

PERM

# WATER DEPARTMENT

## CITY OF LONG BEACH, CALIFORNIA



### HISTORY AND ANNUAL REPORT

1943-1944

PERM

WATER DEPARTMENT—CITY OF LONG BEACH, CALIFORNIA—1943-1944

WATER DEPARTMENT  
CITY OF LONG BEACH, CALIFORNIA

HISTORICAL SKETCH  
*and*  
ANNUAL REPORT

*July 1, 1943 to June 30, 1944*

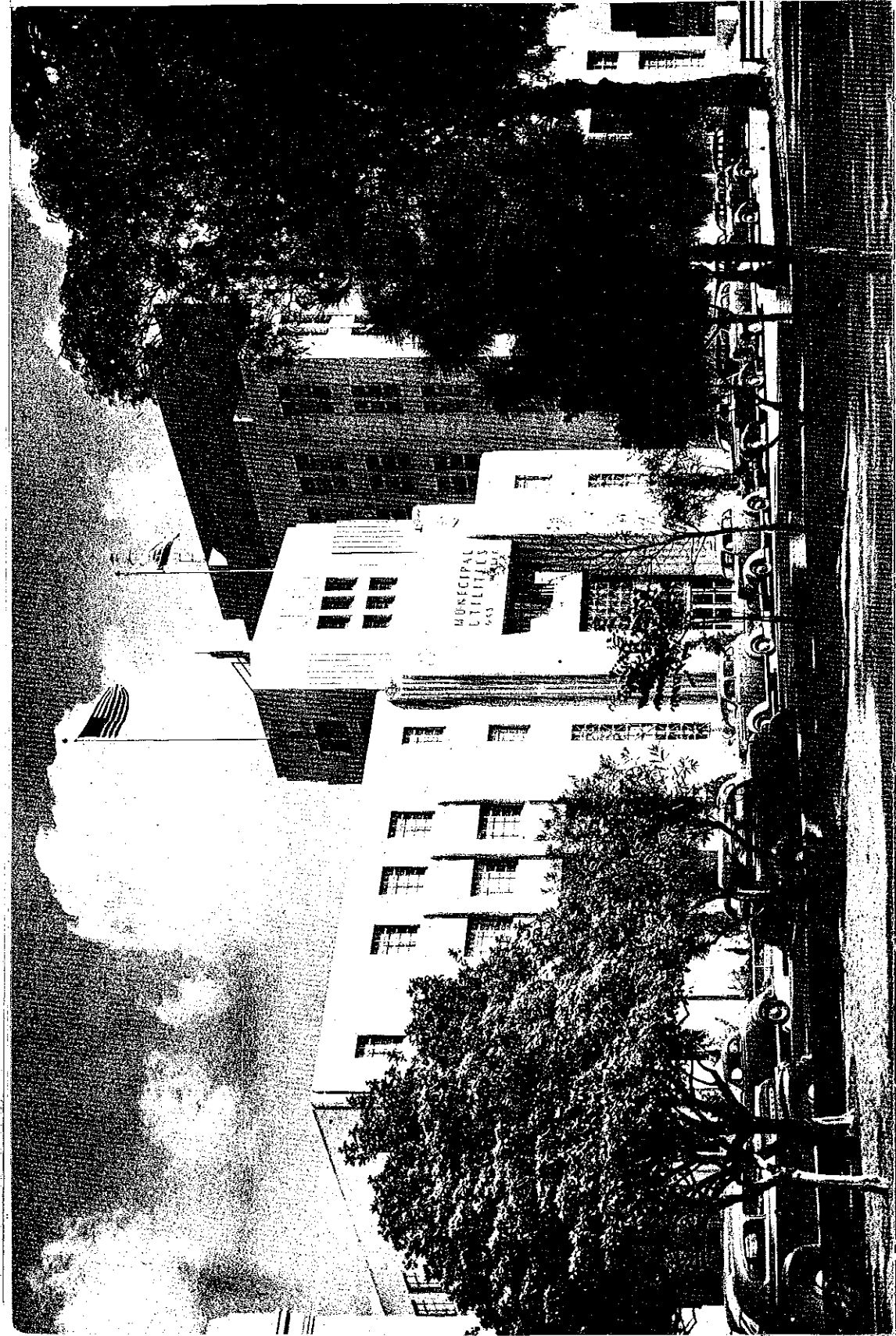


LONG BEACH  
1944

*Dedicated to the memory of GEORGE ROYAL WADE,  
beloved General Manager of the Long Beach Water  
Department from December 19, 1940, to November  
24, 1944, under whose direction the book was pre-  
pared. His great desire was to see it in print,  
but the Supreme Architect of the Universe willed  
otherwise and called him while it was  
still unfinished.*

*A drop of water, taken up from the ocean by a sun-beam, shall fall as a snowflake upon the mountain top, rest in the frozen silence through the long winter, stir again under the summer sun and seek to find its way back to the sea down the granite steeps and fissures. It shall join its fellows in mad frolics in mountain gorges, singing the song of falling waters and dancing with the fairies in the moonlight. It shall lie upon the bosom of a crystal lake, and forget for a while its quest of the ocean level. Again it shall obey the law and resume its journey with murmurs and frettings; and then it shall pass out of the sunlight and the free air and be borne along a weary way in darkness and silence for many days. And at last the drop that fell as a snowflake upon the Sierra's crest and set out to find its home in the sea, shall be taken up from beneath the ground by a thirsty rootlet and distilled into the perfume of an orange blossom in a garden. . . . .*

ALLEN KELLY, 1905.



## LETTER OF TRANSMITTAL

Long Beach, California  
November 8, 1944

HONORABLE PRESIDENT AND MEMBERS  
BOARD OF WATER COMMISSIONERS  
CITY OF LONG BEACH, CALIFORNIA

GENTLEMEN:

Herewith please find History and Annual Report of the Water Department of the City of Long Beach, California, for the fiscal year 1943-1944.

While this is the first report to be published, it covers the 33rd year of the Department's existence. Our aim has been to touch upon every phase of operation clearly and concisely, omitting routine procedure and detail.

Particular stress has been placed upon comparative figures of the present and past years to give a full conception of the unusual and continued heavy demands made upon the Water Department by the influx of war workers and abnormal industrial expansion. Likewise emphasized is the extreme handicap suffered in maintaining uninterrupted service, constructing necessary extensions and performing essential operations, because of Governmental regulations, manpower shortages and restricted purchasing power.

Your attention is called to the use of Metropolitan District water, which was turned into the City system for the first time in August, 1942. It is being used to increase pressures in high level areas and, whenever necessary, to care for the demand in excess of the safe yield of the local underground supply.

Attention is also called to the fact that no bond issue for water works improvement has been voted for 17 years and capital improvements are financed out of departmental earnings.

Statistical data herein contained reveal a consistent increase in both gross and net revenues, whereas the cost of operations per 1000 cubic feet has steadily declined. A substantial net profit is shown for the fiscal year's business after deductions have been made for depreciation, redemption of bond principal and interest payments.

It is our conviction that a long range program of necessary extensions and improvements should be adopted for post war construction to meet future demands upon the Department, as there can be little doubt that the City will, for a time at least, continue to increase in population out of proportion to ordinary and natural trends. Although the Department now enjoys the distinction of having an exceedingly low water rate, being bettered for the household consumer by only one city in California whose population is greater than 50,000, it should be possible to make a further reduction in rates following such time as the Department is permitted to fully develop the system and the demands upon it become normal.

I wish to express my sincere appreciation to the members of the Board of Water Commissioners for their confidence and loyal support, and their untiring efforts in dealing with the many problems with which they have been confronted. Commendation is also due to the individual members of the Water Department's personnel for their cooperation and support.

Respectfully submitted,

G. R. WADE, *General Manager*  
Long Beach Water Department

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## WATER — THE PARADOX

WATER, the familiar H<sub>2</sub>O, will extinguish fire—  
but is composed of two gases: hydrogen, highly  
inflammable, and oxygen, absolutely necessary  
for combustion.

WATER has many forms—  
it may be a liquid, a solid or a gas.

WATER, as a liquid, cannot ordinarily be made colder than 32°F.—  
but if it is, the slightest vibration will convert  
it into ice.

WATER, in its solid form, expands only 9%—  
but, if confined, exerts a pressure up to 276,000  
pounds per square inch.

WATER, in its gaseous form, expands 164,200%—  
but cannot be seen in this state.

WATER, the liquid, is 819 times heavier than dry air—  
but steam, the gas, is 133 times lighter than dry air.

WATER, the liquid, without pressure, can be heated  
above 212°F. only below sea level—  
but water or steam, under pressure, may be made  
much hotter.

WATER from the sea is salty—  
but frozen sea water is fresh.

WATER evaporates at all temperatures—  
cold slows the process but does not prevent it.

WATER, as dew, does not "fall"—  
but is the condensation of water vapor on a  
chilled surface.

WATER sometimes appears to be absolutely still—  
but it is continually in motion in this cycle:  
evaporation, vapor, condensation and precipitation.

WATER, under control, is man's servant—  
but without regulation, it may be a formidable enemy.

