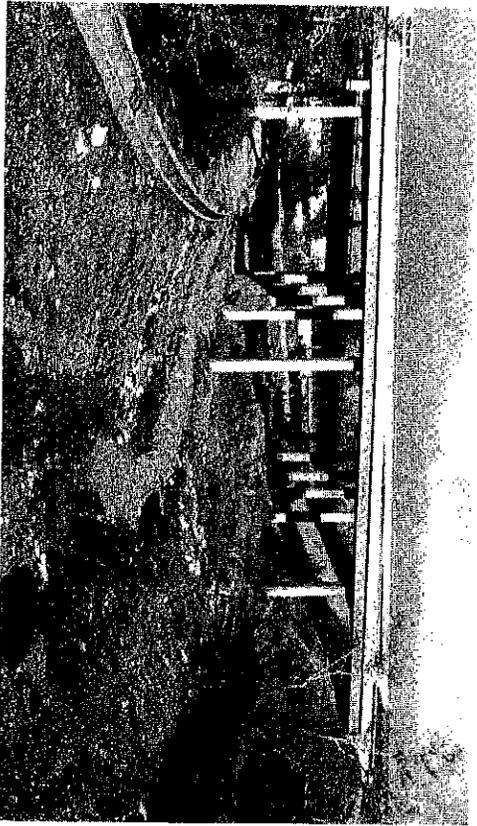




Looking upstream from Bristol Street toward Flower Street, this photo/overlay represents the proposed concrete lined channel with bicycle/equestrian trails on benched terraces.



Looking downstream from Flower Street bridge, the photo/overlay shows the grade separation between bicycle and equestrian trails, and low-flow water area.



This photo/overlay shows improvements to channel bottom (concrete); stepped side walls, and trail locations outside channel limits, near Garden Grove Freeway.



This photo/overlay is looking upstream from Main Street. The proposed channel consists of two conduits, which is designed to minimize potential erosion on outer bend area of the channel.



NOTE: The photo/overlays are intended to provide a general representation of existing and proposed channel conditions. They are not to be considered fact or true to scale.

EARTHWORK QUANTITIES

PROJECT	REACH I		REACH II		REACH III		REACH IV		REACH V	
	CUT	FILL	CUT	FILL	CUT	FILL	CUT	FILL	CUT	FILL
ALTERNATE A	76,400		66,450		354,150		5,989,750		11,125	
(SUGGESTED PLAN"	97,600		59,975		190,025		6,564,200		73,400	
ALTERNATE B	170,000		122,825		157,000		5,855,150		11,125	
(Project Flood)	57,000		47,900		375,450		7,456,200		73,400	
ALTERNATE B	72,500		34,875		273,200		5,735,150		11,125	
(Reduced Flow)	106,250		73,800		423,950		7,527,250		73,400	
ALTERNATE C	288,500		74,300		739,200		5,990,550		11,125	
(Project Flood)	78,100		137,025		189,150		7,471,925		73,400	
ALTERNATE C	101,200		50,100		554,200		5,890,650		11,125	
(Reduced Flow)	90,700		65,900		234,150		6,564,325		73,400	

* Figures are in Cubic Yards

** These figures represent approximate calculations of the total earthwork required for each Reach.

courts, football/soccer/baseball, parking, camping areas, etc.) will require site preparation (grading). A "conceptual" park plan is provided in exhibits 10a and 10b of the Project Report; however, specific site development information is not available at this planning level.

During the development process for trails and the regional park, additional environmental analysis will be required.

- c. Roads. Extension of Walnut Ave. and Orange Park Blvd. will require extensive cut and fill material. Approximately 155,650 cubic yards of earth is required for Walnut and 84,525 cubic yards for Orange Park Blvd. some slopes will be in excess of 15 to 20 feet, resulting in visual impact.
- d. Inert Landfill. This project proposes to fill an existing sand and gravel pit with approximately 1,800,000 cubic yards of inert material. When completed the surface of the landfill will be benched at 10 foot intervals, providing access for trail use within the channel (exhibit F1, Project Report Appendix F).

C. Mitigation Measures.

1. Landform.

- a. Retarding Basin. To insure that finished grade conditions of the borrow site are suitable for subsequent park implementation, a schematic grading plan shall be submitted to the Parks/Recreation Program (EMA) and Santiago Creek Greenbelt Commission for their review as to consistency with the goals and objectives of the Santiago Creek Greenbelt/Recreation program. It is desired that finished grade be contoured to conform with the intensive recreation facilities proposed at the park and to serve as a visual enhancer of the greenbelt area.
- b. Channel Lining. To enhance areas proposed for concrete lining, it is recommended that a "textured" wall surface be constructed with occasional wall designs in the form of mosaic or paint. Such designs should, of course, be compatible with the surrounding environment.
- c. Recreation. Contoured slopes and appropriate landscaping plans shall be considered when constructing trail, parks, and other facilities associated with recreational use.
- d. Roads. Fill slopes required to cross the creek should not be steeper than 4:1. Also, these slopes should be contoured and extensively landscaped.
- e. Inert Landfill. Prior to landfill operations, a grading plan shall be submitted to the EMA (Parks/Recreation), Santiago Creek Greenbelt Commission, and the Planning Commission for their review and comment as to conformance with the greenbelt/park corridor concept. In any case, the grading plan shall contain proposals to lessen visual impact through contoured benching and extensive landscaping.

3.3 HYDROLOGY (SURFACE AND SUBSURFACE) AND WATER QUALITY.

A. Existing Conditions.

Santiago Creek has its headwaters in the Santa Ana Mountains. It flows northwestward through Santiago Canyon and then southwestward through the Cities of Orange and Santa Ana into the Santa Ana River. Elevations range from 110 feet at the confluence with the Santa Ana River to 500 feet at the Villa Park Dam. Average stream gradient is 50 feet per mile, and drainage area is 102 square miles. There are no known significant aquifers or recharge sites within the Lower Santiago Creek Watershed area. There are a few fresh water pond areas. In Reach 5, ponding results from the Carpenter-Serrano submerged dam, resulting in significant riparian vegetation. Other ponded areas occur in the sand and gravel areas as the result of washwater activities. Due to intense urbanized development, particularly in Reaches 1, 2 and portions of 3 adjacent to the creek, storm intensities greater than 30 year storm will overflow the existing channel. Exhibit A indicates inundation areas as a result of the Standard Project Flood (Frequency of occurrence: once every 250+ years). Note: Floodplain limits in Reach 1 extend to a larger area than shown. Between the Santa Ana River and Bristol Street, the floodplain is greater both northerly and southerly of the creek.

B. Impacts.

1. The most significant impact on surface hydrology will result from proposed flood control facilities which will reduce inundation areas during most storm occurrences (including Standard Project Flood). This is considered a positive impact. Otherwise, there will be little or no impact to surface hydrology.
2. The consideration of utilizing the sand and gravel extraction area between Collins Ave-Prospect Street and Villa Park Avenue as groundwater recharge area will alter subsurface water flows. This use will increase the groundwater table within the immediate area significantly, resulting in a positive impact. The proposed inert landfill upstream could impact the water quality of this recharge system.
3. Development of Lower Santiago Creek Regional Park, particularly the wilderness area (Blome-Rinker, exhibit F), may impact the water quality of the ponded areas and eventually associated vegetation and wildlife habitats. Primary impact will result from potential overuse as access to the area is not controlled. The wilderness park concept, however, will provide beneficial impact as birds and other wildlife will be sanctioned from development encroachment.

C. Mitigation Measures.

1. Prior to project implementation of the proposed inert landfill and groundwater recharge basin, a detailed geologic and soils analysis must be performed to determine the viability of these uses and potential impacts of each use to the other.

2. To minimize the potential of water quality degradation (and vegetation/wildlife destruction), a controlled access program must be instituted for the wilderness area (Blome-Rinker). Two possible means of access control are offered: vehicular access through gate control, and user access through use of a "permit system". Implementation of the controlled vehicular access system could be effected by the acquisition of the Anna E. Smith parcel (Life Estate purchase), see exhibit 13e of the project report. This acquisition would provide the County with single ownership of the Blome-Rinker area facilitating a controlled gate access mechanism.

Also, the parcel would provide an excellent area for off-street parking facilities which are strongly needed in this area. It is recommended that the County pursue this possibility at least on a long term basis.

