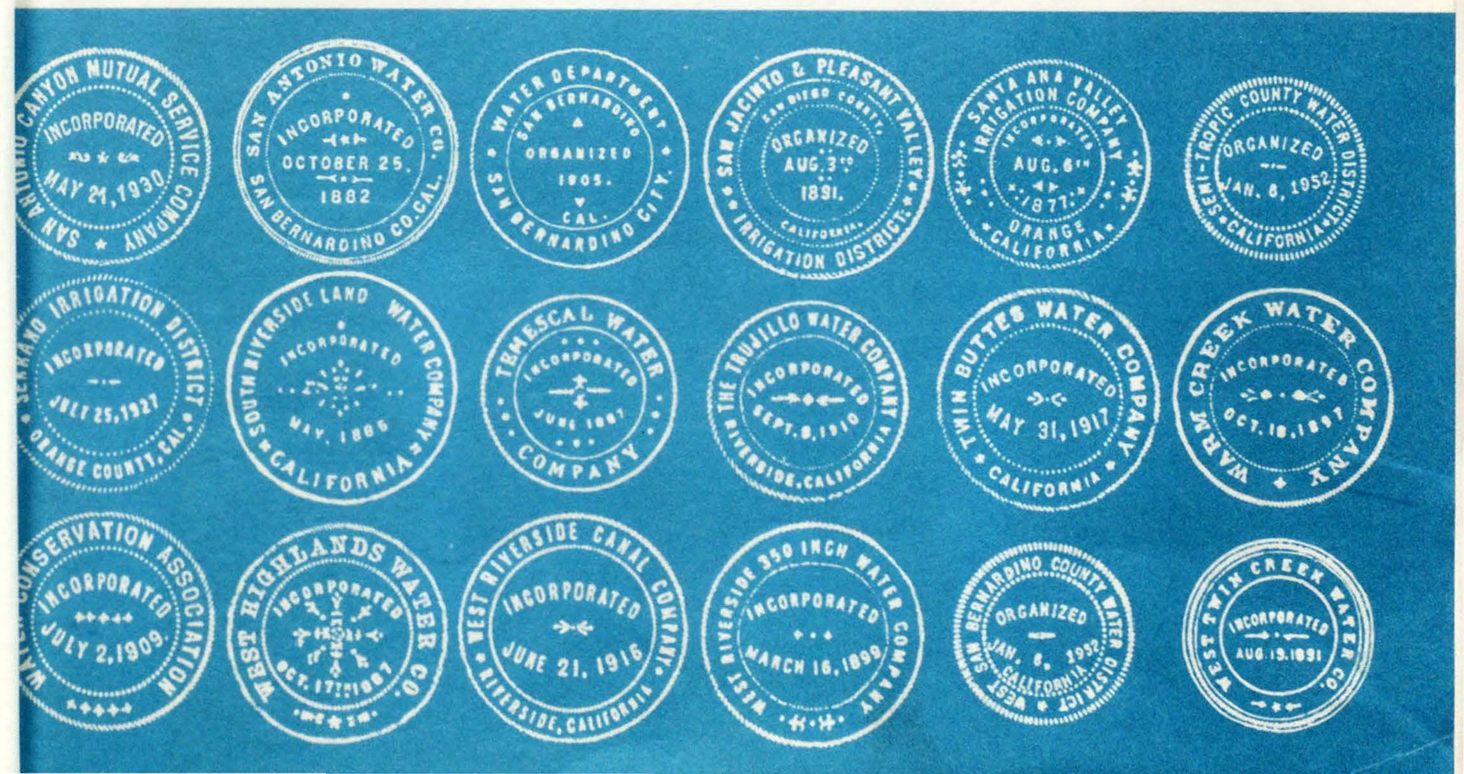
DEVELOPMENT OF WATER FACILITIES IN THE SANTA ANA RIVER BASIN CALIFORNIA, 1810-1968

A COMPILATION OF HISTORICAL NOTES DERIVED FROM MANY SOURCES DESCRIBING DITCH AND CANAL COMPANIES, DIVERSIONS, AND WATER RIGHTS

U.S. GEOLOGICAL SURVEY
Open-File Report 77-398

PREPARED IN COOPERATION WITH THE CALIFORNIA DEPARTMENT OF WATER RESOURCES
SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT
WESTERN MUNICIPAL WATER DISTRICT OF RIVERSIDE COUNTY



Front and back covers--Corporate seals of 67 of the organizations involved in development of water facilities in the Santa Ana River basin

UNITED STATES
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

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By M. B. Scott

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Prepared in cooperation with the
California Department of Water Resources
San Bernardino Valley Municipal Water District
Western Municipal Water District of Riverside County

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May 1977

ILLUSTRATIONS

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A COMPILATION OF HISTORICAL NOTES DERIVED FROM MANY SOURCES DESCRIBING DITCH AND CANAL COMPANIES, DIVERSIONS, AND WATER RIGHTS

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ABSTRACT

This report traces by text, maps, and photographs, the development of the water supply in the Santa Ana River basin from its beginning in 1810 or 1811 to 1968. The value of the report lies in the fact that interpretation of the hydrologic systems in the basin requires knowledge of the concurrent state of development of the water supply, because that development has progressively altered the local regimen of both surface water and ground water.

Most of the information for the earlier years was extracted and condensed from an investigation made by W. H. Hall, California State Engineer during the years 1878-87. Hall's study described irrigation development in southern California from its beginning through 1888. Information for the years following 1888 was obtained from the archives of the numerous water companies and water agencies in the Santa Ana River basin and from the various depositories of courthouse, county, and municipal records.

The history of water-resources development in the Santa Ana River basin begins with the introduction of irrigation in the area by the Spanish, who settled in southern California in the latter part of the 18th century. The first irrigation diversion from the Santa Ana River was made in 1810 or 1811 by Jose Antonio Yorba and Juan Pablo Peralta. Irrigation remained a localized practice during the Mexican-Californian, or rancho, period following the separation of Mexico from Spain in 1821. Rancho grantees principally raised cattle, horses, and sheep and irrigated only small plots of feed grain for their livestock and fruit crops for household use. The breakup of the ranchos through sales to Americans, who were migrating to California in ever-increasing numbers following the acquisition of California by the United States in 1848, marked the beginning of a rapid increase in water use and the beginning of widespread irrigation.

Many water companies and water agencies were organized to divert the surface flow of the Santa Ana River and its tributaries for irrigation. The Santa Ana River had been a perennial stream, except in years of extreme drought, from its source in the mountains nearly to the Pacific Ocean. With the great increase in population and the accompanying use of water for irrigation, the river was no longer a perennial stream, and it was necessary to supplement the surface-water supply with ground water. Many wells were dug or drilled in the artesian areas of the upper basin; of those wells many originally flowed, but as ground-water pressures and levels declined, an increasing amount of pumping was required.

Conservation measures were taken to store some of the surplus winter runoff for use during low runoff years and during summer periods of heavy demand. Conservation facilities included surface-storage reservoirs and water-spreading grounds or percolation basins for utilization of underground storage.

The competition for water in the Santa Ana River basin has been accompanied by frequent litigation over water rights, and over the years these water rights have generally been established by court decree.

Although the demand for water still increases, the water demand for agricultural use has declined since the mid-1940's in response to the rapid urbanization of agricultural areas. Since that date the continued expansion of communities has encroached significantly into the agricultural areas causing a decrease in water use for agriculture, a more than compensating increase in water use for municipal purposes, and a rapid change in the ownership of water rights.

The urbanization of flood plains made floods potentially more damaging than they previously had been when the flood plains were used for agriculture. In recognition of this increased hazard, flood-control facilities such as reservoirs, debris basins, flood-conveyance channels, and levees have been constructed to reduce potential damage. Most of the construction has occurred since the devastating flood of March 1938.

By the mid-1940's it was apparent that the local water supply--both surface and ground water--would be insufficient to meet the increasing demand in the basin. To augment the local supply, Colorado River water was purchased from the Metropolitan Water District of Southern California and released to the Santa Ana River beginning in August 1949. Additional supplemental water became available in the early 1970's from northern California through the conveyance facilities of the California Water Project.

INTRODUCTION

The history and development of southern California are closely related to the development of its water supply. This report traces the history of water-resources development in the Santa Ana River basin (fig. 1) from its beginning in 1810 or 1811 to 1968. The value of the report lies in the fact that interpretation of the hydrologic systems in the basin requires knowledge of the concurrent state of development of the water supply, because that development has progressively altered the local regimen of both surface water and ground water.

William Hamilton Hall, California State Engineer during the years 1878-87, described the development of irrigation in southern California from its beginning through 1888. The present report includes that part of Hall's work that pertains to the Santa Ana River basin and continues the history of water development through 1968. The organization and the history of more than 100 ditch and canal companies, consolidated into 23 water agencies, are described, and the diversion works are shown in numerous maps and photographs. Figure 2 is an index to the principal maps.

The water rights of the various companies and agencies are discussed or alluded to throughout this report, and it is therefore appropriate at this point to define some of the terms used in connection with water rights. The unit of stream discharge used at present in water rights is a cubic foot per second (ft^3/s), often referred to in past years as a second-foot. A cubic foot per second is equivalent to the discharge of a stream of rectangular cross section, 1 foot wide and 1 foot deep, whose average velocity is 1 foot per second. The unit of stream discharge used in earlier water rights was the miner's inch, a discharge rate that varied with locality. In southern California the miner's inch generally was the equivalent of 0.02 ft^3/s, or 50 miner's inches equaled 1 ft^3/s.

Water rights were sometimes expressed in hours. This was not an absolute quantity, its magnitude being dependent on the flow that was available. For example, a 3-hour right was a right to use the entire flow in a particular ditch for 3 hours at some stated time. Another unit used in some of the early water rights was the acre-right. One acre-right was the quantity of water used to irrigate 1 acre for a given number of hours.

Occasionally water was said to be rented. This implied a temporary right to use water from a particular source, in contrast to the permanent right associated with ownership.

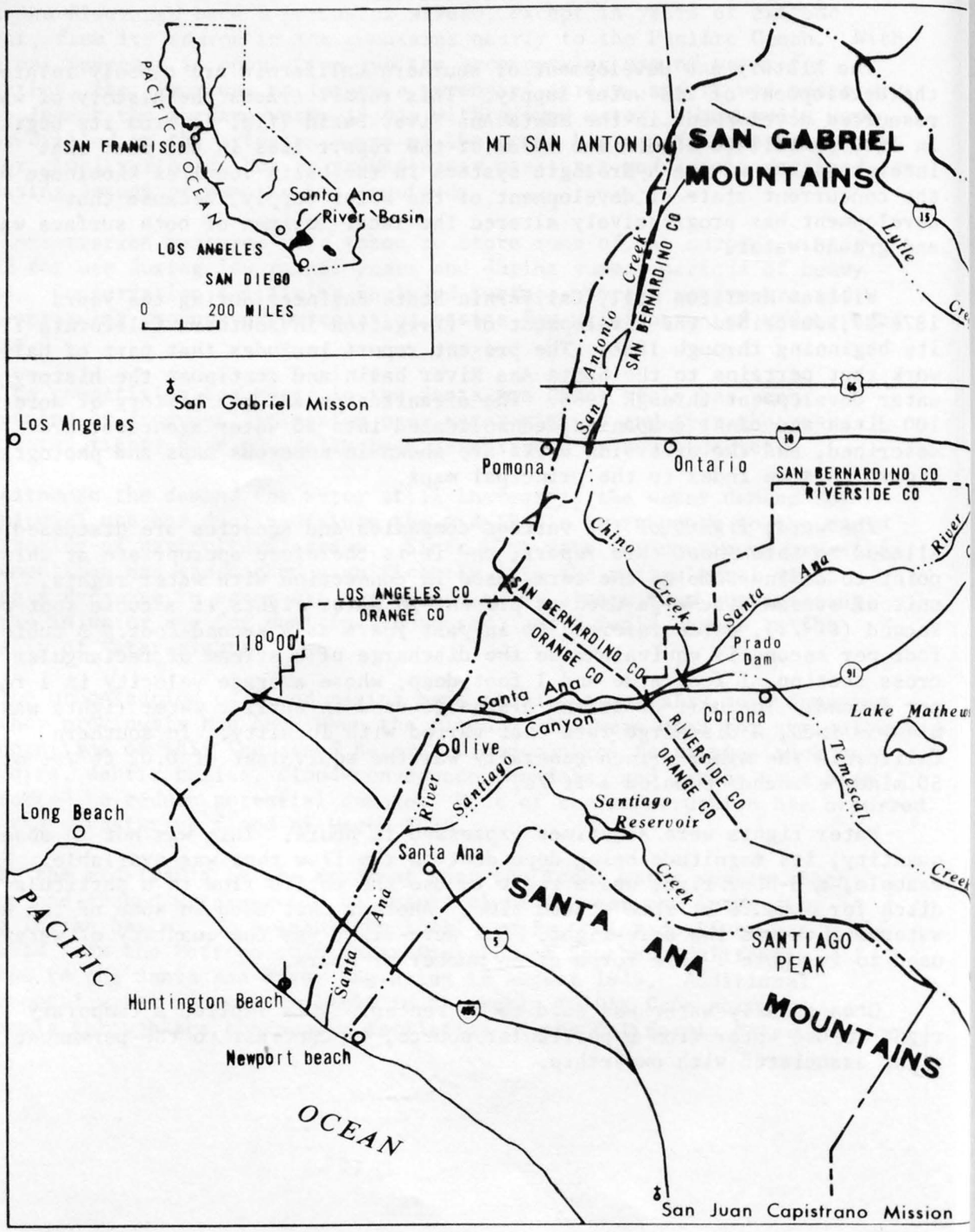


FIGURE 1.--Santa Ana River basin.

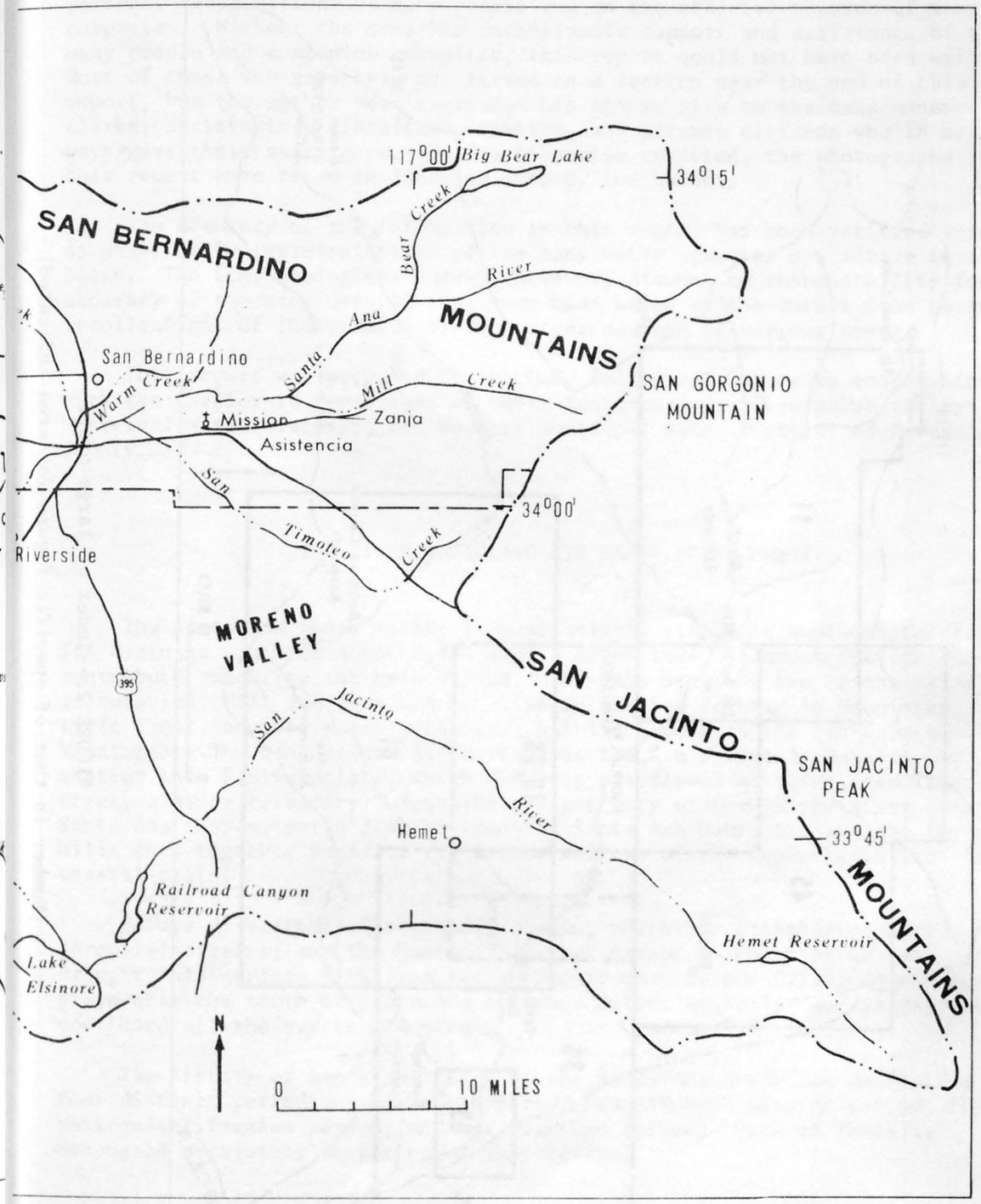


FIGURE 1.--Continued.

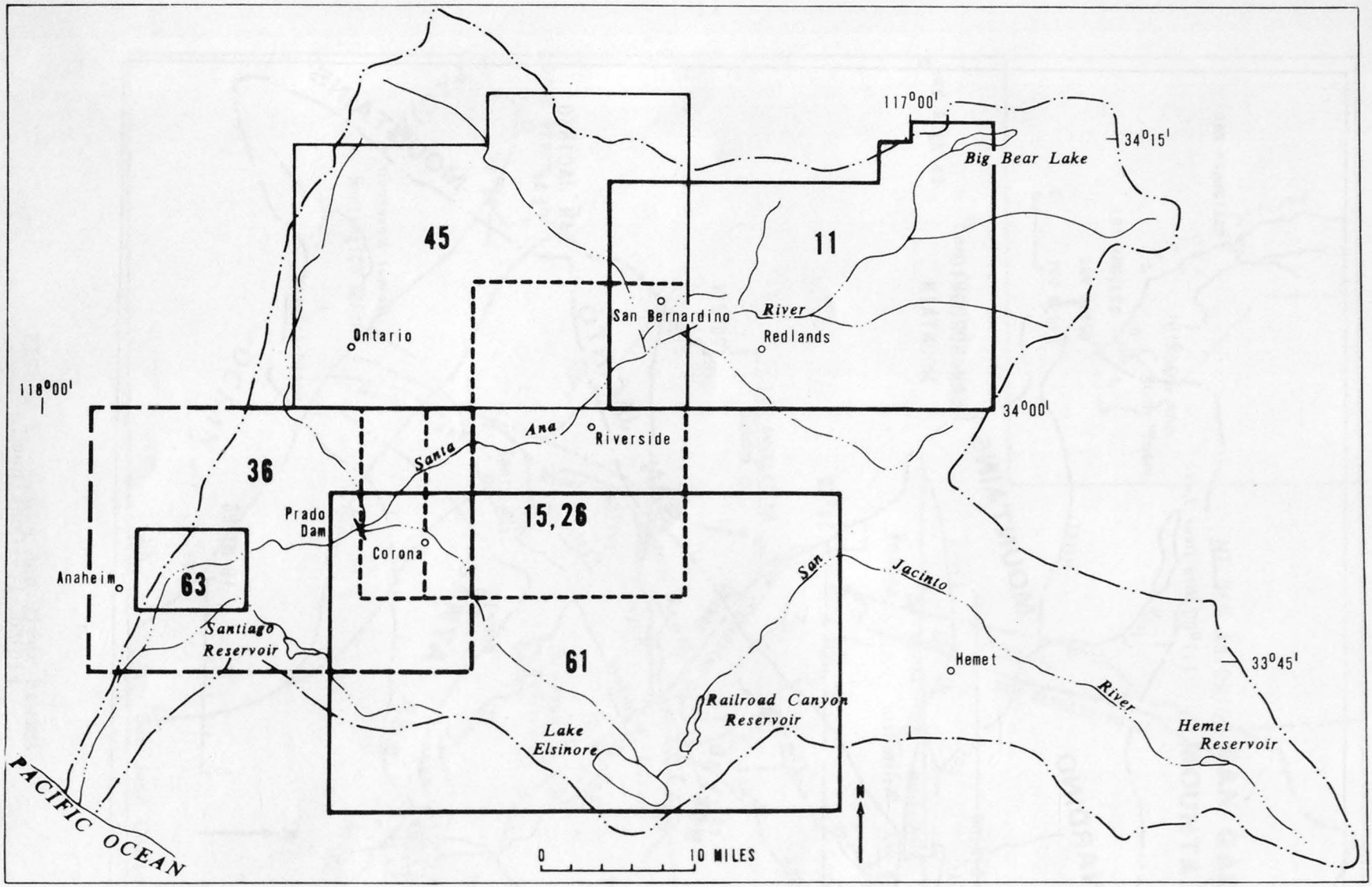


FIGURE 2.--Index of large maps.

[Number is that of specific figure for area indicated]

An acknowledgment of assistance received in this study is in order at this point. A report of this type must necessarily draw heavily on the personal recollections of many people and on the official records of many companies. Without the kind and enthusiastic support and assistance of the many people and companies consulted, this report could not have been written. Most of those who gave help are listed in a section near the end of this report, but the author here expresses his thanks also to the many unnamed clerks, secretaries, librarians, workers, and private citizens who in many ways gave their assistance. Unless otherwise credited, the photographs in this report were taken in 1967 and 1968 by the author.

The accuracy of the information in this report has been verified insofar as possible by representatives of the many water agencies now active in the basin. The U.S. Geological Survey, however, assumes no responsibility for the accuracy of the many details that have been given to the author from personal recollections of individuals or from other sources of various kinds.

This report was prepared by the U.S. Geological Survey in cooperation with the California Department of Water Resources, San Bernardino Valley Municipal Water District, and Western Municipal Water District of Riverside County.

THE RIVER BASIN AND ITS EARLY DEVELOPMENT

The Santa Ana River is the largest coastal stream in southern California. Its drainage basin of about 2,470 square miles includes areas that seldom contribute runoff to the main stream. The main stem and two of the major tributaries, Mill and Bear Creeks, rise in the San Bernardino Mountains. Lytle Creek, another major tributary, has its source in the San Gabriel Mountains. The San Jacinto River rises in the San Jacinto Mountains and empties into Elsinore Lake, which formerly overflowed at times into Temescal Creek, a minor tributary. Near the present city of Corona the river enters Santa Ana Canyon, which lies between the Santa Ana Mountains and the Chino Hills that together separate the inland valleys of the upper basin from the coastal plain.

Before diversions of streamflow began, the major tributaries were perennial streams, and the Santa Ana River, except in years of extreme drought, had surface flow from its source to what is now Olive, on the coastal plain near the mouth of Santa Ana Canyon. During unusually wet years flow continued all the way to the ocean.

The history of man's influence on the Santa Ana River can be divided into four distinct periods: the Indian period, the Spanish mission period, the Mexican-Californian period, and the American period. Each of these is discussed separately on the pages that follow.

Indian period.--The Santa Ana River basin has been inhabited for several millennia--artifacts found within the basin suggest that habitation may have had its beginning about 5,500 B.C. All evidence found near the coast and in one inland valley indicates that these prehistoric people lived on the flesh of small animals and on seeds. The coastal inhabitants added shellfish to their diet. These prehistoric dwellers are designated as hunters and gatherers (oral commun., P. G. Chace, archeologist, Charles W. Bowers Memorial Museum, 1967).

No evidence has been found that indicates the length of occupancy of the prehistoric settlements discovered in the basin, nor is it known whether or not the Indians found by the Spaniards were descendants of those ancient inhabitants. All evidence indicates that no form of agriculture was practiced in the basin until the Spanish mission period.

Spanish-mission period.--The early Spanish settlements in what is now southwestern United States were mostly in the interior of Arizona and New Mexico. California, then known as Alta California, was not explored until Juan Rodriguez Cabrillo was given command of two small boats and instructed to explore the coast. Cabrillo sailed from Navidad, on the west coast of Mexico, on June 27, 1542. He sailed up the west coast of Baja California and on September 28 entered a bay for a landing at a site he called San Miguel. (We know it as San Diego.) He continued sailing north along the coast and landed at various places along his course. Exploration of Alta California then lagged until 1768, when Jose de Galvez, visidora (royal inspector) of all New Spain, visited Baja California and began planning expeditions to Alta California. He chose Captain Gaspar de Portola, governor of Baja and Alta California, to command the expedition and Father Junipero Serra to establish a chain of missions.

Portola, accompanied by Father Serra, reached San Diego July 1, 1769. Portola continued his overland trip to the north and camped in a broad valley on July 28. That being Saint Anne's day, he and his men celebrated the day with a mass and named the valley Santa Ana.

The settlement of Alta California was centered around the missions that were established to convert the Indians to Christianity. San Gabriel Mission was established September 8, 1771, and San Juan Capistrano Mission was established 5 years later on November 1, 1776. Those two missions are not in the Santa Ana River basin, but the mission facilities that were built to divert water for irrigating garden crops provided the model for the early irrigation developments in the Santa Ana basin.

Many travelers crossed the Santa Ana River basin after the establishment of the San Gabriel Mission. Juan Bautista de Anza crossed the basin in 1776 and 1777 on his two historic trips from Sonora, Mexico, that led to the founding of the city of San Francisco. Father Dumetz of San Gabriel Mission, in his travels, visited a valley in the basin on May 20, 1810, and named it San Bernardino de Siena (the present San Bernardino Valley) in honor of the saint of that day.

Jose Antonio Yorba, a young soldier with the Portola expedition, returned to the Santa Ana Valley in 1810, and in that year he and his nephew, Juan Pablo Peralta, requested a grant from the government of Spain (MacArthur

and Meadows, 1963, p. 28). They received the Rancho Santiago de Santa Ana (fig. 3) encompassing 62,516 acres. The men settled on the grant and immediately dug ditches from the Santa Ana River to irrigate their crops. This diversion was the first irrigation development to use water from the Santa Ana River. It established a riparian right that has continued through the years.

Indians from the San Bernardino Valley visited San Gabriel Mission and observed how the mission Indians had benefited from the mission teachings and assistance. One visiting group was from a settlement or rancheria south of the Santa Ana River and west of the present city of Redlands. That group, known as the Guachama Indians, requested assistance in developing an irrigation diversion. The request was granted, resulting in the construction of the Mill Creek zanja (irrigation ditch) in 1819-20 (figs. 4 and 11), the first irrigation project in the upper Santa Ana Valley and the second in the drainage basin.

The missions prospered until the separation of Mexico from Spain in 1821. The Spanish Government had passed a law in 1813 calling for immediate secularization of all missions that had existed for 10 or more years, but the law was not published in Alta California until 1821. In August 1833 the Mexican Government declared that secularization must become effective, and in April 1834 gave the governor of Alta California four months to completely execute the terms of the law. This law reduced the mission lands to a few acres and opened the remainder to settlement. Thus the mission period ended and the Mexican-Californian or rancho period began.

Mexican-Californian period.--Immediately after the final execution of the act secularizing the missions, prominent members of Mexican-Californian families requested and received land grants from the California governors, who were appointed by the government of Mexico. The grants in the Santa Ana River basin and the dates of several of them are shown in figure 3. Irrigation increased but remained a localized practice during the Mexican-Californian or rancho period. Rancho grantees principally raised cattle, horses, and sheep and they irrigated only small plots of feed grain for their livestock and fruit crops for household use.

The American influence began to be felt during the late Spanish-mission period and early Mexican-Californian period, when many Americans moved into southern California, became Mexican citizens, and married into land-holding Spanish or Mexican families. The Mexican-Californian period came to an end and the American period began when Mexico ceded Alta California to the United States in 1848.

American period.--The breakup of the ranchos through sales to Americans, who were migrating to California in ever-increasing numbers after 1848, marked the beginning of the American period. The first significant event of that kind in the basin was the purchase of the San Bernardino Rancho by two Mormon immigrants, Amasa M. Lyman and Charles C. Rich, on September 22, 1851 (Beattie and Beattie, 1939, p. 182). Six years later, in September 1857, a group of Germans living in San Francisco purchased 1,165 acres of the Rancho San Juan y Cajon de Santa Ana (Pleasants, 1931, p. 333), and established a settlement that was to become the present city of Anaheim.

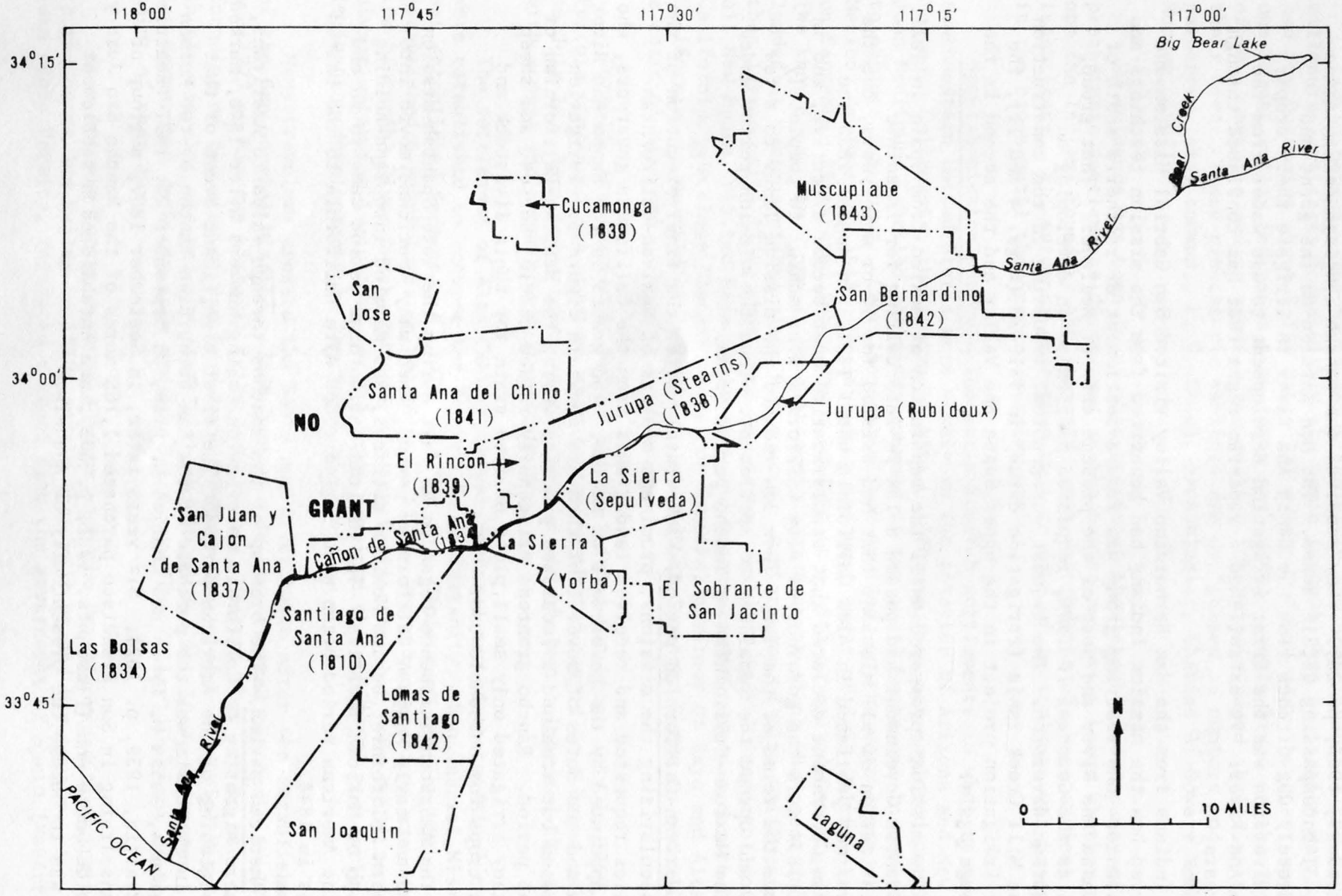


FIGURE 3.--Land grants in the Santa Ana River basin.

Intensive irrigation began with the settlement of the land in those two ranchos. Other ranchos began breaking up through sale or distribution of the land among the heirs of the original grantees. The Santa Ana River basin was entering a stage of rapid development that was accompanied by a continually increasing demand for water, first for agriculture and later for municipal supply, on the land first occupied by migrant Indians.

Extensive trade with the Mexicans, originally for hides and tallow, did much to encourage Americans to settle in southern California, many of whom married into prominent Mexican families and became landowners and merchants. Members of the Mormon Battalion that traveled to California in 1846, during the war between the United States and Mexico, had carried reports back to Utah of the agricultural potential of southern California. Those reports were a contributing factor in the Mormon migration to the area.

The subsequent history of the Santa Ana River basin with respect to the development of its water resources is detailed in the bulk of the report that follows. Elements discussed include the following:

1. The establishment of water rights by the numerous water companies and agencies, and ensuing water-rights litigation.

2. The use of ground water when surface supplies proved inadequate to meet the ever-increasing water demand.

3. The development of hydroelectric power generation.

4. Floods and flood protection.

5. The importation of water to supplement the local supply.

WATER DEVELOPMENT IN THE UPPER SANTA ANA RIVER BASIN

North Fork Water Company and Bear Valley Mutual Water Company

The North Fork Water Co. and the Bear Valley Mutual Water Co. divert all flow of the Santa Ana River at the mouth of the canyon where the river emerges from the San Bernardino Mountains. The two companies control the distribution of the water for the irrigation of large acreages on both sides of the river.

The water rights of those two companies are the outgrowth of a number of small ditch rights established during the early development of the San Bernardino Valley. Development of that valley was an outgrowth of the purchase of the San Bernardino Rancho by Lyman and Rich (p. 9) in 1851 and subsequent colonization of the valley. The earliest diversions were on the north side of the river, but some of the water rights were gradually transferred to the south side. Through the years the water rights became considered as distinct north-side and south-side rights, and the ditches became known as the North Fork and South Fork ditches. Eventually all water rights in the area became vested in the present North Fork Water Co. and Bear Valley Mutual Water Co.

Water commissions played an important role in regulating those water rights. As early as 1854, the California legislature, in seeking to promote the orderly development of irrigated agriculture in the State, passed an act providing for "board(s) of commissioners...to regulate water courses," whose duty would be "to apportion the (irrigating) water of the streams in their districts among the inhabitants thereof, and authorize the construction of ditches" when proper application was made.

On the pages that immediately follow, there are numerous references to Hall (1888) and Beattie (1951). In their histories of the water development of the Santa Ana River above Waterman Avenue, San Bernardino (fig. 4), Hall and Beattie disagree at times on the location of points of diversion and on dates when ditches were established. Beattie's account is given more credence here because he had access to Hall's report when he was doing his research and would be unlikely to differ with Hall for frivolous reasons.

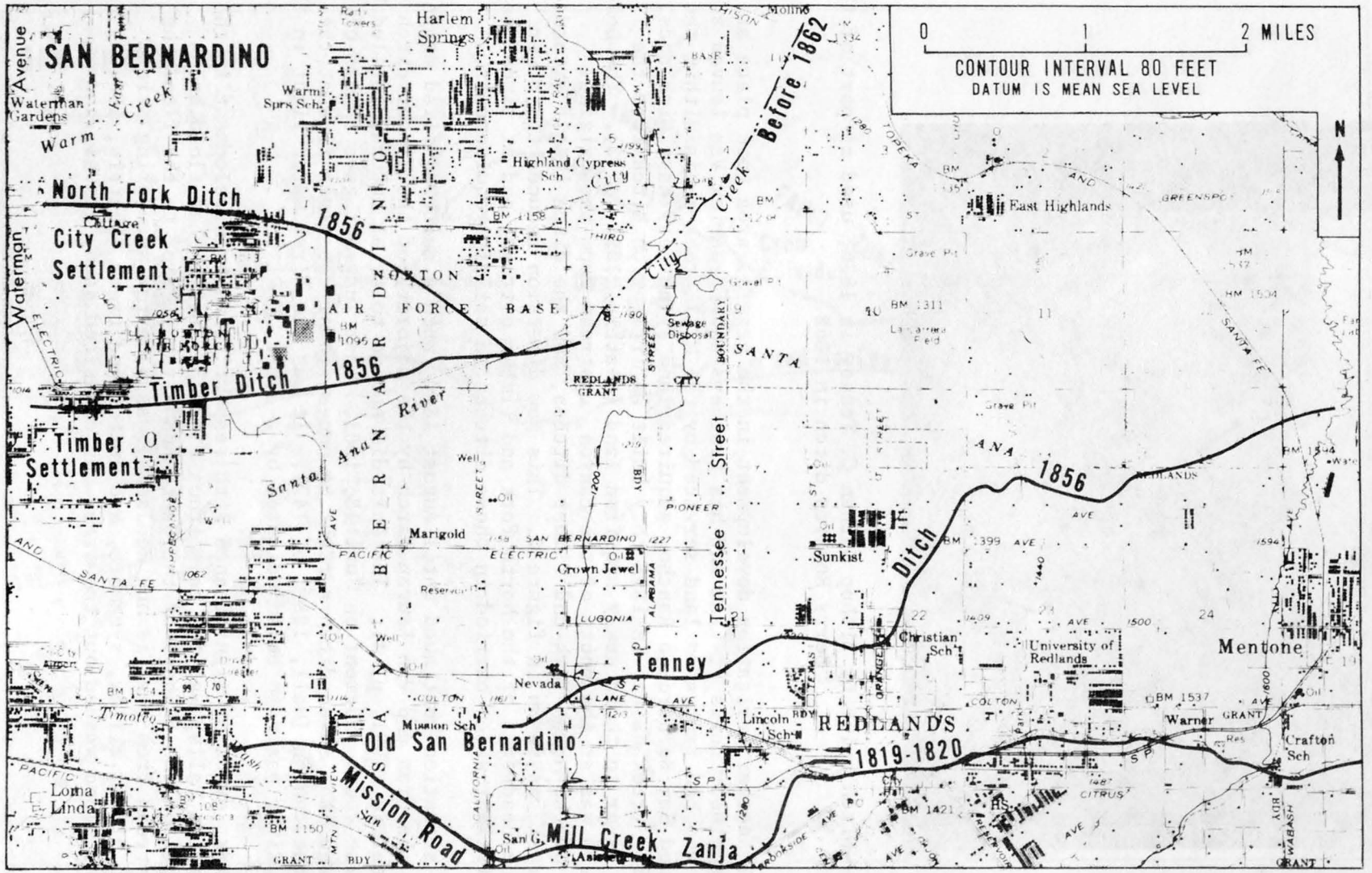
North Fork Ditch

Two groups of non-Mormon settlers established communities east of San Bernardino in the early 1850's. Referred to present streets, one community was south of Mill Street between Waterman and Tippecanoe Avenues, and the other along Sixth Street between Waterman and Sterling Avenues (Beattie and Beattie, 1939, p. 241). The former was known as the Timber Settlement and the latter as the City Creek Settlement (fig. 4). The high water table in the area enabled deep-rooted crops to grow readily, but shallow-rooted crops such as corn and garden crops required supplemental water.

In May 1856 the settlers in the two communities combined their efforts in the construction of a dam in the Santa Ana River and two diversion ditches to carry water to the settlements. The approximate location of the ditch heading and ditches is shown in figure 4. The Timber Settlement was served by the Timber ditch and the City Creek Settlement was served by the North Fork ditch.

At about the same time, two Mormon groups established settlements near the City Creek and Timber Settlements. One group settled on the site of the present city of San Bernardino, and the other group settled on the south side of the Santa Ana River, northwest of San Gabriel Mission Asistencia. The latter settlement became known as Old San Bernardino. In the autumn of 1856, the settlers of Old San Bernardino, under the leadership of Bishop Nathan C. Tenney, built the Tenney ditch (figs. 4 and 5) from the south side of the river to irrigate land to the north of that irrigated by the Mill Creek zanja, or old mission ditch (Beattie, 1951, p. 3).

Because the Tenney ditch heading was upstream from the earlier established heading of the diversions to the City Creek and Timber Settlements--North Fork and Timber ditches--the users of those two ditches immediately protested to the board of water commissioners. The board decreed that all flow belonged to the Timber and North Fork ditches and ordered Tenney to cease diverting any flow from the river. By order of the board a tight dam was built across the head of the Tenney ditch and that terminated the Tenney diversion.



Base from U.S. Geological Survey San Bernardino and Redlands 1954, 1:62,500

FIGURE 4.--North Fork, Timber, and Tenney ditches.

FIGURE 5.--Ditch built by Bishop Nathan C. Tenney in 1856; used as part of the Berry Roberts ditch in 1868.

Still another irrigation development in the general area took place at about this time. Lewis F. Cram and his brothers and Frederick Van Leuven and his sons, who had irrigated land serviced by the Mill Creek zanja within the Mormon-owned San Bernardino Rancho, acquired land lying near East Highlands, east of City Creek Wash. In 1858 they built an irrigation ditch from the Santa Ana River to their newly acquired land (Beattie, 1951, p. 3). The head of the ditch was at the mouth of the canyon, upstream from the original headworks of the North Fork and Timber ditches, and the ditch itself extended to City Creek, as shown in figure 6. This new diversion reduced the river flow at the headworks of the North Fork and Timber ditches, and at times there was insufficient water carried in those ditches to satisfy requirements.

That situation continued until August 1860, when a suit was filed against owners of the Cram and Van Leuven ditch by the majority of the Timber ditch owners (Beattie, 1951, p. 4). The suit did not go to trial but was settled by a compromise court judgment on June 18, 1861. That judgment gave owners of the Cram and Van Leuven ditch a right to one-sixth of the river flow at the mouth of the canyon (Hall, 1888, p. 147). It was the first water right in the Santa Ana River basin to be adjudicated by a court.

The next event of significance with respect to water development in the San Bernardino Valley was the calamitous flood of 1862. That flood had a major effect on the channel of the Santa Ana River. Prior to the flood the river, upstream from what is now Redlands, was a narrow meandering stream lined with alder, willow, sycamore, and cottonwood trees (Beattie, 1951, p. 5). The flood washed out the trees and deposited sand, gravel, and

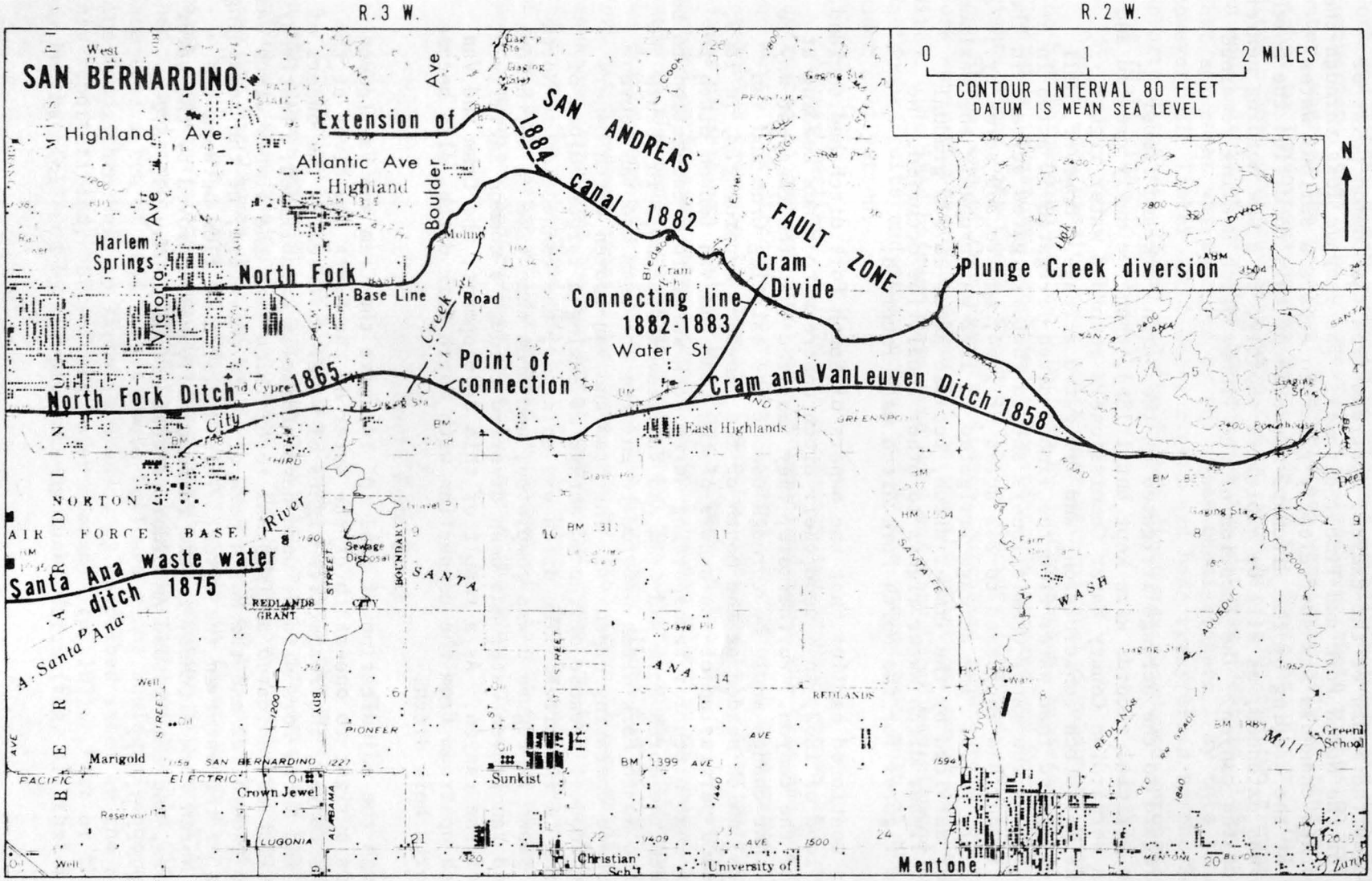


FIGURE 6.--Cram and Van Leuven ditch and North Fork Canal.

boulders on the riverbed and on the adjacent inundated area. After the flood the river no longer followed a well-defined course, but instead ran in several channels below the mouth of the canyon, upstream from the common point of diversion for the North Fork and Timber ditches. The seepage loss through the beds of the new channels was sufficiently great to create a serious water deficiency at the heading of the ditches. Because of this condition the North Fork ditch was extended, as will be explained shortly, to a new heading nearer the mouth of the canyon. The location of the Timber ditch heading remained unchanged.

With regard to the acreage irrigated by the North Fork and Timber ditches, no official records were kept until 1864, when the newly created and elected San Bernardino County Water Commissioners recorded water rights, applications for ditch construction, and irrigated acreage. However, Hall (1888, p. 45) noted that water from the Timber ditch irrigated 50 acres in 1857. Records of the water commissioners showed that irrigated acreage in the Timber Settlement had increased to 242 acres by 1864, and to 369 acres by 1872 (Beattie, 1951, p. 2). The acreage irrigated in 1872 was probably the maximum acreage ever serviced by the Timber ditch, because after 1872 a gradual transfer of Timber ditch water rights to other localities occurred. No comparative figures for the North Fork ditch were recorded.

It was mentioned earlier that the owners of North Fork ditch had decided, after the flood of 1862, to extend their ditch upstream to a new heading at the mouth of the canyon. Furthermore, they realized that the cheapest way to accomplish that change would be through use of the existing Cram and Van Leuven ditch, which headed at the mouth of the canyon. Accordingly, in 1865, they requested permission of the owners of the Cram and Van Leuven ditch to make use of that ditch for transporting North Fork water to a connection to be built between the North Fork and Cram and Van Leuven ditches. In return the owners of the North Fork ditch offered to enlarge the Cram and Van Leuven ditch and share operating expenses. The Cram and Van Leuven ditch owners granted the request because of the advantage of having a larger volume of water flowing in the ditch. The ditch was enlarged, the connection to North Fork ditch shown in figure 6 was completed, and from that time on North Fork and Cram and Van Leuven water has been diverted through a common facility at the mouth of the canyon. As a result of this development, the Cram and Van Leuven ditch upstream from the connection with North Fork ditch, also became known as North Fork ditch.

Although the adjudication of 1861 (p. 14) gave the Cram and Van Leuven ditch owners a right to one-sixth of the water of the Santa Ana River at the mouth of the canyon, the respective rights of water diverted by the owners of the Timber and North Fork ditches were never formally established. Testimony in that litigation indicated an informal recognition that the Timber ditch was entitled to two-thirds and the North Fork ditch to one-third, of the remaining five-sixths of the water in the river. This division of flow between the Timber and North Fork ditches, in the ratio of 2:1, was approved by the water commissioners, and they issued an order to that effect on May 29, 1872 (Beattie, 1951, p. 4).

The owners of the North Fork ditch were dissatisfied with the commission's order; they claimed that the combined entitlement of the North Fork and Timber ditches should be divided equally between the two ditches. Furthermore, they were interested in maintaining their rights to use of the water, whereas the owners of Timber ditch were gradually selling their water rights to landowners on the south side of the Santa Ana River. The North Fork ditch owners pressed their case and on June 12, 1879, the two groups agreed to an equal division of water between the two ditches (Beattie, 1951, p. 4). That agreement was approved by the water commissioners. By this time, however, all Timber ditch water rights had been transferred to the Berry Roberts ditch (p. 22-25) and the Timber ditch was abandoned--probably about 1878 (Hall, 1888, p. 162-163).

With each passing year additional agricultural development took place in the San Bernardino Valley. In 1880 R. J. Cunningham, representing a number of Riverside investors, purchased a considerable acreage and North Fork water rights along City Creek, south of Harlem Springs (Beattie, 1951, p. 19). John Stone, one of Cunningham's clients, purchased rights to 43 hours of North Fork water through Cunningham and became the principal owner of the North Fork ditch. The land between Base Line Road and City Creek was planted to deciduous fruits and other crops, and by the second year most of the land was under cultivation.

A year earlier, in 1879, E. G. Judson and Frank E. Brown had become interested in the potential of the benchland above the Cram and Van Leuven and North Fork ditches for raising oranges, a crop with more value than the vegetables grown on the lowland (Beattie, 1951, p. 16). They purchased the claims of settlers living near Plunge Creek in sec. 35, T. 1 N., R. 3 W., and secured options on other parcels of land in the vicinity of sec. 35. To bring water to the benchland, Judson and Brown met several times with owners of the two ditches and offered to build a new high-line ditch for $1,000. The North Fork ditch owners opposed the plan, but by 1880, several owners of land on the bench had purchased lowland water rights and requested transfer of those rights to the benchland (Hall, 1888, p. 148). Judson and Brown and the owners of North Fork ditch rights signed an agreement, in the spring of 1881, for the construction of a high-line ditch to serve the benchlands.

North Fork Canal

Construction of the high-line ditch, known as the North Fork Canal, began in the autumn of 1881, and it was completed and in operation in April of the following year (Hall, 1888, p. 148). The North Fork Canal left the original Cram and Van Leuven ditch a short distance west of the east line of sec. 6, T. 1 S., R. 2 W., and followed the course shown in figure 6 to City Creek. To reach the area along Base Line Road, the canal crossed City Creek in a flume, then turned south, probably following along the route of the old City Creek-Base Line ditch of 1865. This route followed along Boulder Avenue to Base Line Road, then west to Victoria Avenue, as described later in the section of this report titled, "City Creek Water Company" (p. 107). Part of this route may be that followed by the present-day Snake ditch (fig. 41) that is

currently used by the North Fork Water Co. After the completion of the North Fork Canal, the owners of the Cram and Van Leuven ditch built a connecting ditch in 1882-83 from their ditch to the North Fork Canal (Hall, 1888, p. 149). The approximate location of that connecting ditch is shown in figure 6.

The North Fork Canal was excavated through highly permeable material and was subject to considerable seepage loss and breaks throughout most of its length. To reduce water losses, Cunningham (p. 17) contracted to have the canal paved from the heading to about half a mile east of Plunge Creek--probably in 1882 (Beattie, 1951, p. 19). Many of the owners objected, but the work was completed and each owner paid his share. At about this time additional land was being purchased for agriculture north of Base Line Road and north of Highland Avenue. To meet the demand for more water it was necessary to enlarge and further pave part of the canal (figs. 7 and 8); to serve the area north of Highland Avenue it was necessary to build a new extension of the canal. (The route of the proposed extension is designated "Extension of 1884" in figure 6). After considerable discussion, the ditch owners agreed in the autumn of 1883 that the canal capacity should be increased to 1,500 miner's inches, and that the canal should tunnel through the San Andreas fault ridge east of City Creek. The canal would then cross City Creek (fig. 9) and continue west, on the south side of Highland Avenue, to its end at present-day Palm Avenue. The construction of a ditch to service the area north of Highland Avenue was to be left to the owners of that land. (See the section of this report titled, "West Highlands Water Co.," p. 33-34.)

FIGURE 7.--North Fork Canal east of Plunge Creek; enlarged and paved in 1883-84.

FIGURE 8.--North Fork Canal east of Plunge Creek crossing.

The first part of the construction that was completed was the tunnel and the extension of the canal along Highland Avenue. That completion date was January 1884 (Beattie, 1951, p. 21). By August 1885 all improvements had been completed with the help of the Bear Valley Land and Water Co., as described below.

On January 13, 1885, the owners of North Fork water rights incorporated under the name of North Fork Water Co. The owners of the Cram and Van Leuven ditch water rights were not included in the new company, but they continued their affiliation with the new company as joint owners of the upstream part of the North Fork Canal. An unusual feature of the incorporation of the North Fork Water Co. was that the individual owners granted their water rights to the company by a trust deed limiting their possession to a period of 12 years. Another provision required that the deed be signed by owners of three-fourths of the 240 hours or shares in the ditch before the incorporation could become effective.

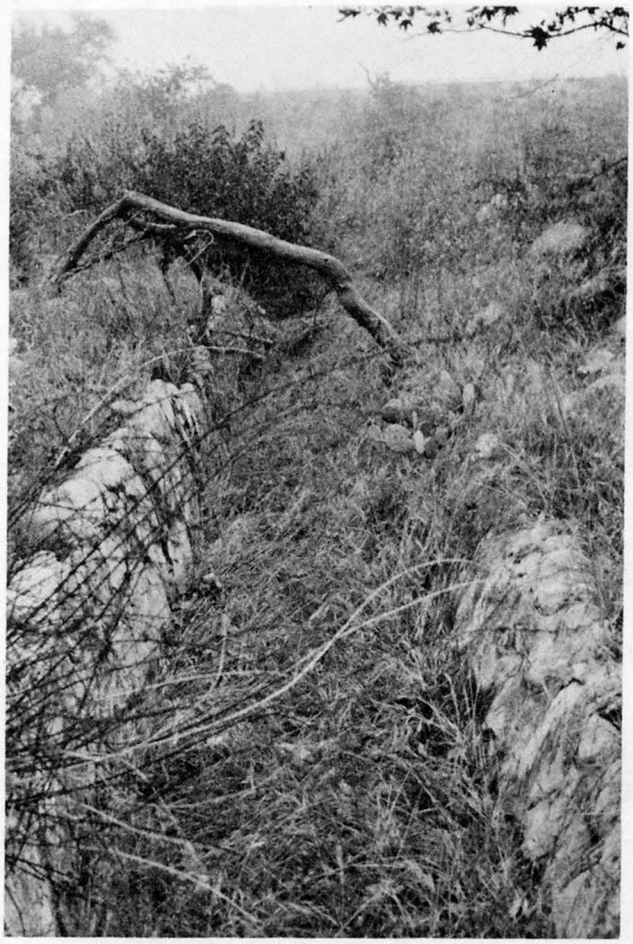


FIGURE 9.--North Fork Canal across City Creek; used 1884-1916.

The Bear Valley Land and Water Co.--an organization that developed about this time and one that is discussed later in this report--was given control of all the Santa Ana River water by the terms of an agreement, signed May 5, 1885, with the North Fork Water Co. and the owners of Cram and Van Leuven water rights. The North Fork Water Co. relinquished all rights to flow in excess of the following discharge rates: 500 miner's inches in June; 450 miner's inches in October; 400 miner's inches in November; 600 miner's inches in any of the first four months of the year, provided the sum of the four monthly deliveries did not exceed 2,250 miner's inches. During the remaining 5 months of the year, one-fourth of the supply at the diversion point, exclusive of additional supply contributed by a new reservoir on Bear Creek, was to be delivered to the owners of North Fork and Cram and Van Leuven water rights. (The disposition of the Cram and Van Leuven water rights is discussed in later paragraphs.)

The Bear Valley Land and Water Co. purchased a half-interest in the North Fork Canal and joined with the North Fork Water Co. in enlarging and paving the canal, making it capable of conveying 1,500 miner's inches of water. Each company paid half the cost, and each agreed to pay half of future maintenance costs.

Both companies benefited from the agreement. The North Fork Water Co. secured a water supply of 500-600 miner's inches during two or three months of heavy demand in each year, regardless of the total flow in the stream, although they might receive less water than before in some of the other months. In addition, the reduction of water losses brought about by the improvement of the canal, insured increased water deliveries, so that nearly 50 percent more acreage could be irrigated. The Bear Valley Land and Water Co., by obtaining control of the surplus flow in the canal for supplying its customers, reduced its dependence on water stored in the new reservoir on Bear Creek. By having control of the operation of the entire system, the company eliminated many possible conflicts among the water users. Furthermore, the company had the cooperation of the North Fork Water Co. in enlarging and maintaining one of the principal canals for the delivery of its water.

The owners of Cram and Van Leuven water rights incorporated as a separate company in February 1890 (Beattie, 1951, p. 28) and continued to operate as a separate company for the next 35 years. As mentioned on page 19, the Cram and Van Leuven people owned an interest in the upstream part of the North Fork Canal--that part upstream from Cram Divide (fig. 6)--but their water could not be carried in the canal beyond Cram Divide. That meant that owners of Cram and Van Leuven water rights who had purchased land on the bench beyond the divide could not deliver water to their property. As early as 1884 one of those property owners had requested permission to deliver water to his property, but it was 1891 before the first of such requests was granted for a fee (Beattie, 1951, p. 28).

Owners of Cram and Van Leuven water rights merged their interests with the North Fork Water Co. in March 1925 (Beattie, 1951, p. 29). Cram and Van Leuven stock was transferred to the North Fork Water Co., and in exchange, the owners of that stock received North Fork Water Co. certificates giving them the right to a quantity of water equivalent to the value of their certificates.

Since 1891 water has been conveyed from the downstream end of the North Fork Canal to Highland ditch (fig. 11), to serve the area of West Highlands. (Highland ditch is discussed in a later section of this report on pages 33-34.) In recent years there have been many changes in land use in the North Fork Canal-Highland ditch service area. Some of the land formerly irrigated for agriculture has now been urbanized, and land that was previously undeveloped has been placed under irrigation. The net result, however, has been that the acreage irrigated has changed only slightly in the last 30 years (oral commun., North Fork Water Co., 1967).

The use of ground water has been ever-increasing in the San Bernardino Valley, and during dry years the diversion from the Santa Ana River is supplemented by water from wells. In addition, water is diverted from the mouth of Plunge Creek and released to the North Fork Canal (fig. 6).

South Fork Ditch

In 1867-68, Berry Roberts and E. H. Thomas, of the Timber Settlement (fig. 4), acquired 160 acres of land northwest of Redlands near the present-day intersection of Pioneer and Tennessee Streets. They planned to farm the newly acquired land, using water from the Santa Ana River for irrigation. At that time water rights to the river were held by owners of the North Fork, Cram and Van Leuven, and Timber ditches. On March 10, 1869, Roberts notified the water commissioners that he was claiming a right to Santa Ana River water that was surplus to the needs of the three existing ditches (Beattie, 1951, p. 7). Although there was no objection from the ditch owners, the commissioners took no action on the claim.

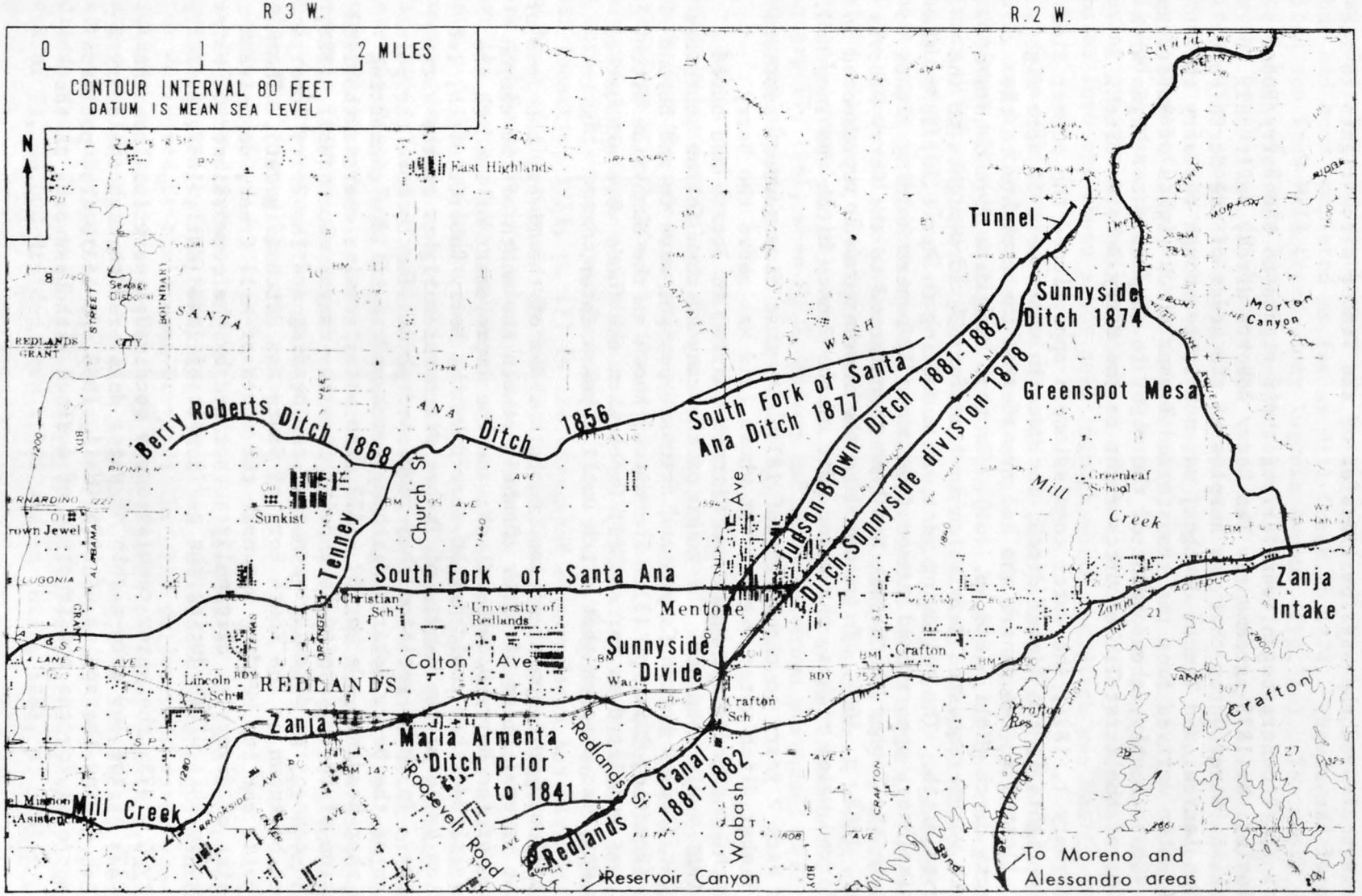
Roberts and Thomas built a ditch heading, probably near the old Tenney ditch heading, and a channel connecting with the old Tenney ditch. The Tenney ditch was used to convey water to a point near the present-day intersection of Pioneer and Church Streets. From that point a rather crude ditch--the Berry Roberts ditch (fig. 10)--carried water to the property of Roberts and Thomas.

Thomas sold his property and his claim to surplus Santa Ana River water to August Starke, probably in 1869, and in the same year Henry Suverkrup filed a claim to 160 acres immediately north of the claim of Roberts and Starke (Beattie, 1951, p. 8). Roberts and Starke gave Suverkrup a one-third interest in the ditch, it being agreed that for $20 given to Roberts to enlarge the ditch, Suverkrup would receive a share of the ditch and water right. A short time after that transaction was completed, Starke sold his land and water claims to George A. Craw.

Until this time no official recognition of the Berry Roberts ditch and its water rights had been secured. On February 10, 1870, the water commissioners at the request of Suverkrup, Roberts, and Craw officially recognized and described the Berry Roberts ditch and acknowledged its claim to surplus Santa Ana River water, to be divided equally among the three men (Beattie, 1951, p. 8).

Berry Roberts sold his land and water rights to H. W. Ball in December 1870. Ball also owned land with a 30-acre water right in the Timber ditch. It is not definitely known, but Ball probably sold his Timber Settlement property and water rights, moved to the Roberts property, and took over Roberts' work as overseer or watermaster of the Berry Roberts ditch. In 1872 Ball acquired 45 shares or acre-rights, and Suverkrup acquired a 30-acre right in the Timber ditch (Beattie, 1951, p. 10). Water acquired under those rights was diverted from the Santa Ana River into the Berry Roberts ditch, under protest from the other owners of the Timber ditch.

At a meeting of Timber ditch shareholders February 15, 1873, the water rights were apportioned among 18 owners for the irrigation of 369 acres (Hall, 1888, p. 161). Included among the owners were Suverkrup, Ball, and other owners of land south of the Santa Ana River, whose water rights collectively totaled 148 acres. In addition to the apportionment of water rights, it was



Base from U.S. Geological Survey
Redlands 1954, 1:62,500

FIGURE 10.--Diversions near Redlands.

agreed, at the meeting, that shareholders "...have the power to sell and transfer their water rights, without any question or hindrance whatever." That agreement cleared the way for transfer of the Timber ditch rights to the south side of the river.

Timber ditch owners began transferring their rights to the Berry Roberts ditch following the 1873 agreement. The Berry Roberts ditch, built only to carry Santa Ana River water that was surplus to the needs of the North Fork, Cram and Van Leuven, and Timber ditches, was not large enough to carry the additional water derived from the transferred Timber ditch rights of Suverkrup and Ball. Consequently, abandonment of the right to surplus water began with the transfer of the first Timber ditch right to the Berry Roberts ditch.

On February 1, 1875, the water commissioners apportioned the summer flow of 369 acre-rights in the Timber ditch, included in which were 34 acre-rights that were allotted to two owners who had transferred their rights to the Berry Roberts ditch (Hall, 1888, p. 161). On that same date five owners of Timber ditch water requested permission to transfer 62½ acre-rights to the Berry Roberts ditch. The following year, at a meeting on April 20, 1876, the water commissioners apportioned summer flow among 12 owners holding rights to 220½ acres in the Timber ditch that had been transferred to the Berry Roberts ditch (Hall, 1888, p. 162). To accommodate the increased flow represented in the transferred water rights, the upper part of the Tenney ditch was reopened.

We go back 2 years to the spring of 1874. At that time several settlers who owned Timber ditch water rights, but whose land was above the Berry Roberts ditch, engaged W. W. McCoy and Hiram M. Barton to locate and build a new ditch that would head near the mouth of the canyon, then follow southwest along the bluff below Morton Canyon and across Greenspot mesa to and beyond Mill Creek (Beattie, 1951, p. 13). The ditch, known as the Sunnyside ditch (fig. 10), was completed as far as Mill Creek when the funds were exhausted. No further work was done on that ditch until 4 years later.

The continued development of land on both sides of the river, the loss of water in the several miles of river channel between the mouth of the canyon and the head of the Berry Roberts ditch, and the improvement of land to the east at an altitude that could not be served by the Berry Roberts ditch, led to a petition by 14 of the owners of Timber ditch water rights to the water commissioners. In their petition they requested permission to move the point of diversion of the Berry Roberts ditch upstream and to build a connecting ditch from that heading. On May 17, 1877, the water commissioners authorized the relocation of the diversion to a point near the canyon mouth (Hall, 1888, p. 162); the connecting ditch between that new heading and the Berry Roberts ditch was to be known as the South Fork of Santa Ana ditch (fig. 10). The ditch was built but its heading was near the mouth of Mill Creek, downstream from the point of diversion originally authorized by the commissioners. Water was conveyed in this ditch during the early part of 1878 (Hall, 1888, p. 163).

On July 5, 1878, the water commissioners received a petition from the owners of 233¼ of the 369 acre-rights of water delivered through the Berry Roberts ditch during the spring of 1878 (Hall, 1888, p. 163). The petition requested approval for the construction of a ditch with headworks at the

diversion point designated in the authorization that had been given on May 17, 1877. The commission considered and approved the petition that same day, July 5. The ditch that was built utilized the abandoned Sunnyside ditch that had been completed as far as Mill Creek in 1874. The new section of ditch ran from Mill Creek along Lugonia Avenue (fig. 10). The ditch was named South Fork of Santa Ana ditch-Sunnyside division, but was usually referred to as the South Fork ditch, and its upper end was commonly called the Sunnyside ditch. The grade along Lugonia Avenue was very steep. To prevent excessive erosion, a 2-mile reach was paved with large boulders. The space between the boulders was filled with heavy red clay, and then a small flow of water was allowed to pass through the ditch until the clay was compacted. This early paving program not only eliminated erosion, but probably reduced seepage losses into the loose sandy soil through which the ditch was built.

Some water was diverted through the Sunnyside ditch in the autumn of 1878, and by the summer of 1879 it carried all the water diverted in accordance with water rights originally held by owners of the now-abandoned Timber ditch, except for the water diverted by Ball. Ball continued to use the older (1877) South Fork of Santa Ana ditch (fig. 10). Considerable controversy arose between Ball and the Sunnyside ditch owners. The heading of the ditch and the intervening stretch of channel was highly pervious. Ball's allotment of water therefore suffered all the channel losses that were formerly shared by all water users. The controversy continued until January 17, 1881, when E. G. Judson and Frank E. Brown purchased Ball's 160 acres of land and 33 acre-rights to South Fork water.

Judson and Brown started the agricultural development of a new area in Redlands between Colton Avenue and the hills to the south. To obtain a water supply for the new area, they purchased 50 shares of stock in the South Fork ditch from stockholders in the Lugonia district. To develop additional water to supplement that available to them by virtue of those 50 shares and the 33 acre-rights purchased from Ball, they started construction of a tunnel in 1881 (Beattie, 1951, p. 17) in the streambed of the Santa Ana River (fig. 10). The head of the tunnel was not far downstream from the headings of the North Fork and South Fork ditches. The tunnel ran downstream about 1,500 feet to near the mouth of Morton Canyon where Morton Canyon water was collected. From there a ditch was built that joined the Redlands Canal, another Judson and Brown enterprise, near the intersection of Wabash and Colton Avenues (fig. 10). The Redlands Canal took off from the Sunnyside ditch at the point where the South Fork ditch turned west on Lugonia Avenue. The canal continued southwest to a reservoir site near the mouth of the canyon now known as Reservoir Canyon. During the late 1880's and the 1890's, the alinement of the canal was improved, its capacity was increased, and much of the open ditch was replaced by closed conduit.

Judson and Brown planned to develop 1,500 acres of land in Redlands using water delivered by the Sunnyside ditch and Redlands Canal, supplemented by water delivered by the Judson-Brown ditch. The delivery of water was originally to be 1 miner's inch to each 8 acres of land, but that was later changed to 1 miner's inch to each 4 acres of land. To facilitate the distribution of water to the Redlands area, Judson and Brown organized the Redlands Water Co., which was incorporated October 27, 1881, with a capital stock of $1,500,000 divided into 1,500 shares (Hall, 1888, p. 176).

Judson and Brown turned over 50 shares of South Fork stock to the new company and received a contract from the company to continue the construction of a tunnel in Morton Canyon which they had started. The Redlands Water Co. issued shares of stock to Judson and Brown and assigned a share to each acre of land in their holdings. Although this stock was assigned to the land, it remained personal property and could be sold independently of the land.

Under the original plan of operation, the company did not sell water to the land owners but delivered a proportional part of the available supply. In practice, some irrigators requested and received more water than their proportion of the supply.

The water taken from Morton Canyon by the tunnel system, together with the supply from the 50 shares of South Fork stock, was not sufficient to meet the water requirements in the Redlands area. Judson and Brown at this time were also involved in the Bear Valley Land and Water Co., an enterprise that is discussed in the next section of this report. To obtain the rights to sufficient supplemental water for the Redlands area, Judson and Brown made stock in the Bear Valley Land and Water Co. available to the Redlands Water Co. The financial details are quite complicated. For this report, suffice it to say that in 1888, the water supply of the Redlands Water Co. was derived from 300 shares of stock in the Bear Valley Water Co., water from the South Fork interests, and Morton Canyon water resulting from the tunnel development (Hall, 1888, p. 176). The combined supply gave the Redlands Water Co. 375 miner's inches of water, or the equivalent of 1 miner's inch per 4 acres of land for the company's 1,500 acres.

At about this time, other developments were taking place in the Redlands area. The Redlands, Lugonia, and Crafton Domestic Water Co. was incorporated in 1887 to furnish domestic water. The new company owned 108 of the original 1,500 shares of Redlands Water Co. stock. The water they supplied was diverted from South Fork ditch into a reservoir prior to distribution.

Also incorporated in 1887 was the Lugonia Water Co. The company was formed by the owners of water rights in the South Fork ditch with a capital stock of $369,000 divided into 3,690 shares (Hall, 1888, p. 165). The owners conveyed their water rights to the new company by grant deed and received 10 shares of the new stock for each share of original South Fork stock. (It will be recalled that there were 369 shares in the original Timber ditch that were later transferred to the South Fork ditch.) In 1888 about 165 of the original 369 shares had been transferred to the new company by Lugonia owners. The Redlands Water Co. owned 50 shares, and the Redlands, Lugonia and Crafton Domestic Water Co. owned 31-3/4 shares; the remainder was held by large stockholders and some nonresidents. Some of the shares were held out because of complicating factors, but those complications were eventually eliminated.

Bear Valley Land and Water Company

During the summer of 1880, Big Bear Valley in the upper part of Bear Creek (fig. 11) was surveyed by the State Engineer to determine its potential as a reservoir site. The survey and study that followed indicated that Big Bear Valley was one of the best reservoir sites in southern California (Hall, 1888, p. 181). F. E. Brown, a civil engineer and partner of Judson in the Judson and Brown enterprises, heard of the favorable report and visited Big Bear Valley with Hiram Barton in May 1883 (Hall, 1888, p. 187). Both men were impressed with the reservoir site and its potential. The storage of floodwater during the winter and its subsequent release during the summer would provide additional water for further development of the Redlands and Old San Bernardino areas.

After their visit to the reservoir site, the two men organized a partnership in which there were 36 shares. They purchased 3,800 acres of land from private owners in Bear Valley and obtained an additional 700 acres of railroad and Government land. The 4,500 acres included all of the proposed reservoir site and part of the adjacent watershed. According to Hall (1888, p. 188), the total cost of the land was between $25,000 and $30,000.

Construction of Bear Valley Dam to create a reservoir (fig. 12) began on September 27, 1883, and except for the spillway, was completed in November 1884 (Hall, 1888, p. 188). The Bear Valley Land and Water Co. was incorporated in September 1883 with a capital stock of $360,000 divided into 3,600 shares of stock. Each share of stock was to represent 1 miner's inch of water flowing during the 6-month irrigation season. In addition to the stock, the company issued water certificates that were transferable and independent of the stock. These certificates entitled their owners to water rights in the Bear Valley water supply. Each certificate entitled its owner to one-seventh of a miner's inch during the 6 months of the irrigation season. Credit for unused water could be accumulated during those 6 months, but no more than one-fourth of the total water allotted for the 6 months could be used in any one month. Also, a certificate holder was entitled to his part of the 6-month winter flow under the contracts with the North and South Fork ditches.

The closing of the outlet gate of the dam would, of course, affect the availability of water to satisfy the rights established by the North and South Fork interests at the mouth of the canyon. Therefore, no water could be stored in the reservoir until a satisfactory agreement was reached with the holders of downstream rights with regard to a schedule of reservoir operation. The Bear Valley Land and Water Co. reached an agreement with the North Fork Water Co. in 1885 (p. 20-21) on the division of water from the Santa Ana River and the timing of water deliveries. Agreements with the various interests south of the Santa Ana River were more difficult to obtain because of conflicts between owners of water rights in the Lugonia Avenue and Redlands areas (fig. 10). Several attempts to form a corporation involving all interests south of the river were unsuccessful. However, an association representing those interests was formed to deal with the Bear Valley Land and Water Co.

FIGURE 11.--Diversions in the eastern part of San Bernardino Valley.

