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FEBRUARY 12, 1992 FLOOD:

VENTURA BEACH RV RESORT

A SPECIAL REPORT
SUBMITTED BY FRIENDS OF THE VENTURA RIVER
TO THE
SAN BUENAVENTURA CITY COUNCIL

April 20, 1992

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Introduction

On February 12, 1992 the Ventura River over-flowed its main channel several hundred yards above the Main Street Bridge and poured across agricultural fields, the west end of Main Street, and into the Ventura Beach RV Resort. The flood waters were sufficiently deep and swift to pick up and carry several recreational vehicles back into the main channel of the Ventura River and out to the ocean.

While numerous individuals were stranded, and one homeless individual lost his life, the flood flows fortunately reached their peak during the mid-morning when visibility was good and rescue operations were possible. Had the flood occurred several hours earlier during the night, the damage and loss of life could have been considerably higher.

The flood flows which caused the damage and loss of life were estimated at about 46,000 cubic feet per second. As such, the flood is rated as a 40 year frequency event, that is a flood event which has the chance of occurring once every 40 years, or a 2.5% chance of occurring in any given year. Such a storm has a 20% chance of occurring in a 10-year period, and a 15% chance of occurring in a 5-year period. The flood which occurred on February 12, 1992, therefore, was not a particularly unusual flood event, and in fact has a rather high probability of occurring again in a relatively short time.

Ventura River System

The Ventura River begins in the rugged transverse range, runs through a relatively broad and shallow valley, and terminates at a marine delta. Any evaluation of the floods of February 12, 1992 requires a basic understanding of the different components of the Ventura River system. These elements each have distinct geologic, geomorphic, and hydrologic characteristics which are critical to planning and land use planning along the Ventura River or its tributaries.

The tributaries in the headwaters have steep gradients which serves to collect the majority of the water in the system. Because of their steepness and the easily erodible nature of the soils through which they pass, these tributaries account for the majority of the sediment produced in the Ventura River system through erosion.

The main stem of the river has a relatively shallow gradient, and as a result of tectonic up lift and periodic eustatic sea-level changes, runs through a broad bed composed of loosely consolidated alluvium. The main stem is also characterized by braided or multiple channels. The main stem, in addition to carrying the combined flows of the tributaries also acts as a temporary storage area for sediments eroded in the headwaters. These sediments are periodically picked up and transported downstream where they are either passed to the ocean or fill existing channels, thereby forcing flood waters out of current channels or into new or previously abandoned channels. As a result, channels are subject to rapid sifts during periodic floods making accurate predictions of the areal extent of flooding extremely difficult.

The fan shaped delta at the rivers' mouth (beginning 1 mile upstream from the ocean) is characterized by a system of distributary or branching channels which discharge river flow to the ocean at different points along the ocean frontage of the delta. The gradient in this segment of the river is extremely shallow; and as result, deposition of sediment and the consequent dispersal of river flow is the dominant geologic/hydrologic process. The Ventura Beach RV Resort is particularly susceptible for flooding because of its location on the Ventura River Delta which is subject to the full force of combined force of the runoff generated by all of the river's tributaries and the unpredictable nature of the branching channel pattern.

Inadequacy of Flood Analysis

The general flood potential of the Ventura River has been well known for more than a century. Following the disastrous floods of 1969 the U.S. Army Corps of Engineer prepared a series of comprehensive studies of the major drainages of Ventura County which summarized the nature of floods in the Ventura River. The study noted particularly the unpredictable nature of flood flow patterns in the main stem of the Ventura River, referring to the:

> rapid and destructive shifts in the currents as some channel sections are filled and as others are cut out. . . This stability of the Ventura River may cause actual flooded areas to vary from those of theoretical floods. (U.S. Army Corps of Engineers, "Flood Plain Information: Ventura River (including Coyote Creek) Ventura County California", 1971, p 5.)

The U.S. Army Corps of Engineer study, however, did not make a distinction between the main stem of the Ventura River and the various distributary channels which make up the well developed delta at the mouth, the site of the Ventura Beach RV Resort.

Nevertheless, the occurrence of flooding on the site of the Ventura Beach RV Resort has been well documented and reflected in previous developments and land use designations for the area. Both the Main Street bridge constructed in 1932 and the U.S. 101 crossing constructed in 1964 were designed to pass flood flows across what is now the Ventura Beach RV Resort. Prior to the development of the Ventura Beach RV Resort the land-use designation on the property was agriculture, with a flood overlay which prohibited permanent structures.

Despite the recognized flood hazards associated with the Ventura River Delta, the flood analysis performed for the Ventura Beach RV Resort was defective in a number of fundamental ways:

(1) it relied on a flood analysis methodology which is inappropriate to a mixed-sediment load stream with a highly mobile channel; (2) it misinterpreted the nature of the flooding patterns associated with the project site on the Ventura River Delta; (3) it underestimated the magnitude and frequency of catastrophic flooding in the lower river; (4) it incorrectly assessed the significance of dams, bridges, and levees along the river; and (5) it ignored the effects of urbanization in the watershed on the flooding potential of the Ventura Beach RV Resort site.

Methodology

The applicant proposed and governmental agencies agreed to the use of a standard HEC-2 analysis developed by the U.S. Army Corps of Engineers for evaluating flooding potential of the Ventura Beach RV Resort site.

This model for predicting the areal extent of flooding under given magnitude of storm flows assumes a **fixed** cross-sectional channel area, and is not appropriate for watercourses with highly mobile channels and banks such as the Ventura River. It is particularly inappropriate for use on a delta where there are multiple channels. The inadequacy of the HEC-2 computer modeling was tragically demonstrated during the recent inundation of the the Ventura Beach RV Resort. The HEC-2 analysis in this instance predicted that the site would not be inundated in less than 78,000 cubic feet per second flows, but in fact was completely inundated with a 46,000 cubic feet per second flow.

Flooding Pattern

The analysis misrepresented the nature of flooding patterns by misapplying the Federal Emergency Management Agency (FEMA) flood insurance terminology "floodway" and "floodway fringe" to the project site, using them for planning purposes for which they were not originally intended.