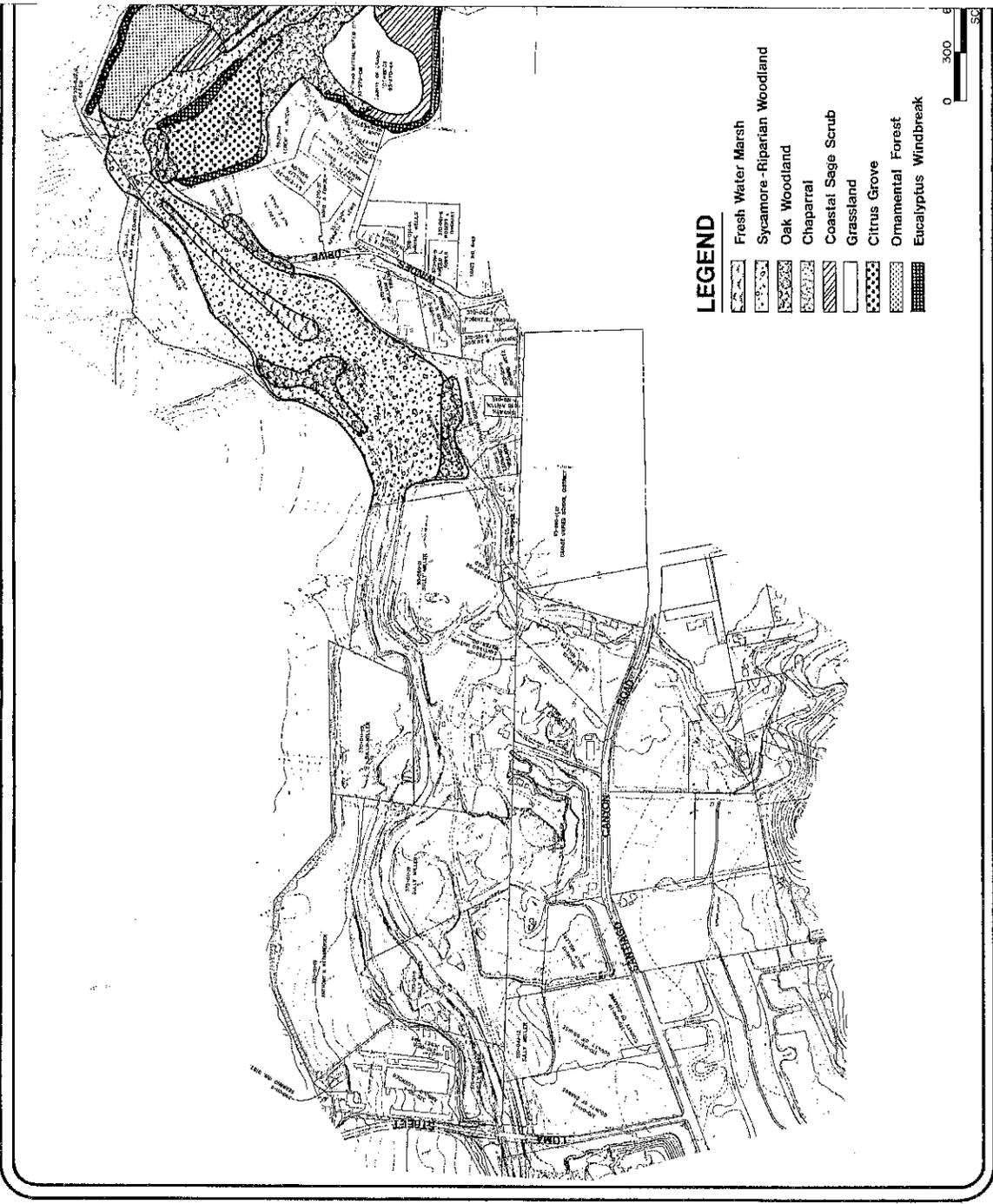
3.4 VEGETATION AND WILDLIFE

A. Existing Conditions.

1. Vegetation. As shown on exhibit A, the study area is geographically divided as to vegetation and wildlife significance. The lower reaches (1, 2, and 3) primarily contain ornamental landscaping trees (eucalyptus, pepper, poplar, various pines) occurring on creek banks and "hanging over" from rear yard residences. In areas where water ponding occurs, some species associated with riparian vegetation (i.e., arroyo willow, anise, mulefat) exist. In Reach 2, extensive landscape vegetation (eucalyptus, pepper trees) exists within Santiago Creek Park. In Reaches 3 and 4, sporadic water ponding has caused the development of a woodland riparian, vegetative community. Also, washwater from sand and gravel mining operations has developed numerous clusters of bamboo, attracting ducks and other birds.

In Reach 5, and portions of 4, vegetative and wildlife habitats are quite diverse and well developed. Exhibit D relates the type and location of the various vegetative communities in this area. As shown, significant Sycamore-Riparian Woodland, Oak Woodland, Chaparral, Coastal Sage Scrub, and Ornamental Forest exist in this area.

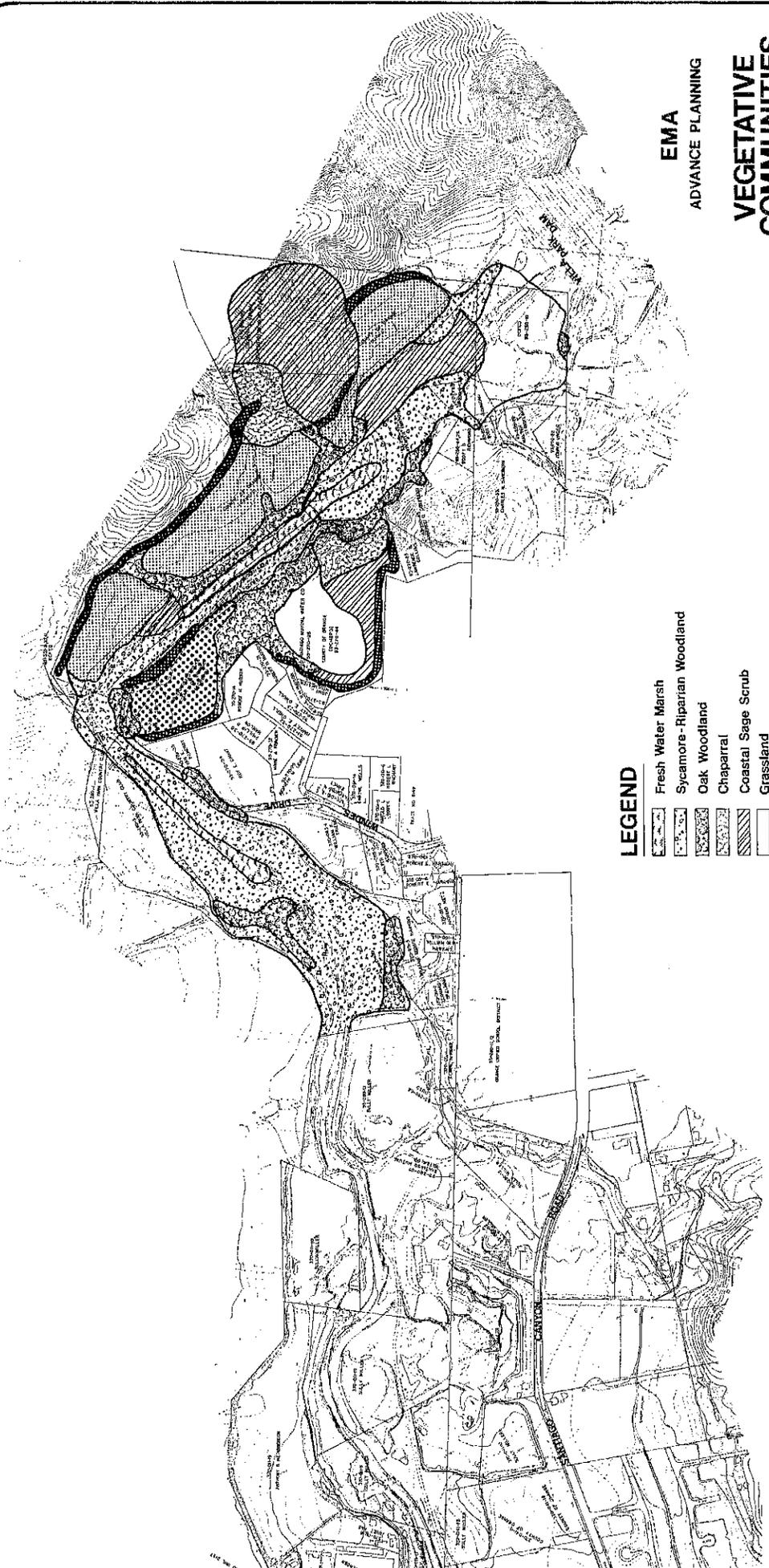
2. Wildlife. In the lower Reaches (1, 2, 3, portions of 4), wildlife constituency is limited to birds, rodents, and domesticated dogs and cats. However, in reach 5 the abundance and diversity of wildlife changes dramatically.
 - a. Fauna. In Reach 5 (Blome-Rinker) over 120 different species of birds have been observed during the Sea and Sage Audubon census (ongoing since 1970). As a consequence, the Audubon Society has stated that the Blome-Rinker area is the finest bird observation site in Orange County. Some birds observed are: White Kites, Great Blue Herrons (protected status), Red Tail Hawk, Red Shoulder Hawk, and Marsh Hawk (protected status). As a result of nearby urbanization, the population of Starlings is increasing in the area.



LEGEND

-  Fresh Water Marsh
-  Sycamore-Riparian Woodland
-  Oak Woodland
-  Chaparral
-  Coastal Sage Scrub
-  Grassland
-  Citrus Grove
-  Ornamental Forest
-  Eucalyptus Windbreak

0 300 600

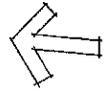


LEGEND

-  Fresh Water Marsh
-  Sycamore-Riparian Woodland
-  Oak Woodland
-  Chaparral
-  Coastal Sage Scrub
-  Grassland
-  Citrus Grove
-  Ornamental Forest
-  Eucalyptus Windbreak

EMA
ADVANCE PLANNING

**VEGETATIVE
COMMUNITIES
BLOME-RINKER AREA
LOWER SANTIAGO CREEK
SPECIFIC PLAN**



b. Mammals, Reptiles, Amphibians and Fish. Due to the rugged terrain of the upper reaches, mobility for larger mammals is restricted. As such, victims by moles, voles, cottontails, bay fox, and bobcats are very rare. Due to the increase in domesticated pet (dog, cat) populations, the numbers of reptiles (primarily snakes and lizards) has drastically decreased. The amphibian group abound in great diversity and quantity in the marsh/pond habitat. The overabundance of surface water in the Blome-Binker area supports populations of Catfish, Bass, and Crappie.

B. Impacts.

Areas requiring channel/trail excavation will result in impact to existing vegetation. In Rasthies 1 and 2, oaks/yclops woodrows on existing creek banks are susceptible to destruction. In areas where the channel bottom will be paved impact will result to vegetation on a permanent basis. Development of the regional park, levee landfill, and roads may impact some vegetation; however, where specific plans are not available at this time, extent of impact is not known.