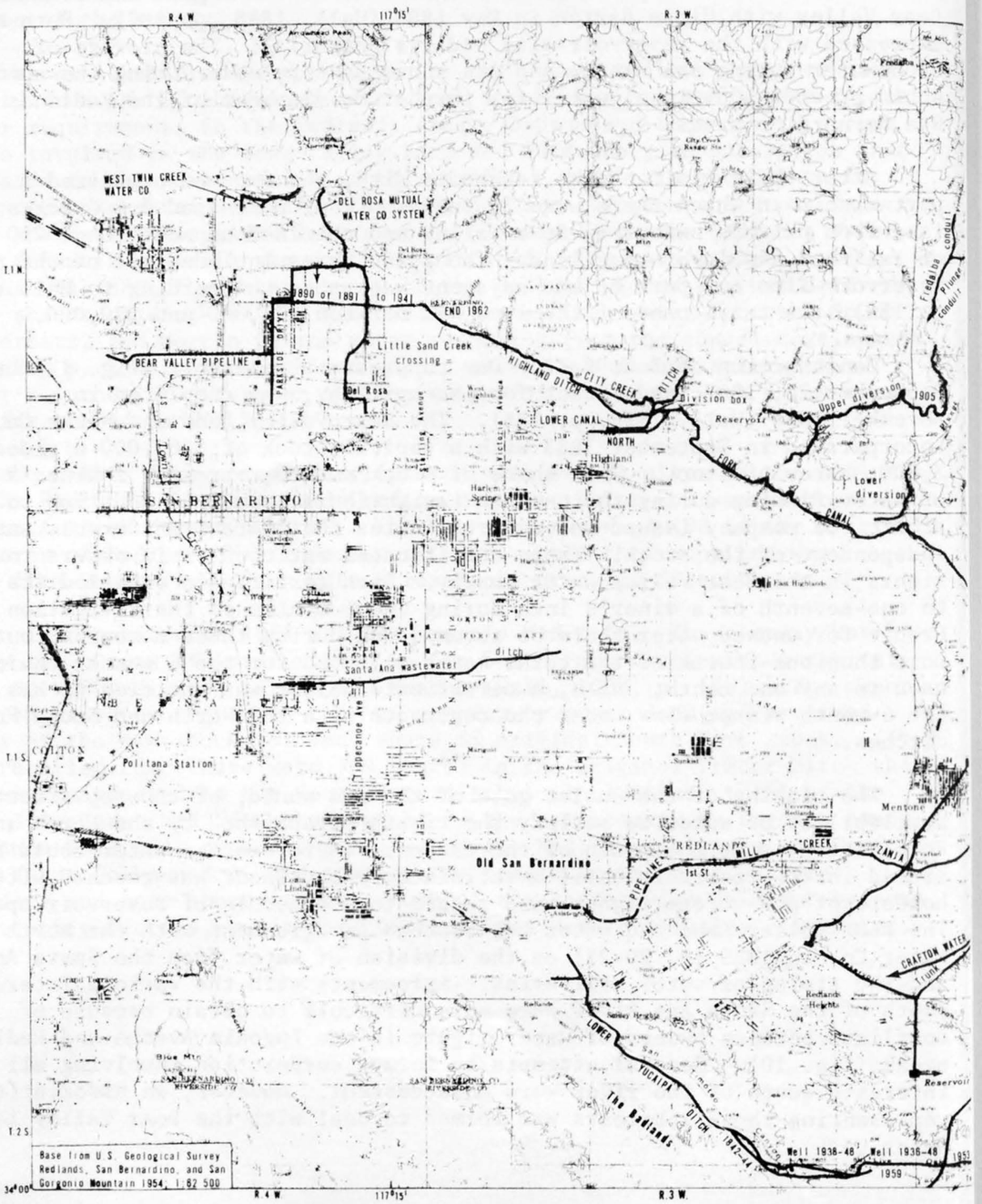


FIGURE 11.--Continued.

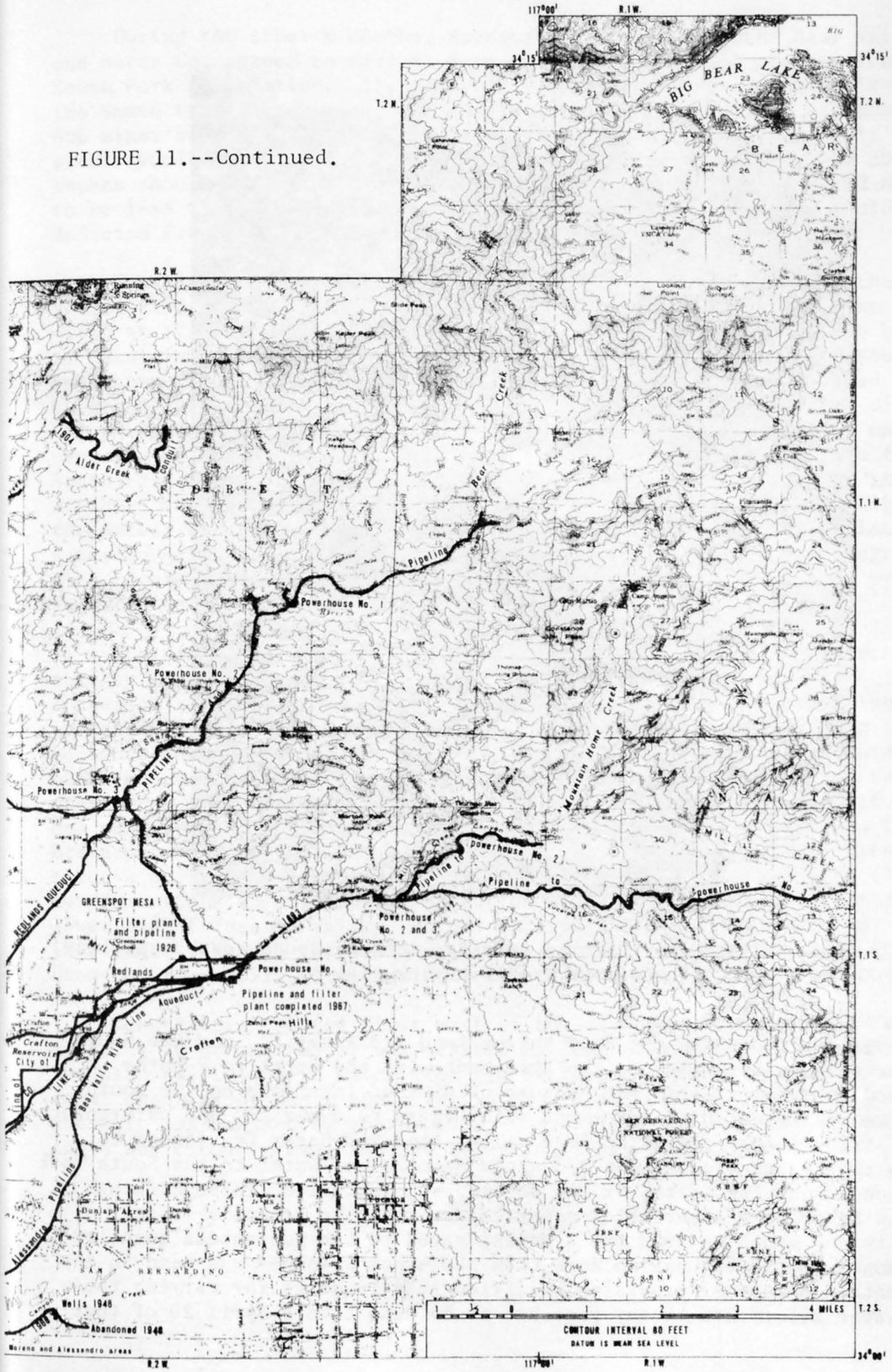


FIGURE 12.--Bear Valley Dam, built in 1883-84, looking south toward spillway. (Photograph from Schuyler, 1897)

The agreement between the Bear Valley Land and Water Co. and the South Fork Association was similar to the agreement with the North Fork Water Co. with regard to water rights, but because of divided interests on the south side, there was no definite agreement with regard to ownership and maintenance of the distribution system. The Bear Valley Land and Water Co. agreed to furnish a continuous flow of 466-2/3 miner's inches of water to the South Fork Association during the months of May to October, inclusive, in each future year. The South Fork Association reserved the right to accept a lesser quantity in any month and add the quantity saved to the guaranteed quantity in a later month, provided that no more than 600 miner's inches was used in any single month. A further provision specified that requests for varying the monthly water allotments in any year had to be made before April 20 of that year.

During the other 6 months, November through April, the Bear Valley Land and Water Co. agreed to deliver a continuous flow of 300 miner's inches to the South Fork Association. If, after delivering the first 300 miner's inches to the South Fork Association, the supply of water in the river exceeded the 600 miner's inches due the Bear Valley Land and Water Co., one-half of the excess would be delivered to the Association. If the delivery of 300 miner's inches should cause the flow available to the Bear Valley Land and Water Co. to be less than 600 miner's inches, one-half of the deficiency would be deducted from the 300 miner's inches delivered to the Association.

The agreement with the South Fork Association also provided that the Bear Valley Land and Water Co. could enlarge, reconstruct, or extend the South Fork ditch at its own expense, but if it did so, the company would also be required to maintain and operate the ditch. If the Bear Valley Land and Water Co. did reconstruct the South Fork ditch and then at some later time failed to maintain and operate it, the South Fork Association could buy the ditch at a value based on ditch capacity, but not to exceed the value placed on a capacity of 2,000 miner's inches. If the Association did not wish to buy the South Fork ditch, it could instead have a continuous right-of-way through the ditch to the Sunnyside divide at the head of the Redlands Canal (fig. 10), and the excess capacity of the ditch would belong to the Bear Valley Land and Water Co. If the company failed to comply with the terms of the agreement, with regard to the delivery of water, it forfeited all rights and privileges acquired under the agreement.

The promoters who organized the Bear Valley Land and Water Co. figured that by impounding the flow of Bear Creek, the available supply would be increased sufficiently to supply water to part of the San Bernardino Valley and also to the Moreno and Allesandro areas south of Redlands (fig. 11). The aqueduct that was proposed to accomplish this would start at an intake in the Santa Ana River at the present site of Southern California Edison Co.'s powerhouse No. 2. It would continue downstream to the canyon mouth in flumes and tunnels generally parallel to the river, turn southeast across the Greenspot Mesa to Mill Creek, and cross Mill Creek and the Mill Creek zanja about a quarter of a mile downstream from the zanja intake. From there it would continue in a southwest direction along the Crafton Hills, through the lower end of Yucaipa Valley, across Yucaipa and San Timoteo Creeks, and then, in a tunnel through the Badlands, to a reservoir in Moreno Valley (not shown). From the reservoir, water would be turned into the various distribution lines.

Construction of the first part of the aqueduct from the Mill Creek zanja crossing to Moreno Valley was started in 1888 or 1889 (Beattie, 1951, p. 57). The plan was to divert water from the zanja and replace that water with an equal quantity of Santa Ana River water, released into the zanja at the point where it was crossed by the Redlands Canal. The first diversion from the zanja was probably made in 1890 (Beattie, 1951, p. 57).

The owners of rights in the lower zanja protested this exchange of water in 1892 (Beattie, 1951, p. 57). Consequently, the Bear Valley Irrigation Co. (successor to the Bear Valley Land and Water Co. after December 1890) was forced to build its aqueduct between the Santa Ana River and Mill Creek. The aqueduct was known as the Santa Ana Canal when built; it is now known as Greenspot or Bear Valley High Line Aqueduct and includes several long tunnels and inverted siphons that were completed in 1892 (oral commun., Bear Valley Mutual Water Co., 1967). The excessive cost of the 8 miles of canal placed the Bear Valley Irrigation Co. in serious financial difficulty, and the company went bankrupt in 1895. After April 1899, no water was run through the High Line Aqueduct between the Santa Ana River and Mill Creek zanja until 1910 (Beattie, 1951, p. 57), when the Crafton Heights Pipeline Co. and the Bear Valley Mutual Water Co. put the aqueduct back in operation.

After the financial failure of the Bear Valley Irrigation Co. in 1895, the system was operated under the supervision of the receiver until 1903 (oral commun., Bear Valley Mutual Water Co., 1967). In that year the stockholders organized the Bear Valley Mutual Water Co. The company was incorporated June 15, 1903, with a capital stock of $2,000,000 divided into 100,000 shares, but only 83,527 shares were issued.

During the period when the system was operated under the supervision of the receiver, the Moreno Valley interests purchased water from the zanja owners, usually on an annual basis. (These purchases involved measured quantities of water, rather than continuing rights to the use of water.) Several of the zanja owners drilled wells to obtain ground water for their own use, so that they could sell zanja water to the Moreno users during the dry years, 1898 to 1904 (Beattie, 1951, p. 57).

Water was delivered through the Bear Valley High Line Aqueduct to the Moreno Valley area until 1956, when the line south of Sand Canyon (fig. 11) was abandoned (oral commun., Bear Valley Mutual Water Co., 1967). Water deliveries south of that point are now made by other companies.

In summary, the conflicts arising after 1856 from the many diversions and transfers of water rights, were settled by the agreements of 1885 and 1886. Diversions continue, water is delivered to the north and south sides of the river, and the North Fork Canal is still in use. The flow originally diverted for irrigation on the north side of the river, now is used primarily to irrigate a large area on the south side of the river. That area became one of the best citrus-growing areas in the Santa Ana River basin. Water delivered by the Bear Valley Mutual Water Co. and its two prior-right companies, North Fork Water Co. and Lugonia Water Co., has been used for irrigation only. The area which they served reached a maximum of about 10,000 acres in 1947, and is only slightly less at present (oral commun., Bear Valley Mutual Water Co., 1967).

West Highlands Water Company

Although capacity of the North Fork Canal was increased to 1,500 miner's inches in 1884, and the line west of City Creek was built along Highland Avenue (p. 18, 19), the owners of property north of Highland Avenue, in the area now known as West Highlands (fig. 11), were unable to receive water from the North Fork Canal. Seth Marshall, A. E. Sterling, and several other owners of such land, who were also large stockholders in the North Fork Water Co., organized the West Highlands Water Co. The purpose of the company was to acquire and manage water, water rights, and water-distribution facilities in the area. The West Highlands Water Co. was incorporated October 17, 1887, with a capital stock of $90,000 divided into 900 shares (written commun., North Fork Water Co., 1967).

The following year the same group of men organized the Highland Ditch Co., which was incorporated February 10, 1888, with a capital stock of $180,000 divided into 9,000 shares. The main objective of this company was to build a canal--the Highland ditch--along the base of the mountains, west of City Creek, to supply water to the West Highlands area. The Highland ditch (figs. 11 and 13), completed in 1888, diverted from the North Fork Canal on the east side of City Creek, crossed City Creek upstream from the North Fork Canal, continued northwest along the base of the mountains, and ended north of Del Rosa near the north end of Sterling Avenue. From that point the Bear Valley pipeline extended west along the north side of the present-day country club (37th Street), and then south along the west side of the country club (Parkside Drive).

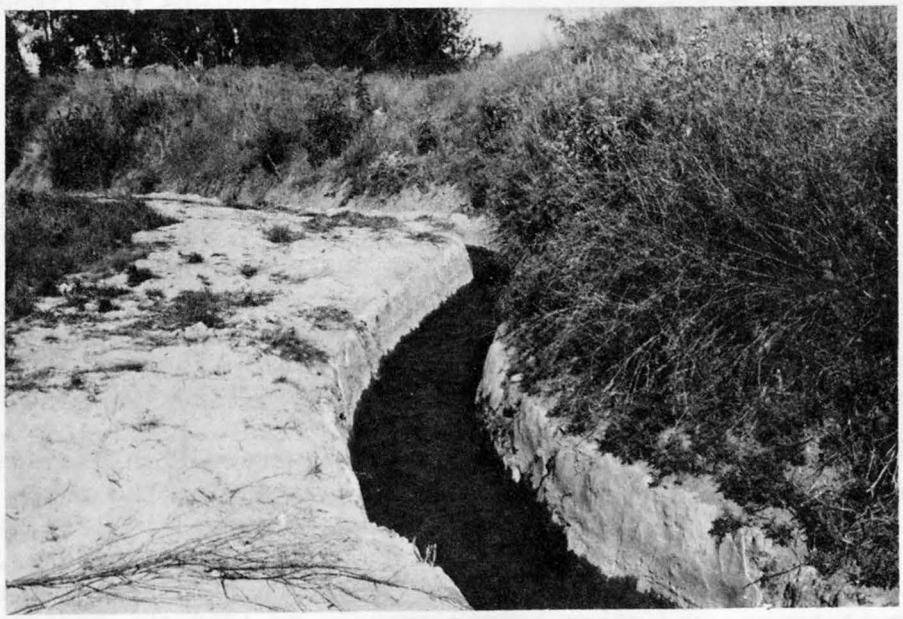


FIGURE 13.--Highland ditch east of Sand Creek, built in 1888; now part of Bear Valley Mutual Water Company system.

The flood of January 1916 destroyed the City Creek crossing of the North Fork Canal (Beattie, 1951, p. 32). Instead of rebuilding the crossing, the Bear Valley Mutual and North Fork Water Cos. diverted North Fork water through the Highland ditch flume to a division box (fig. 11). From there a connecting line was built. The Highland ditch flume over City Creek was replaced by an inverted siphon in 1947 (Beattie, 1951, p. 32). In recent years the conversion of agricultural land to building lots near the lower end of the Highland ditch has resulted in a decrease in water demand in that area. Consequently, in 1962 the Highland ditch was closed at the Little Sand Creek crossing (fig. 11).

There has been a succession of water companies in the West Highlands area. In 1892 the Highland Ditch Co. sold its ditch to the Bear Valley Irrigation Co., successor to the Bear Valley Land and Water Co. (Beattie, 1951, p. 29). The West Highlands Water Co. continued to deliver water derived from stock held in the North Fork Water Co. and the Bear Valley Irrigation Co., or its successor, the Bear Valley Mutual Water Co., until early in 1967. During recent years, the East San Bernardino County Water District acquired stock in the North Fork Water Co. and Bear Valley Mutual Water Co. from property owners in the West Highlands district. In March 1967 the West Highlands Water Co., by a quit claim deed, conveyed all ditches, rights-of-way, and easements to the East San Bernardino County Water District, and about November 19, 1967, the West Highland Water Co. was dissolved (written commun., J. R. Poppett, 1967).

Santa Ana Wastewater Ditch

The forerunner of the Santa Ana wastewater ditch was the Timber ditch (fig. 4), discussed earlier in this report. By 1878, the original owners of Timber ditch water rights had transferred their rights to lands on the south side of the Santa Ana River and the Timber ditch was abandoned (p. 17). Shortly after that, property owners on the north side of the river filed claim on the surplus water of the river up to a maximum of 500 miner's inches, a flow rate that was equivalent to the capacity of the old Timber ditch. In other words, the claim was for 500 miner's inches of the wastewater in the river, if that quantity was available after upstream rights were satisfied.

A new ditch--the Santa Ana wastewater ditch--was built with its intake at about the same site as that of the old Timber ditch. The new ditch generally followed the course of the old ditch and joined it (figs. 6 and 11).

Operational records for the Santa Ana wastewater ditch are scanty. Only a small quantity of water was available to owners during the three consecutive dry years 1881-83 (Hall, 1888, p. 281). Floods occurred in 1884, and in the summers of the years 1884-87 the flow was about 200 miner's inches. About 250 acres was irrigated from the ditch in 1885. On this acreage grew alfalfa, deciduous fruit trees, and other summer crops. By 1888 the irrigated cropland had increased to 300 acres (Hall, 1888, p. 281).

The gradual increase of diversion upstream from the ditch heading and the partial regulation of Bear Creek by Big Bear Dam reduced the wastewater available to the extent that no summer flow occurred at the ditch heading in 1898 and 1899 (Lippincott, 1902a, p. 26). Because of this lack of water the Santa Ana wastewater ditch was abandoned a short time later.

Hydroelectric Power Development

The Southern California Edison Co. now operates three hydroelectric powerplants and an aqueduct system in a 7-mile reach of the canyon of the Santa Ana River in the San Bernardino Mountains (fig. 11). The aqueduct system has a capacity of 90 ft^3/s (cubic feet per second). By agreement between the power company and the Bear Valley Mutual Water Co., all flow in the Santa Ana River, up to 90 ft^3/s, is diverted into the system and is returned to the river at the mouth of the canyon. Water releases from Big Bear Lake supplement the river flow to maintain the discharge needed for irrigation in the areas served by the North Fork and Bear Valley Mutual Water Cos. The diversion by the power company eliminates substantial seepage loss that occurred naturally in the river channel between the mouth of Bear Creek and the mouth of the canyon.

Several hydroelectric power companies preceded the Southern California Edison Co. The first powerplant on the river (powerhouse No. 1) was built in 1898 (Fowler, 1923, p. 533). The project was started by the Southern California Power Co. It was completed by the Edison Electric Co. of Los Angeles, which was reorganized in 1909 as the Southern California Edison Co.

The Mountain Power Co. acquired rights for hydroelectric power development at and near the present site of powerhouse No. 2, and drilled a short tunnel that is part of the present aqueduct. The company was incorporated in 1900 (Fowler, 1923, p. 529); it was transferred to the Southwest Gas and Electric Co. in 1901 and deeded to the Edison Electric Co., the predecessor of the Southern California Edison Co., in 1902. The Mentone Power Co., incorporated in 1901, acquired the old irrigation canal above the mouth of the canyon, as part of a plan for a powerplant at the canyon mouth--the site of the present powerhouse No. 3. The company's property was taken over by the Pacific Light and Power Corp. in April 1903, and powerhouse No. 3 was built the following year (Fowler, 1923, p. 596). In 1911 all holdings were turned over to the Southern California Edison Co., thus making that company sole owner of all power-generation facilities on the upper Santa Ana River.

Gage Canal Company

The water rights of the Gage Canal Co. consist of: (1) The diversion rights to the Hunt and Cooley ditch and the Camp Carlton ditch which replaced it; (2) the Parish claim to "rising water" on the north side of the Santa Ana River upstream from the ditch headings ("rising water" is the local term for subsurface water that is forced to the surface when its downslope movement in the aquifer is impeded by a reduction in cross-sectional area of the aquifer or by a reduction in aquifer permeability); (3) the Wells and Long claim to Santa Ana River water; and (4) water from artesian wells in the area near the head of the Gage Canal.

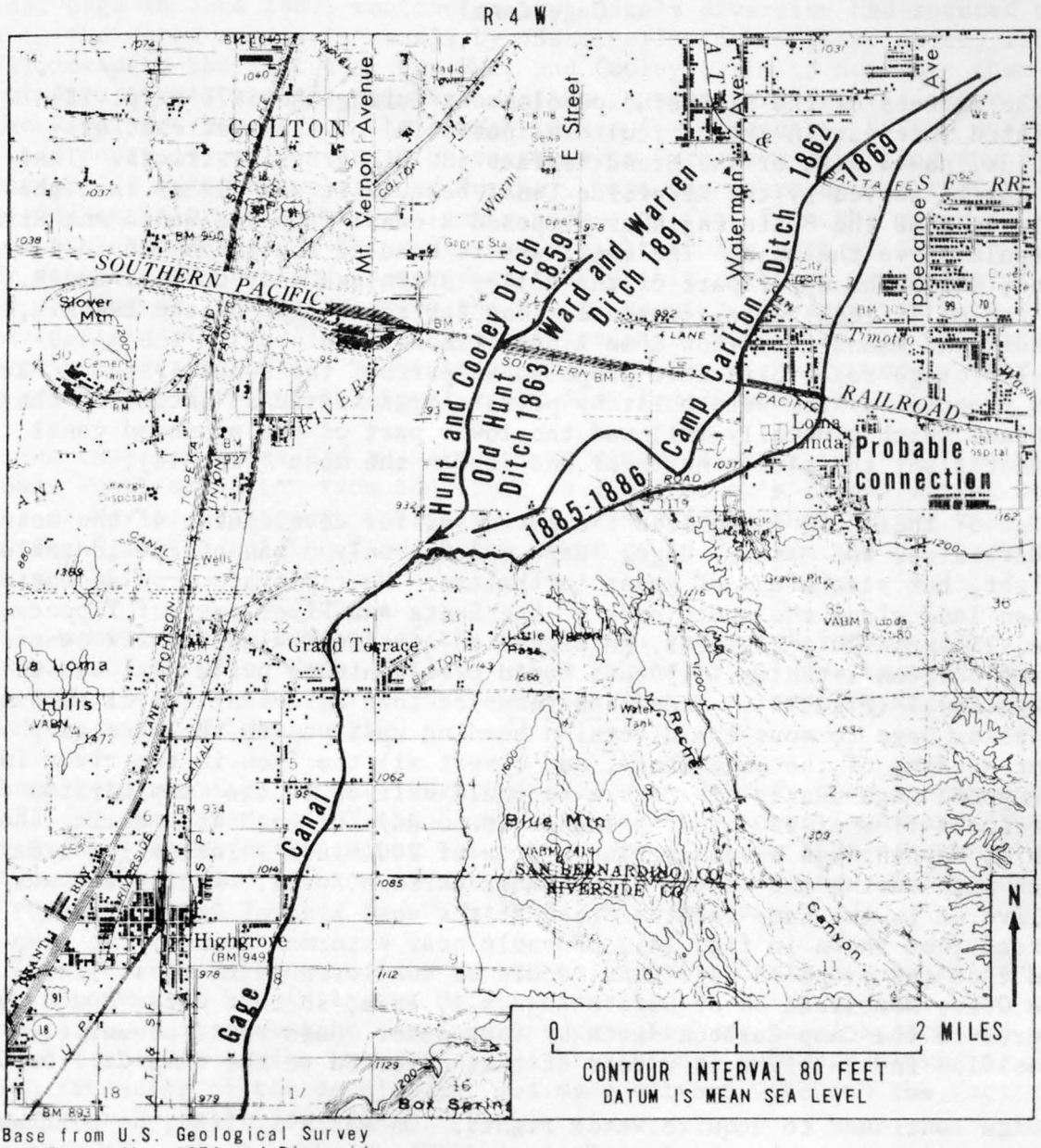
The development of those various water rights is discussed on the pages that follow; the information given, unless otherwise referenced, is from the Gage Canal Co.

Hunt and Cooley Ditch--Camp Carlton Ditch

The Hunt and Cooley ditch (fig. 14), built in 1859, diverted flow from a former channel of the Santa Ana River at a point just upstream from the present Southern Pacific railroad crossing. The flood of 1862, however, damaged the upper part of the ditch. The ditch was abandoned and was replaced by a new ditch built with its heading 1½ miles upstream from the original heading. The new heading was near the present bridge crossing of the Atchison, Topeka and Santa Fe railroad. The new ditch was known as the Camp Carlton ditch because its heading was across the river from a Civil War troop camp of that name. The water commissioners approved the ditch and water right in August 1865 and assessed the total value of both at $4,725 (Hall, 1888, p. 262). The ownership was divided among six men; Cooley owned two-sevenths and each of the other five--Carit, Felance, Hunt, Steward, and Ward--owned one-seventh.

The upper part of the Camp Carlton ditch was destroyed by the flood of 1868-69 (Hall, 1888, p. 162) and the new section of ditch that replaced it was built with its heading at a new site, above Tippecanoe Avenue and near the head of the present Gage Canal. The capacity of the Camp Carlton ditch was 250 miner's inches of water, but the actual flow diverted ranged from 125 to 160 miner's inches. The area irrigated by the ditch ranged from 211 acres in 1864 to 415 acres in 1888 (Hall, 1888, p. 261), and included orchards, vineyards, and grain fields.

By agreement the Camp Carlton ditch was entitled to half the flow of the Santa Ana River at the ditch head, and the Jansen ditch (p. 47) was entitled to the other half. However, for a number of years prior to the flood of 1884, the Camp Carlton ditch diverted the entire flow at its heading during each irrigation season. The flood of 1884 changed the channel at the ditch head. The streambed was lowered by scouring of the gravel bed material with



Base from U.S. Geological Survey
San Bernardino 1954 and Riverside
1942, 1:62,500

FIGURE 14.--Gage Canal and predecessors.

the result that low and medium discharges were confined to a single channel. Heavier rainfall in the mid- and late 1880's, combined with the improved channel conditions, resulted in an increase in available river discharge at the ditch head. This increase in flow was the basis for a later water-rights controversy that is discussed in the following section headed, "Gage Canal." That section of the report also continues the history of the Camp Carlton ditch, which came under the control of the Gage Canal Co.

Gage Canal

The success of the Riverside development during the 1870's (p. 75) stimulated interest in the agricultural potential of the mesa east of Riverside, now a part of the Grand Terrace and Highgrove Districts. That land could not be served by the Riverside Canal because it was higher than the canal. In 1880 the State Engineer proposed a canal from the Santa Ana River that could serve the mesa. The canal was to head at the canyon mouth near Mentone, skirt the upper part of the valley south and east of Mill Creek, cross the Mill Creek zanja, continue along the south side of the Lugonia, Redlands, and Mound City (now Loma Linda) tracts, and west to the mesa. Several storage reservoirs were proposed as part of the canal system. Parts of the proposed system were built by private organizations, including the Gage Canal which generally followed the lower part of the proposed canal alinement along the bluffs north of and across the mesa (fig. 14).

One of those who recognized the potential for development of the mesa, or East Riverside, was Matthew Gage. Gage was not only a man of considerable foresight, but also a man of great initiative. He first acquired an option on riparian land along the south side of the Santa Ana River east of Tippecanoe Avenue. Then on July 27, 1885, he signed an agreement with the six owners of the Camp Carlton ditch (p. 36) that would permit him to build what was to be the Gage Canal (fig. 14). Under the terms of that agreement the ditch owners would allow Gage to move the diversion heading upstream to the site of the present heading of the Gage Canal, and divert all the flow in the river into the proposed Gage Canal. In return he would deliver to the Camp Carlton ditch a continuous flow of 130 miner's inches for 6 days of each week during the months of May through November, and a flow of 200 miner's inches for 6 days of each week during the months of December through April. That water was to be delivered to the Camp Carlton ditch at the west line of Orange Grove Homestead (not shown in fig. 14), probably near Waterman Avenue. It also was agreed that the proposed Gage Canal would be completed to the west line of Orange Grove Homestead on or before August 1, 1886, so that water could be delivered to the Camp Carlton ditch by that date. Gage would be entitled to all the flow in the river in excess of that diverted to the Camp Carlton ditch.

Gage continued to acquire water rights. On March 1, 1886, he purchased the one-seventh right in the Camp Carlton ditch owned by Carit. He next acquired two water rights on the north side of the river. One was the Wells and Long claim to Santa Ana River water, based on a small diversion (not shown in fig. 14) that had been destroyed in the flood of 1884; the other was the Parish claim to "rising water" (p. 36) on the bottom land north of the river.

After acquiring those water rights Gage contracted with the East Riverside landowners to furnish them water from the proposed Gage Canal. These contracts were used by Gage to obtain sufficient funds to start construction of the diversion headworks and canal in October 1885. The headworks and first 11.9 miles of canal were completed to Tequesquite Arroyo in November 1886 (fig. 15), and water for irrigation was diverted in the spring of 1887. The location of the intake and canal shown in figure 14 is as described by Hall (1888, p. 253). Figure 15 shows the entire Gage Canal system.

The Riverside Water Co. (discussed in detail on p. 72-80) filed a suit against Gage in June 1887, contending that Gage's diversion had reduced the flow in the water company's canals by 450 miner's inches (Lippincott, 1902a, p. 71), despite the fact that the Hunt and Cooley claim to not more than 200 miner's inches was the only water claim granted prior to the water right of the Riverside Water Co. The company asked for damages of $5,000 and costs, that the court issue an injunction restraining Gage from diverting any flow in excess of 300 miner's inches, and further, that the court decree that the Gage Canal was entitled to only 200 miner's inches of flow from the river. Gage denied that the Riverside Water Co. had a right to any part of the flow in the river at the canal heading, contending that by his right of ownership of a large portion of land riparian to the river--about 2,300 acres on both banks--he could claim all the flow at the canal heading. Gage also claimed water ownership by virtue of his acquisition of the water rights owned by Hunt and Cooley, who had diverted the total river flow for 20 years.

The case was tried and a judgment was rendered early in 1888, limiting the Gage Canal diversion from the river to 289.5 miner's inches during the months of May to September, inclusive. It was assumed that during the remaining 7 months all the flow in the river could be diverted by those who could use it.

To meet the requirements of the irrigators in East Riverside, the management of the Gage Canal drilled wells in the artesian area near the canal heading (fig. 16). Water from those wells was used to supplement the quantity of water granted by the court.

According to Lippincott (1902a, p. 72), a survey was made in the spring of 1887 for the extension of the Gage Canal to its present lower end at Tyler Avenue, south of Arlington (fig. 15). In February 1888 construction was started on the second section of the canal. It was completed in June of the same year, adding 8.2 miles to the original 11.9 miles.

Gage visited England in 1889 hoping to interest English capitalists in his development of the Arlington Heights area, south of Riverside. Two representatives from England examined the property and canal system and reported favorably on the enterprise. A provisional contract providing for English financing of the development was made between Gage and the English interests on December 13, 1889.

The Riverside Trust Co., Ltd., was organized with a capital stock of $1,255,000 divided into 5,000 A shares at $250 each and 1,000 B shares at $5 each. Gage deeded his rights in the system, including water rights, rights-of-way, canal, and 7,000 acres in the Arlington Heights area, to the trust company. The Riverside Trust Co. operated the system and financed improvements to the canal (fig. 17) and to the distribution system in the Arlington Heights area. The operation was conducted through the Gage Canal Co., incorporated November 5, 1890. The Gage Canal Co. owned no property until 1910; its sole functions were to operate the canal system and develop the water system for the Riverside Trust Co.

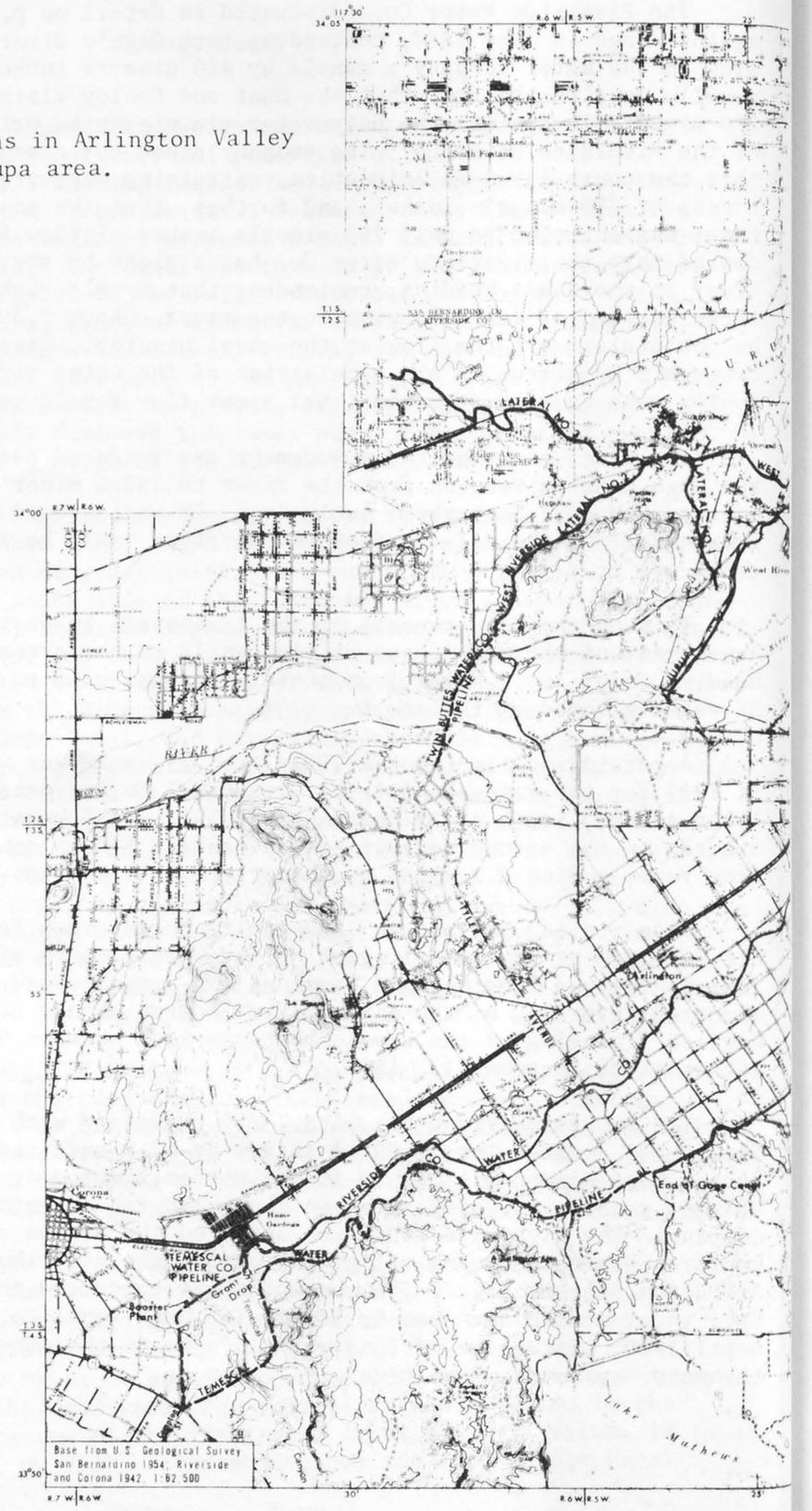


FIGURE 15.--Diversions in Arlington Valley and Jurupa area.

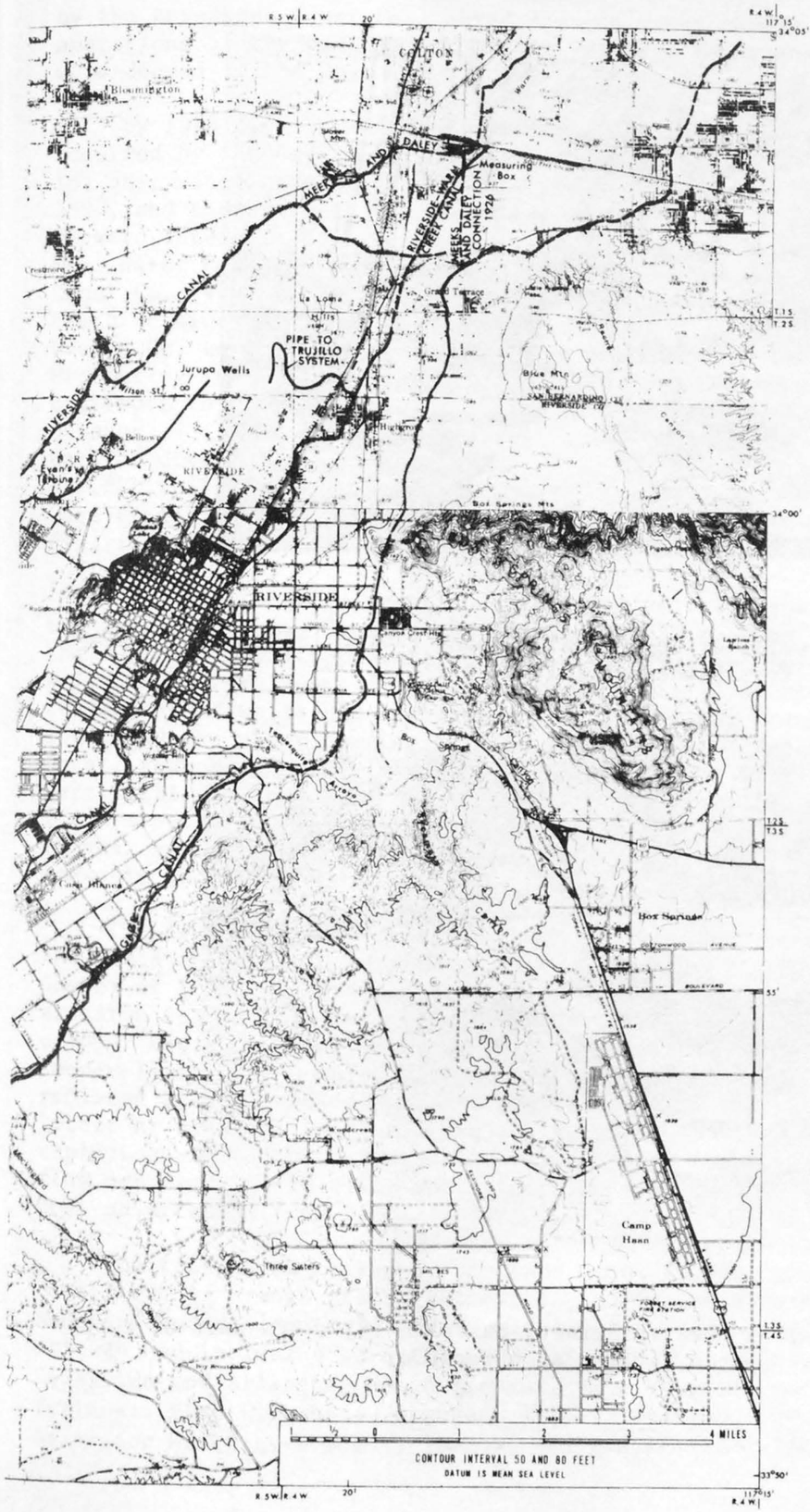


FIGURE 15.--Continued.

FIGURE 16.--Artesian wells of Gage Canal Company (about 1887). (Photograph from Mendenhall, 1902, pl. VII.)

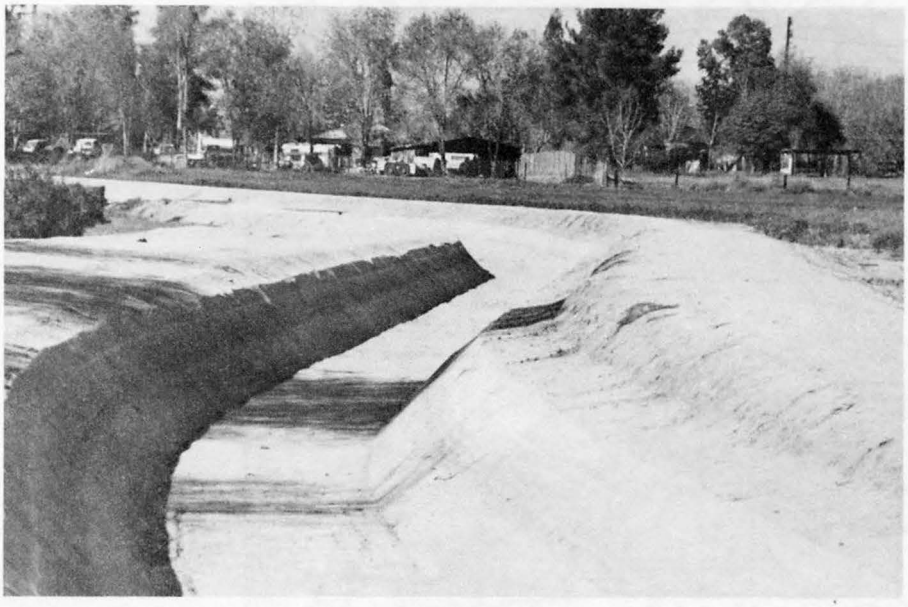


FIGURE 17.--Gage Canal at DeBerry Street, built in 1887; now part of supply system of city of Riverside.

From 1904 to 1910, a third company, the Riverside Orange Co., organized by the Riverside Trust Co., acted for the trust company to supervise the operations of the Gage Canal Co. In 1910 the canal and all water sources were deeded to the Gage Canal Co.

By 1915 five-sevenths of the rights in the Camp Carlton ditch had been acquired by the Gage Canal Co. The Carit interest had been purchased in 1886 (p. 38). The Felance interest was transferred to the Riverside Trust Co. in 1890, and then through the Riverside Orange Co. to the Gage Canal Co. The Steward interest was transferred to a Mr. Kelley in 1899, then to the Alta Mesa Water Co., and finally through the Riverside Orange Co. to the Gage Canal Co. The Ward interest was transferred to a Mr. Howes in 1888, then to the Riverside Highlands Water Co. in 1907, and finally through the Riverside Orange Co. to the Gage Canal Co. The Hunt interest was transferred to a Mr. Tetley in 1920, and then to the Gage Canal Co. in that same year. Cooley continued to own two-sevenths of the original right and until October 15, 1920, his water was delivered from the Gage Canal to the Camp Carlton ditch in the connecting ditch along the north side of the Southern Pacific railroad (fig. 14). After 1920 Cooley water was delivered from the Gage Canal through a conduit at a point due south of E Street (not shown in fig. 14).

The Gage Canal Co. continued to drill wells in the artesian area near the canal heading. By 1889 the company had 27 flowing wells to supplement the surface flow (Lippincott, 1902a, p. 74-79); by 1892 there were 55 flowing wells whose total potential discharge rate was 1,793 miner's inches; by 1899 the number of wells had increased to 68. The long drought between 1892 and 1900, and the heavy pumping to meet the increasing demand for irrigation water, reduced the flow of the wells, and in June 1899 only 55 of the 68 wells were still flowing. The total discharge of the wells at that time was 1,440 miner's inches, the discharge of the Santa Ana River was 12 miner's inches, and the Parish ditch in the area of "rising water" (p. 36), which commonly had had a discharge of 120 miner's inches, was dry.

The decreasing artesian flow made it necessary to install pumps on two of the wells to maintain sufficient water to meet delivery requirements in the summer of 1900. During the next 2 years, seven more pumps were installed on artesian wells whose diameters ranged from 10 to 12 inches. In 1926 the company began drilling wells of 24-inch diameter and equipping them with deep-well turbine pumps. By 1930 all the old artesian-well pumps had been replaced by deep-well pumps. During the drought period, 1922-36, there was little or no artesian flow. The wet years of 1937 and 1938 brought replenishment to the artesian aquifer, with the result that some artesian flow occurred in the early spring of each year from 1938 to 1950. There has been no artesian flow since 1952.

The total area served by the Gage Canal in 1888 was 1,106 acres consisting of orange groves, vineyards, fields of alfalfa and summer crops, and town and residential lots (Hall, 1888, p. 252). By 1902 the irrigated acreage had increased to 6,010 acres (Lippincott, 1902a, p. 92-93) in the East Riverside and Arlington Heights areas. The crops in each of two areas were as follows: East Riverside--oranges, lemons, deciduous fruits, and alfalfa; Arlington Heights--oranges, lemons, and grapefruit. The Gage Canal also

delivered water to the San Jacinto Land Co. (part of El Sobrante de San Jacinto Rancho, east of Corona) to irrigate 530 acres of citrus fruits. Industry began to move into the East Riverside area about 1936. Land was taken out of cultivation for industrial use, and by 1967 the irrigated area had been reduced to about 1,500 acres. The irrigated acreage in the Arlington Heights area reached a peak of about 6,300 acres in 1956, and then declined slightly as a result of expanding urbanization. In 1967 about 6,000 acres was being irrigated.

The city of Riverside began buying stock in the canal company as early as 1956, and in 1965 acquired the company and all its sources of water by condemnation. Thus the Gage Canal Co. reverted to its original role, serving as an operating agency for another organization--the city of Riverside. The water stock originally was assigned to the land and could not be separated from it. Since the condemnation the water stock can be sold separately, but it cannot be transferred from one piece of land to another without the permission of the city. When land is removed from agricultural use, the stock is transferred to the city at a fixed price.

The facilities of the Gage Canal system have been improved through the years. The old wooden box that brought water from the north side of the river to the canal heading was destroyed during the flood of 1938 and was replaced by a steel pipe, the open canal was paved throughout its length, and the long flumes of the original system have been replaced by steel pipe either above ground or in inverted siphons. Prior to acquisition of the system by the city of Riverside in 1965, diversions of surface water were made whenever such water was available. Since 1965 the city has not permitted surface diversion and all water delivered is from ground-water sources. The average annual quantity of water delivered during recent years was 600,000 miner's inch-days--equivalent to a steady flow of 1,640 miner's inches.

By way of an epilogue, the Gage Canal Co. was deeply involved in the development of the Riverside area. The service area of the canal first developed as a highly productive agricultural area specializing in citrus crops. In recent years urbanization has increasingly encroached on agricultural land. There has been a corresponding change in water use, from agricultural to municipal and industrial, as the small city of Riverside, established and organized by agricultural interests, grew to a metropolis with a continually increasing water demand. The efficient irrigation system created by Matthew Gage has become part of an impressive domestic system.

Riverside Highland Water Company

The Riverside Highland Water Co. is a consolidation of several older systems including: (1) the Jansen ditch, later known as the Warner and Warren ditch, then the Warren ditch, and finally as the Ward and Warren ditch; (2) the Old Hunt ditch, later known as the Ward ditch; and (3) the Vivienda Water Co. (figs. 18 and 19). The original sources of water for these ditches were the Santa Ana River, Lytle Creek, springs, and "rising water" (see p. 36 for definition).

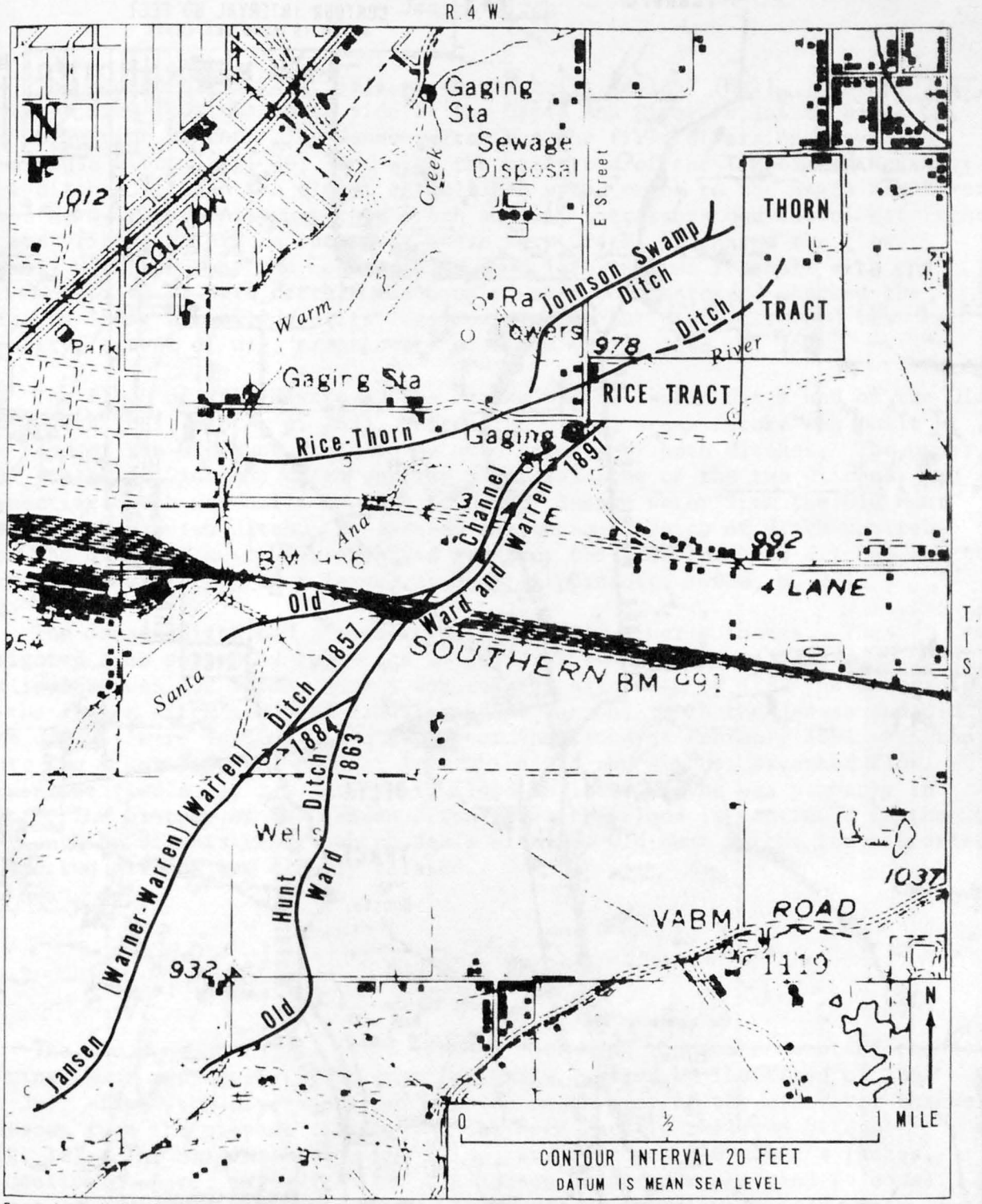
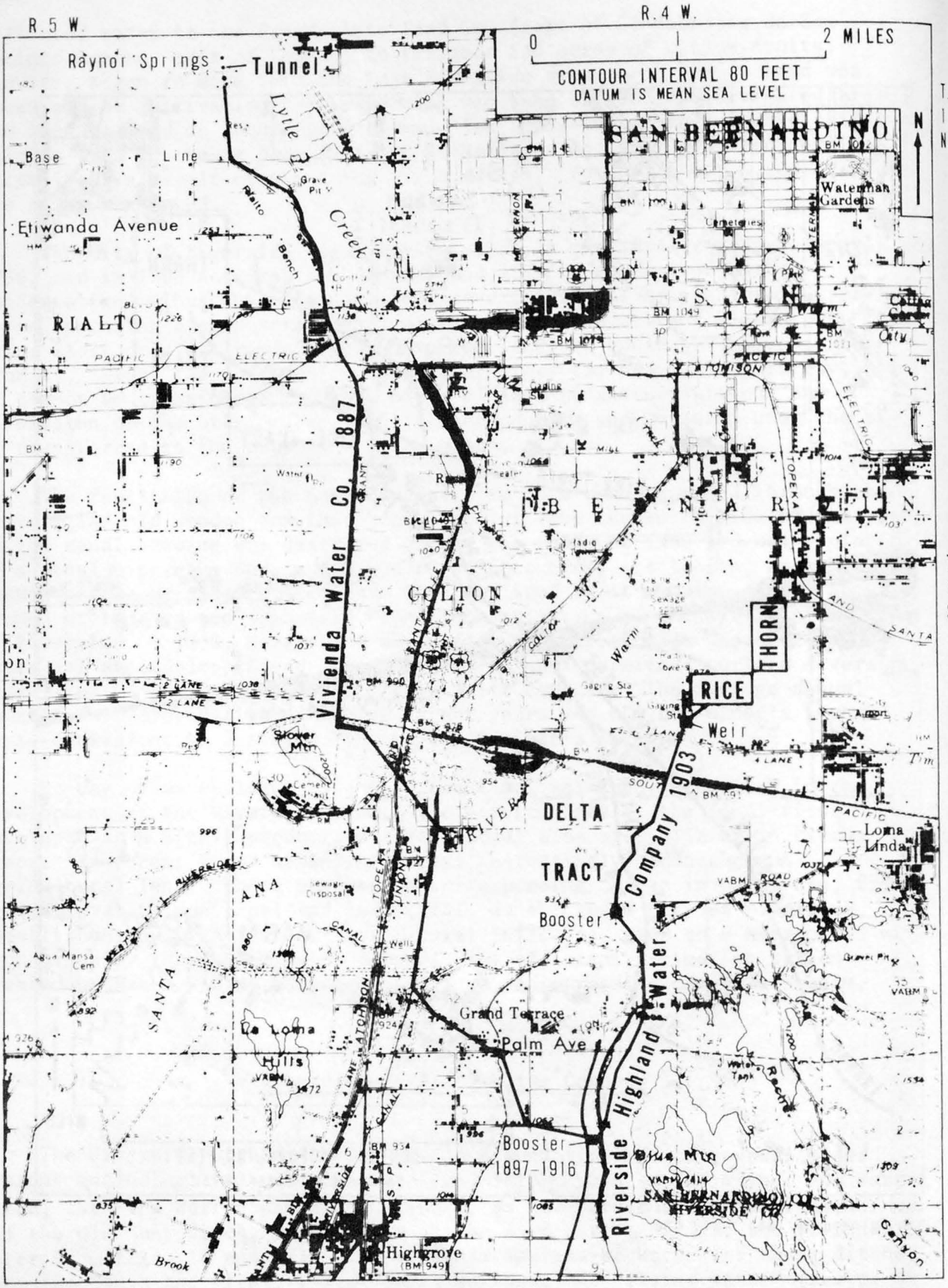


FIGURE 18.--Jansen, Old Hunt, and Rice-Thorn diversions.



Base from U.S. Geological Survey
San Bernardino 1954, 1:62,500

FIGURE 19.--Vivienda and Riverside Highland diversions.

Jansen Ditch

The Jansen ditch (fig. 18), which was built in 1857 (Hall, 1888, p. 265), diverted flow from the south side of the Santa Ana River in lot 8, block 64, San Bernardino Rancho. The Jansen ditch was the first diversion above the Agua Mansa ditch (fig. 26), and with the exception of the Timber and North Fork ditches, it had the oldest established water right to the Santa Ana River above Warm Creek. Although this ditch and its successors had the oldest right to the "rising water" in the river above Warm Creek, it shared the flow equally with the Hunt and Cooley ditch, and later shared its half with the Old Hunt ditch or Ward ditch. The county water commissioners checked the ditch in 1865, acknowledged its legal existence, but did not record its capacity, extent of use, or priority of claim (Hall, 1888, p. 265).

The flood of 1884 destroyed the intake of the Jansen ditch and of the Old Hunt ditch (Hall, 1888, p. 263). After the flood, a new intake was built at the head of the Old Hunt ditch to be used jointly by both ditches. The upper half a mile of Old Hunt ditch carried the total flow of the two ditches, and a connecting ditch was built in 1884 to convey Jansen water from the Old Hunt ditch to the Jansen ditch. In 1888-89 the common stretch of ditch upstream from the division point was enlarged to carry the flow for both ditches and to permit the irrigation of a larger acreage (Lippincott, 1902a, p. 27).

The Jansen ditch had a capacity of about 130 miner's inches. The irrigated area served by the ditch in 1879 was 100 acres (Hall, 1888, p. 265), and in 1881 was 132 acres, mostly for raising alfalfa. By 1888 the ownership of the Jansen ditch had been transferred to Warren. Both the Jansen and Old Hunt ditches were left high and dry after the flood of February 1891 when the Santa Ana River left the channel from which the two ditches diverted flow. Lippincott (1902a, p. 27) dated this flood as 1892, but he was probably in error. The history of the Jansen ditch after the flood is continued in the next section of this report which deals with the Old Hunt ditch; the histories of the two ditches are closely related.

Old Hunt Ditch

The Old Hunt ditch was built in 1863 following the abandonment of the original Hunt and Cooley ditch that was badly damaged by the flood of 1862 (p. 36). The ditch diverted flow from the south side of the old river channel upstream from the present site of the Southern Pacific railroad bridge (fig. 18). The original ditch had a capacity of about 140 miner's inches. As mentioned above, this ditch and the Jansen ditch were entitled to equal shares of their combined diversion. The area irrigated by the Old Hunt ditch in 1879 was about 110 acres; in 1881 and 1888 it was about 125 acres (Hall, 1888, p. 263). After 1884, the upper half a mile of ditch carried both Old Hunt and Jansen water, and in 1888-89 the combined ditch above the division point was enlarged to permit a greater diversion. By 1888 the

ownership of the Old Hunt ditch had been transferred to Ward (Hall, 1888, p. 264), and the combined ditch above the division point was known as the Ward and Warren ditch. (Warren at this time was the owner of the Jansen ditch.)

The increase in diversion by the Ward and Warren ditch reduced the flow at the Riverside Upper Canal heading of the Riverside Water Co. (The history of that company is discussed on pages 72-80.) The Riverside Water Co. accordingly filed suit against the owners of the Ward and Warren ditch in an attempt to limit their diversion. By a court decree dated February 26, 1890, the owners of the Ward and Warren ditch were entitled to 309 miner's inches from the Santa Ana River, and the Riverside Water Co. was entitled to the use of the remainder of the river flow at the head of the Ward and Warren ditch (Lippincott, 1902a, p. 27). The court also decreed that the Ward and Warren ditch was entitled to 78.18 miner's inches of water from the Rice and Thorn tracts owned by the Riverside Water Co. along the north side of the river (fig. 18). That water flowed from the swamp area in the artesian basin and entered the Santa Ana River in a small stream above the Ward and Warren ditch.

The flood of 1891 changed the course of the Santa Ana River which cut a new channel about half a mile north of the original channel. The Ward and Warren ditch was extended upstream to the new channel. A significant quantity of water was lost by seepage, however, in the new ditch extension where it crossed the dry, sandy former bed of the Santa Ana River.

In June 1898 the Ward and Warren ditch received 1.60 ft^3/s from the Rice and Thorn tracts and 0.72 ft^3/s from the Santa Ana River (Lippincott, 1902a, p. 27). In August 1899 and June 1900, the corresponding discharges were 1.56 ft^3/s and 1.7 ft^3/s, respectively.

At the turn of the century the Riverside Highland Water Co., discussed on pages 50-51, was rapidly expanding its holdings. By the end of 1903 the company had acquired all the property supplied and owned by the Ward and Warren ditch, including all water rights, ditches, and rights-of-way.

Vivienda Water Company

The Vivienda Water Co. was formed to furnish water to the area on both sides of the Santa Ana River in the vicinity of Riverside. It was incorporated in August 1887 with a capital stock of $250,000 divided into 5,000 shares (Hall, 1888, p. 258). On October 14, 1887, the company signed a contract with Raynor, owner of Raynor Springs (fig. 19), that gave the company the right to develop 148½ miner's inches in the area of rising water on the west side of Lytle Creek, north of Base Line Road (written commun., Riverside Highland Water Co., 1967). That right was later increased to 450 miner's inches.

Water was first developed by the use of drainage ditches, then by artesian wells, and later by a tunnel that was added to the system. Water was originally conveyed in an open ditch from the Raynor Springs area to a point a short distance south of Etiwanda Avenue; from there the water was conveyed 7 miles to the East Riverside mesa in a 24-inch pressure line. The open ditch was later replaced by a closed conduit. The upper part of the pressure line crossed several private properties, and in exchange for the right-of-way across those properties, the Vivienda Water Co. agreed to furnish a limited quantity of water to the owners for domestic use.

The company contracted with landowners in the Highgrove area of the East Riverside mesa to deliver 400 miner's inches of water to the area for $750 per miner's inch. The distribution of the water from the main ditches or pipes was the responsibility of the landowners.

The original conveyance system of the Vivienda Water Co. was operated continuously until 1897. Water was delivered to the gravity ditch east of Highgrove from the end of the pressure line. To irrigate an area at a higher elevation, the water was boosted to a conduit (fig. 20) by a booster pump installed in 1897. This booster was operated until 1916. However, long before this time the ownership of the company had changed hands. In 1891 the pipeline and water rights of the company were purchased by the East Riverside Irrigation District, which in turn was absorbed by the Riverside Highland Water Co. in 1899 (p. 50).

FIGURE 20.--High-level conduit of Vivienda Water Company, south of Palm Avenue, Grand Terrace; used 1897-1916.

Development of the Riverside Highland Water Company

The East Riverside Irrigation District--predecessor to the Riverside Highland Water Co.--was organized about 1888 under the Wright Irrigation District Act. The area within the district was 3,100 acres, of which 250 acres were hilly and not suitable for cultivation. On April 5, 1891, the district purchased the pipeline and water rights of the Vivienda Water Co., and in the following year purchased 65 acres in the artesian area of Lytle Creek from Garner E. McKenzie (written commun., Riverside Highlands Water Co., 1967). The district drilled three wells in the artesian area and dug a ditch into the swamp in 1892 (Lippincott, 1902b, p. 103). That development produced about 100 miner's inches of water (2 ft^3/s) during the first year. Lippincott (1902a, p. 53) measured the outflow of the system, at various times, at a weir at the head of the pipeline, and he recorded the following: September 1898--4.43 ft^3/s; June 1899--2.08 ft^3/s; June 1900--5.38 ft^3/s.

The complications of operating the East Riverside Irrigation District under the Wright Act made it impractical for the individual owners in the district to continue the operation. Consequently, on February 21, 1898, they organized the Riverside Highland Water Co. to furnish domestic and irrigation water to the stockholders. The area served was about 2,500 acres on the mesa east of Riverside (fig. 19). The company was originally incorporated with a capital stock of $200,000, divided into 5,000 shares. The policy of the new company was to deliver 1 miner's inch of water for each 5 acres of citrus-growing land. Prior to 1902 the capital stock was reduced to $100,000, divided into 2,500 shares (Lippincott, 1902b, p. 105). The holdings of the East Riverside Irrigation District, including the Vivienda Water Co. system, were purchased by the Riverside Highland Water Co. in January 1899, and have been operated by that company since that date.

In 1902 the Riverside Highland Water Co. purchased about 600 acres of land known as the Delta tract (fig. 19), extending from the booster plant to the Southern Pacific railroad (written commun., Riverside Highland Water Co., 1967). All pertinent water rights were included with the land in this sale, but later the land was sold without water rights, which were retained by the company. In 1903 the company started a well-drilling program on the tract, and by 1954 had drilled six wells, but only four wells were being pumped in 1967. By the end of 1903 the company had acquired all the property supplied by the Ward and Warren ditch (fig. 18) including all water rights, ditches, and rights-of-way.

The increased development of a water supply in the Lytle Creek basin led to a lawsuit over the water rights in that basin. By the court decrees of 1924 (p. 124), the Riverside Highland Water Co. was entitled to no more than 450 miner's inches from wells or water development in Lytle Creek between Base Line Road and Highland Avenue (fig. 46). By a later court decree the diversion from the Lytle Creek basin was reduced to 90 miner's inches, and in return the company was granted the right to pump about 360 miner's inches from the Santa Ana River ground-water basin. As water pressures and levels declined in that artesian basin, pumps were installed and additional wells were drilled. At one time seven wells were being pumped, but by 1967 the

number of wells had been reduced to two, one shallow and one deep (oral commun., Riverside Highland Water Co., 1967). The deep well was producing 85 to 90 miner's inches of water in 1967.

The citrus acreage in the Highgrove area has been reduced by urbanization in recent years. The Riverside Highland Water Co. furnished irrigation water for 2,500 acres in that area in 1950, but only 2,000 acres were irrigated in 1967. In the Grand Terrace area all water now served is for domestic use.

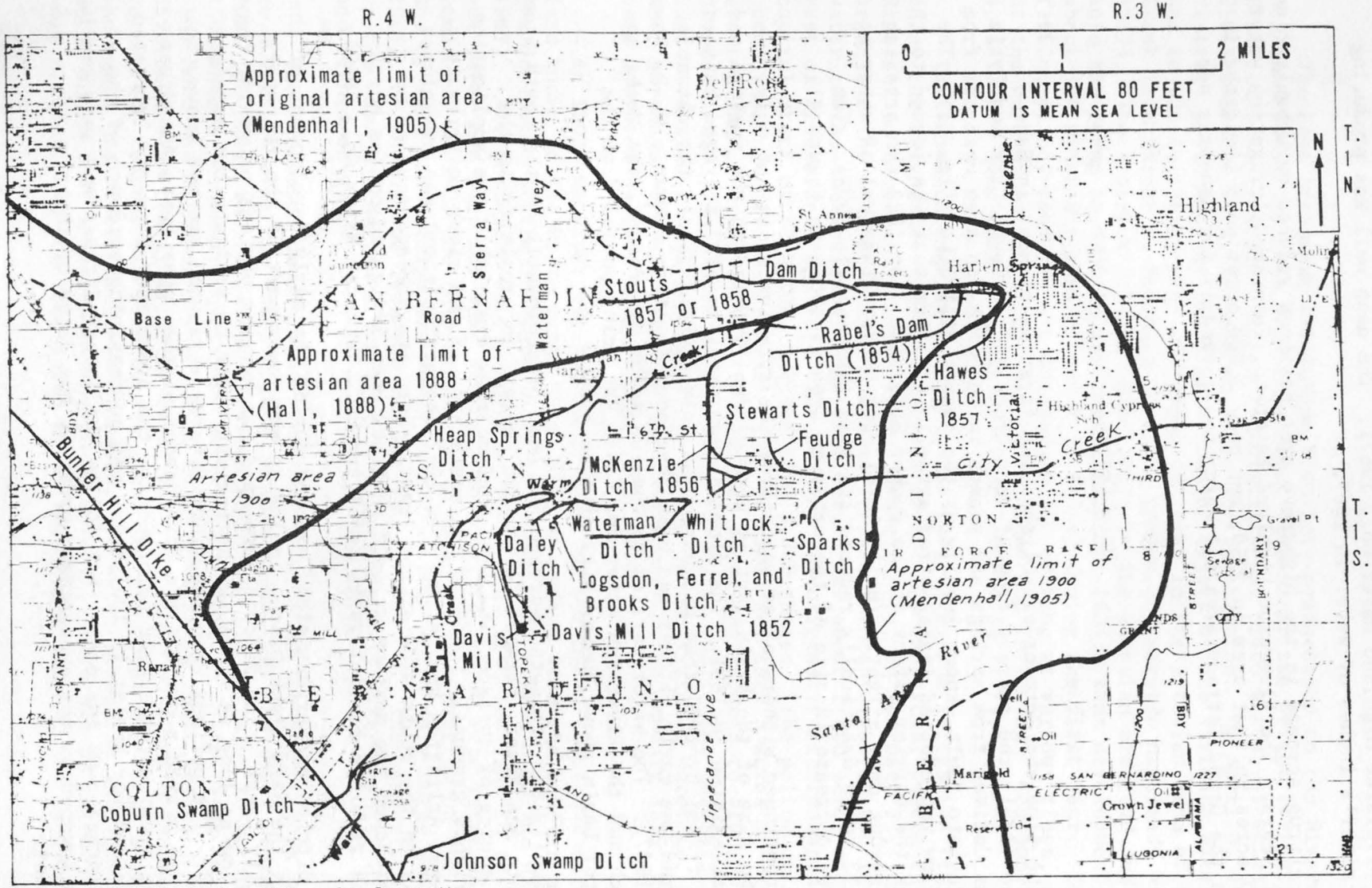
Warm Creek

At the time the Mormons established the first settlement in San Bernardino (1851) the surface flow of Warm Creek and of lower City and Lytle Creeks was derived from springs and swamps in the artesian area upstream from the San Jacinto fault, known locally as the Bunker Hill dike (fig. 21). The surface flow represented leakage from artesian aquifers that was forced to the surface by the barrier effect of the Bunker Hill dike. By 1888 the artesian area had shrunk only slightly (Hall, 1888), but heavy withdrawal of water in the next 12 years drastically reduced its size (Mendenhall, 1905). The progressive decrease in size of the artesian area is shown in figure 21.

The continued withdrawal of water from the artesian basin not only reduced the size of the basin, but it also gradually dried up the springs and swamps that existed in 1851. The flow in Warm Creek in 1887 averaged between 75 and 80 ft^3/s; by 1900 that discharge was halved; by 1955 all the channels were dry and the early ditches had been abandoned (written commun., W. P. Rowe and Son, 1967). The water carried by the two major diversions, the Meeks and Daley ditch and the Riverside Water Co. Canal, was being pumped from the ground-water basin above Bunker Hill dike in 1955.

Originally the irrigated acreage had been predominantly on the north side of the Santa Ana River, between Colton and Pedley, in proximity to the principal source of surface flow. As surface flow diminished the application of water rights gradually moved to the south side of the river to irrigate areas between Arlington and Colton. In 1967 the agricultural use was almost exclusively on the south side of the river, where its acreage equaled or possibly exceeded the maximum acreage that had been irrigated on the north side of the river in earlier years (oral commun., Temescal Water Co., 1967).

Many ditches of various sizes existed during the early development of the area within the Warm Creek basin, including the lower part of the tributary basin of City Creek. The ditches were used for varying periods of years; they diverted flow as long as there was sufficient water to irrigate the acreage they served. The periods when the minor ditches were used are not known, but those ditches played a part in the development of the upper Santa Ana River basin. The minor ditches were abandoned as the areas they formerly irrigated were subdivided for homes; in 1967 there was no remaining evidence of those original ditches. On the pages that follow the larger ditches and some small ones are discussed in the approximate order of the dates of their establishment.



Base from U.S. Geological Survey San Bernardino and Redlands 1954, 1:62 500

FIGURE 21.--Diversions from Warm Creek.

St. Bernard or Davis Mill Ditch

In the fall of 1851 the Mormon settlers of San Bernardino planted about 1,300 acres of wheat west of Waterman Canyon, between the Shandin Hills and the base of the San Bernardino Mountains (Beattie and Beattie, 1939, p. 188). The foundation for the grist mill (fig. 22) to grind the wheat crop was laid in May 1852, near the present intersection of Mill and Allen Streets (Beattie and Beattie, 1939, p. 199). The diversion dam on Warm Creek and the ditch to the mill (fig. 21) were completed in August 1852. The ditch to the mill was first known as St. Bernard ditch, then Davis mill ditch, and in later years as the Kehl ditch. Water from the ditch was dropped into what is now Timber Creek, which led from Waterman swamp, east of the ditch, to Warm Creek. Initially, the water was used to provide power for the grist mill; later, water from the ditch was used for irrigation (Hall, 1888, p. 274).

During the period 1857-61, the flow in Warm Creek decreased to about three-fourths of that which was available at the time the ditch was built (Hall, 1888, p. 275). During those 4 years only a limited area was being irrigated, and sufficient water for operating the mill was available. The mill was still in use during Hall's investigation in the 1880's, and at that time the ditch had a capacity of about 1,500 miner's inches.

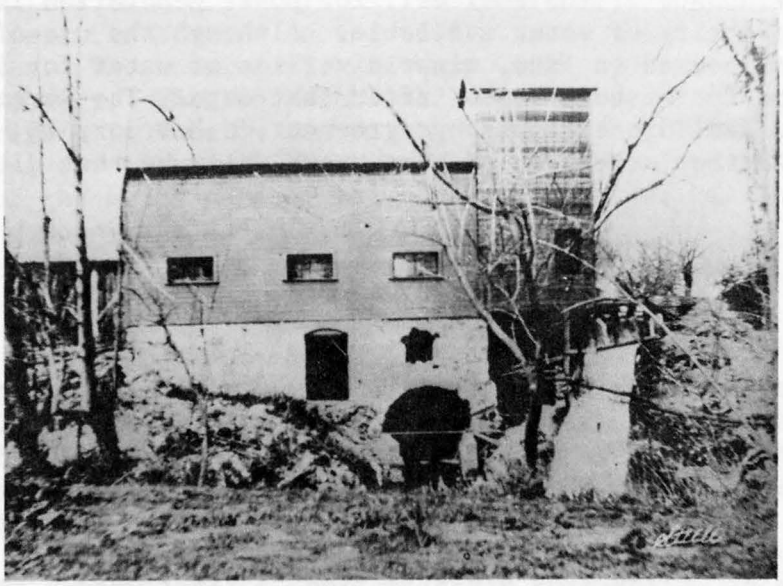


FIGURE 22.--Mormon grist mill; photographed in 1895. (Photograph courtesy of Steele's Photo Service.)

The history of the Davis mill ditch becomes obscure until about the turn of the century. On July 1, 1899, the Riverside Water Co. purchased a right to drill a well or wells in the artesian basin on the Cooley tract (written commun., city of Riverside, 1967). The ground-water yield was to supplement the natural flow of Warm Creek. As part of the purchase agreement the company agreed to deliver a continuous flow of 20 miner's inches from the well or wells to the owners of the tract. Because the head of the Davis mill ditch, then known as the Kehl ditch, was in the lower part of the Cooley tract, the 20 miner's inches may have been delivered through that ditch.

During 1899 and 1900, Lippincott (1902a, b) investigated the San Bernardino area, but makes no mention of a ditch that could be identified as the St. Bernard or Davis mill ditch. However, in March 1901, the San Bernardino Gas and Electric Light Co., by a court decree, was given the right to use, for power purposes at Kehl's mill (Davis mill), all the water that the Riverside Water Co. was entitled to from Warm Creek. This included any natural flow that exceeded the right of upstream ditches, plus all water from artesian wells discharging into Warm Creek (written commun., W. P. Rowe and Son, 1967). The powerplant that was built was a combined hydroelectric and steam plant. The plant was taken over by Pacific Light and Power Co. after 1902, and power was first developed by the new company in 1904 (Fowler, 1923, p. 549). The plant was listed as both hydroelectric and steam-electric until February 1906, then as a steam plant only until December 1906, at which time power generation ceased. The plant was abandoned in 1910.

The discontinuance of the Kehl mill for power generation indicates a decline in the quantity of water available. Although the use of water for power development ceased in 1906, minor diversion of water for irrigation probably occurred for a short period after that date. The Riverside Water Co. acquired the Kehl ditch rights by agreement on February 18, 1909, and eliminated any further diversion of Warm Creek water by that ditch.

Rabel's Dam Ditch

Rabel's dam ditch was built about 1854 by a group of Mormon settlers from San Bernardino (Hall, 1888, p. 269). The heading of the ditch, shown in figure 12, was below a large group of springs in the channel, adjacent to a large area of rising water that was probably one of the best water-supply sources in Warm Creek.

At the time of Hall's 1888 investigation, a tight wooden dam with wasteway and sluice gate had been built across the channel. This dam created a pool by raising the water level between 4 and 5 feet. From the pool, a ditch, having a capacity of about 200 miner's inches, led off to the southwest, for the irrigation of land on both sides of Sterling Avenue and probably as far south as Sixth Street. Hall estimated the irrigated acreage as follows: in 1881, 267 acres; in 1885, 325 acres; and in 1888, 350 to 370 acres. The irrigated area grew summer crops, alfalfa, and deciduous fruits. The number of owners of the ditch increased from eight in 1881 to 15 or 16 persons in 1888 (Hall, 1888, p. 270).

The control of Rabel's dam ditch passed from the Mormons, probably in 1857 or 1858 (Beattie, 1939, p. 290), when many of them returned to Salt Lake City. The Rancho San Bernardino was then divided and sold to individual owners, who maintained the ditch. In October 1895 an agreement between the ditch owners and the Riverside Water Co. provided that owners of rights in the ditch were entitled to 250 miner's inches of the natural flow of Warm Creek (Lippincott, 1902a, p. 24). To measure this flow the company, as part of the agreement, installed a permanent weir at the head of the ditch. In 1899 the weir was removed and the upper part of the ditch was lowered with the consent of the Riverside Water Co. (Lippincott, 1902a, p. 24). This increased the flow for a short time, but the flow soon dropped to less than the original discharge.

At about the time the above-mentioned weir was installed, the owners of Rabel's dam ditch decided that they would have better control of their water rights and distribution system by incorporating. Accordingly, on October 18, 1897, they organized the Warm Creek Water Co. Their service area, in 1900, consisted of 400 irrigated acres of alfalfa, vegetables, and other garden produce (Lippincott, 1902a, p. 24).