Any development in an area which receives run-off will displace that runoff and therefore cause flood flows to either spread out **laterally** or rise **vertically**. In an effort to discourage the lateral encroachment into the flood prone land, FEMA has chose to determine flood insurance eligibility by

reference to the rise in vertical elevation of flood flows resulting from later incursions into the flood plain of a watercourse.

The term "floodway" is a technical term used by FEMA to designate a **lateral** area into which a discharge from a 100 year frequency storm can be squeezed without increasing the **vertical** height of the flood flow more than one (1) foot. Significantly, this term does not designate those areas which will be inundated **only** during a 100 year frequency storm. Similarly, the term "floodway fringe" is a technical term used to designate that portion of the natural 100 year flood plain which would be **theoretically** left dry after squeezing the 100 year flood flow into the ""floodway". It does not designated that portion of the flood plain which is necessarily less prone to flooding.

The two definitions were created for the purpose of determining flood insurance eligibility, and to define a standard which would allow some development within flood prone lands where such flood prone areas were so extensive (such as in the mid-west) that to categorically prohibit development on these lands would result in the removal of large tracts from any development, or intensive human use. Development in areas designated as "floodway" would by definition cause a rise of one (1) foot in flood flow elevations and therefore not be eligible for low cost flood insurance without incorporation of some type of flood proofing features such as raised foundations. Conversely, development in the area designated as "floodway fringe would not cause a rise of one footing flood flows elevations and therefore would be eligible flood insurance without applying special flood proofing building standards.

Both of the terms are artificial in the sense that the do not purport to describe the **natural** pattern of flooding, but rather areas in which flood flows man be **artificially** channeled. They specifically were not intended to describe the pattern of flooding in either braided channels or on deltas with a system of distributary channels such as displayed by the Ventura River. Nevertheless both terms were used throughout the planning and decision making process to designate areas on the Ventura Beach RV Resort which would experience projected levels of flooding under uncontrolled conditions.

It must be emphasized that the "floodway fringe" areas are **not** necessarily less susceptible to flooding than "floodway areas: they are simply, and only theoretically, what is left of the flood plain for development without special flood insurance requirements when a 100 year frequently flood is squeezed laterally into the point where its vertical rise in no more than one (1) foot.

Magnitude & Frequency of Flooding

The analysis underestimated the magnitude and frequency of flooding in the lower Ventura River, and specifically where the project was to be situated on the Ventura River Delta.

Fluvial geomorphologists have long recognized the presence of a major active delta at the moth of the Ventura River. The first U.S. Coast and Geodetic Survey of the Pacific Coast in 1855 mapped the delta and its various distributaries in considerable detail. They have also recognized

that the defining characteristic of a delta is a system of distributary channels which are subject to rapid and unpredictable deposition, erosion, and lateral migration. The frequency of flooding within distributary channels is not directly a function of the magnitude of flood flows, but is the result of deposition and erosion patterns which is only partially dependent upon the magnitude of flood flows. Consequently, the flooding associated with distributary channels may be more frequent than than a standard flood frequency analysis might suggest.

The western most distributary channels of the Ventura River Delta have been irregularly, but frequently used in major storm events. The distributary channel which runs through the Ventura Beach RV Resort and which discharges through the Second Mouth of the Ventura River has been used to pass flood waters during the 1969, 1978, 1982, and 1992 flood events - an average of once every six years. Furthermore the flood flows rated as a 40 year frequency event (i.e., 46,000 cubic feet per second) have actually occurred 4 times over the last 23 years, or on the average of every 6 years. This past history of flooding on the Ventura River Delta was not taken into account in the flood analysis performed for the Ventura Beach RV Resort.

Dams, Bridges & Levees

The flood analysis mis-evaluated the significant of dams, bridges, and levees constructed in the watershed, assuming that these structures had substantially reduced the frequency and magnitude of flooding, as well as the basic pattern of distributary flooding in the Ventura River Delta.

These bridges were constructed in line with The Southern Pacific Railroad bridge over the Second Mouth constructed in 1914, the Main Street Bridge constructed in 1932, and the U.S. 101 bridge and associated "fairweather" crossing were all constructed to accommodate the western distributary channel which runs through the middle of the Ventura Beach RV Resort. None of these structures was intended to restrict the flow through this distributary channel. The flood analysis performed for the Ventura Beach RV Resort site found, however, that there was no evidence of distributary channels through the subject property.

It is significant that the level of use of the distributary channel across which the Ventura Beach RV Resort is constructed has been maintained since the construction of the Matilija Dam (1948) and Casitas Dam (1958) in the Ventura River watershed.

These two dams were not designed or are operated for food control purposes. While the larger of the two (Casitas with a storage capacity of 254,000 acre feet) has some flood attenuation capacity when it is not full, it was not built on the largest tributary of the river; further even this moderating effect is substantially lessened if a flood coincides with a full reservoir as it did in 1978 and 1982. The Robles Diversion which diverts water to Casitas Reservoir from the main stem of the Ventura River has a maximum capacity of 500 cubic; the total diversion during the February 12, 1992 flood thus constituted only about 1% of the total flood flows.

It should also be noted that proposals to use the Casitas Reservoir as a storage reservoir for imported state water would increase the likelihood

that the Casitas reservoir would be maintained at a higher level, and therefore provide even less flood attenuating capacity.

The Matilija Dam, situated on the major food producing tributary of the Ventura River has has is storage capacity which has been reduced to less than 1000 acre feet as a result of siltation and lowering of the dam crest; as a result it has no appreciable effect on flood flows.

The Ventura River levee which was constructed by the U.S. Army Corps of Engineers on the east side of the Ventura River in 1948, rather than confining the river to its main channel, has increased the tendency of the river to utilize the distributary channels to the west, including the channel over which the Ventura Beach RV Resort was constructed. As noted above, the design of the U.S. 101 crossing was intended to accommodate these distributary flows, and incorporates a large "fairweather" crossing to the west of the highway 101 bridge which passes major flood flows in conjunction with the bridge.