WATER will float the largest battleship—  
yet a small grain of sand will sink in it.

WATER is the most essential commodity—  
but the Long Beach Water Department delivers it to  
the consumer's premises at an average cost of only  
4 CENTS PER TON.

BOARD OF WATER COMMISSIONERS  
ROSTER OF OFFICERS

PRESIDENT

\*Charles L. Heartwell ..... July 6, 1931, to Dec. 11, 1941  
Geo. M. Winstead ..... Dec. 18, 1941, to June 30, 1945

VICE-PRESIDENT

J. W. V. Steele ..... July 6, 1931, to July 23, 1931  
Herbert F. Ahlswede ..... July 23, 1931, to June 9, 1932  
John Schinner ..... June 9, 1932, to Aug. 16, 1934  
\*Harry Ross ..... Aug. 23, 1934, to Apr. 9, 1939  
Geo. M. Winstead ..... Apr. 13, 1939, to Dec. 11, 1941  
J. Will Johnson ..... Dec. 18, 1941, to June 30, 1945

SECRETARY

Ray M. Dickinson ..... July 6, 1931, to Oct. 18, 1934  
\*Edwin M. John ..... Oct. 25, 1934, to Sept. 2, 1937  
Gerard T. Wall ..... July 7, 1938, to Aug. 31, 1939  
V. E. O'Neil ..... Sept. 14, 1939, to June 30, 1945

ROSTER OF MEMBERS

\*Charles L. Heartwell ..... July 6, 1931, to Dec. 11, 1941  
J. W. V. Steele ..... July 6, 1931, to July 23, 1931  
Ray M. Dickinson ..... July 6, 1931, to Oct. 18, 1934  
Herbert F. Ahlswede ..... July 6, 1931, to June 9, 1932  
John Schinner ..... July 6, 1931, to Aug. 16, 1934  
A. C. Walker ..... July 23, 1931, to July 20, 1933  
T. A. Stephens ..... June 16, 1932, to July 1, 1933  
\*Edwin M. John ..... July 27, 1933, to Sept. 2, 1937  
\*Harry Ross ..... July 27, 1933, to Apr. 9, 1939  
Gerard T. Wall ..... Oct. 11, 1934, to Aug. 31, 1939  
Geo. M. Winstead ..... Dec. 27, 1934, to June 30, 1946  
E. H. Jackson ..... Sept. 23, 1937, to Jan. 5, 1939  
L. M. Swope ..... Jan. 5, 1939, to Aug. 31, 1939  
V. E. O'Neil ..... Sept. 7, 1939, to June 30, 1947  
J. Will Johnson ..... Sept. 7, 1939, to June 30, 1948  
\*Thomas M. Brown ..... Sept. 7, 1939, to Dec. 30, 1943  
E. L. Brown ..... Dec. 18, 1941, to June 30, 1944  
John P. Hilbert ..... Feb. 3, 1944, to June 30, 1945

\* Died in office

BOARD OF WATER COMMISSIONERS  
LONG BEACH, CALIFORNIA



V. E. O'NEIL  
Secretary



J. WILL JOHNSON  
Vice-President



GEO. M. WINSTEAD  
President



JOHN P. HILBERT  
Member



E. L. BROWN  
Member



ORGANIZATION CHART

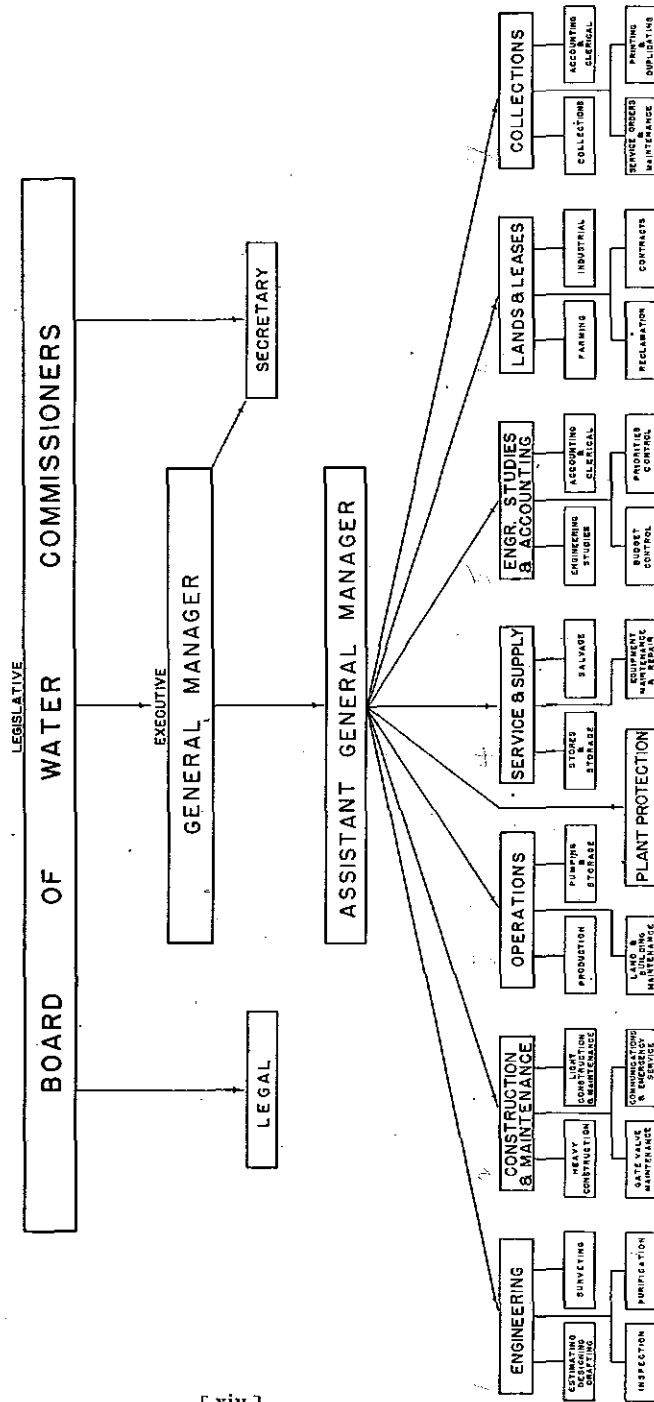


Fig. 1

ORGANIZATION  
OF THE  
LONG BEACH WATER DEPARTMENT

THE CHARTER of the City of Long Beach, California, effective July 5, 1921, and as subsequently amended, is the organic law of the Water Department. Pertinent extracts from it follow.

LEGISLATIVE

BOARD OF WATER COMMISSIONERS

"Sec. 216. There is hereby created a department of the City government to be known as the 'Water Department' which shall be under the exclusive jurisdiction and control of five commissioners who shall be known as the Board of Water Commissioners . . . .

"The term of each of the members of said commission shall be five years beginning with the first Monday after the first day of July from and after their respective appointments . . . .

"The members of said Board shall be appointed by the City Manager, subject to the approval of a majority of the City Council . . . ."

The terms of the five members are staggered, only one expiring each year.

"Sec. 216a. Annually . . . . , after the first Monday after the first day of July of each year, the Board shall organize by electing one of its members president and one vice-president, who shall each hold office for a term of one year . . . . The Board shall hold a regular meeting at least twice a month . . . .

"Sec. 216b. The Board of Water Commissioners shall appoint a secretary . . . . who shall hold office during the pleasure of the Board . . . .

"Sec. 216c. The powers conferred . . . . upon the Board of Water Commissioners shall be exercised by order or resolution adopted by a majority of its members . . . ."

EXECUTIVE

GENERAL MANAGER

"Sec. 217. The Board of Water Commissioners shall have the complete and exclusive power: . . . .

"(2) To appoint a general manager who shall be, subject to the control of the Board, the chief administrative officer of the department . . . ."

DEPARTMENTAL ORGANIZATION

The framework of the departmental organization under the General Manager is as shown by the Organization Chart, Figure 1.

### OTHER CITY OFFICIALS

The duties of certain City officials, as defined in the City Charter, apply to the Water Department as well as to other branches of the City government. These officials are as follows:

#### CITY ATTORNEY

"Sec. 217. . . . .

"(7) . . . . the City Attorney shall represent the Board in all matters to which it is a party and shall be the sole and exclusive legal adviser of the Board with reference to any of its functions, powers or duties under this charter."

#### CITY HEALTH OFFICER

"Sec. 180. The City Health Officer shall enforce all rules and regulations which may be adopted for the carrying out and enforcement of a good sanitary condition of the city; for the protection of the public health . . . ."

Under this Charter provision, the City Health Officer makes regular inspections and analyses of the City water supply, and reports to and advises with the Water Department for the purpose of maintaining at all times a safe, potable water.

#### CITY AUDITOR

"Sec. 132.110. The City Auditor shall be the general auditor of the City of Long Beach and of every department, commission, board and office thereof."

#### CITY TREASURER

"Sec. 137.105. The City Treasurer shall be the custodian of all public monies of the City of Long Beach, or of any board or commission thereof, and of all other monies coming into his hands as City Treasurer."