In the wilderness area of the regional park (Blome-Binker), sensitive vegetative communities (Sycamore-Riparian Woodland, freshwater marsh areas) and wildlife habitats are susceptible to impact. The presence of these habitats are, in part, due to the absence of human activity. Thus, the proposal to attract hikers, picnickers, nature observers, etc., to the area may be detrimental to the existence of these sensitive habitats. Certainly, the lack of controlled access renders the area vulnerable to "overuse" and consequently, deterioration of the environment. Particularly susceptible to impact are the riparian vegetative communities and the amphibian wildlife group within the freshwater ponds.

C. Mitigation Measures.

1. Those areas requiring removal of vegetation for channel/trail/park/road construction shall be replanted with a landscaping scheme consistent with the Santa Ana River/Santiago Creek Greenbelt Landscaping Guide. Additionally, a landscaping plan shall be prepared and submitted to DWA, Parks/Recreation, Santiago Creek Greenbelt Commission, EMA - Current Planning/Site Plan Review for their review and comment as to conformity with the Santiago Creek Greenbelt Corridor concept.
2. To minimize the vulnerability of impact to the sensitive vegetative/wildlife habitat in the Blome-Binker area, access control is required. Refer to Land Use Section for description of this mitigation measure.

3.5 AIR QUALITY

A. Existing Conditions.

The air quality of this area of Orange County is monitored by the Southern California Air Pollution Control District's Anaheim station. During 1975, California State standards for ozone (0.10 ppm) were exceeded for 8 months and six days, and Federal Standards (0.08 ppm) were exceeded for 6 months and 10 days. Thus, the level required to protect public health with an adequate margin of safety was exceeded during at least half of the year, 1975.

In terms of air pollution sources for the study area, the primary sources are from automobile emissions and sand and gravel mining operations. Although most of the auto emissions occur within Reaches 1, 2, and 3, daily land/water breezes disperse pollutants throughout the study area.

B. Impacts.

Short term air pollution impacts will result from construction activities associated with flood control channel "improvements", entering levee, roads, and parks/trails. Heavy equipment and haul truck emissions will generate most of the pollutants.

Longer term impacts will result from regional park users (auto emissions) and activities associated with the inert landfill operations. Estimated park user figures have not been calculated for this project; therefore, specific traffic generation figures are not available for air quality consideration. However, due to the park's size (400+ acres) and assuming the provision of recreational activities normally associated with regional parks (tennis, baseball, soccer, football, picnicking, etc.) park usage will be high and therefore, auto trips will be significant enough to affect air quality.

An specific project planning occurs subsequent to this Specific Plan, detailed information will be available for an in depth analysis of air quality (and other environmental concerns).

A positive impact will result from the provision of bicycle/amenity trails. Hopefully, this facility will stimulate not only recreational use but an alternate source of transportation to the internal combustion engine.

C. Mitigation Measures.

None.

3.6 CULTURAL RESOURCES

A. Palaeontological Resources.

1. Archaeological Resources. A records search and field survey was conducted for the study area in April/May, 1976 by Christopher E. Dreyer, archaeologist. Refer to Appendix A for a copy of Mr. Dreyer's archaeological assessment.

Two registered sites have been recorded within the study area, ORA-89 and ORA-359. Both sites are located on the westerly side of the creek, within Reaches 4 and 5. Field investigations revealed that ORA-89 was destroyed by the construction of an apartment complex. ORA-359 still exists; however, on site investigations disclosed only sporadic shell fragments spread over an area of 100 x 300 meters.

2. Palaeontological Resources. A records search and field survey was conducted by Environmental Impact Profiles, Rodney S. Reschke, Geologist/Palaeontologist in March, 1976. See Appendix B, for a copy of Mr. Reschke's palaeontological assessment.

There are no registered sites within the study area and no evidence of fossiliferous materials were observed during the field survey. However, in Reach 1 a potential fossil bearing bedrock unit, Vacucon-Sage Formation is exposed. Fossiliferous bones have been collected from this rock unit in the Houshaka Canyon area. Therefore, it is possible that some paleontological resources may exist in the Reach 3 area.

D. Impact.

1. **Archaeology.** If grading is required for site preparation, registered site OIA-269 may be impacted from uses proposed by this Specific Plan. As shown on exhibit 10 of the Project Report, "limited parking and playground" facilities are proposed. This land use appears compatible with the archaeological resources as long as site preparation (grading) is minimal. Also, unknown sites may be impacted as a result of excavation required for flood control, roads, and park/crill facilities.
2. **Paleontology.** Although no paleontological resources were reported, potential impact may result from grading/construction activities to unknown resources, especially those areas indicated on the geology map (exhibit A) as containing Vacucon-Sage bedrock formations.

C. Mitigation Measures.

1. A qualified archaeologist shall be contracted to perform a subsurface test of registered site OIA-269 prior to preparation and ultimate construction of the site for its proposed use. Said archaeologist shall report any findings to the LRA, Environmental Services Division for disposition procedures.
2. If any grading is proposed within the geologic Vacucon-Sage Formation, a qualified paleontologist shall be contracted to monitor all earthwork activities. If specimens are uncovered, the paleontologist shall contact the project construction inspector, and they shall consult with the CE, Environmental Services Division regarding disposition procedures.

3.7 Aesthetics

A. Wetland Conditions.

As with other environmental factors in the lower Santiago Creek area, the aesthetic quality of the creek varies spatially.

The near reach area in Reach 3 (Blom-Hilker) where topography is mountainous with high banks and steep slopes, abundant vegetation/wildlife habitats, and very little urban development.

In contrast, Reaches 3 and 4 have been severely disturbed by sand and gravel mining operations. Topography has been altered into massive, open pits; vegetation has been destroyed or displaced; and large mining equipment within the creek's floodplain is highly visible to surrounding residential areas and to motorists as far away as the Newport Freeway.

Although urbanization has occurred up to the creek's levee in Reaches 1 and 2, the general aesthetic quality of the creek has been maintained through landscaping efforts and the fact that the channel's structure consists of earthen material (except in some areas where reinforced concrete has been applied for slope protection). Thus, within this highly, urban developed area, the creek provides some respite, visual relief.

B. Impacts.

Implementation of this Specific Plan will create positive and negative impacts. Positive impacts will result from ultimate development of the regional park, including rehabilitation of an abandoned sand and gravel pit to a groundwater recharge basin. When finished, areas in Reaches 3 and 4 will be significantly upgraded through the use of landscaped berms.

Negative impacts will primarily result from proposed flood control, road, and inset landfill facilities.

1. The most noticeable impact will occur in Reaches 1 and 2 where the existing "rural" character of the creek will be altered into a vertical wall concrete channel. (Note: In some areas the vertical wall channel will contain steps for trails, and at other locations the existing channel will be preserved as adjacent park area will be allowed to flood).

Exhibit C is a recent photograph of the creek.

This photo is intended to generally represent a "before/after" comparison of the channel where flood facilities are proposed. (Note: the "after" photos are not exact as true to scale; they are provided for conceptual purposes only.) Vegetation will be removed or trimmed where channelization is expected to occur, deteriorating the visual quality of the area.

2. Where Walnut Avenue and Orange Park Blvd. are proposed to cross the creek, a visual impact will result from proposed 15 to 20 foot high fill slopes.
3. The proposed borrow site (park near Levee and Orange Park Blvd.) for slope stabilization of the retaining basin will result in a visual impact to this area as over 5,000,000 cubic yards of earth will be removed.

C. Mitigation Measures.

1. To minimize visual/aesthetic impact to the lower reaches as a result of flood control channelization proposals, it is recommended that the course of the creek be designed to "meander" as it flows through this highly urbanized area. Additionally, the mitigation measures proposed in Sections 3.2 C(1)(b) and 3.4C(1) and (2) (textured lining wall and landscaped) apply.
2. For mitigation measures proposed to minimize aesthetic impact as a result of road, inset landfill, and borrow site proposals, see Section 3.2C(1)(a), (d) and (e).

3.8 CIRCULATION AND TRAFFIC

A. Existing Conditions.

Due to the large area covered by this project, the circulation system is varied and complex. Three freeways cross over the creek: Santa Ana, Garden Grove, and Newport and numerous, large arterial highways form a grid network over most of the study area (i.e., Bristol, Flower, Main, Grand-Gissanel, Dorris, Prospect, Orange Park Blvd., Santiago Canyon Road, Katella, Chapman, 17th, etc.) Numerous bicycle trails exist on these arterial highways and local streets (Exhibit 3, Project Report). The Southern Pacific Railroad and the Atchafalaya Tunnel and Santa Fe Railroad cross the creek as shown on Exhibit E. This exhibit (Traffic Flow Map) indicates existing Average Daily Traffic (ADT) for the principal arterial highways and freeways which affect the study area. As shown, the study area is highly accessible from the numerous arterial highways and local streets.

The map also shows that the circulation system is carrying a great number of vehicle trips per day and, of course, that quantity will increase as the County continues to develop. Refer to the Alternative Proposal Section of the Project Report for a discussion of "Northwest Orange County Circulation Study".

Most of the existing traffic flow occurs westerly of the Newport Freeway (Reaches 1, 2, and a portion of 3), while the easterly area (Reaches 4 and 5) has low to moderate traffic flow.