Finally, the flood analysis did not consider the effects of increased urbanization in the Ventura River watershed. Since the end of the Second World War the Ventura River watershed outside of the Los Padres National Forest has undergone substantial urbanization and agricultural development. These changes, which involve the construction of increased impermeable surfaces and grading on steep hill-slopes have increased the rate and percentage of run-off over historical levels which in turn has contributed to increased erosion, deposition, and inundation in the lower reaches of the River.

Additionally, fire suppression programs in the National Forest have led to less frequent but more widespread forest fires such as the most recent Wheeler Fire in 1985 which also greatly increases sediment loads in the flood flows, leading to expanded areas of inundation).

Conclusion and Recommendations

In the light of the foregoing, it can be reasonably expected that the Ventura Beach RV Resort, if allowed to continue, will be subject to repeated flooding and damages, including possibly the loss of life. It is doubtful that the City, given its past experience with flooding on this site, would be able to avoid all financial and legal responsibility for property damages or loss of life resulting from future flood events.

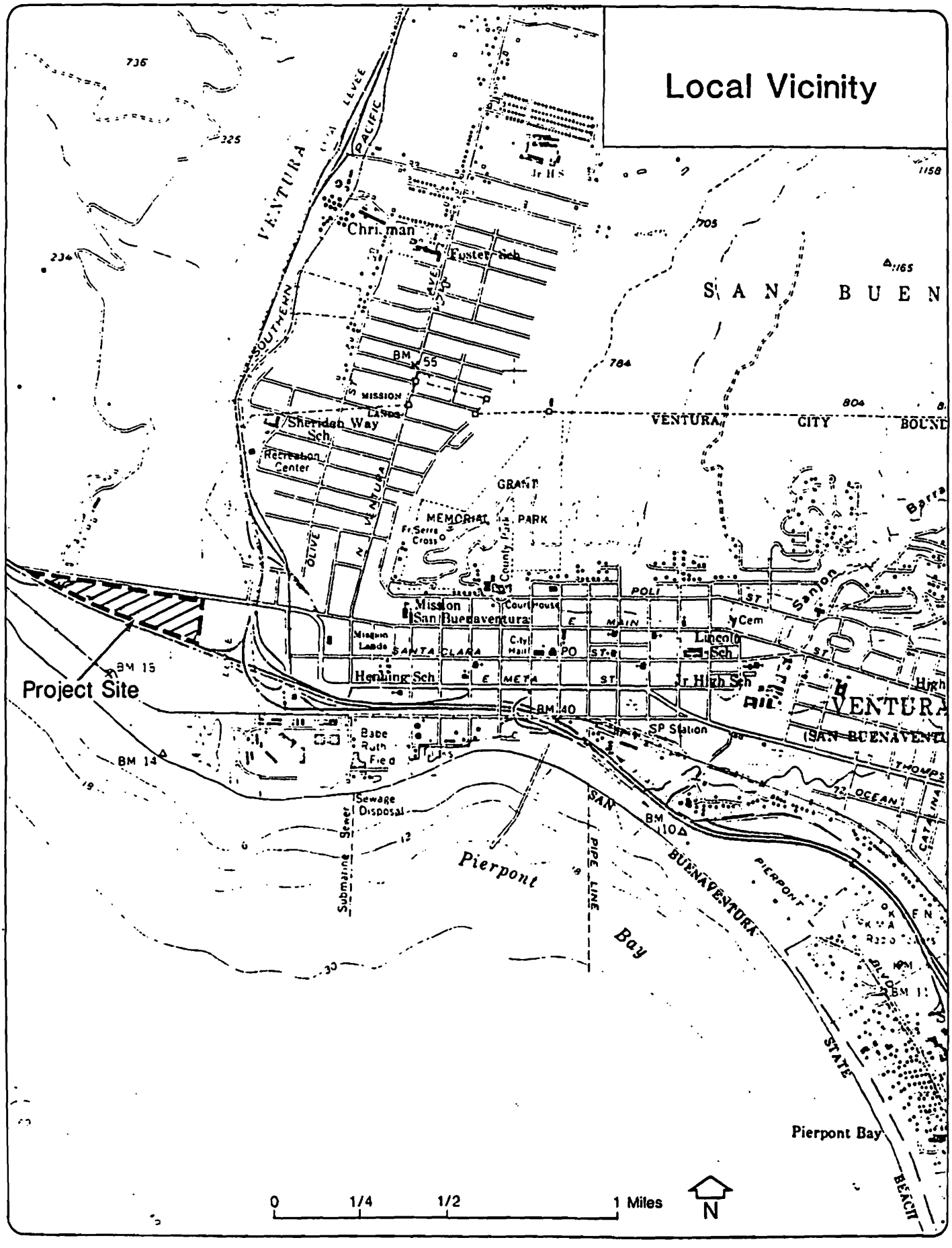
In order to avert a further tragedy the City should seriously consider the following options:

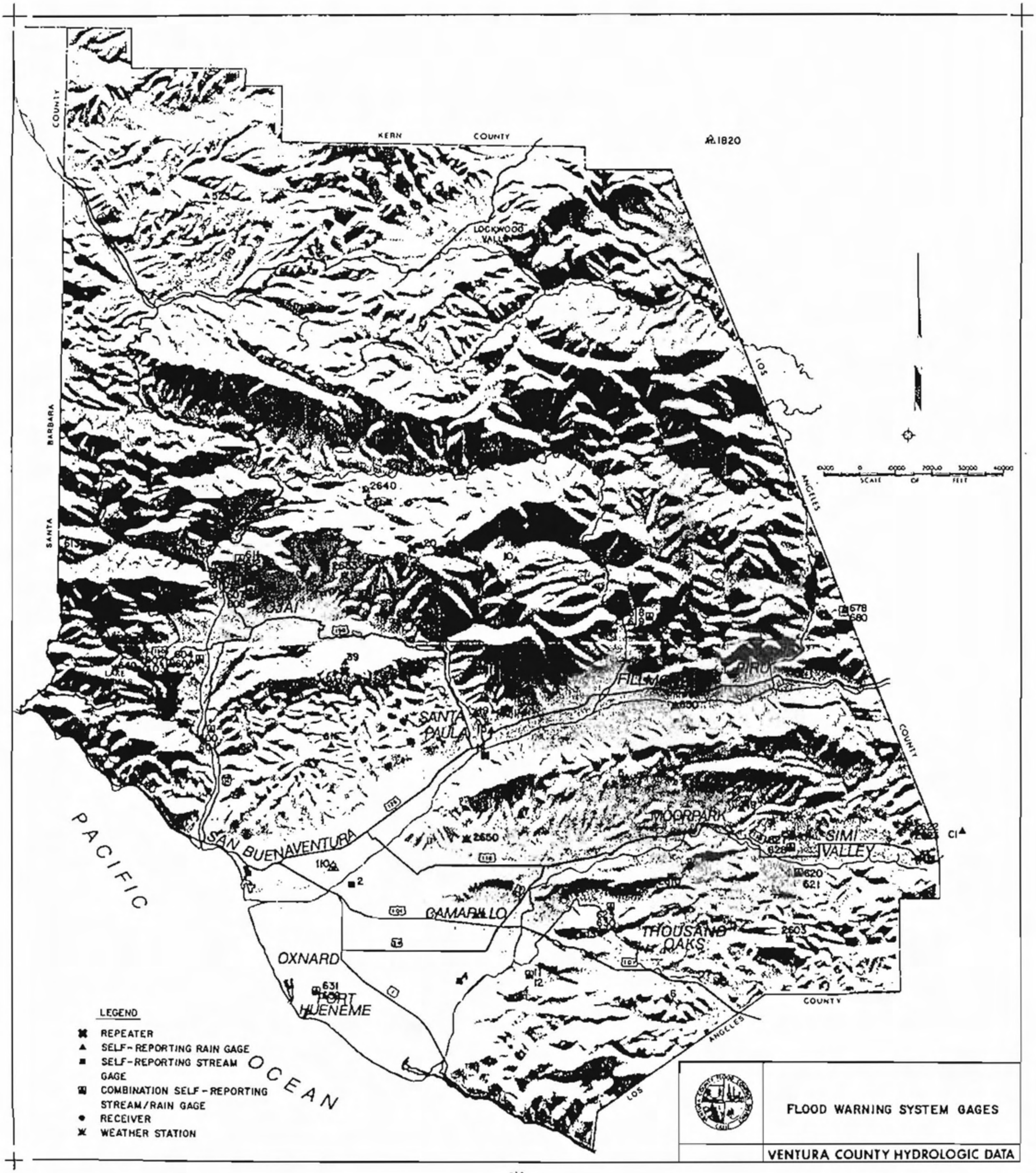
1. Revocation. Initiate a permit revocation hearing for the purpose of examining the suitability of the existing use in the light of the demonstrated flood hazards associated with the subject parcel. Revocation review should also consider possible ways of lessening hazards to patrons of the Ventura Beach RV Resort by: (a) limiting the time of year the park may be occupied; (b) limiting the areas of the Ventura Beach RV Resort which may be occupied; and (c) strengthen permit conditions regarding the length of stay, and the flood warning system.

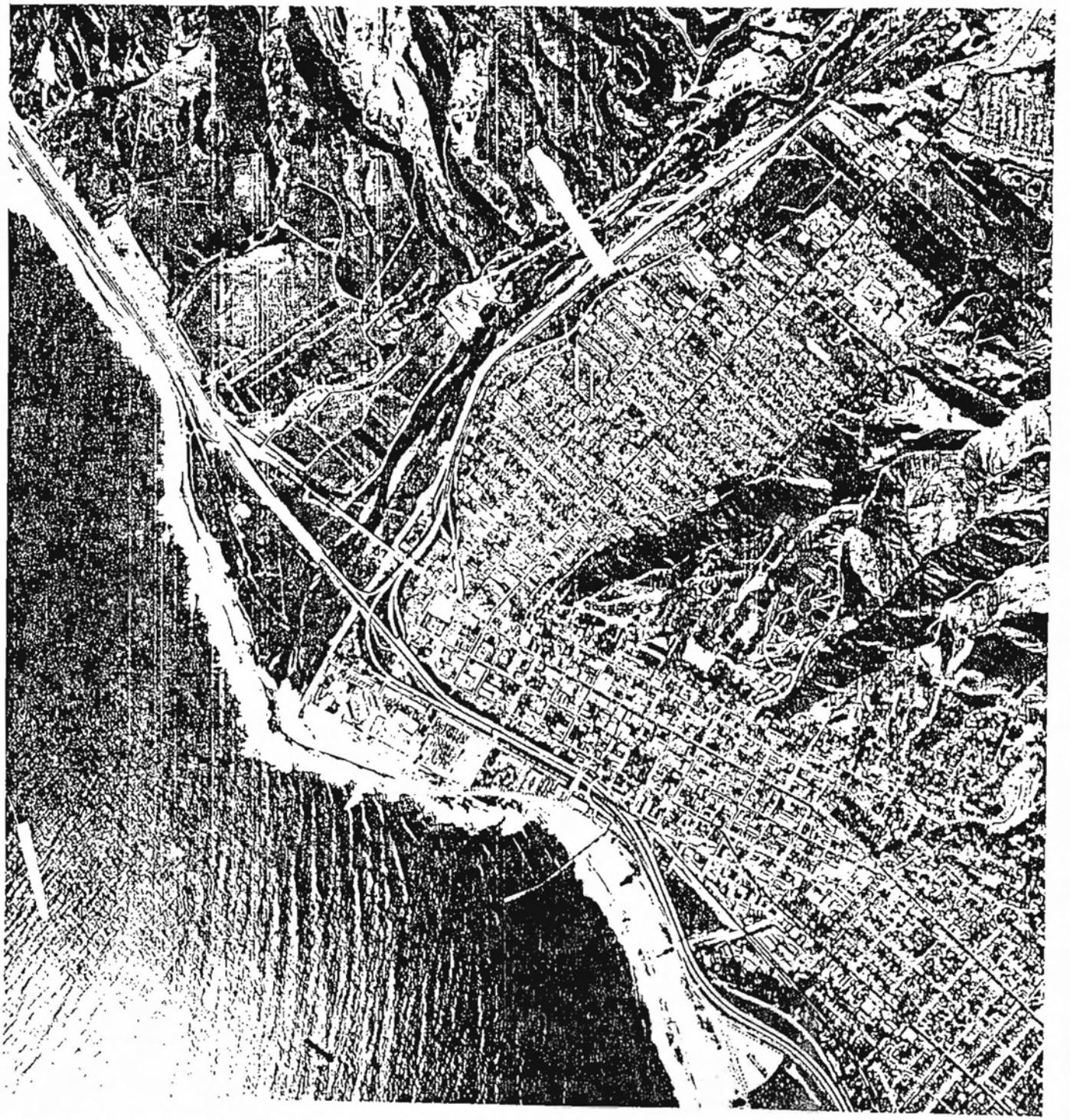
2. Permit Compliance. Vigorously pursue violations associated with the operation of the Ventura Beach RV Resort including: (a) the unpermitted placement of 26,000 cubic yards of soil within the designated buffer area adjacent to the main Ventura River channel; and (b) the unauthorized length of stay of patrons in the Ventura Beach RV Resort.