As mentioned on page 51, the artesian wells, drilled to supplement the natural flow from the basin, greatly reduced the flow of the springs at the head of Warm Creek. The measured flow in the ditch in August 1899 was only 0.94 ft^3/s, and in June of the following year the flow dropped to 0.35 ft^3/s (Lippincott, 1902a, p. 29). The decrease in flow from about 5 ft^3/s in the early 1880's to less than 0.5 ft^3/s in 1900 reflects the general decline in surface flow of all the streams on the valley floor whose source was within the artesian area. The natural flow of Warm Creek continued to decline in the twentieth century. When in March 1952, the Meeks and Daley Water Co. purchased the rights in Rabel's dam ditch, there was no flow in Warm Creek at the ditch heading (oral commun., Meeks and Daley Water Co., 1967). After this purchase of the major part of the outstanding stock of the Warm Creek Water Co., the company was dissolved.

McKenzie Ditch

The McKenzie ditch was built by Mormon settlers about 1856 (Hall, 1888, p. 273). The point of diversion from Warm Creek was on the south side of the creek about midway between present-day Sterling and Tippecanoe Avenues (fig. 21). In the early 1880's the owners of the ditch maintained a tight wooden dam in the stream and diverted the flow through an open ditch whose capacity was about 200 miner's inches. During that period water from the ditch irrigated about 240 acres of land west of Tippecanoe Avenue, between Warm and City Creeks, and 85 acres south of City Creek. Water was carried across City Creek in a flume (Hall, 1888, p. 272). The irrigated areas included orchards, vineyards, and fields of alfalfa and summer crops.

Prior to 1880, the water supply was generally adequate for all needs, but in the next few years there were brief periods when the supply fell short of the irrigation requirements (Hall, 1888, p. 72). In 1899 the ditch diverted 2 ft^3/s and in June 1900 it diverted 1.57 ft^3/s (Lippincott, 1902a, p. 30). In 1900 the irrigated area was about 300 acres, principally for growing alfalfa and garden crops.

In 1900 the owners of the McKenzie ditch claimed all the water in Warm Creek at their dam, but the Riverside Water Co. claimed that the McKenzie right was limited to 100 miner's inches (Lippincott, 1902a, p. 25). The controversy was settled in March 1901 when a court decree established the rights of the ditch owners to 209 miner's inches of the natural flow of Warm Creek, with no right to exceed that quantity by pumping (written commun., W. P. Rowe and Son, 1967).

The discharge records of Warm Creek at Base Line Road show that flow for the months of June to September, during the mid-1940's, ranged from 0.2 to 3.4 ft^3/s, with a probable average of 1 ft^3/s or less during those irrigation seasons. A combination of diminishing flow in Warm Creek and subdivision of the service area for residential use had eliminated the diversion, prior to the purchase of the water rights of the ditch in 1943 by the Riverside Water Co. (written commun., city of Riverside, 1967).

Stout's Dam Ditch or Shay Ditch

Stout's dam ditch, later known as the Shay ditch, diverted upstream from a tight dam in the Warm Creek channel, a short distance east of Sterling Avenue (fig. 21). The original ditch followed a course generally parallel to Base Line Road, extending west to, or possibly beyond, the East Twin Creek channel. The ditch was built in 1857 or 1858, and in 1881 its capacity was about 100 miner's inches (Hall, 1888, p. 275). At some later date the ditch was apparently enlarged.

The area irrigated from Stout's dam ditch lay between the ditch and Base Line Road. The irrigated acreage was 140 acres in 1881, and increased to 210 acres in 1885 (Hall, 1888, p. 271). During that period the irrigated crops included deciduous fruits, grapes, alfalfa, and summer crops.

The water supply for the ditch was not as copious as that for Rabel's dam ditch, it being subject to the prior rights of both Rabel's dam ditch and the McKenzie ditch. The supply was principally outflow from a swamp north of Warm Creek and east of the diversion dam. During the dry period following 1862, the supply was insufficient to meet irrigation needs (Hall, 1888, p. 271). In 1895, by agreement with the Riverside Water Co., the owners of the ditch were entitled to divert 112.5 miner's inches of water from Warm Creek (Lippincott, 1902a, p. 24).

By 1898 the irrigated area had decreased to 150 acres. The following discharge measurements--2.08 ft^3/s in September 1898; 0.9 ft^3/s in August 1899; 0.4 ft^3/s in June 1900--indicate the decrease that occurred in the discharge of rising water in upper Warm Creek (Lippincott, 1902a, p. 29). Diversion for irrigation continued until the service area was subdivided for homes in the mid-1940's (oral commun., W. P. Rowe and Son, 1967).

Hawes Ditch

Hawes ditch (fig. 21) was a small ditch--capacity about 50 miner's inches--established in 1857 near the head of Warm Creek (Lippincott, 1902a, p. 24). The source of its water supply was a swamp and springs. The water was used to irrigate about 25 acres west of Victoria Avenue and south of Base Line Road. The water right for the ditch was originally included in that of Rabel's dam ditch, but in 1862 the water rights were separated and Hawes ditch received one-eighth of the combined water right (Hall, 1888, p. 269).

Although few records of discharge for Hawes ditch exist, the ditch was known to be dry in June and August of 1899, and in March and June of 1900. The only flow in the ditch in the other months of those 2 years was water pumped from the Harlem swimming pool.

In March 1901 a court decree, resulting from a suit filed against the ditch owners by the Riverside Water Co., limited the diversion to 50 miner's inches of the natural flow of Warm Creek at the head of the ditch (written commun., W. P. Rowe and Son, 1967). The flow was to be measured at a weir installed under the supervision of the water company. Diversion ceased, probably in the early 1900's, as a result of decreased water levels and pressures in the artesian basin and the drying up of springs.

Heap Springs (Beam) Ditch

The Heap Springs ditch, also known as the Beam ditch, diverted water from a channel leading from Heap Springs to Warm Creek. The springs were west of the East Twin Creek channel, probably in the present Waterman Gardens area (fig. 21). The capacity of the ditch in 1887 was about 45 miner's inches, and the water irrigated about 70 acres of land near Waterman Avenue, north of Warm Creek (Hall, 1888, p. 275). By 1900 the irrigated area had increased to about 100 acres (Lippincott, 1902a, p. 31). The flow of the ditch, as measured by Lippincott, was: 0.67 ft^3/s on June 30, 1898; 0.52 ft^3/s on June 27, 1899; 0.5 ft^3/s on June 14, 1900.

To supplement the diminishing natural flow of Warm Creek, the Riverside Water Co., in 1901 and 1902, purchased the rights to drill wells in the Heap and Cooley tracts (written commun., city of Riverside, 1967). Subsequent purchase of the Heap tract included an agreement to furnish a continuous flow

of 25 miner's inches of water to the ditch owners, thus maintaining a supply of water for the area irrigated by Heap Springs ditch. In the early 1930's the Riverside Water Co. purchased this right to 25 miner's inches, and thus eliminated one more small diversion in the Warm Creek basin (oral commun., city of Riverside, 1967).

Spark's Ditch

Spark's ditch diverted water from the south side of City Creek (a tributary of Warm Creek) near Sterling Avenue (fig. 21). The water was used to irrigate 20 acres of land west of Sterling Avenue and south of City Creek. In 1880 the capacity of the ditch was about 25 miner's inches (Hall, 1888, p. 273). Although Lippincott (1902a, b) does not mention Spark's ditch, Mendenhall (1905, pl. XII) indicates that it was still in use in 1904.

Stewart's Ditch

Stewart's ditch diverted water from the north side of City Creek about midway between Sterling and Tippecanoe Avenues (fig. 21), for the irrigation of about 47 acres of land east of Tippecanoe Avenue (Hall, 1888, p. 273). At the time of Hall's investigation, the capacity of the ditch was about 35 miner's inches.

Whitlock Ditch

The Whitlock ditch diverted flow from the north side of City Creek (fig. 21). The ditch was used to irrigate vegetable gardens in the area, and its surplus water discharged into the McKenzie ditch. Records for the ditch are meager. On June 29, 1898, its flow was 12 miner's inches (Lippincott, 1902a, p. 26). The diminishing flow in the artesian basin of City Creek caused the abandonment of this diversion.

Feudge Ditch

The Feudge ditch probably diverted water from the north side of City Creek, upstream from Stewart's ditch (fig. 21). The water was used to irrigate a small area north of City Creek and east of Stewart's ditch, as indicated on a map by Hall (1888, San Bernardino sheet). Neither Hall nor Lippincott mentioned the Feudge ditch in the text of their reports.

Waterman Ditch--Logsdon, Ferrel, and Brooks Ditch

The Waterman ditch diverted flow from the south side of City Creek, east of Tippecanoe Avenue (fig. 21). Originally known as the old Waters ditch, it was the first diversion from City Creek. At the time of Hall's investigation (1888, p. 274) the capacity of the ditch was about 60 miner's inches, and its flow was used to irrigate about 55 acres of land between City Creek and the large Waterman swamp that then existed between City Creek and the Santa Ana River.

A short time prior to 1880, the water rights of the Logsdon, Ferrel, and Brooks ditch were combined with those of the Waterman ditch. The Logsdon, Ferrel, and Brooks ditch diverted flow at various points a short distance downstream from the Waterman ditch heading, and irrigated a part of the same land served by the Waterman ditch. In 1898 garden areas totaling 80 acres were served with irrigation water. Measured diversions in the years 1898 to 1900 were as follows: 0.72 ft^3/s in June 1898; 1.15 ft^3/s in June 1899; 0.49 ft^3/s in June 1900 (Lippincott, 1902a, p. 30).

In March 1902 the Riverside Water Co. purchased rights to develop water in the artesian basin adjacent to City Creek, between Tippecanoe and Waterman Avenues (written commun., city of Riverside, 1967). Withdrawals from wells in this and other areas reduced the natural flow of City Creek and probably caused the eventual abandonment of the ditches.

Daley Ditch

The Daley ditch was a small ditch--its capacity is not known--that diverted flow from the north side of City Creek, a short distance upstream from the junction of City and Warm Creeks (fig. 21). The ditch was shown on a map by Hall (1888, San Bernardino sheet) but is not mentioned in the text of his report. However, the diversion was still active in 1898 (Lippincott, 1902a, p. 26). Water was conveyed over City Creek in a flume and was used to irrigate about 40 acres on the south side of the creek, probably immediately west of Waterman Avenue. Lippincott (1902a, p. 32) measured the diversion in the years 1898 to 1900, and obtained the following results: 0.63 ft^3/s in June 1898; 0.51 ft^3/s in June 1899; 1.12 ft^3/s in June 1900.

In 1902 the Riverside Land Co. purchased the Daley tract between Waterman Avenue and Sierra Way, through which City Creek flowed, and a one-fourth interest in the flow of City Creek within 130 yards of the junction of City and Warm Creeks. The rights were subsequently transferred to the Riverside Water Co. (p. 97).

Johnson Swamp Ditch

The Johnson Swamp ditch (figs. 18 and 21) derived its water from one of the largest swamps in the upper Santa Ana River basin. The swamp occupied about 160 acres north of the Santa Ana River, between E Street and Waterman Avenue. Water from that area was collected in several ditches that emptied into the Johnson Swamp ditch, which had a capacity of about 120 miner's inches. The water was used to irrigate about 115 acres of land north of the Santa Ana River and west of E Street (Hall, 1888, p. 276). No later mention of this ditch is made in the literature.

Coburn Swamp Ditch

The Coburn Swamp ditch received water from a swamp between Colton Avenue and Warm Creek, and west of E Street, and carried it around the base of the bluff, west of Warm Creek (fig. 21). The ditch had a capacity of about 65 miner's inches, and the water was used to irrigate about 56 acres east of Colton. There was no flow in the ditch after 1959 (oral commun., Temescal Water Co., 1967). The Meeks and Daley Water Co. (p. 61-68) had earlier purchased the Coburn ditch right.

Rice-Thorn Ditch

In 1886 and 1887 the Riverside Water Co. acquired the Rice and Thorn tracts (fig. 18) which were in the artesian area adjacent to and north of the Santa Ana River and east of E Street (oral commun., city of Riverside, 1967). In the early 1890's the company dug the Rice-Thorn ditch from the artesian area, across the Johnson tract, which it had acquired in August 1890, to Warm Creek.

The Riverside Water Co. continued to develop the tracts, first supplementing the natural streamflow by flowing wells, and later by pumping from the basin as ground-water levels and pressures receded. Through a series of exchanges of water rights, the Alta Mesa Water Co. (p. 72) obtained a right to 250 miner's inches of water from the Rice-Thorn tract. The water was to be delivered to the service area in Arlington (fig. 15) by being first conveyed through the system of the Riverside Highland Water Co. to the Gage Canal, and then in the Gage Canal to the service area. Additional details are given on pages 71-72.

The original open Rice-Thorn ditch was replaced by a closed conduit that discharged its flow directly into the Riverside Canal, downstream from the Southern Pacific weir (fig. 45).

Meeks and Daley Water Company

In 1858 or 1859 Daley and two associates constructed a diversion dam on Warm Creek, a short distance upstream from its mouth and downstream from the intake to the Meeks or Matthews mill (Hall, 1888, p. 284). (In those days, prior to the construction of the Southern Pacific railroad in the area, Warm Creek entered the Santa Ana River some distance downstream from the present stream junction.) A small ditch was dug from the dam to the lower part of the bench downstream from Colton. The exact location of the dam and ditch is not known, but the probable location is shown in figure 23.

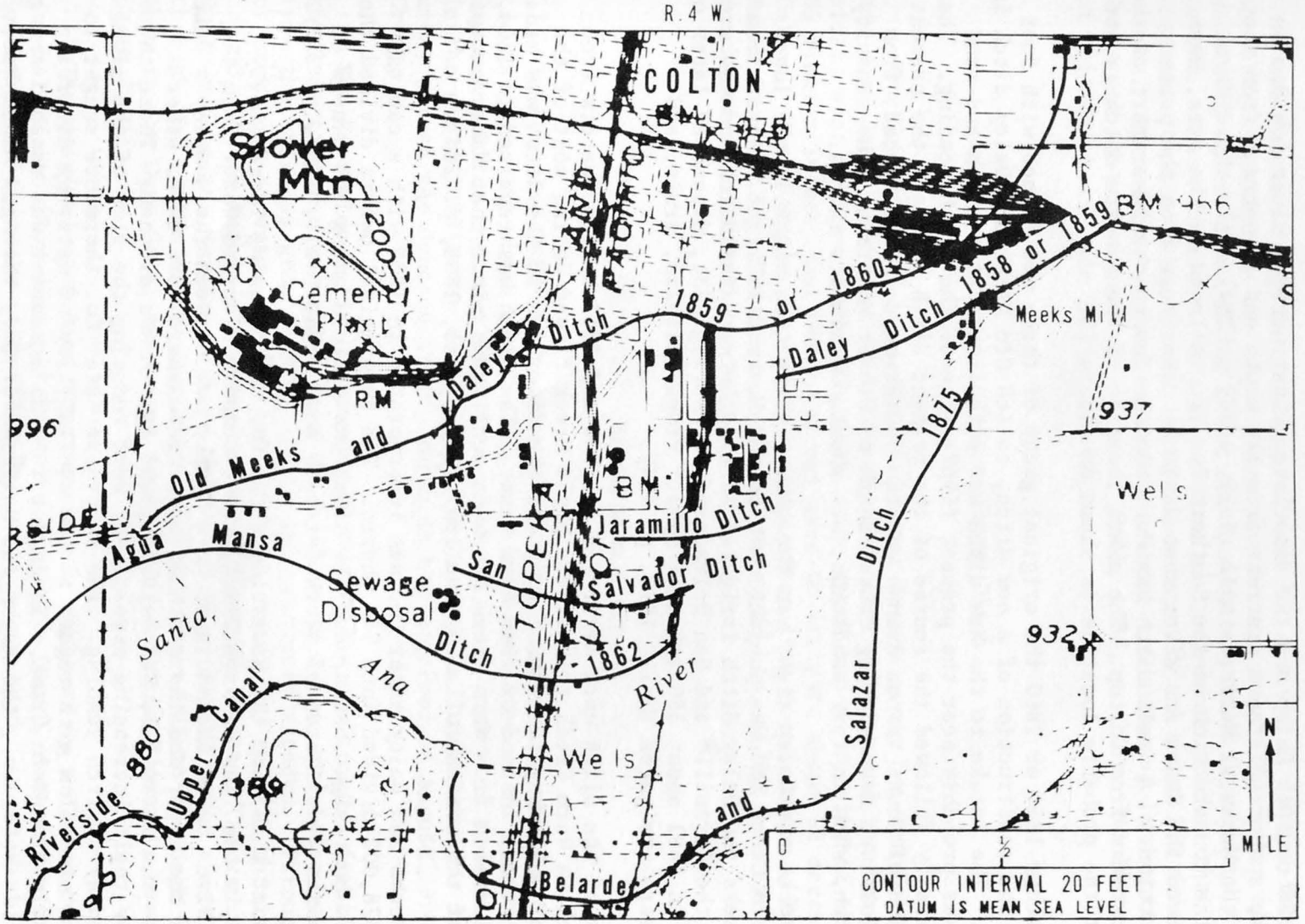
In either 1859 or 1860 the original group of three men joined with four others in the construction of a new ditch, called Old Meeks and Daley ditch in figure 23. The intake to the new ditch was established at a brush-and-sand dam that was probably near the present (1967) site of the ditch heading. The ditch generally followed the course of the present ditch to about the present intersection of Mount Vernon Avenue and the Southern Pacific railroad; from there it followed a meandering course south of Slover Mountain. The capacity of the ditch, when in fair condition, was about 600 miner's inches.

The Meeks and Daley right was the oldest irrigation right in the lower part of Warm Creek and was subject only to the Meeks mill right. Water from the Old Meeks and Daley ditch irrigated an area between the ditch and the area served by the Jaramillo and San Salvador ditches (fig. 23), discussed later on page 71. In 1881 about 350 acres of summer crops, alfalfa, grain, and orchards were irrigated (Hall, 1888, p. 284).

Parts of the ditch were destroyed in 1862 and 1867 by floodwaters from Lytle Creek, a Warm Creek tributary. Lytle Creek flowed during most of the two seasons following the 1862 flood, and the diversion to the ditch was made from that stream instead of from Warm Creek. The ditch was repaired in 1864, and the diversion from Warm Creek has been continuous since that date, except for part of the season following the 1867 flood (Hall, 1888, p. 284).

The Meeks and Daley Water Co. was incorporated in 1885 with a capital stock of $78,000 divided into 780 shares. The 30 original owners divided the water on an hour-right basis, and the stock was divided among the owners on the same basis--two shares of stock for each hour-right (Hall, 1888, p. 285).

At about this time the Riverside Water Co. was becoming increasingly interested in the flow of Warm Creek. That company diverted water from the Santa Ana River below the mouth of Warm Creek, but between the company's ditch heading on the river and the mouth of Warm Creek there were three other diversions--the Jaramillo, San Salvador, and Agua Mansa ditches. Those three ditches, by their increasing diversions, were reducing the flow of the river at the company's ditch heading. The Riverside Water Co. therefore sought to improve its situation with regard to the availability of water by diverting flow directly from Warm Creek. In August 1887 an agreement was reached among the Riverside Water Co., the Meeks and Daley Water Co., the Agua Mansa Water Co., and the owners of the San Salvador ditch, apportioning the flow in Warm



Base from U.S. Geological Survey
San Bernardino 1954, 1:62,500

FIGURE 23.--Diversions from lower Warm Creek.

Creek and in the Santa Ana River below Warm Creek. The Riverside Water Co. agreed to reconstruct and realine the Meeks and Daley ditch and surface it with a plastered rubble lining, and to bring the ditch capacity up to 850 miner's inches. The company further agreed to construct the following: concrete headworks including a 6-foot weir (fig. 24), wooden regulating gates, an escapeway, and connecting branch ditches from the end of the Meeks and Daley ditch to the Agua Mansa and San Salvador ditches and later to the Jaramillo ditch. The location of the lower part of the reconstructed Meeks and Daley ditch and the connection to the Agua Mansa ditch are shown in figure 25.

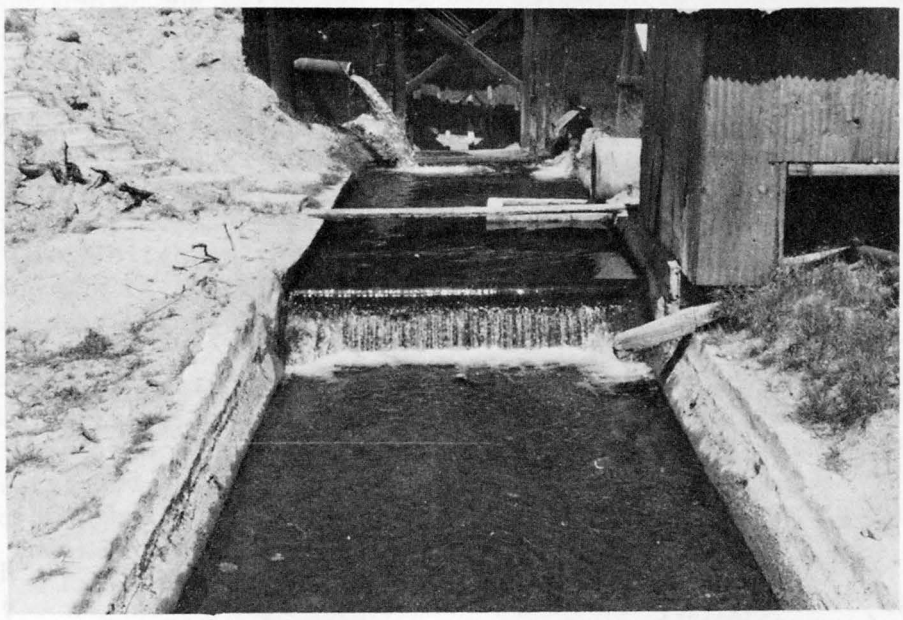


FIGURE 24.--Meeks and Daley weir; in use since 1887.

In return the other companies relinquished all claims to water in Warm Creek and in the Santa Ana River, except that the Meeks and Daley Water Co., the Agua Mansa Water Co., and the owners of the San Salvador ditch would retain rights to 400, 250, and 125 miner's inches, respectively, of continuous flow from Warm Creek, to be delivered to the Meeks and Daley ditch at its heading. In addition to the 775 miner's inches thus allotted, 25 miner's inches would be added to compensate for evaporation loss between the heading and points of distribution. Although all water was to be supplied through the Meeks and Daley ditch, each of the other ditches was to be operated as an individual unit by its owners.

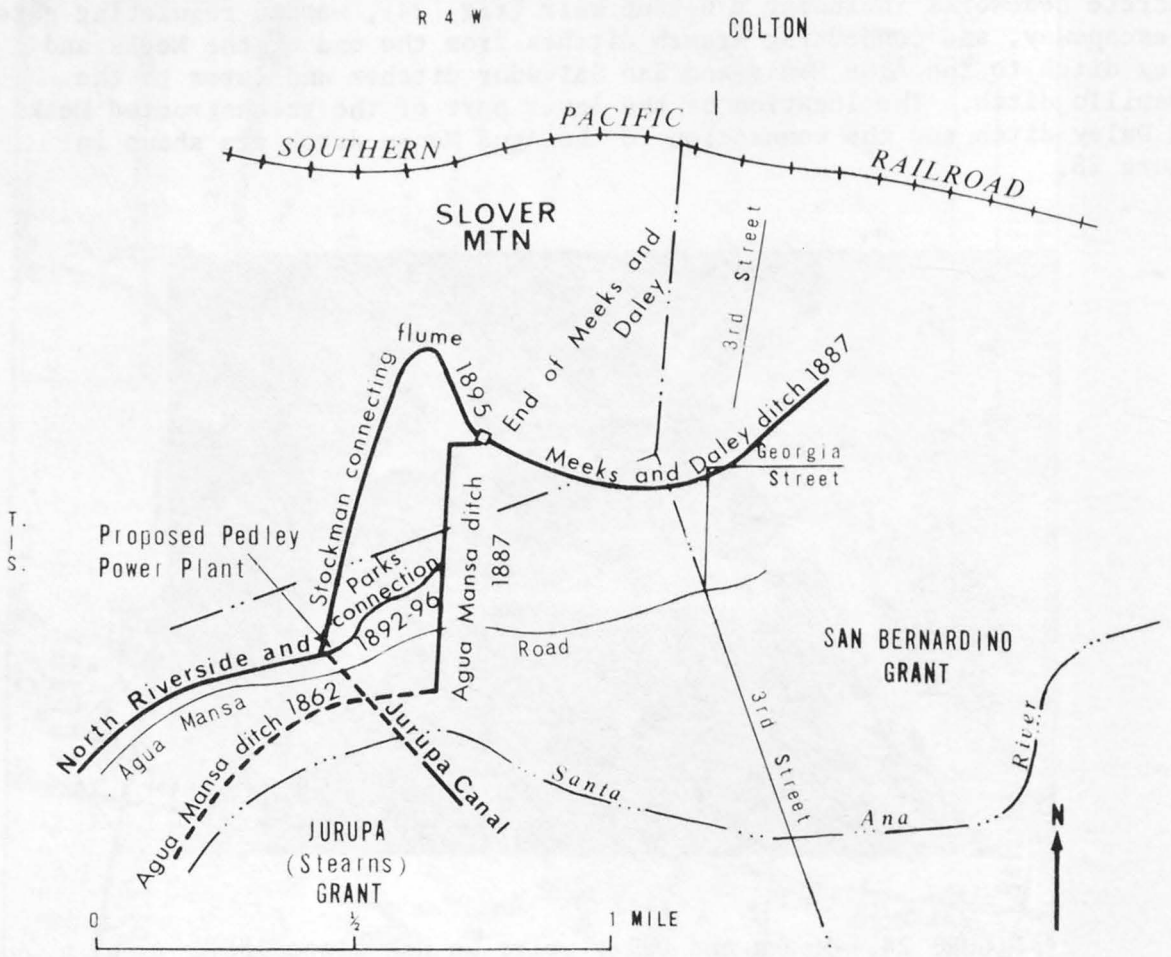


FIGURE 25.--Diversions from Meeks and Daley ditch, 1887-96.

Shortly after this agreement and by similar agreement between the Riverside Water Co. and several owners of the Jaramillo water right, the Jaramillo ditch owners relinquished all their rights to water in the Santa Ana River except for 50 miner's inches of continuous flow from Warm Creek, to be diverted at the Meeks and Daley ditch heading and delivered to them through a branch canal from the end of the Meeks and Daley ditch (Hall, 1888, p. 286). The Riverside Water Co. thus eliminated the last of the diversions between its upper canal heading and the mouth of Warm Creek, except for diversion in the Belarde and Salazar ditch (p. 79-80).

The development of the Stearns Rancho properties west of Riverside and north of the Santa Ana River led the owners of those properties to purchase stock in the Meeks and Daley and Agua Mansa Water Cos. To deliver water to the rancho it was necessary for the two water companies to connect their systems to the North Riverside and Jurupa Canal (p. 84-85). On July 11, 1892, a right-of-way for a connecting ditch having a capacity of 600 miner's inches was deeded to H. C. Parks and others by F. J. Stockman and Olive A. Byrne, and the Parks connection (fig. 25) was built (written commun., Temescal Water Co., 1967). In 1895 Stockman built a wooden flume (fig. 25) from the end of the Meeks and Daley ditch to the North Riverside and Jurupa Canal. Stockman offered free use of the flume to the Agua Mansa Water Co. and to owners of Warm Creek water rights.

The Parks connection was abandoned in 1896 and water formerly delivered through the Parks connection was delivered through the Stockman flume. The Stockman flume, however, proved unsatisfactory because of leakage, many interruptions, and unsatisfactory arrangement for repairs. In 1897 the Agua Mansa Water Co. built a flume on the Parks right-of-way, and water was again delivered to the North Riverside and Jurupa Canal by a new Parks connection (written commun., Temescal Water Co., 1967).

The development of the Stearns Rancho area and its need for water started a transfer of water rights formerly used in the Agua Mansa area and in the area south of Colton. The transfer was accomplished through the purchase of stock in the Agua Mansa and the Meeks and Daley Water Cos. The water involved in the transfer was carried in the North Riverside and Jurupa Canal to the newly developed land.

Some time in the early 1890's W. E. Pedley promoted an area north of the Santa Ana River and east of Van Buren Avenue. A considerable acreage was planted with citrus trees, and required irrigation water that was probably supplied principally through ownership of stock in the Meeks and Daley and Agua Mansa Water Cos. Water for the area was delivered in the North Riverside and Jurupa Canal (fig. 26). In February 1908 Pedley proposed to rebuild the Stockman flume by replacing the wooden structure with a concrete-lined canal. He offered free water transport to owners of the Agua Mansa and other water rights (written commun., Temescal Water Co., 1967). A year later Pedley reported the completion of the canal which had a capacity of 1,000 miner's inches. He proposed to deed the carrying capacity to the Agua Mansa Water Co., with the provision that users of the canal would pay the costs of maintenance. In return, Pedley was to have the use of the water to develop power through the drop from the new canal into the North Riverside and Jurupa Canal. The power developed would be used to operate a pump on a nearby well.

FIGURE 26.--Diversions between Colton and Corona.

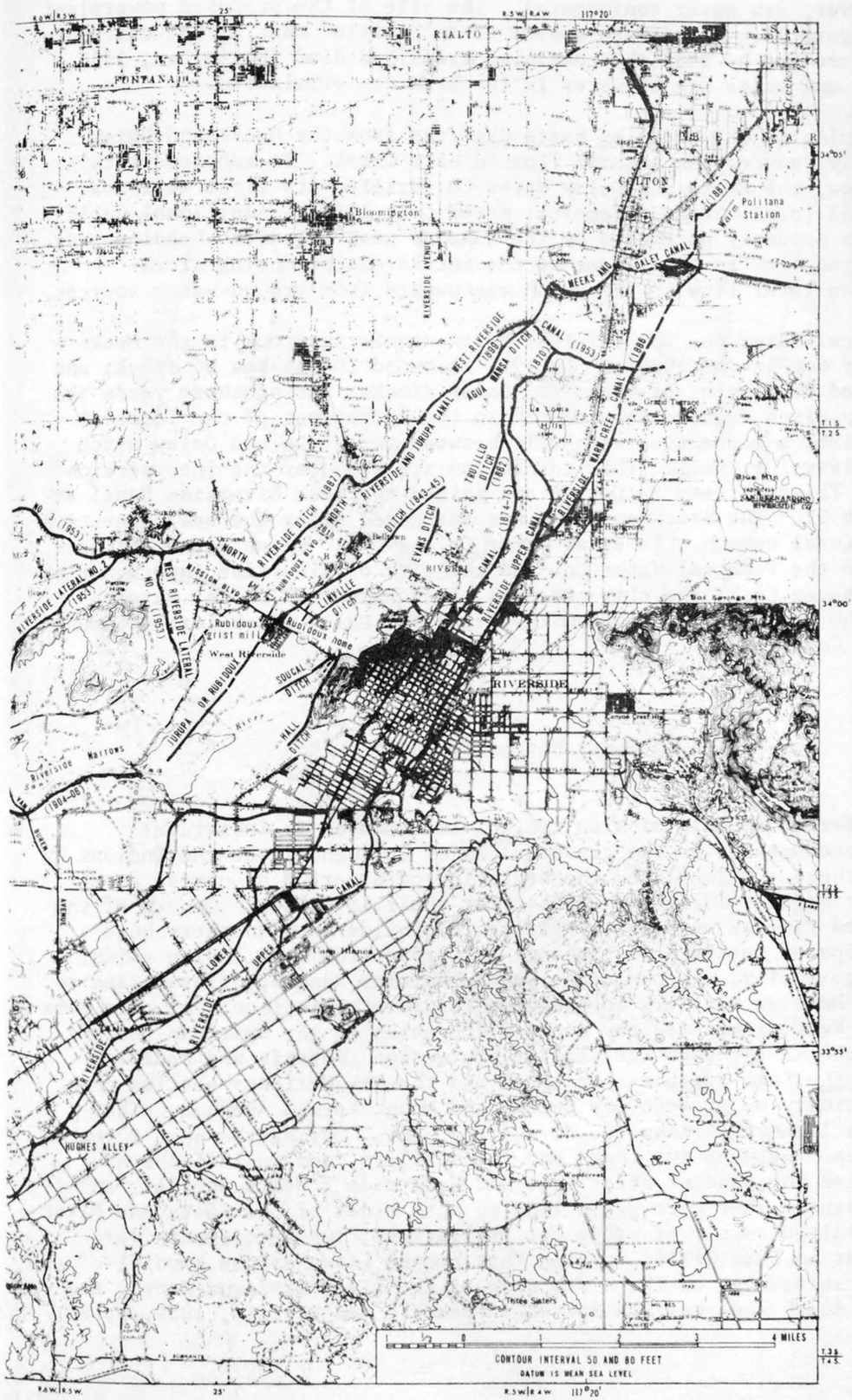


FIGURE 26.--Continued.

The deal, however, was never consummated. The site of the proposed powerplant is shown in figure 25. The severe freeze of 1913 killed many of the citrus trees in the area and by 1930 the remaining trees had died (Patterson, 1964, p. 133). Thus one major use of water in the area was eliminated.

Heavy pumping in the artesian basin upstream from the Meeks and Daley intake gradually reduced the natural flow in Warm Creek. To supplement this diminishing flow, the Meeks and Daley Water Co. drilled its first well near E Street in 1931 (oral commun., Temescal Water Co., 1967). Additional wells were drilled on property purchased by the company near the ditch heading. By 1955 there was no flow in Warm Creek at the intake except during storm periods, and the total flow in the ditch was pumped from ground-water sources.

The Temescal Water Co. (p. 189-195) began acquiring stock in the Meeks and Daley Water Co. in the 1920's. In 1925 it owned 204 shares of stock, and by 1967 it owned 92 percent of Meeks and Daley stock. During those years the Meeks and Daley ditch figured prominently in the operations of the Temescal Water Co. In 1962 a connection was built between the Meeks and Daley ditch and the West Riverside Canal. This connection started near the intersection of Georgia and Third Streets in Colton and joined the West Riverside Canal as shown in figure 27. The Stockman flume was abandoned after the new connection was completed (oral commun., Temescal Water Co., 1967). By an agreement made in 1966 between the Temescal Water Co. and the city of Riverside (now owner of the Riverside Water Co.), the city now uses, on a temporary basis, water delivered to the Riverside Canal from the Meeks and Daley ditch (oral commun., Temescal Water Co., 1967).

Agua Mansa Water Company

The transfer of the old mission ranchos from church to individual ownership was accompanied by the gradual loss of influence over the Indians by the Spanish fathers. This marked the beginning of a period of unrest among the Indians who began raiding the ranchos for their livestock. Owners of the thinly populated ranchos were often willing to provide land on their huge ranchos to groups of settlers in exchange for protection from Indian raids. In 1843 the Lugo family, who owned the San Bernardino Rancho, offered land to a group of New Mexican settlers in exchange for such protection. At this same time, Don Juan Bandini offered the group 2,200 acres at the upstream end of his Jurupa Rancho in exchange for similar protection (Beattie and Beattie, 1939, p. 59). The Lugo offer was accepted and the New Mexicans settled on land in the vicinity of present day Colton and Mount Vernon Avenues. They named their settlement Politana (p. 94 and fig. 26). During the next 2 years conflict developed between the Lugos and the settlers, and in 1845 the settlers accepted the Bandini offer that had been made 2 years earlier, and they left Politana. They were given land on both sides of the Santa Ana River and had an unlimited supply of water for irrigation. Two settlements were established near La Loma Hills, an area that became known as the Bandini Donation. The settlement on the north side of the river was Agua Mansa, and the one on the south side was San Salvador (Beattie and Beattie, 1939, p. 96).

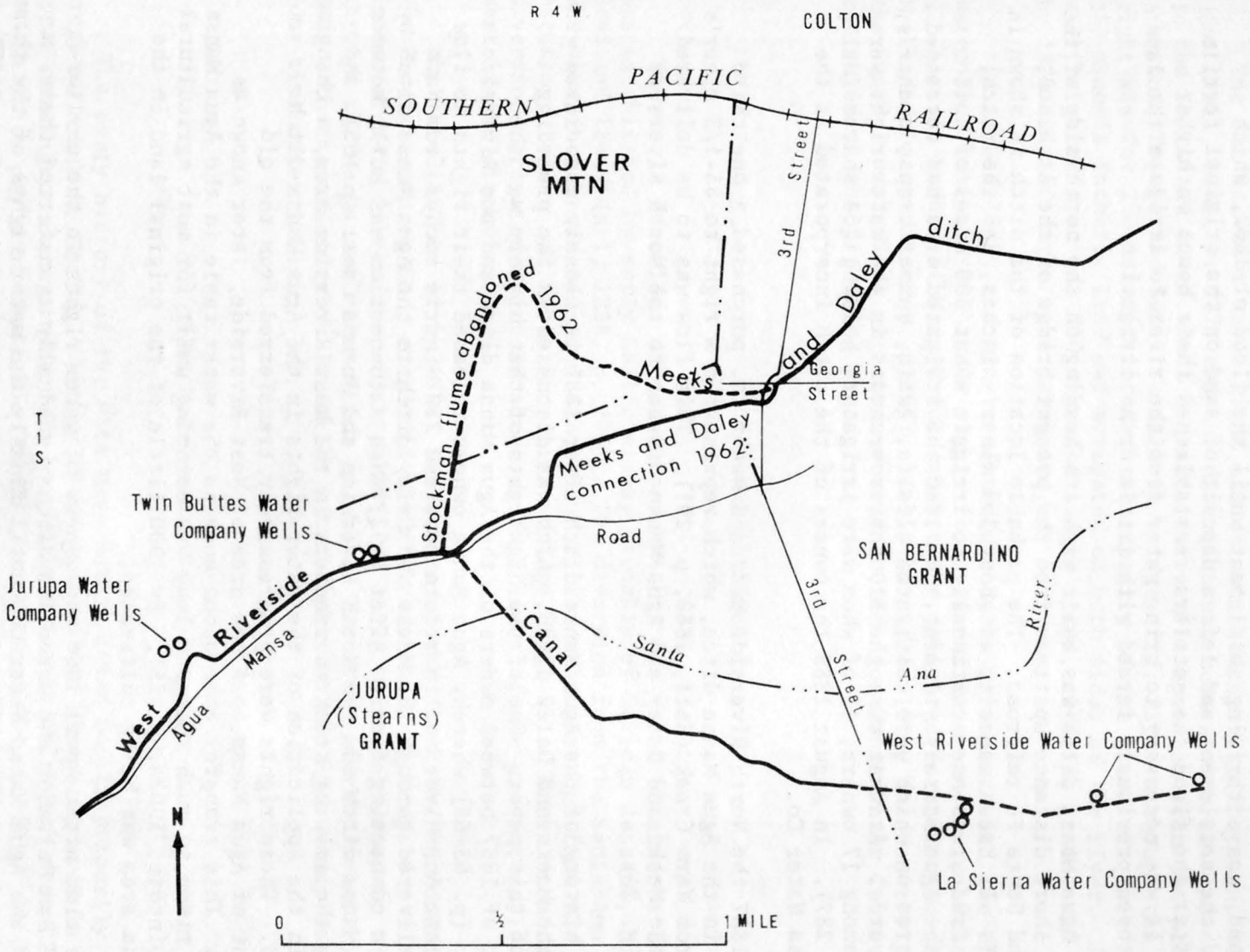


FIGURE 27.--Diversions from Meeks and Daley ditch, 1962.

The rich bottom land of the Bandini Donation was capable of producing good crops with a minimum of irrigation. A ditch (not shown) was built by the settlers in 1845 (Hall, 1888, p. 288), thereby establishing one of the first water rights in the upper Santa Ana River basin. Agua Mansa, established on the lowland, was a thriving settlement until the flood of 1862, which destroyed the settlement and left a deposit of sand on the original fertile soil. After the flood the settlers reestablished their homes on higher ground. It was necessary to bring water from the river to irrigate the land that had been previously farmed with little or no irrigation.

The Agua Mansa ditch was built with its heading on the north side of the river, a short distance upstream from the present bridge of the Atchison, Topeka and Santa Fe railroad. The probable location of the ditch is shown in figure 23. It had a capacity of about 300 miner's inches, and the ditch, although crude, was used continually to irrigate about 300 acres of bottom land in the Agua Mansa settlement. By 1880 the irrigated area had decreased to 116 acres on which were cultivated alfalfa, grain, summer crops, orchards, and vineyards. At that time the 310 shares or hours in the water right were divided among 17 owners, 11 of whom were irrigators holding 264 shares (Hall, 1888, p. 287). In August 1885 the owners of the ditch incorporated as the Agua Mansa Water Co.

In 1887 the North Riverside Land and Water Co. purchased a one-third interest in the Agua Mansa ditch, which represented a right to 83-1/3 miner's inches from Warm Creek (Hall, 1888, p. 291). This flow was to be delivered through the Meeks and Daley and Agua Mansa ditches to the North Riverside ditch (fig. 26).

The history of the Agua Mansa ditch after 1887 is closely associated with that of the Meeks and Daley ditch, which was discussed in the preceding section of this paper. One of the highlights of that history was the agreement of 1887 between owners of the Agua Mansa ditch and the Riverside Water Co. (p. 63-65) whereby Agua Mansa owners released their rights to flow in the Santa Ana River and in return received 250 miner's inches from Warm Creek, delivered through the Meeks and Daley ditch to the Agua Mansa ditch by means of a connecting flume. After 1892, when a connection was built between the Agua Mansa ditch and the North Riverside and Jurupa Canal (p. 65), and following the sale of stock to ranchers in the West Riverside area, a changing pattern in the application of the water rights in the Agua Mansa ditch developed. These rights were progressively transferred from the old settlement of Agua Mansa to a new area of West Riverside, later known as Rubidoux. This transfer came about because the water table in the Agua Mansa area had risen so much that the land was becoming unfit for most agricultural use (Lippincott, 1902a, p. 28). By 1900 little of the original land in the Agua Mansa area was being cultivated.

Some time after April 1908 the owners of water rights in the earlier-mentioned San Salvador and Jaramillo ditches gradually transferred their rights to the Agua Mansa Water Co. until finally the water rights of the three organizations were consolidated (written commun., Temescal Water Co., 1967). The Agua Mansa Water Co. gave the owners of rights in the two ditches 1.284 shares of stock in the enlarged company for each miner's inch of water right transferred. The Temescal Water Co. (p. 189-195) began acquiring stock in the Agua Mansa Water Co. in the 1920's, and by 1967 it owned 25 percent of that stock.

San Salvador Ditch

The San Salvador water right was established sometime between 1862 and 1864 (Hall, 1888, p. 287) and the diversion was made at a brush-and-sand dam in the Santa Ana River about a quarter of a mile upstream from the present Atchison, Topeka and Santa Fe railway bridge (fig. 23). Although the water right was for 250 miner's inches, the capacity of the ditch was only about 150 miner's inches. Land was irrigated on both sides of the river. In 1882 the irrigated area was 130 acres of summer crops, alfalfa, grain, and grapes; by 1888 only 50 acres were irrigated.

In August 1887, the owners of the ditch, by agreement with the Riverside Water Co., relinquished their rights to Santa Ana River water in exchange for 125 miner's inches of Warm Creek water to be delivered to them through the Meeks and Daley ditch (p. 61-65). Some time after 1908, the water rights in the San Salvador ditch were transferred to the Agua Mansa Water Co. as mentioned on the preceding page.

Jaramillo Ditch

The small Jaramillo ditch, whose capacity was about 50 miner's inches, was established by early Californians, probably of Mexican descent, between 1863 and 1866 (Hall, 1888, p. 286). The diversion from the Santa Ana River was made at a brush-and-sand dam, about half a mile upstream from the present Atchison, Topeka and Santa Fe railway bridge (fig. 23). Water from this diversion irrigated about 30 acres on both sides of the present railroad, due west of the diversion site.

In late 1887 or early 1888, the owners of the ditch, by agreement with the Riverside Water Co., abandoned their diversion in exchange for 50 miner's inches of Warm Creek water (Hall, 1888, p. 235), to be delivered to them through the Meeks and Daley ditch (p. 65). The story of the Jaramillo ditch ends with the transfer of Jaramillo water rights to the Agua Mansa Water Co. some time after 1908 (p. 70).

Alta Mesa Mutual Water Company

The early history of the Alta Mesa Mutual Water Co. is primarily the story of Frank A. Tetley. Tetley first came to the Riverside area in 1887 and began dealing in real estate. He bought land in the Arlington area (fig. 18) and in other parts of Riverside County (Patterson, 1964, p. 51). To develop the land, he acquired water rights through the purchase of stock in both the Meeks and Daley and Agua Mansa Water Cos.

On September 22, 1905, Tetley entered into an agreement with the Riverside Water Co. under the terms of which he agreed to deliver 145½ miner's inches of water to the company's canal south of the Southern Pacific railroad yards, through a pipeline he would build from the Meeks and Daley ditch (written commun., city of Riverside, 1967). In return, the Riverside Water Co. agreed to deliver 145½ miner's inches of water from their Rice-Thorn tract to the pipeline of the Riverside Highland Water Co., south of the Santa Ana River and west of E Street (fig. 18). From that point the water was to be carried through the system of the Riverside Highland Water Co. to the steam booster plant at the base of the bluff south of the Santa Ana River, to be pumped up to Gage Canal which would carry the water to Arlington (fig. 15). The connecting pipeline was built to have a capacity of 200 miner's inches. By a later supplemental agreement, the quantity of the water exchanged was increased from 145½ to 175 miner's inches.

Tetley organized the Alta Mesa Water Co. to deliver water to the Arlington area. Six years later, in 1911, he made two additional agreements with the Riverside Water Co. The first of the two, made in May, increased the water exchange to 210 miner's inches; the second, made in September, further increased the exchange to 250 miner's inches. Tetley agreed to deliver the additional 40 miner's inches from the Meeks and Daley ditch--10 miner's inches to be delivered to the Mill tract and 30 miner's inches to the Riverside Canal. Following each agreement, Tetley assigned the exchange water rights to the Alta Mesa Water Co., but he retained all his stock in the Meeks and Daley and Agua Mansa Water Cos. (written commun., city of Riverside, 1967). As a result of all these agreements the Alta Mesa Water Co. was entitled to 250 miner's inches from the Rice-Thorn tract. The company was incorporated as the Alta Mesa Mutual Water Co. in 1924, and by February 1925 it owned about 50 percent of the stock of the Agua Mansa Water Co. (oral commun., Temescal Water Co., 1967).

The Temescal Water Co. began acquiring stock in the Alta Mesa Mutual Water Co. in the 1920's. By 1925 it had acquired 969 shares of stock, and by 1967 it owned 73 percent of Alta Mesa stock.

Riverside Water Company

The history of the development of the Riverside Water Co. from 1869 to 1884 is taken from Hall (1888, p. 222-234). Subsequent to 1884 the source material, except as noted, is from the city of Riverside.

The Silk Center Association of southern California was organized in November 1869 to establish a colony that would promote the production of raw silk. That production required the planting of mulberry trees to provide food for silkworms. The trees in turn required irrigation to supplement the winter rains. The Association arranged to purchase 5,000 or 6,000 acres of the Jurupa and Rubidoux Ranchos, which included the present site of the city of Riverside, and 1,400 acres of Government land adjacent to the rancho land. In the spring of 1870 a preliminary survey was made, and a notice of water

appropriation was posted for a canal from the Santa Ana River to the area to be developed. Some work was done at the headworks, but the project was dropped following the death of the leader of the Association, probably in 1870.

During the spring of 1870, another group that was interested in cultivating orchards and vineyards examined the land held by the Silk Center Association. In September 1870 the group purchased that land. They set up a camp, called Jurupa, on the present site of Riverside and organized under the name of Southern California Colony Association.

The canal survey was continued, and construction of the Riverside Upper Canal (fig. 26) was started in October 1870, about a month after the land purchase had been made. Construction continued through the fall and spring of 1870-71, and the first water was diverted into the canal in the early part of May 1871 (fig. 28). The headworks for the diversion canal was on the south side of the Santa Ana River, about half a mile downstream from the present Atchison, Topeka and Santa Fe railroad bridge (fig. 23). The capacity of the canal, from its intake to the Spanishtown flume (Trujillo ditch) across the gully at the south edge of La Loma Hills, was 700 to 800 miner's inches. Downstream from the Spanishtown flume, the capacity reduced to 500 miner's inches, and the canal route was across the mesa to the southern boundary of the Jurupa Rancho south of Riverside. Improvements were continually made in canal alinement and grade and the canal was also enlarged. By 1875 the canal had a capacity of 1,000 miner's inches. To that time, however, no more than 300 or 400 miner's inches had been used for the irrigation of a maximum of 500 acres. In February 1875, the Southern California Colony Association, to strengthen its water-right claims, purchased the Matthew Mill property at the junction of Warm Creek and the Santa Ana River.

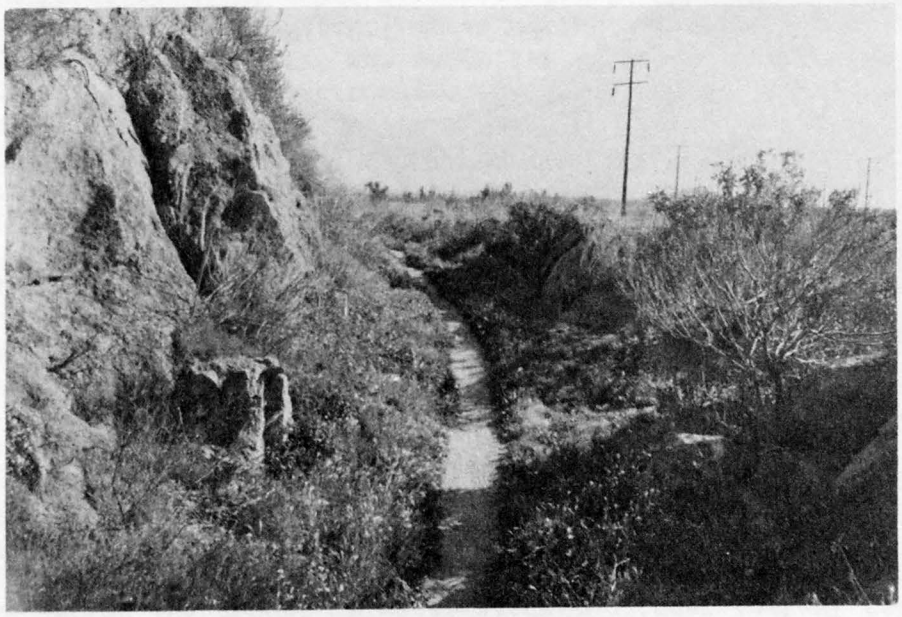


FIGURE 28.--Riverside Upper Canal, south of intake of Riverside Lower Canal; used 1871-1912.

The year before, in 1874, S. C. Evans and W. T. Sayward purchased 8,000 acres of land south of the Rubidoux and Jurupa Ranchos. Their plan was to colonize the land and irrigate it with water diverted from the Santa Ana River. The two men joined with the owners of the San Jacinto Sobrante Rancho, also known as the San Jacinto Tin Co., which lay south of their property, in planning the construction of another canal. The settlement of Evans and Sayward was called the New England Colony and that of the San Jacinto group was called the Santa Ana Colony.

The two groups started construction of the Riverside Lower Canal (fig. 26) in the autumn of 1874, without making a preliminary survey. They soon found that not only would the cost of the canal exceed the original estimate, but only about 3,500 acres of land owned by the New England Colony could be irrigated, and that would be possible only if the canal were built at a higher elevation than originally planned. The New England Colony began construction at a higher elevation and after completing 1,500 feet of the canal, starting from the headworks (fig. 29), the canal reached the property of the Southern California Colony Association. The Association refused to allow the canal to cross Association property. Work on the upper end of the canal was stopped and construction below the Rubidoux Rancho line started. However, in April 1875, the Southern California Colony Association granted a right-of-way for construction of the Riverside Lower Canal. The conflict had been resolved when Evans, Sayward, and the San Jacinto Tin Co., who had merged their interests and formed the Riverside Land and Irrigating Co., purchased a four-sevenths interest in the Southern California Colony Association for $50,000. Right-of-way difficulties had also developed with the inhabitants of Spanishtown, who owned the Trujillo ditch. The settlement with the Trujillo ditch owners is discussed in the history of that ditch (p. 81).

FIGURE 29.--Intake of Riverside Lower Canal; used 1875-1912.

The Riverside Land and Irrigating Co. gradually acquired the stock of the Southern California Colony Association, and on March 10, 1877, the Association formally transferred all its real estate, rights, and franchises to the company, thus consolidating all the interests of the original organizations. However, in May 1876, 10 months prior to complete consolidation, the Riverside Land and Irrigating Co. had taken over the full management of both canals--the Riverside Upper and Riverside Lower Canals. By October 1876 both canals had been completed and were furnishing sufficient water to irrigate about 2,000 acres. During the next 5 years both canals were improved, laterals were added, and gates and flumes were built. The combined capacity of the canals was about 5,000 miner's inches and by 1887 about 4,300 acres were being irrigated.

We go back in time now to May 1878, shortly after the Riverside Land and Irrigating Co. completely absorbed the Southern California Colony Association. The controlling stockholders of the company organized the Riverside Canal Co., whose primary purpose was to promote the sale of irrigable land and to control the canals, water rights, and water franchises of the parent company. The Riverside Canal Co. sold canal stock to irrigators, most of whom had purchased land from the company, but some of whom were settlers on government land adjacent to the company's holdings. Within a few years, a conflict over water rates developed between the canal company and the irrigators.

The story of the controversy properly begins in 1880, when the State legislature passed the Streeter bill. That bill directed and authorized boards of supervisors to fix the water rates that might be collected by canal companies. Soon after the law was passed its provisions were put in operation for regulating the charges of the Riverside Canal Co. Early in 1882 the president of the Riverside Canal Co. submitted a statement of the company's affairs at several citizens meetings and requested permission to secure an increase in rates from the board of supervisors. A citizens committee was appointed to study the situation. After making a detailed study of the Riverside Canal Co.'s affairs, the committee reported that the sale of land furnished capital to build the canals, or to repay individuals who had advanced money for canal construction, and that in the judgment of the committee, the Riverside Canal Co. was not entitled to a net revenue on its stock. The committee agreed that a slight advance in rates would be sufficient to pay the operating expenses of the company.

The Riverside Canal Co. took issue with those findings. The company contended that its water rates had been fixed and maintained at a low figure to encourage settlers to purchase and improve the land, and as a result the revenue was not nearly sufficient to pay the operating costs. The company, therefore, felt that a significant increase in rates was in order. The irrigators contended that the Riverside Land and Irrigating Co., which virtually owned the Riverside Canal Co., had promised water to the purchasers of its land at a cost equal to the operation and maintenance cost of the canal system, and that the canal company was not entitled to revenue in excess of operation and maintenance costs. Also, the irrigators contended that no limits were set on the amount of water stock the canal company could sell or on the quantity of water it could deliver. They questioned that an adequate water supply was available to honor the commitments that had been made by the canal company.

Several citizens meetings were held to consider matters related to the increasing conflict. As a result of the meetings, the Citizens Water Co. organized and incorporated in December 1882. The company would represent the irrigators in dealing with the Riverside Canal Co. As another result of the controversy, the Satterwhite Bill was introduced in the legislature and became State law. Under that law water companies were compelled to furnish water to all customers at the same price rate, and after once supplying a customer the company was required to continue to furnish him water. The irrigators in the Riverside area immediately availed themselves of the provisions of that law.

Actually, the Riverside Canal Co. was in difficulty. Company expenses exceeded receipts, and the company allowed its canals to deteriorate, with the result that considerable quantities of water were lost in transit. This significant water loss, occurring during the dry seasons of 1881-83, resulted in an insufficient supply of water for the irrigators to maintain their orchards and vineyards. A slump in land values followed in the Riverside area, although elsewhere land values were booming. In July 1883 the Citizens Water Co., as a result of the depression and uncertainty concerning the future, initiated a move among the citizens for incorporation of the city of Riverside. In September an election was held and the incorporation proposition was approved.

Prior to the incorporation of the city of Riverside, the Riverside Canal Co. had offered to sell its canal system and water rights to the Citizens Water Co., but no agreement could be reached on the sale price and the canal company withdrew its offer. After the incorporation of the city many citizens viewed the proposal of the Riverside Canal Co. more favorably. They felt that their interests were deteriorating under the existing system, but that sufficient water for their present needs, and even for the irrigation of additional acreage, could be made available if the canals were rebuilt or improved and properly managed. They further believed that proper management of the holdings of the Riverside Canal Co. could be the basis for a profitable enterprise.

The conflict between the opposing interests was not lessened when a suit was filed by the Riverside Canal Co. against the Citizens Water Co., the board of supervisors of San Bernardino County (present-day Riverside County was part of San Bernardino County until March 1893), the board of trustees of the city of Riverside, the city of Riverside, and the individuals comprising the separate boards. The complaint stated that the defendants were depriving the Riverside Canal Co. of a fair return on its investment by fixing or procuring water rates that were too low.

By the autumn of 1884 the general conflict had not yet been resolved and development of the Riverside area was practically at a standstill. To remedy this situation, L. M. Holt proposed a compromise measure to serve as a basis for the sale of the property of the Riverside Canal Co. to the citizens, who would organize as a new water company. The compromise was accepted by the three groups concerned--the Riverside Canal Co., the Riverside Land and Irrigating Co., and the Citizens Water Co. A provisional agreement was ratified at a meeting of the citizens of Riverside in October 1884. The Riverside Water Co. was incorporated November 21, 1885, with a capital stock of $240,000 represented by 24,000 shares of stock. The new company would

acquire, hold, or transfer water rights, canals, and other interests, and do everything necessary for managing the water interests of the community of Riverside. The stock was issued only to owners of specified lands at the rate of two shares per acre and could not be separated from the title to the land.

The purchase agreement included the issuance of stock for 6,000 acres of land irrigated or sold by the Riverside Land and Irrigating Co., and for several thousand acres not irrigated at the time. The terms of the agreement also stated that if sufficient water were available after the irrigation of the first 6,000 acres was provided for, water stock could be sold for the irrigation of an additional 6,000 acres of land formerly owned by the Riverside Land and Irrigating Co. By the terms of the sale, the water property was transferred to a newly organized company called the Riverside Land Co. The Riverside Water Co. held half the stock of the new company, and Evans and Felton owned the other half.

After accepting all water properties and interests transferred by the Riverside Canal Co. and by the Riverside Land and Irrigation Co., and after accepting the half-interest in 6,000 acres transferred to the Riverside Land Co., the Riverside Water Co. purchased the Evans and Felton interest for $70,120 in 20-year 6-percent bonds. The Riverside Water Co. also agreed to take the stock of other holders of water rights in the Riverside Canal Co. at the rate of two shares for one. Before long the irrigating landowners of the community of Riverside, by virtue of their ownership of Riverside Water Co. stock, became complete owners of all the water property in the community.

Not only did the Riverside Water Co. rapidly consolidate water rights in the area, but it also proceeded with its charge to improve the water supply of the area. The Riverside Upper Canal was extended to Hughes Alley, and in 1886 construction began on the Riverside-Warm Creek Canal (fig. 26). The latter canal had its intake on Warm Creek a short distance upstream from the junction of Warm Creek and the Santa Ana River and about 500 feet upstream from the Southern Pacific railroad bridge. That diversion supplemented the diversion from the Santa Ana River and was necessary to reduce the seepage losses that occurred in the streambed of the Santa Ana River downstream from Warm Creek.

The Riverside-Warm Creek Canal followed the line of the old Meeks Mill Canal, using the mill drop to develop power. Below the old mill the water was carried across the Santa Ana River in a flume 6,412 feet long (replaced with an inverted siphon in 1943) (figs. 30, 31, and 32). From the end of the flume the water was carried in tunnels and in an open canal across the Highgrove mesa to join the original Riverside Upper Canal near La Cadena Drive and Spring Street. A drop of 40 feet was used to develop power for the towns of Riverside and Colton. Although water from the Riverside-Warm Creek Canal above the powerplant could have been used to serve a large area on the Riverside mesa, none was diverted for that purpose until after the water had entered the Riverside Upper Canal. After completion of the Riverside-Warm Creek Canal, flow in the Riverside Upper Canal was turned into the Riverside Lower Canal, thereby conserving water that otherwise would have been lost by seepage into the riverbed before reaching the lower canal intake.

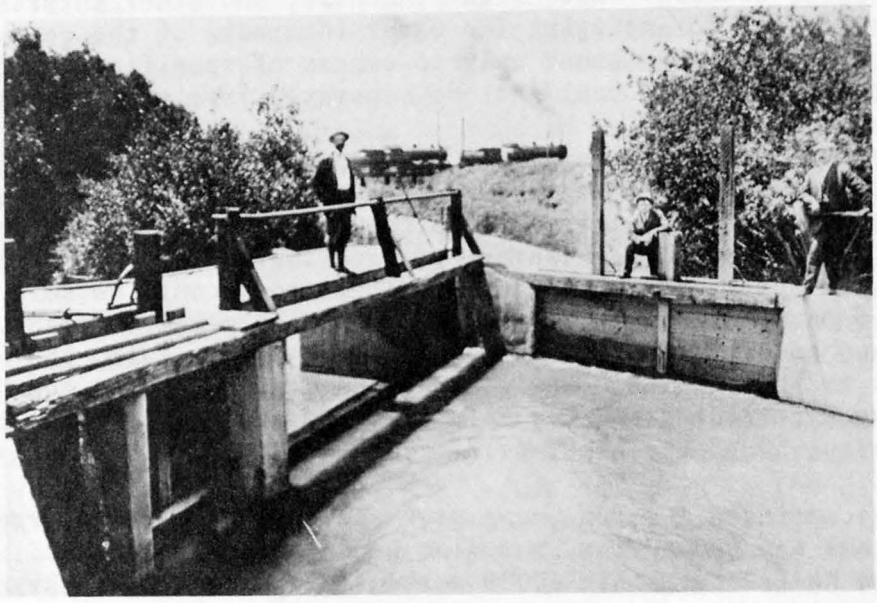


FIGURE 30.--Intake of Riverside-Warm Creek flume, built in 1886. (Photographed prior to 1916; courtesy of city of Riverside.)

FIGURE 31.--Riverside-Warm Creek flume across Santa Ana River (length, 6,412 feet); used 1886-1944. (Courtesy of city of Riverside.)

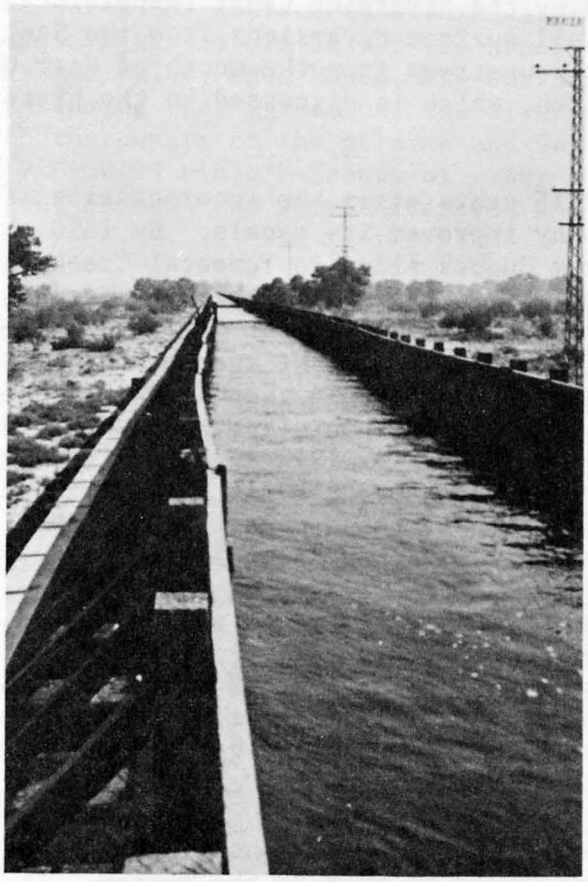


FIGURE 32.--Riverside-Warm Creek flume. (Courtesy of city of Riverside.)

At about the time that construction started on the Riverside-Warm Creek Canal, the Riverside Water Co. began purchasing parcels of land and water rights along Warm Creek. These purchases of water rights and their effects on the operations of the other diverters of Warm Creek water were discussed throughout the history of the development of Warm Creek (p. 51-72).

As mentioned earlier (p. 61-65) water rights to the flow of Warm Creek and the Santa Ana River near their junction were established in the agreements of 1887 between the Riverside Water Co. and the owners of the water rights of the Meeks and Daley, Agua Mansa, San Salvador, and Jaramillo ditches. As a result of these agreements the only remaining diversion immediately downstream from the mouth of Warm Creek was the Belarde and Salazar ditch. The Riverside Water Co. recognized the prior right of that ditch and agreed to allow sufficient water to pass its Warm Creek heading so that 75 to 100 miner's inches of water would be available at the Belarde and Salazar ditch heading. To reduce the channel seepage losses upstream from that ditch heading, the Riverside Water Co. agreed, some time prior to 1902, to deliver the Belarde and Salazar water to the North Riverside and Jurupa Canal at the point where

that canal is crossed by the Riverside Canal (Lippincott, 1902a, p. 27). That agreement eliminated all surface diversions from the Santa Ana River for a considerable distance downstream from the mouth of Warm Creek, except for the Jurupa or Rubidoux ditch, which is discussed in the history of that ditch (p. 82-84).

During the first 15 years after the incorporation of the Riverside Water Co. in 1885, the company improved its canals. By 1890 the Riverside Lower Canal was extended from Hughes Alley to Temescal Creek where it terminated (fig. 26). For several years the natural flow in Warm Creek had been supplemented by the flow of artesian wells drilled in the basin upstream from the Bunker Hill dike (p. 51). After the agreements of 1887, surface diversions from the Santa Ana River in the Riverside Upper and Lower Canals were almost entirely eliminated; such diversions were made only when there was considerable flow in the river. By 1912 surface diversions had entirely ceased. In that year, a pipeline was built from the Riverside-Warm Creek Canal (currently called the Riverside Canal) to the Trujillo system (fig. 15) to satisfy the Trujillo agreement (p. 81-82).

The Riverside Lower Canal was used as a part of the distribution system of the Riverside Upper Canal after 1912. In 1913 the upper canal was deeded to the city of Riverside for use as a storm drain, and no deliveries were made from it upstream from Hughes Alley (fig. 26). By an agreement made in that same year, the city of Riverside was also granted the right to use parts of the upper canal as a storm drain, and the canal has been so used through 1967.

The city of Riverside purchased the holdings of the Riverside Water Co. in May 1961 and has continued to operate the system. In 1967 the system, as shown in figure 15, consisted of open canals, inverted siphons, and closed conduits. Water was supplied exclusively from ground-water sources, about 60 percent of it for agricultural use and 40 percent for domestic use.

Salazar Water Company

The Belarde and Salazar ditch (fig. 25) was approved by the water commissioners in 1875, and named after the two owners listed in the petition to the commissioners (Hall, 1888, p. 267). In the petition no specified quantity of water was claimed, but later the irrigators claimed half the flow in the river. This diversion was made at a brush-and-sand dam in the Santa Ana River that was replaced after the high-water season of each year. The diversion ditch had a capacity of 75 to 100 miner's inches. The upper end of the ditch was dug through porous soil, but the rest of the ditch was less permeable. The ditch ran along the base of a bluff, passed under the flume of the Riverside Water Co.'s canal from Warm Creek and under the Atchison, Topeka and Santa Fe railroad trestle. Water from the ditch irrigated about 55 acres of alfalfa and summer crops near the railroad.

When the Riverside Water Co. decided to divert water directly from Warm Creek, it made the necessary agreements in 1887 to honor the water rights of the owners of the Meeks and Daley, Agua Mansa, San Salvador, and Jaramillo ditches (p. 61-65). Following that agreement, the Riverside Water Co. made similar agreements with the owners of the Belarde and Salazar ditch, assuring them a firm supply of 75 to 100 miner's inches of water at the ditch heading, which was later delivered through the North Riverside and Jurupa Canal (p. 79-80).

The owners of the Belarde and Salazar ditch incorporated as the Salazar Water Co. in April 1905, and issued one share of stock for each right to 1 miner's inch of water. In 1950 the city of Riverside began buying stock in the company. By 1959 the city had purchased 63½ shares and the corresponding 63½ miner's inches of water was delivered to the city (oral commun., city of Riverside, 1967).

In 1967 the city of Riverside was still receiving 63½ miner's inches of water. The remaining 11½ miner's inches were being delivered to other stockholders of the Salazar Water Co. through the canal of the West Riverside Canal Co. that was first called the North Riverside ditch, then later called the North Riverside and Jurupa Canal, and is now called the West Riverside Canal (fig. 26).

Trujillo Water Company

After the flood of 1862, which destroyed the Agua Mansa settlement (p. 70), some of the settlers moved across the Santa Ana River opposite the downstream part of the original settlement and southwest of the La Loma Hills. The new settlement was known as Spanishtown. The Mexican settlers built the Trujillo ditch, which probably diverted flow from the river opposite the point of the hill and continued south, as shown in figure 26 (Hall, 1888, p. 295).

In 1874 when construction started on the Riverside Lower Canal, the New England Colony, which had made no preliminary survey (p. 74), found that its proposed canal route closely followed the Trujillo ditch. The owners of the Trujillo ditch at first refused to allow construction of the Riverside Lower Canal across their property. By a later compromise they agreed to permit the canal construction, and in return their ditch would receive its water from the Riverside Lower Canal (Hall, 1888, p. 295).

In May 1879 the Trujillo ditch carried a flow of about 200 miner's inches for the irrigation of 200 acres of summer crops and alfalfa. By court decree in 1884 the ditch was given entitlement to a continuous flow of 100 miner's inches from the Riverside Lower Canal--only half the flow received in 1879. The owners of Trujillo water rights incorporated under the name of the Trujillo Water Co. in September 1910 (oral commun., city of Riverside, 1967).

In 1912 the Riverside Water Co. built the pipeline, shown in figure 15, from the Riverside Canal to the Trujillo water system. Water has been delivered by the pipeline since that date. The acreage presently irrigated has declined to only a small percentage of that irrigated in the late 1880's (oral commun., city of Riverside, 1967).

Diversions between Warm Creek and Van Buren Avenue

The Jurupa Rancho (fig. 3) extending from Colton to Corona, primarily along the north side of the Santa Ana River, included a large fertile area that lacked only an irrigation supply to become agriculturally productive. Part of the grant adjacent to the river was bought by B. D. Wilson who later sold it to Louis Rubidoux. A large part of the irrigable land was within the Rubidoux area; its development resulted from the establishment of two major canal systems and several small privately owned ditches.

Jurupa Water Company

In late 1842 or early 1843, B. D. Wilson purchased part of the Jurupa Rancho from Don Juan Bandini. Wilson lived on the property until he sold it to Louis Rubidoux in 1847 (Patterson, 1964, p. 20). Rubidoux built his home on what is now the north side of Mission Boulevard, east of Rubidoux Boulevard (fig. 26), and lived there until his death in 1868. That part of the original rancho is now known as Jurupa (Rubidoux). Wilson had built a ditch to his land from the Santa Ana River during the years 1843-45 (Hall, 1888, p. 294). The exact location of the ditch is not known, but considering the location of the Rubidoux home and grist mill (near the present intersection of Rubidoux and Mission Boulevards), the ditch probably followed the course shown in figure 26 for the Jurupa or Rubidoux ditch. In recent years, when a field some distance south of the grist mill was plowed, evidence of the old ditch was found (oral commun., Judge D. L. Schroeder, 1967).

The Jurupa ditch diverted flow from the west side of the Santa Ana River, at a brush-and-sand dam a short distance north of the Riverside-San Bernardino County line. Its period of use is not known exactly, but the ditch was used at least intermittently prior to the death of Rubidoux in 1868.

New settlers, some from the Agua Mansa settlement, moved into the Rubidoux area (oral commun., O. G. Jensen, 1967). They improved the ditch in 1869, relocated it at approximately its present site (Hall, 1888, p. 294), and began irrigating a fairly large acreage in the Rubidoux area (fig. 33). In 1880, 12 owners of the ditch held 953 acres of irrigable land but irrigated only 446 acres that were occupied by orchards, vineyards, and alfalfa fields. In 1885, 19 owners irrigated about 500 acres that grew citrus and deciduous fruits, grapes, alfalfa, and summer crops. The ditch had a capacity that ranged from 250 to 750 miner's inches, depending on its condition.

FIGURE 33.--Jurupa ditch south of Wilson Street, probably first built between 1843 and 1845; rehabilitated in 1869 and now used by the Jurupa Water Company.

In 1883, the ditch owners claimed 700 miner's inches of water at their ditch heading (Hall, 1888, p. 293). At that time, however, upstream diversions of the Riverside Canal Co. were such that a continuous flow of only 300 miner's inches was available at the Jurupa ditch heading. A suit was filed against the canal company to compel that company to allow as much as 700 miner's inches to pass its headworks. The suit was compromised, and the Riverside Canal Co. acknowledged a prior right of 300 miner's inches at the Jurupa ditch heading.

In January 1902, the owners of the Jurupa ditch incorporated as the Jurupa Ditch Co. with a capital stock of 384 shares (oral commun., Judge D. L. Schroeder, 1967). At about that time, however, the Riverside Water Co., successor to the Riverside Canal Co., was finding it wasteful of water to guarantee a continuous river flow of 300 miner's inches at the Jurupa ditch heading. Because of seepage losses in the river channel upstream from that heading, it was necessary for the Riverside Water Co. to permit flow in excess of 300 miner's inches to pass the company's diversion sites. To salvage the excess flow, the Riverside Water Co., in 1904, agreed to drill a well or wells near the Jurupa ditch heading and use ground water to fulfill, at least in part, its guarantee of water to the Jurupa ditch. The agreement stated that as much of the 300 miner's inches as possible must be made by diversion from the river, and that any deficiency would be supplied by well water. By 1930 all water was supplied from wells near the Santa Ana River, east of the Agua Mansa Road and north of Wilson Street (oral commun., Judge D. L. Schroeder, 1967).

The Jurupa Ditch Co. was succeeded by the Jurupa Water Co., which incorporated in 1909.

The wells and the alinement of the Jurupa ditch in 1967 are shown in figure 15. Water from the wells flows in an open ditch for a short distance, then in a closed conduit to the Evans Turbine Drop, where power can be developed. From that point water flows in an open ditch to the end of the system. In 1967 between 250 and 300 acres of pasture, alfalfa, and garden crops were being irrigated (oral commun., Judge D. L. Schroeder, 1967).

West Riverside Canal Company

The North Riverside Land and Water Co. was organized to develop a water supply for about 900 acres of the Rubidoux Rancho north of the Jurupa ditch. The company was incorporated in August 1887 with a capital stock of $50,000 divided into 5,000 shares (Hall, 1888, p. 291). The North Riverside Land and Water Co. purchased a one-third interest in the Agua Mansa ditch in that same year. That purchase entitled the company to 83-1/3 miner's inches from Warm Creek (p. 70). By the following year, 1888, the company had sold 400 acres of land, including water rights for 80 miner's inches, at the rate of 1 miner's inch for each 5 acres.

To develop additional water supply, the company at about that same time purchased land east of the Santa Fe railroad between the Santa Ana River and the Riverside Mesa (Grand Terrace, fig. 26), including the Peter Peters and Warren sloughs (not shown in fig. 26). A main ditch, 12 feet deep, was dug through the wet land. In the ditch was placed a wooden flume that was 3 feet wide, 5 feet deep, and open on the bottom. Three laterals leading into the main flume were also built. From the end of the flume a ditch was built, which in 1887 was known as the North Riverside ditch, and later in 1899 as the North Riverside and Jurupa Canal. The ditch followed along the base of a bluff, crossed over the Riverside Upper Canal, and then crossed the Santa Ana River in a flume supported on a trestle. From the north side of the river the ditch continued southwest, as shown in figure 26. The system consisted of open ditches, flumes, and tunnels (fig. 34). The open ditches were lined with concrete in 1900.

The Jurupa Land and Water Co., which was controlled by the owners of the North Riverside Land and Water Co., was incorporated in May 1888 with a capital stock of $3.5 million (Hall, 1888, p. 291). The company contracted with the Stearns Rancho syndicate to purchase about 26,000 acres of unimproved land in the Jurupa Rancho. That purchase gave the Jurupa Land and Water Co. control of a large acreage adjacent to the Santa Ana River, and the land held riparian rights in accordance with the terms of the original Jurupa land grant. Two companies, the North Riverside Land and Water Co. and the Vivienda Water Co., agreed to supply the Jurupa Land and Water Co. with all the water the two companies could develop in excess of their prior commitments.

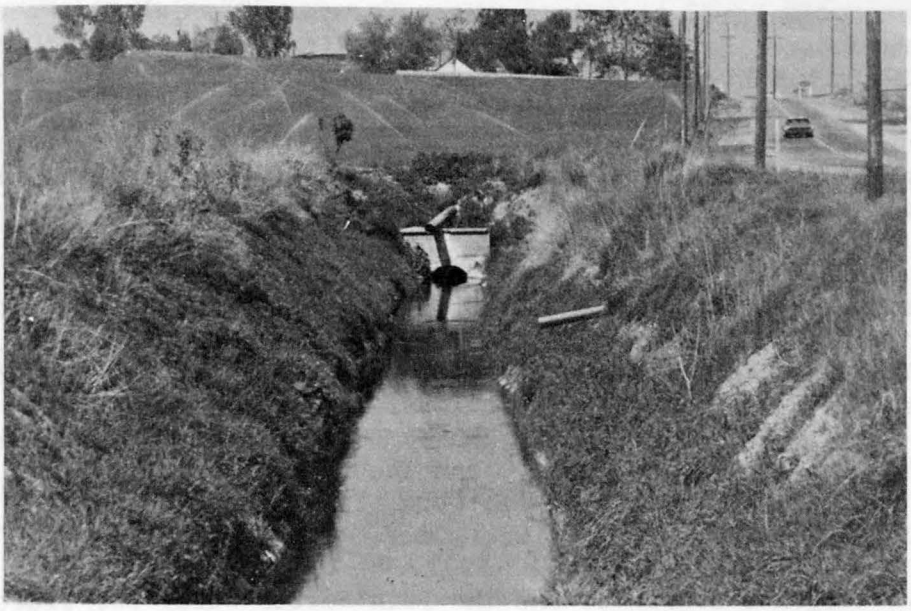


FIGURE 34.--Downstream end of West Riverside Canal Company tunnel (length, 4,000 feet) along Agua Mansa Road, west of Riverside Avenue.