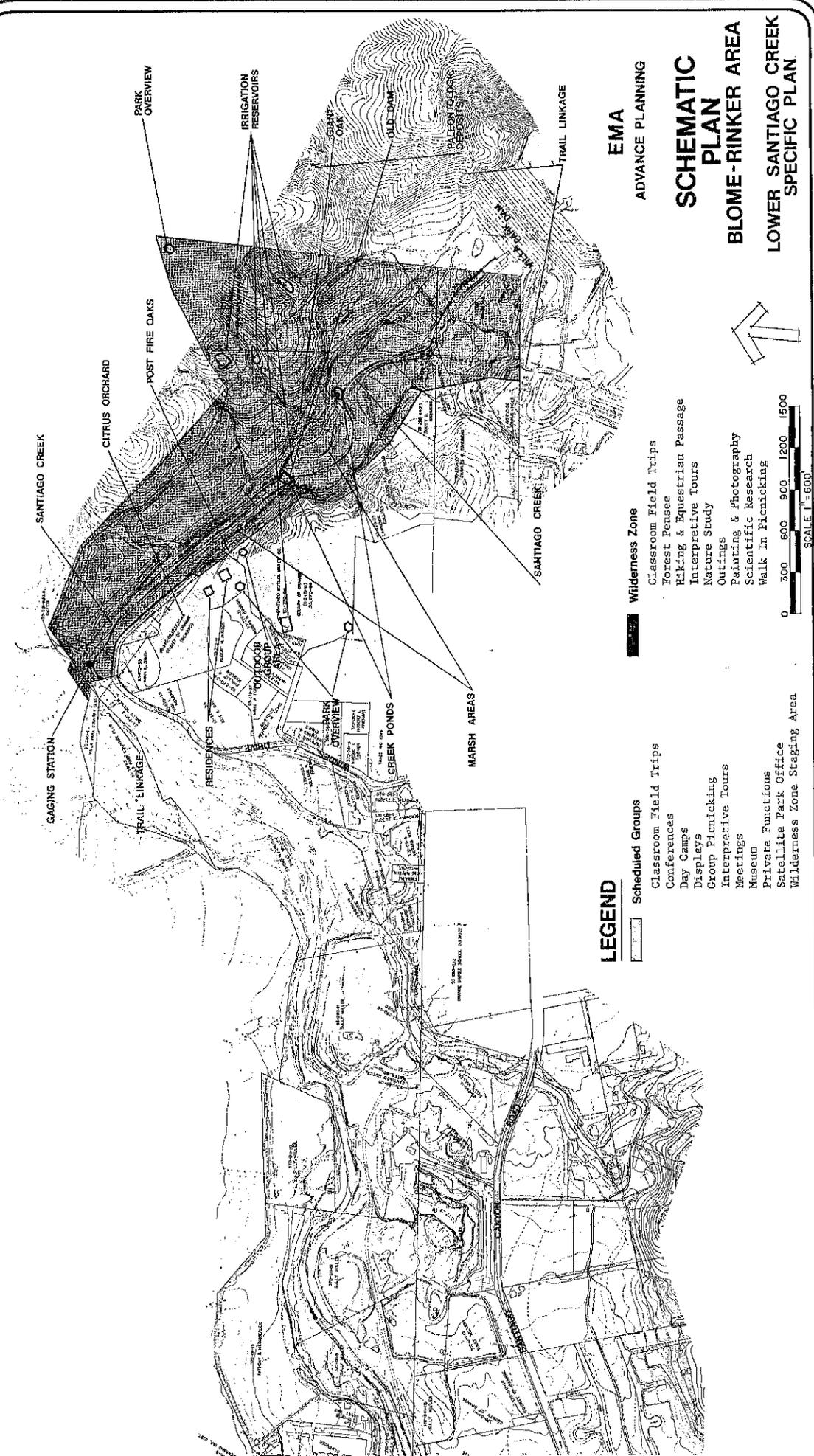
In Reach 5, circulation is limited to Windsor Drive, Santiago Canyon Road, and Orange Park Blvd. Windsor Drive is the only public access facility to the proposed Wilderness Area (Blinn-Winkler) of Lower Santiago Creek Regional Park. It is also proposed to serve as parking for this wilderness area.

Approximately 21 highways cross the creek, of which 4 bridges will be widened or replaced in conjunction with the proposed flood control facilities (Exhibit D). A high potential exists in Reaches 3, 4, and 5 for park parking facilities, while there is an absence of parking space in Reaches 1 and 2.

B. Impacts.

Specific planning data for Lower Santiago Creek Regional Park has not been generated at this time; thus, projected traffic information is not available regarding impact to existing highways.

1. Widening and/or reconstruction of six bridges may result in traffic congestion to existing highways.
2. The dual function of Windsor Drive (access and parking to the Blinn-Winkler wilderness area) will result in congestion to the facility and nuisance to nearby residences.
3. The lack of parking facilities for trail staging in Reaches 1 and 2 may impact local residential streets.

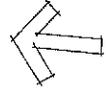


LEGEND

- Scheduled Groups**
- Classroom Field Trips
- Conferences
- Day Camps
- Displays
- Group Picnicking
- Interpretive Tours
- Meetings
- Museum
- Private Functions
- Satellite Park Office
- Wilderness Zone Staging Area

Wilderness Zone

- Classroom Field Trips
- Forest Peasee
- Hiking & Equestrian Passage
- Interpretive Tours
- Nature Study
- Outings
- Painting & Photography
- Scientific Research
- Walk In Picnicking



EMA
ADVANCE PLANNING

SCHEMATIC PLAN

**BLOME-RINKER AREA
LOWER SANTIAGO CREEK
SPECIFIC PLAN**

Exhibit E

4. The relocation and reconstruction of some bridges may result in an adverse aesthetic impact. Some of these bridges are old, rustic, wooden bridges with unique visual characteristics.

C. Mitigation Measures.

1. To minimize probable traffic congestion on Wenden Drive, the proposed mitigation measure in Section 3.11 (C) applies.
2. Bridges requiring reconstruction or widening shall be designed to enhance the "greenbelt/recreation corridor" concept of the Specific Plan. As such, it is recommended that prior to adoption of final bridge design plans, DMG, Recreation Design Division and the Santiago Creek Greenbelt Commission shall review said plans to insure consistency with the greenbelt concept.

3.9 NOISE

A. Existing Conditions.

Generally, noise sources are associated with urban activity, particularly transportation and industrial facilities. Within the study area, traffic intensity is concentrated in Routes 1, 2, and 3, specifically where the creek meets the Santa Ana, Garden Grove and Newport Freeways and the larger arterial highways. Review of the county's Noise Element indicates that noise levels adjacent to these transportation facilities range from 60 to 70 dBA (Community Noise Equivalent Level); however, a "built-in" noise attenuator (the creek in below the highways) reduces these levels, moderately.

In Reach 4 and a portion of 3, sand and gravel mining operations are the other principal source of noise. Although the noise levels in these areas are below 60 dBA, the type of noise is considered "annoyance" to adjacent residential development.

B. Impacts.

Implementation of this Specific Plan will generate additional noise sources and will contribute to expected higher noise levels in the future. The automobile and truck traffic associated with the regional park and forest facilities will add to the high noise levels on existing freeways and arterials, but perhaps the most noticeable noise (to adjacent residents) will be that which is generated from trail users, especially in Reaches 1 and 2. This noise is considered "nuisance" as its decibel level is not comparatively high but is distinguishable from other ambient noise sources.

C. Mitigation Measures.

In those areas of the creek (Reaches 1 and 2) where biking/riding trails will be close to adjacent residences, trails will be located in the creek bottom to help minimize noise levels.

3.10 RELATION TO OTHER PLANS

A. Existing Conditions.

The proposed project affects four political jurisdictions: the cities of

Orange, Santa Ana, Villa Park and the unincorporated County of Orange. Each agency has an adopted general plan which affects the proposed project. In coordination with and approval of these agencies, the Board of Supervisors approved the Lower Santiago Creek Drainage Plan. Essentially, this plan represents the regional goals and objectives of each agency, as the plan's framework emerged from input of each agency. Basic goals of the project are the preservation of the existing natural character of the creek while providing regional recreation facilities and flood control protection.

Elements which affect the project and are common to all agencies are:

- Recreation
- Circulation (South P)
- Open Space
- Conservation
- Erosion
- Land Use
- Housing

Other planning programs which may affect the project are:

1. Northeast Orange County Circulation Study (NEOCCS).

The purpose of this plan is to evaluate existing and future circulation needs for northeastern Orange County and to identify locations and transportation facilities to accommodate these needs. The plan is in the initial data gathering stage. From this data, goals, objectives, guidelines, and alternate circulation networks will be proposed. Therefore, specific interface with this plan and Lower Santiago Creek Specific Plan is not possible at this time; however, general impact concepts can be stated. The entire study area of this Specific Plan, east of the Newport Freeway to with boundary limits of NEOCCS.

2. Orange Park Acres - Specific Plan.

This plan was approved in September, 1973 and covers the future development of approximately 1,794 acres. The boundary limits are bounded by Foothill Hills and Santiago Creek on the north and the Vista Plain on the south. The concept plan delineates a mixture of residential and Open Space uses.

3. Anaheim Hills.

This planned community is located northerly of the study area and delineates a mixture of residential, recreation and open space uses. Although a large portion of the community is currently developed, the easterly area which affects Santiago Creek is undeveloped. If not properly planned and designed, some of the development intensification of this community will impact the scenic wilderness area of Reach 3.

4. East Orange - General Plan.

This plan was approved in December, 1975 and covers over 1900 acres. The plan proposes a mixture of residential, open space, recreation and circulation uses.

8. Impacts.

1. Recreation Element.

Implementation of this specific plan will satisfy those components of the recreation element which affect the project area. Specifically, the plan will ultimately provide: regional and local bicycle-connection trails, satisfying the "Master Plan of Articular Ekeowya", and the "Hiking and Riding Trails" components; "Lower Santiago Creek Regional Park" will satisfy the "Master Plan of Regional Parks."

2. Circulation Element.

Exhibit F is a map of the "Master Plan of Arterial Ekeowya" for the project area. As shown, the extension of Walnut Avenue and Orange Park Boulevard are consistent with this element.