4. Acquisition. Explore the acquisition of the parcel in conjunction with other public and private entities such as the California Coastal Conservancy and the Trust for Public Land for the purpose of converting the present use to an open space use more compatible with the flood hazards and environmentally sensitive habitats associated with the site.

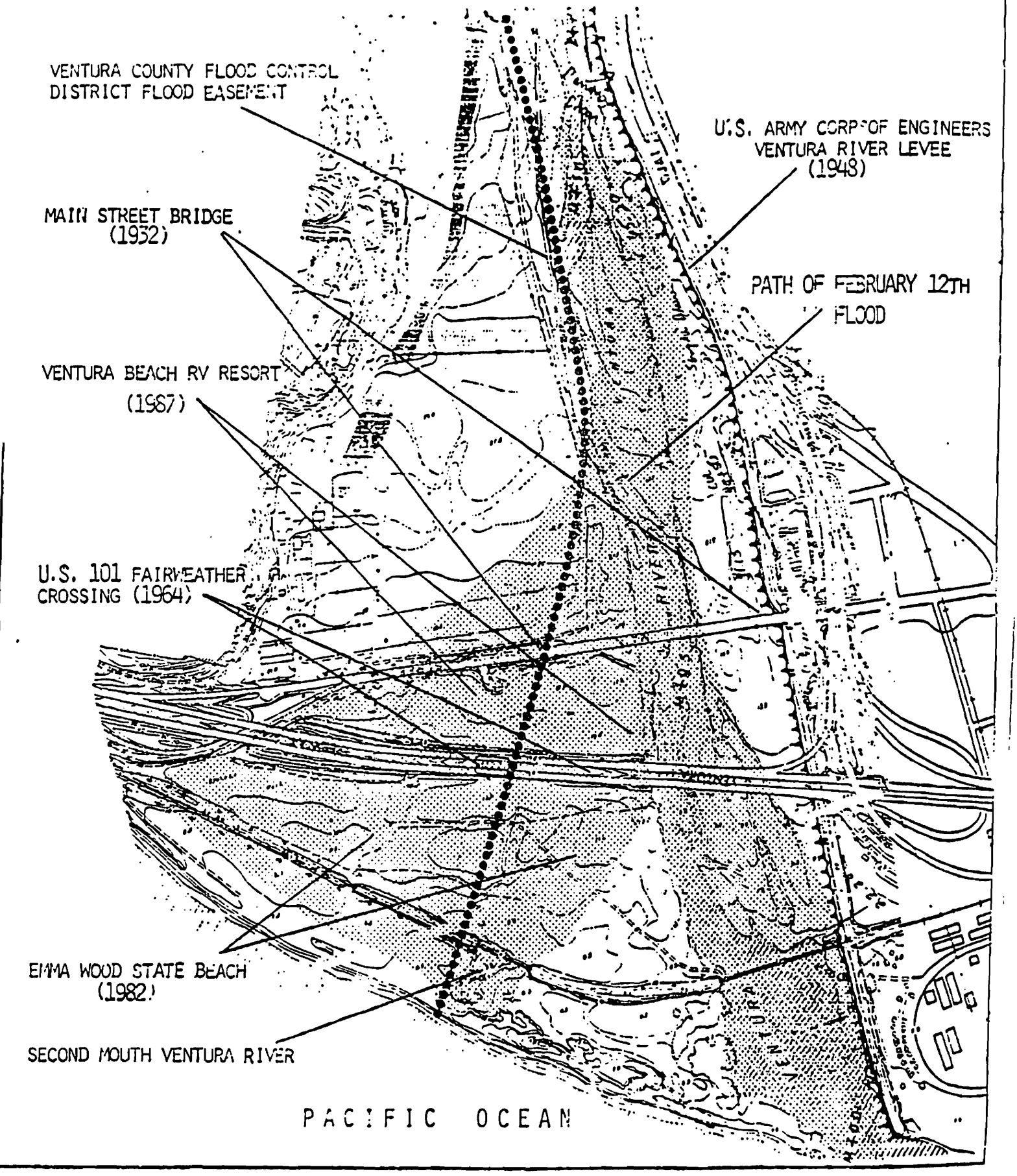
5. Amortization. Initiate an amortization program for this and other parcels with non-conforming uses in the Regulatory Floodways identified by FEMA for the purpose of eventual closure of the Ventura Beach RV Park and public acquisition.

