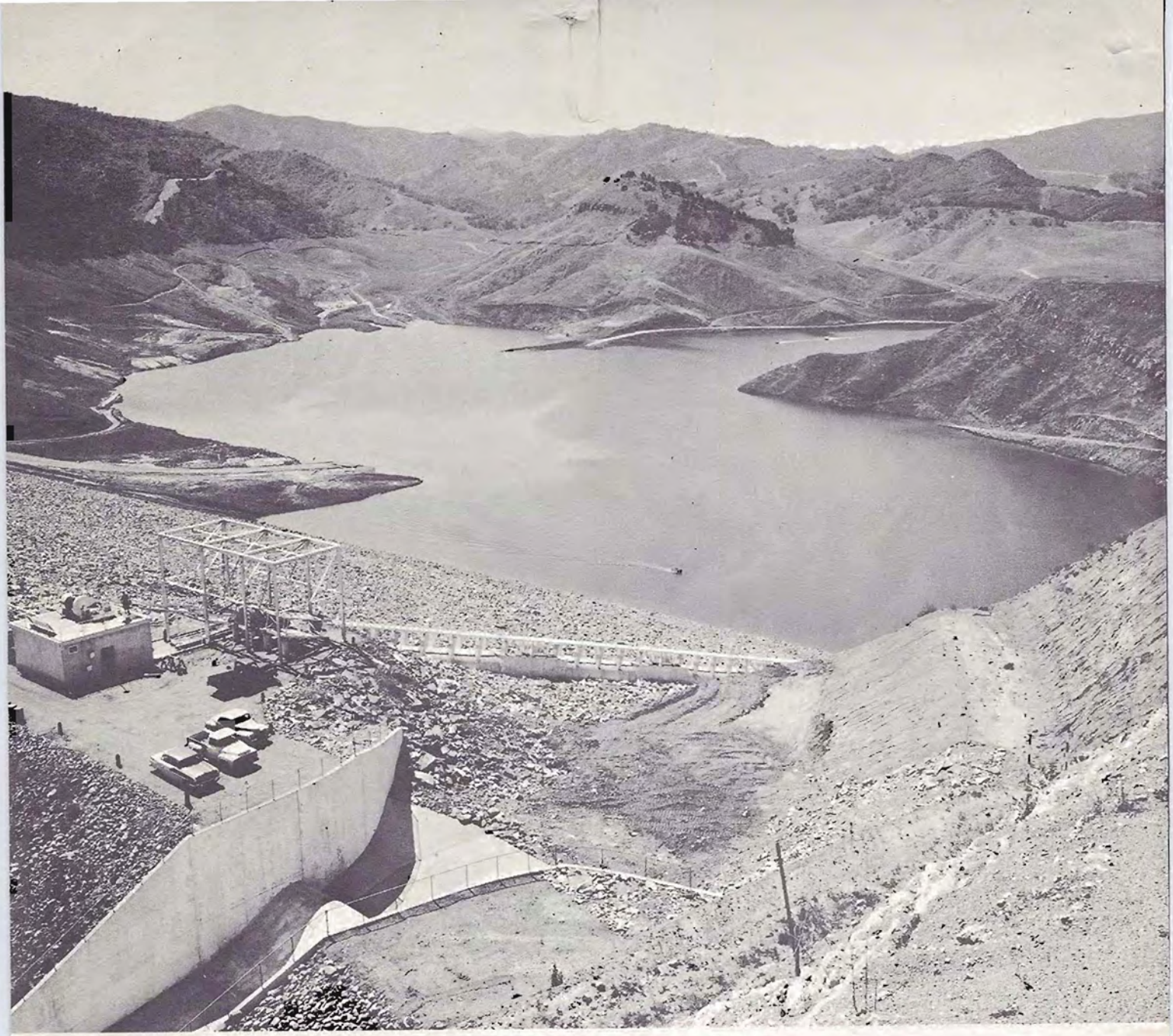
Ventura River Project

VENTURA COUNTY

California

1960

BUREAU OF RECLAMATION
UNITED STATES DEPARTMENT OF THE INTERIOR



CASITAS DAM and RESERVOIR, principal feature of the VENTURA RIVER PROJECT, is located on Coyote Creek in Ventura County about 60 miles northwest of Los Angeles.

Contents

Ventura River Project

IN CALIFORNIA

Reclamation Management

FRED A. SEATON
Secretary of the Interior

FLOYD E. DOMINY
Commissioner of Reclamation

H. P. DUGAN
Regional Director

G. RAYMOND ROLIN
Project Construction Engineer

Milestones OF VENTURA RIVER PROJECT

- OCTOBER 17, 1952 . . . . . Ventura River Municipal Water District formed
- MARCH 9, 1953 . . . . . District contracted with United States for Project investigation
- JULY 29, 1954 . . . . . District contracted with United States for advance planning
- MARCH 1, 1956 . . . . . Project authorized (Public Law 423)
- MARCH 7, 1956 . . . . . District signed repayment contract for $27,600,000

- MAY 5, 1956 to MARCH 31, 1960 — PROJECT UNDER CONSTRUCTION

  5- 5-56 to 3- 7-59 . . . . . Casitas Dam

  9-11-57 to 1-27-59 . . . . . Robles Diversion Dam and Robles-Casitas Diversion Canal

  11-20-57 to 4-24-59 . . . . . Conveyance System

  5- 9-58 to 7- 2-59 . . . . . Pumping Plants

  6-11-58 to 5- 8-59 . . . . . Balancing Reservoirs

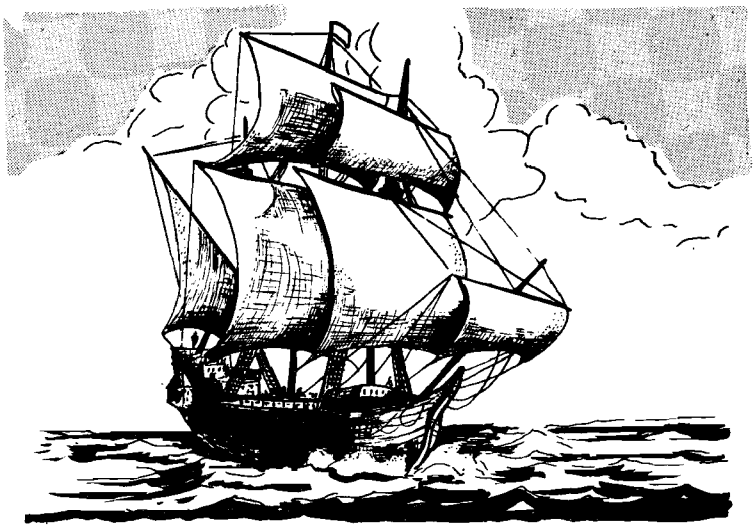
  6-13-58 to 3-31-60 . . . . . Automatic Control and Telemetering System