In July 1892 a connecting ditch was built between the North Riverside and Jurupa Canal and the Agua Mansa Canal (p. 160 and fig. 26), making it possible to deliver water from Warm Creek to the area served in West Riverside. In 1897 the North Riverside and Jurupa Canal carried 350 miner's inches of Agua Mansa water, 75 miner's inches of Salazar water (p. 194), and 350 miner's inches of water from the development at the head of the canal (Lippincott, 1902a, p. 28). The canal, at first, delivered water to individual land owners, and later to organized companies. The original owners of the ditch were assessed, on a miner's inch basis, for the operating expenses of the ditch. Owners of Agua Mansa and other rights, who had their water transported in the North Riverside and Jurupa Canal, paid a carrying charge in 1897 on a miner's inch per year basis.

C. W. Rogers, owner of the Rogers Development Co., purchased a part of the Stearns Rancho holdings in the early 1900's and took over the operation of the North Riverside and Jurupa Canal system. The owners of water rights using the canal continued to pay a carrying charge for delivery of their water. The Rogers Development Co. operated the canal as a carrier until January 27, 1916, when a flood destroyed the flume across the Santa Ana River (written commun., West Riverside Canal Co., 1967).

Later that same year, on June 21, 1916, the West Riverside Canal Co. was incorporated with a capital stock of $100,000 divided into 2,000 shares. The new company purchased the canal system, changed the name of the canal to West Riverside Canal, and continued as a water-carrying agency. At that time the

canal was used to transport water from its origin to the appropriate service area for five companies: Agua Mansa Water Co. (p. 70); Salazar Water Co. (p. 81); Jurupa Water Co. (p. 82); La Sierra Water Co. (fig. 27); and West Riverside 350 Inch Water Co. The last-named company was incorporated in 1899 by the owners of water rights to the first 350 miner's inches sold by the North Riverside Land and Water Co. The Salazar and Jurupa companies owned carrying rights in the West Riverside Canal, whereas the carrying rights for the Agua Mansa and La Sierra companies were owned by individuals in those companies.

A sixth company, the Twin Buttes Water Co., comes into the picture after 1917. The company was organized that year by W. T. Hole and others. The company built a pipeline from the end of lateral No. 2 of the West Riverside Canal, across the Santa Ana River to a small reservoir (fig. 26). Water from this system irrigated land in the La Sierra area. The city of Riverside purchased the rights of this company, and the company was dissolved on January 25, 1967. However, deliveries were still being made to the system in 1967 (oral commun., city of Riverside, 1967).

The five original companies and the Twin Buttes Water Co. (later, the city of Riverside) were delivering water through the West Riverside Canal in 1967 (oral commun., West Riverside Canal Co., 1967). The source of water was ground water pumped into the canal from wells shown in figure 27.

Small Ditches near Riverside

Several small ditches were built near Riverside during the late 1870's (Hall, 1888, p. 296). They diverted water from the Santa Ana River at brush-and-sand dams that were destroyed each year by moderate rises in the river. Water was carried in the ditches to irrigate bottom land adjacent to the river. Little information is available concerning the dates of construction and use of the ditches, but most of the ditches were probably abandoned by 1910 when the Riverside Water Co. was diverting all the flow at its canal headings. If any of the ditches were still in use in 1916, the flood of that year probably destroyed their upper reaches.

The Evans ditch was not described in Hall's report and may not have been in use at that time, but it is shown on a map prepared about 1890, and is also shown by Mendenhall (1905, pl. XII). A ditch in about the same location is shown by Adams (1913, pl. XVII), but Adams refers to it as the Pellisier ditch. That ditch, like the other small ditches, was probably abandoned when the flow of the river was insufficient for irrigation.

The intake to the Linville ditch was on the west side of the river about 1½ to 2 miles downstream from the Jurupa ditch intake. In 1880 the ditch was owned by three irrigators, who were also Jurupa ditch stockholders (Hall, 1888, p. 296). The probable capacity of the ditch was 100 miner's inches, and the water irrigated about 75 acres of summer crops and alfalfa.

The Soucal ditch also diverted water from the west side of the river. In May 1879 about 125 miner's inches of water irrigated 75 to 100 acres of land (Hall, 1888, p. 296). Little change in diversion or use occurred between 1879 and 1888. Adams (1913, pl. XVII) showed a ditch in operation in 1912 at about the same location as the Soucal ditch, but Adams referred to it as the New ditch.

The Hall ditch diverted from the east side of the river near Rubidoux Mountain (fig. 26). In 1880 the ditch had a capacity of about 50 miner's inches, and the water irrigated about 100 acres of bottomland at the edge of the Riverside Mesa. This ditch was shown in Adams' report (1913, pl. XVII).

In 1882 the Santa Ana River split into two channels, creating an island whose upstream end was about three-quarters of a mile upstream from Rubidoux Mountain (Hall, 1888, p. 296). The maximum width of the island was about three-quarters of a mile. In that year three of the Jurupa ditch owners irrigated about 125 acres on the island from a ditch that diverted from an old river channel opposite Riverside. The location of the ditch is not known, but it was still in use in 1886 and irrigated about the same acreage as in 1882.

Riverside Power Company

A group of businessmen in the Riverside area organized and incorporated the Riverside Power Co. in April 1901 (Fowler, 1923, p. 550). Soon after incorporating, the company acquired a right to divert water from the Santa Ana River near the upper end of Riverside Narrows (fig. 26) to develop hydroelectric power for use in the Riverside area. The construction of the canal and powerhouse was under the direction of W. E. Pedley. The diversion from the river was made at a dam of tongue-and-groove sheet piling driven into the streambed. Water was diverted into a concrete-lined canal on the south side of the river near the Union Pacific railroad bridge. The canal (fig. 35) followed the south bank of the river for about 6 miles, in the course of which it passed through two short tunnels near its lower end at the Pedley powerhouse. The capacity of the canal was 100 cubic feet per second. The water that was diverted returned to the river from the powerhouse tailrace.

The system was completed in 1904 and power was delivered to the Riverside area in that year (Fowler, 1923, p. 550). The venture, however, was unsuccessful and the power company went into the hands of a receiver. In 1906 the assets of the company were bought by the Pacific Light and Power Co., which began operating the powerplant in June of the same year. However, the headworks of the canal were destroyed by the flood of January 1916, and that ended power development in Riverside Narrows. In May 1917 the Southern California Edison Co. purchased all properties of the Pacific Light and Power Co., including franchises, land, canal, and powerplant. To protect its water rights in the Santa Ana River, the Santa Ana River Development Co., in March 1943, purchased the holdings of the Southern California Edison Co. (written commun., Anaheim Public Library, 1967).

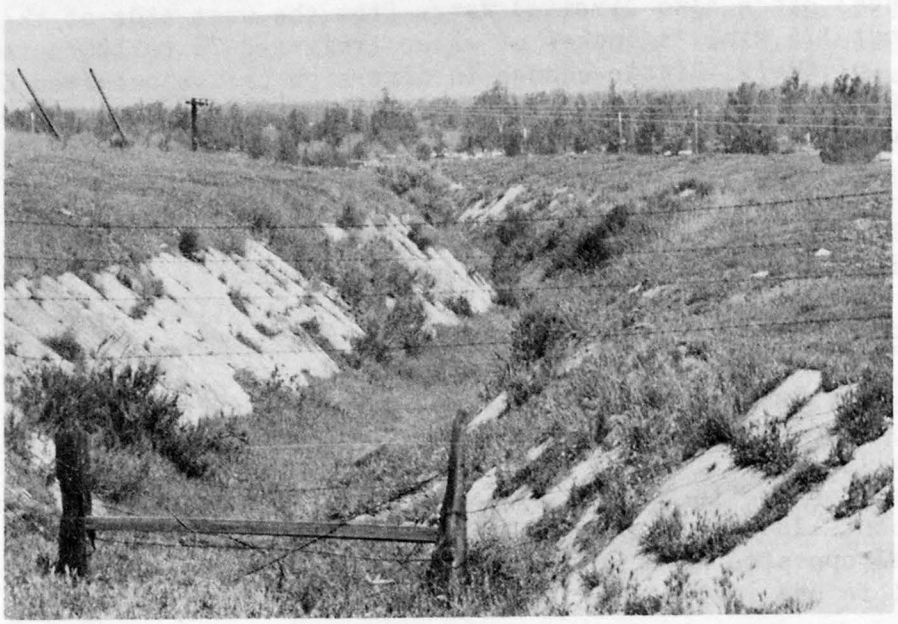


FIGURE 35.--Riverside Power Company canal, west of Pedley Substation Road; used 1904-16.

Diversions between Van Buren Avenue and the Orange-Riverside County Line

This section of the report describes several small irrigation ditches that were in operation at various times, between Van Buren Avenue and the Orange-Riverside County line.

Castillo ditch diverted flow from the south side of the Santa Ana River (fig. 26). The ditch was known to be in use only in 1886 (Hall, 1888, Riverside Sheet) and in 1912 (Adams, 1913, pl. XVIII). Neither Hall nor Adams discussed the ditch in his report.

The Newton ditch, known in recent years as the J ditch (fig. 26), was built in 1894. In February of that year L. Newton purchased 35 acres on the north side of the Santa Ana River, west of Etiwanda Avenue. His deed to the land granted him the right to use one-half the flow in the river, and also gave him the right to build a ditch across the adjacent land. Newton built the ditch and diverted water to his property. In the following years successive sales of land adjacent to the Newton property granted the owners various rights to transport water in the Newton ditch. Those rights apparently became limited to 120 miner's inches by the terms of a deed dated April 10, 1902 (written commun., W. P. Rowe and Son, 1967). The ownership of the original Newton property changed several times and the property finally

became a part of the Edison tract that was purchased by the Santa Ana River Development Co. in 1943. Water from the ditch continued to irrigate pasture and garden crops in the bottom land between the bluff and the river. Although the river has shifted its course through the years, the ditch has been maintained to divert water for the irrigation of those crops. The ditch was in use in 1967 (oral commun., Anaheim Union Water Co., 1967).

The Fuller ditch (fig. 26), built in 1892 or 1893, diverted flow from the north side of the Santa Ana River and followed along a bluff to the Auburndale bridge (written commun., Anaheim Union Water Co., 1967). This ditch was shown on plate XVII of the Adams' report (1913) but was not listed in his table of diversions. The irrigated area served by the Fuller ditch lay adjacent to River Road between Archibald and Hallman Avenues. In 1900 the ditch, which was trapezoidal in cross section, had a top width of 11 feet, a bottom width of 7 feet, and a capacity of 200-225 miner's inches. Ditch diversions ceased in January 1907 as a result of a lawsuit filed against the ditch owners by the Anaheim Union Water Co. and the Santa Ana Valley Irrigation Co. In September 1949 the Santa Ana River Development Co. purchased the land on the north side of the Santa Ana River downstream from Adams Avenue, a tract through which the Fuller ditch passed (written commun., Anaheim Public Library, 1967).

Le Gaye ditch, shown on a map by Adams (1913, pl. XVII), diverted flow from the Santa Ana River upstream from the Auburndale bridge (figs. 26 and 36). Although he mapped a single ditch, Adams (1913, p. 81) listed an upper and a lower Le Gaye ditch in his table of diversions and irrigated acreage. According to that table, 150 acres were irrigated from the upper ditch and 75 acres from the lower ditch, all of the acreage being bottom land between the base of the bluff and Rincon ditch (figs. 26 and 36). The Santa Ana River Development Co. purchased the Le Gaye tract in 1930 and terminated the use of the ditches (written commun., Anaheim Public Library, 1967).

The Rincon ditch (fig. 36), originally known as the Yorba ditch, was built in 1876 to irrigate pasture. The ditch and the area it served are within what is now the Prado flood-control basin. The diversion was made from the south side of the Santa Ana River at a brush dam (Hall, 1888, p. 297). The owners of the ditch claimed a right to 750 miner's inches of flow, but the capacity of the ditch was only about 400-500 miner's inches. The ownership of the water rights in 1888 was divided among the South Riverside Vineyard Co., the Rincon Town and Land Co., and nine individual owners (Hall, 1888, p. 297). The individual owners diverted 250 miner's inches of water to irrigate 485 acres of grapes, alfalfa, and summer crops.

In November 1900 a predecessor company of the Santa Ana River Development Co. purchased 107 acres of land and water rights owned by the South Riverside Land and Water Co. (written commun., Anaheim Public Library, 1967). In January 1930, the Santa Ana River Development Co. made a similar purchase of 192 acres of the Le Gaye tract. Those two purchases eliminated all diversions on the south side of the river between Auburndale bridge and the present Prado Dam.

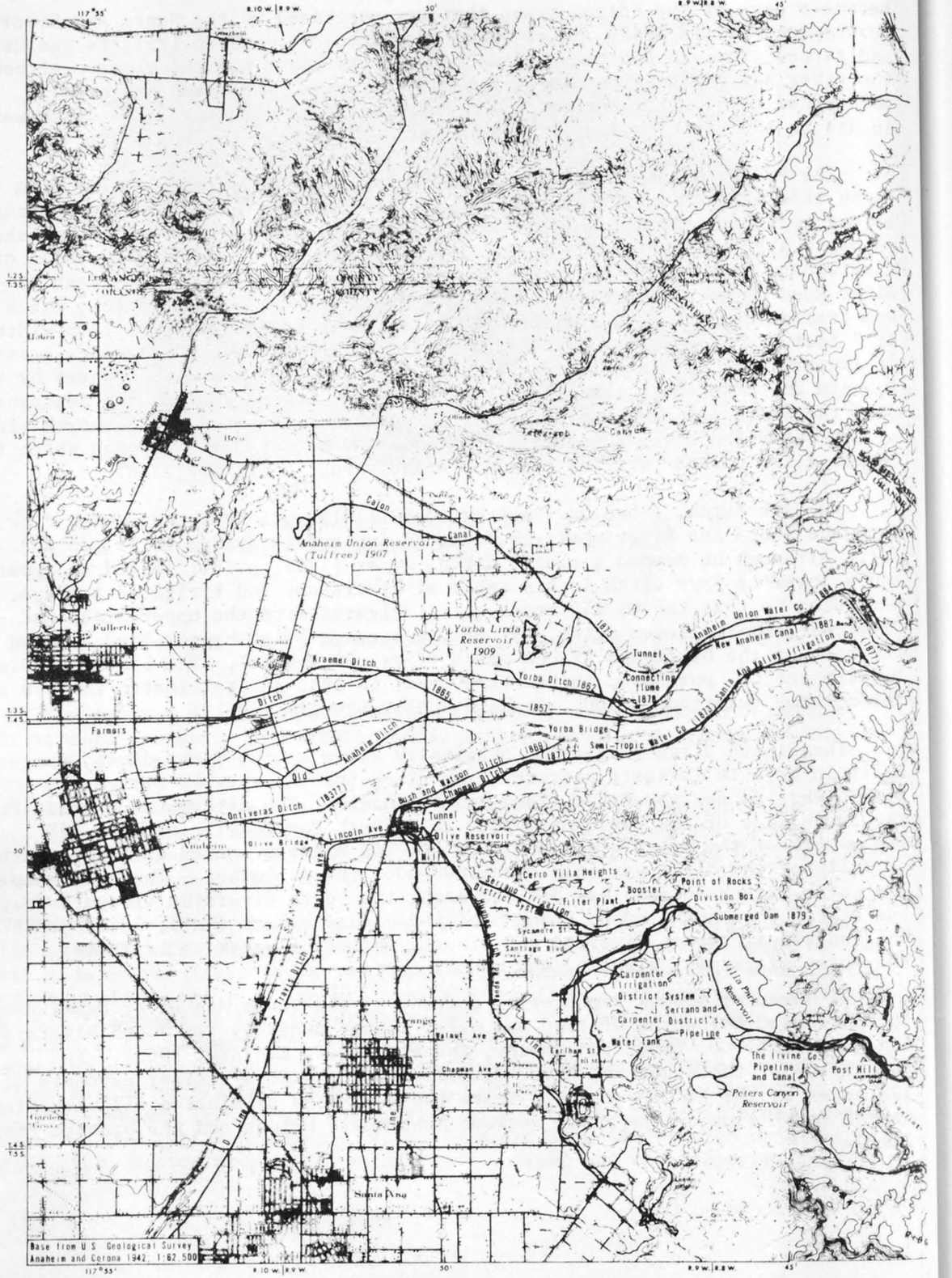


FIGURE 36.--Diversions in Chino basin and in Santa Ana Canyon.

FIGURE 36.--Continued.

The Fernandez, or Durkee, ditch (fig. 36) was built in 1870 by Captain Leonardo de Cota (Hall, 1888, p. 298). The diversion was made from the north side of the river, a short distance downstream from the Auburndale bridge, and the ditch ran along the bottom lands of the Rincon area north of the river. The ditch, which was owned equally by four persons, carried 300 miner's inches of water in 1888, although the owners claimed the right to 1,000 miner's inches. In that year the irrigated land grew deciduous fruits, grapes, alfalfa, and garden crops. In 1899 the ditch diverted 800 miner's inches of water to irrigate 1,713 acres, most of which was permanent pasture. That acreage was divided as follows among the six persons who then owned the water rights: Daniel Durkee--1,446 acres; Serrano, Aros, and Ashcroft--200 acres; Kuster--45 acres; and Bent--22 acres (written commun., Anaheim Public Library, 1967).

By 1900 the competition for water was becoming intense, because the increased use of water in the Santa Ana River basin upstream from the head of Santa Ana Canyon (present site of Prado Dam) had depleted the supply available to downstream water users. In January 1900 the Durkee property and its water rights were purchased by the Anaheim Union Water Co. and the Santa Ana Valley Irrigation Co. That purchase eliminated the major use of water from the Durkee ditch, but water was still being diverted in 1912 to irrigate about 300 acres (Adams, 1913, p. 81). In 1922 the ditch was extended upstream to a new diversion site nearly a mile upstream from the Auburndale bridge.

The Kuster property was purchased by the Anaheim Union Water Co. in 1924; the Bent property was purchased by the Santa Ana Valley Irrigation Co. in 1926. After these purchases were made, the only remaining rights in the Durkee ditch that were owned by individuals were those of Serrano, Aros, and Ashcroft. In 1930 suit was filed against those individuals by the Santa Ana River Development Co., in an effort by the company to redefine water rights, but in November 1931, before the legal aspects were settled, the company purchased these last remaining rights in the Durkee ditch (written commun., Anaheim Public Library, 1967). That purchase eliminated the last diversion from the Santa Ana River main stem between the Auburndale bridge and Prado Dam.

The Spring Valley ditch (fig. 36) formerly known as the Mayhew ditch, diverted flow from the west side of Mill Creek, a small tributary to the Santa Ana River upstream from Prado Dam. Part of the diverted water was used to irrigate an area on the west side of the creek; the unused water continued flowing in the ditch and entered the creek downstream from the diversion site. On the east bank of Mill Creek, opposite the point where Spring Valley ditch returned to the creek, water was diverted into Fugua ditch to irrigate an area on the east side of Mill Creek. In 1888, the Spring Valley ditch diverted 50-75 miner's inches of water to irrigate about 47 acres, and the Fugua ditch diverted a similar quantity to irrigate about 66 acres of orchards, vineyards, and fields of alfalfa and summer crops (Hall, 1888, p. 299). In 1912 the area irrigated by the Fugua ditch was about 200 acres (Adams, 1913, p. 81). The source of flow in Mill Creek and in Chino Creek (discussed on pages that follow) is ground-water leakage from the Chino basin, which lies northeast of the Chino Hills (fig. 36). As the water level in the Chino basin lowered through the years as a result of pumping, the leakage diminished, thereby reducing the flow in Mill and Chino Creeks.

In 1940 the U.S. Government built Prado Dam (fig. 36), a flood-control structure on the Santa Ana River, and purchased the flooding rights of about 2,300 acres from the Santa Ana River Development Co. That acreage of potential inundation comprises the flood-control basin of the dam, the diversion works, and the area irrigated by the small ditches that diverted flow from Mill and Chino Creeks. The combination of diminishing flow in the two creeks and the construction of Prado Dam probably eliminated the diversions within the Prado flood-control basin by 1940, or possibly earlier.

The Cota ditch (fig. 36) was dug in 1870 to divert water from Mill Creek. Its original capacity was about 300 miner's inches. About 44 acres of vineyards, summer crops, and alfalfa were irrigated in 1888, at which time the ditch carried about 200 miner's inches of water (Hall, 1888, p. 299). The Cota property was bought by Durkee, a purchase that probably included the Cota ditch and associated water right. Purchase of the Durkee property by the water companies terminated the use of the ditch, a contributing factor being the diminishing flow of Mill Creek at the ditch heading.

The Taylor ditch (fig. 36) was a small ditch that diverted flow from the west side of Chino Creek. In 1888 the Pasadena and Rincon Land and Water Co. and one individual diverted about 50 miner's inches of flow from Chino Creek for the irrigation of about 6 acres of alfalfa and summer crops (Hall, 1888, p. 298). As mentioned in a preceding paragraph, the diminishing flow in Chino Creek and the inclusion of the ditch and service area in the Prado flood-control basin probably caused the abandonment of the Taylor ditch.

A ditch, locally called the Dan Durkee ditch (fig. 36), was located and described by Robert W. Meredith (oral commun., 1967), a resident who lived in the vicinity for more than 70 years. The ditch diverted flow from the west side of Chino Creek, between Pine and Robles Avenues, crossed under the old Pomona-Rincon Road, and skirted along the base of the bluff to irrigate the land between the ditch and Chino Creek. The period of use of the ditch is unknown, but it probably was abandoned in 1902 as the result of a suit filed by Dan Durkee against the users (oral commun., R. W. Meredith, 1967).

There were two Scully ditches, an upper and a lower ditch, in Santa Ana Canyon (fig. 36). The upper ditch diverted flow from the south side of the river, a short distance downstream from the present Prado Dam, and followed along the bottom land to an area east of the Riverside-Orange County line. The lower ditch diverted flow from the west side of the river near the lower end of the upper ditch and supplied water to an area immediately west of the county line, between the bluff and the river. The ditches were not identified by Hall in 1888, but were known to be in use in 1900 (written commun., W. P. Rowe and Son, 1967). The lower Scully ditch was abandoned by the early 1930's (oral commun., A. O. Dominguez, 1967). By the late 1930's only parts of the lower ditch remained, but the upper ditch was still in use. The Santa Ana River Development Co. purchased major parts of the land irrigated with water from the lower ditch in 1932 and in 1948 (written commun., Anaheim Public Library, 1967). A limited quantity of water was diverted through the upper ditch as late as 1948. A short time later, ground water pumped from a nearby well was substituted for the ditch-conveyed surface water, and some time after that, cultivation of the land ceased, putting an end to the irrigation.

Diversions from Other Santa Ana River Tributaries

Upstream from Cucamonga Creek

Mill Creek Zanja

The beginnings of the Mill Creek zanja (irrigation ditch) go back to the Spanish-mission period of California history. After the establishment of the San Gabriel Mission in 1771, representatives of the mission were sent to the surrounding area to visit the Indian settlements. Father Dumetz was sent to the San Bernardino Valley in May 1810. He found an Indian settlement along the north side of the Santa Ana River, probably south of present-day Colton Avenue, between E Street and Mount Vernon Avenue. At that site he established the mission station of Politana (fig. 11). The mission station had a short and unhappy history. A major earthquake in 1812 destroyed most of the Indian shelters and mission buildings. That disaster was followed by a raid by desert Indians who massacred most of the local Indians and destroyed the remaining buildings. As a result, the fathers of the San Gabriel Mission lost interest in the Indian settlements in the San Bernardino Valley (Caballeria, 1892, p. 39).

The Guachama Indians living in the San Bernardino Valley visited the San Gabriel Mission in the years following the destruction of the Politana settlement. They observed the prosperity surrounding the mission and in 1819 requested the reestablishment of a mission in the San Bernardino Valley to give them instruction in agriculture and stock raising. The request was granted by the head of the mission, and Pedro Alvarez was sent from San Gabriel to establish the San Gabriel Mission Asistencia, southwest of Redlands (fig. 11). He built a chapel and began work on a ditch to bring water from Mill Creek to the mission grounds.

Construction of the Mill Creek zanja (fig. 37) was begun in 1819, and the first diversion was made in time for the spring planting in 1820. The diversion from Mill Creek was made at about the present site of the Southern California Edison Co.'s powerhouse No. 1 (fig. 11). A dam was built across Mill Creek and water was diverted from the left bank into a very crude ditch that was hand dug by the Guachama Indians. According to legend (Beattie, 1951, p. 42), the Indians used the shoulder blades of cattle as digging tools and carried the dirt in baskets to build up the banks of the ditch. The ditch followed along natural depressions or shallow existing channels wherever possible. Crossings over washes were made by damming the wash downstream from the ditch line to create a pond, through which the diverted water continued to the next reach of ditch. Depressions along the ditch route likewise acted as ponds through which the diverted water passed.

FIGURE 37.--Mill Creek zanja, east of Opal Street, Mentone; used for water supply from 1820 to about 1926, but now used mainly as a storm drain.

The location of the zanja is shown in figures 10 and 11. The original ditch (fig. 10) continued past the present asistencia along Mission Road, then called Cottonwood Row, as far as the residence of the overseer and the storehouse. The site of that terminus is now indicated by a historical marker on the north side of the road, about 0.4 mile southeast of Mountain View Avenue. Later, the ditch was extended northwest along Cottonwood Row to Mountain View Avenue, then west to San Timoteo Wash.

The word "zanja," Spanish for irrigation ditch, is not being used here as an affectation. That designation by the early builders of the ditch indicated that the ditch was not a natural channel leading from Mill Creek. That point later became a court issue in the establishment of water rights to the flow through the zanja.

The San Gabriel Mission Asistencia flourished during its early years. After the separation of Mexico from Spain in 1821 and the decree of secularization in 1834 (p. 9), the Mexican Government encouraged the settlement of former church property by Mexican colonies. Several members of the Lugo family, under the direction of José del Carmen Lugo, moved into the valley in 1839 and established a colony in San Bernardino, colonization being a requirement for obtaining a government land grant (Beattie, 1951, p. 44). The Lugos moved into the buildings of the San Gabriel Mission Asistencia that had been vacated by the mission people and continued the farming activities, using water from the zanja. After petitioning the Mexican governor, Lugo received a grant to the San Bernardino Rancho (fig. 3) in 1842. The grant included the lower part of the zanja, but it is questionable whether rights to Mill Creek water were specified. Although Lugo irrigated some land near his residence, his main activity was raising cattle.

José Bermudez and his wife, Maria Armenta, worked for José Lugo when they lived on the Rancho del Lugo, near the present town of Compton. When Lugo moved to the San Bernardino Rancho, Bermudez and his wife also moved and settled at the mouth of Reservoir Canyon, probably between present-day Palm and Highland Avenues, northeast of Roosevelt Road (fig. 10). To irrigate his crops of corn, grain, and grapes, Bermudez dug a connecting ditch to the zanja some time prior to 1841--probably in 1839. The point of diversion from the zanja was a short distance west of Wabash Avenue, and the connecting ditch followed a course now used by the Redlands Canal to Redlands Street--not to be confused with Redlands Avenue, a mile to the west. From Redlands Street the connecting ditch turned west for about half a mile. The ditch became known as the Maria Armenta ditch. The period of its use is not known, but by 1844 Bermudez and his wife had moved to San Timoteo Canyon (Beattie and Beattie, 1939, p. 44-67), where they played a part in the history of the lower Yucaipa ditch (p. 102).

After the annexation of California by the United States in 1848, Americans began to move to California--some of them into the San Bernardino Valley. When a group of Mormon settlers under the leadership of Lyman and Rich offered to buy the San Bernardino Rancho in 1851, Lugo sold it to them (p. 9) and moved to Los Angeles. The Mormons began to farm that part of the rancho north of the Santa Ana River. In 1852 another group of Mormons under Bishop Tenney settled south of the river (p. 12) on the part of the rancho formerly occupied by the Lugos. During their first few years there, they probably used only a small quantity of water from the zanja to irrigate their orchards and vineyards, because those years were unusually wet ones--the grain crop probably required no irrigation.

In Bishop Tenney's settlement, which became known as Old San Bernardino, lived a non-Mormon, Lewis F. Cram, and his two brothers. They were given permission to farm the land and use water from the zanja in return for their labor in improving the ditch. In 1857 the head of the Mormon Church in Salt Lake City called the Mormons in the San Bernardino Valley back to Utah. Many responded and sold their property, which they had originally purchased from Lyman and Rich. Early in 1858 Lyman and Rich sold the remaining part of the rancho to four individuals: Conn, Carpenter, Willis, and Crafts (Beattie, 1951, p. 48). Conn's purchase was the 320 acres of land along the zanja, on which the Crams had built a house and did their farming. The Crams in turn sold their house and their right to use zanja water to Carpenter. This may have been the first sale of a water right separate from the land. Carpenter then purchased from Conn the 320 acres formerly occupied by the Crams. That eliminated Conn from the picture. Willis' purchase of 160 acres adjoined Carpenter's property on the west; Crafts' purchase of 466 acres adjoined Carpenter's property on the east. All this property was served by the zanja.

During that period much of the land in Old San Bernardino was sold to non-Mormons, but the deeds made no mention of water rights. That was also true of the deed transferring Conn's land to Carpenter. The adjoining properties of Carpenter, Willis, and Crafts, which were near Crafton, became known at this time as the Upper Settlement, as distinguished from the area near the asistencia which became known as the Lower Settlement.

Although the Lower Settlement denied the Crafts and Willis right to zanja water, the county water commissioners, in 1859, approved, in writing, an allotment of water for the Carpenter ranch for the irrigation of 135 acres. That allotment was for 75, 35, and 25 acres that Carpenter, Crafts, and Willis, respectively, proposed to irrigate that year. The written ruling of approval by the commissioners was possibly the only one written prior to 1864, after which time written rulings were made a requirement (Beattie, 1951, p. 49).

In 1861 an arrangement, if not a completely signed agreement, concerning water use became effective. The Lower Settlement acknowledged the right of the Upper Settlement to some water and proposed that Carpenter draw as much zanja water as needed by the Upper Settlement, but only between the hours of 3 p.m. and 9 p.m. (Beattie, 1951, p. 50). An agreement to that effect was drawn up; it was signed by water users in the Lower Settlement but not by Carpenter. However, Carpenter and the others complied with the terms of the agreement. What made the arrangement mutually satisfactory was the fact that the zanja between the two settlements was of such length that water released from the Upper Settlement at 9 p.m. would not reach the Lower Settlement before daylight, and thus neither settlement had to resort to night irrigation to keep from interfering with the other's use of water.

To this agreement another feature was added some time prior to 1864 (Beattie, 1951, p. 51); the water users in the Upper Settlement would maintain the ditch from its head to the lower end of the Willis property, and the Lower Settlement would maintain the ditch from there to its lower end. The only exception to this plan would occur when a major flood shut off water from all the users.

Myron Crafts, one of the three land owners in the Upper Settlement, was an aggressive individual who expanded his agricultural activities. He therefore required more water, which he proceeded to take from the zanja. Dr. Benjamin Barton and others in the Lower Settlement filed a suit in the district court against Crafts and Willis in September 1864. Barton's claim was that Crafts and Willis had no right to Mill Creek water and that they should be restrained from using it. The court ruling restricted Crafts' and Willis' use of the zanja water to the hours of 3 p.m. to 9 p.m. This was a recognition of the Carpenter agreement of 1861, which had been in practice since that date. After this ruling the water commission issued an order in 1867 giving Crafts all the water in the zanja every 6 days (sixth day?) between 3 p.m. and 9 p.m. That was the first recognition of Crafts' right by the commission (Beattie, 1951, p. 52).

Several more water suits were filed in court, all concerned with the zanja water rights, and Crafts was involved in most of them. In one suit Crafts claimed that the zanja was a natural stream. Because he owned land through which the zanja flowed, Crafts claimed the riparian right to one-half the water, which he proceeded to use regardless of time of day. This suit was carried to the State Supreme Court and the final decision, rendered in July 1878, affirmed that the zanja was not a natural channel of Mill Creek. This ruling destroyed any claim to riparian rights in the zanja (Beattie, 1951, p. 54). The decision so clearly defined the rights of the various persons involved with zanja water that very little litigation concerning zanja water rights has arisen since 1878.

A major change occurred in the operation of the Mill Creek zanja in the 1880's. For the 60 years of its history prior to 1880, the zanja had been a very crude ditch, easily destroyed, and subject to excessive seepage losses. During those first 60 years, only minor improvements had been made to the ditch. Furthermore the limiting of irrigation to daylight hours was wasteful of water that ran continuously through the ditch. In the 1880's the garden and field crops that formerly were irrigated were being replaced by orchards that required longer and more frequent irrigation. The agreement of 1861 giving Carpenter and others the right to use all the water from 3 p.m. to 9 p.m., and later the use of water every sixth day, could not be adapted to the development of citrus orchards (Beattie, 1951, p. 55).

At the time of this change in cropping pattern, Crafts' use of zanja water was restricted to short irrigation runs several days apart, and he found the restriction unsuitable to his needs. In 1882 he organized the Crafton Land and Water Co. and built a small reservoir (forerunner of the present Crafton Reservoir) above the Crafton subdivision. He stored water from his short runs in this reservoir and used the water when required by his crops (Beattie, 1951, p. 56). This improved his system of irrigating, and the water conserved enabled him to expand his developments.

The first major improvement of the zanja--one that was short-lived--was the construction of a stone-paved ditch from the mouth of the canyon to the zanja intake. Its purpose was to bypass an upstream stretch of creek channel in which seepage losses were heavy. In 1885, 325 acres of land were purchased along the proposed ditch alinement and construction of the ditch started. The completed ditch (not shown on map) was used until its destruction in the early summer of 1886 (Beattie, 1951, p. 56).

The next major improvement to the irrigation system followed the formation of the Crafton Water Co., successor to the Crafton Land and Water Co. The new company was organized and incorporated in 1886 by the owners of rights to zanja water in the Upper Settlement (Beattie, 1951, p. 56). Each owner transferred his right in the zanja flow to the company at the rate of 1 hour of flow every 10 days for 17 shares of Crafton Water Co. stock. The company purchased the Crafton Reservoir (figs. 10 and 11) and enlarged its capacity to 68 acre-feet. The company also paved parts of the zanja from the intake to the point of diversion to the Crafton Reservoir.

An event of historic interest, although not of great significance, was the installation of a water wheel in the zanja by A. A. Osbun, in 1889 (fig. 38), to drive an electric generator. The generator furnished power for shops and for the motor depot in Redlands. The installation was badly damaged by a subsequent flood and, although the water wheel was restored, the generator was never put back in service because of the damage it sustained and because of diminishing flow in the zanja. In 1968 the city of Redlands decided to keep the water wheel in the improved section of the zanja beneath the corner of Orange Street and Redlands Boulevard--the zanja is now used as a storm drain.

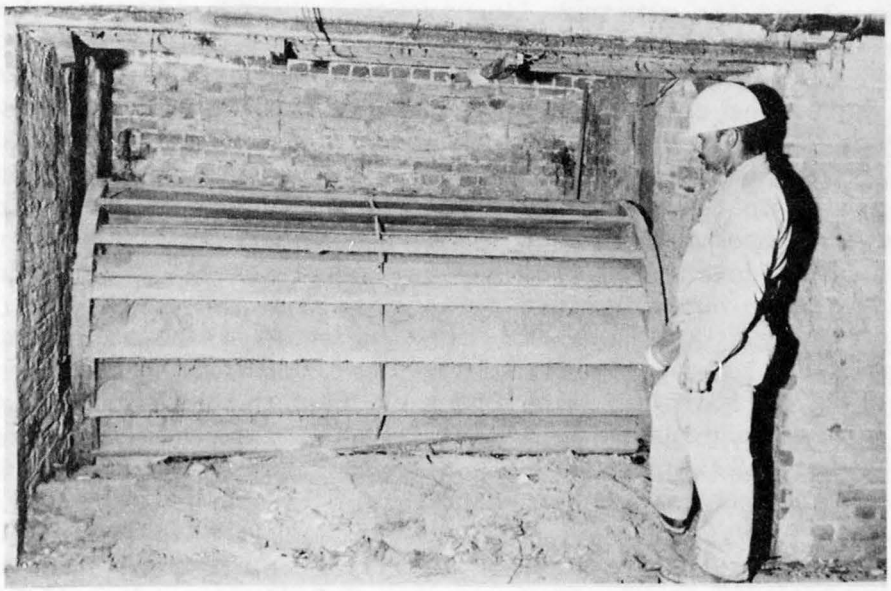


FIGURE 38.--Water wheel built in the Mill Creek zanja by A. A. Osbun in 1889. (Courtesy of Redlands Daily Facts.)

Our earlier discussion of the Bear Valley Land and Water Co. (p. 27-32) told of the building of an aqueduct from the zanja to Moreno Valley (fig. 11) about 1890 (p. 31-32). Water from the zanja was diverted into the aqueduct for use in Moreno Valley, and an equivalent quantity was released to the zanja at the Redlands Canal crossing. In 1892 the water users on the lower zanja filed a protest against the Bear Valley Irrigation Co., successor to the Bear Valley Land and Water Co., and the exchange was terminated. The interchange structures were still in existence in 1967 (oral commun., H. P. Hinckley, 1967). Water was furnished to users in Moreno Valley and Crafton on a rental basis during the dry years of 1898-1904 (Beattie, 1951, p. 57).

The next important development occurred in October 1892, when several influential citizens organized the Redlands Electric Light and Power Co. to develop hydroelectric power using Mill Creek water. The new company made an agreement with the owners of rights to zanja water, whereby the company would build a pipeline from the mouth of the canyon to a powerplant--powerhouse No. 1 (fig. 11)--a quarter of a mile upstream from the zanja intake. The pipeline and powerhouse were completed, and deliveries of power to Redlands began in September 1893. The transmission line was extended to Riverside in 1896 (Fowler, 1923, p. 606). The plant had the distinction of being the first polyphase alternating-current station in California and the second in the United States.

The Redlands Electric Light and Power Co. began construction of powerhouse No. 2 and its penstock line in October 1898. The plant was completed in September 1899 and put into operation 2 months later (Fowler, 1923, p. 601). The intake to the penstock line is upstream from Mountain Home Creek. Soon after the completion of powerhouse No. 2, the Redlands Electric Light and Power Co. was purchased by the Edison Electric Co. of Los Angeles. The Edison Electric Co. started construction of powerhouse No. 3 and its penstock (fig. 11) in the autumn of 1889. Work progressed slowly and the plant was not completed until March 1903. The intake to the penstock of powerhouse No. 3 is downstream from the Fallsvale school. Powerhouses Nos. 2 and 3 are in a single building just downstream from the mouth of Mill Creek Canyon.

The Southern California Edison Co. took over the holdings of the Edison Electric Co. of Los Angeles on September 1, 1909, through a reorganization of the system (Fowler, 1923, p. 529). That company has operated the three powerplants continuously since that date.

Several wells were dug or drilled in Mill Creek Canyon; four of them were still operating in 1967 (oral commun., city of Redlands, 1967). Power to operate the wells is furnished by the Southern California Edison Co., and the pumped water is discharged into the penstock lines. This additional water not only increases the power output but also increases the water supply available to the zanja. The reduction of channel seepage losses by the delivery of water to powerhouse No. 1 through a pipeline also resulted in an increase in water in the zanja. That benefit to owners of the zanja proved to be a detriment to the Mentone Irrigation Co. which was organized in 1887 to develop a water supply below the zanja intake (Beattie, 1951, p. 58). The company's supply was obtained from two springs, a tunnel, a system of ditches, and later a well. The Mentone Irrigation Co. filed suit against the Redlands Electric Light and Power Co. and against the owners of the zanja, claiming that by confining Mill Creek water in a pipeline the company reduced the replenishment of the ground-water basin. The case was settled by court decree in 1903. That decree stated that owners of the zanja had a right to 2,500 miner's inches that antedated by many years the development of the Mentone Irrigation Co., and that the power development diverted the flow from the creek and returned it to the channel with no loss (Beattie, 1951, p. 59). A number of suits were filed in the next few years, but all were settled in favor of the owners of the zanja on the basis of their long continued use of the water.

During the dry years of 1898 and 1899 the Crafton Water Co., which owned water rights in the upper zanja (p. 98), proposed to drill wells in Mill Creek Canyon to supplement the flow in Mill Creek, but the owners of the lower zanja had no desire to share the expense (Beattie, 1951, p. 60). The Crafton Water Co. then decided on its own to drill one well near the mouth of the canyon and another at the junction of Mountain Home and Mill Creeks. The Redlands Electric Light and Power Co. furnished free power to pump the latter well because the water was pumped into the canal that supplied powerhouses Nos. 1 and 2, before the water reached the zanja heading. The Crafton Water Co. realized that its pumping was reducing the surface flow of Mill Creek. On the advice of its engineers, the company built flumes, starting at points

1,200 feet upstream from each well, to divert the surface flow around the wells and back into the creek. It was hoped that this would negate the effect of pumping on the surface-water flow. The land owners along the lower zanja were not convinced, however, and successfully filed suit against the Crafton Water Co. to stop the pumping. The suit was settled in March 1906 with a decision by the court that the surface and subsurface water were one and the same; that because the subsurface water was a part of Mill Creek water, it could not be separated from the surface water; therefore, rights to the water belonged to all owners of the zanja. That suit generally settled the water rights of Mill Creek.

The channel losses in the zanja itself between the Crafton Water Co.'s intake and the Lower Settlement reduced the flow delivered to the lower part of the zanja, especially during dry years. Many users of water from the lower zanja drilled wells for their supply and sold their Mill Creek water to users in Crafton and Moreno Valley (p. 32). In 1925, the Moreno Valley interests purchased rights to 10 hours of zanja flow (Beattie, 1951, p. 63). The Bear Valley Mutual Water Co. delivered an equivalent amount of its water to Moreno Valley in lieu of the zanja water, because the Crafton Water Co. owned stock in the Bear Valley Mutual Water Co. However, the quantity of water from Mill Creek, or from any other source in San Bernardino Valley, that could be delivered to Moreno Valley was limited to 2,131 acre-feet per year, as the result of a lawsuit filed in 1929 by the Santa Ana River Development Co. of Orange County (Beattie, 1951, p. 63).

In 1926 the city of Redlands voted a $525,000 bond issue to purchase additional rights to Mill Creek water (written commun., H. P. Hinckley, 1968). The city up to then had purchased 84 hours and 42 minutes of rights in Mill Creek water. Since 1926 the city has acquired additional rights, and in 1967 the city owned 103 hours and 18-5/6 minutes of the 240-hour total rights in Mill Creek water (oral commun., city of Redlands, 1968). The division of water between the city of Redlands and the Crafton Water Co. is made at the tailrace of powerhouse No. 1. Water for the city is diverted immediately below the tailrace, passed through the filter plant, and is delivered to the city distribution system through the main lines shown in figure 11.

Water for the Crafton Water Co. is carried in an open channel from the zanja crossing on Mill Creek Road to a point just east of Garnet Avenue, and from there in a conduit to the Crafton Reservoir. From the reservoir the water is delivered in a conduit to the company service area. The company, which at the time of incorporation owned rights to 14 percent of the total flow in the zanja, had increased its ownership rights, by purchase, to 53 percent in 1949, and to 55 percent of the total in 1967 (oral commun., city of Redlands, 1967).

Soon after the 1926 purchase of water rights in Mill Creek, the city of Redlands drilled two wells on Texas Street, near its intersection with the zanja. These wells supply water to the western part of Redlands and to other users in the Lower Settlement. At the same time the open ditch from First Street to the San Gabriel Mission Asistencia was replaced with a closed conduit laid in the bottom of the original ditch.

Thus the open ditch, or zanja, built by the Indians under the guidance of the mission fathers, has been nearly eliminated, and the only water it carries at the present time is storm runoff, or water released at times to keep alive the few remaining trees along its banks. In its course through the city of Redlands, the zanja has been replaced by a closed conduit, and little surface evidence of its existence remains. The rights to water for the crops of the asistencia have been consolidated with those of the city of Redlands and the Crafton Water Co., which together control nearly 98 percent of the rights. The distribution of the total 240-hour rights is as follows:

City of Redlands - -	103 hours, 18-5/6 minutes
Crafton Water Co. - -	131 hours, 57 minutes
Others - - - - - - - -	4 hours, 44-1/6 minutes

In 1967, 65 percent of the total supply was used for irrigation, and the remainder was supplied for domestic use (oral commun., city of Redlands, 1968).

The progress and growth of the community of Redlands, which once looked upon the tree-bordered zanja as one of its major attractions, has been the principal factor in the near-elimination of the zanja.

Lower Yucaipa Ditch

The exact date when the lower Yucaipa ditch (fig. 11) was built is not known. However, Hall (1888, p. 308) noted that it was built by Mexicans and Indians 30 years prior to his study, which would make the construction date about 1858. On the other hand, it has been conjectured (Beattie and Beattie, 1939, p. 67) that part of the ditch may have been built in the 1840's by Maria Armenta and her husband, José Bermudez. They had pulled up their grapevines from an area near the mouth of Reservoir Canyon and moved to a site below the mouth of Yucaipa Creek in San Timoteo Canyon (p. 96). They replanted their grapevines and raised garden crops. The garden crops required irrigation during the summer months, and Yucaipa Creek was probably the best source of water.

The first record of the ditch described the point of diversion as being near the center of sec. 13, T. 2 S., R. 3 W. (Hall, 1888, p. 302). The ditch diverted flow from the south side of Yucaipa Creek, followed along the south bank of the creek, crossed San Timoteo Wash, and followed along the west side of the wash to Brookside siding, now known as Redlands siding.

In 1888 the upper part of the ditch was small; it had a recorded right to 70 miner's inches, but its capacity was only about 50 miner's inches (Hall, 1888, p. 308). The total length of the ditch at that time was about 4 miles, the upper half being an open ditch and the lower half an 8-inch concrete pipe. Some of the concrete pipe was cast in place in the old ditch. There was no additional distribution system; the ditch served a narrow strip of land between the ditch and San Timoteo Wash. In 1888 the irrigated area totaled about 166 acres, divided among 16 irrigators, who together owned 216 hour-shares in the ditch. On that acreage grew citrus orchards, vineyards, deciduous fruits, alfalfa, and summer crops.

Several years later the Redlands and Yucaipa Land Co. developed an area now known as Dunlap Acres, along Yucaipa Creek. The company development was upstream from the lower Yucaipa ditch heading, and at that upstream site the company diverted all surface flow, thereby reducing the flow at the lower Yucaipa ditch heading. In 1904 the lower Yucaipa water users filed suit against the company. By the terms of a court decree dated March 29, 1906, the company was given a firm right to 19 miner's inches and was permitted to divert additional water during the irrigation season, but only if a flow of at least 70 miner's inches was maintained at the heading of the lower Yucaipa ditch.

The next event of significance that occurred in the area was the flood of January 27, 1916, which caused considerable damage to the ditch. Because many changes to the system were necessary, the loosely organized group of owners of water rights formed a company which was incorporated in April 1916, as the Lower Yucaipa Water Co. The corporation had a capital stock of $21,600 divided into 432 shares. Each share of stock was entitled to one-half hour of the entire flow of Yucaipa Creek every 9 days (oral commun., Lower Yucaipa Water Co., 1967).

The location of the company diversion was not changed after the flood, but the open ditch was replaced by concrete and steel pipe, and in some places the line was shifted to a higher elevation. (In the text that follows, we will continue to refer to the diversion as a "ditch" even though it became a pipeline after 1916. That is done to avoid confusion in the following discussion of auxiliary pipelines that were built to convey well water to the pipeline diversion.)

In the 1930's the company found it necessary to use ground water to supplement the surface flow which was beginning to diminish. An existing well (State well No. 2S/2W-8L1) on the Vickroy property was first utilized; it discharged through a pipe into the creek and the water was picked up at the ditch heading. In 1936 the company drilled a well near the mouth of Yucaipa Creek; that well discharged directly into the lower Yucaipa ditch. Both these wells were abandoned in 1948 (oral commun., Lower Yucaipa Water Co., 1967). That same year the company drilled a new well (2S/2W-8L2) that until 1950 discharged directly into the creek upstream from the ditch heading. In 1950, a tunnel was dug from the creek to the well casing, a pipe connection was made to the well casing, and the well discharged through this pipe to the creek, thereby eliminating 60 feet of pump lift.

In 1953 a pipeline was laid from the well to a point near the center of sec. 7, T. 2 S., R. 2 W., approximately where Live Oak Canyon Road crosses the San Bernardino-Riverside County line. The water was discharged to the creek at this point and picked up at the lower ditch crossing, half a mile downstream from the ditch heading. That system of diversion was continued until 1959 when the pipeline was extended to the site where the ditch crossed Yucaipa Creek near the east line of sec. 12, T. 2 S., R. 2 W. At that time the diversion of surface water was eliminated, and ground water was delivered by pipeline from the well to the end of the distribution system downstream from the Redlands siding (oral commun., Lower Yucaipa Water Co., 1967).

The Lower Yucaipa Water Co. reincorporated November 28, 1960 (written commun., Lower Yucaipa Water Co., 1967). The major change in the articles of reincorporation was in the definition of the quantity of water to which each share of stock was entitled. By the new articles, "...each share of stock entitles the holder to an amount of water which the shareholders may from time to time determine by a majority vote of outstanding shares of the corporation, providing that each share of stock shall be entitled to the same amount of water, and that water rights are correlative; and provided further, that in the event the corporation shall not have sufficient water to supply the entitlement of all of its outstanding shares, the entitlement of each share shall be proportionately reduced."

In 1966 an additional well (2S/2W-8L3) was drilled, 1,400 feet west of the existing well. It discharged into the connecting pipeline between the existing well and the main diversion pipeline (oral commun., Lower Yucaipa Water Co., 1967). By 1967 the area irrigated had increased to about 310 acres, all of it along San Timoteo Creek at or near the site of the early service area of the lower Yucaipa ditch. The irrigated acreage was used for pasture and to cultivate citrus and alfalfa.

Plunge Creek Diversions

The earliest diversion from Plunge Creek (fig. 39) was made near the mouth of the canyon in 1870, under the authorization of the board of commissioners (Hall, 1888, p. 313). The diversion ditch was small--its capacity was about 50 miner's inches--and the water it carried was used to irrigate about 50 acres of land. A second ditch (fig. 40), built in 1883 or 1884, diverted from the west side of Plunge Creek, about half a mile upstream from the mouth of the canyon. That ditch, which was paved, followed the base of a mountain which paralleled the west bank of the creek. Water from that ditch irrigated an upland area above the North Fork Canal. The ditch had not been used for several years prior to 1888 (Hall, 1888, p. 314).

During these early days of diversion from Plunge Creek, water rights were based on 6-day periods, giving a total 144 hour-rights in the creek. Each owner received his water every 6 days for as many hours as he owned hour-rights. In 1885, the 144 hour-rights were owned by eight persons, four of whom owned 124 hour-rights (written commun., P. R. Jennings, 1967).

In the mid-1880's, J. S. Edwards, realizing the potential for development of the East Highlands area (east of San Bernardino), began acquiring property in that area. Most of his land could be served by the two Plunge Creek diversions described above, or if necessary, water from the North Fork Canal (p. 17-21) could be used to supplement the Plunge Creek diversions (written commun., P. R. Jennings, 1967). Edwards continued to acquire East Highlands property and Plunge Creek water rights, and in 1893 he organized the East Highlands Orange Co.

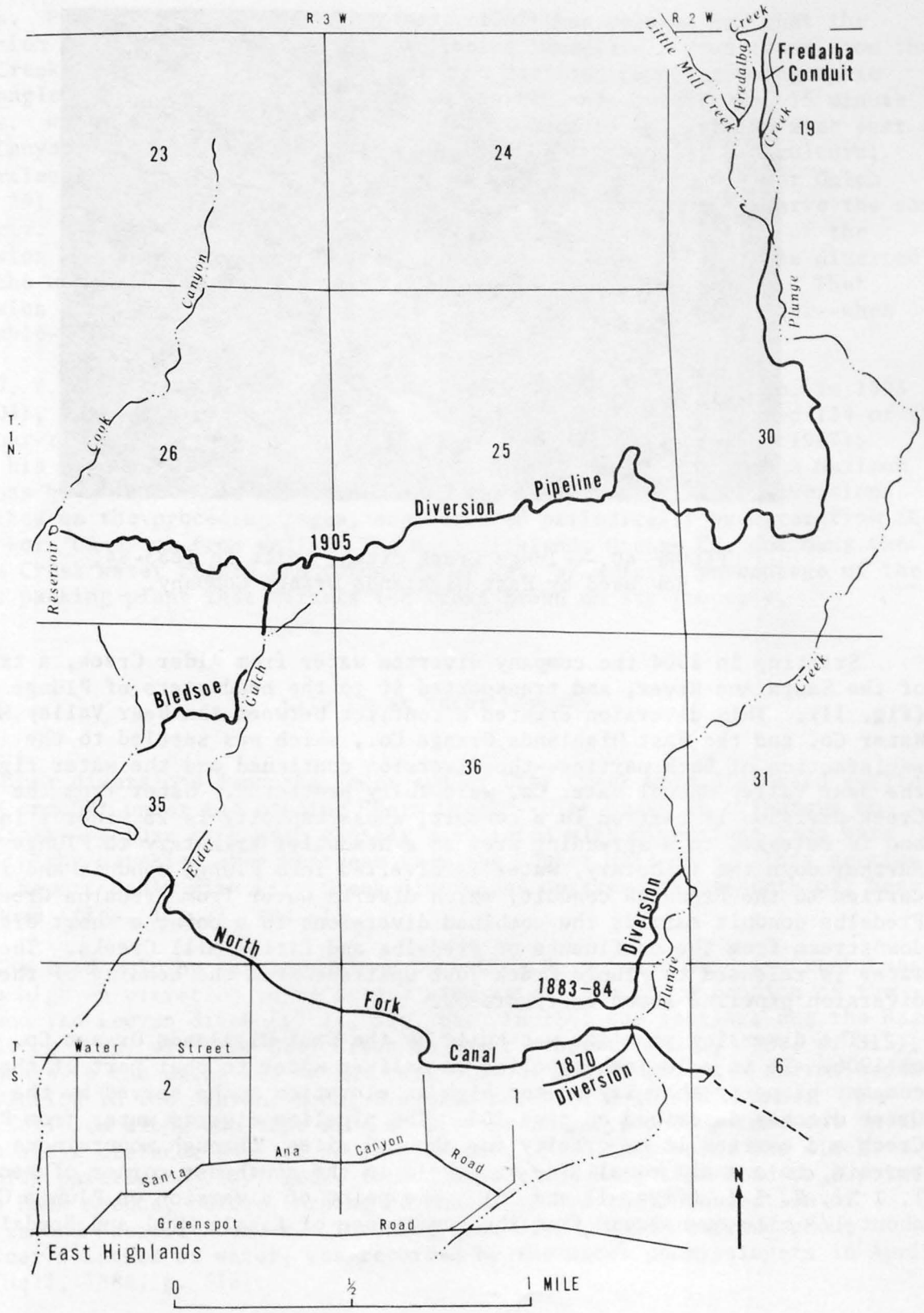


FIGURE 39.--Diversions from Plunge Creek.

FIGURE 40.--Plunge Creek ditch, built in 1883-84; now used by East Highlands Orange Company.

Starting in 1904 the company diverted water from Alder Creek, a tributary of the Santa Ana River, and transported it to the headwaters of Plunge Creek (fig. 11). This diversion created a conflict between the Bear Valley Mutual Water Co. and the East Highlands Orange Co., which was settled to the satisfaction of both parties--the diversion continued and the water rights of the Bear Valley Mutual Water Co. were fully protected. Water from the Alder Creek division is carried in a conduit, whose capacity is 25 miner's inches, and is released to a spreading area on a headwater tributary to Plunge Creek. Farther down the tributary, water is diverted into Plunge conduit and is carried to the Fredalba conduit, which diverts water from Fredalba Creek. The Fredalba conduit carries the combined diversions to a point a short distance downstream from the confluence of Fredalba and Little Mill Creeks. There the water is released to Plunge Creek just upstream from the heading of the diversion pipeline shown in figure 39.

The diversion pipeline was built by the East Highlands Orange Co. in 1905 or 1906. It is a 10-inch pipeline to deliver water to that part of the company property that lay at too high an elevation to be served by the Plunge Creek ditches described on page 104. The pipeline diverts water from Plunge Creek and carries it by gravity for about 9 miles, through mountainous terrain, to a small equalizing reservoir in the southeast corner of sec. 26, T. 1 N., R. 3 W. (figs. 11 and 39). The point of diversion on Plunge Creek is about 1/3 mile downstream from the confluence of Little Mill and Fredalba

Creeks. P. R. Jennings (written commun., 1967) has pointed out that the diversion point is incorrectly shown as being immediately downstream from the Mill Creek-Fredalba Creek confluence on the Harrison Mountain topographic quadrangle map, 7½ minute series, and on the Redlands quadrangle, 15 minute series. Water from the pipeline diversion is used to irrigate an area east of Cook Canyon, that has proved to be one of the best producing agricultural properties owned by the East Highlands Orange Co. Water from Elder Gulch (fig. 39) is diverted to a small reservoir in Bledsoe Canyon to serve the same property. Water that is not diverted at the Plunge Creek heading of the diversion pipeline continues down the creek channel where it may be diverted into the upper of the two diversion ditches discussed on page 104. That diversion ditch has been enlarged and improved, and it carries water--when available--to irrigate low-elevation orchards.

J. S. Edwards, who had organized the East Highlands Orange Co. in 1893 (p. 104), was the prime mover in its development. By 1914 he owned 134 of the 144 hour-rights in Plunge Creek (written commun., P. R. Jennings, 1967). Under his leadership the acreage irrigated by the company reached a maximum that has been maintained through 1967 by the use of the surface diversions described on the preceding pages, supplemented periodically by water from the North Fork Canal or from wells. The East Highlands Orange Co. now owns the Plunge Creek water rights and conduits, as well as a large percentage of the citrus packing plant that markets the fruit grown on its property.

City Creek Water Company

Minor diversions from the lower end of City Creek were discussed earlier (p. 58 and 59) under the heading "Warm Creek"--City Creek is tributary to Warm Creek--because they were closely associated with diversions from Warm Creek in the artesian area upstream from the Bunker Hill dike. This section of the report deals with City Creek diversions upstream from (north of) Base Line Road (figs. 11, 21, and 41).

The land held by settlers along Base Line Road, west of City Creek, was at too high an elevation to be served with water from the extension of the Cram and Van Leuven ditch (p. 14, fig. 6). In 1865 the settlers dug the Base Line ditch (fig. 41) from City Creek to their property (Hall, 1888, p. 315). The intake to the ditch was on the west side of the creek, at a narrow bedrock constriction in the canyon, about 0.4 mile north of Highland Avenue. The ditch followed along the west side of City Creek and probably came out on the mesa a short distance east of Boulder Avenue. From that point the ditch generally paralleled City Creek, turned west along Base Line Road to a point beyond Palm Avenue, before turning northwest toward the intersection of Victoria and Pacific Avenues. The Base Line ditch, which carried about 150 miner's inches of water, was recorded by the water commissioners in April 1871 (Hall, 1888, p. 315).

The North Fork Water Co. probably used a part of the Base Line ditch between Highland Avenue and Base Line Road to deliver water to areas south of Atlantic Avenue and to a part of the Highland settlement near Base Line Road, between the former City Creek channel and Harlem Springs (p. 17). Even now some of the facilities of the North Fork Water Co. (oral commun., 1968) for diverting City Creek water follow the alinement of the old Base Line ditch. The present City Creek intake of the company is at or near the intake site of the early ditch, and part of the present conduit near the intake was probably laid in the old Base Line ditch. The present conduit known as the Snake ditch (fig. 41) is probably in the same general location as that part of the original Base Line ditch that ran along the bluff on the west side of City Creek, between Highland Avenue and the Atchison, Topeka and Santa Fe railroad.

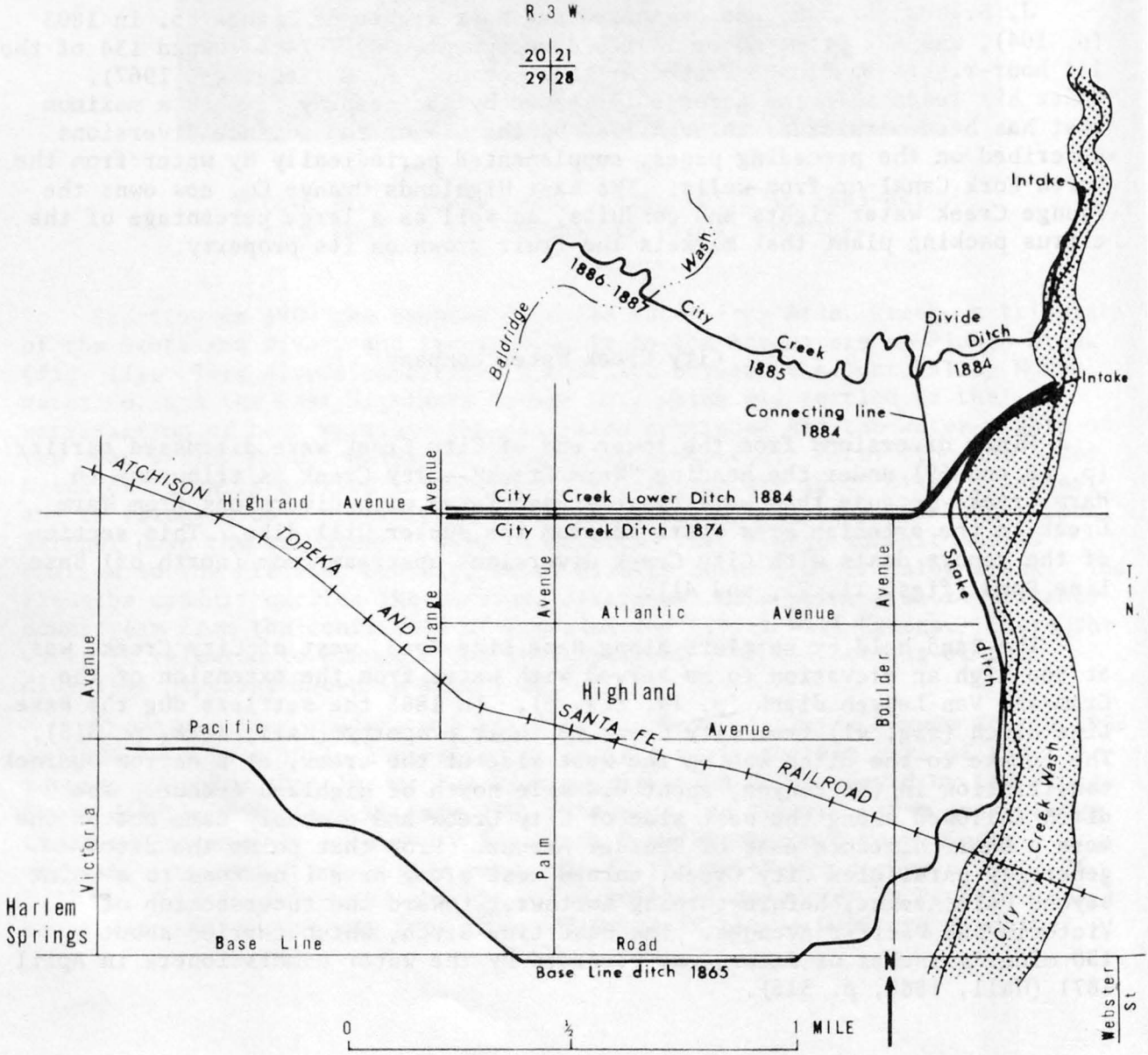


FIGURE 41.--Diversions from City Creek.

The water commissioners approved another diversion, the City Creek ditch, in 1874 (Hall, 1888, p. 315-316). Its intake was at the same location as the intake to the Base Line ditch, but its grade on leaving the canyon, east of the intersection of Boulder and Highland Avenues, was gentler than that of the Base Line ditch. For part of the route of the new ditch, the diverted water was carried in a flume. The new ditch continued west along the south side of Highland Avenue to Orange Avenue (fig. 41), and water was first delivered in 1875. A property owner on the benchland built the ditch, and in return was given a one-ninth interest by the six owners of water rights in this ditch and in the Base Line ditch. The capacity of the City line ditch and flume was 335 miner's inches.

Many of the owners of rights in the Base Line and City Creek ditches purchased benchland at a higher elevation than the land in the service areas of the two ditches. On this higher land more valuable crops could be grown with less water, but unfortunately the benchland was too high to be irrigated by the ditch along Highland Avenue. Obviously another ditch was needed at higher elevation. In the spring of 1883 a survey was made for a new ditch that would head about three-fourths of a mile upstream from the heading of the existing ditch. The ditch would divert from the west side of City Creek and follow the base of the mountains (fig. 41). In the spring of 1884, one of the water-right owners built the first section of the ditch--4,042 feet--from the heading to a division box called the divide (Hall, 1888, p. 316). Water was delivered through the ditch in that same year. Many parts of the ditch were built in the solid rock walls of the mountain (fig. 42), and the rest of the ditch was plastered.

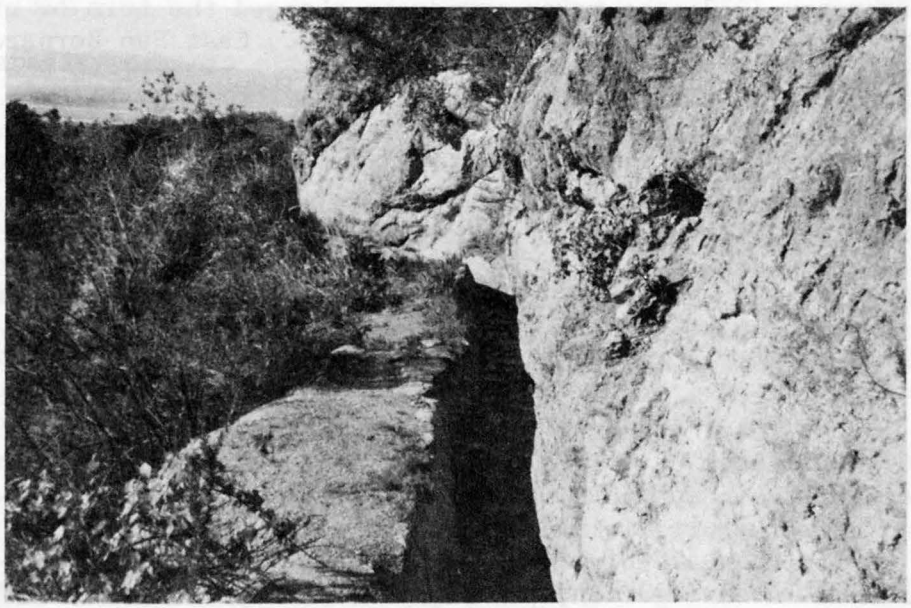


FIGURE 42.--City Creek ditch; used since 1884.

In 1884 a connection was made from the end of the first section of ditch (the divide) to a new ditch, built at the same time, along the north side of Highland Avenue. The new ditch on the north side of Highland Avenue replaced the older ditch on the south side of Highland Avenue, because the older ditch, together with its flume, was rapidly deteriorating. The older ditch was probably then used as the foundation for the Highland Avenue branch of the North Fork Canal (p. 18-19) of the North Fork Water Co.

In the summer of 1885, the new high-elevation ditch was extended 6,022 feet farther west to serve the property of the owners of 55 of the 216 shares in the ditch. An additional westward extension of 2,000 feet was made in 1886-87 to serve the land of the remaining owners of water rights in the ditch (Hall, 1888, p. 316-317). Some time later the heading of the high-elevation ditch was moved about a quarter of a mile downstream from its original site (oral commun., East San Bernardino County Water District, 1967).

The owners of the original City Creek water rights incorporated under the name of City Creek Water Co. in July 1891, with a capital stock of $216,000 divided into 2,160 shares. (Prior to incorporation of the company the owners had called themselves at various times: Base Line Ditch Co., City Creek and Base Line Ditches Co., City Creek or Base Line Ditches Co., City Creek Ditch Co., and City Creek Water Co. [from the minutes of the boards of directors of the organizations named above].) The owners deeded to the company their interest in City Creek water rights, ditch rights, and rights of way. In return they received the right to use the entire flow of the ditch, in regular turns every 9 days, during a period of 6 months. In addition they received 10 shares of stock that entitled them to 1 hour-right in the ditch. Thus, water rights were separated from the land. The articles of incorporation were amended in February 1932; the major amendment changed the term of existence from 50 years to perpetual existence (oral commun., East San Bernardino County Water District, 1967).

Relatively few changes have been made in the water-supply system since its completion in 1887. The lower ditch along the north side of Highland Avenue has been rebuilt as a combined storm drain and irrigation canal. The work was completed in 1965 under a joint agreement between the California Division of Highways and the City Creek Water Co., as part of the Highland Avenue improvement work. The upper ditch was blocked at Baldridge Wash in 1967 (fig. 41); any surplus water in the upper ditch at that point is released to the wash (oral commun., East San Bernardino County Water District, 1967).

During recent years the East San Bernardino County Water District (oral commun., 1967) purchased City Creek Water Co. stock, and by 1967 owned about half the stock in the company. The district's share of water is used for irrigation and for the artificial recharge of ground-water basins by percolation in the channels of City Creek Wash and Warm Creek. The rest of the water is used for irrigation, primarily for citrus orchards. The need for irrigation water is gradually declining in the Highland area, as elsewhere in the Santa Ana River basin, because of the encroachment of urbanization on agricultural lands. The maximum area irrigated and the peak irrigation demand occurred in the mid-1950's when an area of about 500 acres was irrigated. That area had gradually declined to about 350 acres in 1967 (oral commun., East San Bernardino County Water District, 1967).

East Twin Creek Diversions

Del Rosa Mutual Water Company

By a special act of the State Legislature, passed in 1854, the water from Waterman Canyon Creek (formerly called West Twin Creek) and East Twin Creek (figs. 11 and 43) was appropriated for municipal and domestic use by the town of San Bernardino. Water from those creeks was diverted near the mouths of their respective canyons by a ditch that emptied into Town Creek near H Street (Hall, 1888, p. 317). The ditch was dug in 1855 in sandy permeable soil, and its terminus in Town Creek was near the east end of Shandin Hills. (Town Creek is not shown in figure 43; it was near Devil Canyon Wash, which is shown.) The diversion was abandoned several years later because in summer most of the low flow was lost by seepage through the permeable bed of the ditch, and in winter each storm washed away parts of the ditch.

Water from East Twin Creek was not used for several years after the ditch was abandoned. The next diversion made from that creek was in a small ditch (not shown on map) that also diverted water near the mouth of the canyon. This ditch probably followed around the base of the mountain to a point about a mile east of the creek. Several other small diversions were made, and in 1876, following a change in the ownership of water rights, the several diverters consolidated their water claims and dug a new ditch (Hall, 1888, p. 318). This ditch took water from the creek, just upstream from the mouth of the canyon, and carried it east along the base of the mountain for about a mile. The probable location of the ditch is shown in figure 43 by the dashed line dated 1876-85.

The capacity of this ditch (1876-85) was about 60 to 70 miner's inches at the intake, but because of channel seepage losses, only about 30 to 40 miner's inches were delivered to the irrigators in 1885 (Hall, 1888, p. 315). In that year the water rights were owned by five persons with shares ranging from one-eighth to one-fourth of the total water right. The bulk of the water was used to irrigate 69 acres of deciduous fruits and alfalfa.

Construction started on two other ditches in the 1880's, one in 1885 and the other in 1887, both of which headed farther up the canyon than the 1876 ditch. Work stoppages occurred on both ditches as a result of conflict between their owners. One of the ditches was never completed because of right-of-way problems, but some time before 1890 the second of the two ditches was operative. It was built by an association called the Kansas City Realestate Investment Corp. that had acquired the water rights of former irrigators.

In the course of its operations the corporation acquired a tract of land extending from the base of the mountains to Highland Avenue, between Harrison Street and Sterling Avenue. In 1890-91 the corporation subdivided the tract, known as the Orange Grove tract, into 10-acre lots. The deed to each lot included rights to East Twin Creek water and to pipelines (built 1890-91), as

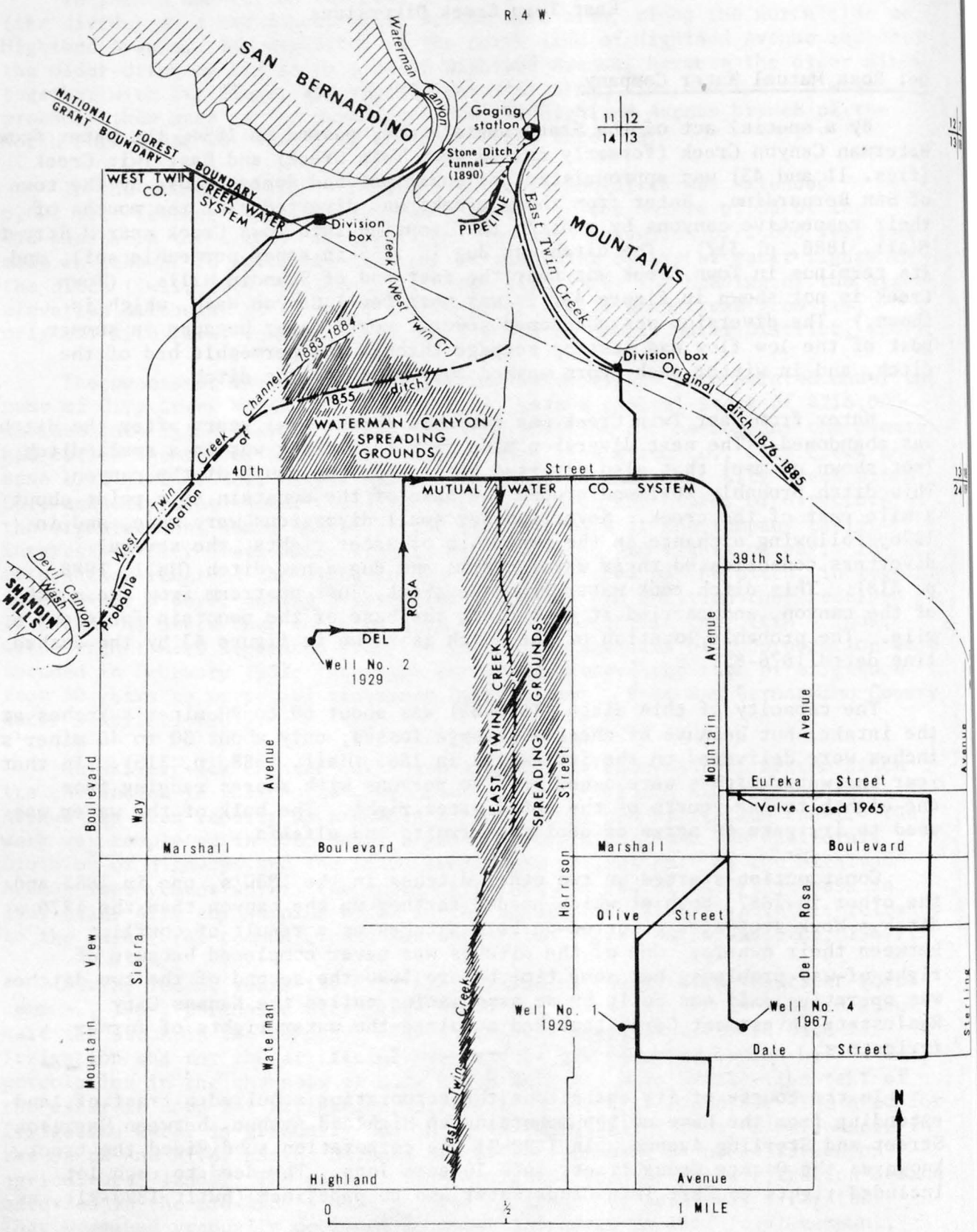


FIGURE 43.--Diversions from East Twin and Waterman Canyon Creeks.

well as easements. The sale of the land gradually eliminated the Kansas City Realestate Corp. from the operation of the irrigation system, which was taken over by the individual property owners.

In December 1901, the individual owners of the water rights of East Twin Creek formed the Del Rosa Water Co., which was incorporated with a capital stock of $15,000 divided into 150 shares. Each owner conveyed all rights in water, water distribution, and easements to the new company. The company continued to operate the system until January 1922, when it reincorporated under the name of the Del Rosa Mutual Water Co., with a capital stock of $58,500 divided into 5,850 shares (written commun., East San Bernardino County Water District, 1967).

During recent years some stock has gone back to the company and much of it has been acquired by the East San Bernardino County Water District and the city of San Bernardino. In 1967, a total of 4,423 shares of the original 5,850 shares was outstanding, and its ownership was as follows:

East San Bernardino County Water District - -	3,403 shares
City of San Bernardino - - - - - - - - - - - -	500 shares (approximately)
Fifteen individuals - - - - - - - - - - - - - -	520 shares (approximately)

The main distribution lines of the water-supply system are shown in figures 11 and 43. In 1929 the flow of East Twin Creek was supplemented by water pumped from two wells. A third well was added in 1967. In 1965 a valve was installed in the line east of Mountain Avenue (fig. 43). Since then the San Bernardino County Water District supplies the area east of the valve from its domestic and agricultural water-supply system. That area can still be served from the Del Rosa system in an emergency.

The maximum area irrigated by the Del Rosa Mutual Water Co. was 800 acres in 1950, but by 1967 only about 100 acres were irrigated. On those 100 acres are olive groves, Christmas tree groves, deciduous fruit orchards, and pasture (oral commun., East San Bernardino County Water District, 1967). In recent years East Twin Creek water that is not used for irrigation is used in the East Twin Creek spreading grounds below 40th Street to recharge the ground-water basin. The water-spreading activity is under the supervision of the Del Rosa Mutual Water Co.

