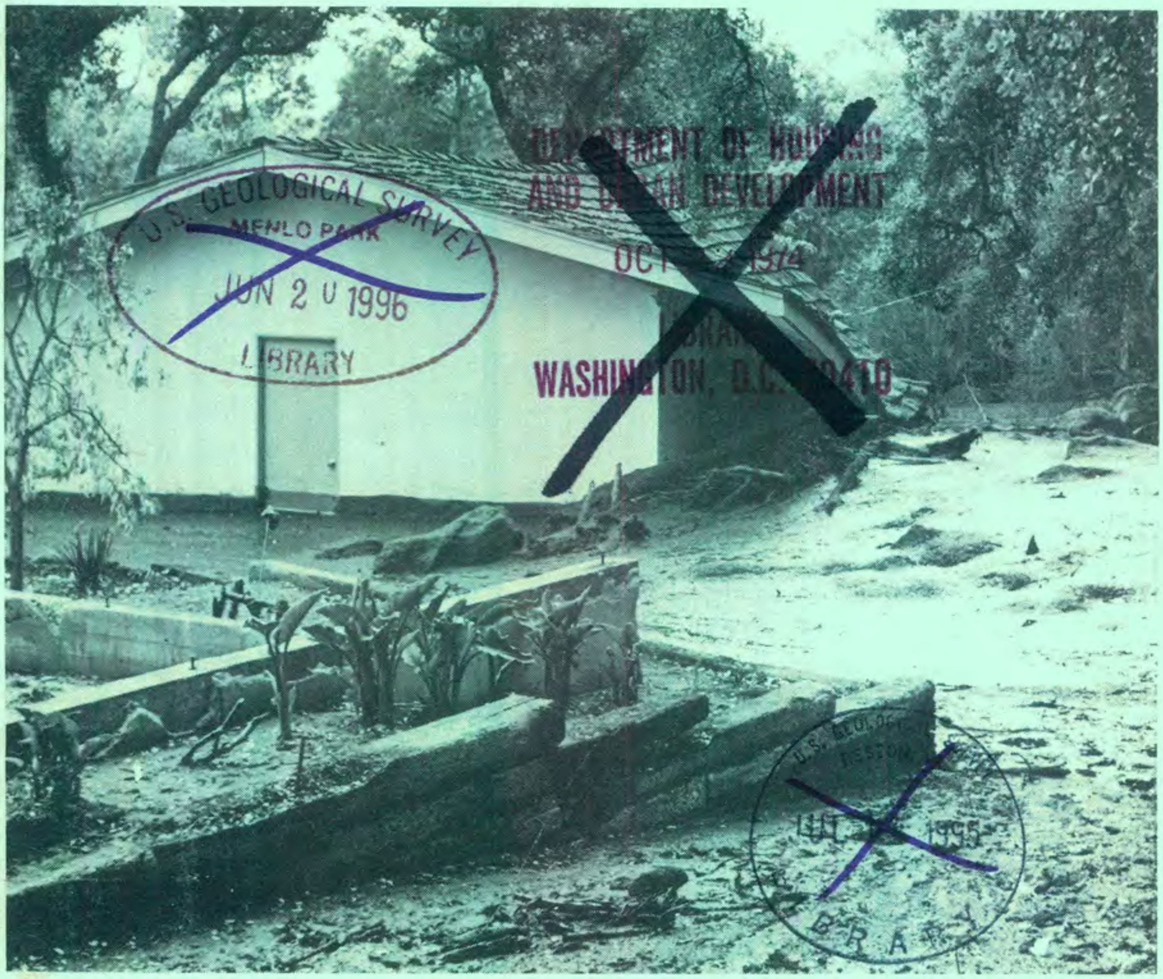
N INFORMATION

MONTECITO STREAMS

VICINITY OF MONTECITO

SANTA BARBARA COUNTY, CALIFORNIA



PREPARED FOR

SANTA BARBARA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

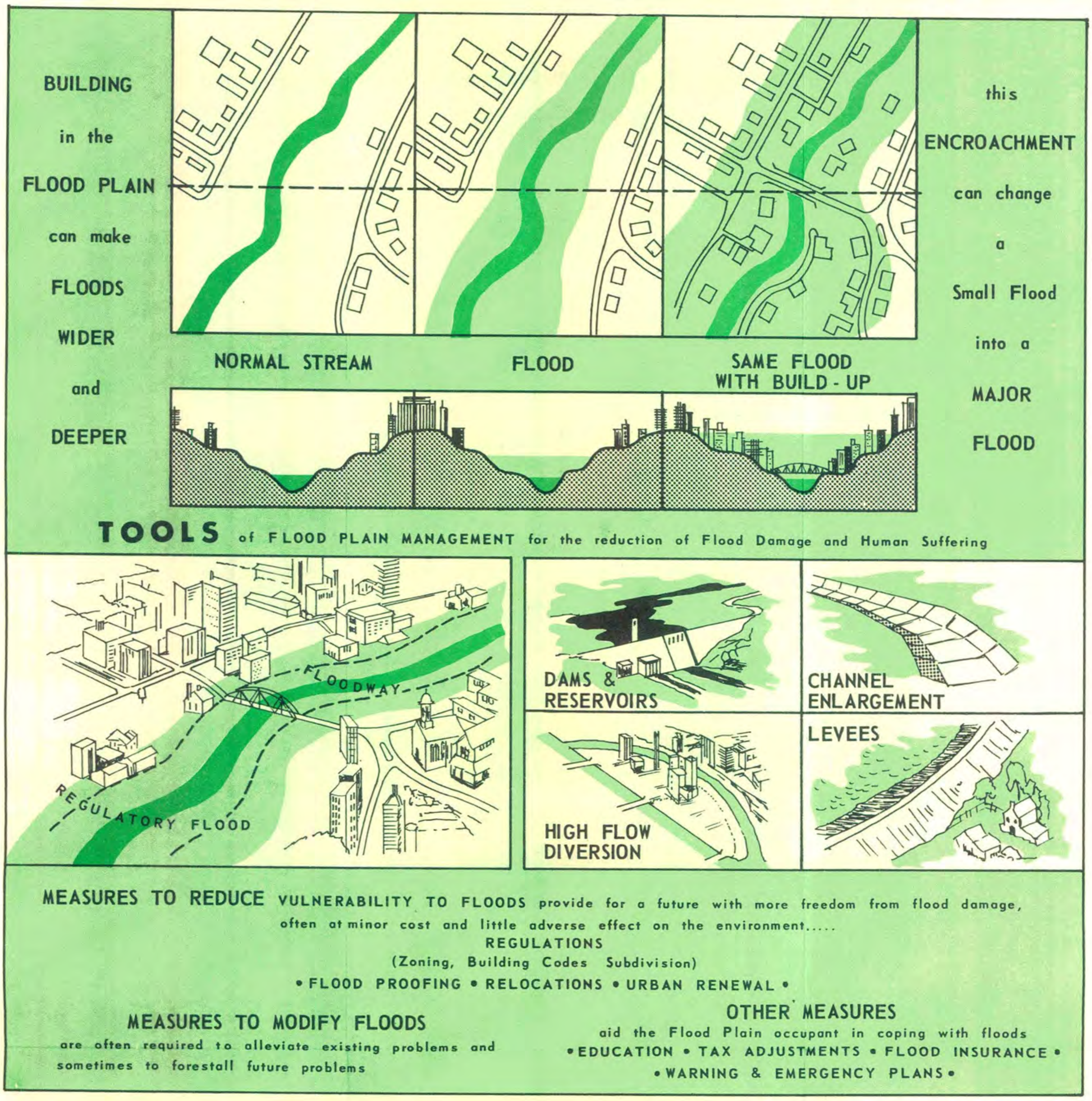
BY THE

DEPARTMENT OF THE ARMY, LOS ANGELES DISTRICT, CORPS OF ENGINEERS

LOS ANGELES, CALIFORNIA

JUNE 1974

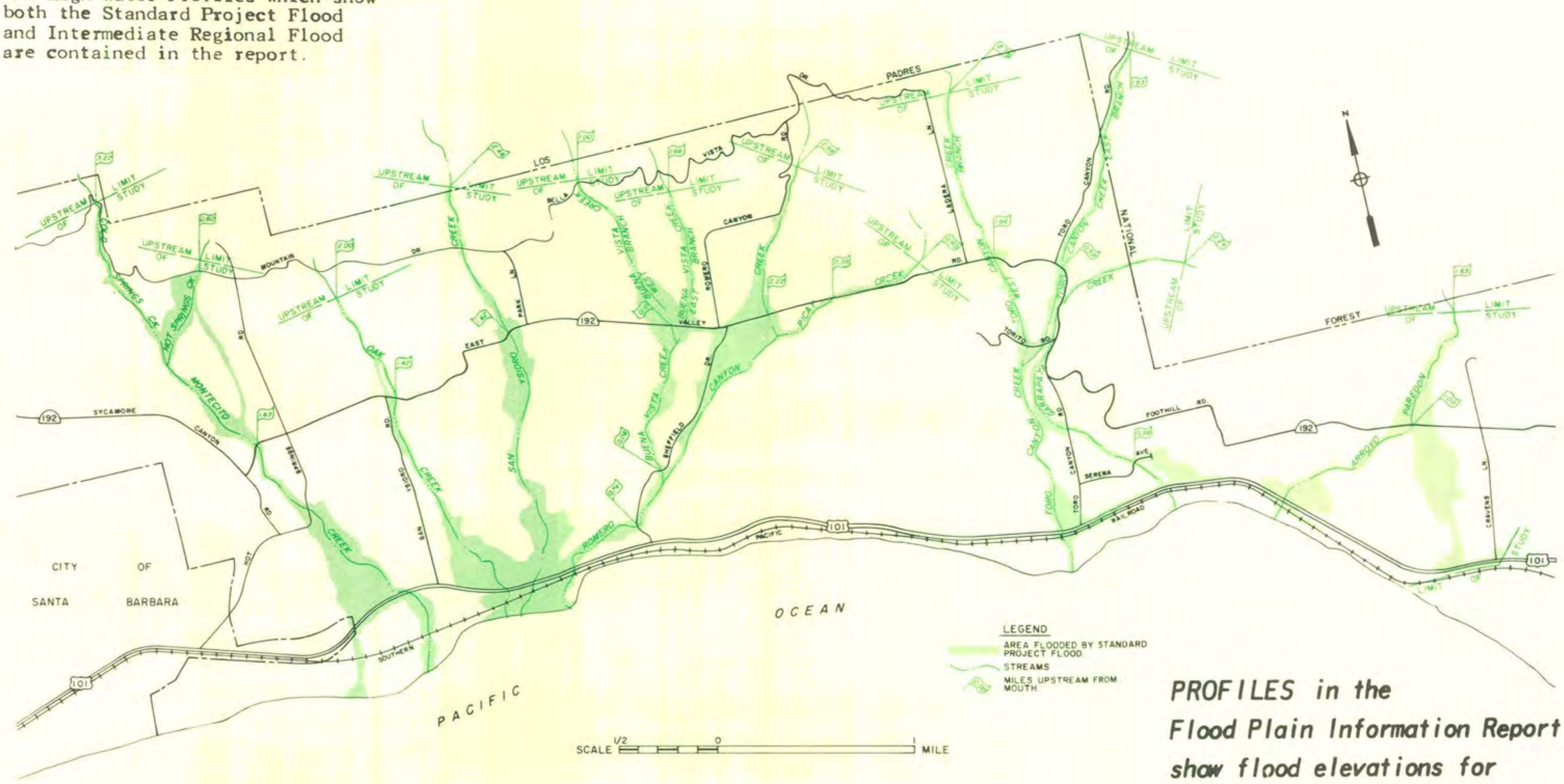
Hot Springs Creek, near Mountain Drive, after November 1964 flood where extremely heavy debris flows flooded many homes.



FLOOD PATTERNS FOR THE MONTECITO STREAMS

VICINITY OF MONTECITO, SANTA BARBARA COUNTY, CALIFORNIA

Flooded Area Maps to a larger scale and High Water Profiles which show both the Standard Project Flood and Intermediate Regional Flood are contained in the report.



PROFILES in the Flood Plain Information Report show flood elevations for the entire study area.

FLOODS

MONTECITO STREAMS
VICINITY OF MONTECITO
SANTA BARBARA COUNTY, CALIFORNIA

Heavy equipment being used to remove logs and boulders that effectively blocked the East Valley Road bridge on San Ysidro Creek after the 1964 flood.