  8-25-58 to 2-24-60 . . . . . Chlorination Stations

- NOVEMBER 7, 1957 . . . . . Repayment contract amended for maximum of $31,000,000
- DECEMBER 4, 1958 . . . . . First water stored behind Casitas Dam
- OCTOBER 1, 1959 . . . . . Project transferred to Ventura River Municipal Water District for operation

Completed CASITAS DAM–outlet works intake structure, screen hoist, and spillway inlet in the foreground.

HISTORY



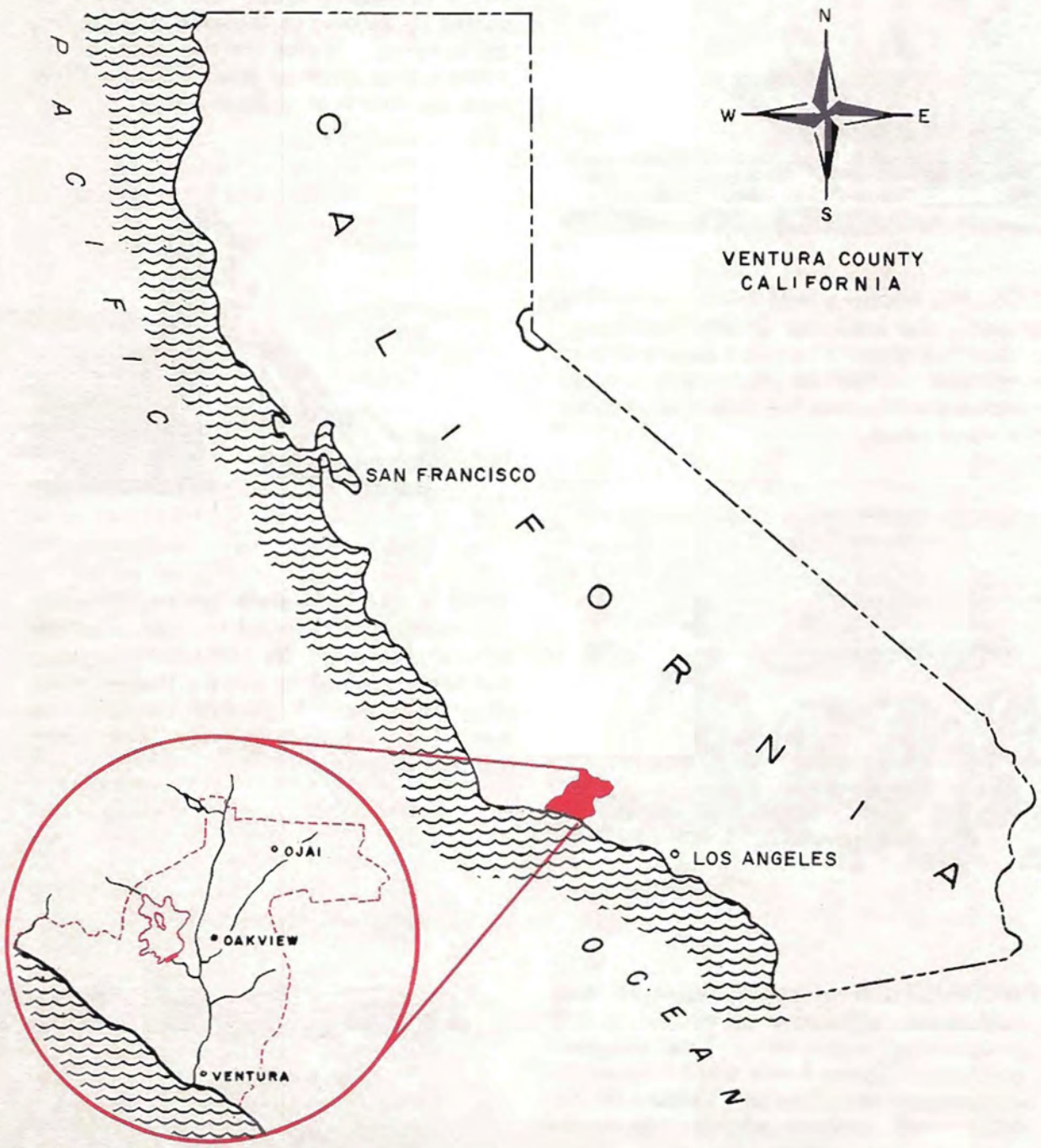
ALTHOUGH the Ventura River area was visited by the Spaniards in 1542, agriculture was not established until about 1782 with the founding of Mission San Buenaventura. These early activities were devoted to raising crops and livestock required by settlers of the area surrounding the mission. Water for the needs of the mission was diverted from Ventura River near the mouth of Cañada Larga.

DURING Mexican rule in the early 19th century, the land was divided into large grants that were subdivided later and sold to settlers. Livestock production was expanded and became the principal activity for many years.

EARLY day large-scale grazing of cattle and sheep was replaced to a large extent by grain farming. By 1900 grain farming had been replaced by more intensive cropping practices. A gradual reduction in size of land ownership also took place during this period.

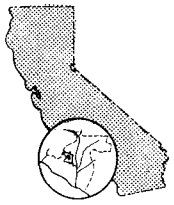
PRODUCTION of apples, apricots, and peaches was initiated at an early date and has continued under dryland and irrigated conditions. Citrus fruits were successfully introduced into Ojai and Ventura River Valleys with commercial plantings starting in the early 1900's.

Location of
VENTURA RIVER PROJECT



LOCATION

Ventura River Project is located in the south coastal section of California in Ventura County, about 60 miles northwest of metropolitan Los Angeles.



The river basin is characterized by rough, mountainous sections and comparatively narrow valleys. The Project includes all of the principal valley areas within the basin and, in addition, a strip of land contiguous with but lying outside of the basin along the coast to the northwest. All of the service area is, however, contained within the boundaries of the Ventura River Municipal Water District.