3. Open Space and Conservation Elements.

The proposed plan will implement some of the goals and objectives of the Lower Santiago Creek Eccewchic Plan, and at the same time, impact some of these goals.

In the lower reaches, the goal to preserve existing environmental quality will be impacted by construction of flood control channels, while in other areas environmental quality will be preserved and enhanced.

4. Noise Element.

The impacts to this element will also be both positive and negative. Positive impacts will result from the general goal to restrict the creek's use to open space and recreation. Negative impacts will result from park and trail usage and noise generated by automobile trips to the park. The project will serve to substantiate the "projected" noise levels contained in the Noise Element.

5. Land Use Element.

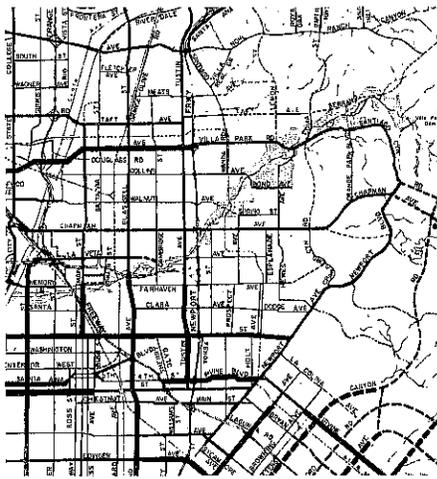
Of the unincorporated territories, the designated use are 5.A "Other Open Space" and 1.41 High Density Residential. This use is consistent with the proposals of the plan.

6. Housing.

The plan calls for no housing use and, therefore, does little to alleviate the general housing shortage in Orange County. However, the plan does provide extensive flood control facilities which will serve to protect existing housing stock and to allow otherwise marginal land utility to be developed with residential use.

C. Mitigation Measures.

Mitigation measures contained in Sections 3.2 C(1)(a), 3.4 C(1) and (2), and 3.7 C(1) apply regarding degradation to Open Space/Conservation Elements.



MASTER PLAN OF ARTERIAL HIGHWAYS



3.11 MUNICIPAL SERVICES AND PUBLIC UTILITIES

A. Existing Conditions.

The proposed project will require police, rescue, and maintenance services and a very slight demand for public utilities. The cities of Orange and Santa Ana will provide police and fire-rescue service for their incorporated area and the Sheriff's and County Fire Department will provide same service for unincorporated areas.

The Southern California Gas Company, Southern California Edison Company, and the Orange County Water District will provide gas, electric and water for the project area.

The Reach 5 area is designated as a "severe fire hazard area."

B. Impact.

Due to the nature of the park (i.e., provide flood and recreational facilities), the only anticipated impact is the additional demand on police and rescue services. Although the project area is under police surveillance now, the additional use to the area will require more frequent checks. Provision of trails (bicycle/equestrian) will undoubtedly increase the number of minor accidents in the area, thus, increasing demand for that service on local fire departments and paramedic squads.

Of the uses proposed in this Specific Plan, those associated with the regional park will require public utilities. Although specific uses for the park have not been finalized, the expected degree of impact on these utilities is not considered significant. More specific reporting will be required during subsequent planning efforts (i.e., conceptual plan approval, construction, etc.)

Implementation of the wilderness park area in Reach 5 will increase the probability of fire occurrence, as additional people will utilize the area.

C. Mitigation Measure.

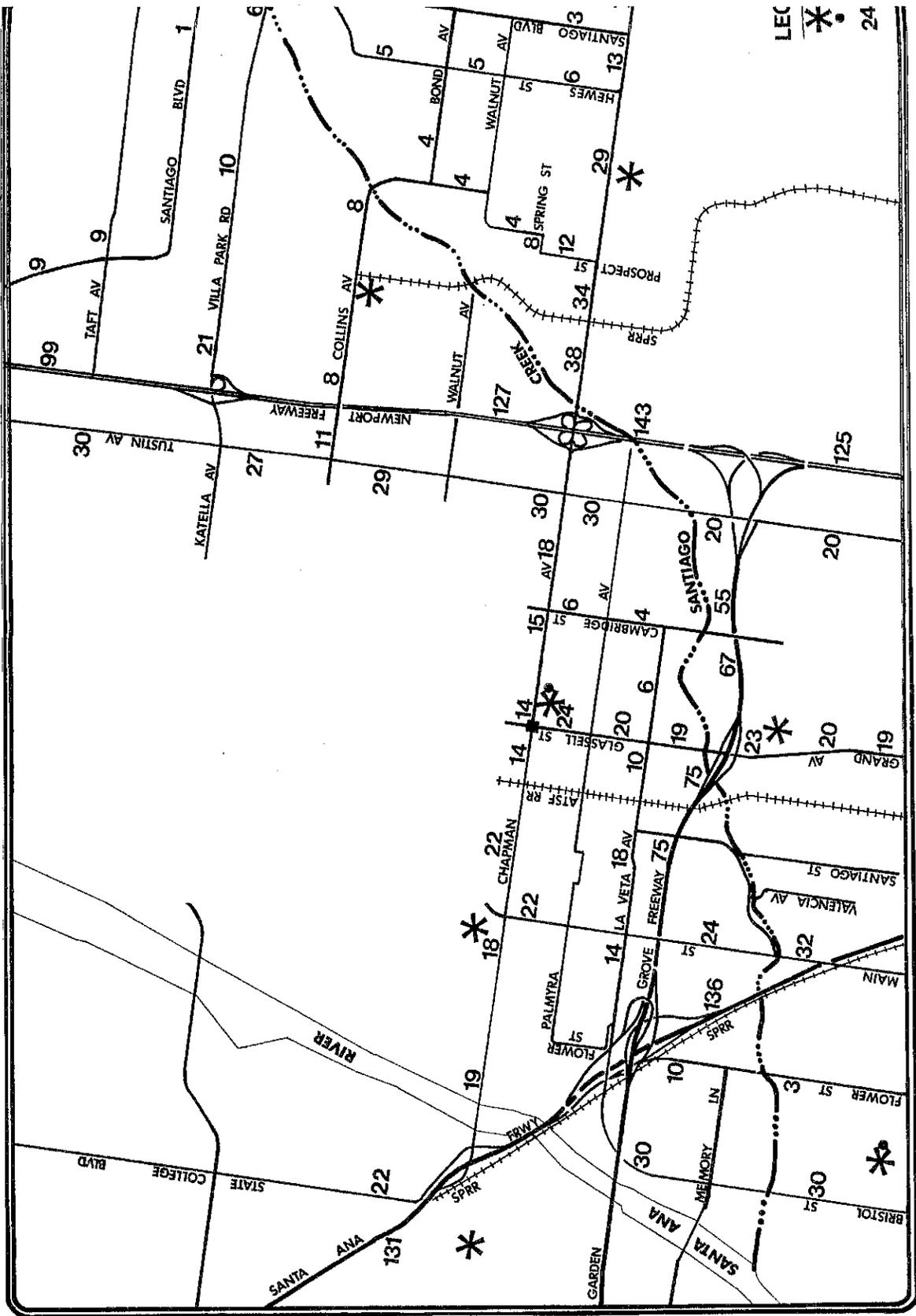
1. To help meet the additional demand for security surveillance, especially in Reach 1, it is recommended that a security patrol officer be contracted to perform routine security checks on a 24 hour basis.
2. The area of Reach 5 will be more vulnerable to fire as more people are introduced into the area. The County is currently installing a new irrigation system to serve the Blom-Hinman area. Fire hydrants will automatically be installed as part of this system.

The County's fire department allows no fires, or smoking during the high risk fire season (summer through fall).