Stone Ditch Tunnel

In 1890 a small tunnel, known as the Stone ditch tunnel, was built in the streambed of East Twin Creek (written commun., W. P. Rowe, 1968). The tunnel was 300 feet long, and its heading was a short distance downstream from the intake to the Del Rosa Water Co.'s ditch (fig. 43). A pipeline picked up water from the lower end of the tunnel and carried it along the west bank of the creek. The measured outflow from the tunnel ranged from 17.5 miner's inches in 1893 to 5.5 miner's inches in 1898 (written commun., W. P. Rowe, 1967). The tunnel and pipeline were owned by a single individual.

In 1912 the Del Rosa Water Co. sank a shaft in the streambed of the creek, about 200 feet upstream from the head of the tunnel. Its purpose was to intercept underflow in the creek channel. The shaft was dug vertically on the west side of the channel to a depth of 42 feet, where bedrock was reached. A horizontal drift was then driven to bedrock on the east side of the channel. A pump that was to be operated 12 hours a day was then installed on the shaft. Pumping affected the outflow from the tunnel; when the water level in the shaft was drawn down 19 feet, flow in the Stone ditch tunnel ceased (written commun., W. P. Rowe, 1967).

In 1919 the Del Rosa Water Co. extended its vertical shaft through the bedrock an additional 18 feet, giving a total depth of 60 feet. A lateral was driven to intercept additional underflow. The deepening of the shaft and the construction of the new lateral increased the quantity of water that could be pumped; in August 1919, before deepening the shaft, the pumpage was 14.9 miner's inches, but a month later, after completion of improvements, the pumpage was 17.5 miner's inches (written commun., W. P. Rowe, 1967). This development resulted in a suit being filed against the Del Rosa Water Co., in 1919, by the owner of the tunnel. The court decision merely required that the water company give the tunnel owner advance notice of any pumping the company did (oral commun., East San Bernardino County Water District, 1967).

Although there is no record of when diversion by the Stone ditch tunnel ceased, no irrigation activity has occurred in the area served by the tunnel since before 1947.

West Twin Creek Water Company

Soon after the abandonment of the 1855 diversion to Town Creek (p. 111) from East Twin Creek and Waterman Canyon Creek (formerly called West Twin Creek), a settler on the west side of Waterman Canyon Wash took possession of the ditch. He claimed the water formerly appropriated from Waterman Canyon Creek by San Bernardino settlers (Hall, 1888, p. 317). The original ditch diverted flow from that creek near the canyon mouth, and carried the water southwest along the base of the mountains before releasing it into a small wash. A short distance below the point of release, the ditch resumed. It diverted flow from the small wash and carried the water a short distance farther along the base of a hill. The probable location of the ditch is shown in figure 43.

In 1888 the ditch was owned by three irrigators, each having 36 hours of flow per week to irrigate a total of 60 to 80 acres, on which were grown grapes, deciduous fruits, alfalfa, and summer crops. The owners had roughly paved the ditch, which then had a capacity of about 50 miner's inches. During the summer the flow was less than 50 miner's inches, and a loss of about 10 miner's inches occurred between the ditch heading and the area irrigated

(Hall, 1888, p. 318). The owners of the water rights incorporated in August 1891, under the name of the West Twin Creek Water Co. The company had a capital stock of $72,000, divided into 720 shares (written commun., East San Bernardino County Water District, 1967).

The capital stock in the new company was issued on the following basis: the owners of water rights transferred to the company all rights and privileges in the water of West Twin Creek (Waterman Canyon Creek) and all interest in the conduits; in exchange they received 20 shares of capital stock for each hour-right in the ditch. One hour-right entitled a stockholder to the full flow of West Twin Creek for one hour in regular turn, once every 36 hours. In 1967, 708 of the original 720 shares were outstanding. The East San Bernardino County Water District owned 355 shares and the other 353 shares were owned by 17 individuals who used the water to irrigate about 200 acres of deciduous fruit orchards and pasture (oral commun., East San Bernardino County Water District, 1967).

Prior to incorporation of the West Twin Creek Water Co., the water-distribution system probably consisted of open ditches only. Since incorporation, all ditches have been replaced with closed conduit. In recent years Waterman Canyon Creek water that is not used for irrigation is spread in the Waterman Canyon Creek spreading grounds to recharge the ground-water basin. The water-spreading activity is under the supervision of the West Twin Creek Water Co.

East San Bernardino County Water District

The formal history of the East San Bernardino County Water District begins in 1940 when the Pioneer Water Co. was founded. Some years before that, A. F. McGlothlen acquired overlying and underground water rights in the general area between Waterman and Victoria Avenues, from Marshall Boulevard south to Sixth Street (fig. 44). In 1940 he organized the Pioneer Water Co. to supply the area with water from wells. In January of that year the Garden Lands and Water Co. had been organized to supply water to the area between Third and Sixth Streets and between Waterman and Tippecanoe Avenues (fig. 44). That water was pumped from wells in the service area.

McGlothlen acquired the Gardens Land and Water Co. in 1944, and in 1950 he combined his two companies to form the Pioneer Gardens Water Co. The new company, between 1950 and 1954, acquired water rights from many small mutual water companies, private associations, and well owners.

The East San Bernardino County Water District was organized in February 1954 and purchased all water rights, easements, and pipelines of the Pioneer Gardens Water Co. Since that purchase the District has gained possession or acquired an interest in many mutual water companies, water associations, and individual wells. Its service area is shown in figure 44.

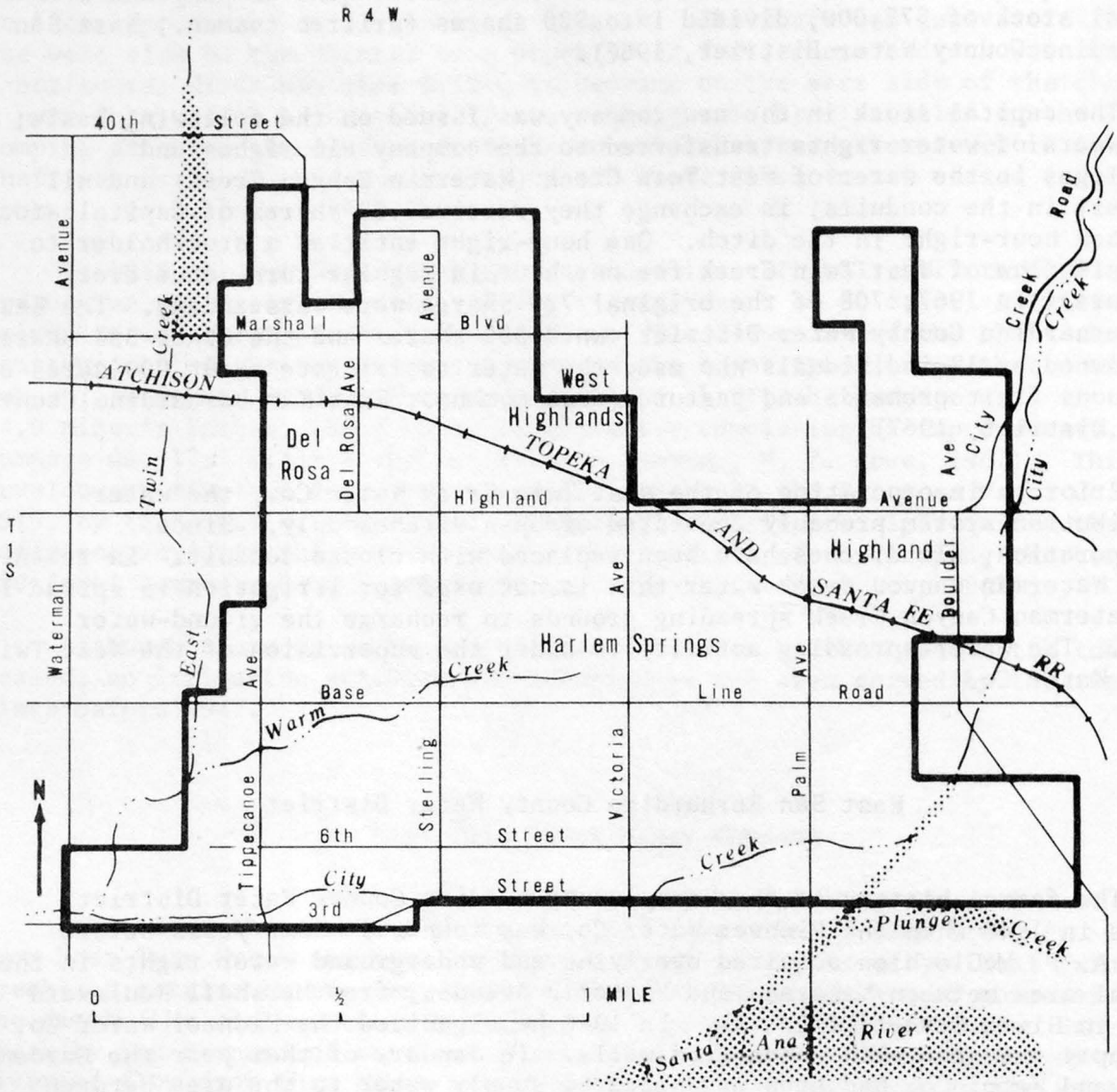


FIGURE 44.--East San Bernardino County Water District.

Devil Canyon Creek Diversions

The first diversion from Devil Canyon Creek was made some time prior to 1900 by the Muscupiabe Land and Water Co. The diversion was made in a ditch whose heading was at the canyon mouth. The location of the ditch, shown in figure 45, was confirmed by an undated map in the files of the Municipal Water Department of San Bernardino. The date of the first diversion is not known, but the ditch was in operation at the time of Mendenhall's investigation

(1905, pl. XII). The diversion was still in use in November 1911, when the U.S. Geological Survey established a stream-gaging station at the mouth of the canyon. At that time water from the ditch was used by a Mr. Severance to irrigate his crops east of Devil Canyon. The last mention of an active open-ditch diversion was in 1914 (U.S. Geological Survey, 1917, p. 79).

The city of San Bernardino acquired property in Devil Canyon and water rights in the creek between June 1921 and July 1923. Some of the land and water rights were purchased from the Muscupiabe Land and Water Co. and the rest were purchased from private owners. In 1925 the city acquired a strip of land, 10 feet wide, from the canyon to the site of Newmark Reservoir, and built that reservoir (fig. 45). The city then built a pipeline diversion to Newmark Reservoir that had its heading just below the confluence of the East and West Forks. This surface-water diversion was used until 1930 (oral commun., city of San Bernardino, 1967).

In 1930 the city began the extensive development of springs in the watersheds of both the East and West Forks, by building horizontal wells and tunnels. During the same year the Devil Canyon Reservoir was built and a pipeline was laid, connecting the new water development in the forks with the existing pipeline to Newmark Reservoir.

Cajon Creek Diversions

Muscoy Water Co.

Except where otherwise noted, information on the development of the Muscoy Water Co. was obtained from records of the San Bernardino Water Utilities Corp.

The first six claims to water from Cajon Creek and its tributaries (fig. 45) were filed in the 20 years from 1885 to 1905. All six were filed by members of the Towne family who, by purchase, had acquired that part of the Muscupiabe Rancho that included the valley of Cajon Creek, as well as other property in Cajon Canyon. The first claim was filed in April 1885; it was for 1,000 miner's inches of water from Cajon Creek, together with its underflow. The second claim was also filed in April 1885; it was for 100 miner's inches of flow from a tributary upstream from Keenbrook. The third claim was filed in August 1887; it was for 100 miner's inches of water from Cajon Creek below the mouth of Swarthout Canyon (Lone Pine Canyon). The fourth claim was filed in 1889; it was for 50 miner's inches of flow from a tributary on the west side of Cajon Creek near the heading of the Glenn Helen ditch. The fifth claim was filed in February 1897; it was for all flow, up to 1,500 miner's inches, on or beneath the surface of the Cajon Creek streambed, at a point about a mile upstream from the submerged diversion dam, which in turn was a short distance downstream from the junction of Lone Pine and Cajon Creeks. The sixth claim was filed in September 1905; it was for 150 miner's inches from the Wilson tunnel near the north line of sec. 20, T. 2 N., R. 5 W., east of Pitman Canyon.

FIGURE 45.--Diversions between Devil Canyon and San Antonio Creeks.

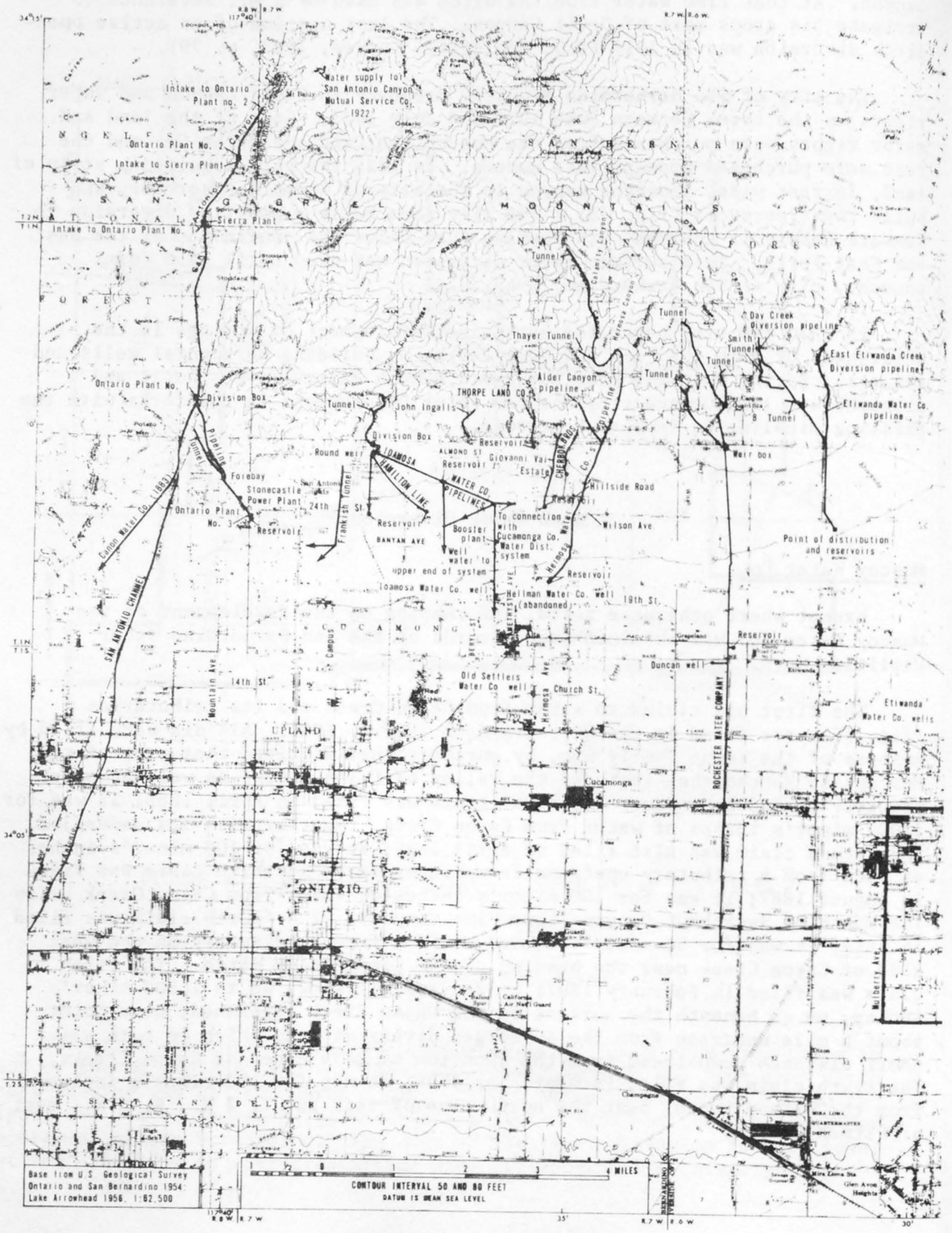
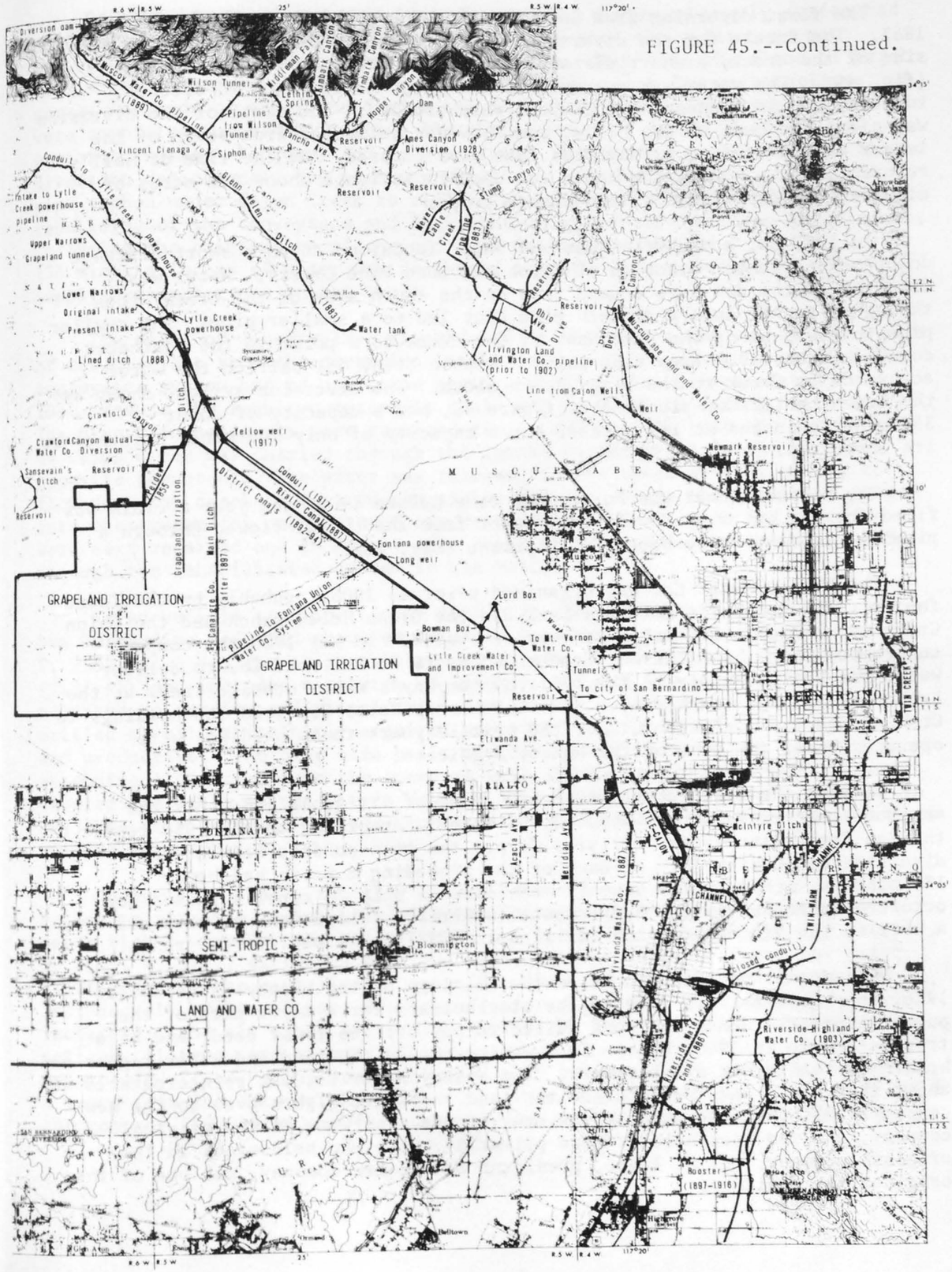


FIGURE 45.--Continued.



The first diversion from Cajon Creek was probably made by Towne about 1883. The intake for the diversion--the Glenn Helen ditch--was on the west side of the creek, a short distance downstream from the Vincent cienaga (fig. 45). The water was conveyed to the Glenn Helen ranch in ditches, tunnels, and in flumes where canyons were crossed. The route of the diversion was along the base of the hills, and flow was collected from seven of the larger canyon-incised tributaries that were crossed. At the time of Hall's report (1888, p. 320), the water was used to irrigate about 200 acres of alfalfa, deciduous fruits, and summer crops.

In 1888-89, a diversion dam was built in Cajon Canyon a short distance downstream from the junction of Cajon and Lone Pine Creeks. Water was diverted at the dam into a sand trap on the south side of the creek, then through a tunnel into a 30-inch pipe that led to a smaller pipe. The smaller pipe followed along the east bank of the creek to a point in the southeast corner of sec. 19. From that point a siphon (fig. 45) carried the water across Cajon Creek to the Glenn Helen ditch. The diversion system, shown as the Muscoy Water Co. pipeline on figure 45, had a capacity of about 350 miner's inches at its intake, but a capacity of only 200 miner's inches at its lower end.

The Wilson tunnel was built some time before 1905, the year a claim was filed for the water it developed. Water from the tunnel flowed through a pipeline to the Muscoy Water Co. pipeline (fig. 45).

The Muscoy Water Co. was organized prior to 1906, probably by the Towne family. The company's holdings included the Glenn Helen ranch and the Cajon Creek water rights and water-conveyance system. In May 1906 the company contracted with the Atchison, Topeka and Santa Fe Railroad Co. to deliver water for boiler supply to the railroad company's water storage tanks at the Keenbrook siding. In November 1926 the Muscoy Water Co. sold its holdings to C. H. Jonas and J. B. Roof. For the next 10 years those holdings were operated under the name of the Muscoy Syndicate.

In 1930 the syndicate owned 5,640 acres of irrigable land, but the maximum area irrigated was about 3,000 acres. According to the 1930 report of the San Bernardino Water Utilities Corp., the mean surface flow at the diversion dam during July of each of the preceding 8 years had been 175 miner's inches, but a monthly mean flow of only 75 miner's inches had occurred in August 1928. Supplemental water for irrigation was obtained from a well in the Vincent cienaga (drilled in 1927) and a well on the ranch.

When Jonas and Roof purchased the holdings of the Muscoy Water Co. in 1926, they gave a trust deed to the stockholders for a major part of the purchase price. Jonas and Roof failed to pay off the trust deed, and at a trustee's sale in 1936, George S. Towne purchased the land and water rights on behalf of the former stockholders. The Muscoy Water Co. was reincorporated at about that time, and Towne turned the land and water rights over to the new company. Although the company was new, it used the name of the original company, and the stockholders were primarily those who held stock in the original company. G. S. Towne, president of the new company, was one of the original stockholders.

Reports issued during 1927-37 indicate that the water-supply system had deteriorated under the management of Jonas, and that the system was not utilized to its capacity during the mid-1930's. Then came the flood of March 1938 which destroyed parts of the Glenn Helen diversion dam and pipelines. A survey was made of the flood damage and during the following 2 years plans were completed for rehabilitating the entire system. Rehabilitation work was performed between February and October 1941. The work included repairs to the diversion dam, tunnel, and existing pipelines; the installation of a steel pipe siphon under Cajon Creek to replace the old concrete siphon; and complete rebuilding of the conveyance and distribution system on the Glenn Helen ranch, including the elimination of the old open ditch. On October 7, 1941, 150 miner's inches of water was delivered through the rehabilitated water-supply system for use on the ranch.

The flood of January 1943 damaged the intake system and washed out a part of the pipeline from the diversion intake to the siphon, thereby putting the conveyance system out of operation again. Repairs were delayed until July 1946 because the required materials could not be obtained during World War II. The diversion headworks were repaired first, and in July 1946 the entire flow of Cajon Creek was carried through the intake to the break in the pipeline opposite Keenbrook. The water was released to the creek at that point, to flow down the creek channel to the siphon intake. There the water was pumped into the system for use on the Glenn Helen ranch. The siphon and pipeline were next repaired and in August 1946 about 75 miner's inches was delivered through the rehabilitated system to the ranch.

We go back in time now to May 1940. At the end of that month the city of San Bernardino acquired about 60 acres of Government land in the SE¼ sec. 19, T. 2 N., R. 5 W. The 60 acres occupied a part of the Vincent cienaga (fig. 45) and included a stretch of channel of Cajon Creek. The land was acquired to develop additional water for the city. During June 1940 the city drilled a well on its newly acquired property; the well proved to be efficient and productive. The city also built two horizontal infiltration tunnels, extending 1,000 feet from the concrete well shaft. A pipeline from the well carried the water to the city's Newmark Reservoir north of Shandin Hills. In 1943 the city acquired two additional parcels of land adjacent to the 60 acres originally purchased.

On April 17, 1947, the city of San Bernardino entered into a lease and option to purchase certain lands in the Cajon Creek area, as well as "all water rights owned by the Muscoy Water Co. north of the south line of sec. 30, T. 2 N., R. 5 W., extending east and west, but not including water or water rights east of the east line of sec. 28. The lease and option to purchase included all rights-of-way, easements, water pipelines, weirs, intake facilities, and all other hydraulic structures, together with certain water notices, filings, and appropriations filed in the San Bernardino County Recorder's office." The lease and option to purchase were for a period of 3 years from the date of the agreement. Upon signing the lease, the city paid the company $50,000 and obligated themselves to pay an additional $50,000.

On June 16, 1951, the city paid the balance due (written commun., city of San Bernardino, 1967). After completion of the transaction the city connected to its system the well drilled in Vincent cienaga in 1927. No surface diversions have been made from Cajon Creek since the city signed the lease with the option to purchase. The county of San Bernardino purchased the Glenn Helen ranch, and all water currently used on the ranch is pumped ground water.

Ames Canyon Diversion

In 1928 the Muscoy Land Co. built a dam in Ames Canyon and laid a pipeline from the dam to the terrace land south of the mouth of the canyon (fig. 45). Parts of the system were destroyed during the flood of March 1938, but repairs were made the following year. The distribution system was sold several times between 1928 and 1967, but has been used continuously to supply domestic and irrigation water to a small service area below the terminal reservoir (oral commun., San Bernardino Water Utilities Corp., 1967).

Devore Water Company

The area now known as Devore Heights (fig. 45) was first subdivided about 1910, and in that same year the Devore Water Co. was organized to supply the 1,800-acre area with water. The company was incorporated with a capital stock of $36,000 divided into 1,800 shares. One share of stock was assigned to each acre. The number of active shares was later reduced to 694, and then increased slightly. In 1967 there were 708 active shares (oral commun., Devore Water Co., 1967).

Water for the area was obtained from five sources: Middleman Falls, Lethin Spring, and Kimbark, East Kimbark, and Hopper Canyons. Springs were developed in each of the canyons. Horizontal tunnels or wells were drilled in the Middleman Falls area and in Kimbark Canyon. Pipelines from each canyon carried the water to the main line on Rancho Avenue, which emptied into a reservoir. From the reservoir and the pipeline along Rancho Avenue, water was delivered to the distribution system.

The agricultural development in the service area has been gradually replaced by residential development, and in 1967 water was delivered almost exclusively for domestic use by 200 home owners. Prior to 1948 water was priced on a flat-rate basis, but since 1948 all water has been metered. At about that same time (1948) the existing water supply was supplemented by water pumped from two additional wells; a third well was added to the system in 1967.

Diversions from Cable Creek and Nearby Streams

This section of the report dealing with the Cable Canyon area is based primarily on information furnished by Mrs. Melba Hrock of the Trans-California Realty Corp.

The history of water development in the Cable Canyon area begins in July 1882, when John Hancock, owner of a part of the Muscupiabe Rancho, deeded 2,450 acres within the rancho to Julius Meyers and F. H. Barclay. Meyers was deeded a two-thirds interest and Barclay a one-third interest. The 2,450-acre tract of land included the watersheds of Cable Creek and small adjacent mountain streams that flowed through the tract (fig. 45). The deed also included water and water rights riparian to all streams flowing through the tract, and water and rights to water rising within the tract. The water and water rights of the two new owners were divided on the same basis as the land. In December 1883 the tract was partitioned into 19 lots, forming the Meyers and Barclay subdivision. Meyers received 12 of the lots and part of another; Barclay received the remainder. The water and water rights were assigned to the lots for domestic and agricultural use, and a pipeline diversion that headed near the mouth of Cable Canyon was built to convey Cable Creek water to the service area (fig. 45).

On May 21, 1885, H. A. Barclay and R. N. C. Wilson purchased 773.18 acres of land that included 8 lots and part of another in the Meyers and Barclay subdivision, as well as additional land that was adjacent to, but mainly southeast of, the subdivision. That same day Barclay and Wilson transferred their newly purchased land to the Irvington Land and Water Co. In the next few months the company acquired additional lots and associated water rights in the Meyers and Barclay subdivision. The water rights were for Cable Creek water and for local mountain drainage onto the land.

The Irvington Land and Water Co. developed a water supply for its land by diverting water from Bailey and Meechem Canyons which lay to the north (fig. 45). The diverted water was carried by pipeline to a reservoir; distribution mains led from the reservoir to the service area. This water system was connected to the Cable Creek pipeline that had been built in 1883. The company subdivided its property, and between June 1886 and March 1897 sold 27 parcels. Each deed included a proportionate right to water developed to serve the company's land holdings. In December 1890 J. M. Clapp recorded a mortgage against all of the company's unsold land and associated water rights. He foreclosed the mortgage in May 1897.

The next event of interest that is pertinent to the water supply of the area occurred in 1914. Two years prior to that date Samuel Martin had patented part of sec. 26, T. 2 N., R. 5 W., adjacent to the Muscupiabe Rancho boundary line. The East and West Forks of Cable Creek joined and flowed through his property, as did a Cable Creek tributary known locally as Stump Canyon Creek. In September 1914 Martin filed a complaint in court against members of the Meyers and Clapp families. In his complaint he made the following claims: (1) He had settled on the land described in the patent in 1879; (2) the land is riparian to Cable Creek and to the two tributaries, East and West Forks, that join to form Cable Creek; (3) subsequent to 1882 the defendants had entered on his land and built dams and diversion works north of his southern boundary line. In January 1917, before any adjudication was reached, Martin sold his property in sec. 26 to the members of the Meyers and Clapp families. The deed included not only Martin's homestead rights, but all water and water rights in Cable Creek and its tributaries that belonged to the purchased land. Those water rights were then divided in proportion to the land held in the Verdemont tract--formerly called the Irvington Land and Water Co. tract--and in the Meyers and Barclay subdivision.

In 1967 nine residents in the Meyers and Barclay subdivision and in the Verdemont tract used water diverted from Cable Creek. Within those two tracts some of the residents had developed springs on their properties. A few were using water from Bailey Canyon, and in the lower part of the area some were using water from a well. In 1967, as in all preceding years, the water was used for domestic purposes; agriculture was and is limited to vineyards which are not irrigated.

Lytle Creek Diversions

During the years when a water supply from lower Lytle Creek was first developed, a series of cienagas or areas of rising water (for definition, see p. 36) extended from the confluence of Lytle and Cajon Creeks almost as far south as Foothill Boulevard (fig. 46). The largest area of rising water, known variously as Raynor or Garner Springs or Meeks Mill place, was on the west side of Lytle Creek near Base Line Road. The early diversions from Lytle Creek, which included the first Rancheria ditch, the Lord ditch, and the Mormon ditches, took water from those cienagas.

As diversions increased, the cienagas dried up and the diversion sites were moved progressively farther upstream into Lytle Canyon. At first trenches and tunnels were dug in areas where rising water formerly occurred; later, shallow wells of small diameter were established in those same areas, and finally larger and deeper wells were used. The increased diversion and pumpage caused concern in the city of San Bernardino in the early 1920's, and a suit was filed by the city against all agencies taking water from the former areas of rising water in the lower Lytle Creek basin. The judgment of January 28, 1924, stipulated the quantity of surface and ground water that each agency could take from the basin. The total allotment to the various agencies of ground water to be taken from the area, from Base Line Road north to a short distance beyond Highland Avenue, was more than 2,600 miner's inches (written commun., West San Bernardino County Water District, 1967). That quantity attests to the intense development of the water supply in the lower Lytle Creek basin.

A pronounced shift in the location of areas served by Lytle Creek diversions has occurred. In the 125 years since New Mexican settlers first utilized Lytle Creek water, almost all rights to the surface flow have been moved from the San Bernardino area to the area south and west of Lytle Creek Wash. As mentioned above, surface flow has been supplemented by pumpage from ground-water basins--those basins are recharged by water from Lytle and Cajon Creeks. Since 1960, the local supply of water has been supplemented in the Fontana district, when needed, with Colorado River water from the aqueduct of the Metropolitan Water District of Southern California (oral commun., Fontana Union Water Co., 1967).

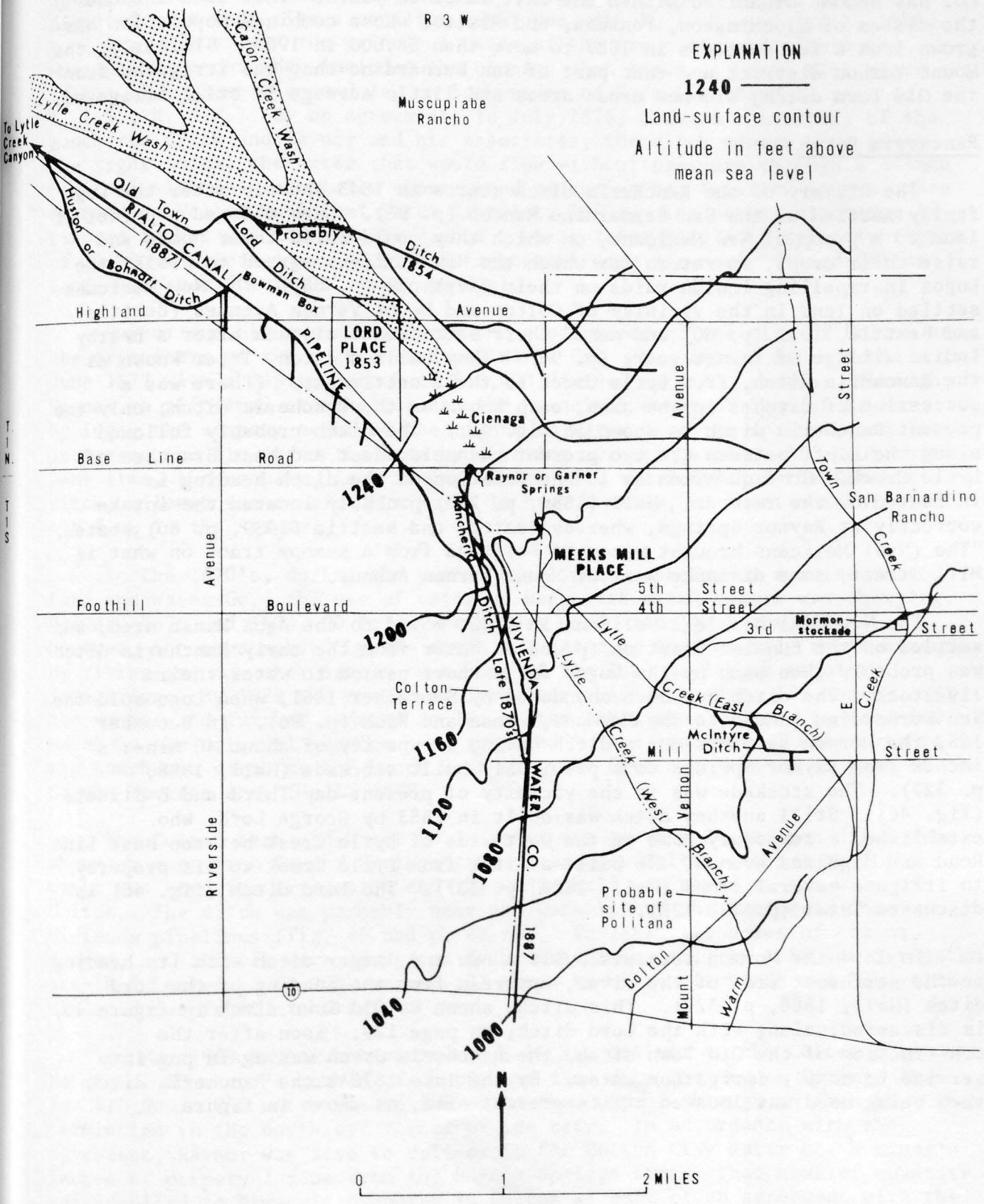


FIGURE 46.--Early development in the lower part of Lytle Creek.

The agricultural area formerly served by the Semi-Tropic Land and Water Co. has become urbanized within the last 15 or 20 years. That area includes the cities of Bloomington, Fontana, and Rialto, whose combined population has grown from a few settlers in 1887 to more than 58,000 in 1967. Similarly, the Mount Vernon district and that part of San Bernardino that was irrigated from the Old Town ditch, are now urban areas and little acreage is still irrigated.

Rancheria Ditch

The history of the Rancheria ditch starts in 1843 shortly after the Lugo family settled on the San Bernardino Rancho (p. 95). Lugo offered a parcel of land to a group of New Mexicans, on which they could build their homes and raise their crops, in return for which the New Mexicans agreed to assist the Lugos in repelling Indian raids on their livestock (p. 68). The New Mexicans settled on land in the vicinity of Colton and Mount Vernon Avenues (Beattie and Beattie, 1939, p. 60) and named their settlement Politana after a nearby Indian village of former years (p. 94). They built a ditch, later known as the Rancheria ditch, from Lytle Creek to their settlement. (There was a succession of ditches in the area, each known as the Rancheria ditch; only the present Rancheria ditch is shown in fig. 46.) The ditch probably followed along the bluff between the two present channels, East and West Branches of Lytle Creek. Some question as to the location of the ditch heading is indicated by the records. Hall (1888, p. 277) probably located the intake correctly at Raynor Springs, whereas Beattie and Beattie (1939, p. 60) stated, "The (New) Mexicans brought water to Politana from a swampy tract on what is Mill Street, some distance west of Mount Vernon Avenue."

The New Mexicans left Politana in 1845, moved to the Agua Mansa area, and settled on the Bandini Donation (p. 68). Water from the early Rancheria ditch was probably then used by the Lugos for a short period to water their livestock. The ditch had been abandoned by September 1851, when Lugo sold the San Bernardino Rancho to the Mormons, Lyman and Rich (p. 96). In December 1852 the Mormon settlers dug a ditch having a capacity of about 40 miner's inches from Raynor Springs to a previously built stockade (Hall, 1888, p. 327). The stockade was in the vicinity of present-day Third and E Streets (fig. 46). Still another ditch was built in 1853 by George Lord, who established a temporary home on the west side of Lytle Creek between Base Line Road and Highland Avenue. He built a ditch from Lytle Creek to his property to irrigate several crops (Hall, 1888, p. 327). The Lord ditch (fig. 46) is discussed later (p. 128-129).

In 1854 the Mormon settlers built a new and larger ditch with its heading on the northeast side of the river, upstream from the heading of the Lord ditch (Hall, 1888, p. 327). This ditch, shown as Old Town ditch in figure 46, is discussed, along with the Lord ditch, on page 129. Soon after the construction of the Old Town ditch, the Rancheria ditch was again put into service to supply irrigation water. By the late 1870's the Rancheria ditch then being used was located at its present site, as shown in figure 46.

The owners of the Rancheria ditch claimed all the water from Raynor Springs, and it was not until the early 1870's that these rights were disputed. At that time a conflict developed with P. A. Raynor (Hall, 1888, p. 278). Raynor was the principal owner of the tract of land within the Muscupiabe Rancho that included the cienaga then known as Meeks Mill place (fig. 46). (Raynor's land lay on both sides of Base Line Road in sec. 6, T. 1 S., R. 4 W.) By an agreement, in July 1875, between the owners of the Rancheria ditch and Raynor and his associates, the ditch owners were given the right to all the water that would flow without pressure through a 6-inch vertical slot in a specially constructed measuring box (written commun., San Bernardino Valley Municipal Water District, 1967). The actual discharge in miner's inches was not specified, but 2 years later (1877), a specific figure of 72 miner's inches was adopted by agreement with the newly formed Colton Land and Water Co. (Hall, 1888, p. 278).

Raynor and his associates were the subdividers of the city of Colton and the organizers of the Colton Land and Water Co. The company was organized in June 1877 with a capital stock of $50,000 divided into 500 shares. Through Raynor, a principal stockholder and the principal owner of land at Raynor Springs, the company acquired the rights to water from the springs, and later increased the flow from the area by drilling artesian wells. At about that same time, the company, in a new agreement with the owners of the Rancheria ditch, allowed the owners 75 miner's inches of water, or about one-third of the flow in the stream.

In the 1870's, during the period of dispute with Raynor and the Colton Land and Water Co., the use of water by Rancheria ditch owners was changing. Between 1870 and 1874, 20 to 25 irrigators used water from the ditch. However, the area served by the ditch was becoming increasingly moist because of rising ground-water levels, and some of the land no longer required irrigation. By 1879 the number of irrigators had dropped to 15, and by 1882 the number had further reduced to 10. After 1882, the decrease in need for water in the original service area resulted in the transfer of water rights in the Rancheria ditch to the bench west of Lytle Creek, in the upper part of the Colton Terrace area (Hall, 1888, p. 278).

The Colton Land and Water Co.'s water was carried in an open ditch (not shown on map) from Raynor Springs to an area near Colton. About half the water was used for irrigation and the other half was piped to the city of Colton. The ditch was probably near and parallel to the Rancheria and Vivienda pipelines (fig. 46 and p. 48-49). In 1881, 112 acres of citrus, grapes, and alfalfa were irrigated from that diversion. By 1888 the irrigated area had increased to 204½ acres--127 acres of citrus orchards and 77½ acres of deciduous fruit orchards.

In May 1889 Raynor contracted to sell and deliver to the Colton City Water Co. 50 miner's inches of continuous flow from the Raynor Springs area for $15,000. The water was delivered to the company through an iron pipe that terminated in the northwest corner of the city. In accordance with that agreement, Raynor was also to deliver to the Colton City Water Co. 4 miner's inches of perpetual flow from the Raynor Springs area. That smaller quantity was supplied to Raynor's property in Colton as part of an agreement with the Vivienda Water Co. (written commun., San Bernardino Valley Municipal Water District, 1967).

By an indenture between Raynor and the Vivienda Water Co. dated April 21, 1891, each party, by quit-claim, surrendered all rights acquired by either in three earlier agreements, and established a right of the Vivienda Water Co. to divert 148½ miner's inches of water from the Raynor property (p. 48). The following year Raynor signed a contract with the Semi-Tropic Land and Water Co. (p. 138) by which he agreed to deliver to the Rialto Irrigation District a continuous flow of 451½ miner's inches of water (written commun., West San Bernardino County Water District, 1967). (The Rialto Irrigation District is discussed on pages 137-138.) It was not required that the full 451½ miner's inches be delivered immediately after the date of the contract; instead, the deliveries were to be progressively built up by increments so that by May 1895 the Rialto Irrigation District was receiving the full 451½ miner's inches of water. None of this continuous flow was to be furnished or accepted between December 1 and May 1; the water was intended for the irrigation season only.

By these various contracts and agreements, the water committed for delivery from the Raynor tract increased from about 200 miner's inches in the late 1870's to 726 miner's inches in 1892. That increase reflected the rapid water development in the Raynor tract in a period of about 15 years. Much of the water was probably obtained from wells in the tract.

In April 1900 the owners of rights in the Rancheria ditch incorporated as the Rancheria Water Co. with a capital stock of $16,125 divided into 645 shares. Prior to incorporation, the rights to water in the ditch were based on hour-rights to the total flow every 8½ days. These hour-rights were conveyed to the new company, and each owner of water rights received stock in the company in proportion to his hour-rights. The term of the corporation was to be 50 years, but it was changed in July 1932 to perpetual existence.

The purpose of the corporation was to acquire, purchase, develop, own, and hold real property, water rights, and water privileges, and to construct and maintain facilities for the distribution of water. By 1924 the Rancheria Water Co. had acquired the right to develop 120 miner's inches of water, through various acquisitions of water-bearing land and water rights (written commun., West San Bernardino County Water District, 1967). However, the company later experienced financial difficulties and was declared bankrupt in 1959. On July 20, 1961, the court appointed a receiver to handle the property and assets of the Rancheria Water Co., thus ending the history of a small diversion established more than 100 years earlier (written commun., San Bernardino Valley Municipal Water District, 1967).

Lytle Creek Water Company

The history of the Lytle Creek Water Company had its beginnings with the coming of the Mormons to the San Bernardino Valley. The first Mormon settlers confined their activities to dry-farming and stock raising and from 1851 to 1854 or 1855 diverted water from Lytle Creek to their stockade for those purposes and for domestic use (p. 126). In 1853 George Lord settled on land south of Lytle Creek, west of the San Bernardino Rancho (fig. 46). He assumed that the land he settled on was Government land, but learned later that his land was included in the Muscupiabe Rancho (Hall, 1888, p. 327). Lord built a

ditch from the south side of Lytle Creek (fig. 46) and used the diverted water to raise several crops. During the same year two other settlers, Garner and Day, enlarged the Lord ditch to irrigate their crops.

A year later, in 1854, the Mormons built a new and larger ditch with its heading on the northeast side of the river, upstream from the heading of the Lord ditch (p. 126). The ditch was probably first known as the Town ditch, but later was called the Old Town ditch. Its exact location is not known, but was probably as shown in figure 46. Water from the ditch was used to irrigate fifty-two 1-acre parcels of land. The construction of the Mormon ditch, with its heading upstream from the heading of the Lord ditch, caused conflict between Lord and the Mormons because Lord claimed, and no longer had access to, as much water as he had used during the preceding year. The conflict was relieved in 1855 when the heavy rains of that year eliminated the need for irrigation. Furthermore, floodwaters in that year destroyed a part of the Mormon ditch. In 1856 the Mormons built a new and larger ditch from the north side of Lytle Creek. The intake to that ditch was upstream from the heading of the older ditch that had been partially destroyed by flood the year before (Hall, 1888, p. 328). The Mormons claimed all the water in Lytle Creek and that claim precipitated another conflict with Lord. The Mormons left San Bernardino during and shortly after 1857, but the conflict continued between Lord and the new owners of the Mormon property.

The Mormons that left the San Bernardino area between 1857 and 1859 to return to Utah did so in response to a call for their return from the head of the church in Salt Lake City (p. 96). Included in the property they sold to non-Mormons was land on the east side of Lytle Creek and water rights in the Old Town ditch that served that property. A Mr. Muscott, whom we will hear of later, was one of the buyers. The new owners began using water from the Old Town ditch for general farming, mostly in the Mount Vernon area. Several other ditches were built. Three that branched off from the Old Town ditch were known as the upper, middle, and lower Town ditches; others were known by the names of the farmers that built them. Some of the ditches are shown in figure 46.

Several other small ditches were built during the period 1855-71. In 1855, a ditch was built from the mouth of Lytle Creek to an area west of the creek (Hall, 1888, p. 328) for the irrigation of a cornfield. The crop failed and the ditch was abandoned. The next year a Mr. Perdew took over the ditch and extended it upstream, and in the next year or two a Mr. Hale extended the ditch even farther upstream. The ditch (fig. 45) became known as the Hale and Perdew ditch, or the Perdew ditch. Perdew is another name that we will hear later.

During 1859-60, Lord extended his ditch upstream to a new heading (Hall, 1888, p. 327-328). In 1871, a Mr. Henderson built a ditch that headed on the south side of Lytle Creek, downstream from the heading of the Lord ditch. The Henderson ditch, which extended to the south and crossed the Lord ditch, was to be used only for surplus or waste water, and received a supply only when flow in the creek was excessive. Later the Anderson ditch was built. Its heading was on the Henderson ditch, south of the Lord ditch. The claim to water in the Anderson ditch was subsequent to that of Henderson. (The Henderson and Anderson ditches are not shown on the maps.)

We now turn our attention to property ownership in the lower Lytle Creek area. The source of the local water supply--the junction of Lytle and Cajon Creeks--was part of the Muscupiabe Rancho. However, much confusion over property rights in the rancho arose because of its indefinite boundaries. When the rancho was originally granted to Michael White in 1843, it was believed to comprise 1 league (4,439 acres), more or less. When the rancho was surveyed in 1871 to determine its boundaries, the grant was found to comprise 30,145 acres, and a patent was granted for that acreage in 1872 (Cowan, 1956, p. 50). Thus many of the users of Lytle Creek water who had settled on land they believed to be Government land were actually on rancho land. The land, ditches, and water rights of those settlers were all within the boundaries of the Muscupiabe Rancho as defined in the final (1872) patent to the land.

White in 1855 disposed of the rancho by deeding a one-half interest to one party, and the other one-half interest to another. The properties changed hands a few times and by 1875 the former rancho lands were almost entirely in the hands of three persons--J. C. Hays, John Hancock, and A. J. Pope. A few individuals, however, still had clear title to small properties within the Rancho boundaries (written commun., Fontana Union Water Co., 1967). Property to the west of the rancho boundary was owned by Henry Pierce. (Pierce figures prominently in the history of the Semi-Tropic Land and Water Co. [p. 131-136].)

A. J. Pope, one of the owners of the grant, sued N. Kinman and other water appropriators in May 1877 (Hall, 1888, p. 329). Pope contended that the land adjacent to Lytle Creek was riparian to the water and only the landowners of that land were entitled to the use of the water. The defendants claimed that continued use of the water for 5 years or more entitled them to continual use of the water. The case was decided in the superior court of San Bernardino in favor of the defendants in December 1878 (Hall, 1888, p. 329). The case was then appealed to the Supreme Court of California, and in December 1879 the decision of the lower court was reversed; the decision was in favor of Pope on the grounds that riparian rights prevailed.

Kinman and the other defendants continued to use Lytle Creek water despite the court decision. To strengthen their cause most of the appropriators formed the Lytle Creek Water Co., which was incorporated in October 1881 with a capital stock of $75,000 divided into 750 shares (Hall, 1888, p. 330). The Perdew, Lord, Milligan, and Muscott water rights were not included in the company. The purpose of the company was to acquire water by appropriation and purchase; to buy and sell rights-of-way for ditches, conduits, and flumes; and to buy and sell real estate.

The company decided to adopt the distribution scheme that had been followed by owners of the Milligan and Muscott water rights. Those owners had divided the flow of Lytle Creek through the Old Town ditch and its branches into hour runs. Once every 15½ days, each owner received the total flow for the number of hours to which he was entitled. The company delivered its water to the stockholders under a similar scheme--the owner of each 1 hour-right had received two shares of stock. Although the owners of the Milligan and Muscott water rights were not included in the organization, they continued to receive their water on the same basis as the stockholders.

The Lytle Creek Water Co. acquired the Perdew right in February 1885 and continued to deliver water through the Perdew ditch (p. 129) to the service area (written commun., Fontana Union Water Co., 1967). In addition to his original right, Perdew transferred to the company a 1½ hour-right purchased from John Burcham. Perdew was to have his share of the wastewater allotted him through his stock.

The conflict continued between the three grant owners and the water appropriators, most of whom were stockholders in the Lytle Creek Water Co. An injunction was filed against those appropriators, but they continued to divert water for their use. During that time, however, the grant owners gradually bought stock in the Lytle Creek Water Co. until they had sufficient stock to control the company. That stock was later sold to the promoters of the Semi-Tropic Land and Water Co. along with land riparian to Lytle Creek. Close ties existed between the Semi-Tropic Land and Water Co. and the Lytle Creek Water and Improvement Co. (p. 132), and over a period of years the Semi-Tropic Land and Water Co. transferred its stock in the Lytle Creek Water Co. to the Lytle Creek Water and Improvement Co. Most of the remaining stock in the Lytle Creek Water Co. was gradually acquired by the Fontana Development Co. (p. 142-143). By 1905, of the original 750 shares of Lytle Creek Water Co. stock, 325 shares were held by the Lytle Creek Water and Improvement Co. and 382-2/60 shares were held by the Fontana Development Co. (written commun., Fontana Union Water Co., 1967).

On May 31, 1935, the Lytle Creek Water Co. executed two deeds, one to the Lytle Creek Water and Improvement Co. and one to the Fontana Union Water Co. (successor to the Fontana Development Co.). By those deeds the Lytle Creek Water Co. conveyed to each company, in accordance with the stock held by it, all the remaining assets of the Lytle Creek Water Co., and the Lytle Creek Water Co. was dissolved.

Semi-Tropic Land and Water Company and Lytle Creek Water and Improvement Company

The Semi-Tropic Land and Water Co. and Lytle Creek Water and Improvement Co. are discussed in a single section because their histories are too interrelated to be discussed individually.

The history of the Semi-Tropic Land and Water Co. starts about 1886 when G. H. Bonebrake, F. C. Hawes, and Samuel Merrill acquired large holdings of land and water rights. From Henry Pierce (p. 130) they purchased about 22,000 acres of land in the Bloomington, Fontana, and Rialto districts, as well as 378 shares in the Lytle Creek Water Co. They also purchased 6,438 acres of land with riparian water rights in the Muscupiabe grant. The 22,000 acres included all the land between Base Line Road and Jurupa Avenue, from Meridian to Citrus Avenues, and land from Citrus Avenue west to Mulberry Avenue, between Merrill and Jurupa Avenues (fig. 15). The area within the Muscupiabe Ranch was along Lytle Creek north of Base Line Road, but did not include 325 acres held by small property owners; one such property was the Lord place (fig. 46).

In January 1887, Bonebrake, Hawes, and Merrill laid out the town of Rialto and organized the Semi-Tropic Land and Water Co. The company was incorporated a month later with a capital stock of $3 million divided into 30,000 shares (written commun., West San Bernardino County Water District, 1967). The purpose of the company was to purchase, improve, hold, and sell real estate, water rights, and privileges; to build reservoirs and ditches; and to lay pipes to distribute water.

In April 1887 the three men deeded to the company all the land and water rights purchased from Pierce. Those water rights included the right to 800 miner's inches of Lytle Creek water that was associated with the stock in the Lytle Creek Water Co. that had been bought from Pierce. During 1887 and 1888 the company acquired various water rights associated with the Lord ditch including the Lord right to the first 90 miner's inches of Lytle Creek water (written commun., Fontana Water Co., 1967). At about this same time, Bonebrake, Hawes, and Merrill, in May 1887, posted a water location notice in Lytle Creek Canyon in the SE¼SE¼ sec. 36, T. 2 N., R. 5 W., claiming 3,000 miner's inches of water originating in the canyon.

The three organizers of the Semi-Tropic Land and Water Co. also organized the Lytle Creek Water and Improvement Co., which was incorporated in May 1887 with a capital stock of $1.5 million divided into 30,000 shares (written commun., West San Bernardino County Water District, 1967). Its purpose, somewhat broader than that of the Semi-Tropic Land and Water Co., was to acquire, develop, and sell land, water, and water rights; to construct dams, reservoirs, ditches, and flumes to conduct water to its land; to distribute and sell water to persons, towns, and cities; to develop and sell water power; and to buy and sell water stock.

The Semi-Tropic Land and Water Co. began construction of the Rialto Canal in 1887 (figs. 45 and 47). The canal replaced the crude ditch that had been used by the Lytle Creek Water Co., and the canal intake was about 2,000 feet downstream from the intake of the older ditch. The first section of the canal, about 5 miles long and paved, was completed in 1888. It ran from its intake at the mouth of the canyon to its junction with the Old Town ditch (fig. 46). In that same year water was delivered through the new paved canal (Hall, 1888, p. 325). The first water so conveyed included water for the Perdew ditch, the Lytle Creek Water Co., the Semi-Tropic Land and Water Co., and for other stockholders. The Lytle Creek Water Co.'s share was turned into that company's old ditches; the Semi-Tropic Land and Water Co.'s share was carried through an open conduit (later a closed conduit) to a distribution point later known as the Bowman box (fig. 45). From the Bowman box water was distributed through various lines to the Rialto district and the town of Rialto.

As part of the improvement and development of the town of Rialto and the surrounding area, the Semi-Tropic Land and Water Co. laid iron pipe in the town and built a concrete-pipe distribution system for irrigation throughout the Rialto district. (This system is not shown on the map.) Water for the domestic system was supplied through a line, independent of the irrigation system, that headed at the Bowman box.

FIGURE 47.--Rialto Canal; used 1888-1940.

After 1888 the ownership of land and water rights changed hands frequently, several such events often occurring concurrently. It becomes difficult, therefore, to maintain the chronology without losing the thread of the narrative. The reader's indulgence is therefore asked during the next several pages where an attempt is made to discuss the land and water-right exchanges in some kind of logical sequence.

In November 1889 the Semi-Tropic Land and Water Co. transferred the rights to 3,000 miner's inches of water to the Lytle Creek Water and Improvement Co. in exchange for the total capital stock of the latter company (written commun., Fontana Union Water Co., 1967). The Semi-Tropic Land and Water Co. did, however, reserve the right to all water it acquired in excess of 3,000 miner's inches, and company acquisitions continued. In that same year (1889) the company acquired the Ferguson ranch. That property (not shown on map) lay north of Highland Avenue along Lytle Creek Wash, upstream from the Lord place (fig. 46).

On October 26, 1891, the Semi-Tropic Land and Water Co. purchased from the Lytle Creek Water Co., for $30,000, the right to a continuous flow of 150 miner's inches at or above the Lord gate (head of the Lord ditch), with the option that one-half of the 150 miner's inches could be diverted at or near the Lord gate, and the remainder at any point upstream from the gate. The location of the Lord gate is not known but it probably was at a point on Lytle Creek Wash at or near the Old Town ditch crossing (fig. 46).

On the same day the Semi-Tropic Land and Water Co. deeded the above right to 150 miner's inches, and associated property rights, to J. C. Campbell. The agreement stipulated that the company could use the Campbell water at any point above the Lord gate, but in return the company would either deliver an equivalent quantity of water to the Lord gate, or would manage its diversions so that Lytle Creek flow would not drop below 150 miner's inches at the Lord gate. The agreement also gave the company the right-of-way for a pipeline to convey water from the Lord gate, or other point of delivery, to the northwest corner of the San Bernardino Rancho near the intersection of 27th and California Streets in Muscoy, and then south to the Muscott place (not shown on map). In return Campbell delivered 120-56/60 shares of capital stock in the Lytle Creek Water Co., and also rights to use flow from Lytle Creek not represented by that stock. Those rights included: 12 hours and 47 minutes of flow, in regular turn, acquired from H. B. Muscott; 50 miner's inches for 12 hours in every 14 days (known as the Lord right), acquired from G. A. Rene; and a mortgage interest in a 4-hour run of 50 miner's inches every 7 days.

In order to complete the story of the Campbell water right we move ahead 15 years. The Campbell right to 150 miner's inches of Lytle Creek water (also known as the Hubbard right) was split in 1906, when the city of San Bernardino purchased the right to 100 miner's inches and the Mount Vernon Water Co. acquired the remaining right to 50 miner's inches (written commun., city of San Bernardino, 1967). The city received its 100 miner's inches at the Lord box, then conveyed it in a pipeline along the base of the bluff to its reservoir in the McKenzie tract north of Base Line Road (fig. 45). The Mount Vernon Water Co., which had incorporated in March 1900 to furnish irrigation water to the area originally supplied by the Old Town ditch, received its 50 miner's inches at the Bowman box (fig. 46), from which point the water entered the company's distribution system. In February 1967 the city of San Bernardino acquired the Mount Vernon Water Co.'s right to the 50 miner's inches. By an agreement made at the time of the acquisition, the city was to furnish water to the remaining stockholders of the company as long as the water was used for irrigation. However, by that time irrigation had practically ceased in the area referred to in the agreement--an area that had been first served by the Old Town ditch about 110 years earlier.

We now return to the 1890's and the further history of the Semi-Tropic Land and Water Co. The company had borrowed large sums of money from such organizations as the California Loan and Trust Co. and the San Francisco Savings Union, for the development of its water-supply and distribution systems. Those systems included the canal from the mouth of Lytle Creek Canyon to the head of the distribution system for the Rialto district, and the distribution system for the town of Rialto. For collateral, the company gave deeds to its landholdings, water rights, and stock; the Rialto domestic supply system was not included as collateral. The Semi-Tropic Land and Water Co. was not able to meet its financial obligations and in 1896 the company was declared bankrupt (written commun., Fontana Union Water Co., 1967).

When bankruptcy was declared, the California Loan and Trust Co., which held notes of the bankrupt company, offered to sell the Rialto domestic supply system, which included a small reservoir, for $6,000, and offered to include 33 shares of Lytle Creek Water and Improvement Co. stock for $7,800 (written commun., West San Bernardino County Water District, 1967). No buyer was then available, but the system was later acquired by A. B. Miller and associates and included in the assets of the Fontana Land and Water Co. (p. 143).

The following year (1897) the San Francisco Savings Union sold the water rights and stock of the bankrupt Semi-Tropic Land and Water Co. to the Chicala Water Co. of Iowa, and its land to the Anglo-American Canaigre Co. Those two companies retained control of their purchases from 1897 to 1901, after which the purchased properties were sold to the Fontana Development Co. (p. 142). During the years 1897-1901, some of the land was sold, and the Canaigre ditch (figs. 45 and 48) was built.

The Lytle Creek Water and Improvement Co. was also having financial problems in the mid-1890's. In March 1896 the company deeded all its water rights in Lytle Creek to the San Francisco Savings Union, except for the first 500 miner's inches which were represented by 500 shares of stock in the Lytle Creek Water Co. (written commun., West San Bernardino County Water District, 1967). The Lytle Creek Water and Improvement Co. also retained a right equivalent to seven shares of Lytle Creek Water Co. stock, or 3.741 miner's inches. Thus the company retained rights to 503.741 miner's inches of the 800 miner's inches originally deeded to it by the Semi-Tropic Land and Water Co. (p. 132), and its capital stock was reduced to 5,000 shares (representing 500 miner's inches of water) from its original 30,000 shares (representing 3,000 miner's inches of water).

FIGURE 48.--Canaigre ditch along Sierra Avenue; used 1897-1930.

Later that same year (1896) there was an adjudication of water rights in Lytle Creek, stemming from a suit filed by the Lytle Creek Water and Improvement Co. against the Grapeland Irrigation District (p. 141-142). The rights, as defined by the judgment in that suit, are listed below in order of priority.

		Water rights, in order of priority	Miner's inches
1.	(a)	Lord Water Right	96.00
	(b)	Lord Salvage Water Right[1]	32.00
2.		Riparian Water Right No. 1	20.00
3.	(a)	Muscott Water Right	20.79
	(b)	Milligan Water Right	2.439
	(c)	Campbell Water Right	150.00
	(d)	Campbell Salvage Water Right[1]	50.00
	(e)	Right awarded to the Lytle Creek Water Co.	381.771
	(f)	Lytle Creek Water Co. Salvage Water Right[1]	45.00
4.		Riparian Water Right No. 2	600.00
5.		Appropriation Water Right	602.00
		Total	2,000.000

[1]The term "salvage water right" applied to the right to the quantity of water whose seepage into the channel is prevented by paving the channel; or, the right to the gain in transported water that occurs when an unlined channel is paved.

Several smaller rights were adjudicated in the water of Lytle Creek, but they were subordinate to the rights listed. Because the flow seldom exceeded 2,000 miner's inches, that quantity was used as the basis of the settlement.

In March 1899 the Lytle Creek Water and Improvement Co. acquired a part of the Lord place (another part was acquired in 1908). In 1900 a well was dug on that property, but pumping ceased some time later when the water table declined. Later in 1900 the company granted to R. M. Welch, trustee for the Anglo-American Canaigre Co., 1,862 shares of capital stock, or the equivalent of 177.518 miner's inches of flow in Lytle Creek. The Lytle Creek Water and Improvement Co. retained title to 326.223 miner's inches, and that is the quantity of Lytle Creek surface flow that the company was entitled to, as of 1967 (written commun., West San Bernardino County Water District, 1967). In June 1960 the area served by the Lytle Creek Water and Improvement Co. was annexed by the Semi-Tropic County Water District, the predecessor of the West San Bernardino County Water District (p. 141).

Rialto Irrigation District

The Rialto Irrigation District (fig. 49) was organized in October 1890, in accordance with an act passed by the legislature of California, known as the Wright Act (written commun., West San Bernardino County Water District., 1967). At the first meeting of the board of directors in that same month, a committee was appointed to determine the quantity of water needed by the district, the sources of available water, and the length and capacity of pipelines needed to distribute the water. The committee reported the next day that the district would require 1,000 miner's inches of water at a cost of $500 per miner's inch. The water was to be distributed on the basis of 1 miner's inch for each 7-23/100 acres, there being about 7,200 acres, divided into 10- and 20-acre farm lots, within the district.

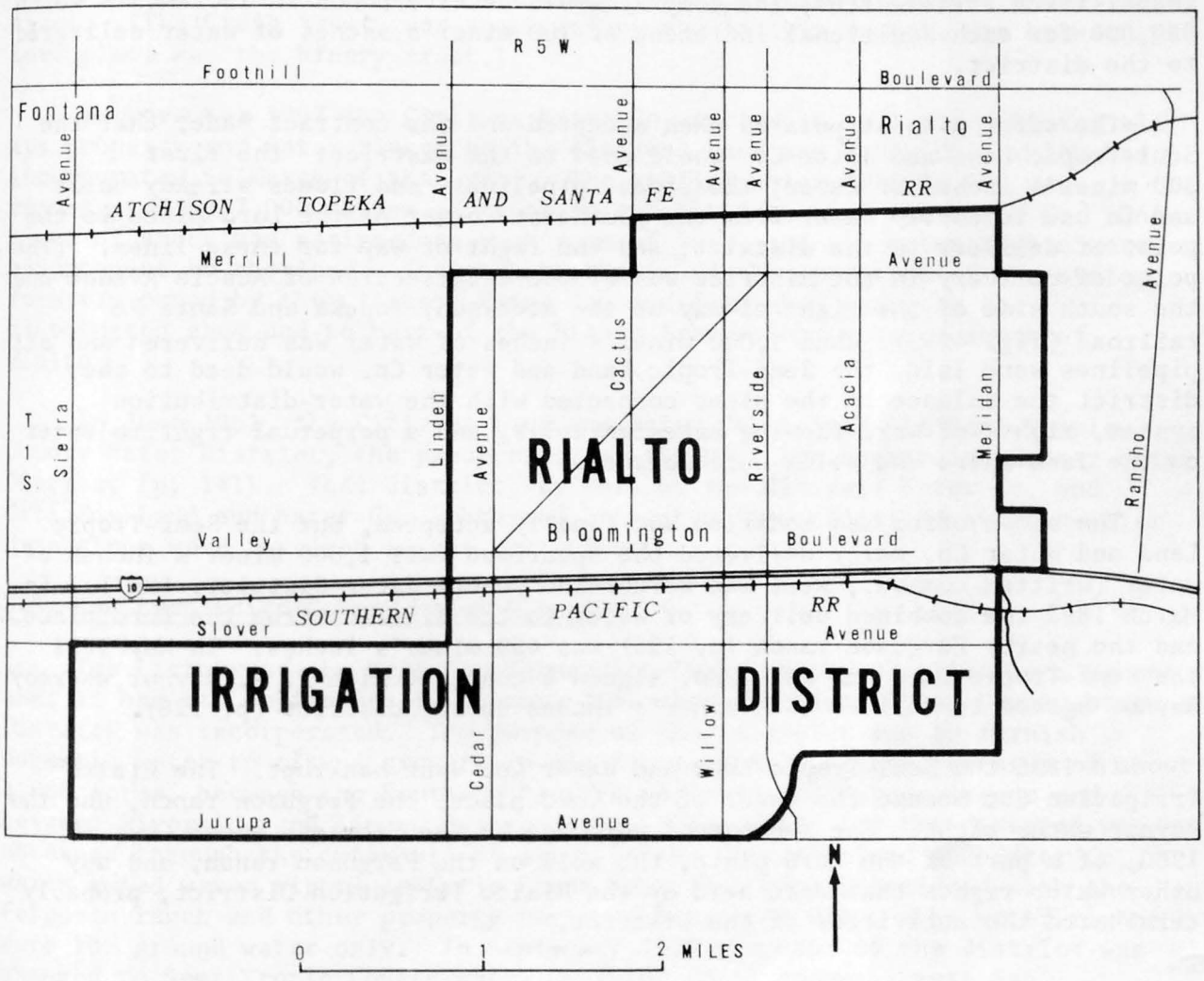


FIGURE 49.--Rialto Irrigation District.

The committee also recommended that the district vote a $500,000 bond issue in accordance with the Wright Act. Proceeds from the sale of the bonds would be used to acquire a supply of water and to build the pipelines necessary to deliver and distribute water in the district. The bond issue was approved by the voters in November 1890 with no dissenting votes (written commun., West San Bernardino County Water District, 1967).

In that same month the directors considered an offer by the Semi-Tropic Land and Water Co. to sell to the district 1,000 miner's inches of water at a cost of $500 per miner's inch. The water, from artesian wells on the Lord place (fig. 46) or on nearby lands, would be distributed in cement or clay pipes adjacent to each 20-acre farm lot in the district. In payment, the Semi-Tropic Land and Water Co. would receive bonds of the Rialto Irrigation District at par value. Bonds worth $150,000 would be advanced to the Semi-Tropic Land and Water Co. when 300 miner's inches of water was delivered to the district. Thereafter, the company would receive bonds in increments worth $50,000 for each additional increment of 100 miner's inches of water delivered to the district.

The offer also stipulated when accepted and the contract made, that the Semi-Tropic Land and Water Co. would deed to the district: the first 300 miner's inches of water; the pipes, pipelines, and flumes already built and in use to convey water from the southeast corner of the Lord place to the point of delivery in the district; and the right of way for these lines. (The point of delivery in the district was at the intersection of Acacia Avenue and the south side of the right-of-way of the Atchison, Topeka and Santa Fe railroad (fig. 49).) When 1,000 miner's inches of water was delivered and all pipelines were laid, the Semi-Tropic Land and Water Co. would deed to the district the balance of the pipes connected with the water-distribution system, rights-of-way, flowing artesian wells, and a perpetual right to enter on the land where the wells were located.

The above offer was modified and finally accepted, but the Semi-Tropic Land and Water Co. never delivered the specified full 1,000 miner's inches of water (written commun., West San Bernardino County Water District, 1967). In March 1892 the combined delivery of water to the district from the Lord place and the nearby Ferguson ranch (p. 133) was 450 miner's inches. In May 1892 the Semi-Tropic Land and Water Co. signed a contract with P. A. Raynor whereby Raynor agreed to deliver 451½ miner's inches to the district (p. 128).

In 1896 the Semi-Tropic Land and Water Co. went bankrupt. The Rialto Irrigation Co. became the owner of the Lord place, the Ferguson ranch, and the Raynor water right. The subsequent purchase by the Citizens Water Co., in 1900, of a part of the Lord place, the well on the Ferguson ranch, and any other water rights that were held by the Rialto Irrigation District, probably terminated the activities of the District.

Citizens Land and Water Company

Information on the history of the Citizens Land and Water Co. and its predecessor, the Citizens Water Co., was furnished by the West San Bernardino County Water District.

The Citizens Water Co. was organized in December 1899 and was incorporated the following month. In March 1900 the company contracted with the Rialto Irrigation District for the purchase of the Lord place (fig. 46), the Ferguson ranch (p. 133), and the Raynor water right (p. 138). At about the same time the company purchased the Winery tract (not shown on map), which was near the Lord place. The Rialto Irrigation District broke the contract, but in May 1900 the Citizens Water Co. purchased a part of the Lord place, including a tunnel leading from a well on the property; the company also purchased a well on the Ferguson ranch. The following year the company signed an agreement with the owner of the Craig tract to lease all water under the tract. (The Craig tract, not shown on any map in this report, was between the Lord place and the Winery tract.)

In November 1907 the Citizens Water Co. agreed to sell and transfer all its property and water rights to the Citizens Land and Water Co., which had incorporated in March of that year. The selling price of $350,000 was represented by 7,000 shares of stock in the Citizens Land and Water Co. One share of stock was assigned to each acre of land, and all water rights were appurtenant to the land. The company continued the operation of the system formerly owned by the Citizens Water Co. and furnished water to the Bloomington area and to part of the Rialto Irrigation District south of Rialto.

In June 1961, the Citizens Land and Water Co. joined the Semi-Tropic County Water District, the predecessor of the West San Bernardino County Water District (p. 141). That district, as well as the Citizens Water Co. and Citizens Land and Water Co., obtained its water from wells; no surface-water diversions were involved in the operations.

West San Bernardino County Water District

The history of the West San Bernardino County Water District is a recent one; it had its beginnings in January 1952 when the Bloomington County Water District was incorporated. The purpose of that district was to furnish domestic water to citrus growers in the Bloomington district, an area of about 1,000 acres, between the Southern Pacific railroad and Jurupa Avenue and between Riverside and Linden Avenues (fig. 50). Water for the district was obtained through the ownership of stock in the Citizens Land and Water Co., which owned water rights in Lytle Creek Wash that were associated with the Ferguson ranch and other property north of Base Line Road. The water rights were for ground water only. In September 1959 the name of the district was changed to Semi-Tropic County Water District (oral commun., West San Bernardino County Water District, 1967).

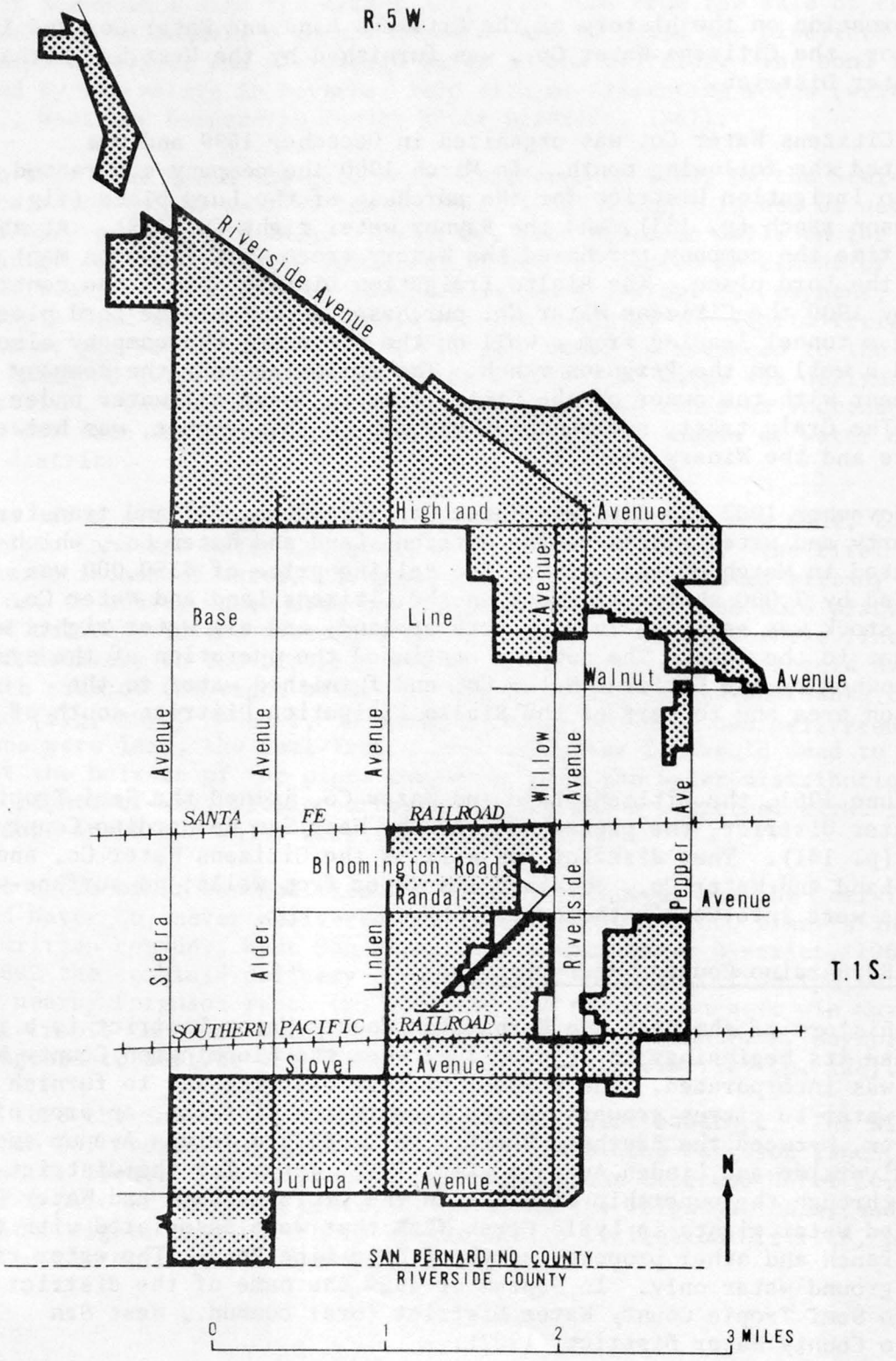


FIGURE 50.--West San Bernardino County Water District.

In June 1960 the Semi-Tropic County Water District annexed the area served by the Lytle Creek Water and Improvement Co. (p. 136), and in June of the following year the district annexed the service area of the Citizens Land and Water Co. (p. 139). In October 1961 the voters within the district approved a revenue bond issue of $3,550,000 to be used in the purchase of all assets of the Lytle Creek Water and Improvement Co., the Citizens Land and Water Co., and the Slover Mutual Water Co. (a company that supplied water from wells). On December 7, 1961, before the sale of the revenue bonds, the district changed its name to the West San Bernardino County Water District. The revenue bonds were sold in February 1962, and on the last day of that month the district acquired the assets of the three companies and took over all operations (oral commun., West San Bernardino County Water District, 1967). The district comprises four areas, two of them quite small (fig. 50).

The irrigated area served by the district (vicinity of Rialto) probably reached a peak of 3,500 acres in the mid-1950's, but it declined rapidly after that to about 350 acres in 1966.

Grapeland Irrigation District

The Grapeland Irrigation District was organized in June 1890, in accordance with the Wright Act (written commun., Fontana Union Water Co., 1967). The district included 10,600 acres and had the irregular boundaries shown in figure 45.