The Ventura River, the major stream in the area, flows some 16 miles through the Ventura River Valley from its formation at the confluence of the Matilija and North Fork Matilija Creeks to the Pacific Ocean. San Antonio Creek is a principal tributary flowing in from the east and draining the Ojai, Upper Ojai, and San Antonio Creek Valleys. Coyote Creek from the west flows through the Santa Ana Valley.

PLANNING AND AUTHORIZATION

The need for water in this area has been recognized for many years. Several investigations were made concerning water problems in all parts of the area. Reports by private companies, State of California, Corps of Engineers, and U. S. Department of Agriculture were consulted during the course of the Bureau of Reclamation's investigations and preparation of its report.

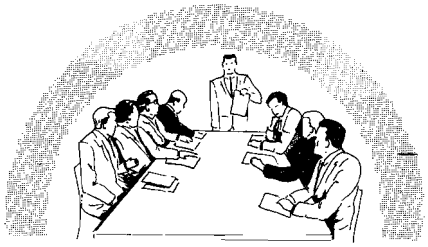
The investigation which led to the construction of Ventura River Project was requested by the Board of Directors of the Ventura River Municipal Water District. On March 9, 1953, a contract was executed between the United States and the Ventura River Municipal Water District providing for a cooperative, matching-fund investigation.

The early part of the investigation was concentrated on selecting the most desirable reservoir sites within the basin. Following this determination, geological investigations, including foundation exploration, engineering surveys, land classification, and crop surveys were made. A plan of development was proposed showing engineering and economic feasibility. This feasibility report was submitted in July 1954.

In order to expedite the project, the Ventura River Municipal Water District advanced some $677,000 for investigations, advance planning, and preconstruction work before authorization of the project. A contract authorizing this work was executed on July 29, 1954. Under terms of the contract, the Bureau of Reclamation compiled all necessary data and prepared specifications for the major features of the Ventura River Project. The work included additional studies required to provide a basis for final design and preparation of specifications for all principal features.

The Ventura River Project was approved by the Secretary of the Interior on June 14, 1955, and a report was transmitted to the House of Representatives on July 12, 1955. The Secretary's Report was published as House Document 222, 84th Congress, 1st Session, and the project was authorized March 1, 1956, by Public Law 423, 84th Congress, 2d Session.

In July 1956 the United States Congress appropriated $6,400,000 to start construction of the Ventura River Project.

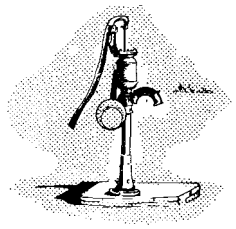


WATER SUPPLY

The Ventura River and its tributaries are the principal sources of water for the service area of the project. The watershed is fan-shaped, about 32 miles long, and embraces 228 square miles, of which 102 square miles are classified as mountainous, 94 square miles as foothill, and 32 square miles as valley area. Ventura River is formed at the confluence of Matilija Creek and North Fork of Matilija Creek, and flows through the narrow Ventura River Valley to the ocean. Coyote Creek is one of the main tributaries of the river system.

Since no significant amount of snow accumulates in the watershed, winter runoff occurs almost immediately after precipitation. Small summer flows are maintained by springs along the tributary streams. Because of the extreme vagaries of stream flow and the use made of river water in the lower valley area, storage is permitted only during periods of high runoff. Such flood storage is the basic plan at Casitas Dam, which was completed to a point where storage was begun December 4, 1958.

The existing water supply, without project operation, is an estimated 13,160 acre-feet annually representing some surface flow development and complete development of ground-water resources. Of this amount, 6,660 acre-feet are used for agricultural purposes and 6,500 acre-feet are used as municipal and industrial water. The project, when in full operation, will supply an additional 12,200 acre-feet for irrigation and 15,600 acre-feet for municipal and industrial use.