#### CITY ACCOUNTANT

"Sec. 139.105. The City Accountant shall keep full, true and detailed records of all accounts of the City, its assets, liabilities, revenues and expenditures, its obligations, commitments and encumbrances . . . ."

In addition to the City Accountant's duties, the Water Department maintains its own accounting and cost keeping division.

#### CIVIL SERVICE BOARD

"Sec. 102. The Civil Service Board, subject to the approval of the City Council, shall adopt, amend, and enforce a code of rules and regulations, providing for appointment and employments in all positions in the classified service . . . ."

### OTHER CITY DEPARTMENTS

As an economy measure the Water Department avails itself of the facilities offered by the City Purchasing Department and the City Laboratory. A single Collections Division is also maintained by the Water and Gas departments to facilitate meter reading, billing and collecting.

### ADMINISTRATIVE STAFF LONG BEACH WATER DEPARTMENT



GEORGE R. WADE  
General Manager



C. KENYON WELLS  
Engineering



BURT HARMON  
Ass't. Gen. Manager



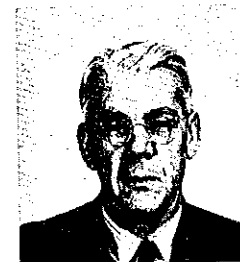
THOMAS M. WARD  
Stores



FRED S. PORTER  
Construction



LUTHER V. BUFORD  
Operations



WALTER M. BROWN  
Eng. Accounting



ALICE B. SAFFOLD  
Collections



CLARK H. SHAW  
Properties

# HISTORICAL SKETCH

## LONG BEACH WATER DEPARTMENT

THE life of any community is directly dependent upon its water supply. This sketch, therefore, is primarily a story of water—sometimes fresh, sometimes salt, sometimes too much, sometimes too little—with its principal theme the constant struggle to control, safeguard, develop and utilize a fresh water supply for the expanding needs of the City of Long Beach.

If we might turn the clock back to a day beyond the dawn of history, no doubt we would find, among the prehistoric patrons of the local water supply, the mastodon, the imperial elephant and the sabre-tooth tiger. According to Clark H. Shaw, who has been with the Water Department from its inception and who was its superintendent for ten years preceding the organization of the Water Commission in 1931, bones of several mastodons were uncovered in recent times during the prosaic task of making brick in the old brickyard north of Seaside Hospital; and bones of individual specimens of the imperial elephant have been found at Spring and Orange, Spring and Cherry, 36th and Walnut, and 37th and Atlantic.

The first use of water by human beings on the site where Long Beach now stands was undoubtedly by Indians. In 1914, Jane Elizabeth Harnett wrote, in her *Notes on the Story of Long Beach*:

“Cabrillo found Indians on Catalina Island and at San Pedro. Three centuries later a Scotchman living at San Gabriel Mission wrote a full description of the Indians of Los Angeles County. He mentions two villages in the vicinity of what is now Long Beach, and while they cannot today be positively located, there is good reason for believing that one of them, Pubug-na, stood at the head of Alamitos Bay. Here can still be seen the traces of a large midden of clam shells; and many stone implements and some human remains have been found near by.”

The Scotchman was Hugo Reid, an early resident of Los Angeles and San Gabriel who in 1851-52 wrote many letters concerning the Indians of Los Angeles County for publication in *La Estrella de Los Angeles*, the first newspaper published in this vicinity. Reid names nearly thirty Indian *rancherias*, “with their corresponding present local names”, and states that “each village generally contained from 500 to 1500 huts.” Those named ranged from San Clemente and Catalina Islands to Cucamonga Farm and San Fernando, and among them were:

“Pubug-na ..... Alamitos  
Tibahag-na ..... Cerritos’.

There is some reason to believe that *Tibahagna* was located in the vicinity of Knoll Park on the west side of Long Beach, since an Indian burying ground and many relics have been excavated there, according to Clark H. Shaw.

Both sites were well supplied with fresh water. A perennial stream, fed by live springs in the gulch or *cienea* north of 27th Street and west of Orange Avenue, flowed through the present "Frog Pond" area and southerly along the base of the high ground until it discharged into Cerritos Slough in the neighborhood of Knoll Park; while a live spring a few hundred feet north of Seventh Street and less than half a mile west of the present bridge across the San Gabriel River supplied the site of *Pubugna* on the easterly end of the knoll now occupied by the Fred H. Bixby home place. This village was sometimes referred to as *Puvu* as shown on the map of the Ranchos Los Cerritos and Los Alamitos. The short length of pipe in the accompanying picture points to a shallow reservoir built around the spring.

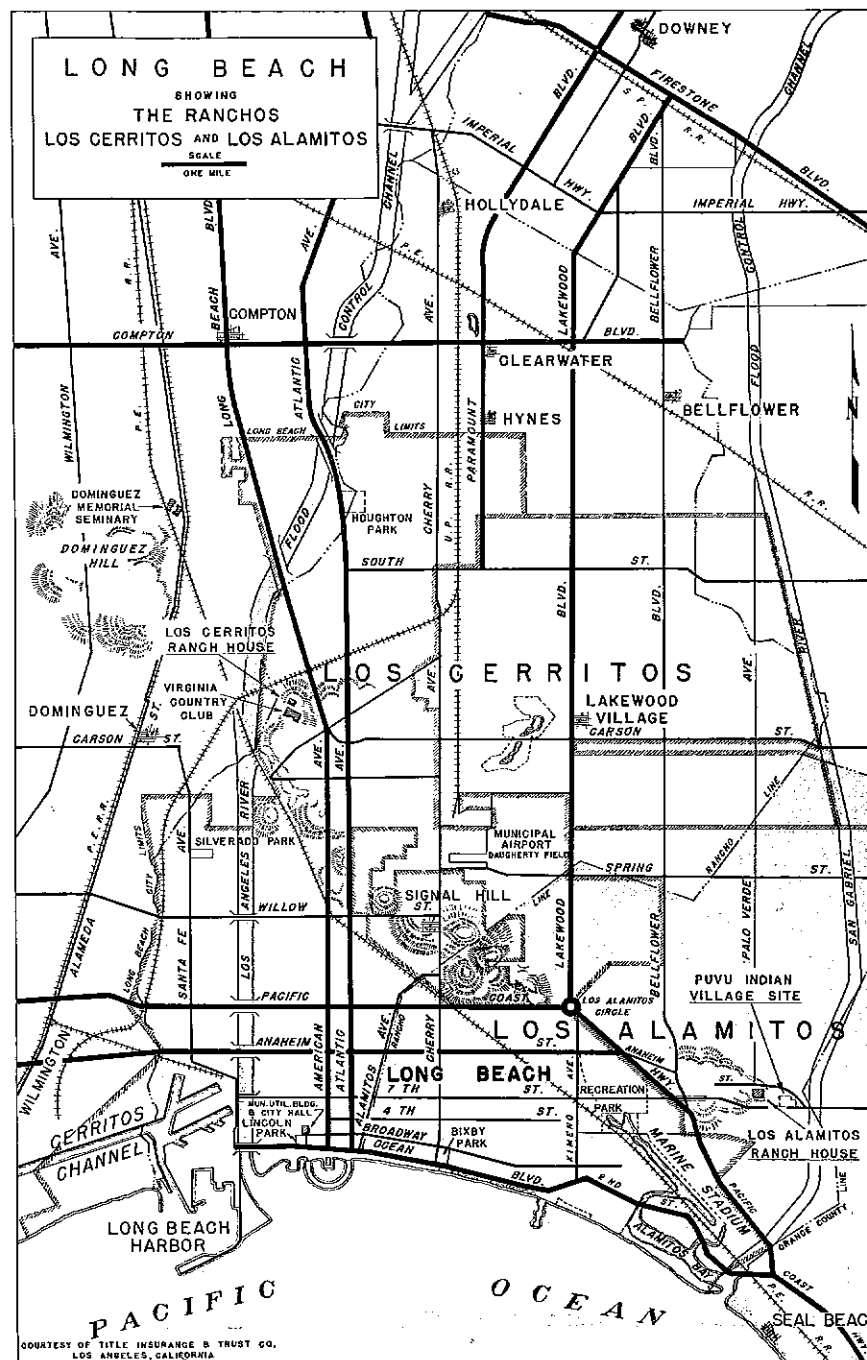
Mr. Bixby says that the Indians used the point of the hill as a lodge site for centuries, and that Mexican cattlemen used it for years as a slaughtering and skinning place. He also reports that the spring flowed undiminished until about 1923 when, following a dry year, it diminished to about one half of its former volume. It ceased completely in 1931 when a well was drilled close by.