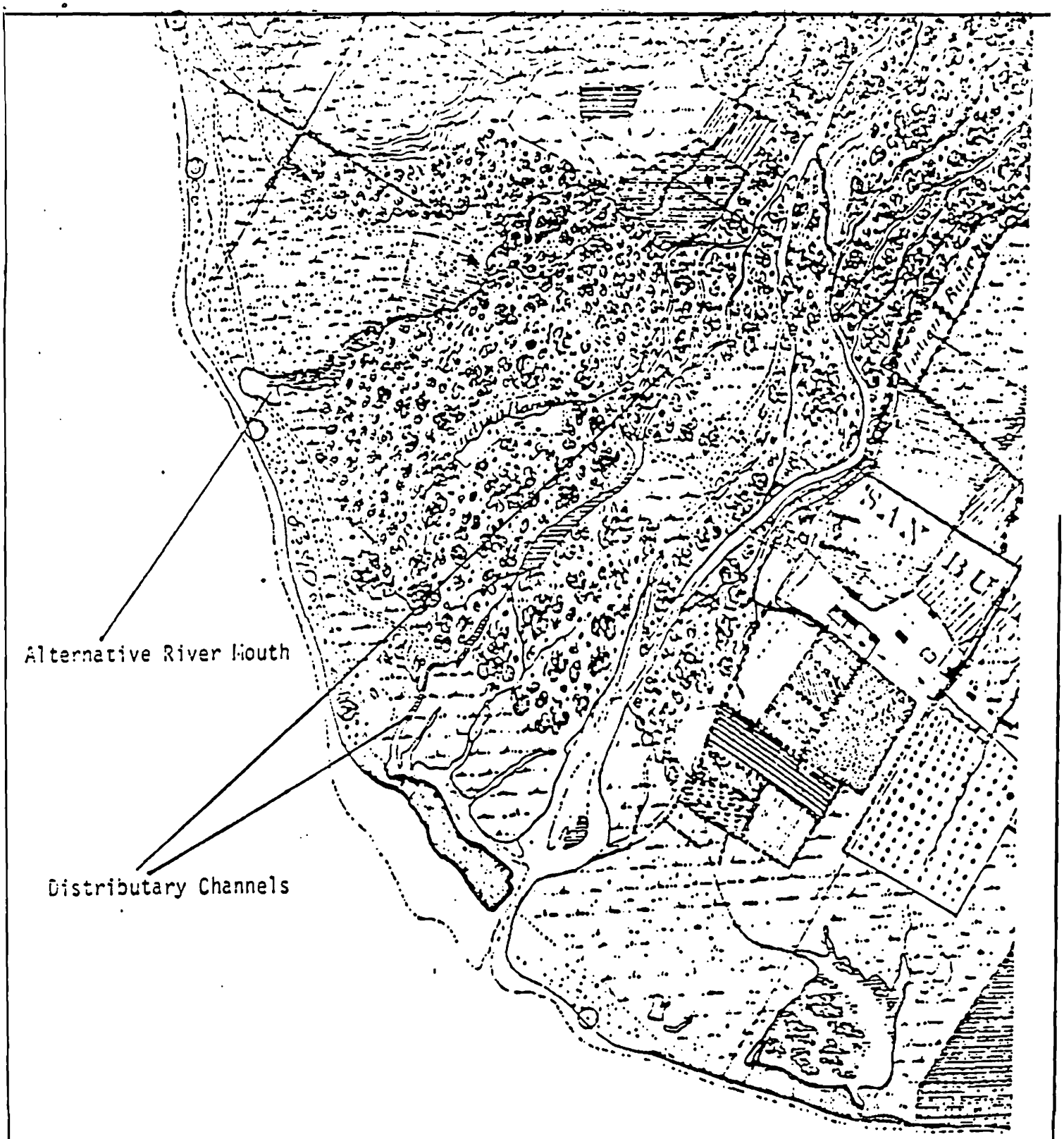

Local Vicinity
Project Site
Pierpont Bay
0
1/4
1/2
1 Miles
N


KERN COUNTY
SANTA BARBARA COUNTY
LOS ANGELES COUNTY
LOCKWOOD VALLEY
OJAI
SANTA PAULA
FILLMORE
PIRU
MOORPARK
SIMI VALLEY
SAN BUENAVENTURA
CAMARILLO
THOUSAND OAKS
OXNARD
PORT HUENEME
PACIFIC OCEAN
SCALE OF FEET
LEGEND
REPEATER
SELF-REPORTING RAIN GAGE
SELF-REPORTING STREAM GAGE
COMBINATION SELF-REPORTING STREAM/RAIN GAGE
RECEIVER
WEATHER STATION
FLOOD WARNING SYSTEM GAGES
VENTURA COUNTY HYDROLOGIC DATA