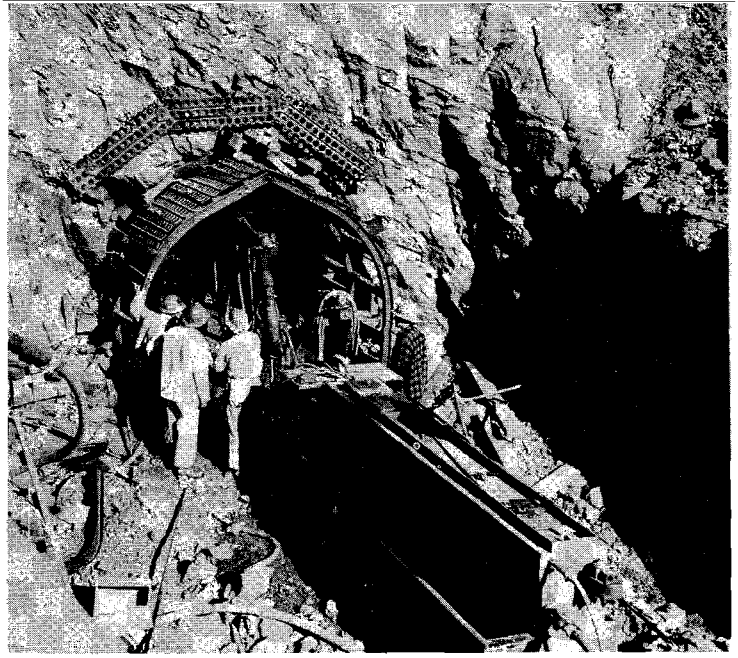


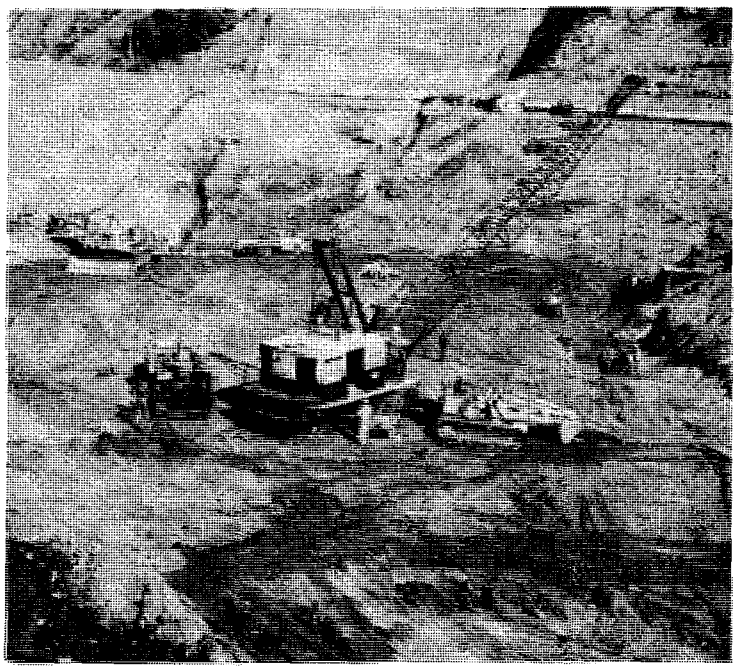
PROJECT LANDS

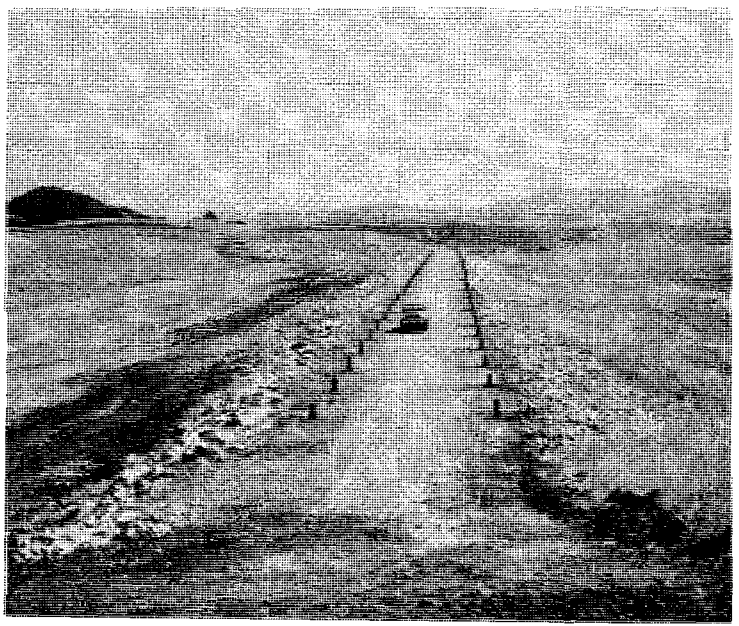
Approximately 21,200 acres within the project area will be used under full development. Most of this land lies in the Ojai and Upper Ojai Valleys, the remainder borders the Ventura River, its tributaries, and the ocean shore. More than one-half is dry-farmed, grazed, or undeveloped idle land; about one-fifth is irrigated, and one-quarter is used for urban, suburban, and industrial purposes. As project water becomes available, it is expected that 13,200 acres will be irrigated. Of the acreage under irrigation, project water will be supplied for full irrigation of 10,700 acres and for supplemental service to 2,500 acres.

PROJECT FEATURES

The Ventura River Project includes a main off-channel storage reservoir on Coyote Creek, a diversion dam on Ventura River, a diversion canal, and an extensive conveyance system. Casitas Dam and Reservoir regulates the flows along the lower reaches of Coyote Creek. The reservoir also stores excess flood waters diverted through the Robles-Casitas Canal from the Robles Diversion Dam on Ventura River. The conveyance system consists of 33 miles of pipelines, 5 pumping plants, and 6 balancing reservoirs. The water is chlorinated at five stations to maintain pipeline capacity and to insure potability. An automatic control and telemetering system determines and records proper volume and pressure in the system.







CASITAS DAM AND RESERVOIR

Casitas Dam, located on Coyote Creek two miles above its junction with Ventura River, is the principal storage feature of the Project. A contract for construction of the dam was awarded on July 5, 1956, to Winston Brothers Company. A total of 9,500,000 cubic yards of zoned earth, sand, gravel, and cobblefill material was placed in the dam embankment. The crest length of the dam is 2,060 feet, and the maximum height above streambed is 285 feet. A spillway located on the left abutment consists of a concrete-lined inlet channel, and uncontrolled overflow concrete crest, and a concrete spillway chute and stilling basin. The outlet works include a concrete intake structure on the upstream face of the dam and 800 feet of 8-foot diameter concrete-lined circular tunnel leading to a high-pressure gate chamber. One thousand feet of 51-inch diameter steel pipe laid inside an 8-foot diameter concrete-lined horseshoe tunnel leads from the gate chamber to the control house at the downstream toe of the dam. A hollow jet valve at the end of the pipeline controls water releases. Included in the construction contract was a dike embankment across a saddle northeast of the dam and also the necessary access roads to the dam.

Casitas Reservoir has a storage capacity of 250,000 acre-feet with a maximum water-surface area of about 2,700 acres. The reservoir area was cleared of trees and brush as well as residences, buildings, and fences.

Top Photo:

TUNNEL EXCAVATION AT OUTLET PORTAL

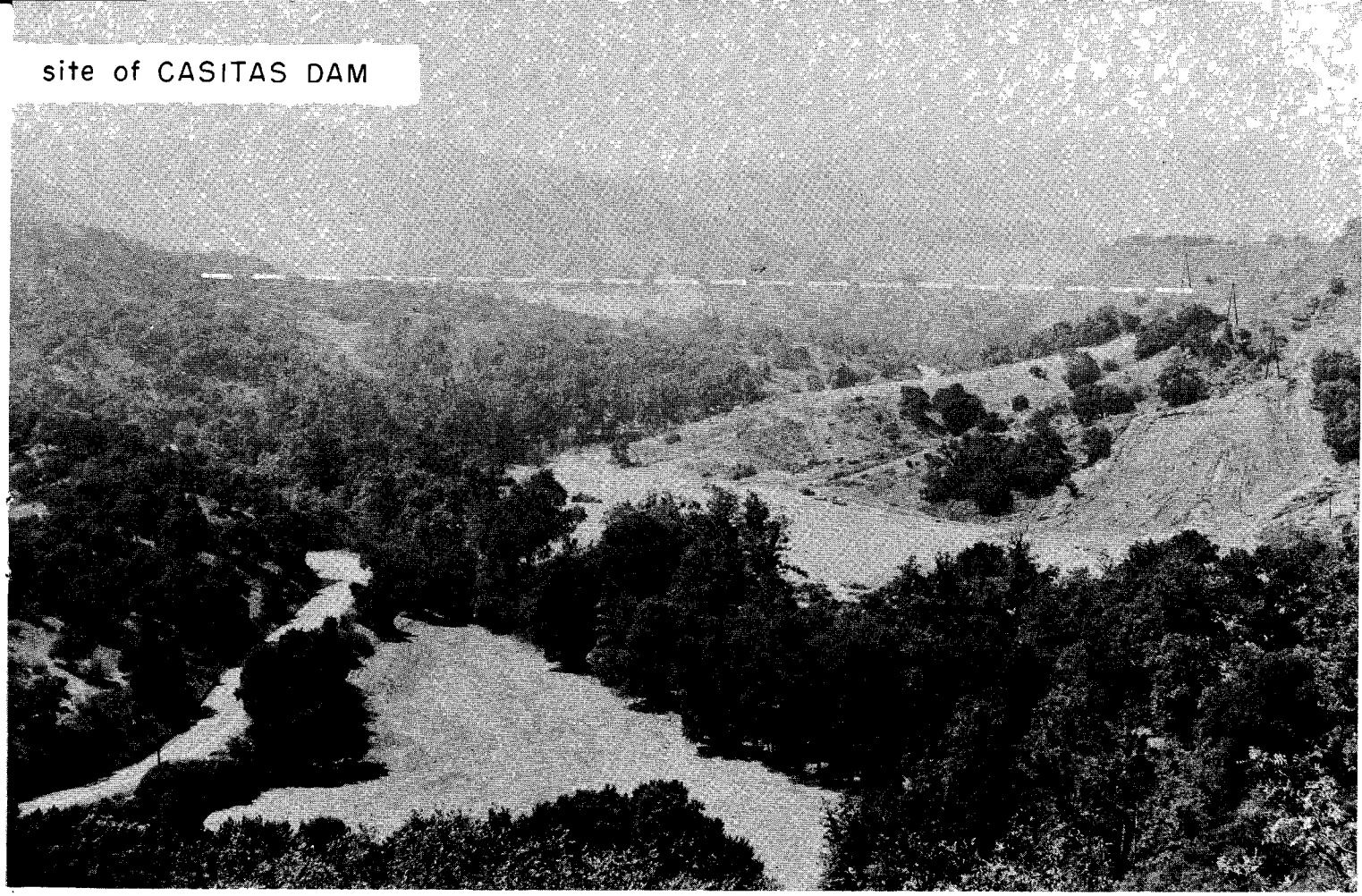
Center:

CONSTRUCTION ACTIVITY – CASITAS DAM

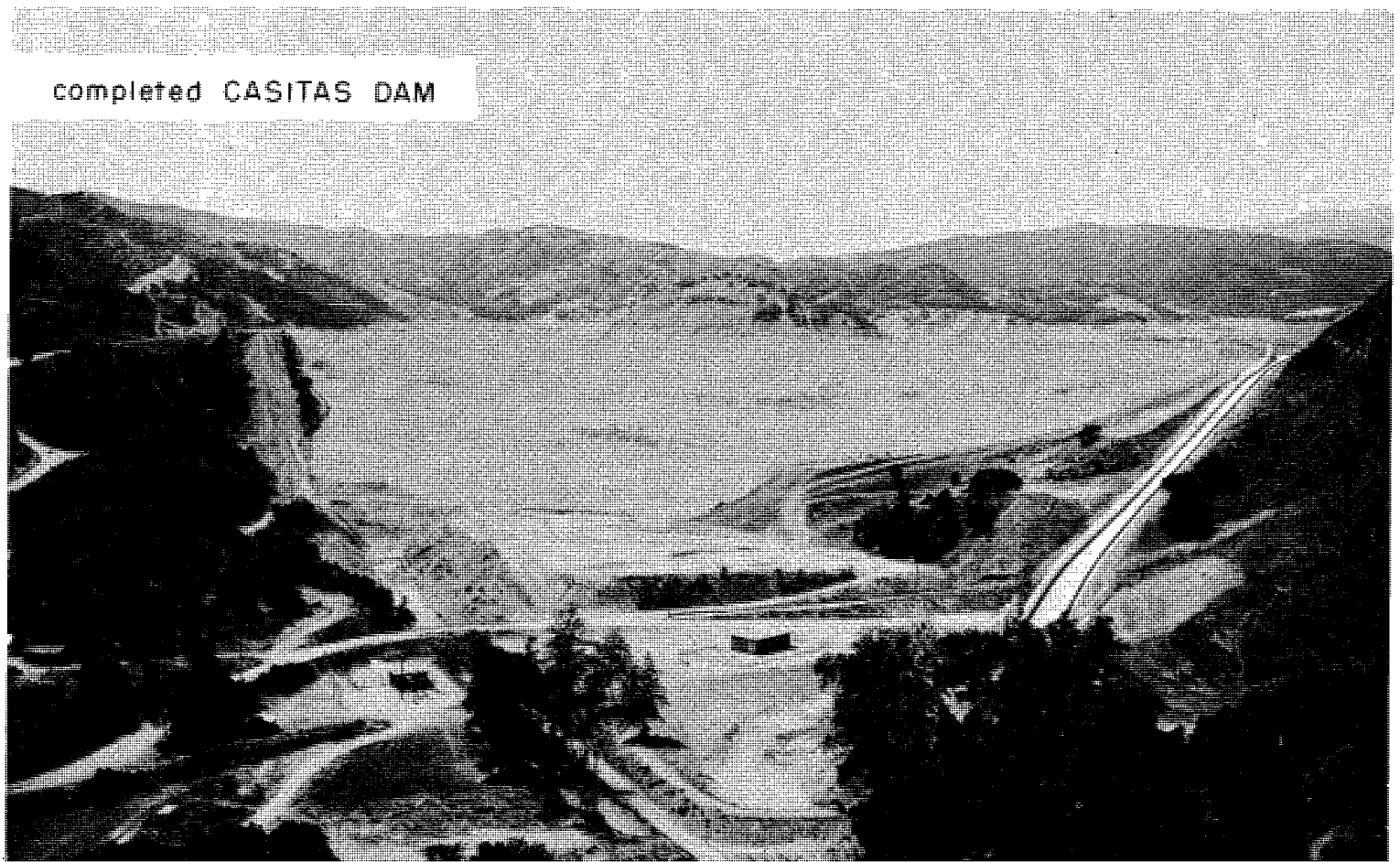
Bottom:

COMPLETED SADDLE DIKE – CASITAS RESERVOIR

site of CASITAS DAM



completed CASITAS DAM



ROBLES DIVERSION DAM AND ROBLES-CASITAS CANAL

Construction of Robles Diversion Dam and Robles-Casitas Diversion Canal was undertaken by M. H. Hasler Construction Company and F. W. Case Corporation under a contract awarded on September 11, 1957.