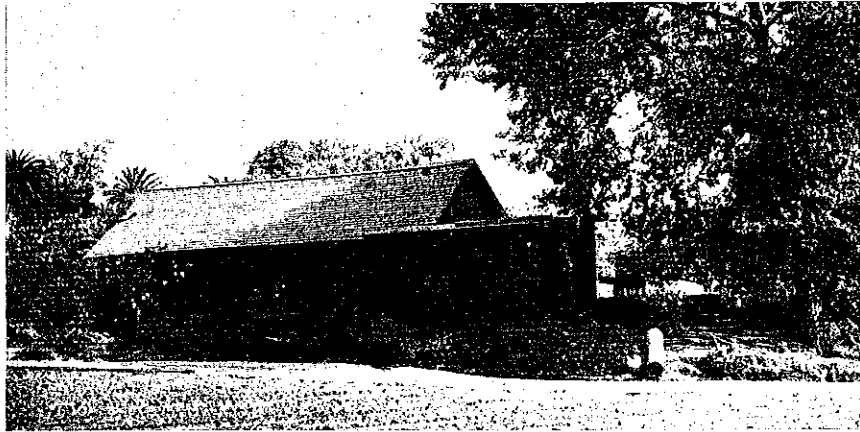
The *Rancherias Pubugna* and *Tibahagna* probably were in existence when the Spanish explorers came and, later, the Spanish padres. Juan Rodriguez Cabrillo came in 1542, Sebastian Vizcaino in 1602, Gasper de Portola and Father Juan Crespi in 1760. With the establishment of the Mission San Gabriel Arcangel by Father Junipero Serra in 1771, the Indians came under mission control and thereafter were known as *Gabrielenos*.

In 1784, three years after the founding of the *Pueblo de Los Angeles*, Governor Pedro Fages rewarded some of his faithful soldiers with land grants in the name of the King of Spain. One of these went to Manuel Nieto and included all of the land lying between the Santa Ana and San Gabriel rivers and between *El Camino Real* and the sea.

When Nieto died, in 1804, his children divided their inheritance; Manuela, a daughter, receiving Rancho Los Cerritos (Little Hills) and a son, Juan Jose, taking Los Alamitos (Little Cottonwoods). These are the ranchos on which the City of Long Beach now stands, and Alamitos Avenue marks the boundary line between them.

During the revolution which followed Mexico's Declaration of Independence in 1810, California remained loyal to Spain but transferred its allegiance to Mexico in 1822, a few months after that country won her independence





THE SPRING THAT SUPPLIED PUBUGNA VILLAGE

in October, 1821. About 1833-34 the Mexican government confirmed the titles to Rancho Los Alamitos and Los Cerritos in Don Juan Jose Nieto and Dona Manuela Nieto de Cota, respectively.

By deed dated June 30, 1834, Don Juan Jose Nieto sold Los Alamitos, comprising some 28,000 acres, to Governor Jose Figueroa for five hundred dollars in cash. Figueroa died in September, 1835, and Abel Stearns, a Massachusetts Yankee who had acquired Mexican citizenship and, in June, 1841, had married the beautiful Arcadia Bandini, took over the property from the Figueroa estate by deed dated July 12, 1842.

In 1843 another Massachusetts Yankee, John Temple, who also had acquired Mexican citizenship, married the lovely Rafaela Cota, daughter of Dona Manuela Nieto de Cota. Temple bought the interests of his wife's eleven brothers and sisters in Los Cerritos for \$3,025, "one half in coined money and the other half in goods at market price . . . including in this sale the branding iron and earmark." Temple's deed was executed at Monterey on December 16, 1843.

Don Juan Temple built the historic adobe ranch house which still stands, after a recent restoration by Llewellyn Bixby, near the Virginia Country Club. As this is written, negotiations are under way for its acquisition by the State of California as a state park.

Don Abel Stearns also had his adobe ranch house at Los Alamitos, now the Fred Bixby home. Both Stearns and Temple engaged in raising cattle and sheep on their respective ranches and both were also prominent in Los Angeles affairs where they maintained residences. Don Abel engaged in local politics and was a member of the first State Constitutional Convention, a City

Councilman, a County Supervisor and a State Assemblyman. Stearns Street, a little known street in Long Beach, which gives access to the Water Department's Alamitos Pumping Plant, was named for him.

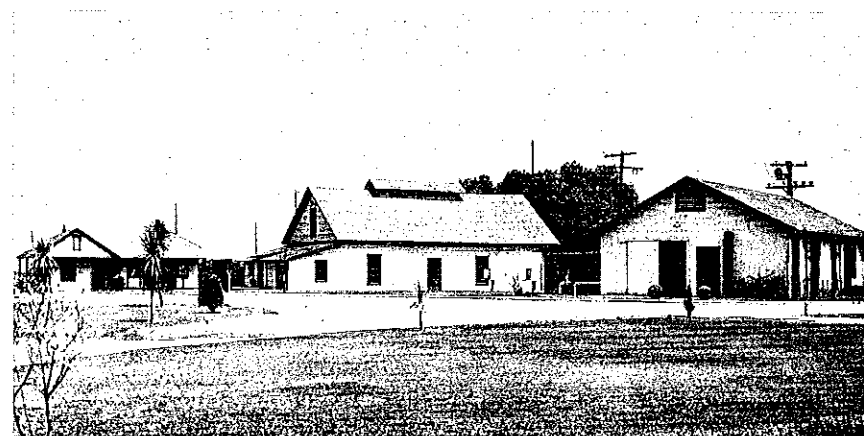
Don Abel had the further distinction of having shipped to the Philadelphia Mint in 1843 the first California gold ever coined—gold mined in Placerita Canyon, near San Fernando Mission, six years before Marshall's discovery at Sutter's Mill.

California was ceded to the United States in 1848 and admitted to the Union as a state two years later. In 1851 a federal Board of Land Commissioners was created to investigate and pass upon land titles in California. The Board confirmed John Temple's title to Rancho Los Cerritos in 1853 and Abel Stearns' title to Rancho Los Alamitos in 1854. U. S. Patents to 27,000 and 28,000 acres of land, respectively, were issued to Temple and Stearns, the former in 1867 and the latter in 1874.

In the meantime, however, one of the greatest ironies of local history came to pass. The great drought of 1863-64 wiped out vast herds of cattle within a few feet of an abundant water supply. Just as later generations were to wander for years over Signal Hill, the harbor area and the region of Alamitos Bay without suspecting the untold wealth of oil that lay a few thousand feet beneath their feet, so wealthy families went bankrupt because nobody had yet thought of drilling for water.

Rancho Los Alamitos was never restocked and later that year ownership passed to the heirs of Michael Reese, a money lender of San Francisco, on a mortgage foreclosure.

Two years later, also as the result of the drought, Flint, Bixby and Co., a northern California firm consisting of Llewellyn Bixby and Thomas and



ALAMITOS PUMPING PLANT  
Located on Stearns Street

Benjamin Flint, purchased Rancho Los Cerritos for \$20,000—seventy-four cents an acre—including the historic Temple hacienda.

In 1869 Jotham Bixby, a younger brother of Llewellyn, acquired a half interest in the property, the firm being reorganized as J. Bixby & Co. The ranch was stocked with sheep and was shortly producing 200,000 pounds of wool annually.

As there was always the danger of a recurrence of the drought of 1863-64, Mr. Bixby began drilling for water and is credited with bringing in ten artesian wells in the late '70's and the early 80's.

In 1881, John W. Bixby, a cousin of Jotham, purchased Rancho Los Alamitos from the Reese heirs, Jotham Bixby and I. W. Hellman participating in the deal.

With this purchase, the whole area now occupied by Long Beach came into possession of the Bixby family and both ranchos were devoted to the raising of sheep. This industry was, however, relatively short lived. Jotham Bixby's discovery of artesian water proved irrigation of the land a possibility and foreshadowed the end of sheep raising.

#### *Origin of Long Beach*

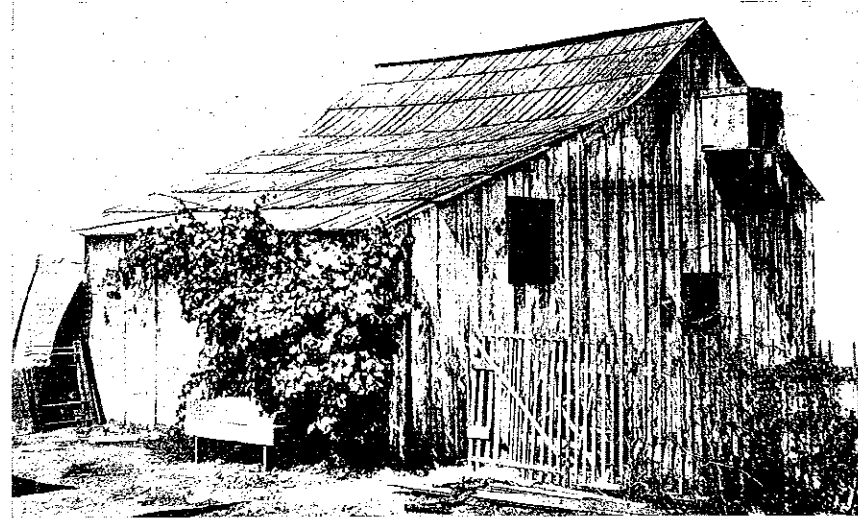
About 1880 or 1881, William E. Willmore secured an option from Jotham Bixby for the purchase of 4,000 acres of Rancho Los Cerritos, fronting the ocean. He immediately began the planning of a development that had long driven him like a fever. It was to consist of a city on the mesa facing the ocean with the area to the north subdivided into "farms" of five, ten, twenty and forty acres each.