FLOODS

IN
THE MONTECITO STREAMS
VICINITY OF MONTECITO
SANTA BARBARA COUNTY, CALIFORNIA

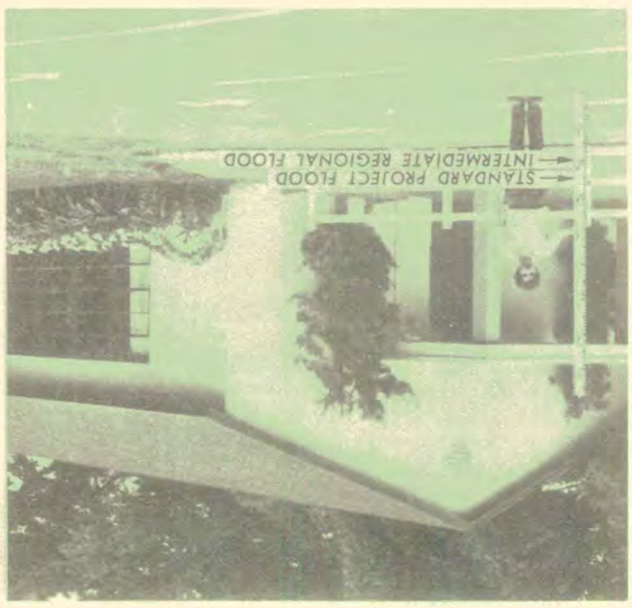
This folder is an announcement of and supplement to the "Flood Plain Information (FPI) Report, Montecito Streams, Vicinity of Montecito, Santa Barbara County, California." The purpose of the report is to present the facts on flood potential and flood hazards in the Montecito Streams which will provide a sound basis for land use planning and for management decisions concerning flood plain utilization.

Although the lands along the Montecito Streams have suffered damage from major floods in the past, studies indicate that even larger floods can occur in the future. Emphasis is given to future floods in the FPI report. Maps, profiles and cross sections have been included to illustrate the possible extent and severity of future floods.

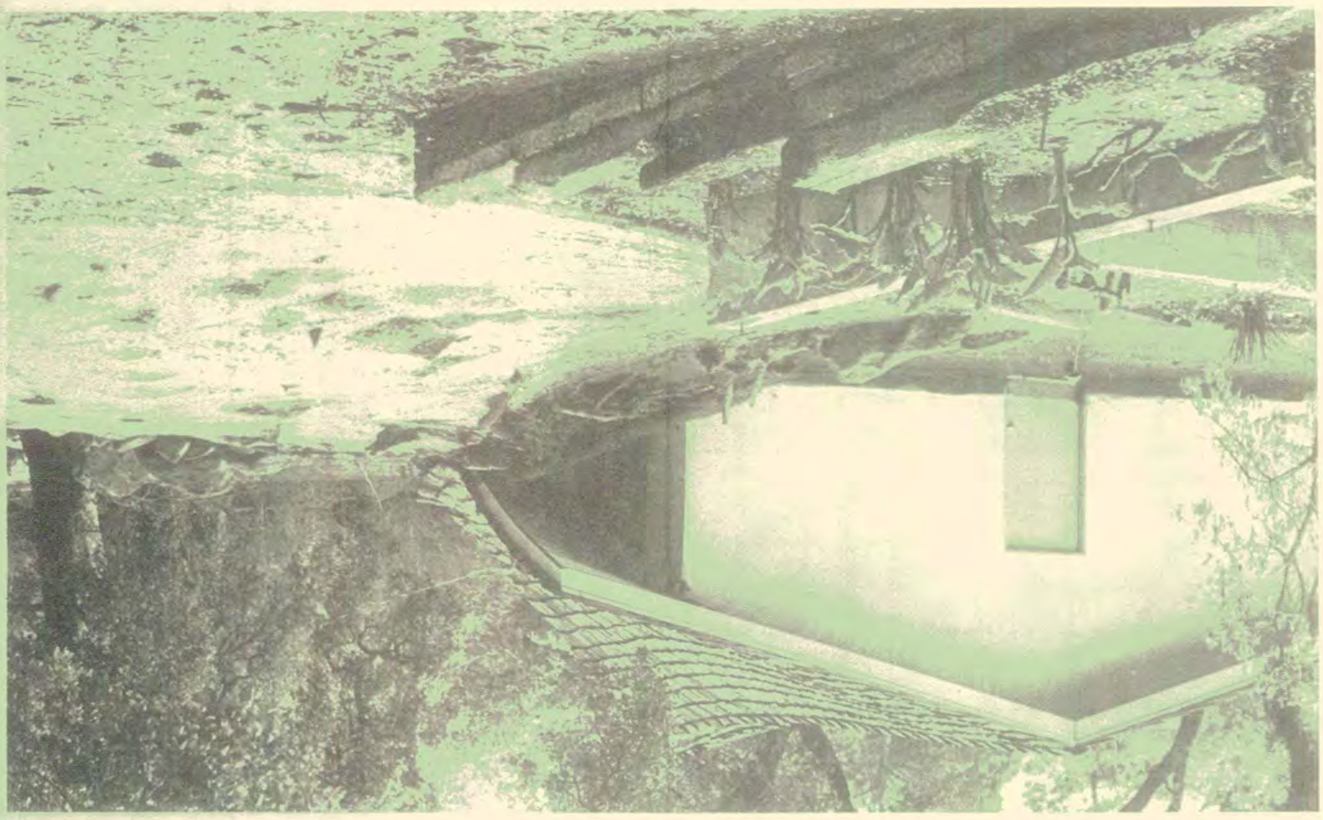
Included in this folder are photographs showing possible future flood heights in the vicinity of Montecito.

The flood height shown for the Intermediate Regional Flood (IRF) has a chance of being equaled or exceeded once in 100 years on the average although it could occur in any year. Also indicated is the flood height that would be reached if the Standard Project Flood (SPF), a much larger flood should occur.

Inside are sketches illustrating the horizontal and vertical relationships of flooded areas and a flood area map from the Flood Plain Information report showing the extent of the Standard Project Flood.



Future flood heights along San Ysidro Creek near San Leandro Lane.



One of many homes flooded by debris flows on Hot Springs Creek in 1964. Debris flows resulted from rain on areas burned by the Coyote fire.

ACTION IS NEEDED

The flood plains of the Montecito Streams in the vicinity of Montecito, Santa Barbara County, California, contain residential and commercial development and agricultural lands, primarily orchards. These flood plains will come under heavy pressure for development. The devastating effects of flooding will continue to increase unless action is taken.

Effective regulatory measures such as zoning ordinances and building codes can be designed to prevent increased flood damages. Floodproofing can reduce potential damages to properties already subject to flooding, and additional works to modify flooding can also be a part of the long-run solution.

Flood plain information has already been provided for many of several thousand flood plagued communities. Nearly 750 of those having FPI reports by mid 1973 have adopted or strengthened regulations, while 780 others have them under study. An additional 1,100 communities have used the FPI reports to establish interim land use control, 480 to guide land acquisition, and 1,500 for other planning functions.

High pressure gasline near Mountain Drive bent by the force of the 1964 floodflows from San Ysidro Creek.

Channel filled with debris during 1969 flood forcing flow from San Ysidro Creek out of the banks.

This folder has been prepared for the Board of Directors of Santa Barbara County Flood Control and Water Conservation District by the U.S. Army Corps of Engineers from data in the report "Flood Plain Information, Montecito Streams, Vicinity of Montecito, Santa Barbara County, California." Copies of the report and this folder are available from the Santa Barbara County Flood Control and Water Conservation District, 123 E. Anapamu Street, Santa Barbara, California 93104. Upon request, the Corps of Engineers will provide technical assistance to planning agencies and speakers to organized groups.

CONTENTS

CONTENTS (Continued)

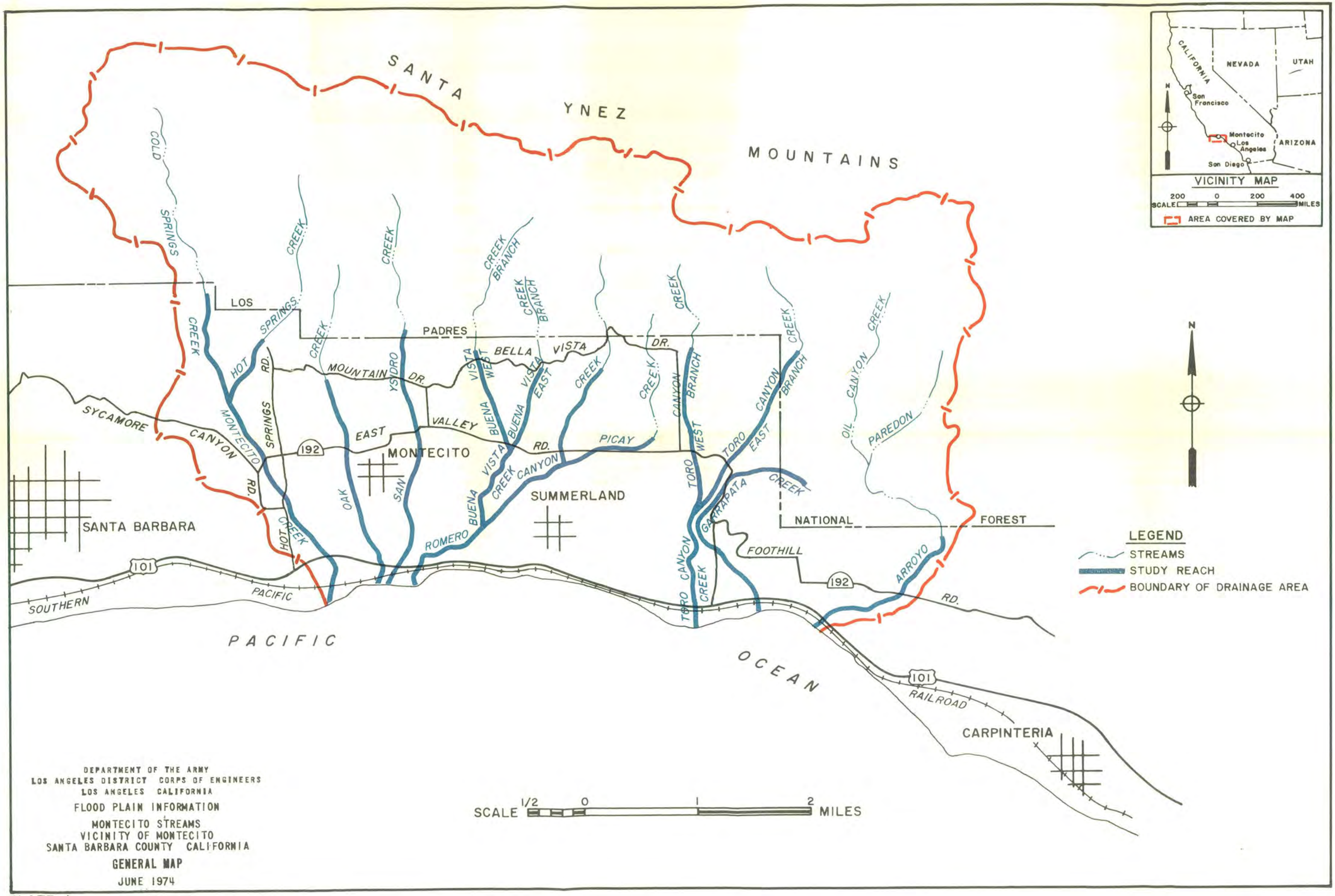
TABLES

FIGURES

CONTENTS (Continued)

FIGURES (Continued)

PLATES



DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT CORPS OF ENGINEERS
LOS ANGELES CALIFORNIA

FLOOD PLAIN INFORMATION

MONTECITO STREAMS
VICINITY OF MONTECITO
SANTA BARBARA COUNTY CALIFORNIA

GENERAL MAP

JUNE 1974

PLATE I

PREFACE

The area within the County of Santa Barbara covered by this report is subject to flooding from the Montecito Streams. The developed properties on the flood plains are suburban and irrigated agricultural, primarily orchards. The open spaces are under pressure for future development. Although large floods have occurred in the past, studies indicate that larger floods are possible.

This report has been prepared because a knowledge of flood potential and flood hazards is important in land use planning and in making management decisions concerning flood plain utilization. It includes a history of flooding in the Montecito-Summerland area and identifies those areas that are subject to possible future floods. Special emphasis is given to these possible future floods through the use of maps, photographs, profiles, and cross sections. The report does not provide solutions to flood problems; however, it does furnish a suitable basis for the adoption of land use controls to guide flood plain development and thereby prevent intensification of the loss problems. It will also aid in the identification of other flood damage reduction techniques, such as works to modify flooding and adjustments (including flood proofing) which might be embodied in an overall flood plain management (FPM) program. Other FPM program studies—those of environmental attributes and the current and future land use role of the flood plain as part of its surroundings—would also profit from this information.