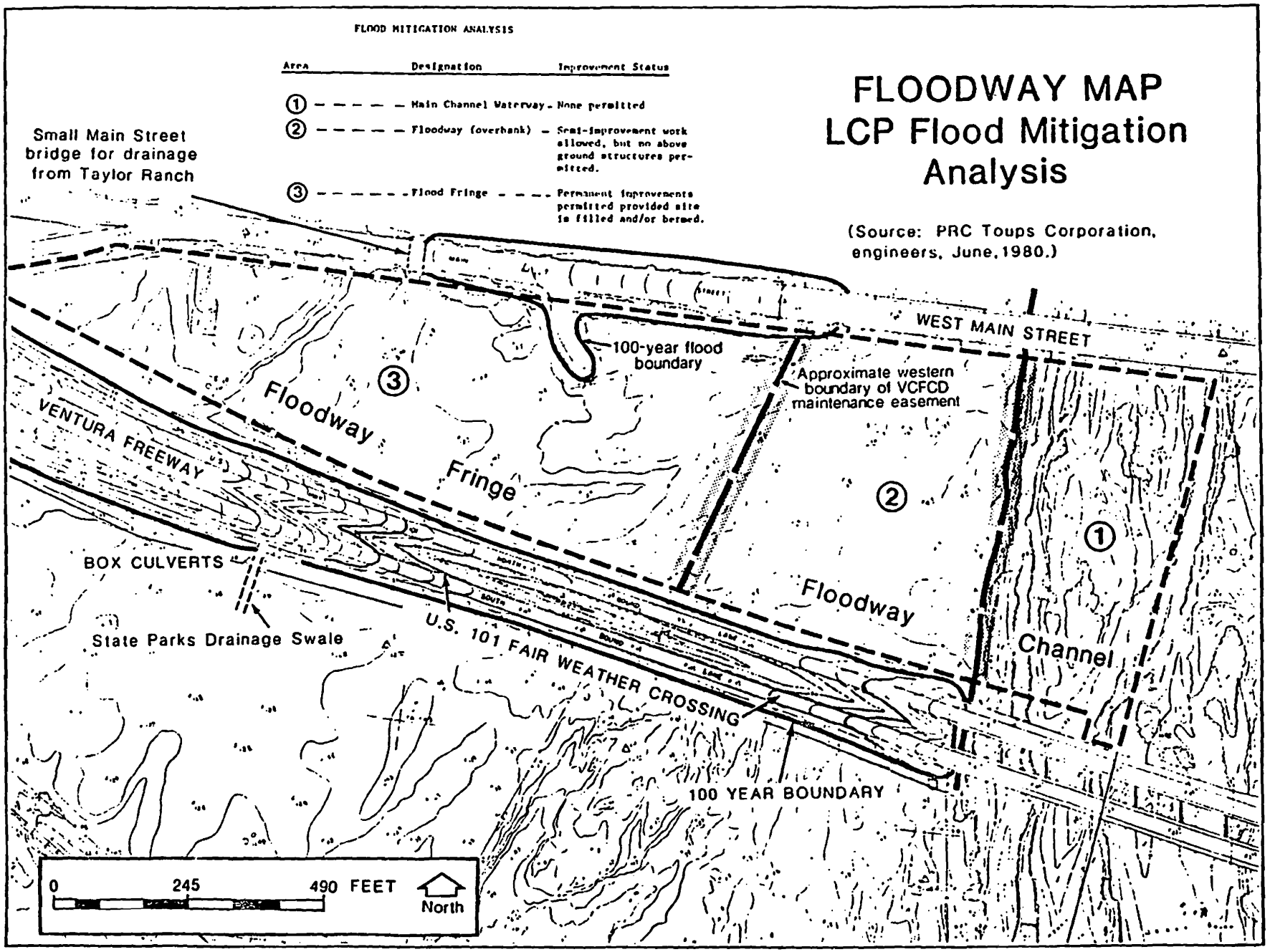


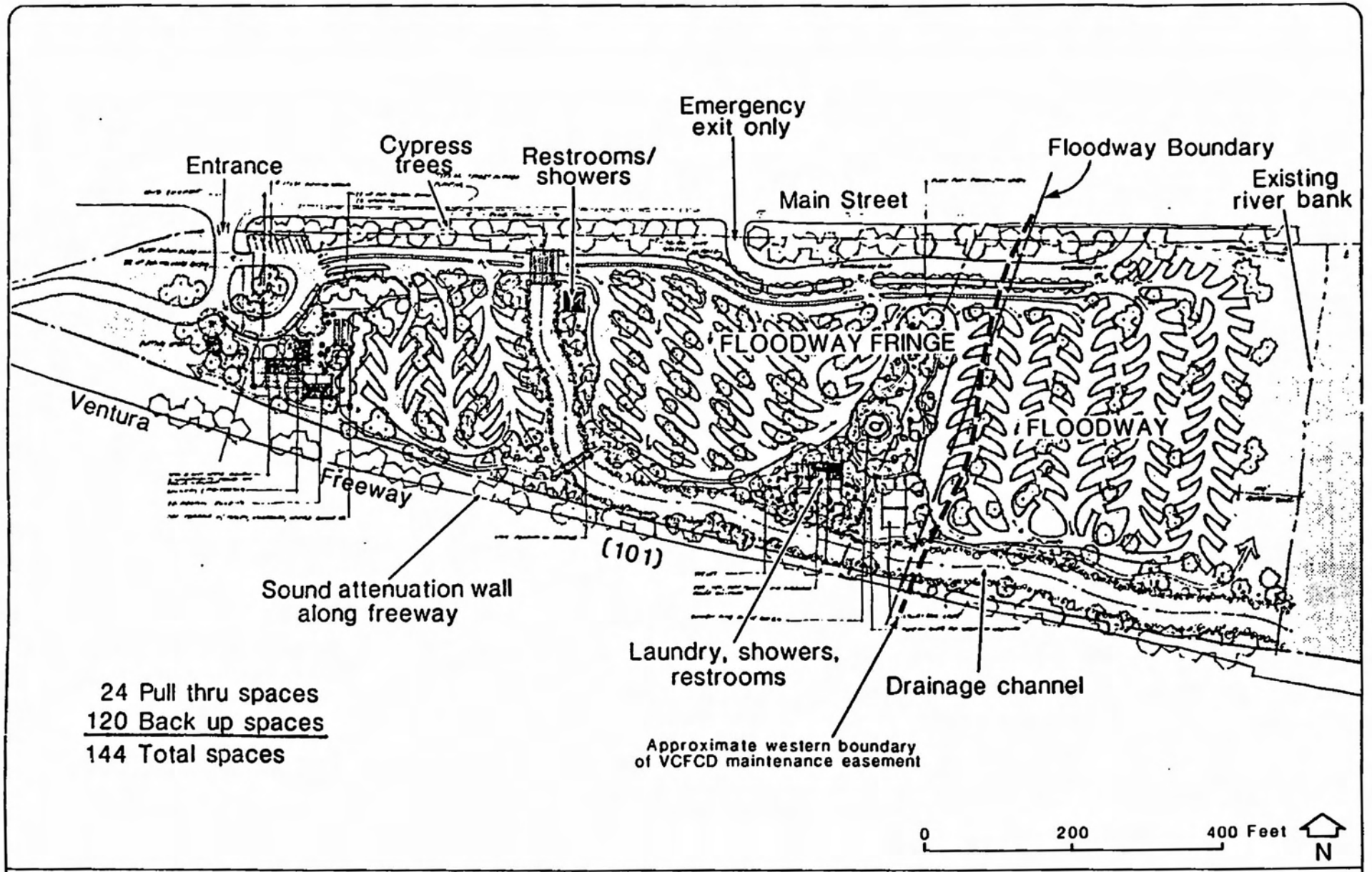
VENTURA RIVER DELTA. THE VENTURA RIVER DELTA HAS BEEN FORMED BY DISTRIUTARY CHANNELS OF THE VENTURA RIVER WHICH FILL WITH SEDIMENT AS THE VELOCITY OF FLOWS DECREASE UPON REACHING THE PACIFIC OCEAN. BECAUSE OF THE RAPID TECTONIC UPLIFT IN THE VENTURA RIVER WATERSHED, THE VENTURA RIVER DELTA IS THE ONLY ADVANCING DELTA ALONG THE PACIFIC COAST.