In 1881, Willmore staged a nationwide advertising campaign, but the recruiting of colonists was dishearteningly slow. Nearly a year elapsed before the first excursion arrived from the east.

"Willmore City" covered that portion of the Long Beach of today which lies between Magnolia and California avenues and south of Tenth Street. Few men, since Brigham Young laid out Salt Lake City, have been more generous in their planning.

Willmore set aside lots for parks (including the present Lincoln Park), churches, schools, a college and a public library. He planned Ocean Avenue as a magnificent 175-foot boulevard, American Avenue 124 feet wide with a row of trees down the center, other north and south avenues 100 feet wide, and east and west streets 80 feet wide. He planned a 30-foot setback line on the north side of Ocean Avenue and every lot on that boulevard was to be guaranteed an unobstructed view of the ocean. And in every deed but two, he forbade the sale of intoxicating liquor, under the penalty of reversion to the original owner.

Willmore's resources, and those of his first associates in the project, were too slender to bridge the gap between vision and reality. With the surveys



FIRST HOUSE IN LONG BEACH

well advanced, he was unable to finance the enterprise further. In this extremity, he turned to Judge R. M. Widney, then living at Santa Monica in the first cottage to be constructed on that site.

Following a trip of inspection, during which the two men were compelled to spend the night in a pile of hay on the present site of Lincoln Park because of the then "dangerous quicksand" between Wilmington and Long Beach, Judge Widney organized a syndicate of five persons, including Willmore and himself, and took over the enterprise, personally assuming its management. He readjusted the surveys made along the ocean front and changed the name of the embryo settlement from "Willmore City" to "Long Beach." But in the main the downtown section of today conforms to the original plan sponsored by Willmore himself.

At this time, according to Judge Widney, the only building on the site was a shepherd's hut, about eight by ten feet in size, which stood at the northeast corner of First and Pine, on the site of the present 12-story Security Building.

#### *Development West of Alamitos Avenue*

The first domestic water developed on the site now occupied by the City of Long Beach came from a few shallow wells, the first of which was dug as early as 1880 or 1881. This well was located at the north end of Lincoln Park, formerly known as Pacific Park, about sixty feet west of Pacific Avenue and under the present sidewalk. It was used to some extent for watering sheep.

The next was the Cook well, located just west of Pine Avenue, between

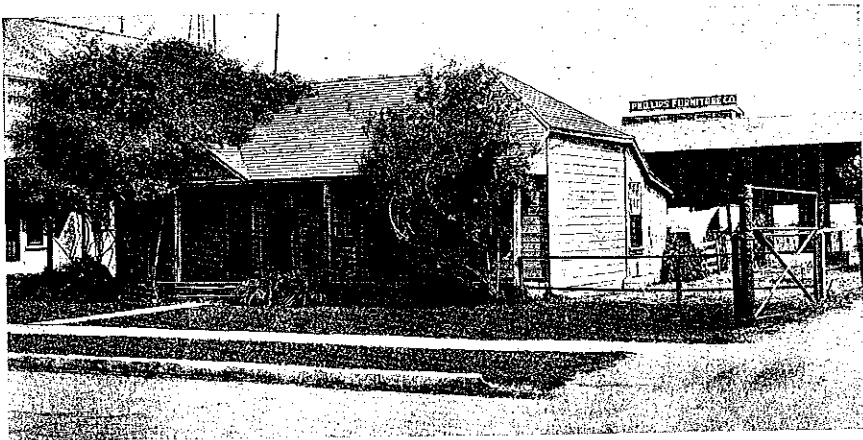
Third and Fourth streets. Others were dug west of Locust Avenue, between Seventh and Eighth streets; on the north side of Anaheim Road, fifty to one hundred feet west of Daisy Avenue; and on the Frank Butler place, south of Willow Street and west of California Avenue.

These wells belonged to individual property owners and were not used to supply the community at large. They were sunk in the mesa on which the greater part of Long Beach is located and which is not a water-bearing formation. Their product was brackish and of poor quality. The Cook well was probably the last of the privately owned water sources to fall into disuse.

Realizing that water was the paramount consideration, Judge Widney concentrated on the problem of its development and distribution. In the *cienega* north of 27th Street and west of Orange Avenue, there were the springs, already referred to, which were seldom or never dry. A well drilled on this site developed an abundance of artesian water which Judge Widney piped into town through a six-inch riveted asphaltum-dipped pipe, thereby displacing the first distribution system—an old white horse, a spring wagon and a few barrels. This six-inch pipe line was the beginning of the Long Beach water system of today.

Judge Widney also constructed a small brick reservoir at the southwest corner of American Avenue and Anaheim Road, which he never used because it gave almost no pressure in the downtown area. It was enlarged by later distributors of water and put into service, much to the dissatisfaction of the consumers, many of whom found it necessary to leave their faucets open all night in order to accumulate a sufficient supply of water for the following day.

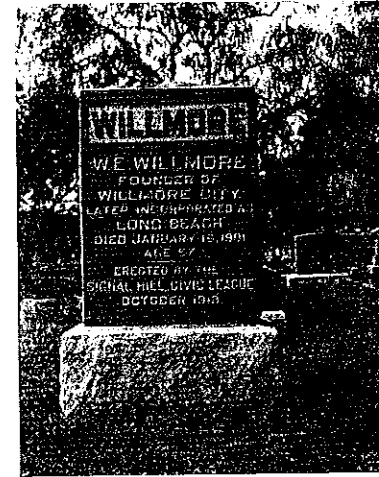
Other public improvements were made during Judge Widney's regime. A crude horse-car line, facetiously known as the G.O.P.—Get Out and



OLD RAILROAD STATION  
Later Used by Various Water Utilities

#### TOMBSTONE OF WILLIAM E. WILLMORE

Willmore founded "Willmore City", now the City of Long Beach. His burial place is in the Long Beach Cemetery, north of Willow Street and west of Orange Avenue.



Push—was constructed out Broadway and Maine Avenue, using wooden stringers in lieu of rails, to connect with the Southern Pacific Railroad at a point known as Thenard. It was ultimately absorbed by the Southern Pacific itself and its right-of-way used to afford that railroad access to its first station in downtown Long Beach, a small frame building which stood on the site of the present City Hall. The patrons of the Long Beach Land and Water Company paid their water bills at this same building.

After several previous moves, the building was shifted to Fifth and Alamitos by the Long Beach Water Company where it was used by that company and later by the Water Department as a residence for employees who stabled the utility's horses on the same site. The last of these horses, after long service for the Water Department, was turned out to graze on the Citizens Tract and died there several years ago. The building referred to is shown in the picture "Old Railroad Station" as it was on the Fifth and Alamitos site.

With the water and transportation problems solved, after a fashion, Judge Widney erected the Long Beach Hotel of forty rooms at the edge of the bluff across Ocean Avenue from the present Lincoln Park, overlooking the waters of the restless Pacific.

In May, 1884, Willmore, broken in health, surrendered his contract with the Bixbys and withdrew from the enterprise. Later, in Arizona, he suffered a sunstroke from which he never fully recovered. He died on January 16, 1901, and now sleeps in the little cemetery north of Willow Street and west of Orange Avenue, in a spot that might look out over the city of his dreams if it were not so closely hemmed in by a forest of oil derricks.

The other members of the original syndicate continued their operations. In December of the same year the Long Beach Land and Water Company

was incorporated for \$100,000 under the management of Judge Widney, and entered into a new contract with the Bixbys.

Judge Widney disposed of his holdings in the Long Beach Land and Water Company shortly after its incorporation, and the management was taken over by Pomeroy and Mills. Perhaps the first public record of a city water supply for Long Beach and the first published schedule of water rates are contained in a poster issued late in 1884 by Pomeroy and Mills which reads:

"Water will be furnished free to a reasonable extent for use on lawns, shrubbery and trees for at least until January 1, 1885. Those planting prior to that date will also be allowed for same use free water for one year longer, to January 1, 1886.

"Campers for 1884 will be allowed to camp, with permission of the Company's agent, along the line of the bluff east of Locust Street and south of Ocean Avenue, but all their stock must be kept safely tied up at the place designated by the Company's agent. Campers will be charged only for the use of water as follows:

- "(a) For each tent of 3 persons or under, 50 cents per week or part of a week; over 3 persons, 75 cents per week.
- "(b) For each animal, 15 cents per week or part of a week.
- "(c) Other uses to be charged a reasonable rate.
- "(d) All water charges must be paid for in advance and the Company's receipt obtained therefor."

The Long Beach Development Company, commonly known as the "Development Company", was incorporated by Southern Pacific interests July 1, 1887, with a capitalization of \$1,000,000, and acquired the properties of the Long Beach Land and Water Company.