At the request of the Santa Barbara County Flood Control and Water Conservation District, and with the endorsement of the Department of Water Resources, State of California, this report was prepared by the Los Angeles District of the Corps of Engineers under the continuing authority provided in section 206 of the 1960 Flood Control Act, as amended.

The assistance and cooperation of the Santa Barbara County Flood Control and Water Conservation District, the State of California Division of Highways, and the U.S. Geological Survey in supplying useful data and photographs for the preparation of this report are gratefully acknowledged.

Additional copies of this report can be obtained from the Santa Barbara County Flood Control and Water Conservation District. The Los Angeles District of the Corps of Engineers, upon request, will provide technical assistance to planning agencies in the interpretation and use of the data presented, as well as planning guidance and further assistance, including the development of additional technical information.

BACKGROUND INFORMATION

Settlement

Santa Barbara County is one of the 27 original counties established in 1850 and encompasses an area of about 2,700 square miles. The county is rich in historic landmarks, including several early day Spanish Missions. Santa Barbara, the largest city and the county seat, together with its suburbs of Montecito and Summerland, has long been a famous tourist center and a city of beautiful homes. Its harbor is both a recreational attraction and the home of a commercial fishing fleet.

Since 1950, Santa Barbara County has had a steady population growth from 100,000 to about 270,000. Agriculture and mining, particularly petroleum products, are chief sources of income.

The Streams and Their Valleys

The Montecito Streams originate in the Santa Ynez Mountains east of the City of Santa Barbara. From their headwaters, the various streams flow south through alluvial fans to the ocean as shown on the general map. Drainage areas contributing to runoff at significant locations in the study area are listed in table 1.

TABLE 1

DRAINAGE AREAS

Location	Drainage area (square miles)
Montecito Creek at mouth	5.9
Hot Springs Creek above confluence with Montecito Creek	0.9
Oak Creek at mouth	1.4
San Ysidro Creek at mouth	3.9
Romero Canyon Creek at mouth	5.8
Buena Vista Creek above confluence with Romero Canyon Creek	2.2
Picay Creek above confluence with Romero Canyon Creek	0.9
Toro Canyon Creek at mouth	3.6
Garrapata Creek at mouth	0.7
Arroyo Paredon at mouth	4.3

Topographically, the drainage basins have two types of areas: mountains and relatively flat lands. The mountains are characterized by narrow valleys and rugged terrain with a maximum elevation of about 4,000 feet above mean sea level. The flatlands are alluvial cones formed from rocks and finer debris carried from the steep upstream areas. When floodflows enter upon the alluvial cones, both the streambed gradient and the flow velocity decrease, causing major deposition and sedimentation, a decrease in the channel capacity, and possible changes in the stream course. Vegetation in the uncultivated parts of the watershed consists of scattered oaks, seasonal grasses, brush, and forbs. Citrus and avocado groves are the main crops in the cultivated flatland. The mean annual precipitation for the drainage areas ranges from 18 inches near the coast to about 28 inches at the headwaters. Most of the precipitation occurs from December to March. The climate in the Santa Barbara area is characterized by warm summers and mild winters. The mean monthly temperature ranges from 53 degrees Fahrenheit in January to 66 degrees Fahrenheit in July.

Developments on the Flood Plain

The lower reaches of the Montecito Streams are within the suburban areas of Montecito and Summerland. Although most of the lands along the channel are agricultural and undeveloped, many houses, utilities, roads, and bridges are on the flood plain, and further development is expected.

Several debris basins have been constructed in the upper reaches but have no appreciable regulating effect on large floods. Also dikes have been constructed to protect landowners, but few of these dikes furnish protection for any but small flows.

FLOOD SITUATION

Sources of Data and Records

Records of stream gages are available in the vicinity of the study area. The length of the gage records ranges from 3 years to 33 years. The gages (under the direction of the United States Geological Survey) in the vicinity of the Montecito Streams drainage basin and their period of service are listed in table 2.

TABLE 2

STREAM GAGES IN THE VICINITY OF
THE MONTECITO STREAMS DRAINAGE BASIN

Location	Periods of Service
Franklin Creek at Carpinteria	October 1970 – present
Carpinteria Creek near Carpinteria	October 1941 – present
Mission Creek at Santa Barbara	October 1970 – present
Arroyo Burro Creek at Santa Barbara	October 1970 – present
Atascadero Creek near Goleta	October 1941 – present
San Jose Creek near Goleta	January 1941 – present

To supplement the records from the gaging stations, newspaper files and historical documents were searched for information concerning the magnitude of past floods.

Maps used in this report are based on topographic maps furnished by the Santa Barbara County Flood Control and Water Conservation District. The topographic maps were prepared from aerial photography dated 1960 and 1962. Structural data on bridges were obtained from the above mentioned District, from the State of California, Division of Highways, and from measurements taken by Corps of Engineers, Los Angeles District, personnel. Channel size was also measured at several locations by Corps personnel; and a survey crew from Santa Barbara County Flood Control District updated the invert profiles on Toro Canyon Creek (including East and West Branches) and Arroyo Paredon.

Hydraulic computations were based upon slope and cross section data as determined from the topographic maps, field survey notes, and past records of deposition. Records of past floods indicate that certain bridges were effectively blocked by debris deposition. Bridges and culverts were assumed partially or completely clogged where past records indicated such; and channel cross section areas were reduced in specific reaches to make allowance for deposition. Computed peak discharges for the steep upper channel reaches were bulked to account for the production of debris in those reaches.

Flood Season and Flood Characteristics

Three types of storms produce precipitation in the Montecito Streams watershed: general winter storms, local storms, and general summer storms. The general winter storms usually occur during the period from November through April. These storms, which originate over the Pacific Ocean and move eastward over the watershed, last for several days and result in widespread precipitation. Local storms can occur at any time; however, they cover comparatively small areas and cause high intensity precipitation for a duration of about 6 hours or less. General summer storms have occurred in southern California during the late summer or early fall months, but have not resulted in any major floods in this particular study area during the periods for which discharge records are available.

Runoff from the Montecito Streams basin is typical of the majority of streams in southern California. Streamflow is negligible, except during and immediately after rains because climatic and basin characteristics are not conducive to continuous runoff; however, it increases rapidly in response to high-intensity precipitation. Streamflow is seasonal and, because of the absence of snowpack, diminishes rapidly at the end of the winter precipitation season. High-intensity rainfall, in combination with the effects of impervious soil types, possible denudation by fire, and steep gradients on most channels, results in intense, debris-laden floods.

Factors Affecting Flooding and Their Impacts

Obstructions to floodflows – Natural obstructions to floodflows include brush, trees, and other vegetation growing on the flood plain. Manmade obstructions include many bridges, some of which are minor crossings and are expected to be washed away before the peak of a big flood. During floods, brush growing on the flood plain can impede floodflows, thus creating backwater and increased flood heights. Brush and trees may be washed away and carried downstream to collect on bridges and on other flow obstructions. As floodflow increases, masses of debris may break loose, causing a wall of water and debris to surge downstream until another obstruction is encountered. Debris may collect against a bridge creating a damming effect, until the load exceeds its structural capability and the bridge is destroyed. The limited capacity of obstructive bridges impedes floodflows and results in flooding upstream, erosion around bridge approach embankments, and possible damage to the overlying roadbed.

In general, obstructions restrict floodflows and result in overbank flows and unpredictable areas of flooding, destruction of or damage to bridges and culverts, and increased velocity of flow immediately downstream. Debris-laden flows from steep areas may deposit their load in the channel as they reach milder slopes and flood adjacent areas that otherwise would not have been flooded. The major obstructions to floodflows in the study area are listed in table 3 and a few major representive structures are shown in figures 1 through 8.

Flood damage reduction measures — Santa Barbara County, in particular the Montecito–Summerland area, was declared a disaster area after the Coyote Fire of 1964, and after the floods of 1969 and 1971. Federal assistance was approved in each case and the U.S. Army Corps of Engineers was authorized to perform emergency channel restoration work.

Between 1964 and 1972, the Corps of Engineers constructed small debris basins on Cold Springs, San Ysidro, Romero Canyon, Toro Canyon (East and West Branches), and Arroyo Paredon Creeks to reduce the amount of debris carried by flows in the upper reaches. (The debris basins were not intended to have a major regulating effect on large floods.)

After the floods of 1964 and 1971 the Corps of Engineers, with the aid of local agencies, performed channel restoration work by removing flood debris and clearing and shaping specified reaches on all creeks in the study area. In some areas, excavated channel material (primarly large boulders) was piled along the banks as levees; however, this work will not provide adequate protection from major floods that may occur in the future. Numerous owners of land along the stream have built dikes to protect their lands, but very few of them furnish adequate protection from major floods.

A land use ordinance enables Santa Barbara County Flood Control District to enforce regulation of land use in designated watercourses. The subdivision ordinance requires that new developments be approved by the District.

Other factors and their impacts — Because of the alluvial-cone topography in the Montecito area, the overbank flows may separate, become independent of the main flow and never return to the stream channel. Consequently, the resulting overland flows could inundate areas that appear to be higher than the channel water surface. Also bank erosion could lead to undercutting and damage to structures with floor elevations higher than the water surface elevation.

A major fire in the watershed (such as the Coyote Fire of September 1964) could increase the size and amount of debris to the extent that some restrictions which normally would have passed the floodflow become plugged causing additional areas to be flooded. In such cases, any analysis would require greater reduction in channel cross sectional area and an increase in the number of bridges blocked than considered in this study.

TABLE 3

ELEVATION DATA

MAJOR BRIDGES AND CULVERTS FOR THE MONTECITO STREAMS

Identification	Miles upstream from mouth	Elevation in feet above mean sea level Soffit Elevation*	Intermediate Regional Flood	Standard Project Flood
MONTECITO CREEK				
Bonnymede Drive	0.06	13	16	16
Hot Springs Road	1.20	168	170	171
East Valley Road	1.63	245	249	250
Ashley Road	2.50	464	468	470
HOT SPRINGS CREEK				
Indian Lane	0.04	413	417	418
Rockbridge Road	0.22	480	482	483
Theater Lane	0.30	513	516	517
Mountain Drive	0.52	605	610	611
OAK CREEK				
South Jameson Lane	0.13	19	20	21
Highway 101 (south bound)	0.14	19	21	21
Highway 101 (north bound)	0.15	20	22	22
North Jameson Lane	0.16	20	23	23
Pomar Lane	0.29	31	33	34
Hixon Road	0.36	41	43	44
San Leandro Lane	0.43	47	48	49
Ramona Lane	0.53	56	59	60
SAN YSIDRO CREEK				
Fernald Point Lane	0.13	18	20	21
Southern Pacific Railroad	0.14	20	24	25
Highway 101 (south bound)	0.17	20	24	25
Highway 101 (north bound)	0.18	20	24	25
North Jameson Lane	0.19	20	24	25
San Leandro Lane	0.56	66	66	67
Glen Oaks (south)	1.47	243	243	244
Glen Oaks (north)	1.58	268	270	271
East Valley Road	1.62	284	285	286

* Average elevation of bottom of bridge or culvert structure.

TABLE 3 (Continued)

ELEVATION DATA

MAJOR BRIDGES AND CULVERTS FOR THE MONTECITO STREAMS

Identification	Miles upstream from mouth	Elevation in feet above mean sea level: Soffit Elevation*	Intermediate Regional Flood	Standard Project Flood
ROMERO CANYON CREEK				
Fernald Point Lane	0.15	18	20	21
Southern Pacific Railroad	0.21	25	31	32
Highway 101 (south bound)	0.22	25	32	33
Highway 101 (north bound)	0.23	25	32	33
North Jameson Lane	0.24	25	32	33
Arroqui Road	0.47	48	50	51
Sheffield Drive	0.74	74	82	83
East Valley Road	2.22	290	292	293
Featherhill Lane	2.45	363	367	368
Unamed Road off Romero Canyon Road	2.77	486	489	490
BUENA VISTA CREEK				
Sheffield Drive	0.08	127	131	132
BUENA VISTA CREEK, EAST BRANCH				
East Valley Road	0.95	254	256	257
Tabor Lane	1.12	284	285	286
Alisos Drive	1.22	309	311	312
Veloz Drive	1.31	329	332	333
Piedras Drive	1.41	367	368	369
Lilac Drive	1.62	478	482	483
BUENA VISTA CREEK, WEST BRANCH				
East Valley Road	0.10	255	256	257
Oak Grove Drive	0.31	324	327	328
Alisos Drive	0.37	355	356	357
Lilac Drive	0.52	436	437	438
Bella Vista Drive	0.99	681	689	691
PICAY CREEK				
East Valley Road	0.39	319	323	324

* Average elevation of bottom of bridge or culvert structure.