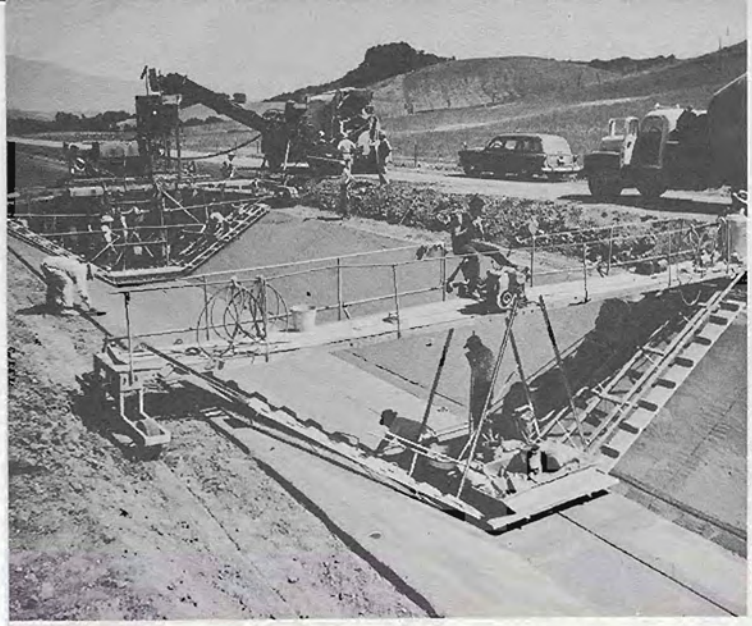
Robles Diversion Dam is located on the Ventura River about one and one-half miles below the confluence of Matilija Creek and North Fork Matilija Creek. It is a rockfill structure with a wooden sheet-piling cutoff wall and a rolled earth core. Although the dam is but 24 feet above its

Top Photo:

ROBLES DIVERSION DAM, SHOWING DIVERSION GATE STRUCTURE

Bottom:

LAYING 42" CONCRETE PIPE – CASITAS GRAVITY MAIN



foundation, it has a crest length of 598 feet. The dam's sluiceway has a capacity of 10,000 cubic feet per second, and is controlled by four radial gates. The diversion canal headworks at the dam are controlled by three radial gates.

Robles-Casitas Diversion Canal has a capacity of 500 cubic feet per second and conveys water five and one-half miles from the Robles Diversion Dam on the Ventura River to the Casitas Reservoir on Coyote Creek. It includes about four and one-quarter miles of concrete-lined canal, one mile of 78-inch diameter reinforced concrete pipe, and one-quarter mile of rectangular drop chutes. The open canal has a width at the top of 27 feet, sloping to a bottom width of 7 feet.

CONVEYANCE SYSTEMS

The conveyance systems include pressure pipelines, pumping plants, balancing reservoirs, and chlorination stations constructed under four separate major contracts.

Pipelines were constructed by E. A. Irish of Los Angeles under a contract awarded on November 20, 1957. The main conduit, 33 miles long, consists of reinforced concrete pipe and steel pipe ranging in size from 54 inches to 12 inches in diameter. The system is inter-connected with an existing pipeline from Matilija Reservoir to integrate the operation of the two systems. One 23.3-mile pipeline of the main conduit extends from Casitas Dam to Upper Ojai Valley and has an initial capacity of 135 cubic feet per second. After crossing Ventura River it branches to serve the lower elevation area, including the City of Ventura, and the higher elevation area to the east and north

Top Photo:

ROBLES–CASITAS CANAL UNDER CONSTRUCTION SHOWING LINING MACHINE AND FINISHING PLATFORM

Center:

COMPLETED ROBLES–CASITAS CANAL

Bottom:

PIPELINE BEING ENCASED IN CONCRETE – LIVE OAKS ACRES MAIN

ROBLES DIVERSION DAM AND ROBLES-CASITAS CANAL

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Bottom:

LAYING 42" CONCRETE PIPE – CASITAS GRAVITY MAIN

of Casitas Reservoir. The Rincon pipeline serves the west coastal area of the project. It starts at the dam where a pumping plant lifts the water 900 feet over Casitas Pass to the Rincon balancing reservoir near the coast, a distance of 9.7 miles. This pipeline ranges in size from 21 inches to 16 inches in diameter and has an initial capacity of 9.6 cubic feet per second.

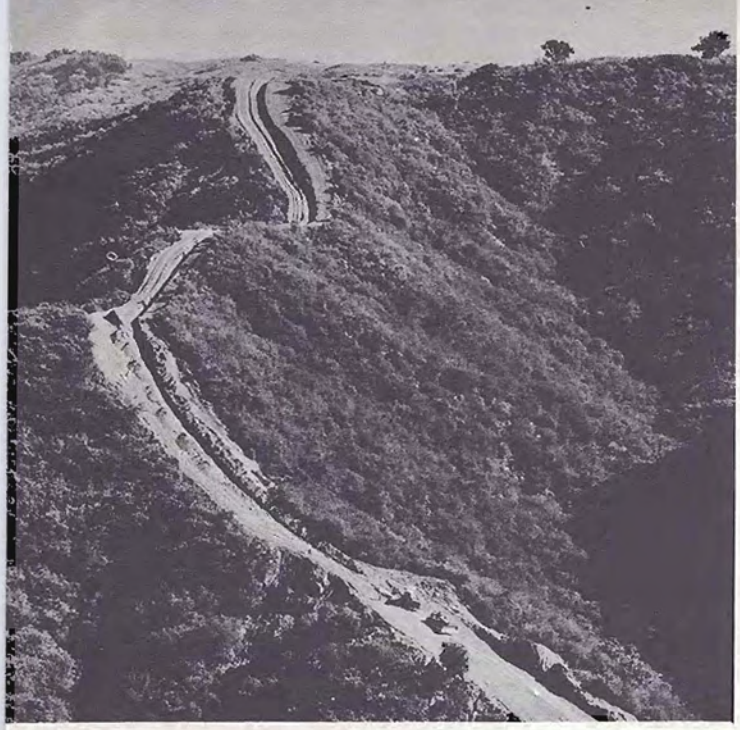
Since a large portion of the service area of the project is at a higher elevation than the main reservoir, five pumping plants were constructed along the pipelines to lift water from the elevation of the storage level in the reservoir to elevations of points of delivery.