At this time, the water system embraced three or four wells, and considerable costly experimenting with cheap pipe had been indulged in. Mr. Pomeroy has described this period thus:

"We experimented with pipe, trying to economize, and spent a lot of money on it after all. Pipe was quite costly in those days, but we had to come back and take out all the thin pipe. It didn't work well. We put in pipe two or three times. We tried to save money and lost it by trying to save it."

Among the early comers to the southland was Wm. Mulholland, who later became nationally known for his development and management of the Los Angeles water system. He landed in San Pedro in February, 1877. When Long Beach was started, he helped build the first water lines down American Avenue—about 1882. According to his own statement, he helped build one of the Long Beach reservoirs in the early 1880's. He has said, "I was with Allen Kelly, sitting out on the hills, the night he wrote that poem referring to a drop of water." (This poem is included in the first pages of this book).

The year 1888 was a momentous one in the history of Long Beach. In the

Fall of that year, the City was incorporated by a vote of 103 to 3. But evil days then descended upon the community of 500 souls.

On November 4, 1888, the inadequacy of the water system was demonstrated. The Long Beach Hotel caught fire that night and because of shortage of water and lack of pressure in the mains, and lack of apparatus to use the water of the ocean for fire fighting, the hotel burned to the ground. During the same year, the death of Charles Crocker, President of the Southern Pacific, brought to an abrupt halt far-reaching plans for the development of the City.

There is reason to believe that Mrs. Crocker intended to continue the development planned by her husband, but she, too, died shortly thereafter. The Crocker sons apparently had little faith in the southland. It is reported that they sold their entire interests in Long Beach for \$240,000 and thereafter took no part in the development of the country south of the Tehachapi.

#### *Development East of Alamitos Avenue*

While all this was taking place in Rancho Los Cerritos, development of the adjoining Rancho Los Alamitos was under way. Artesian water was developed on this property in 1886, the townsite of Alamitos Beach was platted in 1887, and on January 24, 1888, the Alamitos Water Company was incorporated with a capitalization of \$100,000 for the purpose of continuing the development of water. Originally, the Alamitos system was designed to furnish irrigation water for the development of the ranch itself. But as the Alamitos Townsite began to build up and the farm and "villa" lots adjoining it were sold and brought under cultivation, the mains of the new system were extended to keep pace with the demands for water, both domestic and irrigation.

The machinery for the first Alamitos pumping plant was ordered by John W. Bixby, who died the night on which the first of it was delivered. This pumping plant was erected in what is now Recreation Park. It was first housed in a frame building of the board and batten type, and consisted of a small boiler and a 4-inch Byron Jackson centrifugal pump direct connected to a 5x7-inch vertical steam engine.

This latter unit, mounted on a single bed plate and standing scarcely shoulder high, lurked for a number of years in a dim corner of the Alamitos Steam Plant where it was affectionately known as the "Flying Dutchman." It now stands, an honored pensioner, on the floor of the Citizens Pumping Plant.

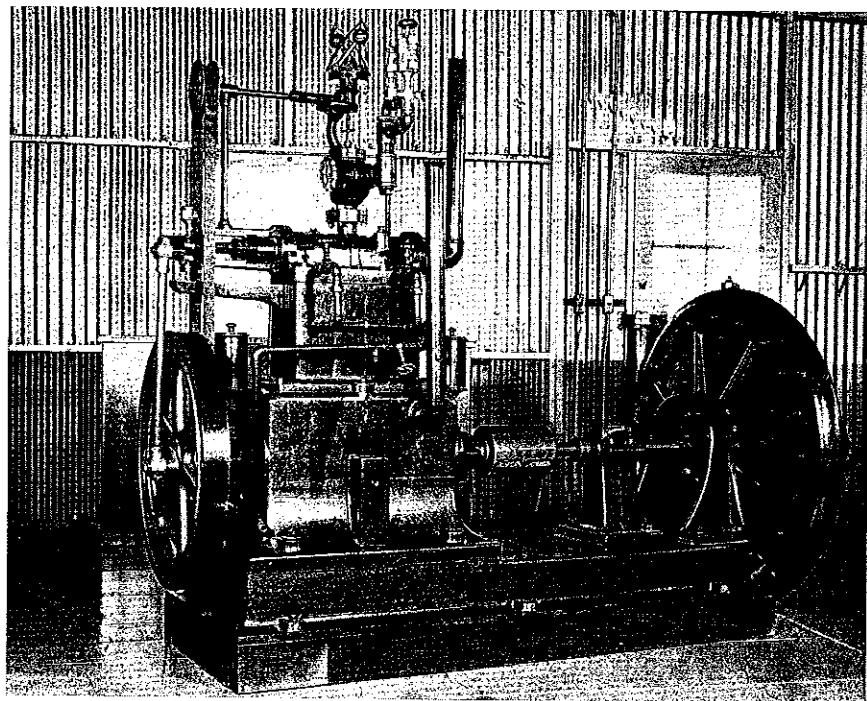
About 1892 this first pumping equipment was moved a few hundred feet easterly and housed in a brick building along with additional boilers and a Worthington duplex plunger pump, which has long since disappeared from the system. The old brick pump house, with its tall brick chimney, was a prominent landmark in Recreation Park until the chimney and part of the walls were wrecked by the earthquake of March 10, 1933. The entire build-



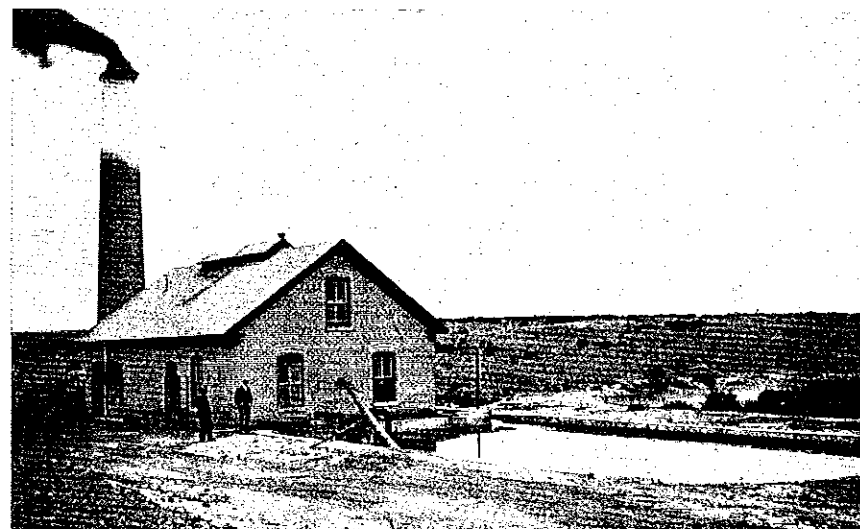
ing was torn down shortly after. It stood a few hundred feet east of the Recreation Park Club House; and the first reservoir stood for many years a short distance to the north. The reservoir was finally demolished and the ground leveled off, and its site is now occupied by a putting green of the municipal golf links.

A map of the Alamitos system as it existed in 1895 shows seven reservoirs of varying types and sizes. Three of these were in the Recreation Park area; one in Alamitos Park, now Bixby Park, used at present as a lily pond; one on the site of the present Community Hospital; one on the top of Alamitos Hill, otherwise known as Reservoir Hill; and one, known as the Sheep Reservoir, located about 1,000 feet north of Anaheim Street and about the same distance east of Termino Avenue. This latter reservoir was used exclusively for the watering of the Bixby flocks as they were driven across country from the Palos Verdes Hills to feeding grounds near Santa Ana and back again.

No. 1 Reservoir was located on the highest ground in Recreation Park at an elevation of approximately 70 feet—about 45 feet above the wells. Its



**"FLYING DUTCHMAN", PUMP AND STEAM ENGINE**  
Used in the First Alamitos Pumping Plant



Courtesy—J. E. Cullen

**OLD BRICK PUMP HOUSE AND COLLECTING RESERVOIR**  
Was on the Site which is Now Part of Municipal Golf Course

elevation permitted it to supply by gravity not only the Sheep Reservoir, but also the reservoir in Bixby Park. This latter, with its elevation of about 60 feet, was of sufficient height to supply downtown Long Beach, at a later date, with some semblance of pressure at the second floor of its two-story buildings.

The crowning achievement of the Alamitos system was the construction of its No. 2 Reservoir on Alamitos Hill, where the Long Beach Water Department's main reservoir, a battery of twelve steel tanks, now stands.

No. 2 Reservoir was begun about 1890 or 1891. After the Bixby threshing crews had completed their annual trip across the southern part of the county, ending at Redondo, their camp was transferred to the top of Alamitos Hill, and the men and teams were put to work throwing up the reservoir walls. This work continued for a year or two, at times when men and teams were available from the routine labors of the ranch. When the earthen basin was finally completed, it would not hold water. Gopher holes and a sandy soil gave it a sieve-like bottom, and it was not until much clay had been hauled to the top of the hill, distributed and puddled, that it became serviceable. Later it was lined with brick and cement.

The completion of this reservoir provided a real pressure system for a portion of the territory served by the Alamitos Water Company, a service far superior to anything the Long Beach Townsite was to know for many years.