Several years prior to the organization of the district, Colonel A. B. Hotchkiss and Doctor W. G. Daniel had acquired a large piece of land in Lytle Creek Canyon on both sides of the creek between the Upper and Lower Narrows (fig. 45). They had filed claims on all the water that could be developed by ditches, tunnels, drains, storage reservoirs, and submerged dams in that reach of canyon, and they had been working continuously for some time developing water by means of tunnels and excavations. In January 1891 the Grapeland Irrigation District agreed to buy from Hotchkiss and Daniel 3,000 miner's inches of water, or as much water as could be delivered to the district within 2 years. The district agreed to pay $150 per miner's inch for all water delivered. In their first development, Hotchkiss and Daniel were able to deliver 20 miner's inches of water to the district. In January 1892 Hotchkiss and Daniel offered to sell all their property and water-development works to the district for $50,000. The district made a counter offer of $25,000 which was later accepted by Hotchkiss and Daniel (written commun., Fontana Union Water Co., 1967).

Immediately after purchase of the Hotchkiss and Daniel property, the Grapeland Irrigation District surveyed and built a tunnel, starting on surface bedrock at the Lower Narrows and extending 2,850 feet upstream. The purpose of the tunnel was to intercept the underflow of Lytle Creek. A ditch was also built, with its heading downstream from the tunnel and downstream from the intake to the canal of the Lytle Creek Water and Improvement Co. The ditch, which was about 2 miles long, ran along the base of the foothills (fig. 51), crossed the canal in a siphon, and terminated at the highest point in the district service area. Water from the tunnel was measured at the tunnel mouth where it discharged into the creek, and the quantity measured was diverted downstream at the heading of the district ditch (written commun., Fontana Union Water Co., 1967).

FIGURE 51.--Grapeland Irrigation District ditch along Muscupiabe Rancho line; used 1892-1937.

Actually, the Grapeland Irrigation District had, in 1892, acquired a right to 5,000 miner's inches of surplus Lytle Creek water, but probably was never able to divert that quantity. The district continued to divert water for irrigation from its tunnel until about 1901 when the Fontana Development Co. leased the tunnel.

Successive Fontana Companies

This section of the report traces the history of the succession of land and water-development companies that operated in the Fontana area, beginning at the turn of the century. Those companies that were engaged solely in the development of hydroelectric power are discussed in a separate section of this report (p. 144-145).

The Fontana Development Co. was organized about 1901 and made several land and water acquisitions in that year, among which were the interests held by the Cicala Water Co. of Iowa and the Anglo-American Canaigre Co. (p. 135). Those two acquisitions included about 20,000 acres of land and a little more than 1,500 miner's inches of the surface flow of Lytle Creek. At about that same time the company executed a lease with the Grapeland Irrigation District whereby the company acquired the right to use, for a fixed time, the tunnel and shafts of that district in Lytle Creek Canyon. The distribution facilities obtained in 1901 by the Fontana Development Co. were also used by the companies that succeeded it. The Canaigre ditch was used until 1930; the Grapeland Irrigation District ditch along the Muscupiabe Rancho line (fig. 51) was used until 1937 (oral commun., Fontana Union Water Co., 1967); a pipeline laid in the western branch of the Grapeland ditch (fig. 45) in 1926 is still in use.

In April 1901 the Fontana Development Co. leased 200 miner's inches of water to the Lytle Creek Water and Improvement Co. (written commun., West San Bernardino County Water District, 1967). The next significant development occurred 2 years later (1903) when the company, along with the Lytle Creek Water Co. and the Lytle Creek Water and Improvement Co. built a pipeline from the Grapeland tunnel to the intake of the ditch that had been used by the Grapeland Irrigation District. Previously, the tunnel discharge had flowed down the creek channel to the ditch intake (p. 141).

In 1906 another company came on the scene. The Fontana Land and Water Co. was organized to "purchase, lease, own, hold, sell, and generally deal in franchises, easements, and real and personal property of every kind and nature, including stocks and bonds of other corporations, water, ditches, flumes, tunnels, wells, conduits, pipes and pipelines, and poles and wires for the carriage and transmission of electricity, and for other purposes." The company was incorporated May 25, 1906 (written commun., Fontana Union Water Co., 1967). The first meeting of the organizers of the company was held a week later and A. B. Miller, one of the organizers, was elected manager by the board of directors.

The new company agreed to buy 3,750 shares of stock of the Fontana Development Co. at a par value of $100 per share. This stock represented land and water rights in Lytle Creek. The domestic water-supply system of the city of Rialto was purchased by Miller and associates from the receivers of the bankrupt Semi-Tropic Land and Water Co. (p. 134), and the Rialto water-supply system was included in the assets of the Fontana Land and Water Co.

At this point we digress to complete the history of the Rialto water-supply system. In 1910 the Fontana Land and Water Co. sold the system, with a surface-flow right of 43.22 miner's inches in Lytle Creek, to Swing and Harris. These two men may have been the organizers of the Rialto Domestic Water Co., which was the name of the system after its purchase in 1910. In 1924 a bond issue was approved by the voters in the city of Rialto which enabled the city to purchase the holdings of the Rialto Domestic Water Co. for $140,000 (written commun., city of Rialto, 1967).

We return again to our discussion of the proliferation of land and water companies in the Fontana area. The Fontana Water Co. was organized and incorporated December 31, 1909, with a capital stock of $40,000 divided into 400 shares (written commun., Fontana Union Water Co., 1967). The company acquired 382-2/60 shares of Lytle Creek Water Co. stock held by the Fontana Development Co. (p. 131), as well as the right to use the ditches originally built by the Grapeland Irrigation District and leased by the Fontana Development Co. The Fontana Water Co. operated until 1912 when A. B. Miller and associates purchased all its properties and the major portion of its water rights in Lytle Creek. The purchasers then organized two new companies in 1912, the Fontana Land Co. and the Fontana Union Water Co., each of which was incorporated for $1 million. These two companies represented the reorganization of the Fontana Development Co. and the Fontana Land and Water Co.

Still another company, the Fontana Domestic Water Co., was organized in the late 1920's to furnish a domestic supply to the agricultural area in the Fontana district. Its water was obtained from the Fontana Union Water Co. through ownership of capital stock in that company. In the late 1940's the San Gabriel Valley Water Co. acquired the holdings of the Fontana Domestic Water Co. and has been delivering domestic water to the service area since that time.

In 1924 the interests of the Fontana Land and Development Co., Fontana Water Co., Fontana Land Co., and Orchard Mutual Co. (a company that owned several wells in the Fontana area) were combined with those of the Fontana Union Water Co. (written commun., Fontana Union Water Co., 1967). This consolidation placed all the water rights of those companies under the management of the Fontana Union Water Co., a situation that still (1968) exists.

The irrigated acreage in the Fontana area reached its peak in the 1940's and then declined, as in most agricultural areas in the Santa Ana River basin, as a result of urban encroachment. The irrigated area in the Fontana district was 15,000 acres in the 1940's and only about 3,000 acres in 1967 (oral commun., Fontana Union Water Co., 1967).

McIntyre Ditch

The McIntyre ditch was a small ditch that diverted flow from the south side of Lytle Creek, east of Mount Vernon Avenue (figs. 45 and 46). It was owned by local ranchers and served an area east of Mount Vernon Avenue and north of Colton Avenue. The ditch was not interconnected with any upstream diversion ditches, and its supply was probably derived from rising water (for definition, see p. 36). The period of operation of the ditch is not known, but it was probably built in the late 1880's or early 1890's. Lippincott (1902a, p. 26) stated that the ditch was dry in 1898, 1899, and 1900.

Hydroelectric Power Development

The Lytle Creek Light and Power Co. was incorporated in May 1897 as a subsidiary of the Redlands Electric Light and Power Co. Its purpose was to obtain rights-of-way for conduits to power sites in Lytle Creek Canyon (Fowler, 1923, p. 529). The Lytle Creek Light and Power Co. began the construction of a conduit from its intake at Miller Narrows to the powerhouse shown in figure 45. In November 1903, before construction of the conduit was completed, the Edison Electric Co. of Los Angeles obtained control of the Redlands Electric Light and Power Co., and took over the conduit rights-of-way and rights to various power sites on Lytle Creek. The construction of the hydroelectric system was completed by the Edison Electric Co., and the Lytle Creek powerhouse has been in operation continuously since September 15, 1904 (Fowler, 1923, p. 609). The Edison Electric Co. was reorganized in 1909 as the Southern California Edison Co.

As originally built, the conduit included a sand trap, five siphons, and sections of flume, canal, concrete pipe, and steel pressure pipe (penstock). The length of the conduit from the intake to the powerhouse is 21,723 feet.

Its capacity is 24 cubic feet per second. A siphon was built across Lytle Creek from the tailrace to the Rialto Canal (fig. 45), to assure that no water would be wasted regardless of how the powerplant was operated.

A second powerhouse, the Fontana powerhouse (fig. 45), farther downstream on Lytle Creek, was put in operation in December 1917 (Fowler, 1923, p. 611). It was built by the Fontana Power Co. and leased to the Southern California Edison Co. on a 30-year contract. Water was delivered to the penstock in a concrete channel 12 feet wide, 10 feet deep, and 130 feet long. The upstream end of that channel was at the weir boxes at the head of the Rialto Canal. The downstream end of the channel was at the head of the penstock and was equipped with a trash rack and sand trap. The 130-foot channel served as the forebay to the powerhouse. The penstock was a pressure pipe that had been laid in a trench that was then backfilled. A connection was made from the yellow weir in the Rialto Canal to the Canaigre ditch, so that water could be delivered in the area served by the ditch. However, the Canaigre ditch has not been used as a water-supply conduit since 1930 (p. 142).

The water for the Fontana powerhouse includes water that passed through the Lytle Creek powerhouse, water from the Grapeland tunnel (p. 141-142), and water diverted from Lytle Creek at the Rialto Canal intake (p. 132). The Rialto Canal itself has not been used as a water-supply conduit since 1940 (oral commun., West San Bernardino County Water District, 1967). On December 31, 1942, the Southern California Edison Co. purchased the Fontana powerhouse.

Minor Diversions in the San Bernardino Area

Town Creek

During periods of heavy runoff, water from Devil and Waterman Canyons overflowed into the depression at the north end of H Street in San Bernardino, south of Shandin Hills (fig. 45). That depression was drained by Town Creek (fig. 46).

Water from Town Creek was used by the Lugo family (p. 95) and later by Mormon settlers. During the development of San Bernardino by the Mormons, water from the creek was diverted to irrigate small plots of land within the present business district of the city. At first the diversions were known as Town ditch Nos. 1, 2, 3. (These ditches should not be confused with the Town ditch, or Old Town ditch, discussed on page 129 and elsewhere in the text.) In later years the water commissioners designated those ditches as East Upper Dam, West Upper Dam, and Lower Dam. At the time Hall (1888, p. 279) made his field survey, water was being used for irrigation.

Water flowed intermittently in Town Creek for a number of years. During the development of San Bernardino in the Shandin Hills area, a large conduit was laid in the creek channel and covered. By 1954 there was no surficial evidence of Town Creek.

Bemis Ditch

The source of water for Bemis ditch was a swamp known as Tompkins Swamp. Neither the ditch nor Tompkins Swamp are shown on the maps in this report, but Tompkins Swamp was on the east side of Lytle Creek and it extended southeast from Ninth Street to about the intersection of Second Street and Mount Vernon Avenue in San Bernardino (oral commun., L. R. Bemis, 1967). The Bemis ditch ran south from the swamp and crossed Fourth and Fifth Streets. The ditch was used for irrigation at the time Hall (1888, p. 279) made his field survey. Mendenhall (1905, pl. XII) noted a stream flowing into Lytle Creek from about the location of the lower end of the swamp referred to by Bemis, but Mendenhall did not show the Bemis ditch on his map.

Garner Swamp Ditch

The Garner Swamp ditch (not shown on maps) diverted from the Garner Swamp along the east side of Lytle Creek, near Raynor Springs (fig. 46). Water from the ditch irrigated land along the ridge on the east bank of the east branch of Lytle Creek. The Garner Swamp ditch was in use at the time Hall (1888, p. 279) made his field survey. The decline in water levels and pressures in the Lytle Creek artesian basin dried up the Garner Swamp, thereby eliminating the source of the diversion.

Crawford Canyon Mutual Water Company

Some time prior to 1926, a group of property owners, west of the mouth of Lytle Creek, filed a claim to the first three miner's inches of flow from Crawford Canyon (fig. 45). They built a small reservoir and a pipeline to convey the flow from the canyon to the reservoir.

The owners formed the Crawford Canyon Mutual Water Co., which was incorporated in December 1926, with a term of existence of 50 years, and with a capital stock of $24,000 divided into 120 shares. All the shares were active in 1967. The purpose of the company was to acquire land, water, and water rights; to build, operate, and maintain ditches, conduits, tunnels, pipelines and reservoirs; and to furnish water at cost to stockholders only, for domestic and irrigation use. In 1967 water was supplied to 40 homes for those two purposes. The water is metered and users are assessed at the rate of $8.00 for a minimum of 12,000 gallons twice a year (oral commun., Crawford Canyon Mutual Water Co., 1967).

Sansevain's Ditch

Sansevain's ditch (fig. 45) was a small ditch that diverted from San Sevaine Creek, a short distance upstream from the mouth of the canyon. The owner of the ditch, which was built some time before 1879, claimed all the water in the canyon. On May 19, 1879, the ditch carried about one quarter of a cubic foot per second and discharged into a reservoir (Hall, 1888, p. 342). The water in that year was used to irrigate about 30 acres.

In 1888 the ditch was abandoned, but was reactivated a few years later by a new owner of the ditch and water right. The water was then used to irrigate about 200 acres, mostly vineyards. Starting in 1918 the vineyards were

gradually removed and the land was converted to pasture. The diversion remained active until its discontinuance in the late 1930's or early 1940's (oral commun., Grover Henderson, 1967).

Etiwanda Water Company

The history of the Etiwanda Water Co. had its beginnings in a series of claims for water from Day and Etiwanda Creeks. In July 1867 George Day, who lived on the west side of Middle Creek (fig. 52), an Etiwanda Creek tributary, filed a claim for all the water of West Canyon, now known as Day Canyon. He built a ditch (fig. 53) to carry irrigation water from the east side of the canyon to land near his house (written commun., Etiwanda Water Co., 1967). Day filed a second claim in July 1869, for all the water in both West and East Canyons, the latter now known as East Etiwanda Canyon (fig. 52). A third claim was filed by Day and W. E. Pierce in the summer of 1873 for all the water in Day (West) Canyon up to 400 miner's inches (Hall, 1888, p. 336). They dug a ditch 2 feet wide and 1½ feet deep, to bring water from the canyon to the land to be irrigated. At about that same time, August 1873, Day filed a claim for all the water in Middle Canyon.

Five years earlier, in 1868, Day had sold a half interest in his water rights. The transferred water rights changed hands several times in the next few years, before being acquired by I. P. Smith. By 1874 Day and Smith shared equally the ownership of all the water from Day, East Etiwanda, and Middle Canyons.

In 1874 Smith sold to J. S. Garcia 560 acres on both sides of Etiwanda Avenue, immediately south of Summit Avenue (fig. 52), as well as the Smith right to half the water from the three canyons. Garcia irrigated about 20 acres that year. The location of Garcia's ditches is not known, but an early ditch may have followed the natural channel of Middle Canyon Wash; the State Engineer reported the use of water from the canyons in 1879 and 1880, citing delivery through the Garcia ditch (Hall, 1888, p. 336).

Day died in 1879 and in the course of the next 2 years all his property, including water rights, became the property of a Mr. Petsch. In January 1882, George Chaffey and his brother, W. B. Chaffey, purchased from Garcia and Petsch all property, water rights, and ditches owned by the two men, thereby giving the Chaffeys complete ownership of water rights in Day, East Etiwanda, and Middle Canyons. On May 9, 1882, the Chaffeys organized the Etiwanda Water Co. with a capital stock of $500,000 divided into 5,000 shares (written commun., Etiwanda Water Co., 1967).

The first meeting of the Etiwanda Water Co. was held May 16, 1882. By that time only 318 of the 5,000 shares of stock had been subscribed to by purchasers of land in the area. The Chaffeys contracted to deliver water to the new company from Day, East Etiwanda, and Middle Canyons, and to construct a distribution system for the service area. By the terms of the contract the Chaffeys reserved the exclusive right to increase the water supply. The company agreed to issue stock to the Chaffeys at the rate of one share for each miner's inch of water delivered to the distribution system. One thousand shares of stock were transferred to the Chaffeys soon after the signing of the contract; an additional 500 shares of stock were issued to them in September 1882 (Hall, 1888, p. 336).

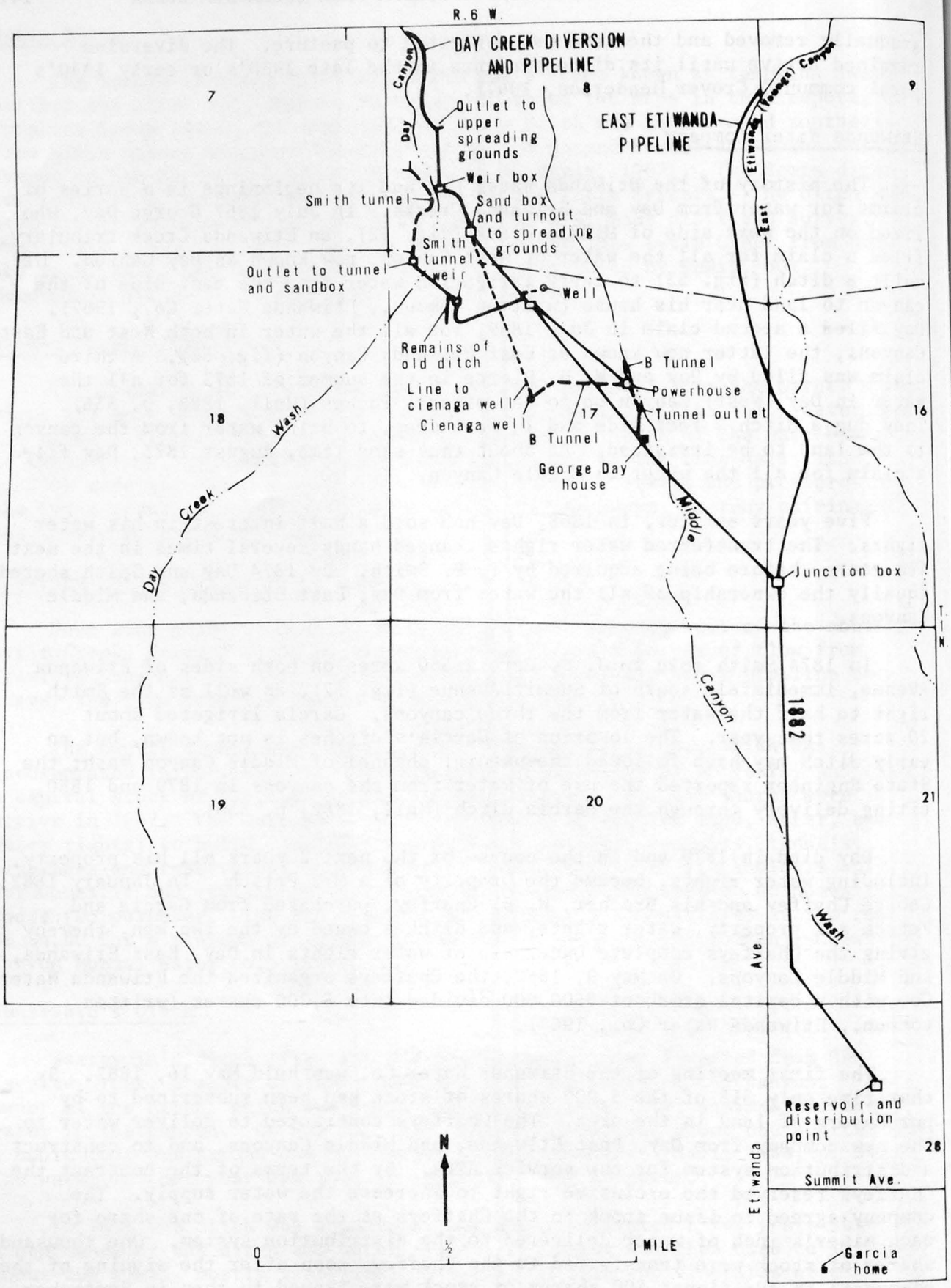


FIGURE 52.--Water developments of the Etiwanda Water Company.

FIGURE 53.--Part of old ditch along east bank of Day Creek.

As part of the contract, the Chaffeys agreed to bring water from the canyon to the distribution system in a flume. To handle the construction of the distribution system and the sale of acquired land, the Chaffey brothers, in June 1882, organized the California Land Improvement Co., with a capital stock of $500,000 divided into 10,000 shares. They deeded to the company all their land in the area and all their water-right property and water claims that had not been specifically transferred to the Etiwanda Water Co. They also transferred their contract with the Etiwanda Water Co. to the new company (Hall, 1888, p. 337).

As owners of the California Land Improvement Co., the Chaffeys built the flumes and the distribution system and began selling land, together with the water to be delivered to each parcel of land at the rate of 1 miner's inch to each 8 acres. The first section of the flume was completed in September 1882; it ran from a point near the southwest corner of sec. 16, T. 1 N., R. 6 W., to a small reservoir (fig. 52) at the head of the distribution system (written commun., Etiwanda Water Co., 1967). The section of flume from the Day Creek diversion dam to the head of the first section of flume was completed the next year. It might be mentioned at this point that the diversion system is shown in figure 45 as well as in figure 52, but with some differences. Figure 52 is based on a map of the system made in 1916; the system as it existed in 1967 is shown in figure 45.

The Chaffeys proposed to increase the quantity of water diverted from Day Creek by the use of tunnels in the cienagas to drain those swampy areas, and by the use of tunnels in the streambed to intercept underflow. They reserved the right to the additional water they would develop over the following 10 years. In return for this additional water the California Land Improvement Co. would turn over additional stock to the Chaffeys. As a means of

determining the quantity of additional water developed, the flow at the reservoir was to be measured July 15, 1883, and again each July for the following 10 years (Hall, 1888, p. 337). In July 1888 the total flow entering the reservoir was 420 miner's inches, and at that time 652 acres of citrus fruits, deciduous fruits, grapes, alfalfa, and summer crops were being irrigated.

At this point we move ahead in time to complete the history of the California Land Improvement Co. The company continued to operate until March 1900 when it transferred 399½ shares of stock to the Peoples Improvement Co., an organization of local residents (written commun., Etiwanda Water Co., 1967). The latter company gradually sold the stock to the individual residents.

We now return to our chronology of Day Creek development. Some time in the early 1890's C. W. Smith dug two tunnels in the gravel streambed of Day Creek. One was in the upper part of the canyon at an elevation of about 5,600 feet, and the other was at the mouth of the canyon, as shown in figure 52 (written commun., Etiwanda Water Co., 1967). Water developed in those tunnels was to be taken to a land development in the Rochester area between Day and Deer Creeks (fig. 45). Smith dug a ditch from the mouth of the lower tunnel, along the west side of the channel, to the proposed service area. However, there is no record of an actual diversion of water having been made by Smith. The Etiwanda Water Co. investigated Smith's tunnels in 1892. Eleven years later (1903) the company purchased for $30,000 the land owned by Smith in sec. 17, T. 1 N., R. 6 W., the lower tunnel, and all Smith water rights. After making this purchase, the company built a pipeline to connect the tunnel to the main diversion line of the company.

Development activity was taking place also in East Etiwanda Canyon in the 1890's. Although Day, Smith, and Garcia had diverted water from the canyon, some question must have arisen concerning the right to the water. Two men, a Mr. Woods and a Mr. Stafford, had purchased a large tract of land along East Etiwanda Creek, and had then built a ditch and diverted flow from the creek to their land. In 1892 Woods and Stafford claimed a part of the flow of the creek and did not acknowledge the Etiwanda Water Co. claim to all the water (written commun., Etiwanda Water Co., 1967). After considerable controversy the company purchased 1,235 acres of land along the channel in secs. 8, 9, 16, 21, and 27, T. 1 N., R. 6 W., together with associated water rights, for $31,000. The company later sold the land but retained the water rights.

The open flumes in the diversion system of the Etiwanda Water Co. were gradually replaced by pipe. That gave rise to the thought that the pipelines might be used to divert water to powerhouses for the generation of hydroelectric power. One plan that was considered involved two powerhouses. The water would be diverted at an elevation of 4,000 feet and dropped from there to a powerhouse whose elevation was 2,900 feet. Another drop would follow to a second powerhouse whose elevation was 1,600 feet. The second powerhouse would be a short distance upstream from the terminal reservoir. Only one powerhouse was actually built, but its brief operation was not a success.

As a conservation measure the Etiwanda Water Co. decided on underground storage of a part of the winter flow of Day Creek for use during the summer months. In February 1910 funds were authorized for the construction of a series of water-spreading ditches, beginning near the mouth of the canyon and continuing to a point near the south line of sec. 8, T. 1 N., R. 6 W. A water-spreading area on the Day Creek debris cone is shown in figure 54. To recover the water stored underground, the company began construction, probably in 1910, of B tunnel (fig. 52). Water from the tunnel was turned into the main diversion line. A well dug in the cienaga (fig. 52) was connected by pipeline to B tunnel. The cienaga well was originally pumped by a jet pump which was operated by water from the main line; later a pump operated by a gasoline-fueled motor was used. The cienaga well has not been used since 1962 (oral commun., Etiwanda Water Co., 1967).

The Etiwanda Water Co. capably served the irrigation needs of the area, but a need to expand the system of domestic supply developed. In May 1927 the Etiwanda Domestic Water Association was formed with a capital of $40,000 divided into 200 shares. Each property owner transferred one-half share of Etiwanda Water Co. stock and $200 to the association, and in return received one share of stock in the association. A distribution system, supplied from a reservoir, was built. The demand for domestic service increased, and in January 1946, the capital stock was increased to 450 shares (written commun., Etiwanda Water Co., 1967).

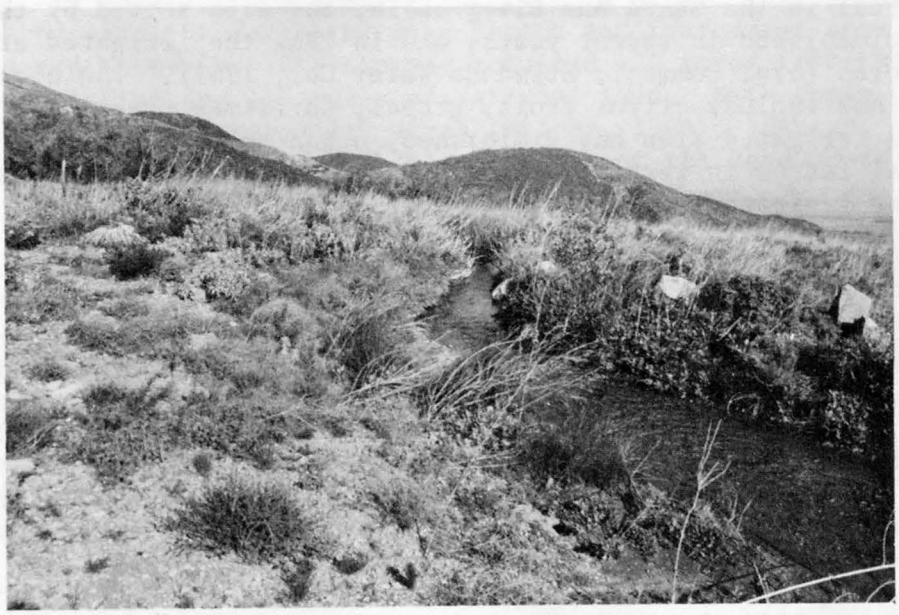


FIGURE 54.--Water entering spreading grounds on Day Creek debris cone; facilities built by Etiwanda Water Company in 1910.

The operation of a domestic water-supply system in conjunction with the irrigation water-supply system became increasingly difficult, and in July 1951 the Etiwanda Domestic Water Association, along with 131 shares of stock in the Etiwanda Water Co., was sold to the Southwest Water Co. The new company purchased additional Etiwanda Water Co. stock and in 1967 owned 230½ shares (oral commun., Etiwanda Water Co., 1967). Water was delivered to four reservoirs for domestic supply on the basis of the water available per share, in the quantity represented by eight shares per day.

To supplement the surface flow and water from the tunnel, the Etiwanda Water Co. drilled a well in the lower end of the service area in November 1927. The well is just north of Foothill Boulevard and just east of East Avenue. Water is pumped from the well to a point on Victoria Avenue. From that point it can be distributed to areas below, or it can be boosted to a distribution point at the upper end of the service area. In December 1948 another well was drilled, this one on the Day Creek debris cone in sec. 17, T. 1 N., R. 6 W. Water from this well is discharged directly into the distribution system. In August 1951 still another well was drilled near Foothill Boulevard; its water is delivered to the system in the manner described for the first (1927) well near Foothill Boulevard.

The area irrigated by the system reached a maximum of about 1,900 acres in the mid-1950's. The principal crops at that time were citrus fruits, deciduous fruits, grapes, and a few summer crops. As with many other irrigated areas in the Santa Ana River basin, the area served by the Etiwanda system has diminished in recent years, and in 1967 the irrigated area was about 950 acres (oral commun., Etiwanda Water Co., 1967). The crops have changed and now include citrus fruit, grapes, Christmas trees, and pasture. Although the irrigated area has diminished, urban encroachment has not been the principal factor in that reduction. However, houses will probably replace the remaining irrigated area in future years.

Rochester Water Company

C. W. Smith (p. 150) and associates acquired land on both sides of Rochester Avenue (fig. 45) in the 1880's. The land probably extended from Highland Avenue south to the Southern Pacific railroad. The purpose of the development was to produce grapejuice from grapes grown on the land (Miller, 1965). Smith acquired all or part of several sections in the mountains between Day and Deer Creeks. Although this mountain area was small, a number of springs in the canyons could be developed to furnish a water supply for domestic use. At that time grapes were grown without irrigation.

In February 1889 the Rochester Water Co. consisting of 35 shareholders was organized with 2,000 shares of stock. There were 15 homes in the community. Later that month, Smith, for a token payment of $2, transferred to the company all of the water, water rights, springs, cienagas, tunnels, dams, ditches, pipes, reservoirs, and all water that flowed or could be developed in secs. 7 and 18, T. 1 N., R. 6 W., and in secs. 1, 12, and 13, T. 1 N., R. 7 W. That transfer included a full right-of-way over the land, a right to construct tunnels and other water-development facilities, and a right to construct ditches and pipelines to convey water across the property (written commun., J. M. Montgomery, Consulting Engineers, Inc., 1967).

The diversion system and development facilities in operation in 1968, shown in figure 45, probably were developed gradually after the organization of the water company. In 1955 the Southwest Water Co. (p. 152) started negotiations for the purchase of the water system. At that time 1,840 shares of stock were outstanding, and each share was entitled to 1/1,840 part of the available water supply. The sale was completed in early 1956, but the Southwest Water Co. acquired only stock in the company; the Rochester Water Co. retained possession of the distribution system. Any additions to the system after the purchase were to become the property of the Southwest Water Co. By 1961 that company owned 1,764 shares of Rochester Water Co. stock.

Since 1957 the Southwest Water Co. has supplemented the supply for the service area of the Rochester Water Co. with water from the Duncan well, which has been leased on an annual basis (oral commun., J. M. Montgomery, 1967). Additional water has been obtained through an interconnection with the system of the Etiwanda Domestic Water Association (p. 151-152), which is owned by the Southwest Water Co. (The interconnection is not shown in figure 45.)

The Hermosa Water Company

The story of the Hermosa Water Co. begins some time before 1880, when Henry Reed acquired a 160-acre preemption claim in sec. 35, T. 1 N., R. 7 W. (Hall, 1888, p. 340). Reed built a ditch from the mouth of Deer Creek to his property to obtain water for domestic use and to irrigate a small plot of peach trees. In 1880 J. P. A. Petsch (p. 147), a German exile, purchased Reed's property, and the following year Petsch and four associates formed the Hermosa Land and Water Co. The company acquired 400 acres from the Cucamonga Homestead Association and 165 acres of railroad land. With these purchases, the company's holdings totaled 725 acres (Miller, 1966). Petsch, however, retained the right, associated with his purchase of the Reed property, to use the water to develop hydroelectric power.

The Hermosa Land and Water Co. was incorporated in January 1882 with a capital stock of $20,000 divided into 100 shares. Because the available water supply during the previous year was 48 miner's inches, the promoters subdivided only 480 acres, and 1 miner's inch of water was allotted to each 10 acres (Hall, 1888, p. 340). The tract was named Hermosa, and the community was known by that name until April 1912, when the community name was changed to Alta Loma. Although the land and water rights in the tract were sold on the basis of 1 miner's inch of water to each 10 acres, the new owners received only their proportion of the available water supply. The ownership of the water right was independent of the land; no stipulation was made as to where the water was to be used.

The available water supply fluctuated widely; in 1881 the flow was 48 miner's inches, but in August 1883 it was only 23 miner's inches, and in September 1885 it was 30 miner's inches (Hall, 1888, p. 340). In 1885 eight owners irrigated 175 acres of vineyard, citrus orchards, and deciduous fruit orchards. By the summer of 1888, 268 acres were being irrigated, and the additional acreage included timber lands and fields of alfalfa and summer crops.

The landowners in the Hermosa community formed The Hermosa Water Co., which was incorporated in October 1887, with a capital stock of $192,000 divided into 1,920 shares. The purpose of the company was to unify the water interests; to acquire water, water-rights, and water-bearing land; and to construct tunnels, flumes, pipelines, and other conduits to carry the water to the land served (written commun., The Hermosa Water Co., 1967).

Each owner conveyed his water rights and interests in the distribution works to the company, and in return received 4 shares of stock for each 10 acres of his land. Each owner received available water in proportion to the stock he held. The stock issued was limited to holders of the original rights and no other shares could be issued. If a surplus of water occurred, it was to be sold to owners of land outside the Hermosa tract, but no stock could be sold to landowners outside the tract. The stock was not appurtenant to the land, however, and could be sold to owners within the tract. The right to the use of water from the original Reed property, which had been withheld by Petsch, was sold to The Hermosa Water Co. in January 1901 (written commun., The Hermosa Water Co., 1967).

The company had acquired a right to flow, up to 20 miner's inches, from Alder Canyon (fig. 45). That water plus the surface flow from Deer Canyon was sufficient for the early needs of the Hermosa community. However, the increased water demand as more land was irrigated, coupled with several years of below-average precipitation, dictated the need to develop an additional supply. A contract was let for the construction of Thayer tunnel (fig. 45) in lower Deer Creek Canyon in May 1896, and the tunnel was completed in December of the same year. During the next few years additional tunnels were dug, and springs were developed, first in Deer Canyon and later in Calamity Canyon, which is tributary to Deer Canyon (written commun., The Hermosa Water Co., 1967). To supplement the water supply from the canyons, the company dug the first of five wells that the company has drilled on a 20-acre plot, purchased in July 1900 for that purpose.

By 1908 the irrigated area had increased to about 500 acres, owned by 40 persons (Mendenhall, 1908, p. 70). The company had acquired 1,200 acres in Deer and Calamity Canyons, which were homesteaded by stockholders and deeded to the company. In addition, a reservoir site of 2½ acres had been acquired prior to 1908.

In 1912 The Hermosa Water Co. gave a private individual permission to develop water in Bull Canyon, a tributary near the mouth of Deer Canyon. Water from that development was first conveyed in a pipeline (not shown in fig. 45) around the east side of Deer Creek to irrigate some land east and south of the creek. Later the water was conveyed by pipeline (not shown in fig. 45) to the west side of Deer Creek and was sold to individuals in that area. Bull Canyon water was not used for a number of years, and in 1965 The Hermosa Water Co. filed a claim on rights to that water (oral commun., The Hermosa Water Co., 1967). As of 1968, water from Bull Canyon was still unused.

Prior to 1945, the company furnished domestic water, as well as irrigation water, to the stockholders. The connection for domestic service was made from the irrigation lines. In January 1945 the directors of the company proposed to separate the domestic system from the irrigation system, and in October of that year the proposal was approved. A new distribution system for irrigation water was built, and the pipes of the original irrigation system were used for distribution of the domestic supply. In that same year, the company purchased a reservoir site between Hermosa and Archibald Avenues, north of 19th Street.

The water demand continued to increase, and to obtain supplemental water to meet that demand The Hermosa Water Co. entered into an agreement with the Foothill Irrigation Co., a company that supplied water from wells. The distribution systems of the two companies were connected in June 1950 so that water could be exchanged between systems when necessary. However, water shortages still occurred, and in January 1956 The Hermosa Water Co. requested a connection between its system and that of the Cucamonga County Water District (p. 168-170), which had been organized in 1955.

The Cucamonga County Water District took over the domestic system of The Hermosa Water Co. in 1962 and has continued to deliver domestic water to the Alta Loma area (oral commun., Cucamonga County Water District, 1967). During 1962 the Cucamonga County Water District purchased a few shares of company stock and by late 1967 had acquired 291 shares.

In summary, the small surface diversion by Henry Reed has been improved, first by replacement of the ditch with a wooden flume, and later by replacement with cement conduits. The water supply has been increased by digging tunnels in Deer Canyon and by developing springs in Deer and Calamity Canyons. The water from those developments is combined near the mouth of Deer Canyon for conveyance in a conduit to a reservoir north of 19th Street (fig. 45). The irrigated area has developed from the small peach orchard of Henry Reed to a prosperous citrus-producing area. The irrigated area reached a peak of 520 acres in 1957, and although some urbanization has occurred in the agricultural service area, the irrigated acreage has not decreased significantly since 1957.

Small Diversions Between Deer and Cucamonga Canyons

In 1888 there were six small water developments between Deer and Cucamonga Canyons. The diversions were made from springs that had been developed by tunnels dug in the small canyons. The total discharge of the springs was about 30 to 40 miner's inches, and the irrigated area totaled about 60 to 70 acres of vineyards and citrus and deciduous fruit orchards (Hall, 1888, p. 352). Six small privately owned developments in that area are still in use.

The Cherbok brothers have developed springs by drilling two tunnels in a canyon area (fig. 45). The surface flow is supplemented by water from wells to irrigate about 80 acres between Archibald and Hermosa Avenues, north of Wilson Avenue.

The diversion for the Giovanni Vai estate is made from two tunnels that were dug to develop springs. That flow, supplemented by water from two wells, is conveyed in a pipe to a reservoir northeast of the intersection of Archibald and Wilson Avenues (fig. 45). The water irrigates 137 acres between Archibald and Hermosa Avenues, from Wilson Avenue to Banyon Avenue.

The water development of John Ingalls is primarily a tunnel in a small canyon that crosses the section line between secs. 15 and 16, T. 1 N., R. 7 W. (fig. 45). The water is used to irrigate about 20 acres along the north boundary of the Cucamonga County Water District. Water can also be obtained from the district's water system.

The Thorpe Land Co. developed a water supply from four tunnels in Demens Canyon (fig. 45). The water is used for irrigation near the north boundary of the Cucamonga County Water District, on both sides of Amethyst Street.

Andre Tolstoy has developed a water supply (not shown in fig. 45) through tunnels driven into the mountains. The springs thus developed supply water to irrigate land north of Hillside Road, between Amethyst Street and Archibald Avenue.

The John King ranch developed water through a tunnel (not shown in fig. 45) in the mountains to irrigate about 20 acres along the north boundary of the Cucamonga County Water District. The irrigated land is near that of John Ingalls. Water can also be delivered to the area from the water line of the Cucamonga County Water District along Almond Street.

Diversions from Cucamonga and San Antonio Creeks

The development of the water rights in the Cucamonga and San Antonio Creek basins during the 100-year period preceding the organization of the Ioamosa Water Co., the Cucamonga Water Co., the San Antonio Water Co., and the Canon Water Co. clearly demonstrates the importance of water-right ownership in the development of an area where there is keen competition for water.

During the 50 years of the Spanish-mission period that followed the establishment of the San Gabriel Mission in 1771, several parties are known to have crossed Cucamonga and San Antonio Creeks on journeys to and from the mission. A rancheria (Indian village) also developed on Cucamonga Creek that bore the name of that creek, and another on San Antonio Creek called Guapiana. In 1839, 18 years after the separation of Mexico from Spain, the Cucamonga Rancho (fig. 3) was granted to Tiburcio Tapia (Beattie and Beattie, 1939, p. 43). We digress for a moment to discuss the boundaries of that rancho. The boundaries of the Cucamonga Rancho, like those of many other ranchos, were vague. The rancho was purported to comprise 3 leagues (1 league = 4,439 acres), but when it was surveyed, the grant was found to comprise 7 leagues. In 1854 the United States Land Commission for California refused the applications for a confirmation of the title for 7 leagues as surveyed. Two years later, the U.S. district court confirmed the title to 3 leagues instead of the 7 leagues requested. A survey of the 3 leagues was made in

1865, but it was not until December 1872, 7 years later, that the grant was patented with L. V. Prudhomme (see below) as claimant (Beattie and Beattie, 1939, p. 145).

We return now to the original grantee of the rancho, Tiburcio Tapia. Tapia used his rancho primarily for grazing cattle, horses, and sheep; agriculture was limited to raising crops for household use. After the death of Tapia in 1845, his daughter inherited the rancho and married Prudhomme, who had been appointed guardian for Tapia's minor heirs and trustee of the estate. Prudhomme managed the rancho, making only minor changes, until 1858 or 1859, when he sold the rancho to John Rains for $8,500. Rains proceeded to develop the rancho for large-scale agriculture, but became overextended financially, and was forced to mortgage the rancho to some Los Angeles merchants. Rains was murdered in 1862, and financial problems became even more acute for his widow. In November 1864 foreclosure proceedings on the rancho were started (Beattie and Beattie, 1939, p. 148, 154, 167).

I. M. and I. W. Hellman and associates purchased a large part of the Cucamonga Rancho in 1870. The following year the Hellmans sold the western part of the rancho to the Cucamonga Land Co.--sometimes called the Cucamonga Co.--an organization formed to act as a holding company and to sell land. The sale included one-half of the water in the east cienaga of lower Cucamonga Creek, one-half of the water in San Antonio Creek, water from springs on the purchased property, and rights-of-way over the rancho (written commun., San Antonio Water Co., 1967). In July 1874 the Hellmans organized the Cucamonga Homestead Association. They sold to the association that part of the remainder of their holdings in the rancho that lay north of Base Line Road. That sale included all rights to water from springs, creeks, and other sources. The association was created for the purpose of subdivision, irrigation, and the sale of 10- and 20-acre lots. The land first subdivided extended east from the west side of Cucamonga Wash to Hermosa Avenue, and from Almond Street, the northern boundary of the rancho, to Base Line Road (fig. 45).

The first development of the water of Cucamonga Creek followed the filing of a claim for 444 miner's inches of water by the Hellmans in June 1874 (written commun., Ioamosa Water Co., 1967). The claim was for the purpose of supplying water for irrigation and domestic use to settlers who purchased land from the Cucamonga Homestead Association. The water that was to be diverted would be conveyed in pipes, flumes, and ditches. The pipes were to be 22 inches in diameter; the flumes were to be 30 inches wide and 20 inches deep; and trapezoidal ditch dimensions were to be 54 inches (top width), 36 inches (bottom width), and 18 inches (depth). The conveyance system was to terminate in a reservoir, from which the water would be distributed locally.

A second claim was filed for all the water in Cucamonga Creek up to 1,400 miner's inches. That claim was filed in August 1874 by J. G. Downey, I. W. Hellman, I. M. Hellman, T. E. Rowan, Charles Lindley, and J. S. Thompson (written commun., Ioamosa Water Co., 1967). The purpose of that claim was also to supply water for irrigation and domestic use to lands within the association boundaries. The conveyance facilities, which were to terminate in a reservoir, were to be appropriately larger than those specified for use with the earlier claim for water.

The Cucamonga Homestead Association built a large flume and ditch from Cucamonga Creek to the northern boundary of the homestead land, but they did not provide distribution facilities to the 10- and 20-acre plots. The present pipeline upstream from the round weir probably follows the line of the original ditch (fig. 45).

In May 1876 the Cucamonga Homestead Association sold the land lying north of 16th Street and west of the east bank of Cucamonga Wash to the Cucamonga Land Co. (written commun., San Antonio Water Co., 1967). The association retained the right to free use of all surface flow claimed from Cucamonga Canyon, but gave the Cucamonga Land Co. the right to use surplus water from the canyon in winter. The flow claimed by the association was divided into 300 parts, for the purpose of selling one part with each 20-acre lot. By 1879 about 20 lots had been sold and about 50 acres were irrigated (Hall, 1888, p. 344).

The history of the Cucamonga Land Co. is discussed on pages 162-163. The Cucamonga Homestead Association was gradually reduced in size as landowners in the association transferred their rights to such organizations as the Cucamonga Development Co. and the Ioamosa Water Co., which are discussed on the pages that follow.

Upper Cucamonga Creek

Iowa Tract Association

In 1883 a group of individuals organized the Iowa Tract Association and purchased 500 acres of land from the Cucamonga Homestead Association. That purchase included a one-third interest in the unsold water from Cucamonga Canyon, using as a base the measured flow during the driest month in 1883 (Hall, 1888, p. 345). The flow during that month was about 160 to 170 miner's inches, of which about 150 miner's inches was unsold. The Iowa Tract Association therefore had a water right to about 50 miner's inches (one-third of 150 miner's inches). The approximate boundaries of the original tract included the area between Beryl Street and Amethyst Street; its southern boundary was about one-third of a mile south of 19th Street, and its northern boundary was about 1,000 feet north of Banyon Street (fig. 45).

The first delivery of water to the Iowa tract was conveyed in a flume (not shown in fig. 45) which was later replaced by a cement pipe. Reservoirs were provided at the head of the distribution system, which was made up of iron pipes to distribute water from the reservoirs to the individual lots. All the land in the tract was sold to settlers, and each lot included a proportional interest in the water rights and diversion works.

In 1900 the owners of the Iowa tract organized the Ioamosa Water Co., which is discussed on pages 160-162.

Cucamonga Development Company

The names of several early settlers in the Cucamonga Creek area--Hugo Sontag, E. W. Reid, and D. A. Kughen--enter into the history of the Cucamonga Development Co.

In 1884 Sontag filed several placer claims in Cucamonga Canyon (written commun., Iomosa Water Co., 1967). Those claims were in parts of secs. 17, 20, and 21, T. 1 N., R. 7 W. His claims in sec. 17 included the Cucamonga Creek channel from a point upstream from the present intake of the Ioamosa Water Co. diversion to about the center of the southeast quarter of sec. 17. The present division box and round weir (fig. 45) are on Sontag's claims in sec. 20. Three years later, in July 1887, Reid, who was one of the settlers in the Iowa tract, filed a claim to the underflow in Cucamonga Canyon up to 2,000 miner's inches (Hall, 1888, p. 345). The water, to be developed by digging a tunnel across the canyon, was to be used on the land of the Cucamonga Homestead Association (p. 157-158).

In September 1887, Reid and Kughen signed a contract with Sontag that gave Reid and Kughen the right to dig a tunnel in Sontag's property and the right to build a pipeline across his property from the tunnel to the existing pipeline of the Cucamonga Homestead Association. In return Sontag would receive a 10-percent interest in all water developed. That agreement was confirmed by an indenture dated April 3, 1892, between Sontag and the Cucamonga Development Co., in which Reid and Kughen by then had interests (written commun., Cucamonga Development Co., 1967).

To better manage the water development of Cucamonga Canyon, several Iowa tract owners and members of the Cucamonga Homestead Association formed the Cucamonga Development Co. The company was incorporated in December 1887 with a capital stock of $120,000 divided into 1,200 shares. The purpose of the company was to furnish, supply, and distribute water at cost to stockholders for domestic, irrigation, and other uses. The company would acquire water, water rights, water works, easements, and real and personal property, and would construct water systems, conduits, ditches, tunnels, and reservoirs (written commun., Cucamonga Development Co., 1967).

The major part of the stock subscribed was held by I. W. Hellman, who was one of the original claimants to surface flow in Cucamonga Canyon (p. 157). Reid and Kughen also subscribed to a portion of the stock in the new company. On January 17, 1888, Reid transferred to the company all his rights, title, and interest in the underflow water of Cucamonga Canyon (written commun., Cucamonga Development Co., 1967). On that same day, Reid and Kughen transferred to the company all their rights, title, and interests in their contract with Sontag (written commun., Ioamosa Water Co., 1967). A provision was made that the stock issued by the Cucamonga Development Co. to Reid and Kughen would not be assessed for the cost of piping the water from Cucamonga Canyon, except for the cost of the main pipeline from its upstream end to the northeast corner of lot 2, block 10, of the Cucamonga Homestead Association. In addition to carrying tunnel discharge, the main pipeline would carry as much available surface flow from the canyon as could be accommodated in the pipeline.

Construction of the tunnel (fig. 45) on Sontag property, as proposed by Reid and Kughen, was started in late January or early February 1888, and the tunnel was completed a year later. The total cost of the tunnel and connecting pipeline was $13,227. In apportioning the tunnel outflow, Sontag was first entitled to his 10 percent. The Iowa Tract Association, by virtue of its water right obtained from the Cucamonga Homestead Association (p. 158), was entitled to one-third of the remaining 90 percent. The 60 percent that then remained would go to the stockholders in the Cucamonga Development Co. After all the water commitments of the company had been met, the Iowa Tract Association had a right to 86/300 of the water still available.

In the following section of this report, the gradual assimilation of the stock and water rights of the Cucamonga Development Co. by the Ioamosa Water Co. is described.

Ioamosa Water Company

The settlers in the Iowa tract combined the names of Iowa and Hermosa, and in October 1887 named their settlement Ioamosa (Miller, 1966). Its location was south of 19th Street and immediately west of Hellman Avenue (fig. 45).

The owners of the Iowa tract organized the Ioamosa Water Co., which was incorporated in April 1900 with a capital stock of $50,000 divided into 500 shares. The purpose of the company was to acquire the water rights and the 344 shares of the Cucamonga Development Co. that were held by owners of the tract. The company was to distribute water to the landowners in the tract and to sell any surplus water that was available. In return, each landowner who conveyed his water rights and rights-of-way would receive one share of stock in the company for each acre of land.

The water acquired by the company was insufficient to meet commitments in 1901, and additional water was rented from the Hellmans (p. 157). The water shortage that year, combined with the increasing water demand, made it evident to the company that the acquisition or development of additional water was a necessity. Land was purchased for the purpose of drilling wells to provide a ground-water supply. A well was dug at the upstream end of the Iowa tract in 1902, but it did not produce water. Additional rights to water in Cucamonga Creek, as well as additional stock in the Cucamonga Development Co., were acquired. These were either purchased outright or, more often, acquired in exchange for stock in the Ioamosa Water Co., with the difference in value being made up by cash. By May 1920 the Ioamosa Water Co. owned 145-4/9 of the 300 shares of water rights in Cucamonga Canyon (p. 158) and 375 of the 1,200 shares of stock in the Cucamonga Development Co.

By an agreement dated February 11, 1921, the Cornelian Street land and water holders, whose property was in the Cucamonga Homestead Association subdivision outside the Iowa tract, agreed to transfer to the Ioamosa Water Co. all their water and water rights in Cucamonga Canyon and their stock in the Cucamonga Development Co. In return they would receive a total of 120 shares of stock in the Ioamosa Water Co. However, all the original 500 shares of stock in the water company had been issued previously. Therefore the articles of incorporation of the company were amended in April

1921 to comply with the above agreement. By this amendment the capital stock was increased to $62,000 divided into 620 shares.

In September 1921 the Ioamosa Water Co. purchased from the I. W. Hellman estate for $55,000 a number of lots in the Cucamonga Homestead Association tract and 70-40/45 shares of water rights in the flow from Cucamonga Canyon. The company continued to acquire water and water rights in the creek, and by July 1932 the company owned 268/300 of the total flow from Cucamonga Canyon.

In the early 1930's Ignaz Schulof and his wife had acquired a small piece of land in sec. 17, T. 1 N., R. 7 W., and in 1932 they proposed to drill a well in the Cucamonga Creek channel and export the water to land that was not riparian to Cucamonga Creek. A suit to stop that action was filed in May 1932 by the Cucamonga Development Co., the Ioamosa Water Co., and the San Antonio Water Co. A final settlement of the suit was made by mutual indenture dated July 24, 1945. By this indenture the Schulofs granted their small land holding to the Cucamonga Development Co. In return the company agreed to deliver to the Schulofs a continuous flow of 1 miner's inch, the diversion to be made at a point 530 feet north of the southeast corner of lot 2 in sec. 20. That right to 1 miner's inch of water has since been acquired by the Cucamonga County Water District (p. 168-170).

During the late 1930's and early 1940's arrangements were made between the Ioamosa Water Co. and several small companies within the area served by the Ioamosa Water Co., whereby that company either purchased ground water which the small companies had developed or exchanged water from Cucamonga Creek for the ground water. In June 1941 an agreement was signed with the Banyan Heights Water Co. whereby the two companies exchanged water--the Ioamosa Water Co. was to supply surplus Cucamonga Creek water when available, and the Banyan Heights Water Co. was to supply well water during periods of deficient surface-water supply.

Other transactions with small suppliers of ground water took place. In August 1941 the board of directors of the Ioamosa Water Co. approved an agreement to buy water from the Hellman Water Co. In April 1948 an agreement was signed between the Ioamosa Water Co. and the Sapphire Mutual Water Co., whereby the Ioamosa Water Co. agreed to deliver a continuous flow of 1 miner's inch to the Sapphire Mutual Water Co., except at those times when no diversion from Cucamonga Creek was made. In return the Ioamosa Water Co. received 60 shares of Sapphire Mutual Water Co. stock. In August 1949 the Ioamosa Water Co. submitted an offer to the Hellman Water Co. to purchase that company's well, but the purchase was not completed until May 1951. The two companies merged following this transaction, and the Hellman Water Co. was dissolved in late 1962 or early 1963.

Early in 1956 the Cucamonga County Water District agreed to deliver water to the Ioamosa Water Co. near the upper end of the water company's distribution system, the first delivery to be made about the end of September. Those deliveries have continued, whenever needed, since September 1956. In June 1958 the Ioamosa Water Co. sold its domestic system to the Cucamonga County Water District for the token payment of one dollar. The district has been acquiring stock in the Ioamosa Water Co., and by the end of 1967 it owned 25 of the 620 shares.

Similarly, by the end of 1967 the Ioamosa Water Co. owned 1072/1200 of all the water from upper Cucamonga Creek; the remaining 128/1200 of the water was owned by the Hamilton interests. Urbanization has encroached but little on the agricultural area of the Iowa tract. All the water represented by the 620 shares of stock was in use for irrigation purposes in 1948; by 1967 such use had decreased by only about 5 percent (oral commun., Cucamonga County Water District, 1967).

Lower Cucamonga Creek

The early history of the Cucamonga Rancho (p. 156-157) indicated that Tapia had been granted the rancho in 1839. He had planted a small vineyard along the east side of Cucamonga Creek, southeast of Red Hill (fig. 45), which in about 1860 was expanded greatly by Rains, a later owner of the rancho. Throughout this early period, water was diverted from Cucamonga Creek to irrigate crops on the nearby land. Although at times the lower reaches of the creek carried direct runoff from the mountains, most of the streamflow was usually outflow from two cienagas, one on the east side and the other on the west side of Red Hill (fig. 55). The east cienaga was far more productive of water than the west cienaga.

Cucamonga Vineyard Company

The Hellmans and associates (p. 157) separated the old vineyard tract, developed by Tapia and Rains, from the eastern part of their holdings and organized the Cucamonga Vineyard Co. to further develop the vineyards. Water from the east cienaga was conveyed to the land in the Old Vineyard Co. ditch (fig. 55). That ditch was later replaced with a paved and cemented ditch, shown as the Vineyard Co. ditch in figure 55.

One half of the water flowing from the east cienaga was allotted to the Cucamonga Vineyard Co. In May 1879 the ditch carried 111.5 miner's inches of water to irrigate about 250 acres (Hall, 1888, p. 347). The irrigated area increased to about 348 acres in 1885--340 acres of vineyard and 8 acres of orchard. Three years later, 10 more acres of vineyard were added.

In August 1917 the land and water rights of the Cucamonga Vineyard Co. were sold to the Cucamonga Water Co. (p. 166) for $150 per acre.

Cucamonga Land Company

In 1871 the Hellmans sold a large part of the Cucamonga Rancho to the Cucamonga Land Co.--sometimes called the Cucamonga Co.--a company organized to hold and sell land (p. 157). That transfer included the western part of the rancho, which in turn included some land east of Cucamonga Creek; the water, water rights, and ditches in the San Antonio Creek basin (fig. 45); and a half interest in the water developed in the east cienaga. (The other half interest in the east cienaga was held by the Cucamonga Vineyard Co.; total interest in the west cienaga was held by the Cucamonga Homestead Association, which was organized by the Hellmans (p. 157).)

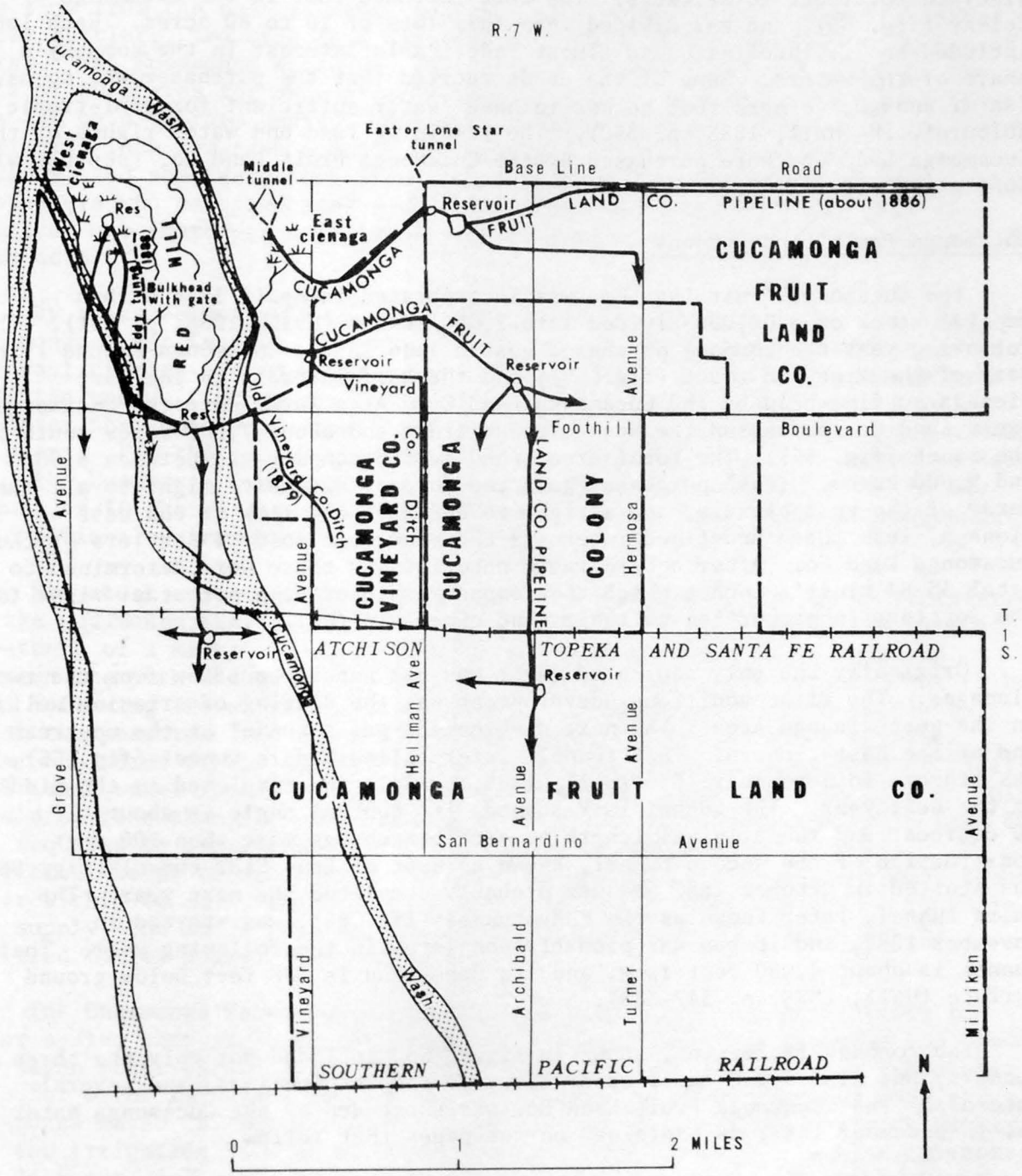


FIGURE 55.--Water systems of Cucamonga Vineyard Company and Cucamonga Fruit Land Company.

The Cucamonga Land Co. sold about 520 acres of land east of the Cucamonga Vineyard Co. tract to settlers. The land included that in the Cucamonga Colony (fig. 55), and was divided into farm lots of 10 to 80 acres. Each lot included an "...indefinite and almost indefinable interest in the company's share of the waters. Some of the deeds recited that the purchaser was to have 'water enough,' others that he was to have 'water sufficient for semi-tropic culture'..." (Hall, 1888, p. 350). The remaining land and water rights of the Cucamonga Land Co. were purchased by the Cucamonga Fruit Land Co. (see below) during and after 1887.

Cucamonga Fruit Land Company

The Cucamonga Fruit Land Co. was incorporated in April 1886 with a capital stock of $200,000 divided into 2,000 shares (Hall, 1888, p. 351). The following year the company purchased unsold land in the Cucamonga Rancho lying east of the Vineyard tract (fig. 55), and the half interest in the east cienaga outflow held by the Cucamonga Land Co. At a later date the Cucamonga Fruit Land Co. purchased the west cienaga tract and about 7,000 acres south of the ranch (fig. 55). The total area owned by the company was between 8,000 and 9,000 acres. Those purchases gave the company exclusive right to all the water of the west cienaga, and a right to one-half the flow of the east cienaga, less those undefined interests that had been sold to settlers by the Cucamonga Land Co. After considerable negotiations these were determined to total 33.84 miner's inches which the company assigned as a perpetual right to the settlers in proportion to their land ownership (Hall, 1888, p. 351).

Originally the only source of water was the natural outflow from the two cienagas. The first additional development was the digging of artesian wells in the west cienaga area. The next development was a tunnel at the upstream end of the east cienaga. That tunnel, later called Middle tunnel (fig. 55), was started in September 1886 (Hall, 1888, p. 347) and completed in the middle of the next year. The tunnel is V-shaped, its central angle is about 60 degrees, and the original length of each branch was more than 500 feet. Construction of the second tunnel, known as East or Lone Star tunnel (fig. 55) was started in October 1887 and was probably completed the next year. The third tunnel, later known as the Eddy tunnel (fig. 55), was started in November 1887, and it too was probably completed in the following year. That tunnel is about 4,000 feet long, and its upper end is 188 feet below ground surface (Hall, 1888, p. 347-348).

The company facilities, shown in figure 55, included not only the three tunnels, but also seven small reservoirs, four main pipelines, and several laterals. The Cucamonga Fruit Land Co. was succeeded by the Cucamonga Water Co. in December 1887, as explained on the pages that follow.

Cucamonga Water Company

The stockholders of the Cucamonga Fruit Land Co. organized the Cucamonga Water Co. in December 1887, with a capital stock of $100,000 divided into 10,000 shares (Hall, 1888, p. 351). The stockholders then deeded all their water, water rights, and distribution works to the Cucamonga Water Co. The new company, in turn, agreed to recognize the obligations of the Cucamonga Fruit Land Co. in the water rights of the early settlers and others to whom the land company had sold land with water.

The transfer of rights to all the flow from the west cienaga and one-half the flow from the east cienaga, less the obligation of 33.84 miner's inches to early settlers, amounted to a transfer of rights to 456.89 miner's inches of water. The Cucamonga Water Co. then issued 4,568.9 shares of stock at the rate of 10 shares for each miner's inch of water. The distribution of shares was not on a uniform basis. Some of the early settlers insisted on receiving 1 miner's inch for each 6 acres, others asked for 1 miner's inch for each 8 acres, and some were satisfied with 1 miner's inch for each 10 acres. Those landowners who had purchased their land from the Cucamonga Fruit Land Co. received one share per acre, entitling them to one-tenth of a miner's inch for each acre.

By an agreement with the Cucamonga Water Co. dated December 27, 1887, the Cucamonga Fruit Land Co. reserved all rights to develop additional water in the east cienaga and to advance its land interests in the west cienaga area (written commun., Cucamonga County Water District, 1967). It agreed to transfer the additional rights and property to the Cucamonga Water Co. within 20 years. For the additional water that it transferred to the Cucamonga Water Co., the Cucamonga Fruit Land Co. would receive water company stock in the amount of 10 shares for each miner's inch of water. The anticipated quantity of additional water was 543 miner's inches.

New stock representing the increase in water supply was to be transferred by the Cucamonga Fruit Land Co. to future buyers of its land at the rate of one-tenth of a miner's inch for each acre. The flow was to be measured between the 10th and 20th of July each year, and the stock transfer was to be made following the discharge measurement, on the basis of the quantity by which the measured flow exceeded the base value of 456.89 miner's inches. Under the terms of the agreement, if at any time prior to the transfer of all additional water rights to the Cucamonga Water Co., the measured flow in July should be less than the water demand on that day, the Cucamonga Fruit Land Co. was required to supply immediately by new development or other means, sufficient water to meet the demand. If it should fail to deliver sufficient water within 10 days, the Cucamonga Water Co. could then proceed to increase the supply, but stock held by the Cucamonga Fruit Land Co. would not be entitled to its normal share of water.

The Cucamonga Water Co. assumed the responsibility of maintaining the water system that included diversion works, conveyance and distribution lines, and seven reservoirs. Also, the company was entitled to charge a reasonable rate for water furnished to meet operating expenses. In February 1888 the Cucamonga Water Co. set the domestic rate of $1.00 per month for each family, and the irrigation rate at 50 cents for each head of water (20 miner's inches for 24 hours) delivered to each 10 acres (written commun., Cucamonga County Water District, 1967).

The Cucamonga Fruit Land Co. continued to develop water through the construction of tunnels and the drilling of wells. In July 1890 the annual measurement of water from all available sources was 759.85 miner's inches (written commun., Cucamonga County Water District, 1967). During the dry years in the 1890's, the flow from all sources continually declined (Mendenhall, 1908, p. 72). By the middle of 1899 the gravity flow was only 190 miner's inches. To meet its requirements, the Cucamonga Water Co. pumped from the East (Lone Star) tunnel near Base Line Road (fig. 55).

The Cucamonga Fruit Land Co. drilled a deep well in the west cienaga tract, and soon after its completion in early 1900, the company contracted to deliver 100 miner's inches of water for $100,000 to the San Antonio Water Co. (p. 176). Immediately, some of the stockholders in the Cucamonga Water Co. filed a suit against the Cucamonga Fruit Land Co. and the Cucamonga Water Co. to prevent completion of the sale (p. 176). A judgment was rendered in favor of the two defendants, and the sale was completed (Mendenhall, 1908, p. 72). The well water was delivered through the Eddy tunnel (fig. 55) to the San Antonio Water Co.

The stockholders who filed the suit gained control of the Cucamonga Water Co. in 1900 through the purchase of outstanding stock. They then purchased from the Cucamonga Fruit Land Co. an interest in all water-bearing lands still owned by that company in the east and west cienagas (Mendenhall, 1908, p. 72). In that same year the Cucamonga Water Co. extended both branches of the Middle tunnel (fig. 55) and drilled several wells in the area to help meet its water requirements (written commun., Cucamonga Water District, 1967). The company also placed pipelines in all its tunnels. (The cost of maintenance of the Eddy tunnel was shared by the Cucamonga Water Co. and the San Antonio Water Co. in proportion to the quantities of their water conveyed in the tunnel. Further discussion of the Eddy tunnel is found on pages 176-177.)

To increase its capital for needed development, the Cucamonga Water Co., in March 1902, increased the price of its stock from $10 to $100 per share and reduced the number of shares from 10,000 to 5,000. In 1907 a gated bulkhead was built into the Eddy tunnel for the purpose of storing winter flow. Despite such conservation measures the available surface-water supply continued to decline. In 1908 the company rented wastewater from the Ioamosa Water Co., expanded its well-drilling program, and increased its pumping (written commun., Cucamonga County Water District, 1967). In 1912 the directors of the Cucamonga Water Co. requested the assistance of the Old Settlers Water Co. (p. 168) in further developing the east cienaga, but the request was refused. Two years later (1914) the Cucamonga Water Co. offered to buy for $25,000 all the water rights in the east cienaga held by the Old Settlers Water Co. That sale was completed in October 1914.

We go back in time now to 1912. In July of that year the board of directors of the Cucamonga Water Co. organized the Cucamonga Investment Co. The board of directors of the water company served in the same capacity for the investment company, which acted as an agent for the Cucamonga Water Co. in purchasing land, water, and water rights. The purchase of the water rights of the Old Settlers Water Co. in 1914 was handled by the investment company, as was the purchase of the land and water rights of the Cucamonga Vineyard Co. in 1917 for $150 per acre (p. 162). On October 12, 1933, the Cucamonga Water Co. agreed to take over the assets of the Cucamonga Investment Co., which was dissolved that same day (written commun., Cucamonga County Water District, 1967).

To better control the extraction of water from the ground-water basin, the Cucamonga Water Co. and the San Antonio Water Co. signed an agreement in October 1926, whereby each company would limit its pumping from the Cucamonga basin to 6,500 acre-feet per year. They also agreed that the water pumped

would not exceed 800 miner's inches at any time. The area of limited pumping was roughly bounded by Foothill Boulevard on the south, the base of the mountains on the north, the extension of Grove Avenue on the west, and Archibald Avenue on the east (figs. 45 and 55). In June 1929 the Cucamonga Water Co. and the San Antonio Water Co. agreed to limit the pumpage from the 90-acre tract near the head of the Eddy tunnel to 1,200 acre-feet in any one year and also not to pump from the area in the months of December through March. If the gravity flow in the tunnel at other times was 50 miner's inches or more, neither company would pump and the gravity flow would be divided equally between them. That agreement remained in effect until July 1, 1934 (written commun., Cucamonga County Water District, 1967). The gravity flow in the tunnels continued to decline, however, and by May 1949 the water supply was entirely from ground-water sources.

Surplus runoff has been spread each winter for many years in Cucamonga Wash by the Cucamonga Water Co. and the San Antonio Water Co., for the purpose of recharging the ground-water body. The two companies shared the cost of the first check dam, and until the formation of the Cucamonga Protective Association, shared all other costs connected with their water-spreading activities. The protective association was formed by the water users in the Cucamonga Creek basin, and as a representative of those users, the association has since assisted in the expense of spreading surplus Cucamonga Creek water.

The disastrous flood of March 1938 gave impetus to the formation of the San Bernardino County Flood Control District in April 1939. The District acquired easements in the Cucamonga Creek channel, and has since built major flood-control facilities, but it is not involved in the water-spreading activities in the upper Santa Ana River basin (written commun., San Bernardino County Flood Control District, 1967).

Throughout the years the Cucamonga Water Co. had delivered domestic water, as well as irrigation water, to the stockholders. The gradual transition from agriculture to urbanization in the area served by the company made it necessary to maintain control of the water deliveries. To maintain such control, the board of directors passed a resolution pertaining to subdivisions on May 13, 1953. It provided that each subdivider must own one share of company stock for each acre in his subdivision. After all subdivision plans, including size of water pipes, were approved by the manager of the Cucamonga Water Co., the stock owned by the subdivider was to be turned over to the company. In return the company would issue one-tenth of a share to each dwelling, on the basis of four dwellings to the acre, and the remaining six-tenths of a share for each acre would be cancelled out.

To supplement the water supply of the company, the board of directors voted December 11, 1953, to purchase 500 acre-feet of water annually for the next 5 years from the Metropolitan Water District of Southern California.

In January 1958 the Cucamonga County Water District (p. 168-170) offered to purchase all water, water rights, and distribution systems of the Cucamonga Water Co. On May 31, 1958, the sale was completed, and the district took over the operation of the system. The Cucamonga Water Co. was dissolved soon after the sale.

Old Settlers Water Company

A group of settlers (p. 164) had purchased 520 acres of land, in lots of 10 to 80 acres, from the Cucamonga Land Co.; the rights of these settlers to water from the east cienaga were highly indefinite. The Cucamonga Fruit Land Co. purchased the remaining land held by the Cucamonga Land Co. in the Cucamonga Rancho during and after 1887. By an agreement between those early settlers and the Cucamonga Fruit Land Co., the indefinite water rights held by the settlers were established as a perpetual right to a continuous flow of 33.84 miner's inches from the east cienage (p. 164) (Hall, 1888, p. 351).

The increasing draft on the east cienaga, resulting from the tunnels and wells dug there (p. 164), made it necessary for the group of settlers to organize in order to maintain their prior water right and to acquire additional water to supplement the diminishing surface flow. The group organized the Old Settlers Water Co. in August 1902. The company was incorporated with a capital stock of $33,840 divided into 33,840 shares.

Soon after incorporation the company acquired property north of the town of Cucamonga. A well was drilled on that property, and water from the well was added to the surface flow from the east cienaga. In the autumn of 1912 the directors discussed the sale of the company's water rights in the east cienaga to the Cucamonga Water Co., but the sale was not completed until October 1914. The Cucamonga Investment Co., acting for the water company, purchased all rights in the east cienaga held by the Old Settlers Water Co. for $25,000 (p. 166). After that sale, the Old Settlers Water Co. continued to deliver water to its stockholders from the above-mentioned well. The well was located about 500 feet west of Archibald Avenue, midway between Base Line Road and Church Street (fig. 45).

In May 1958 the Cucamonga County Water District (see below) purchased the assets of the Old Settlers Water Co., which included the well and water-distribution system. At that time the Old Settlers Water Co. served the area between Hermosa and Hellman Avenues, and from Foothill Boulevard to Church Street (figs. 45 and 55).

Cucamonga County Water District

The Cucamonga County Water District was organized March 14, 1955, under an act that allowed the district to assume the responsibility of furnishing water and sewer service to the area within its boundaries (fig. 56). The district would obtain water from the Metropolitan Water District of Southern California and from other outside sources to supplement the surface- and ground-water supply within the district boundaries.

After organization of the district, the voters approved a bond issue of $1.2 million to construct the necessary facilities to supply supplemental water to the mutual water companies within the district. During the next two years the major facilities shown in figure 56 were built. Distribution facilities connected to this main system served the area. The first delivery of supplemental water was made to The Hermosa Water Co. in September 1956.

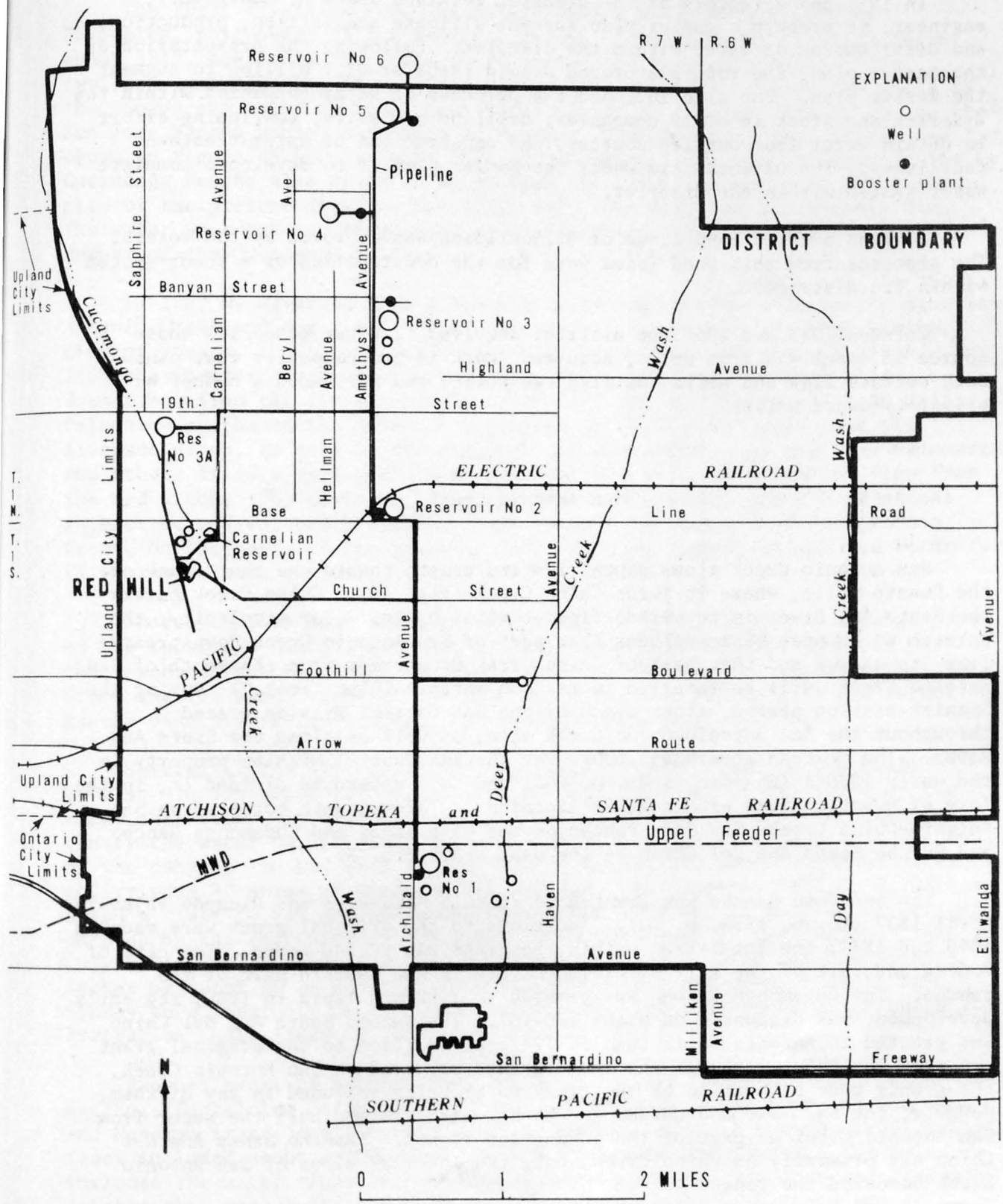


FIGURE 56.--Water system of Cucamonga County Water District.