TABLE 3 (Continued)

ELEVATION DATA

MAJOR BRIDGES AND CULVERTS FOR THE MONTECITO STREAMS

Identification	Miles upstream from mouth	Elevation in feet above mean sea level: Soffit Elevation*	Intermediate Regional Flood	Standard Project Flood
TORO CANYON CREEK				
Padaro Lane	0.21	53	57	58
Southern Pacific Railroad	0.22	55	62	63
Highway 101 (south bound)	0.24	57	62	63
Highway 101 (north bound)	0.26	58	63	64
Via Real	0.27	60	64	65
TORO CANYON CREEK, WEST BRANCH				
Torito Road	1.33	303	306	307
East Valley Road	1.85	493	497	498
Picay Lane	2.12	628	631	632
TORO CANYON CREEK, EAST BRANCH				
Torito Road	0.16	311	316	317
East Valley Road	0.59	495	501	502
GARRAPATA CREEK				
Serena Avenue	0.38	70	76	77
Toro Canyon Road	0.80	146	148	149
Torito Road	1.33	328	331	332
Toro Canyon Road	1.57	430	431	432
ARROYO PAREDON				
Padaro Lane	0.09	10	11	12
Southern Pacific Railroad	0.10	13	15	16
Highway 101 (south bound)	0.12	13	16	17
Highway 101 (north bound)	0.14	13	16	17
Via Real	0.16	13	16	17
Foothill Road	0.98	100	101	102

*Average elevation of bottom of bridge or culvert structure.

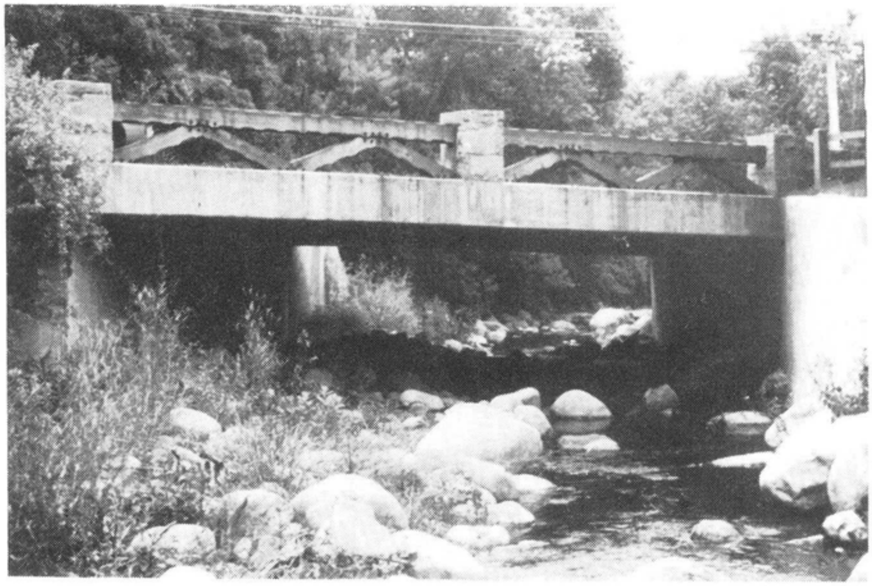


Figure 1 — Hot Springs Road bridge over Montecito Creek (looking downstream at river mile 1.20).

Figure 2 — Romona Lane bridge over Oak Creek (looking upstream at river mile 0.54).

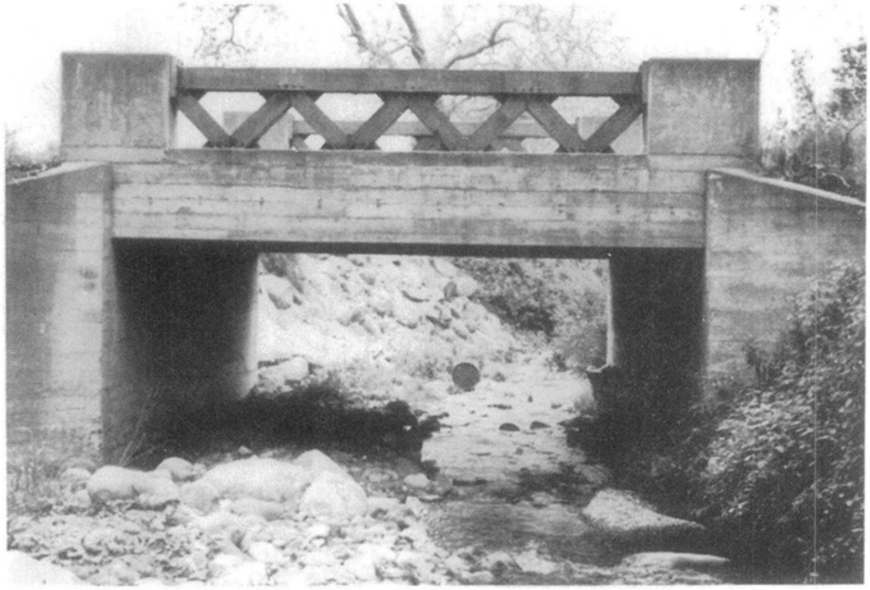


Figure 3 — Sheffield Drive bridge over Romero Canyon Creek (looking downstream at river mile 0.74).

Figure 4 — East Branch Buena Vista Creek culvert at Veloz Drive (looking downstream at river mile 1.33).

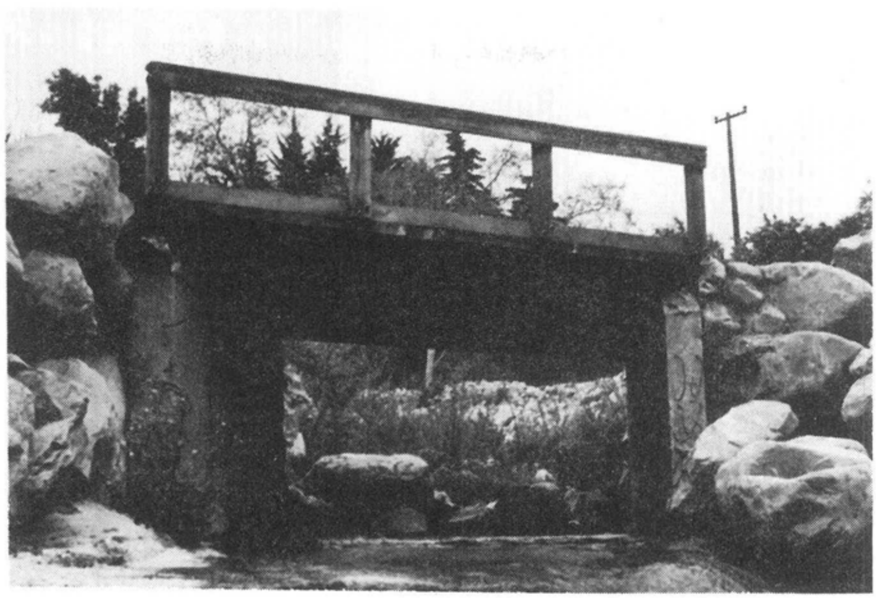


Figure 5 — Torito Road bridge over East Branch Toro Canyon Creek (looking upstream at river mile 0.16).

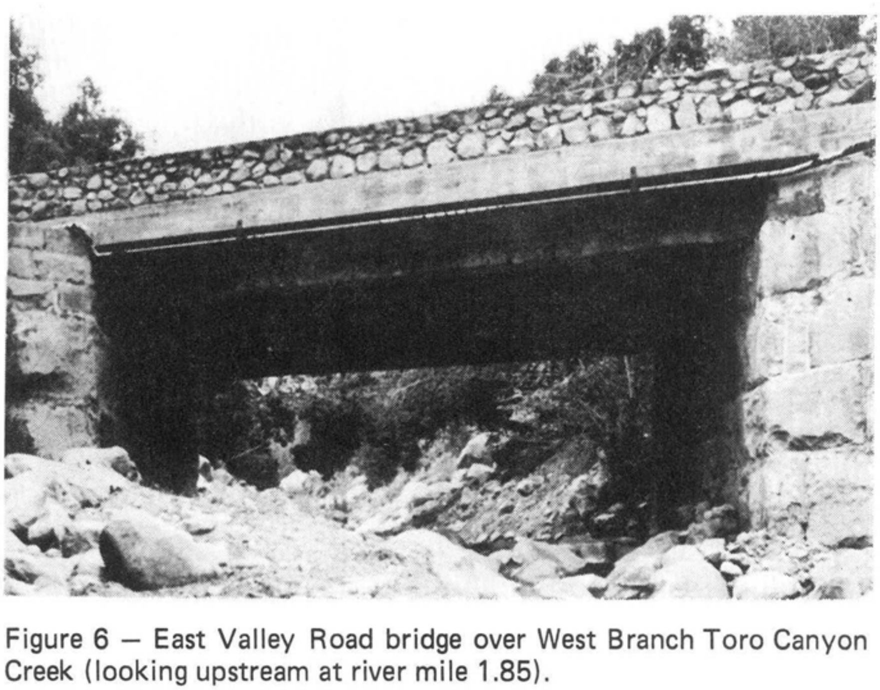


Figure 6 — East Valley Road bridge over West Branch Toro Canyon Creek (looking upstream at river mile 1.85).

Figure 7 – Southern Pacific Railroad bridge over Arroyo Paredon (looking upstream at river mile 0.10).

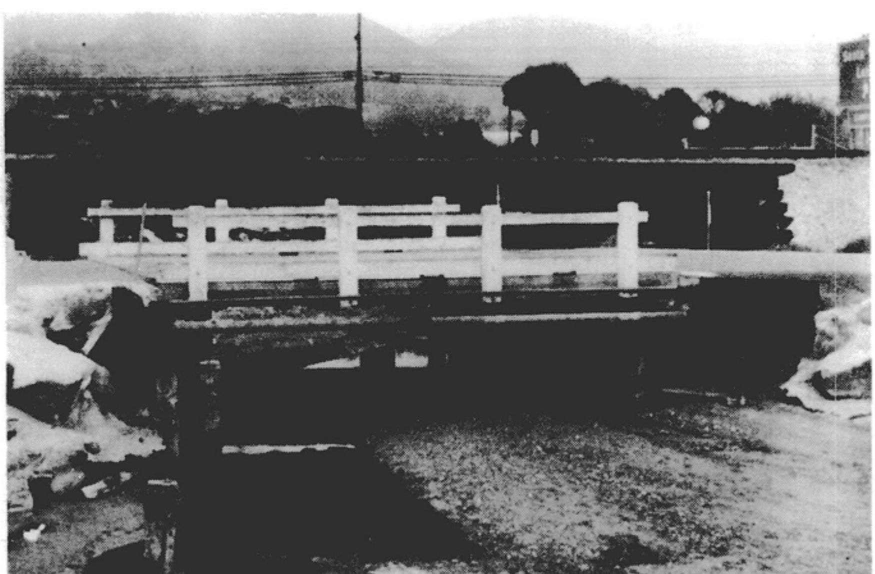


Figure 8 – Padaro Lane bridge over Arroyo Paredon (looking upstream at river mile 0.09).

Flood warning and forecasting – The County of Santa Barbara has considered flood warnings in conjunction with the National Weather Service. Such warnings are not feasible on the steep south coast streams because of the extremely rapid rate of rise in water surfaces and inaccuracies in rainfall forecasting in the study area. Flash flood alarms have been considered also but not implemented due to the lack of time to react to the warning. There has also been concern about false alarms being issued which would result in complacency when the next alarm is issued.

Flood fighting and emergency evacuation plans – In the event of a major flood, emergency procedures will be activated by the county, the State, and upon request, the Federal Government. The Santa Barbara County Flood Control District has an emergency plan that specifies procedures for mobilization and steps to be taken by various sections within the District offices. The California Department of Water Resources, through its Flood Operations Center, coordinates flood fighting activities throughout the State and is authorized to receive requests from public agencies for assistance during floods. The Federal Government, through the Corps of Engineers, will also, upon request, aid in flood fighting, evacuation, and restoration work. Services of the Corps can be requested by the State Office of Emergency Service, or in the event that the area is designated a disaster area by the President of the United States, by the Department of Housing and Urban Development.