Its original capacity was approximately 900,000 gallons and its elevation

was 206 feet above sea level. In 1905, another compartment was built, increasing its capacity to 1,616,000 gallons; and in 1911, it was again enlarged, to 3,850,000 gallons. There was no further change in this reservoir until after the Water Commission came into being in 1931. Its subsequent history will be found on a later page.

Like the Long Beach Land and Water Company, the Alamitos Water Company had its troubles experimenting with substitutes for proven pipe; and, like the other company, it found this experimentation very costly. With a large deposit of good clay at hand, the temptation to experiment with clay pipe was natural. Miles of it were manufactured and some of it was laid. But it leaked at every joint, under even a few pounds pressure; and after it had been taken up and relaid, with the same result, its use was abandoned and steel pipe was purchased and laid in its place.

As the production of the Alamitos wells decreased, the air lift was invoked to increase their capacity. According to Charles H. Thornburg, first and only superintendent of the company:

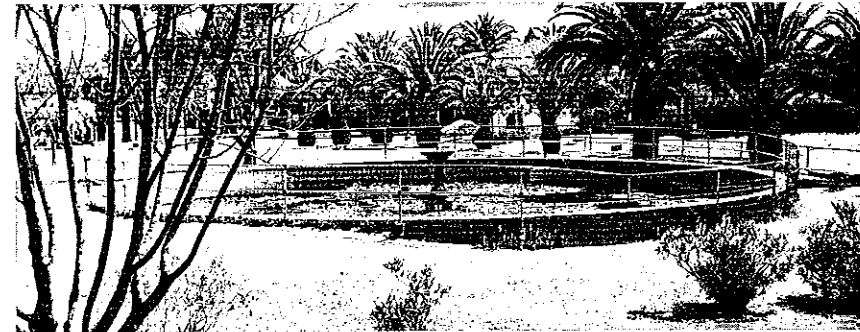
"There was a time when we were using air that we would be within six inches of the bottom of the reservoir every night, and if the people had known it, we would have had very little water. We would work all night and would not know whether we were going to have enough to drink or not. The reservoir in Alamitos Park (now Bixby Park) would fill during the night and cover the ground during the day. Sometimes they drew so heavily that the water did not reach the lower part of town . . . ."

"We were not getting the pressure we should have had in part of the system. We finally found that a left hand gate valve had been closed for three years. After it was opened, everything was all right . . . ."

In 1886 or 1887 the eucalyptus grove at Recreation Park was started to provide fuel for the boilers in the pumping plant. The planting was added to year by year until the grove covered about 70 acres. Wood was the sole source of fuel until 1895 or 1896 when crude oil became available from the Los Angeles field. The use of wood was completely discontinued in 1898.

The Alamitos Water Company commenced business with fifteen domestic taps, most of them for houses that were under construction simultaneously with the installation of the water mains. It was succeeded by the Alamitos Beach Water Company which was incorporated March 20, 1893, with a capitalization of \$187,500. Among the incorporators of both companies were Jotham Bixby, Llewellyn Bixby and I. W. Hellman.

After the completion of the No. 2 Reservoir on the crest of Alamitos Hill, the Alamitos system naturally shaped itself into two zones—the "high pressure" and the "low pressure". The latter was supplied at first by gravity from No. 1 Reservoir, on the small hill in Recreation Park; later by gravity



FORMER RESERVOIR IN BIXBY PARK  
Now Used as a Fish and Lily Pond

from No. 5 Reservoir; on the site of the present Community Hospital, at an elevation of 87 feet. In 1895, the high pressure system served only a few hundred acres, mostly owned by Alamitos employees, on the slope of the hill to the west and south of No. 2 Reservoir. Later, the high pressure mains were extended into Alamitos Beach Townsite, and that town had its high and low pressure zones, just as Long Beach had throughout much of its history.

The Alamitos Water Company drilled five wells or more on the Recreation Park site. They were comparatively shallow, the first one being 380 feet deep. According to Mr. Thornburg, one well was drilled to a depth of 1100 feet, where two strings of tools were lost, and further drilling was abandoned without having reached bedrock. Artesian strata were encountered at depths of approximately 100, 300, 500 and 600 feet.



COMMUNITY HOSPITAL  
Now on The Site of The Old No. 5 Reservoir

*Source of Ground Water Supply*

The rest of this article probably will be more intelligible if we take time at this point to describe the source of the Long Beach ground water supply and some of its peculiarities.

Throughout the last quarter century or more, there have been men to proclaim, from time to time, that Long Beach lies above an immense and inexhaustible lake. Their usual theory is that a prehistoric river, or a branch of the Colorado, penetrates this region beneath the roots of the encircling mountains and provides us with a never-ending water supply. Another idea which has been advanced is that the ocean itself works its way inland, freeing itself of its salt through some mysterious chemical process, and thus maintains the level of the mythical lake.

All of these conceptions are fallacious although, strange as it may seem, the latter one approaches most nearly the truth. The ocean *does* free itself of salt, not by a mysterious chemical process, but by the natural process of evaporation. It *does* make its way inland, as water vapor which condenses into clouds; and the cold air above the mountains precipitates the moisture from the clouds as rain or snow. That portion of the resulting mountain and valley run-off which finds its way into the deep sand and gravel beds of the coastal plain and slowly percolates through the sands and gravels on its return journey to the sea whence it came—that is our water supply. The process is beautifully described in the prose-poem by Allen Kelly.

Three main drainage areas contribute in varying degrees to this supply. They are the watersheds of the Los Angeles, San Gabriel and Santa Ana rivers, all of which have their sources in the Coast Range. Including their respective tributaries, the Los Angeles River drains 167 square miles of mountain territory, the San Gabriel, 280 square miles, and the Santa Ana, 460 square miles. Each of these streams drains a considerable additional area of valley and coastal plain. But the precipitation upon these valley areas is of less importance in the replenishment of the Long Beach water supply than the mountain run-off, partly because of its lesser amount, still further reduced by transpiration and evaporation, and partly because much of it reaches the stream beds below the points of intake of the deeper gravels, as hereinafter shown, and consequently never finds its way into those gravel beds.

Generally speaking, the normal flow of all three of these rivers, and of their tributaries, disappears beneath the surface of their respective stream beds soon after they debouch from the mountains onto the adjoining plain. But they continue to flow underground, not as solid streams in open channels, but as percolating water under pressure, seeping through the gravels of former stream beds now buried—sometimes hundreds of feet below the present surface. Here and there, impervious barriers cross the courses of the underground channels and act as submerged dams to force the water to the surface again.

It then flows as a surface stream until it reaches another area of pervious material, when it again sinks. It is only during periods of storm that the surface flows attain any considerable volume and become continuous to the sea. The eastern tourist is prone to laugh at our dry and dusty "rivers"—until he sees them in flood.

That portion of the Coast Range in which all three of the rivers have their sources is of crystalline rocks. Between this range and the sea are two roughly parallel but irregular ranges of hills composed of sedimentary rocks through which the rivers pass. One of them consists of the Puente and Merced hills, at the Whittier Narrows. The other consists of a series of uplifts, including Dominguez Hill, Signal Hill, Anaheim Landing and others, along the line of the Inglewood fault zone.

The same geologic processes which caused the uplifting of the three ranges have also caused the sinking of large blocks of the original structure, thus forming basins of great depth, which in turn have been filled by erosion from the mountains.

The debris from the crystalline rocks of the Coast Range is spread by the torrential mountain streams in wide, fan-shaped cones at the canyon mouths. Naturally, the coarser and heavier material drops out first, while the finer and lighter material is transported until deposited by flattening gradients and decreasing velocity. As a result of this natural sorting and sizing process, the debris cones at the canyon mouths are composed of coarse granite sand, gravel and boulders, forming a very porous and pervious mass, which gradually gives way to finer and finer gravel and sand and ultimately to clay and silt, with increasing distance from the mountains.

Below the two sedimentary ranges, particularly the more northerly one, great quantities of clay and mud are added in times of flood. There has thus been built up a valley "fill" of unknown depth, consisting of irregular alternating beds of pervious gravel and sand and impervious mud and clay, sloping from the canyon mouths to the sea.

The irregularity of the underground gravel beds has been greatly accentuated by the migratory habits of the rivers themselves. Before they were confined in the present system of flood control channels, the streams gradually raised their beds above the surrounding country, and in times of flood frequently broke their banks and made new channels for themselves. The numerous low divides between valley watersheds also lent themselves to frequent and erratic changes in course.

Prior to 1825, the Los Angeles River flowed westerly through the site of the City of Los Angeles and followed the course of Ballona Creek into the Pacific about four miles south of Santa Monica. From that time until the building of its present flood control channel, it flowed in a fairly direct course to its mouth between Long Beach and Wilmington, but followed many dif-

ferent channels south of Vernon. Some of its flood waters even found their way into Alamitos Bay from time to time.

The San Gabriel River, in earliest historical times, followed a single channel down the east side of El Monte Island, so-called, to a point below the Whittier Narrows, where it swung to the west, into the channel now known as the Rio Hondo, which it followed to a confluence with the Los Angeles River, or sought a separate channel of its own, west of Long Beach, as its vagrant fancy dictated.