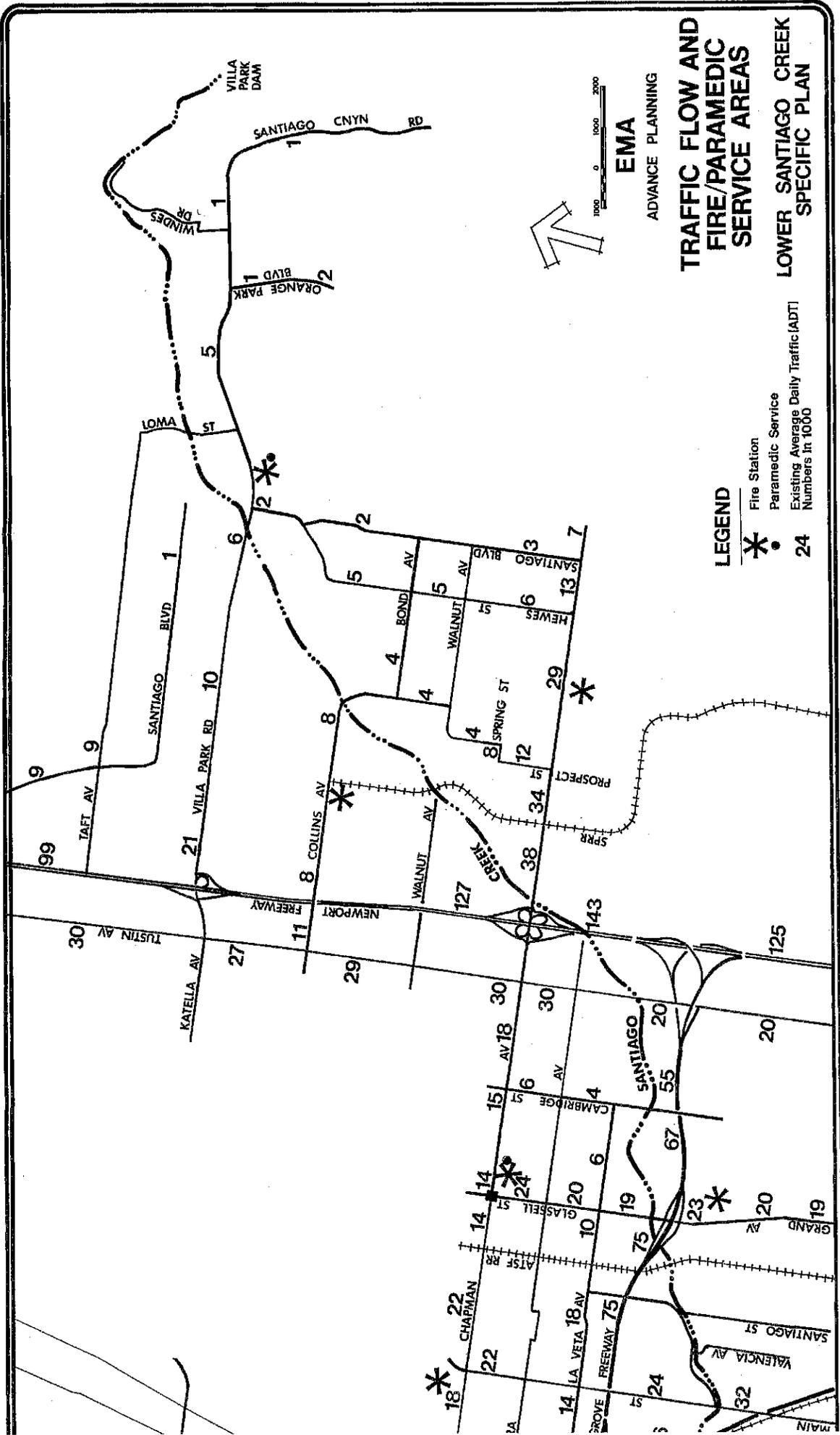
3.12 ENERGY

A. Existing Conditions.

The amount of energy expended is dependent upon the occurrence of large floods



LEC * 24



which require extensive repair and maintenance of any damaged public facility (i.e., roads, channels, sewer mains, etc.) and residential structures. Otherwise, negligible energy consumption occurs within the project area.

B. Impacts.

1. The initial construction of flood control, road, and park/trail facilities will require great amounts of energy. Additionally, subsequent maintainancing of these facilities will require some energy consumption.
2. Vehicle trips generated by this project will require the consumption of fossil fuels.
3. Lighting facilities required along the trail corridor will require the use of electrical energy.
4. Flood control facilities will mitigate the energy needed to replace and/or repair areas once vulnerable to flood damage.

C. Mitigation Measures.

The lighting facilities required along the trail corridor should be equipped with low wattage bulbs to minimize electrical usage.

4.0 UNAVOIDABLE ADVERSE IMPACTS

4.1 LANDFORM

Except for the "No Project" alternate, all other alternatives will result in a significant, unavoidable, adverse impact to existing landform.

4.2 AIR QUALITY

The project will cause short-term and long-term impact to air quality - unavoidable.

4.3 VEGETATION AND WILDLIFE

Those areas requiring channelization and other landform modification proposals will unavoidably remove vegetation and displace existing wildlife habitats.

4.4 NOISE

Noise levels will increase as a result of trail-park usage and from automobile trips generated by the project.

4.5 LAND USE

The project will increase the potential for residential vandalism in areas where the creek and residences are immediately adjacent to each other. Inert landfill activities will conflict with trail and park users.

4.6 CULTURAL RESOURCES

The project has the potential to destroy or damage unknown archaeological and paleontological sites.

4.7 AESTHETICS

Along reaches 1, 2 and portions of 3, the rustic, aesthetic appearance of the creek will be unavoidably impacted by all alternatives, except "No Project."

5.0 ALTERNATIVES

The project proponent has developed numerous alternatives. A concise description of each is contained in the Appendices C, D and E of the Project Report. These alternatives will be discussed under the following categories: Flood Control, Recreation, and "Other Land Uses."

5.1 FLOOD CONTROL ALTERNATIVES.

These alternates are classified into flood control facilities and channel design alternates.

Each alternate is assessed in the Project Report relative to its ability to provide flood protection for four storm levels. There are four basic flood control proposals: Raise Santiago Dam; Increase Controlled Release from Villa Park Dam; Retarding Basin; and Channelization. These alternates are matrixed on Table D1 of Appendix D in the Project Report, as to their function and level of flood protection. Of these alternates, the "Proposed Project" include all but the raising of Santiago Dam.

5.2 FLOOD CONTROL FACILITIES

A. Raise Santiago Dam.

If the flood control goal of this project is to provide protection from all floods identified in Appendix D of the Project Report, then the provision of this alternate; alone or in combination with any of the others, will not provide desired protection, or it will be too costly without benefit of substantial flood control protection. On the other hand, if the "Local Project Flood" is not considered probable for this area, the alternate to raise Santiago Dam is feasible.

Project Proponent rejected this alternate as it didn't provide for all desired levels of flood protection.

B. Channelization.

This alternate will provide a channel size large enough to accommodate all levels of desired flood protection without upstream "reduced flow" measures. (NOTE: All other alternates assume construction of a channel downstream of Prospect St. to carry at least 10,500 cubic feet per second.)

Project proponent rejected this alternate as it would result in significant impact to landform and aesthetics.

C. No Project.

This alternate would mitigate all impacts associated with the "proposed project"; however, the beneficial impact of flood protection would be totally sacrificed.

5.3 CHANNEL DESIGNS

Appendix E of the Project Report indicates possible channel designs. As shown,

these alternates range from "No Channel Improvements" to "Submerged Double Barrel Conduits." Also provided is a cost (\$) figure for each alternate. Alternate 1-B is the "proposed" design.

A. Alternate 1-BB.

This design provides trail location in the creek's channel. The primary benefit of this design is it minimizes intrusion of privacy to adjacent residents.

Project Proponent rejected this alternate due to the additional \$1.5 million cost.

B. Alternate 1-C.

This alternate covers the channel (double barrel box) with earthen materials. The primary benefits are: minimizes aesthetic and visual degradation and provision of more usable space (cover). A possible drawback is the covered surface may attract more users thereby increasing impact to privacy.

Project proponent rejected this alternate as it would add \$4.1 million to the total cost.

C. Alternate 1-D.

This alternate widens the existing channel to accommodate desired flood protection, and lines the sidewalk and bottom with rocks and earthen material. Primary benefit is it provides a "natural" channel to accommodate desired flood levels without significantly impacting the creek's rustic aesthetic character.

Project Proponent rejected this alternate as 57 homes would be removed.

D. The only other channel design not proposed in the project is the terraced channel. The benefit this design provides is it deviates from the straight sidewall to stepped walk. To some this is a more aesthetic design.

Project proponent rejected this alternate as it would increase the cost by \$1.6 million.

E. No Project.

As mentioned, this project will mitigate those impacts associated with the proposed project; however, the project proponent rejected this alternate as it provides no additional flood protection.

5.4 RECREATIONAL TRAIL ALTERNATIVES

There are two areas along the corridor where trail location in the creek presents land use problems, Reach 1 and Santiago Golf Course. In Reach 1, the creek width is very narrow and residential development exists immediately adjacent to the levees; therefore, intrusion of privacy and vandalism of residences are potential problems. The Santiago Golf Course is designed to maximize all available space;

therefore, provision of trails in this area creates conflict between the uses. The "suggested plan" proposes to avoid the golf course via freeway right-of-way easements and local streets; however, in Reach 1 the trails are proposed within the creek.

The plan does investigate an alternative location in Reach 1 (Memory Lane); however, as pointed out in the Project Report, the Memory Lane route would preclude equestrian use.

Therefore, it appears that a viable alternative is not possible if bicycle and equestrian trails are desired. The mitigation measures proposed in Section 3.1C appear adequate to allow trail locations within the creek.

No Project.

This alternate would mitigate those impacts to the existing residences; however, it would, in turn, impact the goals and objectives of the Santiago Creek Greenbelt Plan and the County's Recreational Element to provide bicycle/equestrian trails as a regional corridor to link the Santa Ana River to the Santa Ana Mountains.

5.5 OTHER LAND USES

The "suggested plan" proposes an "inert landfill" in the Smith Pit and Hurwitz-Buchheim Pit near Santiago Canyon Road and Santiago Boulevard. As previously noted, this use will present land use conflict with surrounding residential use and the greenbelt concept plan; therefore, Appendix F in the Project Report discusses the alternative of utilizing the area for a "Groundwater Recharge Basin." The Orange County Water District was contacted regarding this proposal, and their response indicated a preference to use the Bond Street Pit for this use.

No Project.

This alternate will mitigate those impacts associated with the inert landfill use. However, the site is within the planning area boundary of future "Lower Santiago Creek Regional Park," and to be a functional part of the park, the site's landform needs to be modified (filled in). Therefore, the landfill is one means of accomplishing this task, and without it (or some other means) the site would not be prepared for this ultimate recreational use.

The "Lower Santiago Creek Regional Park" is still in the early planning stages. Decisions haven't been made as to specific uses for the park.

THE RELATIONSHIP BETWEEN LOCAL SHORT TERM
USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE
AND ENHANCEMENT OF LONG TERM PRODUCTIVITY

The current use of the study area includes passive open space, local recreation, sand and gravel extraction, and watershed drainage. In the upper reaches, highly developed vegetative-wildlife habitats and scenic vistas provide unique land use opportunities for the area.

If the proposed Specific Plan is implemented, it will create short term and long term impacts on a local and regional level. Short term impacts, associated with construction of flood control, recreation/trail and road facilities will affect surrounding land use, especially adjacent residences, as well as the scenic quality and the flora and fauna of the creek. Most of these short term impacts are temporary and, to some degree, can be mitigated.