Floatable materials stored on the flood plain – During a major flood, unconfined floatable materials on the flood plain would be transported downstream. Although the quantity of floatable objects (such as empty tanks, large containers, crates, or piles of lumber) is sizeable in the developed areas, it would be small in relation to the amount of natural debris, including uprooted trees.

PAST FLOODS

Summary of Historical Floods

Damaging floods in the Montecito Streams area are reported to have occurred as early as 1862. Floods of sufficient magnitude to cause extensive damage occurred in 1862, 1909, 1914, 1927, 1938, 1962, 1964, 1967, 1969, and 1971.

Flood Records

No stream gages are presently located in the Montecito Streams drainage basin. The Santa Barbara County Flood Control and Water Conservation District did install a recording stream gage on San Ysidro Creek a number of years ago, but it was impossible to obtain reliable records because of the heavy sediment movement and deposition in this stream. Several stream gages are maintained by the United States Geological Survey in the vicinity of the study area, as shown in table 2. The estimated peak flows for various Montecito Streams given in table 4 were determined from high water marks. Floodflows and resulting damage on Montecito Streams are illustrated on the front cover and in figures 9 through 20.

Flood Descriptions

The following are descriptions of known large floods that resulted from natural phenomena. These descriptions are based upon rainfall and stream gage records, newspaper accounts, and field investigations.

Flood of January 1914 – The torrential rains of January 1914, particularly those in the two-week period beginning January 15, were the most destructive in recent times. Sixteen inches of rainfall, climaxed by over four inches in two hours on the final day, caused enormous damage in both suburban and rural areas. Two people drowned in Montecito Creek.

Excerpt from the Santa Barbara Morning Press, January 27, 1914

WORST FLOOD IN HISTORY OF SANTA BARBARA COUNTY

Mr. and Mrs. Jones drowned in Montecito. Flood occurred Sunday, January 25, 1914. Loss estimated at half million dollars. Mission and Hot Springs Creek were worst hit.

Flood of November 1964 – Relatively light rain which fell on portions of the watershed burned by the Coyote Fire caused severe flooding in the area of Montecito, Hot Springs, and San Ysidro Creeks. Damage to public and private property was more than $300,000. Eyewitnesses to the flood reported 20-foot walls of water, mud, boulders, and trees moving down the channels at approximately 15 miles per hour. Bridges were swept away in seconds and flows inundated large areas damaging structures and depositing debris.

TABLE 4

ESTIMATED PEAK FLOWS OF PAST FLOODS
MONTECITO STREAMS

Stream and Location	Date Month	Date Year	Estimated peak flow (cubic feet per second)
Montecito Creek at East Valley Road	November	1964	8,000*
San Ysidro Creek above East Valley Road	November	1964	4,000*
San Ysidro Creek at Mountain Drive	November	1964	6,500*
Hot Springs Creek above Mountain Drive	November	1964	7,000*
Cold Springs Creek above Mountain Drive	November	1969	4,000*
Romero Canyon Creek near Highway 101	January	1969	4,000**
Buena Vista Creek, West Branch near Bella Vista Drive	January	1969	1,500**
Romero Canyon Creek near Highway 101	December	1971	1,500***
Toro Canyon Creek near Highway 101	December	1971	5,300***

* Report entitled "Fire, Disaster Assistance, and Flood 22 September 1964 to 20 January 1965, for Santa Barbara, California and Vicinity", U.S. Army Engineer District, Los Angeles Corps of Engineers, May 1965.

** "1969 Floods", Santa Barbara County Flood Control and Water Conservation District, May 1969.

*** U.S. Geological Survey observations, Santa Barbara, California office.

Excerpts from the Santa Barbara News-Press, November 9, 1964

Clogging of Hot Springs Creek by the bridge at Mountain Drive sent water, silt and debris across the road and cascading into the beautiful home community of Riven Rock Estates. The Ashley Road bridge over Cold Spring Creek, above its confluence with Hot Springs, also was clogged, contributing to the flood conditions in Riven Rock Estates.

Rose Swiftly

Eyewitnesses spoke of the swiftness with which the creeks overran their beds. In less than a couple of hours water of such height and force came pouring down the creeks that huge boulders were rolled against bridge abutments.

Trouble Spots

San Ysidro Creek was one of the worst. A flood control patrolman estimated depth of the torrent at San Ysidro Guest Ranch between 20 and 25 feet at 6:40 a.m. and it was rolling boulders and tossing heavy timbers like matches. At the ocean end of San Ysidro Creek, flood authorities were concentrating men and equipment in an effort to move debris, boulders and sand that were blocking the mouth of the creek and backing up flood water.

Gas Main Bent

A high pressure gas main was bent near San Ysidro Creek and Mountain Drive. It did not break, but officials as a safety measure turned it off.

Figure 9 — Cold Springs Creek, above Ashley Road, after November 1964 flood in which debris completely filled channel.

Figure 10 -- Overflow from Hot Springs Creek along Olive Mill Road during November 1964 flood.

Figure 11 – Montecito Creek, near Hot Springs Road, after November 1964 flood. Large boulders carried by the flow were deposited upstream from the bridge.

Figure 12 — San Ysidro Creek, near Mountain Drive, after November 1964 flood where a 20-inch high pressure gasline was bent by the force of the flow. Debris were carried over the bridge deck shown on the extreme right of the picture.

Figure 13 — San Ysidro Creek, at East Valley Road, after November 1964 flood. Heavy equipment was used to remove logs and boulders that effectively blocked the bridge.

Floods of 1969 and 1971–The President of the United States declared Santa Barbara County, in particular the Montecito–Summerland area, to be a disaster area because of floods in 1969 and 1971. Federal assistance was approved in each case and the U.S. Army Corps of Engineers was authorized and directed to perform emergency restoration work in the area.

Excerpts from the Santa Barbara News-Press, January 25, 1969

HUNDREDS EVACUATED IN COUNTY FLOODS; DAMAGE IN MILLIONS

Santa Barbara County was declared a disaster area by Governor Reagan today as the worst flood in 55 years drove hundreds from their homes, caused $4,500,000 property damage that was rising hourly, and closed most highways leading out of the city.

Highways Closed

Highways were closed between Montecito and Carpinteria, Las Cruces and Lompoc, and in the Santa Maria area. A Montecito woman was reported missing – At 8:30 this morning the Montecito Fire Department reported crews out on "between 20 and 30" rescue calls.

Excerpts from the Santa Barbara News-Press, January 30, 1969

USUALLY FRIENDLY TORO CREEK BECAME A MOUSE THAT ROARED

Cascading torrents of water bursting out of the confines of what – on some maps, at least – are shown as the east and west branches of Toro Creek. The mad rush of waters tearing up pine trees and depositing huge, white faced boulders up against homes.

Bridge Collapses

Torito Road bridge collapses and just upstream tons of water force out a new creek channel, removing some 10 to 15 feet of embankment.

Gas main at Toro Canyon and East Valley Road bursts.

Figure 14 — Oak Creek, at the ocean, eroded its banks and undercut existing structures during January 1969 flood.

Figure 15 — San Ysidro Creek during January 1969 flood. The channel was filled with debris, forcing floodwaters out and onto La Vuelta Road where many houses were flooded.

Figure 16 – San Ysidro Creek, at East Valley Road, during January 1969 flood. The channel was filled with rocks and debris forcing flow out of the banks.

Figure 17 – Romero Canyon Creek, near Featherhill Road, after January 1969 flood. Boulders, carried by the flow, crashed through this home and others.

Figure 18 — Overflow from San Ysidro Creek, in the Glen Oaks area, during January 1969 flood.

Figure 19 — View of Highway 101 and Southern Pacific Railroad flooded by overflow from Toro Canyon Creek during December 1971. (Note trucks jack-knifed on highway.) Both railroad and the highway were out of service for many hours.

Figure 20 — Garrapata Creek, at Toro Canyon Road, after December 1971 flood.

FUTURE FLOODS

Discussion of future floods in this report is limited primarily to those that have been designated as the intermediate regional and standard project floods as shown in table 5 and figure 21, although estimates of past floods (table 4) would indicate peak flows of greater magnitude have occurred and could recur in the future. The standard project flood would be larger and would occur less frequently than the intermediate regional flood. A standard project flood would be a rare event, but could reasonably be expected to occur in the future.

Estimates of the intermediate regional and standard project floods were based on hydrologic computations, correlation of records of similar drainage basins, and consideration of pertinent meteorologic and physiographic conditions. Floods in the study area caused by local storms can affect large areas of the watershed, result in greater flood damage, and create greater hazards to people than other types of storms. Therefore, the future floods discussed herein would probably be caused by a local storm.

Intermediate Regional Flood

The intermediate regional flood is one that could occur, on the average, about once in 100 years, although it could occur in any year or more than once in one year. Usually, the peak flow of such a flood is developed from statistical analyses of streamflow and precipitation records and runoff characteristics of the stream basin. Because there are no stream gages located in the Montecito Streams study area, other basins in the general region were analyzed and correlated with the study area, with adjustments for differences in hydrologic, meteorologic, and physiographic characteristics. Peak flows thus developed for the intermediate regional flood at selected points in the study area are shown in table 5 and figure 21.

Standard Project Flood

In accordance with Corps of Engineers criteria a standard project storm was derived for the Montecito Streams drainage basin. The storm selected for the area is based on a high intensity, 3-hour thunderstorm similar to the storm of 3-4 March 1943, over the Sierra Madre area. The total storm depth and rainfall intensity patterns taken from the report "Generalized Standard Project Rainflood Criteria for Southern California Coastal Streams", dated March 1967, were increased by 15 percent. The reason for the increase is that hillsides above Santa Barbara are normally subject to greater orographic uplift and, consequently, heavier precipitation than the Sierra Madre area.

The standard project flood was determined by centering the standard project storm over the drainage area under study and using the most severe runoff conditions that could reasonably be expected to occur. This flood would have a greater magnitude than the intermediate regional flood. Peak flows thus developed for the standard project flood at selected points in the study area are shown in table 5 and figure 21.

TABLE 5

PEAK FLOWS FOR INTERMEDIATE REGIONAL AND STANDARD PROJECT FLOODS*

Location	Distance upstream from mouth (miles)	Drainage area (square miles)	Intermediate Regional Flood (cubic feet per second)	Standard Project Flood (cubic feet per second)
Montecito Creek				
at Highway 101	0.47	5.9	5,700	7,300
at East Valley Road	1.64	5.3	5,500	7,000
below confluence with Hot Springs Creek	2.25	4.8	5,000	6,500
Cold Springs Creek				
at elevation 500 feet	2.62	3.7	5,200**	6,700**
Hot Springs Creek				
above confluence with Montecito Creek	2.27	0.9	1,200	1,500
Oak Creek				
at Highway 101	0.16	1.4	1,800	2,300
at elevation 250 feet	1.73	0.4	600	800
San Ysidro Creek				
at Highway 101	0.20	3.9	3,500	4,400
at East Valley Road	1.62	3.4	3,500	4,300
at elevation 500 feet	2.27	3.0	5,000**	6,800**
Romero Canyon Creek				
at Highway 101	0.23	5.8	4,900	6,300
below confluence with Picay Creek	2.10	3.0	3,100	4,000
above confluence with Picay Creek	2.11	2.1	2,400	3,100
at Romero Canyon Road	2.77	2.0	3,400**	4,600**
Buena Vista Creek				
above confluence with Romero Canyon Creek	0.01	2.2	2,800	3,600
below confluence of East and West Branches	0.80	1.6	2,200	2,800
East Branch Buena Vista Creek				
at East Valley Road	0.95	0.8	1,200	1,500
at Piedras Drive	1.43	0.3	800**	1,100**
West Branch Buena Vista Creek				
at Bella Vista Drive	0.98	0.7	1,600**	2,200**
Toro Canyon Creek				
at Highway 101	0.26	3.6	3,800	4,800
below confluence of East and West Branches	1.21	2.9	4,500**	6,200**

TABLE 5 (Continued)

PEAK FLOWS FOR INTERMEDIATE REGIONAL AND STANDARD PROJECT FLOODS*

Location	Distance upstream from mouth (miles)	Drainage area (square miles)	Intermediate Regional Flood (cubic feet per second)	Standard Project Flood (cubic feet per second)
East Branch Toro Canyon Creek				
above confluence with West Branch Toro Canyon Creek	0.01	1.4	2,500**	3,200**
at Toro Canyon Road	0.60	1.3	2,600**	3,500**
West Branch Toro Canyon Creek				
above confluence with East Branch Toro Canyon Creek	1.22	1.5	2,500**	3,400**
at East Valley Road	1.85	1.3	2,400**	3,300**
Garrapata Creek				
at Highway 101	0.18	0.7	1,000	1,300
at Toro Canyon Road	1.60	0.2	400	500
Arroyo Paredon				
at Highway 101	0.14	4.3	3,500	4,500
at Foothill Road	0.99	3.7	4,300**	5,900**

*Peak flows listed include both channel and overbank discharges, which may be divided as explained in a preceding paragraph titled "Other factors and their impacts".