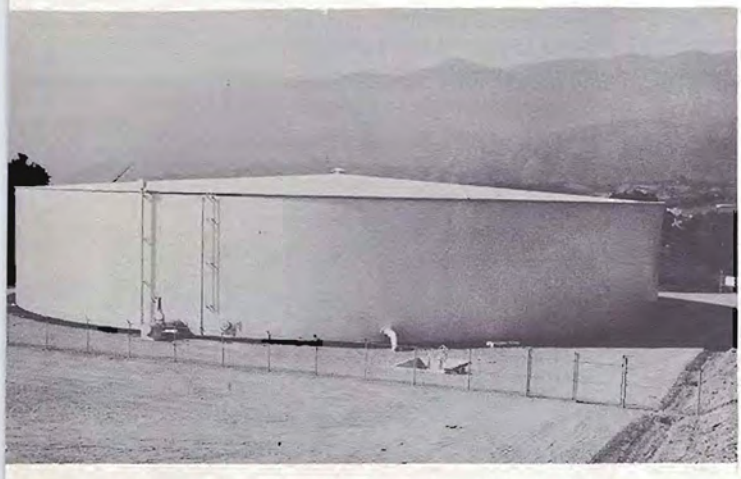
Top Photo:

COMPLETED VENTURA AVE. PUMPING PLANT #1

Bottom:

MATILIJA CHLORINATION STATION #2
UNDER CONSTRUCTION





There are four pumping plants along the main serving the east and north areas of the project:

Ventura Avenue Pumping Plant #1

Four motor-driven pumping units, each with a capacity of 12½ cubic feet per second under a head of 429 feet

Ventura Avenue Pumping Plant #2

Three motor-driven pumping units, each with a capacity of 16 cubic feet per second under a head of 220 feet

Ojai Valley Pumping Plant

Three motor-driven pumping units, each with a capacity of 6.9 cubic feet per second under a head of 250 feet

Upper Ojai Pumping Plant

Two motor-driven pumping units, each with a capacity of 4.1 cubic feet per second under a head of 400 feet

On the Rincon main one pumping plant near the base of Casitas Dam lifts the water over Casitas Pass to irrigate lands in the north coastal area of the project.

Rincon Pumping Plant

Two motor-driven pumping units, each with a capacity of 3.2 cubic feet per second under a head of 900 feet

The pumping units were supplied by Food Machinery and Chemical Corporation and American Ligurian Company, Inc. Construction of the pumping plants and installation of the pumps were performed by Robert E. Ziebarth and Sylvester B. Apler under a contract awarded on May 9, 1958.

Balancing reservoirs along the mains provide effective operation of the project by storing water to meet peak demands and for emergency supply in case

Top Photo:

EXCAVATION FOR RINCON PIPELINE OVER MOUNTAIN GRADE

Center:

VILLANOVA BALANCING RESERVOIR, CAPACITY 6,500,000 GALLONS

Bottom:

OJAI VALLEY MAIN, EXCAVATION IN ORANGE GROVE

BALANCING RESERVOIR STATISTICS

Reservoir (Steel Tank)	Elevation (Feet)	Present Installation (Gallons)	Ultimate Installation (Gallons)
OAK VIEW	704	3,500,000	10,500,000
VILLANOVA	865	6,500,000	13,000,000
OJAI EAST	996	3,000,000	6,000,000
UPPER OJAI	1,381	1,800,000	3,600,000
RINCON	937	1,000,000	2,000,000
RINCON CONTROL	1,045	250,000	250,000

of pump failure. The balancing reservoirs were constructed by Chicago Bridge and Iron Company in accordance with its contract awarded June 11, 1958. Four of the reservoirs are on the main leading through the Ojai service area, and two serve as balancing or control reservoirs on the Rincon main.

Four chlorination stations, Casitas No. 1 and No. 2, Matilija No. 2, and Rincon were constructed by Young and Anderson Company. These stations are operated for the dual purpose of preventing algae growth in the pipelines to maintain their capacity, and for assuring the safety of supply for domestic use.

An additional chlorination station, Matilija No. 1, previously part of Matilija Dam operation, was modified by the Ventura River Municipal Water District to meet the requirements and needs of the present system.

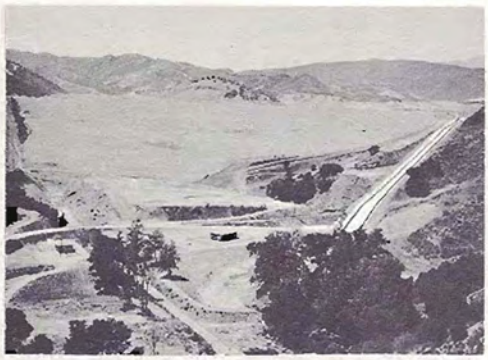
An automatic control and telemetering system has been installed by the Santa Paula Electric Company, Inc. This system operates over telephone lines leased from the Pacific Telephone and Telegraph Company, and provides automatic control for starting and stopping each pump unit of the five pumping plants. Control is effected by changes in water level in a balancing reservoir into which the pumps deliver water. Pumping plants will be shut down automatically whenever there is a failure in the telemetering system or whenever a separate emergency high-water-level control in the reservoir is operated. Continuous telemetering information, as well as remote control of the pumps, is provided at the District Office in Oak View.

In constructing the Ventura River Project, it was necessary to relocate a portion of State Highway 150 and about one and one-half miles of the Santa Ana county road, as well as telephone and power lines. The relocations, financed by federal appropriations, were carried out by the appropriate owning agencies. Other contracts included constructing a Vista House at Casitas Dam, roads, bridges, fences, and improvement of a recreational area.