The long term effects of the proposed plan are associated with the attraction of the proposed regional park facilities. These facilities will generate park users from a large radius. Precise commuting distance is not known as computation depends on the locations of existing regional parks in the area. However, assuming that all regional parks are developed in the area, the commuting distance will vary from 3 miles to the north and east, to 8 miles to the south. Thus, park commuters will generate vehicle trips (4 persons per car) which in turn degrades existing air quality, noise, and circulation conditions.

The maintenance and enhancement of long term productivity of this project appears to off-set the short term/long term impacts described above. Provision of flood control facilities will not only reduce the risk of damage to property and people within the floodplain, but will also defray costs associated with repair or replacement of public (roads, etc.) and private facilities. In addition to the provision of regional recreation facilities, the proposed regional park will also serve to preserve the existing high quality wildlife-vegetative habitats of Reach 5 (Blome-Rinke area) and other significant areas in Reaches 3 and 4. As a whole, therefore, the project will promote preservation of existing environmental conditions while sacrificing some short-term and long term impacts.

SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL
CHANGES SHOULD THE PROJECT BE IMPLEMENTED

Implementation of this Specific Plan will create the following irreversible environmental changes:

- o Alteration of a semi-natural creek into a concrete lined channel.
- o Where channelization and borrow site activities occur, irreversible landform alteration and elimination of vegetation-wildlife habitats will result.
- o Commitment of the County and affected cities to specific land uses (i.e., parks, trails, inert landfill).
- o Attraction of people, and thus automobiles, will contribute to the deteriorating air quality of the County.
- o Potential for vandalism and intrusion on privacy will increase along the creek in Reach 1.
- o Increase in public services and consumption of energy to construct will result.

8.0 GROWTH INDUCING IMPACTS

Implementation of this Specific Plan will stimulate growth to a modest degree.

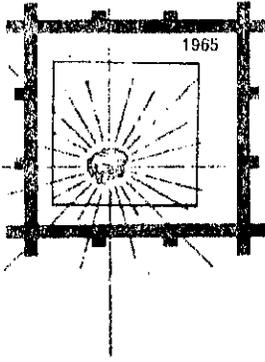
Provision of "Standard Project Flood" level protection will enable parcels to be developed which otherwise would require extensive grading and flood protection facilities. Thus, these parcels are now more "economical" for development. Additionally, an open space-greenbelt corridor with recreation facilities creates a desirable amenity, thus increasing demand for housing in the area and perhaps stimulating service type business to support the general corridor users.

9.0 ORGANIZATIONS AND PERSONS CONSULTED

1. City of Orange
2. City of Santa Ana
3. City of Villa Park
4. Bob Hennessey, Orange County Fire Protection
5. Lt. William T. Weatherly, Police Dept., City of Santa Ana
6. Jim Miller, Hal Reitmeier-EMA/Project Plans
7. Eric Jessen, EMA-Recreation Programs
8. Jim Williams, EMA-Regulations
9. George Britton, EMA-Transportation Plans
10. Wayne Curl, EMA-Drafting Services
11. Marty Kay, Air Pollution Control District
12. Dr. Chris Drover, Archaeologist
13. Rodney Raschke, Paleontologist

APPENDIX "A"

ARCHAEOLOGICAL SURVEY and ANALYSIS



GOLDEN WEST COLLEGE

15744 GOLDEN WEST STREET • HUNTINGTON BEACH • CALIFORNIA 92647
(714) 892-7711

30 April 1976

Tim Bingham, Planner I
Environmental Management Agency
Environmental Services Division
P.O. Box 4108
Santa Ana, California

Dear Mr. Bingham,

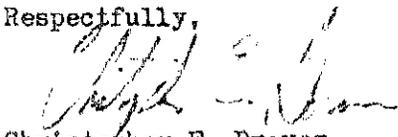
The enclosed is a report resulting from the archaeological reconnaissance of the property encompassed by the Santiago Creek Specific Plan. The area surveyed consisted of the Santiago Creek drainage from Villa Park Dam to its confluence with the Santa River and areas of influence shown on the Santiago Creek Specific Plan Map.

The report is sub-divided into sections which concern, Existing Conditions, Methodology, and Impact Assessment.

Field investigations were not able to produce any incontrovertible evidence of prehistoric occupation within the confines of the adopted plan. The survey indications would not suggest any mitigation procedures other than to require in the grading permit of any planned land alterations that a qualified archaeologist be contacted if archaeological materials were located.

If I can be of any further assistance please do not hesitate to contact me.

Respectfully,


Christopher E. Drover
Archaeologist

RECEIVED
APR 30 1976

ORANGE COUNTY EMA
ENVIRONMENTAL SERVICES
BRANCH

Existing Conditions

The existing physical conditions of the Santiago Creek will be described as they relate to performing an archaeological survey. Specific observations which have a bearing on an area's potential for prehistoric occupation (or recognition of that occupation) will be mentioned. The reference points that will be utilized in this discussion are those areas referred to as "Reaches" on the Santiago Creek Specific Plan Map.

Reach 1--Santa Ana River to Main Street

Reach 1 is the western extent of Santiago Creek at it's confluence with the Santa Ana River. Within this reach of the Specific Plan the Creek is at it's narrowest confines. The Creek, itself, has been totally channelized such that none of the original banks or benches above the banks are observable. Houses immediately adjoin the Creek bank and cobblestones have been retained within wire netting to prevent erosion as the Creek winds through the most urban (developed) part of it's course. The Creek has been reduced to a width of approximately 50 to 100 meters within this area. Physical observation of this area indicates no remaining primary (original) surfaces are left to be visually investigated.

Reach 2--Main Street to Cambridge Street

The second Reach consists of the next ca. 9,000 ft. interval east of Reach 1. The physical characteristics of the Creek within Reach 2 are essentially the same except that the Creek bed is somewhat wider (25-50 m.) and it's bed has been thoroughly channelized (asphalt pavement) in the City Park of Orange. A

small riparian community (fresh water flora and fauna) occurs at the furthest eastern portion of Reach 2 between the City Park and a golf course in the western section of Reach 3. This riparian community shows evidence of being altered by differential drainage and land fill. Although the western section of Reach 2 has banks which are protected by cobblestone netting, the eastern region has unprotected banks. The unprotected banks in the eastern portion of Reach 2 are, however, of secondary deposition (land fill-dumping of waste). Old cars can be seen in several of the banks, an attempt to control the erosion of the floods of 1969. The archaeological potential of Reach 2 was as difficult to assess as Reach 1 as no unaltered surfaces were available for examination. It should be noted, however, that the only artifact recovered during the survey was found in the Creek bed near the Santiago Street crossing (problematical hammerstone--see discussion in cover letter).

Reach 3--Cambridge Street to Southern Pacific Rail Road

Most of Reach 3 is characterized by formal attempts at channelization (cobblestone netting) and is approximately the same width, on the average, as Reach 2. A golf course predominates the western portion of this reach, resulting in extensive landscaping. In the eastern section of Reach 3, those banks which have not been formally channelized consist of secondary land fill (construction and pavement deposition). Once again the observation of primary (original) deposits for evidence of prehistoric occupation or utilization was impossible.

Reach 4--Southern Pacific Rail Road to Loma Street

While Reach 4 is characterized by the least formal channelization,

it is marked by the most landfill of any of the Reaches. The greatest width of the proposed plan occurs within Reach 4, roughly 1 km. in some areas. Although seemingly undisturbed banks and benches of the Creek appear within this Reach, closer inspection indicates they are the result of landfill operations. While the western half of Reach 4 is relatively open with small patches of riparian growth where the water surfaces, the eastern half is heavily impacted due to gravel quarrying. In the eastern section, quarrying activities have not been relegated only to the Creek channel but have incorporated the southern bank so as to extract cobbles from the Pleistocene flood plain. Areas which appear undisturbed (orange groves) on the Specific Plan map have been reduced to gaping cavities, some of which are lower than the water table and collect small lakes in the bottom. Even though this area required more surface survey, it proved as negative as the preceding Reaches.

Reach 5--Loma Street to Villa Park Dam

Reach 5, although heavily impacted by stream erosion and previous agricultural pursuits, represents the least altered stream channel and terraces of any of the previous Reaches. The western half of Reach 5 is heavily impacted due to quarrying activities but the eastern half supports a fairly viable riparian community. After the water in Santiago Creek passes through Villa Park Dam it is forced to the surface by a breccia (conglomerate) bed-rock. Where the water is forced to the surface, an array of freshwater plants (bullrushes) and animals associated with a riparian environment appear. The southern bank of the Creek is non-existent or abruptly grades into Rattlesnake Peak, a breccia

formation roughly 300 ft. higher than the Creek bed. A remnant stream terrace exists on the northern bank of the Creek which has been subject to various agricultural pursuits (orange, pepper and pine tree groves). Although the northern bank of the Creek in the eastern half of Reach 5 provided the most potential area for the recovery of prehistoric data, none was observed.

Methodology

Field work was accomplished in a three-day period by myself and Terry Schuster, a graduate student in Anthropology at California State University at Long Beach. The field strategy slightly differed between that used in Reaches 1,2,3 and that used in Reaches 4,5. Due to the narrowness of the channel in Reaches 1,2,3, two field workers could completely observe all aspects of the channelized Creek. Reaches 4 and 5 being somewhat larger in surface area and having some areas obscured by plant growth required systematic sampling. In Reaches 4 and 5, the Creek bed itself was neglected due to the secondary, erosional aspects of it's deposition while the stream terraces were concentrated upon. Orange groves were sampled on a 50% basis as dense surface grass resulting from having lain fallow obscured the surface and the preparation of such groves for planting greatly reduces the probability of observing intact prehistoric data. Most groves are prepared by sub-soiling (a technique of plowing up to three feet in depth often by a Caterpillar) or actually dynamiting holes for trees if the soil is hard. The existing original land surfaces were inspected in a 100% fashion. Several rock shelters (possible) were examined on

Rattlesnake Peak.