**Bulked flows.

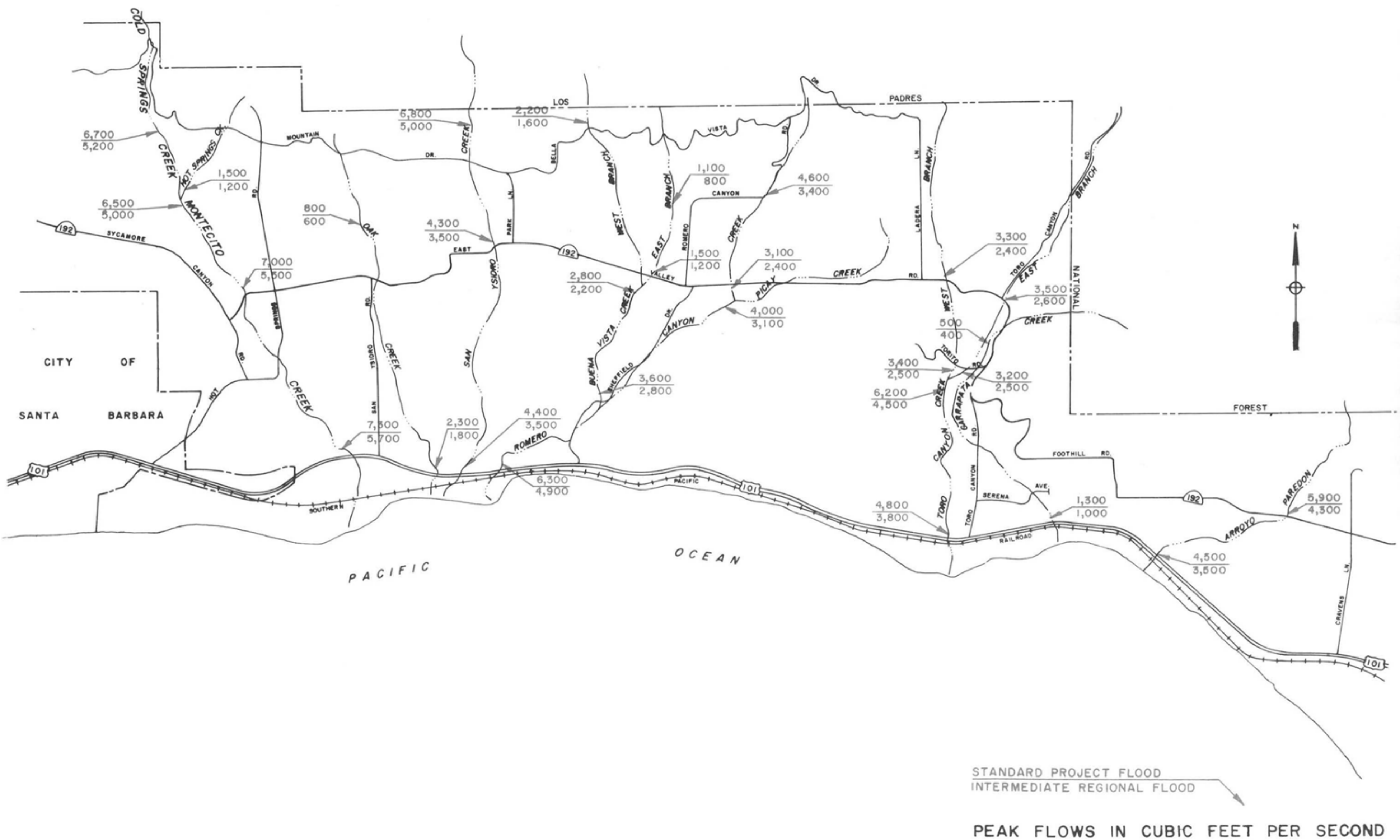


FIGURE 21–PEAK DISCHARGES ALONG MONTECITO STREAMS

Debris

Runoff originating on the precipitous slopes of the mountains above the suburbs of Montecito and Summerland flows down the canyons at high velocities carrying large quantities of debris. To account for this debris, peak discharges, which were previously computed for the intermediate regional and standard project floods, were bulked in areas of relatively steep slopes. Bulking was accomplished by estimating the total debris volume produced by a given storm using the method presented in the report "A New Method of Estimating Debris-Storage Requirements for Debris Basins," by Tatum and distributing this debris volume around the peak of the discharge hydrograph. Bulked flows are indicated in table 5.

Frequency

Frequency curves of peak flows up to the magnitude of the standard project flood were constructed for the Montecito Streams on the basis of available information and computed flows of floods. (Estimates of peak discharges greater than the standard project flood can be made by extrapolating the frequency curves.) The frequency curves thus derived, which are available on request, reflect the judgement of engineers who have studied the area and are familiar with the region; however, they must be regarded as approximate and should be used with caution in any planning of flood plain use. Floods larger than the standard project flood are possible (see table 4), but the combination of factors necessary to produce such large flows would be rare.

Hazards of Large Floods

The extent of damage caused by any flood depends on the topography of the area flooded, depth and duration of flooding, velocity of flow, rate of rise, and developments on the flood plain. Intermediate regional or standard project floods in the Montecito Streams would result in inundation of agricultural, commercial, and residential sections in the Montecito–Summerland areas. Deep floodwater flowing at high velocity and carrying floating debris would create conditions hazardous to anyone attempting to cross flooded areas. In general, floodwater 3 or more feet deep and flowing at a velocity of 3 or more feet per second could easily sweep an adult person off his feet, thus creating definite danger of injury or drowning. Rapidly rising and swiftly flowing floodwater may trap persons in homes that are ultimately destroyed, or in vehicles that are ultimately submerged or floated downstream. Waterlines can be ruptured by deposits of debris and the force of floodwaters, thus creating the possibility of contaminated domestic water supplies. Damaged sanitary sewerlines and sewage treatment plants could result in the pollution of floodwaters, creating health hazards. Isolation of developed areas by floodwater could create hazards in terms of medical, fire, or law enforcement emergencies. Extensive flood damage on the flood plains could be brought about by bank erosion causing houses built above flood elevations to be totally damaged or washed away when side currents undercut the structures.

Flooded areas and flood damages — The areas along the Montecito Streams that would be flooded by the standard project flood are shown on plate 2, which is also an index map to plates 3 through 36. Areas that would be flooded by the intermediate regional and standard project floods are shown in detail on plates 3 through 36. *The actual limits of these overflow areas may vary from those shown on the plates because of map scale limitations, inaccuracies in the original topographic maps, recent development, and difficulty in accurately predicting the effects of erosion and deposition.* As shown on these plates, floodflows from the Montecito Streams cover wide areas in the relatively flat lands. The areas that would be flooded by the intermediate regional and standard project floods include agricultural and residential sections and the streets, roads, and private and public utilities in and around Montecito and Summerland. Considerable damage to these facilities would occur during an intermediate regional flood. Because of the wider extent, greater depths of flooding, higher velocity flow, and longer duration of flooding during a standard project flood, damage would be even more severe than during an intermediate regional flood. Certain houses and other structures shown in the flooded areas may be free from flood damage because they are on elevated pads or on locally high ground and first floor elevations are above the floodwater surface. This situation would exist when the flow velocities are low and undercutting of the structures by erosion and sloughing is not possible. Also certain structures shown outside the flooded areas may be flooded when the channel is filled with debris and the water surface is raised significantly. This is expected to occur more frequently at obstructions, abrupt changes in channel direction, and where the channel slope changes from steep to mild. Plates 37 through 75 show water surface profiles of the intermediate regional and standard project floods. At certain locations, the water surface in the overbanks may be higher or lower than that in the channel, a situation which may arise when the channel flow and overbank flow are independent of each other some distance downstream from the beginning of overbank flooding. Typical cross sections of the flood plain at selected locations, together with water surface elevations and lateral extent of the intermediate regional and standard project floods, are shown on plates 76 through 78.

Overbank flows become independent of the main stream channel flow and result in sheet flow in several areas. In particular, Montecito, Garrapata, and Arroyo Paredon Creeks breakout during the intermediate regional and standard project floods and inundate large areas as shown on plates 2, 3, 4, 28, 29, 34, and 36. Depths of these flows can be estimated from existing contour lines but, in most cases, are 2 feet or less. Due to smaller depths of flow and reduced velocities, damage from sheet flow is small compared to that from flow adjacent to the main channel.

Obstructions — During floods, debris collecting on bridges will decrease their carrying capacity and cause greater water depths (backwater effect) upstream from these structures. These bridges would be obstructive to the intermediate regional and standard project floods. The roadways of some bridges and their approaches would be subject to flooding and could be washed out by either of these floods. Table 3 lists the pertinent structural and water surface elevations for major obstructive bridges (data for other bridges can be taken from the profile plates).

Bridges and culverts which become clogged, trap debris such that trees, boulders, and other material are deposited out further and further upstream. Eventually the channel reaches some distance upstream of the structure becomes ineffective in conveying even small flows. Figures 9, 11, and 13 indicate structures which were effectively blocked during past floods and the resulting deposition upstream.

Velocities of flow – Velocities of flow during floods depend largely on the shape of the cross sections, conditions of the stream, the size of the discharge, and the bed slope, all of which vary in different streams and at different locations in the same stream. At the peak of an intermediate regional flood in the Montecito Streams, velocities of main channel flow along the study reaches would range from 1 to 19 feet per second (1 to 13 miles per hour) and velocities of overbank flow would range from 1 to 8 feet per second (1 to 5 miles per hour). The velocities of flow during a standard project flood would be slightly higher than that during an intermediate regional flood. The high velocities of flow in the main channels would be capable of causing severe erosion to streambanks and around bridge abutments and would transport large rocks and masses of debris. In the overbank areas, water flowing at relatively lower velocities would deposit debris and silt. Table 6 lists average velocities of flow at representative locations in the study area.

TABLE 6

AVERAGE VELOCITIES OF FLOW
(feet per second)

Location	Miles upstream from mouth	Intermediate Regional Flood		Standard Project Flood	
		Channel	Overbank	Channel	Overbank
Montecito Creek Cross Section No. 1	1.31	14	2	15	3
San Ysidro Creek Cross Section No. 2	1.74	13	3	14	3
Romero Canyon Creek Cross Section No. 3	1.39	10	4	11	5
Buena Vista Creek (East Branch) Cross Section No. 4	1.16	7	3	7	4
Buena Vista Creek (West Branch) Cross Section No. 5	0.25	7	2	8	2
Toro Canyon Creek (East Branch) Cross Section No. 6	0.34	12	5	13	6
Arroyo Paredon Cross Section No. 7	1.11	9	2	10	2

Rates of rise and duration of flooding – Both the intermediate regional and standard project floods would rise from streambed to extreme flood peak (within the study area) in about 3 hours from the beginning of flow because of the local nature of the storms. Table 7 gives the average rate of rise, height of rise (from flood stage level to maximum floodflow level), time of rise (time period corresponding to height of rise), and duration of flood stage (period of time during which flooding is above flood stage level) for Montecito Creek. The time versus flood elevation relationships are shown graphically on the Stage Hydrograph, plate 79.

TABLE 7

RATES OF RISE AND DURATION
Montecito Creek at mile 1.30

Flood	Average rate of rise (feet per hour)	Height of rise (feet)	Time of rise (hours)	Duration of flood stage (hours)
Intermediate Regional Flood	8.8	5.3	0.6	1.4
Standard Project Flood	9.1	6.4	0.7	1.7

The Stage Hydrograph for Montecito Creek was computed from the discharge versus time relationship developed for the intermediate regional and standard project storms and for specific runoff conditions. The shape of the curves and time of rise from streambed to extreme flood peak is representative of all streams in the study area. Although under unusual conditions, such as existed immediately after the Coyote Fire of September 1964, rates of rise and duration of flooding could be substantially different than computed. After a fire, the watershed cover which normally holds the water back and allows it to infiltrate is eliminated. This plus the formation of a relatively impervious layer of ash on steep mountain slopes would cause most of the rainfall to run off immediately and would produce greater volumes of debris than previously estimated.