Recreational facilities were proposed in a public use plan prepared under the supervision of the National Park Service. These facilities, not to exceed $100,000, were constructed with nonreimbursable project funds. A picnic area was provided, access road built, parking area paved, and fencing installed. The local District is extending these minimum features.

Ventura RIVER

CASITAS DAM



Type	Earth and Rock Fill
Volume	9,500,000 Cubic Yards
Structural Height	334 Feet
Height Above Streambed	285 Feet
Crest Length	2,060 Feet
Crest Width	40 Feet
Base Width	1,625 Feet
Spillway Capacity	7,400 C.F.S.
Outlet Capacity	480 C.F.S.

CASITAS RESERVOIR

Gross Storage	250,000 Acre-Feet
Active Storage	248,000 Acre-Feet
Maximum Area	2,710 Acres
Shoreline	28 Miles
Annual Yield	27,800 Acre-Feet
Estimated Filling Time	
Minimum	5 Years
Maximum	20 Years
Estimated Silting Rate	100 Acre-Feet/Year

SADDLE DIKE

Type	Earth and Rock Fill
Volume	190,300 Cubic Yards
Height at Centerline	40 Feet
Crest Length	1,600 Feet
Crest Width	30 Feet
Base Width	240 Feet

BALANCING RESERVOIR STATISTICS

Reservoir (Steel Tank)	Elevation (Feet)	Present Installation (Gallons)	Ultimate Installation (Gallons)
OAK VIEW	704	3,500,000	10,500,000
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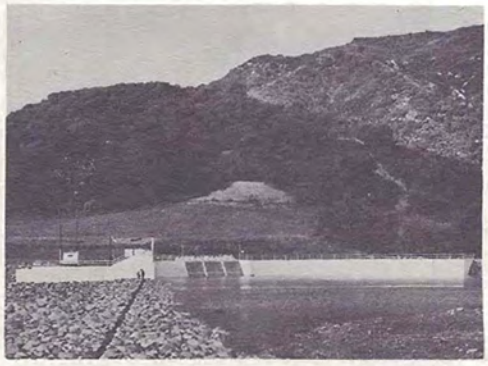
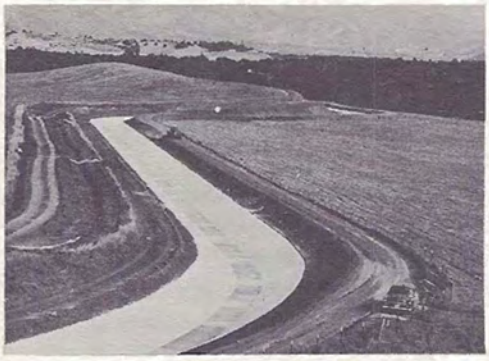
PROJECT STATISTICS

ROBLES DIVERSION DAM



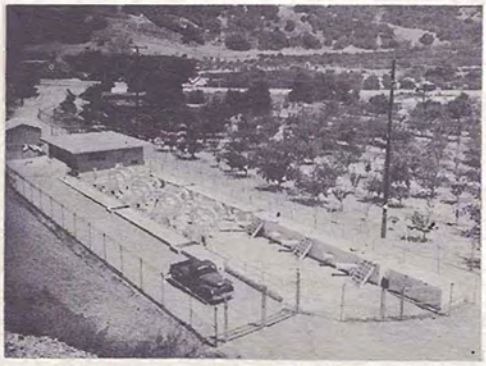
Type	Earth and Rock Fill with Timber Cut-Off Wall
Structural Height	24 Feet
Height Above Streambed	14 Feet
Crest Length	598 Feet
Crest Width	1.2 Feet
Diversion Capacity	500 C.F.S.
Three Radial Gates	11½ Ft. x 10 Ft.
Sluiceway Capacity	10,000 C.F.S.
Three Radial Gates	16 Ft. x 9½ Ft.
One Radial Gate	10 Ft. x 9½ Ft.

ROBLES-CASITAS DIVERSION CANAL



Total Length	5.35 Miles
Concrete-Lined Canal	4.27 Miles
Concrete Pipe Siphon (78 in.)	0.86 Mile
Four Concrete Drop Chutes	0.21 Mile
Parshall Flume	0.01 Mile
Capacity	500 C.F.S.
Canal Top Width	27 Feet
Canal Bottom Width	7 Feet
Canal Depth	6.8 Feet
Canal Grade	0.66 Feet/1000 Feet

CONVEYANCE SYSTEM



Length of Pipeline	33 Miles
Diameter	54 In. to 12 In.
Balancing Reservoirs	6
Pumping Plants	5
Chlorination Stations	5

VENTURA RIVER PROJECT PRINCIPAL FEATURES COST

Feature	Cost to 3-31-60	Estimated Total Cost
CASITAS DAM AND RESERVOIR	$16,093,810	$17,700,000
ROBLES DIVERSION DAM	611,679	640,000
ROBLES-CASITAS CANAL	1,670,260	1,680,000
CONVEYANCE SYSTEM	9,438,421	9,480,000
TELEMETERING AND CONTROL	91,419	100,000
TOTAL	$27,905,589	$29,600,000

PROJECT COST

The estimated total capital cost of the project is $29,600,000, including $27,905,589 actual cost of project features through March 31, 1960.

Remaining costs include land and land rights not yet settled, final costs of relocating highway and utilities, and small completion contracts still incomplete.

ALLOCATION AND REPAYMENT

Of the total estimated cost of $29,600,000, the amount of $100,000 is allocated to recreation and is nonreimbursable, leaving $29,500,000 as the estimated construction obligation to be repaid by the Ventura River Municipal Water District. The District advanced some $677,000 toward investigation and preconstruction costs, leaving $28,823,000 of the estimated construction obligation to be repaid. The following allocation is made in accordance with percentages established by contract:

Irrigation	57.33%
Municipal and industrial	42.67%

The repayment contracts provide that the irrigation allocation be repaid in 40 annual installments following a 10-year development period. The annual installments will be 1½% of the irrigation allocation each year for 30 years, and 5½% annually for the last 10 years.

The municipal and industrial allocation will be repaid in 40 annual installments with interest of 2.591% on the unpaid balance.

The above repayment is based on the estimated rate of growth of demand and prices of $25.00 and $50.00 per acre-foot for irrigation and municipal water respectively, together with assistance from taxation.

DISTRIBUTION OF VENTURA RIVER PROJECT COST