Impact Assessment

No indication of prehistoric occupation were discovered as a result of the survey procedures. One possible hammerstone was recovered in the Creek bed in Reach 3 but it's origins are unknown. While it is difficult to make an absolute judgement as to the authenticity of such a simple artifact found in context in which it could have been naturally manufactured (stream erosion), the material (basalt--uncommon in the surrounding Creek bed) and differential wear suggest human manufacture. Unfortunately the artifact was found out of context and is of no aid in assessing an area of occupation (archaeological site). Although no archaeological sites were located during survey it is felt that a drainage of this nature would have been extremely attractive for prehistoric occupation. The Creek is a source of perennial (year-long) fresh water which would have attracted many animals and the lithic material found in the Creek is highly conducive to stone work. Some of the lithics (rocks) in the stream bed are of igneous origins and not only provide highly suitable raw materials but are relatively rare in Orange County.

Mitigation Measures

As no evidence of prehistoric occupation or use areas were designated as a result of survey, there are no mitigating measures to suggest other than to require in the grading permit of any planned land alterations that a qualified archaeologist be notified if grading operations locate any

questionable archaeological materials. Since many areas have been subjected to land-fill (stream terraces) archaeological sites may very likely remain buried in these deposits.

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SANTA BARBARA • SANTA CRUZ

THE INSTITUTE OF ARCHAEOLOGY
LOS ANGELES, CALIFORNIA 90024

May 10, 1976

Chris Drover
Archaeology
Golden West College
15744 Golden West Street
Huntington Beach, California 92647

Dear Mr. Drover,

This is in reply to your request for archaeological information for the Santiago Creek area from Park Dam (Villa Park) to its junction with the Santa Ana River.

I've sent back your maps to you (taped together), and have shown the locations of two archaeological sites recorded within the areas of concern. These sites are described as follows:

Ora-89: recorded in 1963 by McKinney, 701-705 Mallard St. south of Collins St., one mile east of Hwy 55 on old Adams Orange Grove property; former orange grove now developed apartment units. The following artifacts are described as coming from the site- manos, milling stones, hammers (no shell or chipping waste found). Site was apparently destroyed in 1963 when the apartment houses were constructed. No published references.

Ora-369: recorded in 10/13/72 by Allen Marquette and John Houser, located between Serrano Road and Bluff line, overlooking gravel pit; site described as area of minute shell material and polyhedral core, waste flakes (size 300x300 meters). No mention as to the current status of the site. No published references.

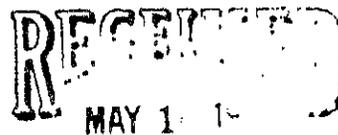
If you have any further questions concerning the area please contact me at the Survey (213-825-7411).

I have enclosed an invoice for the literature and map search.

Sincerely,

Martin D. Rosen
Survey Archaeologist
Archaeological Survey

Enclosures: maps
invoice



OFFICE OF THE CHIEF OF EIA
ENVIRONMENTAL SERVICES
BRANCH

RECEIVED
MAY 17 1976

Archaeological Records Check

The existing archaeological records for Orange County ENVIRONMENTAL SERVICES
checked by University of California Los Angeles Archaeological
Survey office, the District 7 clearinghouse for southern, coastal
California. These records are by no means thought to be comprehensive
as they result from sporadic and sometimes unsystematic surveys.
The records are, however, a means by which previously recorded or
subsequently destroyed archaeological site may be considered.

Two archaeological sites are reported for the project area,
both of which are described in the attached letter from U.C.L.A.
CA-Ora-89 is located on the north bank of Santiago Creek on the
western edge of Reach 4. Since it's recording, the site has been
destroyed by the construction of an apartment building.

CA-Ora-369 a site located on the north bank of Santiago
Creek in the western half of Reach 5 still exists. Ora-369 is
situated on a small bench which protrudes into the Creek bed and
is presently cultivated. On site observation disclosed sporadic
shell (5-6 fragments) spread over a region of 100X300 meters.
Although no lithic material was observed the original survey
report indicates a polyhedral core and several waste flakes were
recovered. The soil has been recently plowed to a depth of two feet
but does not shown any indications of soil discoloration or textural
changes associated with cultural deposition.

A small area located near the Windes Stables was reported
to have archaeological materials in an Eir report done for the
extension of Serrano Road. This site is not recorded with U.C.L.A.
and subsequent visitation has shown no evidence of any archaeological
materials. Since it was not originally given a number and no traces

of it were recorded at U.C.L.A. or by field investigation, it will be assumed that it is a non-entity.

Recommendations

Although CA-Ora-89 is recorded as having been destroyed, it's destruction may not have been total. Development and expansion of European buildings, subways and sewers etc., have been extremely lucrative to our archaeological knowledge. Although further consideration of this site for purposes of greenbelt planning are negligible, future archaeologists may consider investigation at such time that the existing structure is altered or torn down.

CA-Ora-369 is an extremely minimal prehistoric deposit. It is presently difficult to acknowledge it's existence much less use it for interpretive facilities. It is, however suggested that the site be protected from further cultivation if at all possible. As the site is well within the area being considered by the County for greenbelt it's preservation would be well advised. Certainly subsurface archaeological testing would be warranted if preservation is an impossible option.

APPENDIX "B"

PALEONTOLOGICAL SURVEY and ANALYSIS

LOWER SANTIAGO CREEK
PALEONTOLOGICAL RESOURCES

Prepared for:

EMA, Advance Planning Division
Environmental Service Branch
811 North Broadway, 2nd Floor
Santa Ana, California 92701

Prepared by:

ENVIRONMENTAL IMPACT PROFILES
642 South B Street
Tustin, California 92680
(714) 544-3262

March 1976



642 SOUTH B STREET TUSTIN, CALIFORNIA 92680 (714) 544-3263

Dedicated to Improving Man's use of his environment

March 30, 1976

EMA, Advance Planning Division
Environmental Service Branch
811 North Broadway, 2nd Floor
Santa Ana, California 92701

Attention: Tim Bingham

Re: Lower Santiago Creek Paleontological Resources

Dear Mr. Bingham:

This report by our paleontologist, Mr. Rodney E. Raschke, has been prepared pursuant to your Purchase Order No. C 50149 (Control No. 24579).

We appreciate receiving this opportunity to provide services for the County of Orange.

If you have any questions, then please contact us at your convenience.

Sincerely,

A handwritten signature in cursive script that reads "Burton B. Milburn".

Burton B. Milburn
Principal

BBM:rjl

LOWER SANTIAGO CREEK PALEONTOLOGICAL RESOURCES

Setting

The Lower Santiago Creek study area extends from the Villa Park Dam-Rattlesnake Peak area to the confluence of Santiago Creek and the Santa Ana River.

The study area is underlain by the Upper Oligocene-Lower Miocene undifferentiated Vaqueros-Sespe Formations and Pliocene to Recent alluvial and terrace deposits.

The Vaqueros-Sespe Formation are approximately 30 million years old. Terrestrial mammals have been collected from this rock unit to the south of the study area near Modjeska Canyon. Other than this locality very little is known about the fossil content of this rock unit in Orange County. The Vaqueros-Sespe Formations are exposed only in Reach 5 of the study area.

The alluvial and terrace deposits are "Ice Age" deposits and probably less than $\frac{1}{2}$ million years old. These deposits have produced fossils of terrestrial mammals in several areas of the county. Most notable are those from Laguna Hills of Costeau Park and Los Coyote Hills at Emery Borrow Pit. These deposits are exposed throughout the study area.

A review of the locality maps of the Vertebrate Paleontology Section of Los Angeles County Museum of Natural History failed to disclose any fossil localities within the study area. The review disclosed that fossil remains have been collected in the study area, however, there is no data on the locations where these remains were collected and therefore what rock units produced them is unknown.

A walkover survey was conducted in Reach 5 concentrating on exposures of the undifferentiated Vaqueros-Sespe Formation. This walkover survey failed to disclose any fossil remains within this portion of the study area. The reason for concentrating on Reach 5 is the known fossil producing nature of the Vaqueros-Sespe Formations and the unpredictable fossil content of the

alluvial and terrace deposits.

Conclusions and Recommendations

The portion of the study area with the highest potential for producing fossil remains is Reach 5. Fossils are likely to be found at some time in the exposure of the Vaqueros-Sespe Formation. Any fossils collected from this area would be of scientific importance as the fossil content of this rock unit is largely unknown. Doctor Donald Savage of the University of California, Berkeley who collected the locality near Modjeska Canyon feels that an important fauna exists in this rock unit. The alluvial and terrace deposits are also more likely to produce fossil remains as concentration of Pleistocene remains are generally found close to the foothills.

The fossil content of the alluvial and terrace deposits in Reaches 1 through 4 is highly unpredictable do to the nature of the environments of deposition of these rocks. In general, areas such as this produce randomly scattered isolated bones or teeth with occasional concentration of remains.

The utilization of the Rattlesnake Peak area as a regional park would cause the least impact on the fossil record as it would leave a natural exposure of the Vaqueros-Sespe Formation which could be periodically studied by professional paleontologists for remains. Also, it would make some of the most colorful and interesting rock units in the county available to the public and school children. No matter what type of development takes place in this area periodic inspections by a professional paleontologist should be made during construction.

The conversion of the sand and gravel pits into sanitary land fills would have minor impact on the fossil record do to the nature of the fossil content of the rock units. Periodic inspection by professional paleontologist would reduce this impact to almost nil.

The channelization of a portion of Santiago Creek would again have only minor

impacts which could be mitigated by allowing for periodic inspections during construction.

At this time no large concentration of fossil remains are known to be present in or near the study area, however, if such a concentration or other unique remains are discovered they should be included in a regional park interpretive center dealing with the natural history of the Orange County area.