Photographs, future flood heights – The levels that the intermediate regional and standard project floods are expected to reach at various locations on the flood plains are indicated in figures 22 through 27.

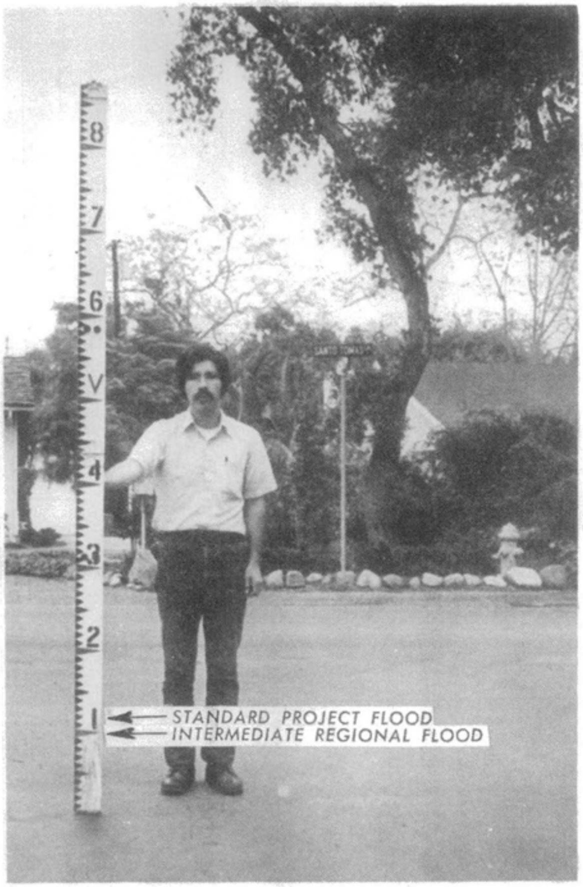


Figure 22 – Future flood heights from Montecito Creek along the intersection of Olive Mill Lane and Santo Thomas Lane.

Figure 23 – Future flood heights along Oak Creek at North Jameson Lane bridge.

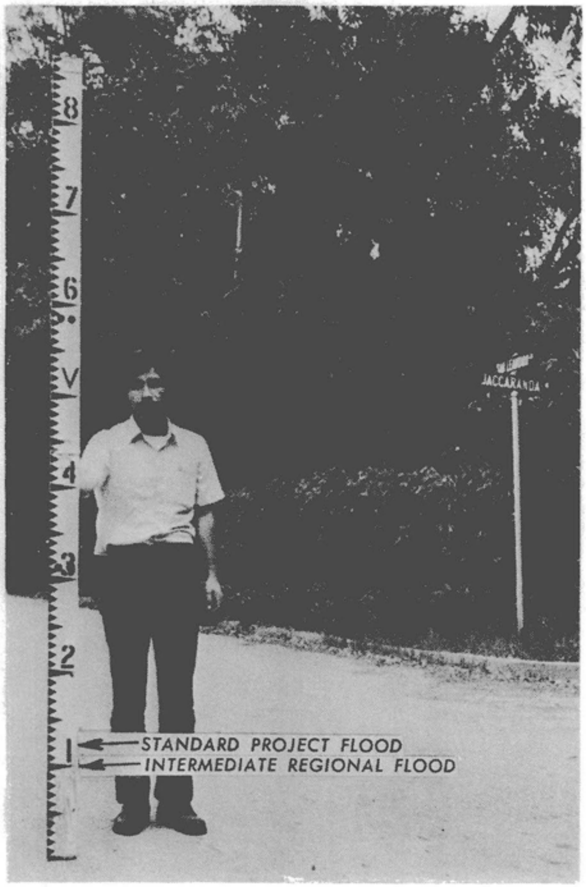


Figure 24 — Future flood heights from Oak Creek along the intersection of San Leandro Lane and Jacaranda Lane.

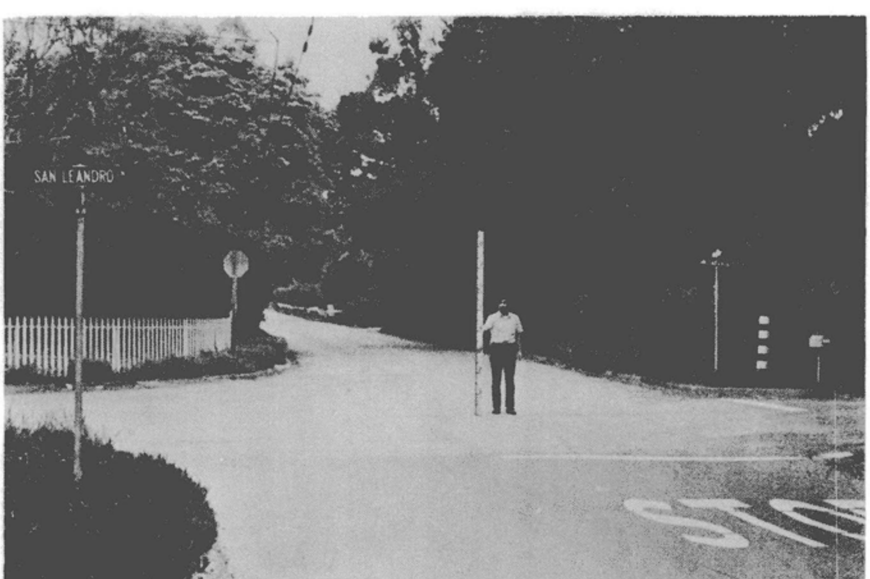
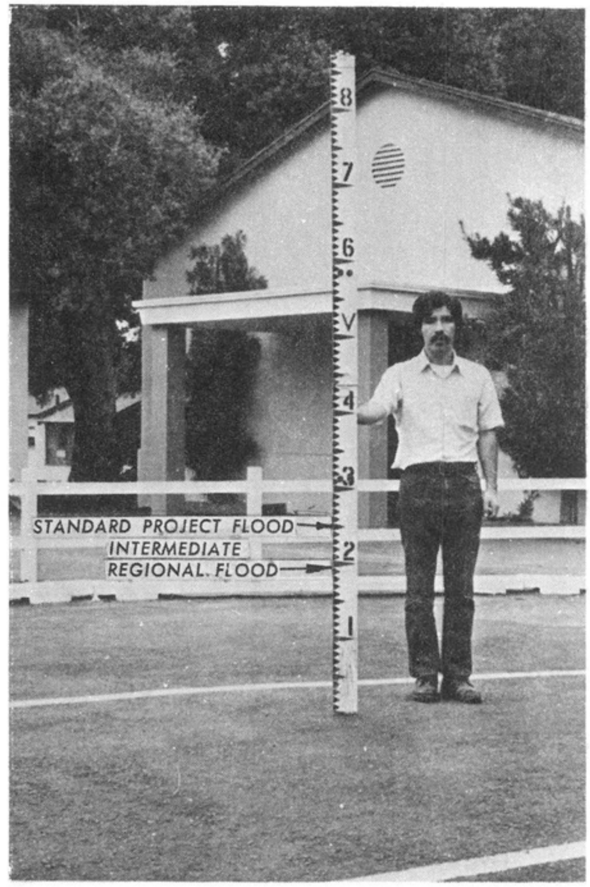


Figure 25 — Future flood heights along San Ysidro Creek near San Leandro Lane (Crane Country Day School).



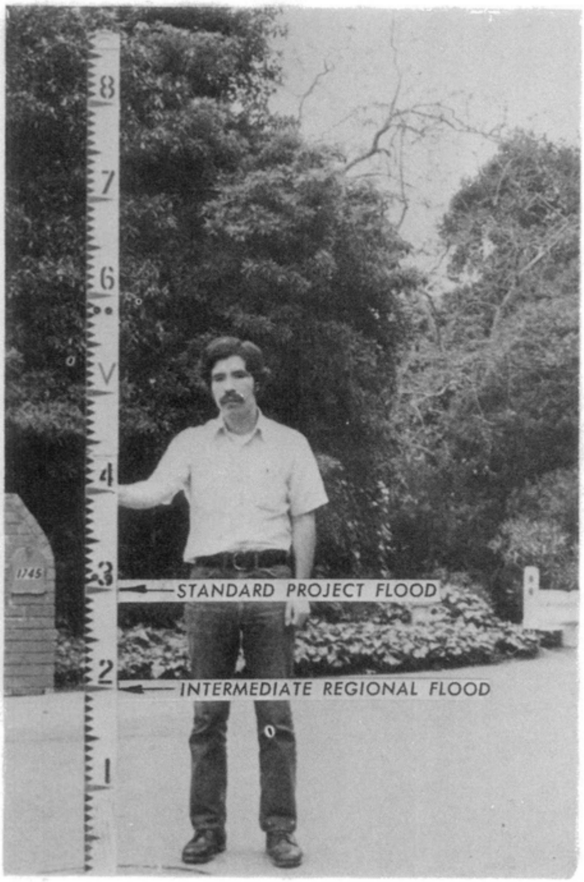


Figure 26 – Future flood heights along Romero Canyon Creek at Fernald Point Lane bridge.

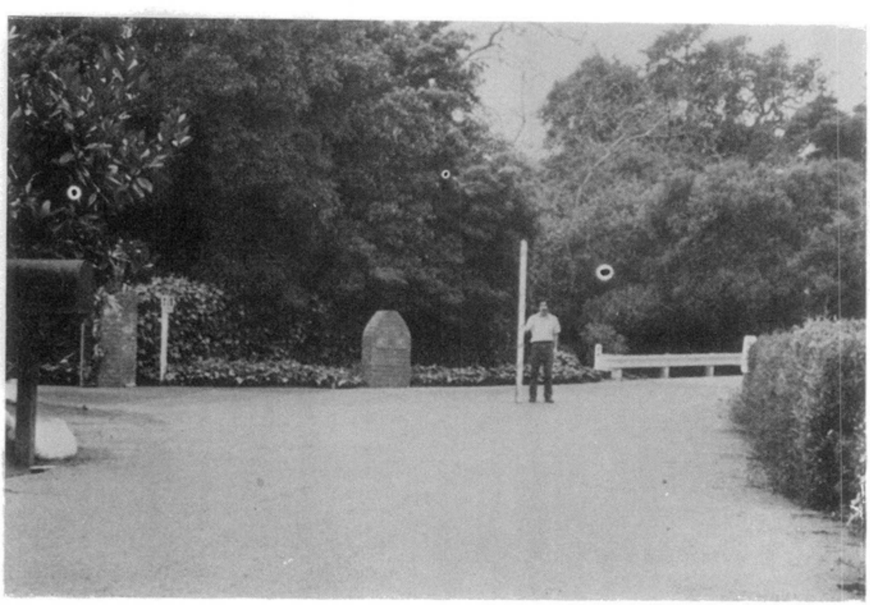
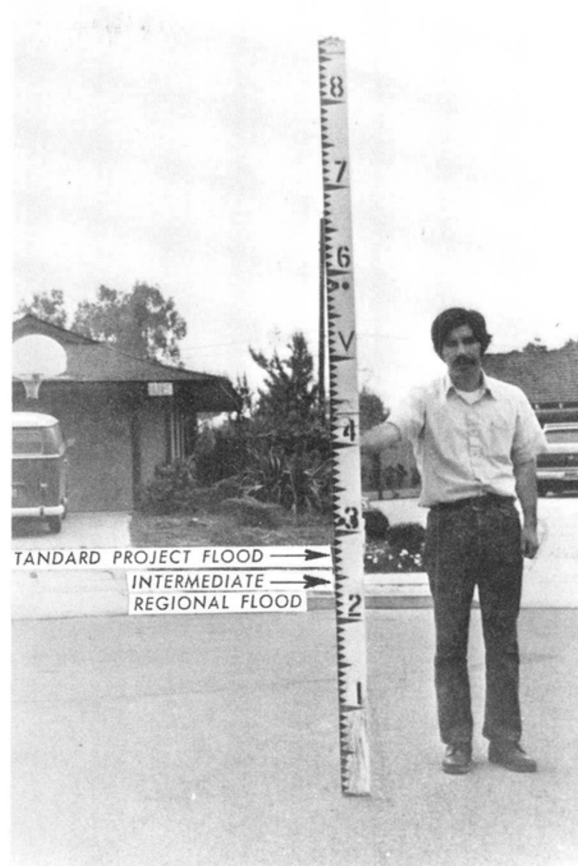


Figure 27 — Future flood heights from Garrapata Creek at the south end of Serpolla Drive.