VENTURA COUNTY FLOOD CONTROL DISTRICT FLOOD EASEMENT
U.S. ARMY CORPS OF ENGINEERS VENTURA RIVER LEVEE (1948)
MAIN STREET BRIDGE (1952)
PATH OF FEBRUARY 12TH FLOOD
VENTURA BEACH RV RESORT (1967)
U.S. 101 FAIRWEATHER CROSSING (1964)
EMMA WOOD STATE BEACH (1982)
SECOND MOUTH VENTURA RIVER
PACIFIC OCEAN

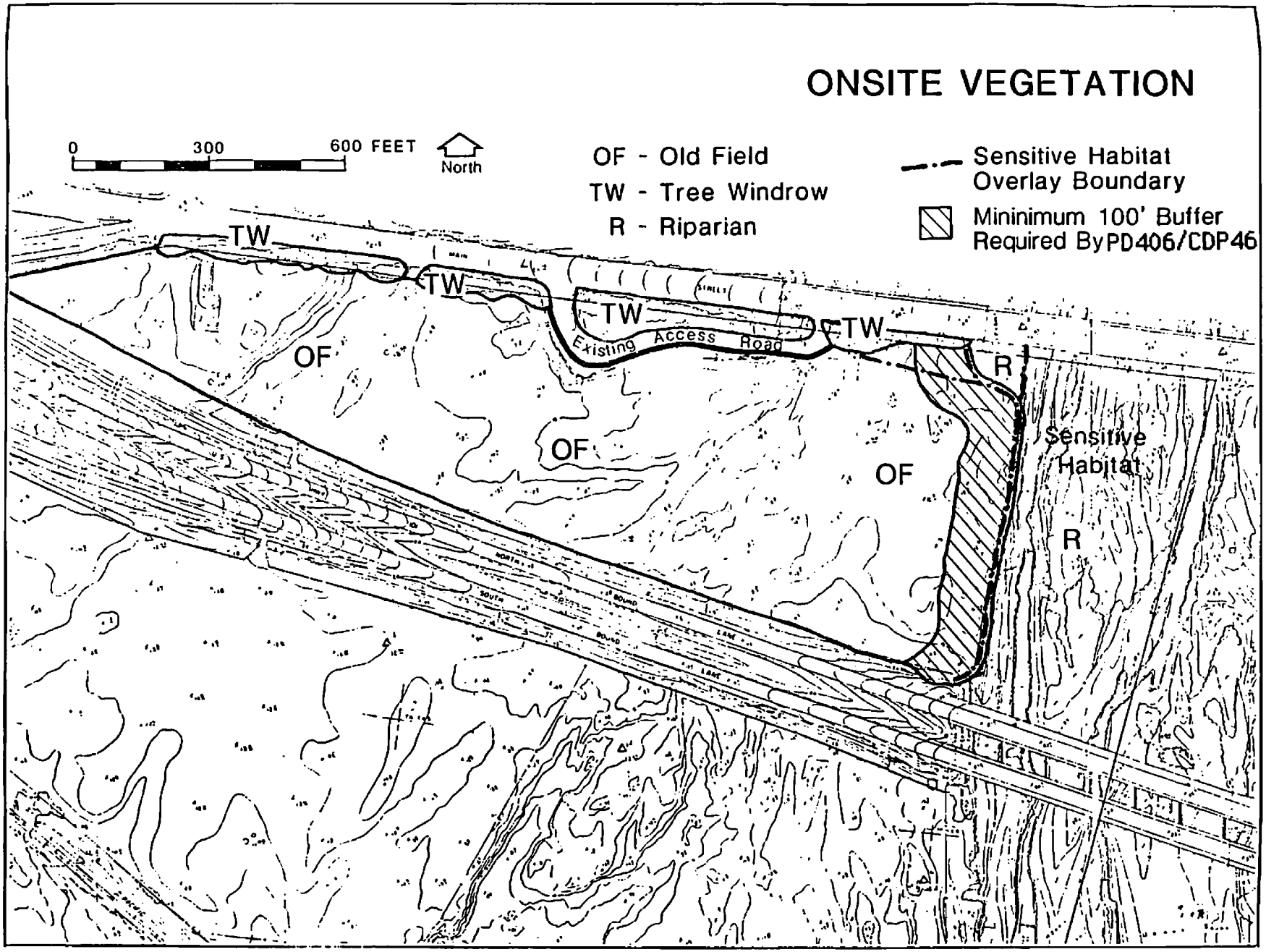


U.S.
COAST SURVEY
1855


FLOOD MITIGATION ANALYSIS
Area
Designation
Improvement Status
① - - - - - Main Channel Waterway - None permitted
② - - - - - Floodway (overbank) - Semi-improvement work allowed, but no above ground structures permitted.
③ - - - - - Flood Fringe - - - - Permanent improvements permitted provided site is filled and/or bermed.
FLOODWAY MAP
LCP Flood Mitigation Analysis
(Source: PRC Toups Corporation, engineers, June, 1980.)
Small Main Street bridge for drainage from Taylor Ranch
WEST MAIN STREET
100-year flood boundary
Approximate western boundary of VCFCD maintenance easement
Floodway
Fringe
VENTURA FREEWAY
BOX CULVERTS
State Parks Drainage Swale
U.S. 101 FAIR WEATHER CROSSING
100 YEAR BOUNDARY
Floodway
Channel
0
245
490 FEET
North


Emergency exit only
Entrance
Cypress trees
Restrooms/ showers
Main Street
Floodway Boundary
Existing river bank
FLOODWAY FRINGE
FLOODWAY
Ventura
Freeway
(101)
Sound attenuation wall along freeway
Laundry, showers, restrooms
Drainage channel
24 Pull thru spaces
120 Back up spaces
144 Total spaces
Approximate western boundary of VCFCD maintenance easement
0
200
400 Feet
N

Site Plan


ONSITE VEGETATION
0
300
600 FEET
North
OF - Old Field
TW - Tree Windrow
R - Riparian
Sensitive Habitat Overlay Boundary
Mininimum 100' Buffer Required By PD406/CDP46
TW
TW
TW
TW
Existing Access Road
OF
OF
OF
R
Sensitive Habitat
R