In 1957 the directors of the district retained James M. Montgomery, engineer, to prepare a master plan for the ultimate acquisition, production, and distribution of water within the district. Following the presentation of the master plan, the voters approved a bond issue of $3.7 million to augment the master plan. The plan included the purchase of water companies within the district and stock in other companies, drilling new wells, continuing effort to obtain water from outside sources, and construction of water-treatment facilities. The ultimate aim under the master plan is to develop a complete water system within the district.

In 1963 a third bond issue of $1.5 million was approved by the voters. The proceeds from this bond issue were for the construction of a sewer system within the district.

Between 1958 and 1967 the district acquired 12 water companies whose source of water was from wells, acquired stock in two companies that owned both surface flow and wells, drilled two wells, and purchased a number of privately owned wells.

San Antonio Creek

San Antonio Creek flows south from its canyon toward the east flank of the Puente Hills, where it joins Chino Creek (fig. 45). Chino Creek enters the Santa Ana River in the Prado flood-control basin. (For simplicity, the stretch of channel that includes that part of San Antonio Creek downstream from its canyon and that part of Chino Creek downstream from the mouth of San Antonio Creek, will be referred to as "San Antonio-Chino Creek.") During the Spanish-mission period, stock owned by the San Gabriel Mission grazed throughout the San Antonio-Chino Creek area, as well as along the Santa Ana River. The Mexican government took over the San Gabriel Mission property in the early 1830's (Chapman, 1939, p. 469) and soon afterward divided it, in the form of grants, among prominent Californians. Three grants bordered on San Antonio-Chino Creek--San Jose Rancho on the west side, and Cucamonga Rancho and Rancho Santa Ana del Chino on the east side (fig. 3).

The San Jose Rancho was granted to Ygnacio Palomares and Ricardo Vejar in April 1837 (Cowan, 1956, p. 80). Additions to the original grant were made in 1840 and 1841; the total area within the grant was 22,340 acres. The city of Pomona and part of the city of Claremont are in the eastern part of the rancho. The Cucamonga Rancho was granted to Tiburcio Tapia in 1839; its early development was discussed on pages 156-157. The Rancho Santa Ana del Chino was granted to Antonio Maria Lugo in 1841; an addition to the original grant was made in 1845. Although the three grants bordered on San Antonio Creek, the grants made no mention of the creek water being included in any of them. However, the San Jose and Cucamonga Ranchos each claimed half the water from San Antonio Creek as part of the land-grant rights. (Rancho Santa Ana del Chino was primarily on Chino Creek; only the lower 2½ miles of San Antonio Creek bordered the rancho.)

The first diversion from San Antonio Creek was probably made by Palomares, part-owner of the San Jose Rancho. That diversion, which began about 1847, continued for three years before its temporary abandonment (written commun., city of Pomona, 1967). Water was diverted at the mouth of the canyon and conveyed in an open ditch, known as the San Jose ditch, to the San Jose Rancho house, northeast of Pomona. None of the early ditches are shown in figure 45 because only their approximate locations are known. The Cucamonga Rancho also diverted water from the creek, probably at about the site of the present division box (fig. 45), upstream from San Antonio dam. The water was conveyed in an open ditch to irrigate land in the northwest corner of the Cucamonga Rancho.

In 1852 M. Alvarado took a squatter claim on the San Jose Rancho near San Antonio Creek and dug a ditch from the creek to his claim (written commun., city of Pomona, 1967). He later abandoned both the claim and the ditch. In 1862 the younger Alvarado diverted water from the creek, several miles downstream from the first Alvarado ditch, for use on land near Indian Hill. Palomares purchased the Alvarado interests in 1863 or 1864 and used the Alvarado ditch, as well as the original San Jose ditch. In May 1871 Palomares and others filed a suit against some people who had been diverting flow from the old ditch. The district court granted the Palomares group a perpetual injunction and established their claim to half the water from San Antonio Creek, on the basis of the grant as well as on continuous use of the water for 15 years (written commun., city of Pomona, 1967).

Shortly before that suit, the Hellmans, in 1870, purchased a large part of the Cucamonga Rancho, and the following year they sold the western part of the rancho to the Cucamonga Land Co. (p. 157). Both sales included the old ditch and the water right in San Antonio Creek that belonged to the former rancho owners (written commun., San Antonio Water Co., 1967).

Several claims were filed for San Antonio Creek water in the early 1870's. In September 1872 M. M. Kincaid filed a claim to one-third of the water that flowed in the creek (Hall, 1888, p. 359). He built a ditch to convey the water to his property on the east side of the creek, near the mouth of the canyon. In May 1879 Kincaid was diverting 210 miner's inches of water to irrigate 40 acres of vineyard and orchard. In December 1872 J. B. Dalvez filed a claim to San Antonio Creek water that also was to be used to irrigate an area on the east side of the creek, near the mouth of the canyon. Then in July 1874 Charles Lindley and J. S. Thompson filed a claim for 400 miner's inches of water to be diverted from the canyon and conveyed in pipes and flumes to a reservoir on the Cucamonga Rancho, and then to be distributed for irrigation (Hall, 1888, p. 359).

Another event of significance occurred in 1874, this time on the San Jose Rancho. Concepcion Palomares sold a tract of land, later known as the Loop and Meserve tract, for $16,000 (written commun., city of Pomona, 1967). That tract included about 2,000 acres between Claremont and Pomona. The sale included the water right in San Antonio Creek, and the San Jose and Alvarado ditches that were mentioned earlier. The purchasers, C. F. Loop and A. R. Meserve, used the San Jose ditch in summer and the Alvarado ditch in winter, until 1882. The purchase of the Loop and Meserve tract was the prelude to a chain of events that figured prominently in the early development of the San Antonio Creek water resource.

By the late 1870's three ditches, other than those previously discussed, were in use. One of the three, known as the Dexter or Grid Appropriation ditch, diverted about 25 miner's inches of water at a point upstream from the ditches of Kincaid and the Cucamonga Land Co. (Hall, 1888, p. 359). The other two ditches were known as the Hancock upper and lower ditches. The upper ditch diverted near the mouth of the canyon and the lower ditch diverted about 3 miles downstream; both ditches delivered water to the same area in the vicinity of Ontario. Diversions in the two ditches were limited to surplus San Antonio Creek water, which was used to irrigate 160 to 200 acres of grain.

An event of major significance occurred in December 1877 when the Cucamonga Land Co. entered into an agreement with C. F. Loop, A. R. Meserve, H. K. W. Bent, and Joseph Howard, for mutual development of the water of San Antonio Creek from its source to a site where the water would be divided equally between the east and west sides (written commun., San Antonio Water Co., 1967). Soon after the signing of the agreement the division facilities were built, the cost being shared by the water developers on each side of the creek. The division box was at the approximate site of the present box (fig. 45). Equal division of the water continued until 1897.

During this period of irrigation development, C. T. Mills of Oakland, Calif., and M. L. Wicks of Los Angeles acquired land in Pomona. They then contracted with Loop, Meserve, and others to buy the San Jose ditch and a part of the tract owned by Loop and associates. The land in the tract had a water allotment of 1 miner's inch to each 8 acres, but Loop and associates agreed to provide Mills and Wicks with additional water by deeding them all excess water available for the tract. In return, Mills and Wicks would construct a diversion dam at the mouth of the canyon, build a pipeline from the dam to the northeast corner of the tract, and maintain the pipeline for the next 10 years. In May 1882, immediately before starting construction, Mills and Wicks filed a claim for 3,300 miner's inches of San Antonio Creek water (written commun., San Antonio Water Co., 1967). They completed the diversion dam and a pipeline down the west side of the creek early in 1883, at a cost of about $62,000 (written commun., city of Pomona, 1967).

Mills and Wicks organized the Pomona Land and Water Co., which was incorporated in October 1882. In December of the same year they transferred all their land and water rights to the new company.

The above account covers the history of water development in the San Antonio Creek basin to the year 1882. Its subsequent history is discussed, under major headings, on the pages that follow. The Pomona Land and Water Co. is not discussed under a separate heading; the major events in the history of that company are given on pages 175, 177, 178, and 182-183.

San Antonio Water Company

Unless otherwise noted, all information in this section of the report was obtained from the San Antonio Water Co.

In 1882 the Cucamonga Land Co. granted J. S. Garcia and J. C. Dunlap an option for that part of the Cucamonga Rancho west of Cucamonga Creek, and for the rancho rights to water from San Antonio Creek. Although Wicks, one of the organizers of the Pomona Land and Water Co., had tried to buy that property,

the Chaffey brothers (p. 147-150) later in 1882 purchased the option to the land and water rights in San Antonio Creek for $60,000. The land included in the purchase amounted to 6,216 acres. The Chaffey brothers also purchased land with water rights at the mouth of the canyon, which included the Kincaid property and water rights (p. 171).

The acquisition of those lands and water rights by the Chaffeys created a conflict between them and the landowners on the west side of the creek. The conflict was finally resolved by an agreement whereby the Chaffeys were given one-half of the surface flow and the west-side interests were given the other half. No mention was made of the underflow, which the Chaffeys later appropriated. In all, the Chaffeys had acquired a total of about 10,000 acres, which they proceeded to subdivide into 10-acre lots. A preliminary plot of their subdivision, which they called Ontario Colony Lands, was recorded in December 1882, and the final map was recorded in September 1890.

The Chaffeys organized the San Antonio Water Co., which was incorporated in October 1882, with a capital stock of $1.5 million divided into 15,000 shares. The purpose of the company was to acquire water, water rights, and land, and to furnish water for irrigation and other purposes to its stockholders. Each share of stock entitled the owner to a proportionate share of the water supply available to the company.

The Chaffey brothers entered into an agreement with the San Antonio Water Co. in November 1882, in which they agreed to install weirs and pipelines to deliver water to the highest corner of each 10-acre lot. They also agreed to lay pipelines in the 160-acre tract of the town of Ontario. Furthermore, on July 15, 1883, they would convey to the company all structures, up to one-half the total flow of water from San Antonio Creek, and all the water to be developed flowing in and through San Antonio Canyon and Creek. The Chaffeys reserved for themselves, however, the right to generate hydroelectric power.

The San Antonio Water Co. agreed that on or before July 15, 1883, it would issue to the Chaffey brothers one share of stock for each one-tenth miner's inch of water flowing from San Antonio Canyon. On the same date it would put in trust 160 shares for the town of Ontario and 2,000 shares for the Chaffey brothers for future water development. After July 1883 the Chaffeys could develop additional water. On July 15 of each year for 15 years, discharge measurements would be made to determine the additional water developed, and a corresponding amount of additional stock would be issued to the Chaffeys. At the same time the Chaffeys would deed to the company all additional water developed and all pipelines appurtenant to the development. Furthermore, during that 15-year period the San Antonio Water Co. could not issue stock to anyone other than the Chaffey brothers. On July 15, 1897, the company would own all the water, water rights, pipelines, and rights-of-way, and the company would have exclusive right to develop water on all lands acquired. The company also agreed that no stock would be disposed of except in exchange for additional water supply. Such stock would be issued on the basis of one share for each one-tenth miner's inch of water. Water delivery by the company was to be made on the basis of 1 miner's inch of water for each 10 shares of stock, or 30 miner's inches for 24 hours once a month for each 10 acres.

On July 15, 1883, the flow delivered to the San Antonio Water Co. was 365 miner's inches. On the basis of that measured flow, the company delivered 1,500 shares of stock to the trustees for the Chaffey brothers. That increased the outstanding stock to 3,500 shares.

Ontario was incorporated as a city in December 1891 (fig. 57), and after incorporation the San Antonio Water Co. transferred to the city the 160 shares of stock that had been assigned to the domestic system.

In January 1883, the Chaffeys began the construction of a tunnel near the mouth of the canyon, for the purpose of increasing the water supply. By 1888, 3,000 feet of tunnel had been completed at a cost of $75,000 (written commun., city of Pomona, 1967). Outflow from the tunnel joined the surface-water diversion that was carried in an open ditch from the division box. (The exact location of the ditch is not known, but it probably had the general alinement of the present pipeline, as shown in figure 45.) The combined tunnel outflow and surface-water diversion was then carried in a pipe to the point of distribution.

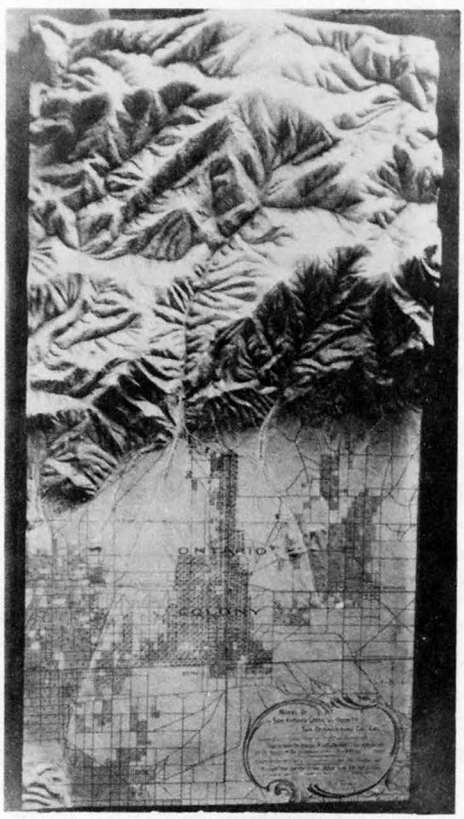


FIGURE 57.--Model of San Antonio Creek and vicinity, shown at Louisiana Purchase Exposition, St. Louis, Mo., in 1904. (Courtesy of San Antonio Water Company.)

In March 1886 the Chaffey brothers and other trustees transferred to a group of individuals the unsold lots in the Ontario Colony, their water rights in San Antonio Creek, wastewater from Cucamonga Creek, water rights appurtenant to land which had been or would be developed, and their interest in the San Antonio Water Co. In March of the next year this group organized the Ontario Land and Improvement Co., and August 5, 1887, they deeded to the company the property and water rights acquired the previous year.

In the years that followed the San Antonio Water Co. was often involved in litigation. A dispute between that company and the Ontario Land and Improvement Co. over the water rights and water-bearing land was settled by court decree in July 1893. By the terms of the decree the Ontario Land and Improvement Co. deeded the tunnel and its interest in the land and water rights to the San Antonio Water Co. In return the San Antonio Water Co. issued 1,149 shares of stock to the Ontario Land and Improvement Co. for 114.9 miner's inches of water from the tunnel. By that transaction the San Antonio Water Co. gained full control of its water system, and the Ontario Land and Improvement Co. was free to develop more water from tunnels.

In June 1894 the San Antonio Water Co. entered into a contract with Charles Frankish and G. T. Stomm to construct a new tunnel to develop an additional supply of water. By the terms of the contract Frankish and Stomm would develop 40 or more miner' s inches of water and the company would pay $750 per miner's inch, or $30,000 for the 40 miner's inches. The Frankish-Stomm tunnel development failed to produce the anticipated quantity of water. In 1898 the tunnel was producing only 6.38 miner's inches of water. In January of the following year the San Antonio Water Co. foreclosed on the tunnel and continued work on it.

During that period when the company was involved with the Frankish-Stomm tunnel, the company acquired additional land and water rights. By an agreement dated April 24, 1897, the Pomona Land and Water Co. (p. 172) sold most of its land in San Antonio Canyon to the San Antonio Water Co. The sale included water rights associated with the land and a major share in the right to water measured at the division box. When the flow at the division box was equal to or less than 624 miner's inches, the two companies shared the flow equally. When the flow at the division box exceeded 624 miner's inches, the San Antonio Water Co. was entitled to all water in excess of 312 miner's inches.

For several years the San Antonio Water Co. was involved in litigation concerning the right to water from Cucamonga Creek developed by the Eddy tunnel (p. 166). A party to that litigation was the Ontario Power Co.; its history is discussed in detail in the next section of this report, "Hydroelectric-Power Development in San Antonio Canyon." That section tells how the San Antonio Water Co., in 1901, became involved in hydroelectric power development in San Antonio Canyon, despite the fact that the Chaffey brothers had reserved for themselves the right to generate power when they organized the company. To protect its water rights in the canyon, the San Antonio Water Co. became associated with the Ontario Power Co., and the interests of the two companies became intertwined.

The Eddy tunnel (fig. 55) in the cienaga west of Red Hill, was built by the Cucamonga Fruit Land Co. in 1888 (p. 164). In September 1896 that company contracted with N. W. Stowell to extend the tunnel and drill additional wells. Stowell's payment was to be based on the additional water developed, at the rate of $600 per miner's inch. Stowell also received a right-of-way through the tunnel for water from a well he owned and was free to dispose of that water to anyone at any time. Furthermore, if flow in the tunnel diminished, Stowell was given the right to develop sufficient water on the west 184 acres of sec. 4, T. 1 S., R. 7 W. (projected), to make up the shortage. Stowell extended the tunnel and drilled several wells, one at the north end of the tunnel, for the Cucamonga Fruit Land Co.

In June 1898 the San Antonio Water Co. rented 30 miner's inches of the water that Stowell had developed under his contract. Then, on April 8, 1899, that company purchased the 30 miner's inches of water from a well owned by Stowell in sec. 4, the water to be delivered through the Eddy tunnel. On the same day, the company purchased 50 miner's inches of water from the Cucamonga Fruit Land Co. and contracted for an additional 50 miner's inches. The additional water was to be developed in sec. 4.

Some of the stockholders in the Cucamonga Water Co. filed a suit against the Cucamonga Water Co. and the Cucamonga Fruit Land Co. to prevent the sale of water from the area at the head of the Eddy tunnel to the San Antonio Water Co. (p. 166). The stockholders claimed that land deeded back to the Cucamonga Fruit Land Co. by the Cucamonga Water Co. deprived the stockholders of lands that they depended upon for water development. The judgment of the court was in favor of the defendants on the ground that the water in question was from a ground-water basin and not from a stream. After settlement of the suit additional wells were drilled in the area.

The Ontario Power Co. (p. 179-181) purchased the Eddy tunnel from the Cucamonga Fruit Land Co. in May 1902. That purchase included the right to carry water through the tunnel to its full capacity, after prior tunnel rights were satisfied. Those prior rights were the right of the Cucamonga Water Co. to use one-half the capacity of the tunnel and the right granted to the San Antonio Water Co. to carry 130 miner's inches. At the same time the Ontario Power Co. acquired land adjacent to the 90 acres on which wells had been developed, to furnish the 130 miner's inches of water purchased by the San Antonio Water Co. After acquiring the Eddy tunnel, the Ontario Power Co. delivered about 65 miner's inches of water on a lease to the Cucamonga Water Co. for use outside the Cucamonga Rancho. For several years after 1902, the Ontario Power Co. leased its water that was developed in the Eddy tunnel.

Another lawsuit evolved in February 1904, at which time the Cucamonga Vineyard Co., the Cucamonga Land and Irrigation Co., and the Old Settlers Water Co. filed a suit against the San Antonio Water Co., Ontario Power Co., Cucamonga Water Co., and the Upland Water Co., asking for an injunction to prevent the defendants from pumping or otherwise taking water from the Eddy tunnel area. Again, the judgment of the court was in favor of the defendants. In November 1908 the use and maintenance of the Eddy tunnel was established by

agreement whereby the Cucamonga Water Co. could use one-third of the tunnel capacity and the San Antonio Water Co. the other two-thirds capacity. The maintenance was to be paid for in proportion to the water carried. The Ontario Power Co., which owned the tunnel, sold or leased all the water it developed there until 1917, when it sold its interest in the tunnel and adjacent land to the San Antonio Water Co.

Many of the companies named in the following paragraphs appear in this report for the first time; they are companies that were involved in the generation of hydroelectric power and are discussed in the next section of the report titled, "Hydroelectric-Power Development in San Antonio Canyon." In June 1911, the Irrigation Co. of Pomona, a subsidiary of the Pomona Land and Water Co. (p. 172), filed a suit in the Superior Court of Los Angeles against the San Antonio Water Co., Ontario Power Co., Sierra Power Co., and Ontario and San Antonio Heights Railroad Co., to determine the rights of each company in the water of San Antonio Creek. A judgment was rendered and later repealed. However, a final court decision, dated October 25, 1913, established the rights of each company, as follows.

The San Antonio Water Co. had the right to divert 740 miner's inches from January 1 to March 31, and to divert a maximum of 965 miner's inches from April 1 to December 31. The water diverted was to be of surface-water origin, and could be used for irrigation or domestic purposes, or could be spread to recharge the underlying ground-water body. The company was also given the right to water developed in the tunnel (p. 175, fig. 45) and laterals. That water could be used for the same purposes as the surface-water diversion, provided the tunnel was not extended or enlarged. The company was granted the right to spread the full quantity of water allotted it from the stream and tunnel, but it could not spread more than that quantity unless the surface flow was 10,000 miner's inches or more at an east-west line drawn through a point near the northwest corner of the Cucamonga Rancho. When the flow in the channel exceeded 10,000 miner's inches, the company could divert an additional 500 miner's inches at the diversion dam for spreading. However, if it were feasible to spread water in the canyon upstream from the diversion dam, that water had to be spread first before any spreading was done downstream from the diversion dam. Other grants to the San Antonio Water Co. included rights to surface water and water from springs that could be used on tracts of land it owned. Twenty-five miner's inches of water was allowed for domestic and irrigation use on its land and on that of the Ontario Power Co. That water was to be diverted between the diversion dam and the intake to the pipeline.

The Ontario Power Co. was granted the right to 17 percent of the 740 miner's inches allotted to the San Antonio Water Co. between January 1 and March 31, and 17 percent of the 965 miner's inches between April 1 and December 31. The Ontario Power Co. was to operate and maintain the pipeline and divert water through the powerhouse. (Ontario plant No. 1 was the only powerhouse owned by the company at that time.) The company was also given a riparian right to use 15 miner's inches of water around the powerhouse, but that water could not be spread.

The Ontario and San Antonio Heights Railroad Co. was granted the right to receive and use, for the generation of power, a part of the water allotted to the San Antonio Water Co. and Ontario Power Co.

The Irrigation Co. of Pomona was granted the right to divert one-half the surface flow after deduction of the Ontario Power Co.'s allotment of 17 percent (see above) and the Grid right to 18 miner's inches (p. 172, 180). This amounted to a right to 312 miner's inches when the surface-water diversion through the pipeline was 773½ miner's inches. No change was made in the rights of the Irrigation Co. of Pomona to spread water.

The above stipulations were still in effect in 1968. By this division of the flow from San Antonio Canyon, the San Antonio Water Co. owns about 60 percent of the water and the Pomona interests own the remainder.

The continued decrease in the water supply made it necessary for the San Antonio Water Co. to request the cities of Upland and Ontario to assume the responsibility for supplying domestic water to their residents. Between July 1925 and March 1929 the company gradually accomplished the discontinuance of domestic service to the two cities, but the customers affected had their water lines connected to the city systems at company expense. During succeeding years the San Antonio Water Co. and the two cities exchanged water.

By an agreement dated November 13, 1930, the major extractors of ground water from the Cucamonga Creek basin--the San Antonio Water Co., the Cucamonga Water Co., and several smaller water companies that pumped ground water--limited their pumpage to 6,500 acre-feet per year, with the further stipulation that no more than 800 miner's inches would be pumped at any time (p. 166-167). To increase its water rights in the Cucamonga Creek basin, the San Antonio Water Co. had diverted San Antonio Creek water to that basin, south of 19th Street, since 1909.

Also in 1930, the San Antonio Water Co. organized the San Antonio Canyon Mutual Service Co. (p. 181) to serve the present community of Mount Baldy.

The San Antonio Water Co. continues to supply irrigation and domestic water to an agricultural area that is gradually becoming urbanized. Water is also supplied to the cities of Ontario and Upland, which own stock in the company. As stated above, those two cities operate their own distribution systems.

Hydroelectric-Power Development in San Antonio Canyon

In the years 1891-1902 there were four hydroelectric developments in San Antonio Canyon.

The history of the first power generation starts in 1890 when C. G. Baldwin, president of Pomona College and a member of the board of trade of the city of Pomona, proposed the development of hydroelectric power in the canyon. He first tried to interest the Pomona Land and Water Co. in the project but was unsuccessful. He then purchased land for the project in sec. 36, T. 2 N., R. 8 W., for $25,000, and in July 1891 organized the San Antonio Light and Power Co. (written commun., city of Pomona, 1967). The new

company built a dam in the creek at the upper end of the Hog Back (fig. 45). From this dam the water was carried through a pipe and tunnel to a powerhouse about a quarter of a mile downstream from the Hog Back. Power was first delivered to Pomona in November 1892 and to San Bernardino a month later (Fowler, 1923, p. 544-545). The capacity of the plant was doubled by the addition of a second unit in 1893, and doubled again the next year by the addition of two more units. In 1898 and 1899 San Antonio Creek had its lowest flow of record, and the water available was insufficient to operate the powerplant. Consequently the company had to build a steamplant in San Bernardino. That led to financial problems and in 1900 the system was sold to W. G. Kerkhoff, a stockholder in the San Gabriel Electric Co.

The second hydroelectric development was underway at the time the San Antonio Light and Power Co. was expanding the generating capacity of its powerplant. Between 1888 and 1894 the Ontario and San Antonio Heights Railroad Co. had operated a mule-drawn street railroad on Euclid Avenue from Ontario to San Antonio Heights (fig. 45). The mules hauled the cars up the hill, and on the return trip they rode back on a special platform built on the rear of the cars. In 1894 the railroad company built the Stone Castle hydroelectric powerplant in San Antonio Heights, utilizing the drop from the point where the tunnel and surface-water diversions were combined. Power from this development operated the streetcars until 1916 when the plant was destroyed by fire (oral commun., Southern California Edison Co., 1967). The water rights of the Ontario and San Antonio Heights Railroad Co. were firmly established by a court decree in 1913 (p. 177-178).

The third hydroelectric development involved W. G. Kerkhoff in the year 1900. After purchasing the generating system of the San Antonio Light and Power Co., he organized the Sierra Power Co. That company abandoned the old powerplant and built a new one downstream known as the Sierra plant (fig. 45). The pipeline was extended to the new plant and power generation began in February 1901 (Fowler, 1923, p. 614). In March 1914 the Sierra Power Co. was purchased by the Pacific Light and Power Co., which in turn was purchased by the Southern California Edison Co. in 1917.

The history of the fourth hydroelectric development is more involved. In 1882 when the Chaffey brothers organized the San Antonio Water Co., they reserved for themselves the right to generate hydroelectric power in San Antonio Canyon (p. 173). Nine years later, in October 1901, the Ontario Power Co. was organized to generate electric power in San Antonio Canyon and deliver it to the town of Ontario (Fowler, 1923, p. 712). In that same year, the stock of the power company was transferred to Kerkhoff, A. C. Balch, and others. The plans of the Ontario Power Co. called for a powerhouse to be built in the lower part of the canyon in sec. 12, T. 2 N., R. 8 W. The powerhouse would use water from the tailrace of the Sierra plant. At about this time, the San Antonio Water Co., which had water rights in the canyon (p. 175), started construction of a pipeline for water supply that started at the tailrace of the Sierra plant. The route of that pipeline would take it across land in sec. 1, T. 1 N., R. 8 W., controlled by either Kerkhoff or the Chaffeys, and past the site of the proposed powerhouse of the Ontario Power Co. Conflicting interests had to be reconciled. Other companies that were involved were the Ontario Land and Improvement Co. (p. 175) and the Ontario Electric Co., which was a small local company.

Kerkhoff, the Chaffey brothers, and the Ontario Land and Improvement Co. consolidated their interests in order that the power development could proceed. Their water rights and property, and those of the Ontario Electric Co., were transferred to the Ontario Power Co. The promoters then made the following proposal: The Ontario Power Co. would issue $380,000 of its common stock to the San Antonio Water Co., if that company would guarantee payment of $380,000 of bonds authorized December 31, 1901, for the development of water rights and water-bearing lands formerly owned by the Ontario Electric Co. (Fowler, 1923, p. 712). The promoters were to receive $280,000 in bonds, and the balance of $100,000 was to remain in the treasury of the Ontario Power Co. for building a powerhouse and distribution system.

To protect its water rights, the San Antonio Water Co. purchased the stock of the Ontario Power Co. for $100,000 May 8, 1902. The next day the San Antonio Water Co. leased to the Ontario Power Co. for 30 years, beginning January 1, 1902, 5 acres of land in sec. 13, T. 1 N., R. 8 W., for a powerhouse; the right to divert water across secs. 1, 12, and 13 for power-generation purposes; and a right-of-way over the same land for pipelines to convey the water to the powerplant (fig. 45). The Ontario powerplant No. 1 was completed in December 1902. Power from the plant was used by the San Antonio Water Co. to operate the pumps on its wells, and any surplus power was sold to the Pacific Light and Power Co.

Piping the water from the tailrace of the Sierra plant to the Ontario plant No. 1 reduced the channel loss, and the water saved was claimed by the Ontario Power Co. The power company rented the salvage water to the San Antonio Water Co. In October 1903 the Pomona Land and Water Co. (p. 175) and the Canon Water Co. (p. 182-183), which had water rights in the canyon, filed suit against the Ontario Power Co. and the San Antonio Water Co. to prevent the diversion of the salvage water to the San Antonio Water Co. The court decided in favor of the plaintiffs. The decision was appealed and in January 1908 the California Supreme Court in Los Angeles reversed the decision of the lower court and gave the Ontario Power Co. the salvage water and the right to pipe that water from the intake of Ontario plant No. 1 to the division box.

In July 1903 the San Antonio Water Co., which was incorporated as a nonprofit mutual water company, transferred its domestic water business to the Ontario Power Co., a company organized as a public utility corporation. The Ontario Power Co. used the salvage water to supply the domestic needs, and it used the pipelines of the San Antonio Water Co. to deliver the water. A judgment rendered in May 1910 established the salvage water as amounting to 17 percent of the water flowing in the pipeline from the Sierra plant. Also, the Grid water right (p. 178) of the San Antonio Water Co. was fixed at a value of 18 miner's inches.

The Ontario Power Co. built Ontario plant No. 2 and put it into operation in December 1919 (Fowler, 1923, p. 714). The intake to this powerplant is in NW¼NW¼ sec. 30, T. 2 N., R. 7 W., and the plant itself is just upstream from the intake to the Sierra plant (fig. 45). Ontario plant No. 2 operated continuously until it was partially destroyed by the flood of March 1938 (oral commun., Southern California Edison Co., 1967). The plant was rehabilitated and put back into operation in June 1963.

Ontario plant No. 3 (fig. 45) was built in San Antonio Heights and put into operation in 1922. Plant No. 3 used the combined tunnel outflow and surface flow downstream from Ontario plant No. 1, and the water, after passing through the plant, was released to a reservoir of the San Antonio Water Co. Plant No. 3 operated continuously until late 1962, when the equipment was dismantled and installed in the rehabilitated Ontario plant No. 2.

The Southern California Edison Co. acquired the stock and facilities of the Ontario Power Co. in October 1927. The right to 25 miner's inches of salvage water was sold to the San Antonio Water Co.

San Antonio Canyon Mutual Service Company

The purchase of land and water rights in San Antonio Canyon by the San Antonio Water Co. included part of the present Mount Baldy community (fig. 45). In 1922 the San Antonio Water Co. divided a part of that land into building lots and installed a domestic water supply and sewer system (oral commun., H. A. Pruitt, 1967). Water for domestic use was diverted from the creek upstream from the settlement first known as Camp Baldy. The following year the company started selling lots.

In 1930 the San Antonio Water Co. organized the San Antonio Canyon Mutual Service Co., which was incorporated in May 1930 with a capital stock of $20,000 divided into 2,000 shares. The new company then issued 119 shares of stock to the San Antonio Water Co. (oral commun., San Antonio Water Co., 1967).

The San Antonio Water Co. continued to sell lots, and after organization of the new company, one share of stock in the San Antonio Canyon Mutual Service Co. was assigned to each lot. That share of stock entitled each residence to 1,800 gallons of water per month. To meet this water requirement of the residential development, the San Antonio Water Co. allotted the local company 214,200 gallons of water per month, or a continuous metered flow of 0.55 miner's inch.

The flood of March 1938 destroyed the diversion facilities and a part of the water and sewer system. After the flood several springs were developed and their outflow was stored in two tanks having a combined capacity of 57,000 gallons. Shortly after the establishment of the new water supply, the San Antonio Water Co. increased the metered allotment to 1.2 million gallons per month, each household being entitled to 12,000 gallons per month. At that time (1939) the San Antonio Water Co. turned over the management of the San Antonio Canyon Mutual Service Co. to the stockholders (oral commun., H. A. Pruitt, 1967).

The San Antonio Canyon Mutual Service Co. serves only that part of the Mount Baldy area that was formerly owned by the San Antonio Water Co. Those residents in the Mount Baldy settlement who lease Government land are supplied by the U.S. Forest Service with water from Bear Creek, a tributary to San Antonio Creek west of Mount Baldy. Several other small water developments--for example, one in Icehouse Canyon (fig. 45)--supply other residents in upper San Antonio Canyon.

Canon Water Company

The Canon Water Co. is best discussed by giving a preliminary resume of the history of its parent company, the Pomona Land and Water Co. The Pomona Land and Water Co. had acquired land and water rights in the Pomona-Claremont area at the time of its incorporation in 1882 (p. 172). In April 1897 the company sold most of its land and more than half its water right in San Antonio Canyon to the San Antonio Water Co. After that sale the Pomona Land and Water Co. retained the right to 312 miner's inches of water when the flow of San Antonio Creek at the division box equaled or exceeded 624 miner's inches, or one-half the flow when the flow was less than 624 miner's inches (p. 175). That right was subject to other limitations--see adjudicated right, on page 178, for the subsidiary Irrigation Co. of Pomona--but water ownership among the property owners was based on a flow of 312 miner's inches.

In August 1897 the Pomona Land and Water Co. organized four subsidiary companies: The Irrigation Co. of Pomona, the Palomares Irrigation Co., the Del Monte Irrigation Co., and the Canon Water Co. Administration of the water rights in San Antonio Canyon and delivery of the water was made the responsibility of the Canon Water Co.

The Canon Water Co. was incorporated August 9, 1897, with a capital stock of $312,000 divided into 31,200 shares (Mendenhall, 1908, p. 80). The company supervised the delivery of water to the various land owners with water rights, in accordance with the following distribution schedule:

Land owners with water rights	Miner's inches
Avenue Line Users (West Ditch)	117.625
Harrison Avenue Water Co. (East Ditch and Loop Lines)	61.375
Kingsley Tract Water Co	52.00
North Palomares Water Co	34.00
Total	265.00

The above distribution of 265 miner's inches constitutes a primary right; the remaining 47 miner's inches that make up the grand total of 312 miner's inches is classed as a secondary or excess right, which was owned by the North Palomares Water Co.

The stock of the Canon Water Co. is owned by the first three companies listed above. The North Palomares Water Co. paid part of the pipeline costs and also pays assessments. In March 1910 the North Palomares Water Co. acquired from the Pomona Land and Water Co. the water rights and 412 acres of land in Evey Canyon which is tributary to San Antonio Creek downstream from the division box (fig. 45). Those water rights were later acquired by the city of Pomona by a resolution dated August 22, 1950 (oral commun., city of Pomona, 1967).

Water deliveries were made to the stockholders of the Avenue Line Users, Harrison Avenue Water Co., and the Kingsley Tract Water Co. on the basis of 1¼ miner's inches to 10 acres. The delivery by the North Palomares Water Co. was made on the basis of 1 miner's inch to 10 acres. The city of Pomona acquired stock in the Canon Water Co., as well as in the four related companies, following the city acquisition of the Evey Canyon water rights. By January 30, 1968, the city owned 284.10 miner's inches of the total right to 312 miner's inches from San Antonio Canyon.

The water diverted from San Antonio Creek to land west of the creek was used almost exclusively for agriculture until the early 1950's, or about the time the city of Pomona began acquiring stock in the water companies. The Avenue Line Users have supplemented their supply since 1951, with Colorado River water bought from the Metropolitan Water District of Southern California (oral commun., G. L. Keiser, 1967). By 1967 the agricultural use had declined to about 5 percent of the total diversion. Most of the water now goes through the treatment plant of the city and is then distributed through the city domestic system.

San Jacinto River

The San Jacinto River drains the western slope of the San Jacinto Mountains (figs. 1 and 58). The flow in the main stem of the river is principally water from its three headwater tributaries: North Fork, South Fork, and Strawberry Creek. After leaving the mouth of its canyon, the river meanders for more than 20 miles in a highly permeable channel before entering Elsinore Lake. In that stretch of channel downstream from the canyon, water is lost by streambed seepage and by evaporation. Although technically tributary to the Santa Ana River, San Jacinto River water reaches the Santa Ana River only on those few occasions when Elsinore Lake overflows to Temescal Creek.

Prior to 1885 several ditches diverted water from the San Jacinto River. Those early ditches are discussed here in downstream order; they are not shown in figure 58. The scanty information given here is taken from Hall (1888; p. 92, 93, 102, and 103).

The Hamler ditch, built in 1871-72, diverted from the river a short distance upstream from the mouth of the canyon. The diverted water was originally used in the Florida tract to irrigate about 100 acres of grain. Later, the diversion was used to irrigate about 50 acres of alfalfa and 5 acres of orchard upstream from the Florida tract. The ditch had a capacity of 200 to 250 miner's inches of water. The Fairview Land and Water Co. later obtained the water right of the ditch in exchange for 1,900 shares of its stock, and the company continued to deliver water in sufficient quantity to irrigate 380 acres of land.

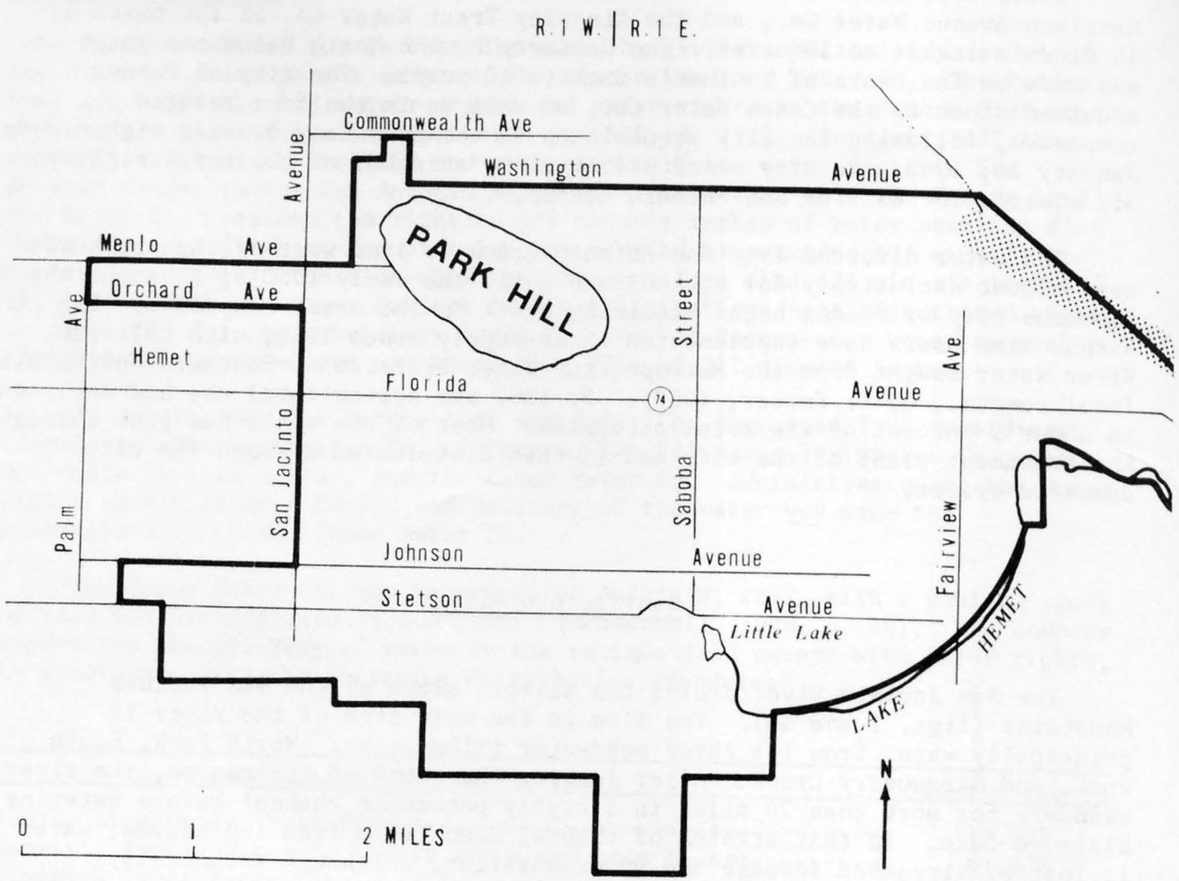


FIGURE 58.--Diversions from San Jacinto River.

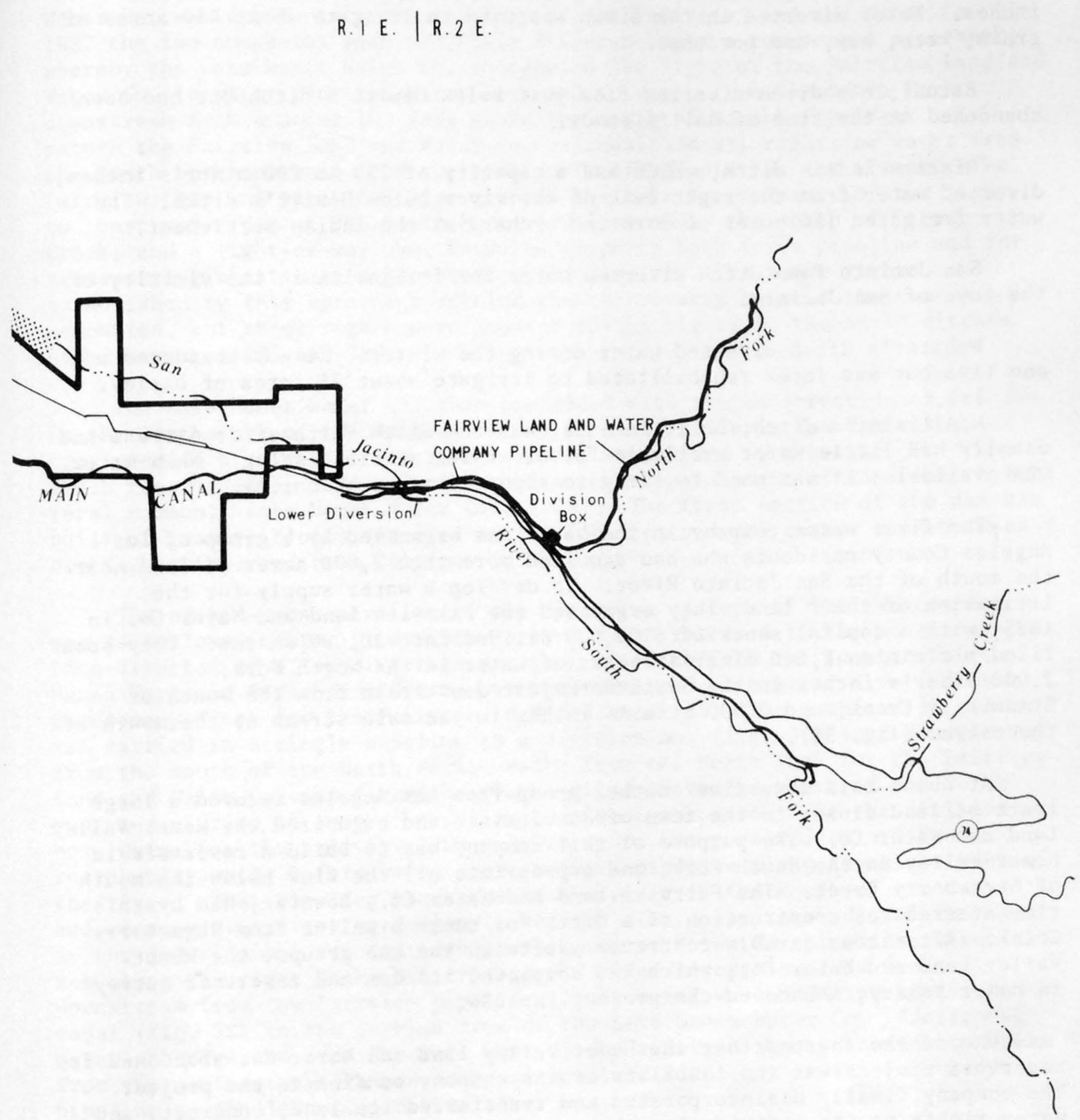


FIGURE 58.--Continued.

Hewitt's ditch, built in 1865, had a capacity of about 600 miner's inches. Water diverted in the ditch was used to irrigate about 450 acres of grain, corn, hay, and potatoes.

Estudillo's ditch diverted flow just below Hewitt's ditch but had been abandoned at the time of Hall's study.

Mission Indian ditch, which had a capacity of 150 to 200 miner's inches, diverted water from the right bank of the river below Hewitt's ditch. The water irrigated 150 acres of corn and orchard at the Indian settlement.

San Jacinto Town ditch diverted water for irrigation in the vicinity of the town of San Jacinto.

Webster's ditch diverted water during the winter. It was abandoned at one time but was later rehabilitated to irrigate about 75 acres of barley.

McAllister's ditch, built in 1882, was the ditch farthest downstream and usually had little water available for diversion at its heading. When water was available, it was used to irrigate about 75 acres of barley.

The first water company in the basin was organized by a group of Los Angeles County residents who had acquired more than 2,000 acres of land near the mouth of the San Jacinto River. To develop a water supply for the irrigation of their land, they organized the Fairview Land and Water Co. in 1885, with a capital stock of $100,000 divided into 20,000 shares. They soon filed a claim on 2,000 miner's inches of water in the North Fork, 2,000 miner's inches in the South Fork just downstream from the mouth of Strawberry Creek, and 2,000 miner's inches in the main stream at the mouth of the canyon (fig. 58).

At about this same time another group from Los Angeles secured a large tract of land closer to the town of San Jacinto and organized the Hemet Valley Land and Water Co. The purpose of that company was to build a reservoir in Hemet Valley on the South Fork and appropriate all the flow below the mouth of Strawberry Creek. The Fairview Land and Water Co., however, had by this time started the construction of a ditch for their pipeline from Strawberry Creek. After considerable controversy between the two groups, the Hemet Valley Land and Water Co., which had completed its dam and reservoir survey in Hemet Valley, abandoned the project in 1886.

One of the reasons that the Hemet Valley Land and Water Co. abandoned its reservoir project was the inability of the company to finance the project. The company finally disincorporated and transferred its land, contract, and water rights to its individual members. Those individuals then organized the Hemet Land Co. and the Lake Hemet Water Co. The Lake Hemet Water Co. was incorporated in January 1887 with a capital stock of $2 million divided into 20,000 shares. Most of that stock was held by the Hemet Land Co. The land contracts were transferred to the Hemet Land Co., and the water rights and land at the reservoir site were transferred to the Lake Hemet Water Co. During this period of reorganization of the Hemet Valley Land and Water Co. interests, the Fairview Land and Water Co. took possession of the water in the river and of land adjacent to the river.

To deliver water to its land, any pipeline built by the Lake Hemet Water Co. would have to cross property of the Fairview Land and Water Co. In 1887 the two companies resolved their differences by a compromise agreement, whereby the Lake Hemet Water Co. recognized the right of the Fairview Land and Water Co. to water from the North Fork and to water from the South Fork downstream from a point 100 feet above the mouth of Strawberry Creek. In return the Fairview Land and Water Co. relinquished all rights to water from the South Fork upstream from the previously named point on the stream. The Fairview Land and Water Co. also granted the Lake Hemet Water Co. the right to construct a dam on the South Fork, 100 feet above the mouth of Strawberry Creek, and a right-of-way over Fairview property both for a pipeline and for transporting construction material to the damsite. The water rights established by this agreement settled the controversy between the two companies, but these rights were subject to the rights in the early ditches named on pages 183 and 185.

The Lake Hemet Water Co. then proceeded with the construction of its dam on the South Fork at the downstream end of Hemet Valley. The dam was completed to a height of 110 feet in 1893, was raised to a height of 122.5 feet in 1895, and was raised again to a final height of 135 feet in 1923 (oral commun., Lake Hemet Water Co., 1967). The first section of the dam was built of granite blocks quarried at the damsite, and the cement used between blocks was imported from Belgium.

The agreed-upon operation of the diversion systems of the two companies was as follows. Water from Hemet Reservoir was released to the South Fork, then diverted at a low diversion dam just upstream from the junction of the South Fork and Strawberry Creek, and then combined with water diverted from Strawberry Creek for the Fairview Land and Water Co. The combined diversion was carried in a single pipeline to a division box (fig. 58) just downstream from the mouth of the North Fork. Water from the North Fork for the Fairview Land and Water Co. was diverted several miles above the mouth of the North Fork and carried in another pipeline to the division box. At the division box, water for the Fairview Land and Water Co. was measured at a 2-foot rectangular weir, before being conveyed in a pipeline along the right bank of the river. That pipeline then crossed the river at the mouth of the canyon and continued west to the company's service area. The remainder of the water at the division box was led into the Lake Hemet Water Co. pipeline, which also ran along the right bank, but crossed the river several hundred feet downstream from the Fairview pipeline. That water was conducted west in a canal (fig. 59) to the service area of the Lake Hemet Water Co. Additional water was diverted from the left bank of the river, a short distance upstream from the mouth of the canyon, and was combined with that in the Fairview pipeline on the left side of the river.

In August 1891, when the construction of the dam for Hemet Reservoir was about to begin, the San Jacinto and Pleasant Valley Irrigation District was organized (written commun., Lake Hemet Municipal Water District, 1967). The boundaries of the area served by the district are not known, but the location

FIGURE 59.--Lake Hemet Water Company canal at Soboba Street, built in 1887-88; now used by the Lake Hemet Municipal Water District.

and probable extent are indicated by the main canals shown in figure 60. Water for the area was probably supplied chiefly from the water-supply system of the Lake Hemet Water Co., although some was supplied from the Fairview Land and Water Co. system. Because of improper incorporation procedures, the assets of the irrigation district were acquired by the Fairview Land and Water Co. in July 1899, but the district was not dissolved until June 1921. The Fairview Land and Water Co. continued to deliver water to the eastern part of the district service area until 1956 (oral commun., Lake Hemet Municipal Water District, 1967).

The long drought of the late 1940's and early 1950's made it necessary for the Fairview Land and Water Co. and the Lake Hemet Water Co. to supplement their local water supplies. In 1954 they purchased Colorado River water from the Metropolitan Water District of Southern California, and such purchases have continued as needed (oral commun., D. W. Henninger, 1968).

On August 4, 1955, the Lake Hemet Municipal Water District (fig. 58) was incorporated. Five months later, on January 1, 1956, the district acquired the water rights, facilities, and all rights-of-way of the Fairview Land and Water Co. and Lake Hemet Water Co. The district has operated the systems since that date and, as of 1968, the diversion and distribution systems were essentially as described on the preceding pages (oral commun., D. W. Henninger, 1968).

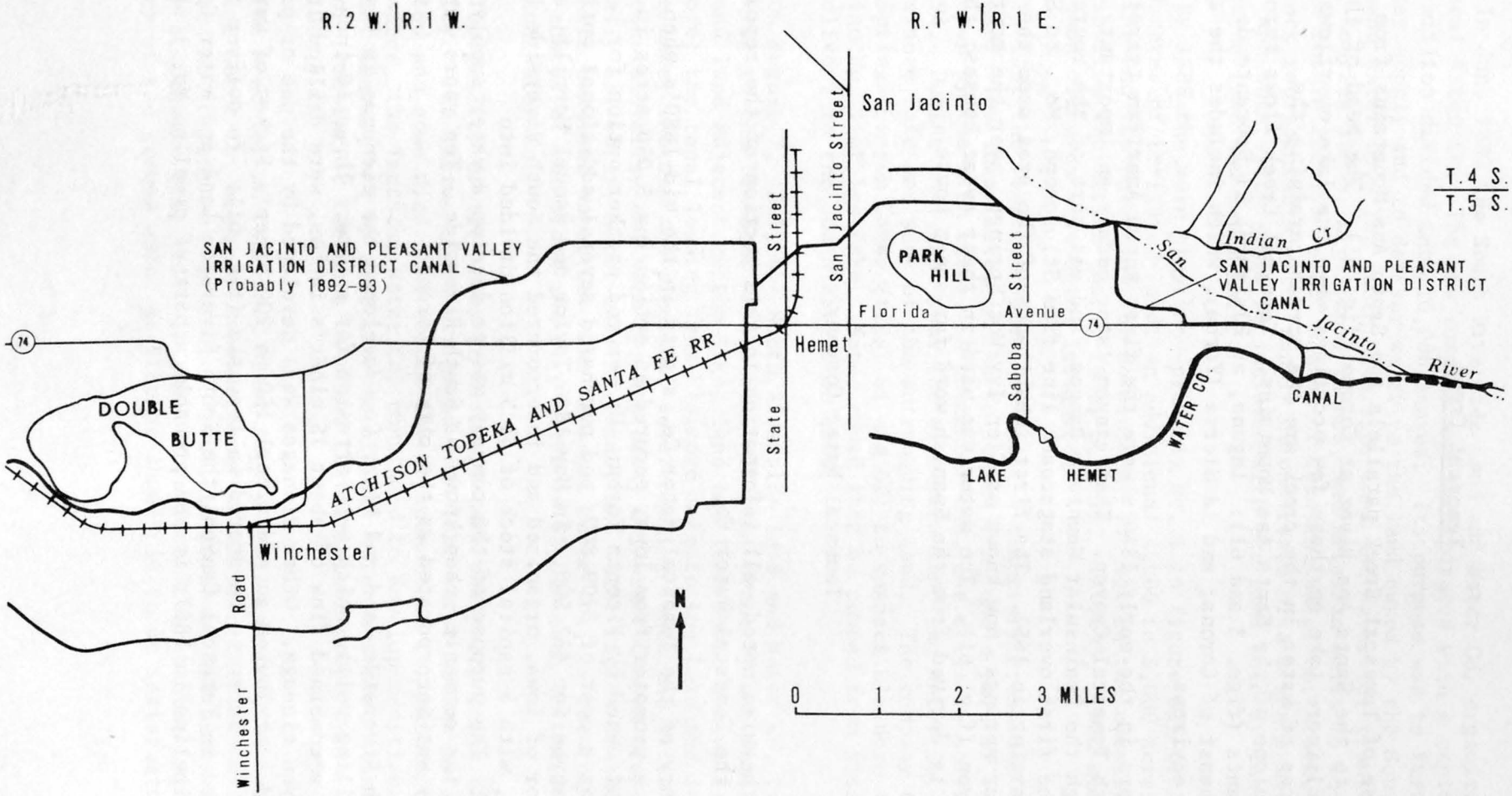


FIGURE 60.--San Jacinto and Pleasant Valley Irrigation District canals.

Temescal Creek

The course of Temescal Creek parallels the Santa Ana Mountains from Elsinore Lake to the Santa Ana River at Corona (fig. 61). The head of the stream is at Elsinore Lake on those few occasions when the lake overflows. The main sources of water in the creek are the streams draining the northeastern slope of the Santa Ana Mountains. Temescal Creek flows through three land grants (figs. 3 and 61): Laguna, at Elsinore; El Sobrante de San Jacinto, southeast of Corona; and La Sierra (Yorba), which includes the city of Corona and environs.

Fur traders in the early 1830's were the first known American travelers to pass through Temescal Canyon. That canyon later became an important pathway through the Peninsular Mountain Ranges, and was part of the route followed by the first overland stagecoach line from St. Joseph, Mo., to San Francisco, starting in 1851. The first inhabitants of the area used the water from the sulfur springs, now known as Glen Ivy Hot Springs, near the mouth of Coldwater Canyon (fig. 61). The water was used in their sweat houses; the name Temescal is derived from the Spanish word for sweat house.

Temescal Water Company

Unless otherwise noted, all information in this section of the report was obtained from the Temescal Water Co.

The history of the Temescal Water Co. starts in the mid-1880's when R. B. Taylor, a promoter from Iowa, secured an option for 5,050 acres in the La Sierra Grant owned by Vicenta Yorba. He secured another option for 11,150 acres at a cost of $109,800, and purchased several additional options in Temescal Canyon for $37,500. In May 1886 Taylor and Samuel Merrill, a former governor of Iowa, organized and incorporated the South Riverside Land and Water Co., with a capital stock of $1.5 million divided into 15,000 shares. The purpose of the company was to develop a water supply for the land near the community then known as South Riverside. Ten years later that community was incorporated as the city of Corona.

The South Riverside Land and Water Co. developed the cienagas in Temescal Canyon by drilling wells, which were artesian for a time. Three 10-inch wells, having a combined flow of about 75 miner's inches, were drilled in the Coldwater Canyon cienaga. Other cienagas were developed by the use of pipes and flumes and contributed an additional 150 to 200 miner's inches of water. Surplus water was later to be stored in Lee Lake (fig. 61). To deliver the water developed in Temescal Canyon, the South Riverside Land and Water Co. completed a pipeline in 1887; it was probably a part of pipeline No. 1 shown in figure 61.

In June 1887 the South Riverside Land and Water Co. organized the Temescal Water Co. The new company was incorporated with a capital stock of $1.6 million divided into 16,000 shares. Its purpose was to further develop a water supply and to deliver water to the land owned by the South Riverside Land and Water Co. The South Riverside Land and Water Co. transferred all its water-bearing lands, pipelines, flumes, and artesian wells to the new company, and in return received 6,000 shares of Temescal Water Co. stock. Each share of stock represented a water supply of one-tenth of a miner's inch per acre of land, and such stock would be included with the land sold by the South Riverside Land and Water Co.

By 1888 the main pipeline--probably No. 1 in figure 61--could serve about 6,000 acres of irrigated land; an additional 4,000 to 5,000 acres above that pipeline had the potential for development but lacked the necessary water and distribution facilities (Hall, 1888, p. 312). In 1893, 2,500 acres of orange and lemon orchards were being irrigated.

In 1892 the Temescal Water Co. built a temporary brush dam at the site of Lee Lake. The lake filled in the following year and a part of the dam was destroyed by the high water. A permanent dam, one still in service, was built in 1894. During that same year the Riverside Land and Water Co. acquired all of Elsinore Lake and some of the surrounding land. The company then built Warm Springs Canyon Canal (figs. 61 and 62) to connect Elsinore Lake with pipeline No. 1 at Lee Lake. Water could then be pumped from Elsinore Lake for delivery to the South Riverside area.

On August 7, 1895, the South Riverside Land and Water Co. transferred the following to the Temescal Water Co.: All real property and water in Elsinore Lake and land adjacent to the lake; land and lots about the village of Elsinore; the canal leading from Elsinore Lake to Lee Lake and land adjacent to Lee Lake; the dam and pipeline; water-bearing lands and artesian wells in the Temescal Valley and Warm Springs area; Coldwater Canyon property; and generally all water, water-bearing lands, and water rights of the South Riverside Land and Water Co. The Temescal Water Co., in return, issued 1,500 shares of its stock and five notes of $5,000 each to the South Riverside Land and Water Co.

The quality of the water in Elsinore Lake was poor, being of high salinity. The citrus trees irrigated with lake water became seriously affected and some died. To reduce the dependence of irrigators on Elsinore Lake water, the Temescal Water Co. continued to develop additional water in Temescal Canyon, and by 1898 the use of lake water was discontinued. (The company transferred Elsinore Lake and certain other property to G. M. Lamy in June 1908.)

The need for an increased water supply still existed, however, and the Temescal Water Co. began to consider sources outside the Temescal Creek basin. The company was advised, in 1901, to purchase 160 acres in Perris Valley at Ethanac (fig. 61), in the San Jacinto River basin. A study of the quality of the ground water at Ethanac showed it to be satisfactory, and the

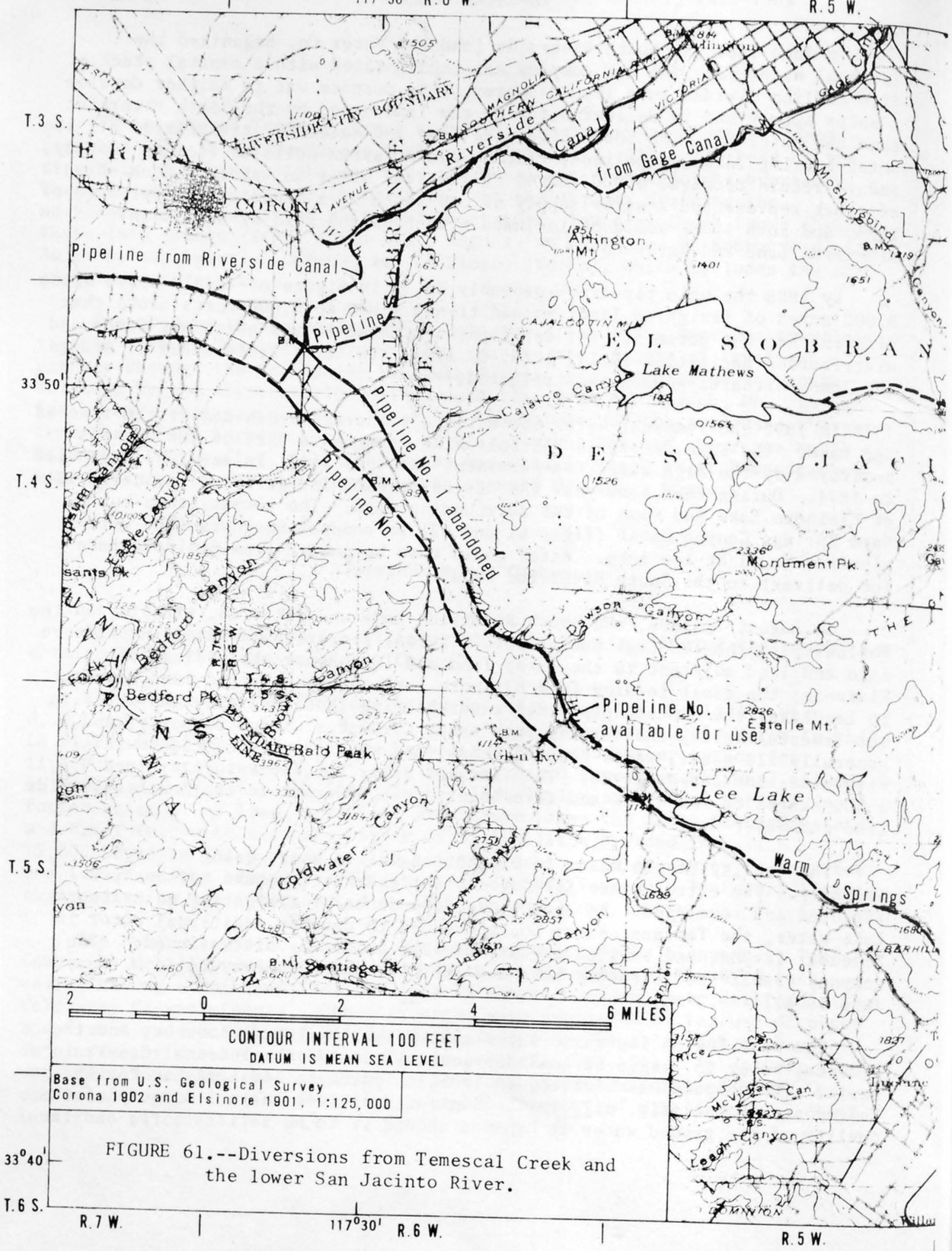


FIGURE 61.--Diversions from Temescal Creek and the lower San Jacinto River.

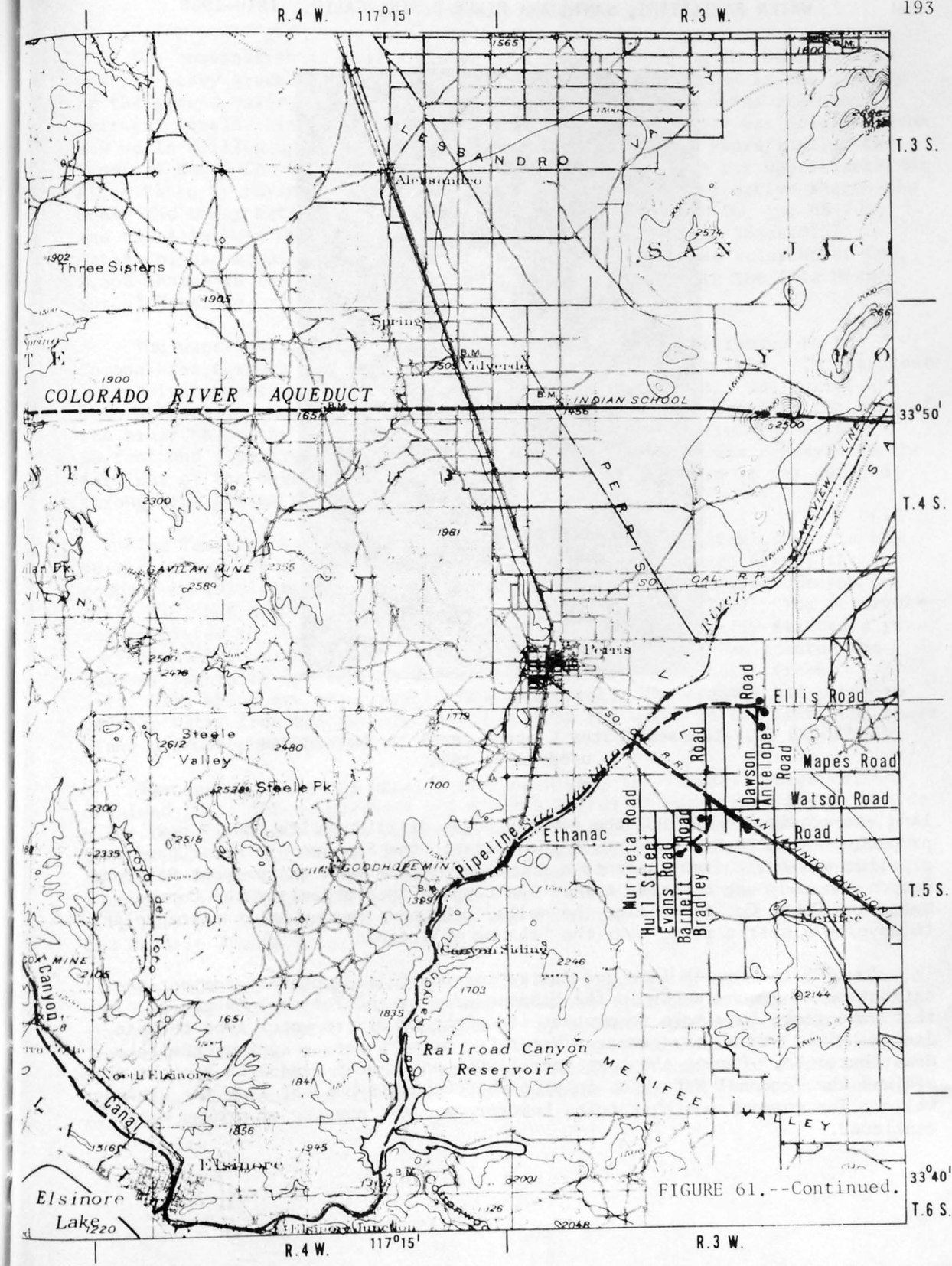


FIGURE 61.--Continued.

FIGURE 62.--Temescal Water Company canal in Warm Springs Canyon; used since 1894.

land was acquired. In 1902 the company began drilling wells on its new property. A ditch was built from the wells to the San Jacinto River, and a pipeline was built from there to a point downstream from the present Railroad Canyon Dam and near Elsinore Lake. The company then organized the Corona Water and Power Co. to operate the wells. The new company built a steamplant to develop electric power near the Ethanac well field.

In 1905 the Lemola Land and Irrigation Co. filed a protest against the extraction of ground water in the Ethanac area by the Temescal Water Co. In that same year, in a move to protect its right to divert water from the San Jacinto River basin, the Temescal Water Co. filed a notice against the Lake Hemet Water Co. During the next year (1906) an Ethanac landowner brought suit against the Temescal Water Co. to stop the company's pumping from the Ethanac wells. The company won that suit, however, and the pumping of ground water continued.

The combination of poor drainage of irrigated land in the Ethanac area and the heavy ground-water pumpage there caused deterioration in the quality of the ground water, and by 1916 the salinity of that water was reaching critical levels. In 1924 a supplemental ground-water supply was obtained from new wells drilled upstream from Lee Lake. However, a few years earlier the Temescal Water Co. began making plans to obtain water from the upper Santa Ana River basin by buying stock in three of the water companies active there--the Meeks and Daley Water Co. (p. 61-68); the Agua Mansa Water Co. (p. 68-70), and the Alta Mesa Mutual Water Co. (p. 71-72). By 1925 the Temescal Water Co. had acquired 204 shares of stock in the Meeks and Daley Water Co., 2.568 shares in the Agua Mansa Water Co., and 969 shares in the Alta Mesa Mutual Water Co.

The water obtained by those transactions was first delivered to the Corona area through the Gage Canal (p. 38-44), starting in 1926. In that year a conduit connecting the Riverside Water Co. and Gage Canals was built, running from the measuring box on the Riverside Water Co. Canal to the base of the bluff below the Gage Canal (fig. 15). A pump then lifted the water 90 feet and discharged it into the Gage Canal. The water was conveyed to the terminus of the Gage Canal (figs. 15 and 61) and from there it was carried through the system of the Temescal Water Co.

The Temescal Water Co. was not ignoring sources of water closer to its service area. To utilize the floodwaters of the San Jacinto River, the company in 1922 decided to build a storage reservoir in Railroad Canyon (fig. 61), but actual construction was not started until 1927. The reservoir was completed in 1929, but the storage of water there actually started a year earlier. At that same time (1928) the State Water Commission granted the company rights to appropriate water from Horsethief and Indian Creeks (fig. 61), which are tributary to Temescal Creek. The company had plans to develop water from the two creeks and deliver the water to Lee Lake, but those plans did not materialize.

Turning again to the upper Santa Ana River, the Temescal Water Co. obtained the right to purchase 200 miner's inches of water from the Riverside Water Co. (p. 72-80) by an agreement dated November 1933 (written commun., city of Riverside, 1967). That right was gradually increased to 600 miner's inches by April 1951. The water was delivered to the Temescal Water Co. through a pipeline, beginning at the Grant Street drop of the Riverside Canal (fig. 15) and entering the system of the Temescal Water Co. at Compton Street and Ontario Avenue (figs. 15 and 61).

In order to transfer water from the Meeks and Daley Water Co. system to the Temescal Water Co. system, it was necessary that the water be conveyed through Riverside Water Co. facilities. By another agreement between the Temescal Water Co. and the Riverside Water Co., dated April 1951, the Temescal Water Co. was granted the right to carry 250 miner's inches of Meeks and Daley water through the system of the Riverside Water Co. (written commun., city of Riverside, 1967).

The demand for water in the Temescal Creek basin still increased faster than the augmentation of the supply, and steps were taken in 1955 to remedy that situation. First, the Temescal Water Co. granted the Elsinore Valley Municipal Water District a storage right of 3,000 acre-feet in Railroad Canyon Reservoir. The two organizations then contracted with the Metropolitan Water District of Southern California for Colorado River water to be released to the San Jacinto River channel at Lakeview (fig. 61), upstream from the reservoir. The cost of the facilities was borne by the two organizations. The Temescal Water Co. has purchased Colorado River water when needed since 1955.

In July 1964 the city of Corona purchased the domestic system that supplied water to its residents. That system had been built before the turn of the century by the South Riverside Land and Water Co., which later transferred the system to the Temescal Water Co. The Temescal Water Co. supplied water to the domestic system, but a subsidiary company, the Corona City Water Co., had administered the system since organization of the subsidiary company for that purpose in September 1897. It was from the Corona City Water Co. that the city of Corona purchased the domestic system. Included in the 1964 purchase were water and water rights in the Coldwater Canyon basin and wells in the Corona basin.

The Temescal Water Co. acquired much land during its years of operation, and in January 1965 the company organized the Temescal Properties Inc. It then transferred to the new company all land that was neither used nor useful in the operation of a public-utilities organization. The Temescal Water Co. also continued its acquisition of stock in the three previously named water companies in the upper Santa Ana River basin. By 1967 the company owned 92 percent of the stock of the Meeks and Daley Water Co., 25 percent of the stock of the Agua Mansa Water Co., and 73 percent of the stock of the Alta Mesa Mutual Water Co. The Temescal Water Co., in 1967, received 78 percent of all the water developed by the three companies on the basis of the stock it owned in those companies.

Since the mid-1950's urban development has been constantly increasing in the Corona area, but the acreage irrigated with water delivered by the Temescal Water Co. showed little change in the 15 years preceding 1968. That relatively constant delivery of irrigation water has been maintained as a result of the development of new agricultural areas to replace those lost by urbanization.

WATER DEVELOPMENT ON THE COASTAL PLAIN

Riparian rights to the water of the lower Santa Ana River were included in the grants of Santiago de Santa Ana on the south and east side of the river (p. 9), Cañon de Santa Ana on the north side, and San Juan y Cajon de Santa Ana on the west side (p. 9) (fig. 3). Those water rights seemed unimportant at the time the grants were made, but they were to be of tremendous importance in the later development of water-supply systems in the area, being a major factor in the division of the flow of the river among the several local irrigation companies operating on the coastal plain.

Water supply from the Santa Ana River is largely responsible for the transformation of a rural area--one that supported the small settlements of Anaheim, Fullerton, Santa Ana, Orange, and Tustin--into the present large metropolitan area. Principal land use in the area progressively changed from pasture for livestock, to truck farming and vineyard cultivation, to citrus-orchard cultivation, and finally to urban development. Associated with those changes was the development of water-supply systems--first for irrigation and later for municipal use. The development of those systems, from their origin through 1967, will be traced on the pages that follow--those on the north side of the river will be discussed first.

Anaheim Union Water Company

The Anaheim Union Water Co. is a consolidation of three companies that were formerly independent--the Anaheim Water Co., the North Anaheim Canal Co., and the Cajon Irrigation Co. Their consolidation in January 1884 made it possible to interconnect the three distribution systems and to gradually abandon all but the present diversion headworks. In August 1884 the Farmer's Ditch Co. was included in the Anaheim Union Water Co.

There were several small independently operated irrigation ditches during the early days of irrigation development in the area, among them the Kraemer, Yorba, and Bixby ditches. The Anaheim Union Water Co. assumed the obligation of the Anaheim Water Co. to deliver water to the Kraemer ditch. It also supplies water to the Yorba ditch owners and to the Bixby property in compliance with court orders. The combined service area currently includes the Yorba Linda, Placentia, Fullerton, and Anaheim districts.

Yorba Ditch

In the early decades of the nineteenth century, the four sons of Jose Antonio Yorba farmed land on the south side of the Santa Ana River in the Rancho Santiago de Santa Ana. Irrigation ditches built by three of the brothers--Jose Antonio II, Tomas, and Teodocio--are shown in figure 63, and discussed on page 210. The fourth brother, Bernardo, always desired a rancho of his own and made formal application to Governor Jose Figueroa for the Rancho Cañon de Santa Ana on the north side of the river.

In 1834 Bernardo Yorba was granted the rancho. His grant included 3 leagues of land, or approximately 13,000 acres, along the north side of the river for nearly the full length of Santa Ana Canyon (Stephenson, 1941, p. 22). The grant also included the riparian right to flow in the river for domestic and irrigation use. During the period when Yorba was negotiating for the rancho, he built the hacienda (fig. 63) and began building his first

irrigation ditch from the river to his cropland. The first ditch was completed in 1835 (written commun., C. V. Robinson, 1936); two additional ditches were built later. One was a high ditch to provide the power drop needed to operate the mill shown in figure 63, but that ditch was also used for irrigation. The total area irrigated with water from the three ditches was about 300 acres in 1860. The disastrous flood of 1862 destroyed all three ditches and washed away a large part of the better farmland (Los Angeles County Superior Court, 1883, p. 294-298).

Only two of the early ditches are shown in figure 63, and their locations are only approximate. The first ditch that was built probably diverted flow at Bed Rock Crossing (fig. 36), several miles upstream from the ditch built after the flood. (The Santa Ana Canyon was referred to as Bed Rock Canyon at the time of the early development of the area, and Bed Rock Crossing was at the narrows, 1 mile downstream from the Orange-Riverside County line, which in those days was the Los Angeles-San Bernardino County line.) After Yorba's death the rancho was divided among his heirs who continued to divert irrigation water from the Santa Ana River. During succeeding years parts of the rancho were sold.

At the time of Hall's investigation in the 1880's the Yorba ditch, shown in figure 36, was 5 feet wide and 1 foot deep (Hall, 1888, p. 634). Its course was through sandy soil, and the seepage loss was large. The ditch was managed by a group of 25 to 30 users who irrigated about 780 acres. The owners claimed a flow of at least 300 miner's inches at their headgate, but the Anaheim ditch owners acknowledged a right of only 125 miner's inches for the Yorba ditch. In 1880 the ditch was carrying about 450 miner's inches, which irrigated about 600 acres.

According to an unpublished paper (1967), "History of Irrigation and Irrigation Development of the Santa Ana Watershed," in the historical section of the Anaheim Public Library, a suit was filed against the owners of the Yorba ditch by the Anaheim Union Water Co., in 1885, to restrict the Yorba diversion. That suit resulted in a temporary injunction, dated December 14, 1891, allowing the Yorba irrigators to divert water from the Santa Ana River in quantity only sufficient to fill their ditch to its capacity. An amended order of injunction, dated June 27, 1903, forbade diversion by the Yorba ditch interests, but the Anaheim Union Water Co. was required to deliver to the Yorba ditch, at a point southwest of the Catholic church (fig. 63), a quantity of water that would fill the ditch to capacity, but not to exceed 200 miner's inches, measured under a 4-inch head. (The capacity of the ditch was variable, depending on the amount of sand deposition and aquatic growth in the ditch at a given time.)