GLOSSARY

Flood – An overflow of lands not normally covered by water and that are used or usable by man. Floods have two essential characterists: The inundation of land is temporary; and the land is adjacent to and inundated by overflow from a river, a stream, or other watercourse, an ocean, or a lake, or other body of standing water.

Normally, a "flood" is considered as any temporary rise in streamflow or stage (not ponding of surface water) that results in significant adverse effects in the vicinity. Adverse effects may include damages from overflow of land areas, temporary backwater effects in sewers and local drainage channels, creation of unsanitary conditions or other unfavorable situations by deposition of materials during flood recessions, rise of ground water coincident with increased streamflow, and other problems.

Flood Crest – The maximum stage or elevation reached by the waters of a flood at a given location.

Flood Peak – The maximum instantaneous discharge of a flood at a given location. It usually occurs at or near the time of the flood crest.

Flood Plain – The relatively flat area or lowlands adjoining the channel of a river, a stream, or other watercourse, an ocean, a lake, or other body of standing water that have been or may be covered by floodwater.

High Water Profile – A graph showing the relationship of water surface elevation to location, the latter generally expressed as distance upstream from the mouth for a stream of water flowing in an open channel. It is generally drawn to show water surface elevation for the crest of a specific flood, but may be prepared for conditions at any given time or stage.

Flood Stage – The stage or elevation at which overflow of the natural banks of a stream or body of water begins in the reach or area in which the elevation is measured.

General Winter Storm – A widespread storm usually occurring in the months of November through April, characterized by prolonged rainfall over a large area.

Local Storm – A high intensity, convective type rainstorm of short duration that is characterized by heavy rainfall over relatively small areas at any time of the year.

General Summer Storm – A summer or early fall storm of moderate duration consisting of general precipitation over a relatively large area, usually with localized convective rainfall embedded. These storms usually enter the area from the south or southeast, and frequently consist of or are associated with tropical cyclones.

Intermediate Regional Flood – A flood having an average frequency of occurrence of once in 100 years, although the flood may occur in any year or more than once in one year. It is based on statistical analyses of streamflow records available for the watershed and analyses of rainfall and runoff characteristics in the general region of the watershed.

Standard Project Flood -- The flood that may be expected from the most severe combination of meteorologic and hydrologic conditions that is considered reasonably characteristic of the geographic area in which the drainage basin is located, excluding extremely rare combinations. Peak discharges for these floods are generally about 40 to 60 percent of the probable maximum floods for the same basins. As used by the Corps of Engineers, standard project floods are intended as practical expressions of the degree of protection that should be sought in the design of flood control works, the failure of which might be disastrous.

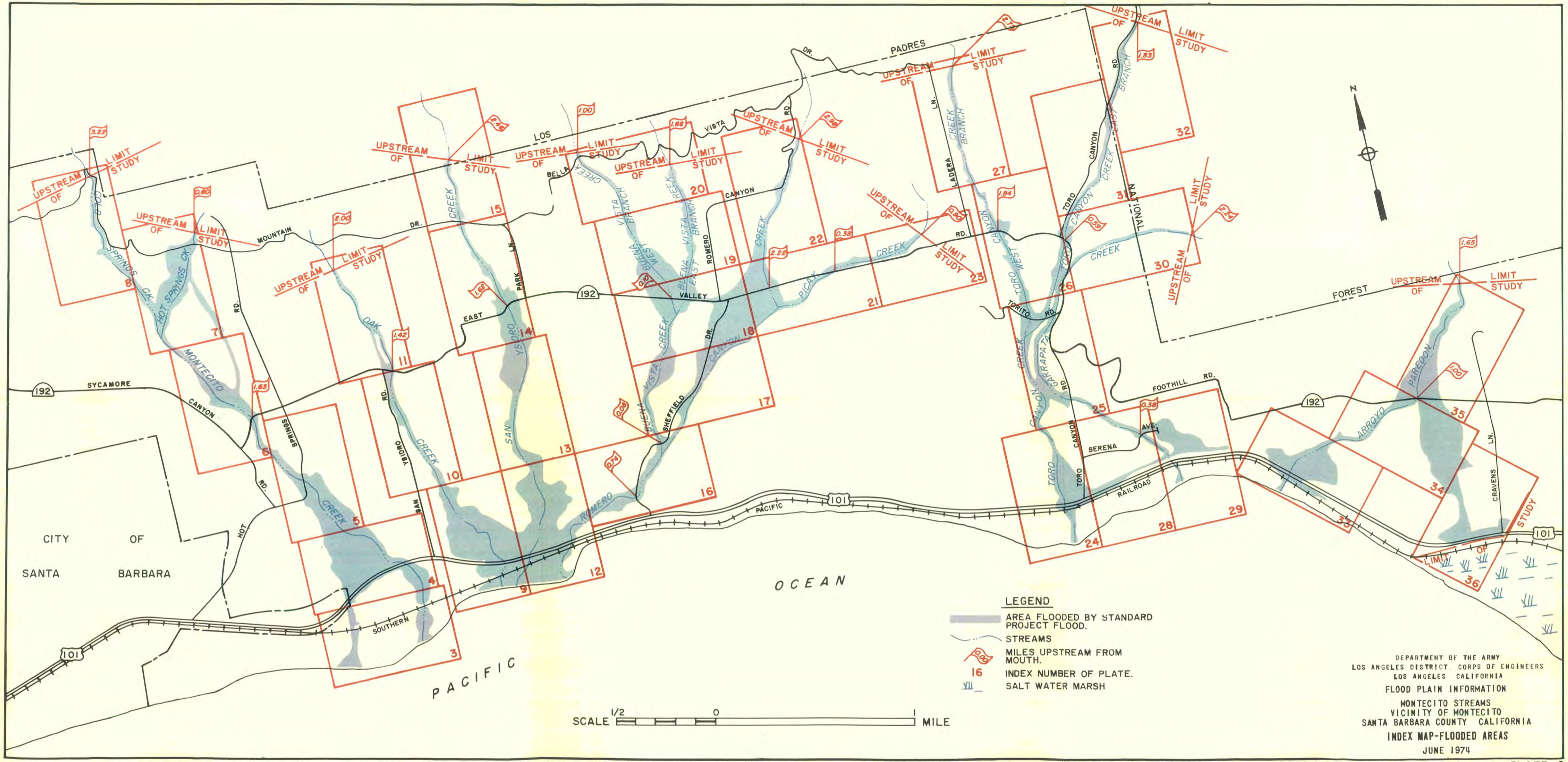
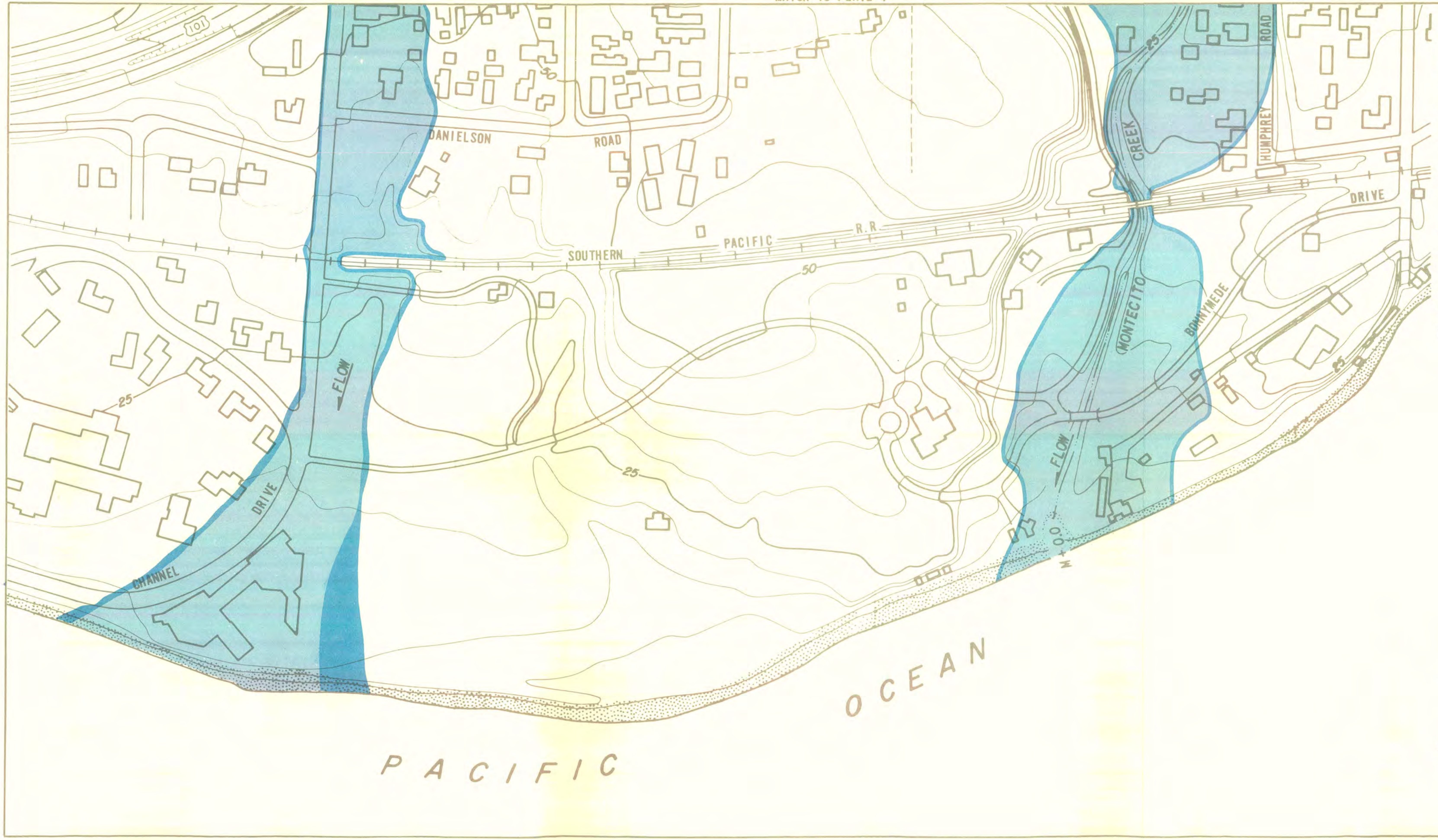

LEGEND
AREA FLOODED BY STANDARD PROJECT FLOOD.
STREAMS
MILES UPSTREAM FROM MOUTH.
16 INDEX NUMBER OF PLATE.
SALT WATER MARSH
SCALE 1/2 0 1 MILE
DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT. CORPS OF ENGINEERS
LOS ANGELES CALIFORNIA
FLOOD PLAIN INFORMATION
MONTECITO STREAMS
VICINITY OF MONTECITO
SANTA BARBARA COUNTY CALIFORNIA
INDEX MAP-FLOODED AREAS
JUNE 1974
CITY OF SANTA BARBARA
PACIFIC OCEAN
LOS PADRES NATIONAL FOREST
UPSTREAM LIMIT OF STUDY
SYCAMORE CANYON RD.
MOUNTAIN DR.
EAST VALLEY RD.
FOOTHILL RD.
SOUTHERN PACIFIC RAILROAD
HOT SPRINGS RD.
SAN YSIDRO RD.
PARK LN.
SHEFFIELD DR.
ROMERO CANYON RD.
BELLA VISTA DR.
LADERA LN.
TORO CANYON RD.
TORITO RD.
SERENA AVE.
CRAVENS LN.
MONTECITO CREEK
COLD SPRINGS CK.
HOT SPRINGS CK.
OAK CREEK
SAN YSIDRO CREEK
ROMERO CREEK
BUENA VISTA CREEK
WEST BUENA VISTA BRANCH
EAST BUENA VISTA BRANCH
PICAY CREEK
TORO CANYON CREEK
WEST TORO CANYON
EAST BRANCH
CREEK BRANCH
GARRAPATA CREEK
ARROYO PAREDON
192
101
3.22
0.80
2.00
1.42
1.83
2.16
1.62
1.00
1.66
2.96
2.25
0.38
0.90
0.10
0.06
0.74
2.70
1.84
0.59
1.83
2.24
0.38
1.65
1.00
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

PLATE 2



DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
LOS ANGELES, CALIFORNIA

FLOOD PLAIN INFORMATION
VICINITY OF MONTECITO
SANTA BARBARA COUNTY, CALIFORNIA

FLOODED AREAS
MONTECITO STREAMS

JUNE 1974