On January 2, 1914, the Yorba Irrigation Co. took over all the Yorba interests in the water delivered to the ditch under the terms of the amended injunction. Irrigation in the area has continued under that company, and orchards have replaced the original field crops. During recent years some of the land in the service area has been converted to urban use.

Ontiveras Ditch

In 1837 Juan Pacifico Ontiveras was granted Rancho San Juan y Cajon de Santa Ana. Some time later he built the Ontiveras ditch (fig. 36) to divert water from the north side of the Santa Ana River to irrigate a small acreage around his home near the site of present-day Anaheim. Figure 63 shows the upper end of the ditch; its intake was across the river from the earlier ditch of Jose Antonio Yorba (p. 196-197). In 1857 Ontiveras was irrigating a large field of corn and beans and about 30 acres of vineyards.

By 1863 Ontiveras had disposed of the rancho. Prior to 1857 he had deeded 3,900 acres of land south and east of Placentia to his two sons. In 1857 he sold 1,165 acres, later known as the Anaheim tract, to the Los Angeles Vineyard Society. In 1863 he sold the remaining 21,572 acres of the rancho to Able Stearns for $6,000, and he moved to Santa Maria (Stephenson, 1941, p. 24). The period of use of the Ontiveras ditch is unknown, but it may have been abandoned when Ontiveras moved to Santa Maria; it was not in use when Hall made his surveys in 1880-86.

Ontiveras-Langenberger Ditch

At about the time that Ontiveras was diverting water for irrigation in the Anaheim area, he, and later his son-in-law, August Langenberger, was also diverting water for the irrigation of vineyards southeast of the present city of Placentia. The diversion for the Ontiveras-Langenberger ditch was made at a point near the Catholic church and the Yorba hacienda (fig. 63). The exact location of the ditch is not known, but it was approximately as shown in figure 63. The ditch established a right to water from the Santa Ana River that was later acknowledged by the Anaheim Water Co.; when the Old Anaheim ditch was built in later years (p. 202), water was furnished to the Ontiveras-Langenberger ditch from the Old Anaheim ditch.

The location of the Langenberger vineyards, with respect to the east boundary of the Rancho San Juan y Cajon de Santa Ana, is questionable. Prior to the final survey to definitely establish their boundaries, that rancho and Rancho Cañon de Santa Ana were assumed to have a common boundary, but the survey showed the two ranchos to be separated by a parcel of land that lay in neither rancho (fig. 3).

Kraemer Ditch

In April 1865 Daniel Kraemer purchased 3,900 acres of land formerly owned by Ontiveras. Kraemer's purchase included the right to divert sufficient water for domestic and irrigation use, a right established by the Ontiveras-Langenberger ditch and acknowledged by the owners of the Old Anaheim ditch

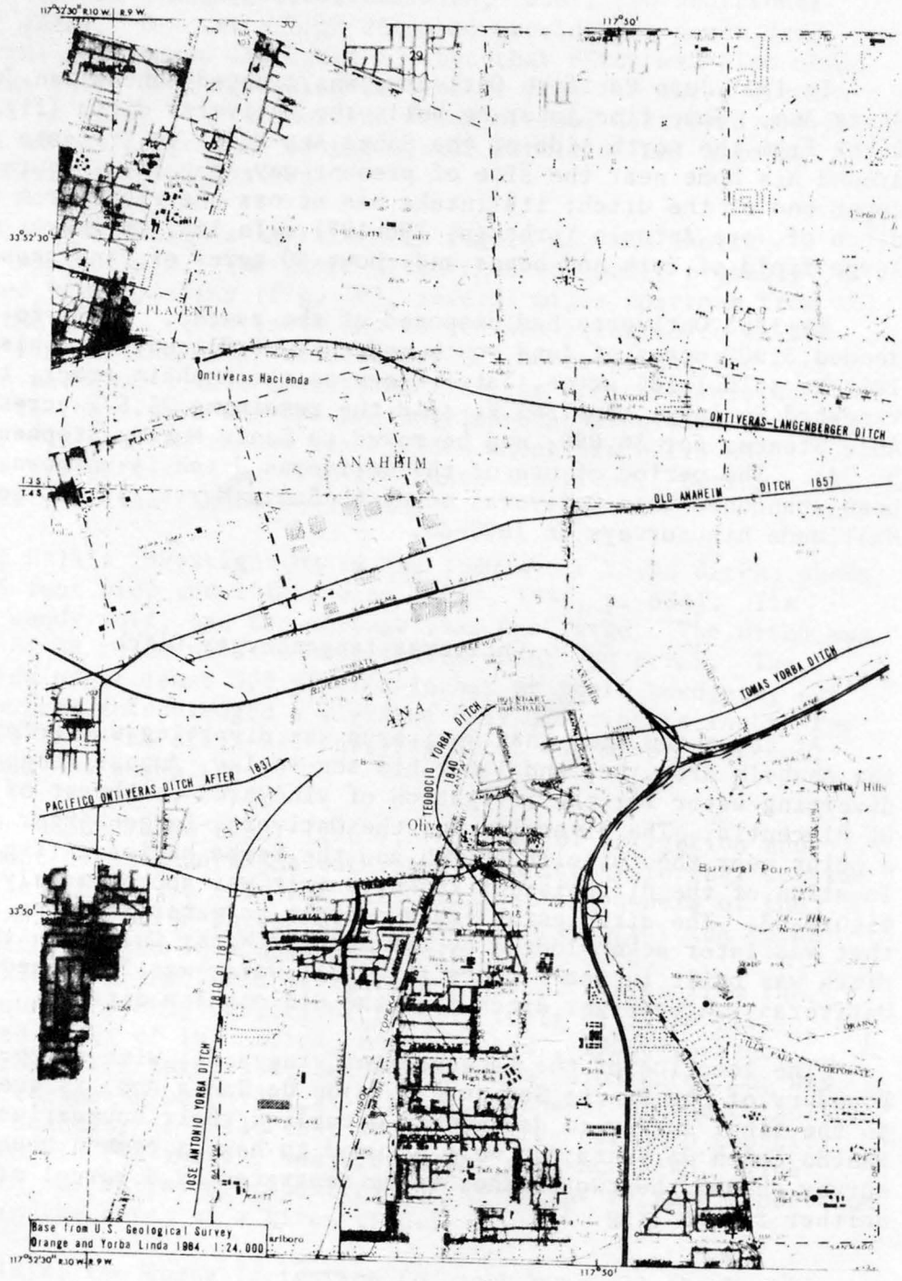


FIGURE 63.--Diversions near the mouth of Santa Ana Canyon.

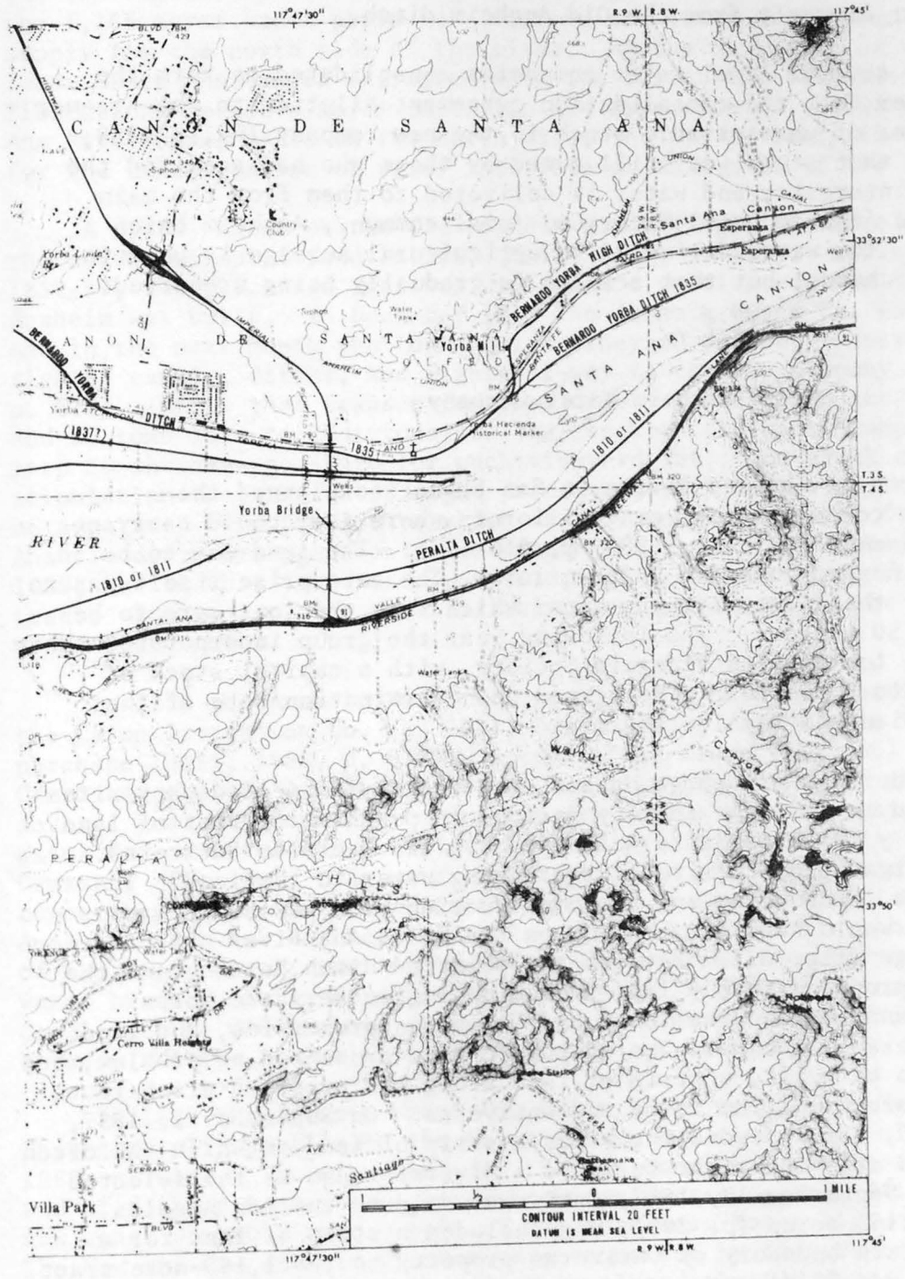


FIGURE 63.--Continued.

(Stephenson, 1941, p. 24). Kraemer then added the Kraemer ditch (fig. 36) to irrigate more of his land. According to Hall (1888, p. 616), that ditch received its water directly from the Old Anaheim ditch.

In 1884 when several local water companies consolidated to form the Anaheim Union Water Co., the consolidation agreement allotted to the Kraemer interests 20 shares of unassessable stock in the new company (Hall, 1888, p. 616). In 1967 that stock was still owned by those who had acquired the original Kraemer interests, and water is delivered to them from the main supply line of the Anaheim Union Water Co. (oral commun., Anaheim Union Water Co., 1967). The water delivered to agricultural acreage is used to irrigate citrus orchards, but that acreage is gradually being urbanized.

Anaheim Water Company

In 1856 a group of Germans living in San Francisco planned the establishment of a colony in southern California where they could carry on the business of winemaking (Hall, 1888, p. 616-617). The land was to be divided into 50 vineyard lots and 50 town lots. The enterprise itself was to be cooperative for the first 3 years, after which time the lots were to be divided among the 50 members. The following year the group incorporated their association as the Los Angeles Vineyard Society, with a capital stock of $37,500 divided into 50 shares. The agreed upon termination date of the cooperative work plan was May 1, 1860.

Under the leadership of George Hansen, the society inspected many sites for the colony, and in 1857 the society decided to purchase a tract of land in Rancho San Juan y Cajon de Santa Ana owned by Juan Pacifico Ontiveras. Hansen also investigated ditch sites for bringing water to the land. The Ontiveras ditch was inadequate, and the construction of a new ditch was proposed, one that would have its heading on the Santa Ana River near the present Yorba bridge (fig. 63). Between the selected ditch heading and the tract the society proposed to buy lay land belonging to Bernardo Yorba (p. 196), public land between the Yorba and Ontiveras properties, and land belonging to Ontiveras. The purchase of public land presented no problem, but if the ditch was to be built, a strip of land along the proposed ditch route would need to be purchased from Yorba and Ontiveras. On September 1, 1857, for the sum of $200, Yorba deeded Ontiveras a strip of land on which the ditch could be built, and also the right to build a diversion dam at the selected ditch heading. On September 12, 1857, Ontiveras sold to the Los Angeles Vineyard Society 1,165 acres (p. 200), and included a strip of land for a ditch from the eastern boundary of Ontiveras property to the 1,165-acre tract. The purchase price was $2 per acre, and it included the right to as much water from the river as would be needed to serve the land (Stephenson, 1941, p. 82-83). At the same time, for the sum of $10, Ontiveras deeded to the society all the rights he had obtained from Yorba 11 days earlier. The city of Anaheim now occupies the center of the 1,165-acre tract purchased by the society.

The deeding by Yorba and Ontiveras of a strip of land for a ditch through the two ranchos and the deeding of the right to sufficient water to irrigate the 1,165 acres had a profound effect on the later development of the water supply for the north side of the river. As the diversion of water in the lower Santa Ana Canyon increased with the years, that transaction and its limitations became a major factor in the diversion of the water of the Santa Ana River among users on the north side, and was probably the principal reason for the consolidation of water interests on that side of the river.

A ditch, known as the Old Anaheim ditch (figs. 36 and 63), was built in the deeded strip of land in 1857 (Hall, 1888, p. 617). During the years 1857-59, the purchased land was divided and cultivated, and the town of Anaheim was built. In December 1859 the Anaheim Water Co. was incorporated, and in the next month the Los Angeles Vineyard Society conveyed all its water rights, canals, ditchs, and rights-of-way to the new company (Hall, 1888, p. 618). After that transaction the society transferred the 50 vineyard lots and 50 town lots to individuals. The stock in the water company was divided into 50 shares--one share for each vineyard lot. The stock carried the stipulation that the water right associated with each vineyard lot could not be separated from the lot to which it was assigned. Water from the Old Anaheim ditch irrigated only the original acreage, the Anaheim tract, until 1869, but in that year water was sold, for the first time, for use outside the tract. Ten years later the area being irrigated outside the tract amounted to about 2,000 acres.

In 1878 the Anaheim Water Co. purchased a half interest in the canal of the Cajon Irrigation Co. (p. 204), but no water rights were included in the purchase (Hall, 1888, p. 618). A connecting flume (fig. 36) between the Cajon Canal and the Old Anaheim ditch was built in the spring of the same year. For several years thereafter, during the dry months of each year, the Anaheim Water Co. diverted its water at the heading of Cajon Canal at Bed Rock Crossing (fig. 36). The water was carried in the Cajon Canal as far as the connecting flume, and then was transferred by way of the flume into the Old Anaheim ditch for delivery to the service area. By using the upstream reach of the Cajon Canal, the Anaheim Water Co. avoided the appreciable loss of water by seepage in the stretch of streambed between the headings of the Cajon Canal and the Old Anaheim ditch. That arrangement, however, led to friction between the two companies that culminated in litigation (p. 204).

In 1882 the Anaheim Water Co. built a new canal--the New Anaheim Canal--that generally paralleled the Cajon Canal, but at a lower elevation (Hall, 1888, p. 618). The diversion for the new canal was made near the downstream end of a sharp bend in the river known as Horseshoe Bend (fig. 36), and the new canal probably used a part of the abandoned Yorba high ditch (p. 197). The New and Old Anaheim ditches were connected by the use of part of the flume that originally connected the Cajon Canal and the Old Anaheim ditch; the systems of the Cajon Irrigation Co. and the Anaheim Water Co. were thereby separated again.

While the irrigation developments described above were progressing on the north side of the Santa Ana River, simultaneous development of an irrigation system was taking place on the south side of the river. Between 1871 and 1877 the diversion of river water for the south side increased greatly, and by 1877 little water was available to the Anaheim Water Co. at its ditch heading (Hall, 1888, p. 632). The south-side diversions that were affecting the flow were being made by the Semi-Tropic Water Co.--not to be confused with the Semi-Tropic Land and Water Co. that operated in the upper river basin (p. 131-136). Litigation between the two companies in the years 1882-84 ended with the two companies dividing the streamflow equally between them. The lawsuit and the landmark decision rendered are described in detail on pages 213-214.

Nothing has been said yet about domestic water supply. During the development of the town of Anaheim, domestic water was obtained from privately owned wells. The wells were scattered throughout the community and generally were unsatisfactory, especially in dry seasons. A more satisfactory supply was obtained in 1879, when an artesian well was drilled on the north side of Cypress Street, between Anaheim and Lemon Streets (Pleasants, 1931, p. 339). Water from the artesian well was pumped to a tank 35 feet above the land surface, and from the tank pipelines were laid along the principal streets.

In January 1884 the Anaheim Water Co. was consolidated with other north-side interests in the Anaheim Union Water Co., whose history is discussed on pages 206-209.

North Anaheim Canal Company

The North Anaheim Canal Co. was organized in 1872 to furnish water to an area north of the Santa Ana River overflow channel (Hall, 1888, p. 618). That area could not be served from the ditch system of the Anaheim Water Co. The location of the diversion ditch of the North Anaheim Canal Co. (not shown on map) is uncertain, but it probably ran west along Orangethorpe Avenue to its service area, using, perhaps, a part of the previously abandoned Ontiveras-Langenberger ditch (fig. 63). The intake to the company canal was probably upstream from that of the Old Anaheim ditch. The only water supply available was the unappropriated surplus water after all other rights were satisfied. The canal was built large enough to carry about 1,500 miner's inches of water, but generally water was available only during the winter months or during the autumn or spring of unusually wet years.

Because its water supply was so uncertain, the company in June 1878 transferred its water right, claim, and ditches to the Cajon Irrigation Co., and received in return $500 in Cajon Irrigation Co. stock (Hall, 1888, p. 619). After absorption of the North Anaheim Canal Co. by the Cajon Irrigation Co., the water users received their water supply from the Cajon Canal under the regulations of the Cajon Irrigation Co.

Cajon Irrigation Company

Construction of the Cajon Canal was started in 1875 by a local water district that was organized to furnish water to the Fullerton and Placentia areas. The canal headed on the north side of the river at Bed Rock Crossing and its route to the mouth of the canyon was that shown in figure 36. Many of the landowners refused to pay the tax levied by the water district for canal construction, and after the expenditure of $40,000 for such construction, work on the Cajon Canal was abandoned for lack of funds. In April 1876 the owners of the Stearns Ranchos Syndicate, who had paid their tax, organized the Cañon de Santa Ana Water Co. and took possession of the canal (Hall, 1888, p. 619).

No action was taken by the new company, and in July 1877 seven landowners in the district organized the Cajon Irrigation Co. with a capital stock of $20,000 divided into 200 shares. The new company filed a claim on 4,320 miner's inches of water at the head of the partially completed canal, and construction resumed on the headworks and canal. The company took possession of all claims of the Cañon de Santa Ana Water Co. and brought suit to quiet title. The case was never tried and possession was never strongly contested. The Cajon Irrigation Co. maintained possession of the system and continued work on the canal.

The company had continual financial problems which delayed completion of the canal. In November 1878, after it had absorbed the North Anaheim Canal Co. (p. 203), the Cajon Irrigation Co. sold a half interest in the Cajon Canal to the Anaheim Water Co. (p. 202), and funds from the sale enabled the Cajon Irrigation Co. to complete the canal (Hall, 1888, p. 618).

Between 1878 and 1882 the Anaheim Water Co. and Cajon Irrigation Co. shared the headwork facilities of the Cajon Canal (p. 202). However, friction developed between the two companies shortly after 1878, over the division of water between them and the division of canal maintenance costs. Finally the friction became so critical that the Anaheim Water Co. sought an injunction to restrain the Cajon Irrigation Co. from diverting water from the river, asserting its prior claim and use. A temporary injunction was granted but was modified to the extent that the Cajon Irrigation Co. was allowed to use 150 miner's inches pending the final judgment. The decree also limited the Anaheim Water Co. to the quantity of water sufficient to irrigate the original 1,165 acres, a stipulation included in the original deed to the right-of-way for the Old Anaheim ditch. By this time, however, the area irrigated by the Anaheim Water Co. had increased to more than 3,000 acres. Thus, all the water required to irrigate the area additional to the original 1,165 acres of the Anaheim Water Co. was subject to the appropriation of 150 miner's inches by the Cajon Irrigation Co.

In the meantime the Cajon Irrigation Co. was having increasing financial problems. Many stockholders were not paying their assessments, and a suit filed by the company to collect the assessments was unsuccessful. These financial difficulties made it necessary for the company to reorganize, which it did in October 1882. The company reorganized under the name of "North Anaheim Canal Co.," that of the company it had absorbed in 1878 (Hall, 1888, p. 620).

The financial problems and water-rights problems described above made it desirable that all north-side water interests be consolidated. In January 1884 the Anaheim Union Water Co. was organized. The new company consolidated all the water rights and property of the Anaheim Water Co., and of the original North Anaheim Canal Co. and Cajon Irrigation Co. About 1,000 acres of irrigable land owned by the Anaheim Water Co. was included. Later in the same year the Farmer's Ditch Co. joined the new organization.

Farmer's Ditch Company

The Farmer's Ditch Co. was organized by a group of landowners to supply water to their property, which lay between Orangethorpe Avenue and Carbon Creek, and between Cypress and Brookhurst Avenues (fig. 36). Most of the early records of the company have been lost or misplaced, and the sketchy history of the company given here has been pieced together from the testimony given in a lawsuit and from other bits of information.

The water supply of the company was the surplus water that was available after the requirements of the Old Anaheim ditch were satisfied. The Farmer's ditch (fig. 36), at its upper end, may have used a part of the abandoned Ontiveras-Langenberger ditch. By an agreement with the Kraemer family, dated December 1, 1881, the company was given the right to transport its water across the Kraemer property in the Kraemer ditch (p. 200-201) to the west line of the property at Placentia Avenue (written commun., E. P. Backs, 1967). The Farmer's ditch then turned south along Placentia Avenue to Orangethorpe Avenue, and continued west along Orangethorpe Avenue to its terminus at Brookhurst Avenue. The route followed by the Farmer's ditch prior to 1881 is not known. The ditch received most of its water from the Old Anaheim ditch near Yorba bridge (fig. 36), and also received some water from the North Anaheim Canal.

According to an unpublished paper (1967), "History of Irrigation and Irrigation Development of the Santa Ana Watershed," in the historical section of the Anaheim Public Library, the Farmer's Ditch Co. transferred all its property, including ditches, rights-of-way, and water rights, to the Anaheim Union Water Co. on August 18, 1884. In return, the Anaheim Union Water Co. issued and transferred 100 shares of stock to the stockholders in the Farmer's Ditch Co. That transaction completed the consolidation of the principal ditches on the north side of the Santa Ana River under one company.

J. W. Bixby Water Right

After the death of Bernardo Yorba (p. 197), the original owner of the Rancho Cañon de Santa Ana, the court partitioned the rancho among his heirs and ruled that each portion of the rancho retained its original water right. In 1876 J. W. Bixby purchased one of those portions comprising about 4,400 acres along the north bank of the river, at the east end of the rancho. For many years he used the land only for grazing stock. In 1881 Bixby purchased another parcel of land that adjoined his original purchase on the west. This gave him several miles of land bordering the north side of the Santa Ana Canyon (Stephenson, 1941, p. 100).

The Cajon Canal (p. 204), from its headworks at Bed Rock Crossing to Horseshoe Bend (fig. 36), passed through the Bixby property. From the time the first water was diverted through the Cajon Canal, the Bixbys had been allowed to use water from the canal to water their stock. In 1894 the Anaheim Union Water Co., successor to the Cajon Irrigation Co. (p. 205), refused to allow water to be taken from the ditch for use on the Bixby property (Stephenson, 1941, p. 100). That resulted in a suit being filed by the Bixbys against the Anaheim Union Water Co. to establish the Bixby right to water from the Santa Ana River.

The case went to trial and the court decreed the following: The Bixbys held a riparian right; they were entitled to divert sufficient water through the Bixby ditch--probably a former Yorba ditch--to irrigate land available for irrigation; the Anaheim Union Water Co. was to deliver water to the Bixbys for the irrigation of land that could be served by the Bixby ditch. The attorneys for the water company appealed the case to the State Supreme Court, but the appeal was dismissed in February 1900. (The foregoing information was obtained from an unpublished paper [1967], "History of Irrigation and Irrigation Development of the Santa Ana Watershed," in the historical section of the Anaheim Public Library.) The action of the court established the Bixby riparian right to a part of the flow of the Santa Ana River, and the Anaheim Union Water Co. agreed to deliver 100 miner's inches of continuous flow to the Bixby property through three connections to the Bixby distribution system.

History of the Anaheim Union Water Company, 1884-1967

As mentioned earlier (p. 205), the Anaheim Union Water Co. was a consolidation of the Anaheim Water Co., the North Anaheim Canal Co., and the Cajon Irrigation District. The company was incorporated January 29, 1884, and 7 months later, on August 18, 1884, the company absorbed the Farmer's Ditch Co., thereby achieving a unification of all significant water interests on the north side of the lower Santa Ana River.

The Anaheim Union Water Co. was incorporated as a joint stock company, having a capital stock of $1,200,000, divided into 12,000 shares. The company was an association of irrigators, who owned their own system, and who sold and delivered water to each stockholder, with the stipulation that no water rights be sold to landowners outside district boundaries. The district included 12,000 acres, but the first stock issue was limited to 7,000 shares, on the basis of the existing water supply. By 1886, 6,882 shares of stock had been issued. Each certificate described the land on which the water would be applied, and that water could not be used on any other piece of land or on an area greater than that designated on the certificate (Hall, 1888, p. 612).

The early years of the company were marked by litigation. The litigation that started in 1882 between the water interests on the south side of the river, as represented by the Semi-Tropic Water Co., and the Anaheim Water Co. (prior to the organization of the Anaheim Union Water Co.), has already been alluded to on page 203. That suit was settled in 1884--the Anaheim Union Water Co. had succeeded the Anaheim Water Co. by then--by an agreement dividing the streamflow equally between the litigants. The lawsuit and the landmark decision rendered are described on pages 213-214.

The next litigation of significance occurred in the years 1885-1903 and involved the division of flow of the river with the owners of the Yorba ditch. That lawsuit was described on page 197. The final settlement required the Anaheim Union Water Co. to deliver to the Yorba ditch sufficient water to fill the ditch to capacity, but not to exceed 200 miner's inches. (The capacity of the ditch was variable, depending on the amount of sand deposition and aquatic growth in the ditch at a given time.)

A third lawsuit, filed in 1894, resulted from the company's refusal to recognize the Bixby riparian right. That litigation was described on page 206. The court recognized the Bixby water right, and the Anaheim Union Water Co. was required to deliver a continuous flow of 100 miner's inches to the Bixby property.

Soon after its incorporation the Anaheim Union Water Co. began improving the facilities of its diversion and distribution system. Most of the open ditches were gradually replaced by pipelines, and the systems of the four original water companies were interconnected for more efficient operation. All water is now delivered through the Cajon Canal, including that delivered to the Kraemer ditch, the Bixby ditch, and to the Yorba Irrigation Co. (p. 197). The Cajon Canal is still an open conduit for most of its length (figs. 64 and 65), but the open sections have been lined with concrete, and the old wooden flumes have been replaced by steel or concrete pipe. Two reservoirs, the Anaheim Union Reservoir (sometimes called Tuffree Reservoir) and the Yorba Linda Reservoir (fig. 36), were built in 1907 and 1908, respectively. The reservoirs store water delivered at night by the Cajon Canal, and release the water by day for use by irrigators (oral commun., Anaheim Union Water Co., 1967). Supplemental water for the rapidly developing service area was obtained from wells in Santa Ana Canyon, downstream from Horseshoe Bend (fig. 36).

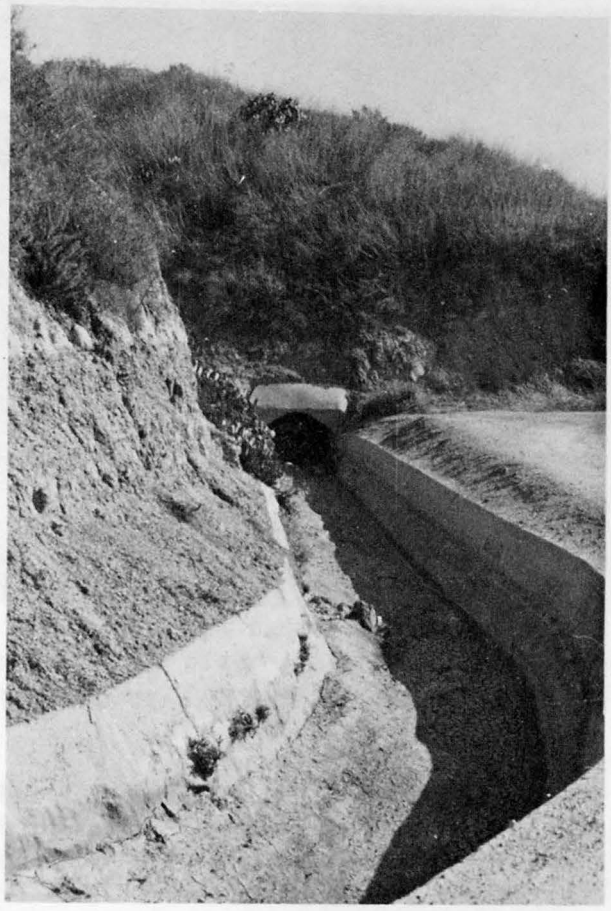


FIGURE 64.--Head of tunnel on Cajon Canal, about 1 mile east of Imperial Highway, built in 1886-87. Canal was formerly part of the Anaheim Union Water Company system, but is now part of the system of the Anaheim Union Irrigation Division of the Orange County Water District.

Until the early 1940's development in the service area had been primarily agricultural; by 1940 the Anaheim Union Water Co. was supplying water for the irrigation of about 8,500 acres. Since that date the agricultural area has been shrinking as a result of urban encroachment, and supplemental Colorado River water for municipal and domestic use is being furnished by the Metropolitan Water District of Southern California. In 1967 water for agricultural use was being supplied by one of the many wells in the area and by the diversion of Santa Ana River flow--the one-half of the flow allotted to the north side interests, less the Kraemer, Yorba, and Bixby rights. All other well water and the imported Colorado River water were being used for municipal and industrial purposes.

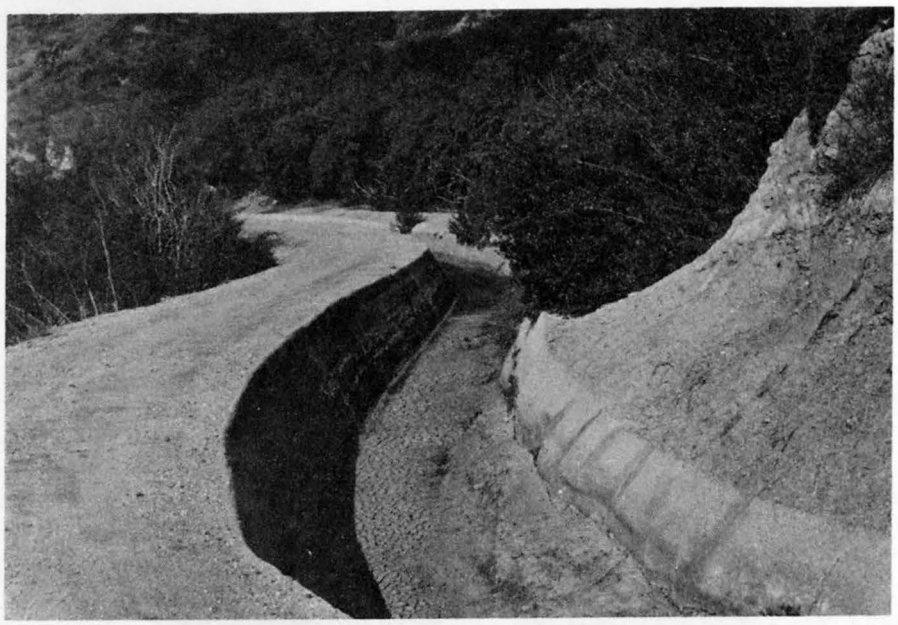


FIGURE 65.--Cajon Canal, about 1 mile east of Imperial Highway.

On October 26, 1967, the city of Anaheim acquired the water, water rights, and operating facilities of the Anaheim Union Water Co. On that same day the city in turn sold those rights to the Orange County Water District, which now operates the system through its Anaheim Union Irrigation Division (oral commun., L. A. Peterson, 1967). As for the Anaheim Union Water Co., after developing and operating a complex water-supply system for almost 84 years, it has become a land management and oil-producing company.

Santa Ana Valley Irrigation Company

This section of the report is a history of the development of the coastal plain, south and east of the Santa Ana River. The earliest farming activity in the area was the grazing of cattle by Don Pablo Grijala and his son-in-law, Jose Antonio Yorba, near the present-day cities of Olive, Orange, and Santa Ana (fig. 36). That activity started at the turn of the nineteenth century (Pleasants, 1931, p. 44). The first official right to use the land was granted in 1810, when Yorba and his nephew, Juan Pablo Peralta, received the Rancho Santiago de Santa Ana (fig. 3) from the Spanish government. Peralta occupied that part of the rancho that lies on the south side of the river upstream from Burruel Point (fig. 63); the Yorbas, a large family, settled along the south and east side of the river and occupied most of the area between the present-day cities of Olive and Orange. The date of the first diversion of water from the Santa Ana River by the Peraltas and Yorbas is not definitely known, but the ditches were probably built in 1810 or 1811 (fig. 63) by both families to divert water for domestic and irrigation use near their homes (written commun., C. V. Robinson, 1936).

The four sons of Jose Antonio Yorba--Antonio II, Tomas, Teodocio, and Bernardo--shared in the ownership and operation of the Rancho Santiago de Santa Ana. Bernardo farmed on this rancho until 1834 when he received the grant to the Rancho Cañon de Santa Ana on the north side of the river (p. 196). Antonio II, Tomas, and Teodocio each farmed land adjacent to the south bank of the river.

The first Yorba ditch was probably the one known as the Tomas Yorba ditch (fig. 63). It diverted flow from the river at a point downstream from the Yorba bridge and was used to irrigate river-bottom land near the present town of Olive. That ditch, which was built in 1810 or 1811, was later known as the Carillo ditch. Antonio II also built a ditch in 1810 or 1811--the Jose Antonio Yorba ditch (fig. 63)--to irrigate orchards, vineyards, and field crops along the ditch between Olive and Chapman Avenue (fig. 36). Downstream from the Jose Antonio Yorba ditch, a later ditch, built by a Mr. Rodriguez, diverted water whenever surplus flow occurred. In 1840 Teodocio Yorba built a ditch (fig. 63) at a higher elevation, to obtain water for irrigating land south of Olive that could not be served by the other ditches (written commun., C. V. Robinson, 1936). Teodocio irrigated a large acreage of wheat, corn, and beans. His son-in-law, Deserio Burruel, who farmed with him, enlarged the ditch and improved the irrigation facilities. The locations of those early ditches south and east of the river (fig. 63) are only approximate, because of the vagueness of their descriptions in early histories of that part of Orange County.

In 1836 the area irrigated by the Yorba ditches was between 1,000 and 2,000 acres. Active irrigation declined somewhat in the next two decades, as the large rancho was divided among the heirs of the Yorba brothers (written commun., C. V. Robinson, 1936). By 1857 many of the smaller ditches leading from the main ditches were abandoned or neglected (Hall, 1888, p. 631).

Some time after 1810 the Peralta family built a ditch for the irrigation of about 40 acres on the south side of the river. The Peralta ditch headed downstream from Horseshoe Bend and extended a short distance downstream from the present-day Yorba bridge (fig. 63). An additional acreage of field crops was later irrigated by the succeeding owners of the Peralta land, a Mr. Hazen and a Mr. Feliz, a son-in-law of Peralta.

In November 1860 the Spanish grant of the Rancho Santiago de Santa Ana was confirmed by the United States district court, and the survey under the decree became final (Pleasants, 1931, p. 36). By that decree the rancho and its right to one-half the water flowing in the Santa Ana River were divided equally between the collective heirs of the Yorbas on the one hand and those of the Peraltas on the other. In 1868 the local district court partitioned the rancho into lots and parcels. The water rights were included with each parcel of land regardless of its distance from the river. The court also protected the water rights of owners of parcels not adjacent to the river, by granting those owners rights-of-way for ditches to carry water to their land over parcels that were adjacent to the river. That right resulted in the building of many small, individually owned ditches. The heirs of Yorba and Peralta still held some parcels in the rancho in 1868, but many had been sold or transferred to other persons.

In 1869 Henry Watson, his son Jonathan, and his son-in-law, J. M. Bush, purchased 6,000 acres of land for sheep raising south of the river near Olive. To increase the feed supply, they planted alfalfa south of Olive and brought irrigation water to that cropland by clearing the old Teodocio Yorba ditch and extending it south to their fields. To increase the supply of water, they extended the ditch upstream to a point west of Yorba bridge, and it became known as the Bush and Watson ditch (fig. 36). The ditch carried about 500 miner's inches of water to the plain below Olive, thus establishing one of the first rights to water on the south side of the Santa Ana River owned by individuals of United States ancestry (written commun., C. V. Robinson, 1936).

In 1870 and 1871 A. B. Chapman and Andrew Glassell acquired several parcels of land in Rancho Santiago de Santa Ana that had formerly been irrigated by small ditches. They started construction of a main ditch (fig. 66) from Horseshoe Bend, utilizing a part of the original Peralta ditch. The new ditch, called the Chapman ditch, followed along the base of the hills and around Burruel Point, at an elevation higher than that of any of the earlier ditches, to a point east of Olive. From there the ditch continued south to Walnut Avenue, where water was supplied to the plaza in Richland, the early name of the present city of Orange. The ditch, now altered and called B line (fig. 36), carried sufficient water to irrigate about 5,000 acres. The first delivery reached Walnut Avenue about July 1871 (written commun., C. V. Robinson, 1936). From that main ditch each irrigator, who had purchased land from Chapman and Glassell, plowed a lateral ditch to irrigate his land.

FIGURE 66.--Santa Ana Valley Irrigation Company Canal (originally Chapman ditch), west of Imperial Highway; used since 1871.

In May 1873 Chapman, Andrew Glassell, and his brother, Captain W. T. Glassell, the principal owners of land served by the Chapman ditch (B line), formed a company, which they incorporated under the name of the Semi-Tropic Water Co. (There is no connection between that company and the Semi-Tropic Land and Water Co. [p. 131-136] that operated in the upper Santa Ana River basin.) The ditch and water rights were transferred to the new company, whose purpose was to provide water to individuals who purchased land in the service area of the ditch (Pleasants, 1931, p. 372).

During the period of development of the Semi-Tropic Water Co., landowners in the area between the present-day towns of Olive and Orange assisted Watson in extending the Bush and Watson ditch to carry water to their land. (The location of that ditch south of Olive is not precisely known.) Because the water supply available to the Chapman ditch was more dependable in the summer than the supply at the heading of the Bush and Watson ditch, Watson traded his water rights for stock in the Semi-Tropic Water Co. For a while Watson received his water through a connection at Olive between the Bush and Watson ditch and the Chapman ditch. However, because disputes arose as to the quantity of water to be furnished Watson, the connection between the two ditches was severed, and the Bush and Watson ditch resumed independent operation.

In 1873 a group of landowners, including Columbus Tustin, began the cultivation of land near the present cities of Santa Ana and Tustin (written commun., C. V. Robinson, 1936). The Semi-Tropic Water Co. would not permit Tustin and his associates to take water from the Chapman ditch but granted them a right-of-way for a ditch to the river to enable them to obtain their own supply. A new ditch--the Tustin ditch (not shown on maps)--was built from the river to the plaza at Orange, in the course of which it crossed Santiago Creek on a long wooden flume. The Tustin ditch was extended to Olive and connected to the Bush and Watson ditch. It was cut through soil so permeable that little, if any, water reached Tustin during the summer months. After 3 years of near failure caused by water shortages, the owners of the Tustin ditch joined with other landowners to build a better ditch (not shown on maps) to the river.

The precise locations of the ditches built by early American settlers to supply water to the rapidly growing area in the vicinity of Orange, Santa Ana, and Tustin are not known, but they were probably near the present main ditches shown in figure 36. Some segments of the earlier-built Spanish and Mexican ditches were used in their construction.

The area continued to develop and to require more water for irrigation. To meet the water demand, the ditch of the Semi-Tropic Water Co. was enlarged to a capacity of about 550 miner's inches in 1876. In 1877 the estimated population of the area on both sides of the river was almost 5,000, distributed as follows in the principal settlements: Anaheim, 1,300; Orange, 300; Tustin, 250; Santa Ana, 2,000 to 3,000 (Los Angeles County Superior Court, 1883, p. 393). Most of those people received all or part of their water from the Santa Ana River. By June 1877 the Semi-Tropic Water Co. was diverting one-half the flow of the river at its diversion headworks (Hall, 1888, p. 631-632).

In August 1877 the Santa Ana Valley Irrigation Co. was incorporated with a capital stock of $100,000 divided into 20,000 shares (Hall, 1888, p. 633). The purpose of the company was to improve the water service to all the area entitled to water on the southeast side of the river. One share of stock was allotted to each acre, and was made nontransferrable from the land. This assured that each acre would retain its proportionate right to water. The new company acquired all water rights, ditches, and properties of the Semi-Tropic Water Co. and immediately began enlarging the system. The district covered by the new company included all the land within the rancho boundaries, as well as the rancho riparian right to half the flow of the Santa Ana River.

The increased diversion of water upstream in the San Bernardino-Riverside area had, by 1877, seriously reduced the flow at the headworks of the Semi-Tropic Water Co. (Hall, 1888, p. 632). That company continued to divert one-half the flow of the river at its headworks, but much of the remaining half was lost by seepage in the sandy river channel before it reached the diversion intake of the Anaheim Water Co., which was downstream. Vineyards and orchards in the service area of the Anaheim Water Co. began to die for lack of water. That condition led the company to file suit against the Semi-Tropic Water Co. (predecessor to the Santa Ana Valley Irrigation Co.). The Anaheim Water Co. claim for water was based on the deed for right-of-way of the Old Anaheim ditch, which granted the right to divert river flow to the capacity of a ditch, 6 feet wide at the bottom, 8 feet wide at the top, and 2 feet deep. The Semi-Tropic Water Co. claimed one-half the flow of the river by right of the continual use of that quantity in the Olive-Orange area--a use that predated the construction of the Old Anaheim ditch in 1857. A judgment was rendered April 14, 1882, in favor of the Anaheim Water Co. (Stephenson, 1941, p. 86). An injunction was then issued, prohibiting the Semi-Tropic Water Co. from diverting water in such quantity as to deprive the Anaheim Water Co. of water needed for a full ditch.

That decision would have had a disastrous effect on agricultural operations on the southeast side of the river, because of insufficient water during dry years. The Santa Ana Valley Irrigation Co., which had acquired the rights of the Semi-Tropic Water Co., immediately appealed the decision to the Supreme Court of California. On September 27, 1883, the Supreme Court reversed the judgment of the lower court. The fundamental point in the Supreme Court's opinion, written by Justice Ross, was the upholding of the riparian rights of the Rancho de Santiago de Santa Ana as opposed to the acts of appropriation by the Anaheim Water Co. The opinion concluded with the following statement:

"But, as for the reasons already given, the plaintiffs have acquired no right to any portion of the water that appertains to the owners of the Rancho Santiago de Santa Ana, the decree of the court below which secures to the plaintiffs sufficient of the water of the river to keep their ditch flowing full to its utmost capacity at all times and seasons of the year, without regard to the quantity of water that may be left in the river after such diversion, and irrespective of the wants and necessities of the owners of the Rancho Santiago de Santa Ana, cannot be sustained. We must, therefore, reverse the judgment and remand the case for a new trial. In doing so we think it not improper to suggest, in view of the value of the water in

dispute and the large interests at stake, whether it is not advisable for the parties to the controversy to divide the water upon an equitable basis, and devote the money that may otherwise be expended in litigation, to the proper development and use of it." (Hall, 1888, p. 632.)

That opinion reaffirmed the riparian rights of the original ranchos bordering the Santa Ana River, and the two companies accepted the suggestion of the court without further legal action. On April 15, 1899, they signed a formal agreement in accordance with a stipulation and agreement made by the companies November 16, 1884 (written commun., Anaheim Public Library, 1967). That agreement stated: First, that the water, both surface and subsurface flowing through the Santa Ana Canyon within Orange County shall be equally divided between the two parties; second, that all water divided at Bed Rock Canyon since November 16, 1884, shall continue to be divided at that point or at some other point that is effective and satisfactory; third, that remaining subsurface waters, if any, shall be owned and divided equally between the parties; fourth, that either party may divert any of said remaining portion, and the party may use this water until the other party pays one-half the expense of the diversion, after which payment the water diverted will be divided equally; fifth, that the parties will share the expense equally to defend their rights to ownership and use of the water or attempts to divert by others; and, sixth, that any notice of appropriation of water filed under the proper civil code by either party shall be for the benefit of both. The two companies have operated since 1884 without conflict, sharing equally the flow of the Santa Ana River at Bed Rock Crossing.

After the settlement of water rights in 1884 the Santa Ana Valley Irrigation Co. began again to improve its canal system by lining the main canal with concrete, replacing the wooden flumes with concrete pipe, and relocating parts of the canal. Earlier, a tunnel had been dug through the hill at Burruel Point connecting the canal on the north to a reservoir east of Olive (fig. 36). The main canal had been divided into branches, now known as A, B, and D lines, as shown in figure 17. Hughes ditch (A line) maintained a high elevation along the east side of the area and supplied water to land between A line and the larger main canal (B line), between Olive and Tustin. B line, after a drop of 57 feet to supply power for the flour mill of the Olive Milling Co., continued south and ended between Santa Ana and Tustin; it supplied water for irrigating land to the west of B ditch. Travis ditch (D line) diverted from the main canal downstream from the Olive mill, to supply water for irrigating a narrow strip of land between D line and the river. D line followed the general course of the old Jose Antonio Yorba ditch that was built shortly after 1810 (fig. 63); the alinement of A and B lines, leading south from Burruel Point, has changed little since 1871, when the canals were first built.

The area served by the Santa Ana Valley Irrigation Co. has increased through the years. In 1879 the irrigated area encompassed 6,400 acres; in 1880 that area increased to 7,000 acres; in 1886 it reached 14,000 acres; in 1888 the irrigated area was 15,000 to 16,000 acres; in 1936 the irrigated area reached a peak of 18,000 acres, which was maintained until the mid-1940's (written commun., C. V. Robinson, 1936). Surface-water diversions were augmented by ground-water pumpage to meet the increasing water demand. To minimize conveyance losses, the open ditches south of Olive were converted to closed conduits.

A period of transition in the development of the area occurred in the 1940's. The rich farming areas were gradually encroached upon by urban development, and new homes and industrial and commercial buildings began to replace the citrus orchards. By 1960 the irrigated area had declined to less than 4,000 acres (oral commun., D. C. Hanson, 1968) in what had become a major metropolitan area. In 1950 the company began purchasing Colorado River water from the Metropolitan Water District of Southern California to supplement the local supply. Some water imported from that source has been purchased each year since 1950.

Santiago Creek

Santiago Creek rises on the western slope of Santiago Peak (fig. 1) and flows through the Cleveland National Forest to the east boundary of the Lomas de Santiago grant (fig. 3). The creek then flows northwest and enters Santiago de Santa Ana grant; there it turns southwest and debouches onto the coastal plain. The creek joins the Santa Ana River in the northern part of the city of Santa Ana.

Most of the irrigable land in the basin lies on the coastal plain within the boundaries of the Santiago de Santa Ana grant. That grant was given to Jose Antonio Yorba and Juan Pablo Peralta by the government of Spain in 1810 (p. 209). Through purchase in 1869 and again in December 1870, J. M. Bush and Jonathan Watson (p. 211) acquired 7,680 acres of land from the heirs of Yorba and Peralta. The present-day communities of Villa Park, McPherson, and El Modena (fig. 36) are within that tract. In June 1872 Bush and Watson built a ditch that headed on the right bank of the creek at the mouth of the canyon at a point then known as Point of Rocks (fig. 36). The water they diverted was used to irrigate land on the northwest side of the creek (written commun., C. V. Robinson, 1936).

At about this same time, or a short time later, Captain Glassell (p. 211) started work on a domestic water-supply system for the town of Orange. He diverted water from Santiago Creek, in an open ditch along Chapman Avenue, to a shallow terminal reservoir he built on the northeast corner of Chapman Avenue and Shaffer Street (Pleasants, 1931, p. 376). A pipeline made of 6-inch stovepipe conveyed water from the reservoir to the town plaza. This source of domestic supply was supplanted some time later by wells that were dug by residents on their properties. Another diversion was made by several orchardists northeast of Orange, who obtained permission from Bush and Watson to build a ditch from the creek to their land. That ditch diverted flow from the creek at Walnut Avenue (written commun., C. V. Robinson, 1936).

The history of water-supply development in the Santiago Creek basin continues on the pages that follow, in the sections dealing with the two principal water agencies in the area--the Carpenter Irrigation District on the south side of the creek and the Serrano Irrigation District on the north side.

Carpenter Irrigation District

Information concerning the Carpenter Irrigation District and its predecessors was furnished by the district, unless otherwise noted.

The history of the Carpenter Irrigation District properly begins in the early 1870's when Messrs. Oge and Bond acquired land, later known as the Oge and Bond tract, on the south side of Santiago Creek. They built a ditch that diverted flow from the creek about half a mile downstream from the heading of the Bush-Watson ditch, and ran along the base of the foothills to Tustin. (Neither the Bush-Watson nor Oge-Bond ditch is shown in figure 36.) Oge and Bond appropriated one-half the flow of the creek and assigned that right to 1,600 acres of their tract that they had subdivided and sold. However, during dry seasons they could not deliver sufficient water to the landowners in the Oge and Bond tract near Tustin. At about this same time the Santa Ana Valley Irrigation Co. had extended its upper canal (A line, fig. 36) to the Tustin area. Consequently, those landowners in the tract near Tustin, whose supply was deficient, purchased rights in the supply system of the Santa Ana Valley Irrigation Co. They sold their rights to Santiago Creek water to other landowners in the Oge and Bond tract who could be served more dependably by the Oge-Bond ditch.

Soon after the Oge-Bond ditch had been built, John T. and Alexander Carpenter purchased a part of the Oge and Bond tract that could be irrigated from the Oge-Bond ditch. That purchase apparently included the Oge and Bond right to one-half the flow of Santiago Creek. The Carpenters organized the Carpenter Water Co. and used part of the Oge-Bond ditch. They also built another ditch that diverted water from the creek near the original Bush-Watson ditch heading at Point of Rocks. The purpose of the company was to furnish irrigation water to land on the south side of the creek.

The quantity of water available to irrigators at the ditch headings was reduced by underflow in the streambed. In the dry year of 1879 the owners of water rights on both sides of Santiago Creek built a submerged dam of clay placed on bedrock at a narrow section in the canyon, to force underflow to the surface where it could be diverted. The dam was damaged by the flood of 1884 and was replaced in 1892 with the present concrete structure (oral commun., Serrano Irrigation District, 1967). Water was conveyed in a pipeline along the left bank from the dam to a division box (fig. 36), at which point the water was divided equally between the water interests on the north side and those on the south side of the creek. (The history of water development on the north side is discussed in a following section titled "Serrano Irrigation District.")

The Carpenter Water Co. operated from the 1870's, when it was organized, until April 6, 1900. On that date the John T. Carpenter Water Co. was organized. The new company was incorporated with a capital stock of $16,000 divided into 1,600 shares. In August 1913 the capital stock was increased to

$32,000 divided into 3,200 shares--1,600 pertinent shares and 1,600 floating shares. The John T. Carpenter Water Co. was succeeded by the Carpenter Irrigation District, which was formed in July 1927. The following year the John T. Carpenter Water Co. conveyed all their water rights to the owners of land within the Carpenter Irrigation District. This included title and interest to the water of Santiago Creek and their distribution system except for the prior right to not more than 500 acre-feet of water each year. The John T. Carpenter Water Co. was dissolved in 1965, but prior to that date the Carpenter Irrigation District had acquired the distribution system.

A group of individuals, who had acquired a number of the floating shares of stock in the John T. Carpenter Water Co., organized the Santiago Land and Water Co. for the purpose of supplying domestic water to the towns of McPherson and Orange. They built a water tank near El Modena and laid a pipeline from the tank to the two cities to be served. The company originally received all its supply from Santiago Creek, but in recent years it has leased a well to provide additional water. The company changed its name several times and is now known as the Santiago Water Co.

The distribution system of the Carpenter Irrigation District has been improved through the years, and the open ditches have been replaced by pipelines. The district encompasses an area of 1,300 acres extending from Santiago Creek to Chapman Avenue, and from Earlham Street on the west to the foothills on the east. As in many agricultural areas in southern California, the irrigated acreage has declined rapidly during recent years. In 1960 the irrigated area was 900 acres; by 1966 it was only about 350 acres.

The recent history of the Carpenter Irrigation District is closely associated with that of the Serrano Irrigation District and The Irvine Co., with regard to the shared construction and use of Santiago Reservoir, and with regard to the use of imported Colorado River water. That part of the district's history is given on pages 219-220.

Serrano Irrigation District

Information concerning the Serrano Irrigation District and its predecessors was furnished by the district.

About 1874 or 1875 R. F. Lotspeich, J. O. Lotspeich, J. Reynolds, and Charles Tieobold acquired 635 acres, which became known as the Lotspeich and Co. tract, on the north side of Santiago Creek. The general location of the tract was from Santiago Boulevard south to the creek, and from Wanda Road on the west to Sycamore Street on the east. At about that same time Jonathan Watson, Jacob Gray, S. S. Gray, and Victor Montgomery subdivided and sold 671 acres, known as the Gray tract, east and north of Santiago Boulevard and west of Sycamore Street. The Gray tract was bounded on the north by the foothills.

Lotspeich and Co. acquired a right to one-half the flow in Santiago Creek, except for a right to 15 miner's inches owned by Victor Montgomery. The water supply for the Gray tract was based on the Montgomery right to 15 miner's inches and the right to water that was surplus to the needs of the Lotspeich and Co. tract. By agreement, the owners of the two tracts consolidated their water rights on the north side of the creek and divided their half of the total flow of the creek as follows: Two-thirds was allotted to the Lotspeich and Co. tract, and one-third to the Gray tract.

The property owners in the two tracts organized the Serrano Water Association and incorporated April 17, 1876. There was no capital stock in the company. Prior to 1879 the association diverted its water in an open ditch that headed near the mouth of the canyon, as did its counterpart organization--the Carpenter Water Co.--on the south side of Santiago Creek. In 1879 the two organizations jointly built a submerged dam (p. 216), and conveyed water in a pipeline from the dam to a division box (fig. 36) on the south bank, where the water was divided equally between the two organizations. The Serrano Water Association carried its water across the creek in a pipeline that ran from the division box to the distribution system of the association.

During the earlier years of operation water was delivered to members of the association at the rate of a full head (probably the total flow) for 20½ minutes per acre every 18½ days. That delivery regime differed from that of the Carpenter Water Co., whose deliveries were at the rate of 12 minutes per acre every 12½ days. The half day was included in the interval, so that night and day deliveries could be alternated for each field. Because water storage is now available in the system (p. 219), deliveries are now made upon application by the irrigator, the request being made for a given quantity of water for a given time.

The Serrano Water Association continued to operate as originally organized until July 1927, when the Serrano Irrigation District was organized. The district boundaries included the 1,300 acres of the two original tracts, plus about 200 additional acres east of Sycamore Street, known as the Bixby tract. The district boundaries remained unchanged until February 1963, when the Cerro Villa Heights tract was included in the district, thereby increasing the total area to about 1,700 acres.

To supplement the flow in Santiago Creek, five wells have been drilled in the district, starting in 1913; in 1968 only three were being pumped. The landowners in the Cerro Villa Heights tract, having no water rights in Santiago Creek, are served well water or Colorado River water purchased from the Metropolitan Water District of Southern California (p. 219). In fact, all water now supplied for domestic use in the service area of the Serrano Irrigation District is obtained from wells or imported from the Colorado River, and in 1968 a filter plant was added to the domestic-supply system. Water for irrigation use is obtained from Santiago Creek.

As mentioned on page 217, the recent history of the Serrano Irrigation District is closely associated with that of the Carpenter Irrigation District and The Irvine Co., with regard to the shared construction and use of Santiago Reservoir, and with regard to the use of imported Colorado River water. That part of the district's history is discussed in the next section of this paper, titled "Santiago Creek Litigation and Agreements."

Santiago Creek Litigation and Agreements

James Irvine was the owner of a large tract of land in the Lomas de Santiago and San Joaquin grants (fig. 3). His property was riparian to Santiago Creek upstream from the diversion headings of the Carpenter Water Co. and the Serrano Water Association, although the bulk of his land lay outside the Santa Ana River basin. Irvine began diverting water from Santiago Creek in 1893 (written commun., C. V. Robinson, 1936). The Carpenter Water Co. and the Serrano Water Association, on the basis of prior water use, brought suit to halt the Irvine diversion. The suit was unsuccessful, and a temporary injunction halting the diversion was withdrawn. The decision permitting the Irvine diversion was appealed to the Supreme Court of the State of California, and the disputed decision was reversed by a judgment dated September 18, 1899 (written commun., C. V. Robinson, 1936). Because the judgment of 1899 was contrary to previous judgments upholding riparian rights, the conflict continued. The differences between the contending parties were settled by an agreement dated November 18, 1909, and confirmed by the court December 16, 1909. Irvine was given the right to divert flow from the creek at his canal heading at Post Hill (fig. 36) between November 20 and June 20, whenever water was available at the heading. His water was conveyed by canal and pipeline to Peters Canyon Reservoir, which he built. In return, The Irvine Co. provided land for water spreading in the gravel deposits upstream from the submerged dam of the other two water-supply organizations.

In February 1928 the Carpenter and Serrano Irrigation Districts and The Irvine Co. signed an agreement for the construction of Santiago Dam (fig. 36). The Irvine Co. was to provide the land for the dam and reservoir, and pay half the construction costs; the two districts were to share the remaining half of the construction costs. The water stored in Santiago Reservoir was to be divided equally between The Irvine Co. on the one hand and two districts on the other, except when the water stored was less than 10,000 acre-feet. Then the districts were to share the first 1,000 acre-feet, and the remainder was to be divided equally between the two districts and The Irvine Co.

The three organizations operated under the provisions of the agreement of 1909 until completion of the dam in 1931. At that time the agreement of 1909 was canceled and that of 1928 went into effect; the agreement of 1928 was still in effect in 1968. The districts built a connecting pipeline from Santiago Dam to their diversion line at the submerged dam; The Irvine Co. extended its canal from Post Hill to Santiago Dam.

The increasing demand for water made it necessary for all three organizations to supplement their local supply with the purchase of Colorado River water from the Metropolitan Water District of Southern California. That water is delivered through the Metropolitan Water District's lower feeder and the Santiago lateral to Santiago Creek and Reservoir. The water can be put into the two systems at Post Hill or delivered to Santiago Reservoir for release at a later time. The first delivery of Colorado River water was made in 1957.

The Villa Park flood-control dam (fig. 36) was completed in December 1962. In 1966 stormflow stored in the reservoir was released to the creek and diverted at the submerged dam by the two irrigation districts. The Irvine Co. received credit for one-half of the released water. That arrangement will continue whenever stored stormflow is available (oral commun., Carpenter Irrigation District, 1967).

ARTIFICIAL GROUND-WATER RECHARGE

The difficulties experienced during years of drought in the three decades 1850-80 stimulated interest in water conservation in the Santa Ana River basin. In 1884 the first major conservation facility was completed when a dam on Bear Creek (fig. 11, p. 27) was built to store winter runoff for release during the summer months, when the demand for irrigation exceeded the natural streamflow. Three more storage reservoirs were built during the next 50 years--Lake Hemet (fig. 1, p. 186), Railroad Canyon Reservoir (fig. 31, p. 194), and Santiago Reservoir (fig. 36, p. 219).

The increased use of ground water to supplement the supply of surface flow stimulated interest in the conservation of storm runoff by spreading all or part of the storm runoff on the alluvial fans near the mouths of the major canyons. The water thus spread would percolate downward to recharge the underlying ground-water bodies. One of the first proponents of this means of conserving stormflow was Seth Marshall, who made such a proposal in 1884 (Beattie, 1951, p. 32). Upstream surface-storage reservoirs are a valuable adjunct in water spreading, because water can be released from the reservoirs at an optimum rate for artificial recharge downstream. The term "artificial recharge" refers to the deliberate spreading of water for ground-water recharge, as opposed to the "natural recharge" that occurs in streambeds without any assistance from man.

The first basinwide interest in coordinated water conservation was shown in 1907 when representatives from Orange, Riverside, and San Bernardino Counties organized the Tri-Counties Reforestation Committee (Beattie, 1951, p. 32). That organization requested the withdrawal from entry of 960 acres of Federal land downstream from the mouth of Santa Ana Canyon (fig. 36). That land would be used for water spreading. The request was granted by Congress in February 1909. Four months later, in June 1909, a permanent organization, the Water Conservation Association, was formed. The new organization authorized the construction of a diversion dam at the mouth of the canyon and a ditch leading from the dam to the water-spreading area. The bylaws of the organization stipulated that no water could be spread unless water was flowing past the Olive bridge (Lincoln Avenue). That bylaw was later amended, designating the Chapman Avenue bridge (fig. 36) as the control point.

In October 1911 the Water Conservation Association published and posted a notice of intent to appropriate a flow of 15,000 miner's inches of winter floodwater for spreading. No effort was made to establish a right to floodwater until February 1921, when the association submitted an application to the Division of Water Resources of the State of California for 48,000 acre-feet of water to be spread between January 1 and June 30. Additional claims were filed, but no final action was taken until June 1946 (Beattie, 1951, p. 33-35).

At about the same time that water spreading was started below the mouth of Santa Ana Canyon the Etiwanda Water Co. and San Antonio Water Co. were also developing spreading basins. The Etiwanda Water Co. built ditches across the Day Creek debris cone for use in spreading surplus water from Day Creek (fig. 45). Water thus stored in the debris cone was recovered in tunnels downstream. The San Antonio Water Co. diverted water from San Antonio Creek to the Cucamonga debris cone near 19th Street (fig. 45). That water was recovered in its wells near Base Line Road.

Other agencies also prepared spreading grounds. The city of Redlands and the East Lugonia Mutual Water Co. spread surplus water from Mill Creek on the alluvial fan east of Mentone (fig. 11). That activity was later taken over by the San Bernardino Valley Water Conservation District (Hinckley, 1944, p. 5). Water users in the Lytle Creek basin (fig. 45) spread water from Lytle Creek below the mouth of its canyon.

During the early period of water spreading at the mouth of Santa Ana Canyon the three counties and other agencies contributed funds to the Water Conservation Association to further its aims. In 1929 the three counties allotted $20,000 toward the construction of a permanent diversion dam at the mouth of the canyon. In 1931 the State legislature appropriated $400,000 to be matched by local funds for use in conservation and flood control. The following year the Water Conservation Association approached its member counties for additional funds to expand the spreading grounds in the upper basin. The engineer for Orange County recommended that the county not participate in a proposed plan for expanded water spreading in the upper basin, and he further recommended that the county actively oppose additional water conservation measures in the upper basin (Beattie, 1951, p. 37).

The knowledge that the expansion of conservation measures in the upper basin would decrease the water supply available to Orange County, coupled with the fact that the legislative appropriation of $400,000 would facilite such expansion in the upper basin, was a cause for concern among water users in Orange County. One such water user was James Irvine (p. 219), the owner of land that was riparian to the lower Santa Ana River. On the basis of a report prepared for him by his engineers, Irvine filed a protest in July 1932 against all parties spreading water in Mill and Lytle Creeks and against the Water Conservation Association. No settlement could be reached, and in November 1932 The Irvine Co. filed a suit in the Federal Court of Los Angeles against all parties spreading water on the alluvial cones of the Santa Ana River, Mill Creek, and Lytle Creek. That suit is discussed in the next section of this report, titled "Litigation--Lower Basin Versus Upper Basin."

To coordinate water-spreading activities the following agencies were formed: The San Bernardino Valley Water Conservation District, the Orange County Water District, and the Riverside County Flood Control and Water Conservation District. Those agencies continue to supervise water spreading within their district boundaries. Water spreading in the Cucamonga Creek basin is supervised by the San Antonio Water Co., assisted by the Cucamonga Basin Protective Association. Water spreading west of San Antonio Creek is supervised by the Pomona Valley Protective Association.

The various county and other water agencies continue to construct new facilities to spread surplus water for the artificial recharge of ground-water bodies. Many of the water districts have acquired water for spreading by the purchase of stock in water companies. Water that leaves Santa Ana Canyon and reaches the coastal plain is spread in the river channel by the Orange County Water District.

By the mid-1940's it was apparent that the local water supply--both surface and ground water--would be insufficient to meet the increasing demand in the basin. To augment the local supply, Colorado River water was purchased from the Metropolitan Water District of Southern California and released to the Santa Ana River beginning in August 1949. Additional supplemental water became available in the early 1970's from northern California through the conveyance facilities of the California Water Project.

LITIGATION--LOWER BASIN VERSUS UPPER BASIN

The competition for water in the Santa Ana River basin has been accompanied by frequent litigation over water rights, and over the years these water rights have generally been established by court decree. The many water companies and water agencies or districts discussed in preceding sections of this report were organized not only to facilitate operations, but to consolidate and protect individual established rights. Most of the litigation in the early years was between water companies or districts operating in the same general area, and such litigation has been described throughout this report. In later years a broader conflict developed when water users in the coastal area of Orange County feared that their supply was threatened by increased development in the upper basin. A discussion of that conflict follows.

By way of background we refer to the preceding section of this report. There we saw that the increased use of ground water to supplement the supply of surface flow stimulated interest in the artificial recharge of ground-water bodies. Storm runoff was spread on the alluvial fans near the mouths of major canyons for downward percolation to the ground-water basins. Such activity in upstream areas had the effect of reducing the quantity of water available to downstream water users. The Irvine suit to prevent upstream water spreading (p. 221) was the first lawsuit that involved a major part of the Santa Ana River basin.

In November 1932 The Irvine Co. filed a suit in the Federal Court of Los Angeles against all parties spreading water on the alluvial cones of the Santa Ana River, Mill Creek, and Lytle Creek. The complaint stated two causes for the action taken. First, the property of The Irvine Co. borders on the Santa Ana River in the Santa Ana Canyon and therefore has an established riparian right, which was held to be endangered. Second, the company at that time obtained a large part of its water from 80 wells, located in the Santa Ana River basin, that were replenished by sustained flow through the Santa Ana Canyon; the replenishment of those wells was believed to be threatened.

As for the defendants, they agreed among themselves that each of the three groups involved would handle its own defense. For example, water spreading on the debris cone of the upper Santa Ana River near Mentone had been administered by the Water Conservation Association since 1909, and the rights and interests there were different from those on Mill and Lytle Creeks. It was also agreed that the Water Conservation Association would reach a compromise or settlement first, and the other two groups--the Mill and Lytle Creek interests--would defer their negotiations.

The Water Conservation Association first offered to limit its spreading to the first 200 ft^3/s (cubic feet per second) measured at the U.S. Geological Survey gaging station upstream from the debris cone near Mentone, then cease spreading when the flow was between 200 and 1,000 ft^3/s, and resume spreading when the flow exceeded 1,000 ft^3/s. That offer was rejected by The Irvine Co. The Orange County Water District then entered the picture. That organization, which was formed in June 1933, represented a large number of downstream well owners who would be affected by any settlement that was made. The district entered the suit as an intervenor, took over its prosecution, and reimbursed The Irvine Co. for a major part of the court costs already incurred by the company.

The next proposal was made by the Orange County Water District in June 1935 (Hinckley, 1944, p. 2). The district proposed that no water be spread on the upper Santa Ana River or its tributaries when the flow passing Tippecanoe Street (fig. 11) was less than 2,000 ft^3/s. Because a flow of that magnitude was equaled or exceeded, on the average, less than 1 day per year, that proposal would eliminate nearly all spreading in the upper basin. The proposal was rejected by the Water Conservation Association. Additional proposals and counterproposals were made; none were mutally acceptable.

In 1936 a 5-year study plan was suggested and accepted. Under that plan each side would appoint one watermaster and the court would appoint a third. The watermasters were to make a study of the effect of water spreading on streamflow, recharge, and the waste of water to the ocean. Spreading under the supervision of the watermasters began in December 1937 (Hinckley, 1944, p. 2-3). During 1938 and 1939 continual conferences were held in an effort to settle the dispute on the basis of a 5-year operating plan that would allow spreading at any time when the sum of the flow of the river at the Mentone gage and that of the canals at the mouth of the canyon was less than 110 ft^3/s.

Another proposal included the above spreading plan, but also included a provision that the total quantity spread in any year should not exceed 11,000 acre-feet. The water companies involved were willing to accept that proposal in May 1940, but the San Bernardino Valley Water Conservation District, which had assumed one-half the cost of operating the spreading works on the upper Santa Ana River, objected on the grounds that the limitation of 11,000 acre-feet each year was too stringent. The district instead proposed that the limiting quantity be cumulative over an 8-year period, so that in any 8-year period no more than 88,000 acre-feet could be spread, with no limitation on the quantity spread in any single year. The Orange County interests rejected that proposal.

Negotiations continued throughout 1941 with no agreement being reached. In January 1942 the court decided that the watermasters would have to continue their studies if a compromise was not agreed upon within 60 days. The San Bernardino Valley Water Conservation District, with the backing of all the water companies involved, was determined to protect its right to spread the normal flows of the upper Santa Ana River system. The Orange County interests, realizing that the upper basin interests were not going to change their position, agreed to a settlement (Hinckley, 1944, p. 4). The agreement, signed in March 1942 and calling for a stipulated judgment, settled the case. The terms of the judgment with regard to all three streams follow.

Santa Ana River.--

1. Spreading was permitted when the sum of the flow in the Santa Ana River at the Mentone gage and that of the canals at the mouth of the canyon was less than 130 ft^3/s. When the flow exceeded 130 ft^3/s, spreading would cease until the flow of the river at Prado Dam reached 3,000 ft^3/s; spreading could then be resumed and continued until the flow at Prado Dam receded to 500 ft^3/s. If a second storm occurred in a season, spreading could be resumed when the flow at Prado Dam reached 3,000 ft^3/s, and could be continued thereafter until the flow receded to 700 ft^3/s.

2. Total diversions to the spreading grounds could not exceed 9,000 acre-feet in any season.

3. When the water levels in 13 designated wells in the recharge area of the upper Santa Ana River basin reached the 1916 levels, all spreading would cease until water levels receded below the 1916 levels.

Mill Creek.--Prior to the judgment of 1942 Mill Creek interests had for many years been spreading the entire flow of the creek, up to a maximum of 80 ft^3/s. The Orange County interests had then proposed a reduction of the maximum spreading rate to 40 ft^3/s, or to 50 ft^3/s with additional limitations. Both those proposals had been rejected by the Mill Creek interests.

The judgment of 1942 limited the diversion to 65 ft^3/s at any and all times, except during the months of January and February. In those two months spreading would cease whenever the sum of the flows of Mill Creek and the canals at the mouth of the canyon exceeded 65 ft^3/s; spreading was permissible in those two months whenever the sum of the flows was 65 ft^3/s or less, at which times all available water could be spread.

Lytle Creek.--Prior to the judgment of 1942 several proposals and counterproposals had been made; none were mutually acceptable. The provisions of the judgment follow.

1. Water could be spread when the flow of the creek at the gage near the mouth of the canyon was less than 110 ft^3/s.

2. After the flow increased to 700 ft^3/s or more, and until it receded to 200 ft^3/s, flow in excess of 200 ft^3/s could be spread, but the rate of spreading could not exceed 1,000 ft^3/s.

3. The discharge of 60 ft^3/s or less from the Fontana powerhouse could be spread.

4. The diversion of surface water into recharge wells was permitted when the flow in the creek did not exceed 110 ft^3/s.

5. Water spreading on the Cajon Creek debris cone was permitted when the flow at the Lone Pine road crossing did not exceed 20 ft^3/s. The spreading of water that originated in Sycamore Flats, Grapevine Canyon, or Meyers Canyon was not restricted or affected by that judgment.

Spreading activities on the upper Santa Ana River, Mill Creek, and Lytle Creek have continued to the present (1968) in accordance with the terms of the judgment of 1942.

Another suit that may affect the rights to water of the Santa Ana River upstream from Prado Dam was filed by the Orange County Water District October 18, 1963, against all water users in Riverside and San Bernardino Counties. Settlement of that suit is pending at present (1968).

FLOODS AND FLOOD CONTROL

In the 200 years since Portola camped along the Santa Ana River, the basin has experienced many floods of significant magnitude. Information on the early floods and their destructive effect is based on Spanish mission records. Floods that occurred after the Spanish-mission period are described in histories of the basin, transcripts of court records, newspaper articles, and reports of water-supply companies and water-resources agencies. The destruction of the early ditches, the loss of farmland, and the changes in stream channels that resulted from floodflows have had a significant effect on water-resources development in the basin.

The first major flood in the recorded history of southern California occurred in 1770. Of the numerous floods that have occurred during the period 1770-1968, six are outstanding. They occurred in 1825, 1862 (January), 1868, 1884 (February-March), 1891 (February), and 1938 (March). The two greatest floods, those of 1862 and 1938, are described briefly on the following pages.

The flood of January 22, 1862, was the greatest in the recorded history of the Santa Ana River basin. It completely destroyed the settlement of Agua Mansa (southwest of Colton), and severely damaged or destroyed parts of San Bernardino and Anaheim. A record of the peak stage of the flood is available at Agua Mansa, where the river almost reached the steps of San Salvador Chapel (fig. 67)--the chapel and one dwelling near the chapel were the only buildings that survived the flood. Two marble posts were later set to mark the high-water level at the chapel site. On the basis of that high-water mark, independent computations of peak discharge that closely agreed were made by the San Bernardino County Flood Control District in 1937 and by the U.S. Geological Survey in 1967; the average of the two determinations of peak discharge is 320,000 ft^3/s. Because the basin was sparsely settled in 1862 the monetary damage caused by the flood was light, but it was a major catastrophe to those who lived there.

The flood of March 1938 was the most damaging flood of recorded history prior to February-March 1969, but ranks second in peak discharge to the flood of 1862. Thirty-four lives were lost in 1938 and property damage in the basin amounted to almost $14 million (Troxell, 1942, p. 382, 384). Peak-flow computations showed the discharge to have been about 100,000 ft^3/s both at Agua Mansa and at the Orange-Riverside County line. The 1938 disaster stimulated the construction of facilities to protect life and property. The construction of major facilities was carried out by the U.S. Army Corps of Engineers; the lesser facilities were constructed by the three counties in the Santa Ana River basin.

FIGURE 67.--San Salvador Chapel at Agua Mansa, built 1852.
(Photograph courtesy of Judge D. L. Schroeder.)

The facilities built by the Corps of Engineers and the dates of their completion are as follows:

Facility	Date of completion
Prado flood-control dam on the Santa Ana River	1941
Lytle-Cajon flood channel and bank-protection levees upstream from Foothill Boulevard	1948
Riverside levees, that is, levees along both banks of the Santa Ana River from the La Loma Hills to beyond Mount Rubidoux	1950
San Antonio flood-control dam and San Antonio-Chino flood channel	1956
Carbon Creek flood-control dam and Mill Creek levees upstream from Garnet Street	1960
East Twin-Warm Creek flood channel	1961

Those facilities, other than the levees, are shown in figures 36 and 45.

The Orange County Flood Control District has built levees along the Santa Ana River downstream from Yorba bridge (fig. 36) and has built or improved a number of small channels within the basin. In 1962 the district completed the construction of the Villa Park flood-control dam (fig. 36). The Riverside County Flood Control and Conservation District and the San Bernardino County Flood Control District have built bank-protection facilities, small flood-control dams, and other facilities to protect property adjacent to many of the tributaries of the Santa Ana River.

The three county organizations cooperate with the Corps of Engineers in integrating the flood-control programs, in consolidating local levee and storm-drainage districts, and in building storm drains and flood channels. It is not economically feasible to protect all areas against the greatest flood that might occur, and the prevention or diminution of flood damage becomes increasingly difficult as urban development encroaches on flood plains and moves into the upland areas on alluvial cones and in the canyons. The upland areas are especially difficult to protect because of the myriad small watercourses that require individual control measures. Studies continue, however, to provide the additional facilities necessary to reduce or eliminate the flood hazard, and much attention is being given to nonstructural measures such as flood-plain management and zoning.

SUMMARY

In a little more than 100 years, man, by his development of the Santa Ana River basin, has seen a seemingly abundant local water supply become inadequate to his needs. As his water demands began to equal the local supply, he adopted such conservation measures as the construction of surface storage reservoirs and the use of subsurface storage for winter flows that were surplus to his winter need. When his demand continued to increase, he supplemented the local supply with imported water. He has anticipated the future need for additional water by planning for the importation of water from more distant sources, by adopting more stringent conservation measures, and by investigating unconventional sources of water supply. He has used physical and judicial means to fight for his water and water rights. It is ironic that there are times when nature is too bountiful--during flood periods--and provides him with more water than he cares to see in a short period. He has spent millions to protect his land from flooding and plans additional flood-protection facilities, as well as such nonstructural flood-protection measures as flood-plain management and zoning. It is obvious that he has no intention of giving up his gains in the Santa Ana River basin.

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CALIFORNIA
ANAHEIM UNION WATER COMPANY
INCORPORATED
JAN. 29, 1884
ANAHEIM ORANGE CO. CAL.
BANTAM HEIGHTS WATER COMPANY
INCORPORATED
APRIL 5, 1937
CALIFORNIA
BEAR VALLEY MUTUAL WATER COMPANY
INCORPORATED
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