In 1867, aided by an irrigation ditch south of Whittier Narrows, it split into two streams, one on each side of El Monte Island, and the easternmost stream carved a channel into Alamitos Bay. This was known for many years as "New River." At still another period, this easternmost branch flowed along the north edge of the mesa into the old channel west of Long Beach. In more recent times and until the construction of the Santa Fe flood control dam, the flood waters of the San Gabriel divided more or less evenly between the "old" and "new" rivers.

The Santa Ana River has been equally erratic in its course throughout its upper reaches, and again below the mouth of Santa Ana Canyon. At one time it discharged into the ocean in the neighborhood of Anaheim Landing. Its present course takes it into the ocean near the northerly end of Newport Bay.

There is no doubt that during past geologic ages, these three rivers have wandered over much of Los Angeles County, and the adjacent southwesterly portion of Orange County, leaving an intricate network of gravel-filled channels behind them, which are now buried more or less deeply in a loosely consolidated sedimentary deposit in which clay becomes the predominating material as the coast line is neared.

The contributions of the Los Angeles and Santa Ana rivers to our local water supply are believed to be negligible. Prior to the construction of Hansen and Sepulveda dams and the improvement of the river channel by the U. S. Army Engineers, very little of the normal flow of the Los Angeles River escaped the collecting galleries and pumping plants of the City of Los Angeles, near Griffith and Elysian parks.

Since then, the "spreading" of Owens Valley water in San Fernando Valley by the City of Los Angeles, together with the "spreading" of water conserved by the several dams of the Los Angeles County Flood Control District, has resulted in a small but practically continuous stream in the formerly dry river bed. Extractions of water in Vernon and its vicinity, however, have become very heavy, drawing not only on the underground waters of the Los Angeles River, but on those of the Rio Hondo branch of the San Gabriel River as well. Whatever Los Angeles River water escapes past the Los Angeles collecting galleries, including a large flow of flood water from the city streets in times of heavy rainfall, escapes so far down stream that it has little or no

opportunity to replenish any but the shallower gravel strata in the Long Beach area. Figure 2 graphically shows the difference between the static water levels of the deep and shallow zones in this area.

As for the Santa Ana River, its nearest channel, the old one leading into Alamitos Bay via Los Alamitos, is no longer followed by the surface stream. It is probable that a portion of its subsurface waters percolate along this old channel; but it is so far to the east and south of the various developed well sites that it is highly improbable that this river has any material effect on the present Long Beach water supply.

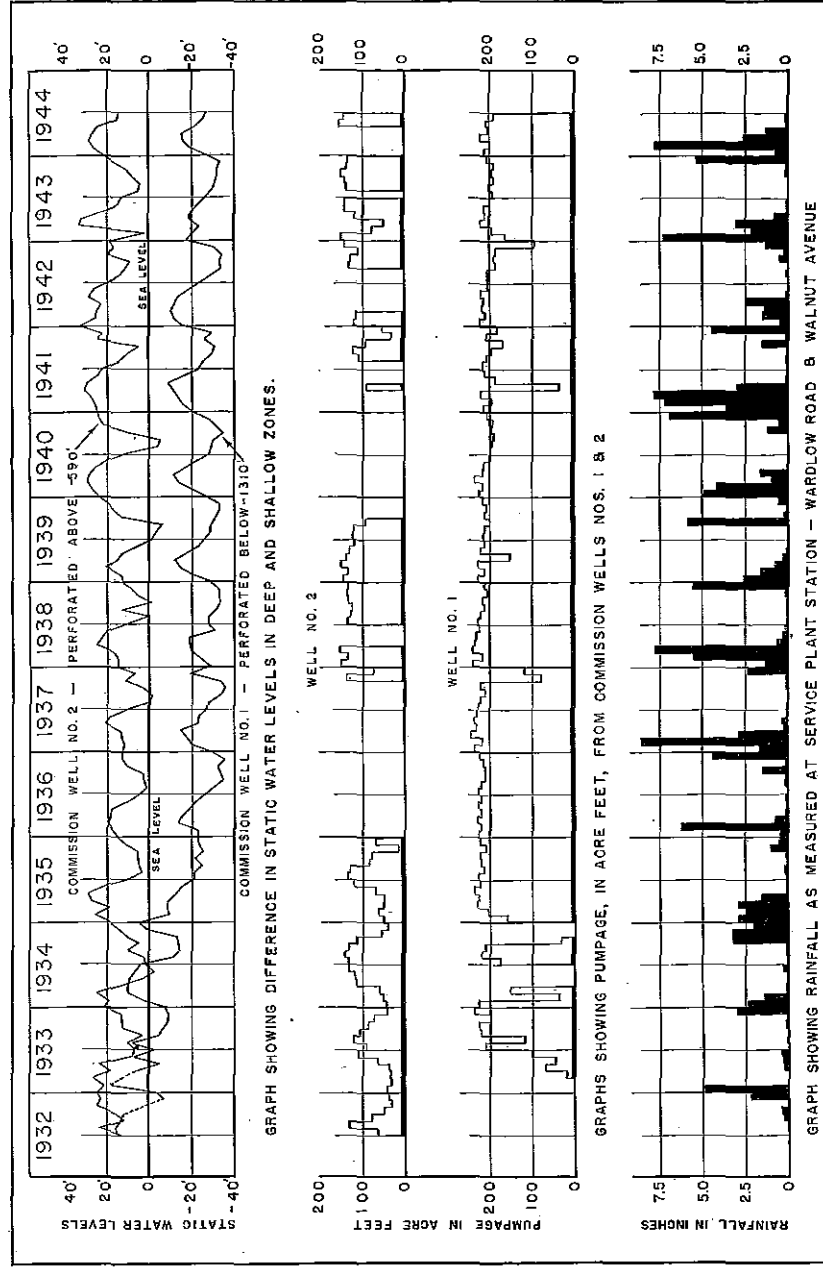
Long Beach is dependent upon the San Gabriel watershed for practically all of its pumped supply. Between the mouth of San Gabriel Canyon and the mouths of the "old" and "new" San Gabriel River channels, west and east of Long Beach, respectively, there are two main basins, filled with gravel, sand and clay to an unknown depth, which have been largely artesian in years past and which still develop artesian flows in very limited areas in wet seasons or after the "spreading" of heavy releases of conserved water from the San Gabriel dams.

The lower rim of the upper basin is a partially eroded fold in the earth's crust at the Whittier Narrows which forms a natural subsurface barrier beneath the present river channels. It extends from the Puente Hills on the east to the Merced Hills on the west.

The normal flow of the San Gabriel River and a portion of its flood waters are absorbed by the coarse gravels of the debris cone at the canyon mouth. As the absorbed waters percolate seaward, they are trapped in the buried gravel beds already described. These beds thus form irregular underground channels or aquifers inclined toward the sea, with percolation upward and downward effectually cut off by the enclosing layers of impervious clay. At the Whittier Narrows the subsurface dam forces much of the percolating water to the surface in a series of live springs.

Below the Narrows a similar artesian basin exists, which is fed by the overflow from the upper one and forms a portion of the coastal plain. Its southerly rim is a barrier similar to the one described above, but formed, in this case, by the continuation of the Dominguez-Signal Hill anticline southeasterly and northwesterly.

Whenever, in either basin, a well is drilled through the clay stratum or "artesian cap" overlying one of the irregular underground water-bearing channels, at a point where the ground level is lower than the intake of the channel, the trapped water will rise under the pressure due to the greater elevation of the intake, and a flowing artesian well will result. If the output of the well is greater than the supply to the intake of the gravel bed, the time will come when the effective point of intake is no longer higher than the top of the well, and then the flow will cease.



In the light of the foregoing generalizations, the following facts must be self-evident:

1. The effective reservoir capacity of the San Gabriel basins is strictly limited by the absorptive capacity of their pervious strata.
2. That portion of the valley rainfall which finds its way to the upper surface of an "artesian cap" does not and cannot contribute to the supply of water beneath the cap, because the clay stratum which restrains the underlying waters from rising to the surface also prevents the surface waters from penetrating to the underlying channels.
3. The larger the number of wells drawing from an artesian stratum, the quicker they will exhaust it.
4. Ordinarily, those wells lowest down on the slope of an artesian basin will be the last to cease to flow.
5. It is conceivable, however, that pumping operations at the upper end of an artesian basin may be carried to such an extreme that little or no water will reach the lower end of the basin.
6. When one artesian basin receives its supply from the overflow of another, if the pumpage from the upper basin is so heavy as to cut off its overflow, excessive pumpage in the lower basin will ultimately either empty it altogether or so lower the water level that economical pumpage is no longer possible.

The original Alamitos wells, in the Recreation Park area, flowed and were of fair capacity when first brought in. But it was not long until their output diminished and they were no longer able to supply the growing demands of the Alamitos water consumers, particularly during the summer season.

Their behavior seems to indicate that they tapped a small subbasin separated from the main artesian area of the coastal plain by the Signal Hill anticline and supplied by the subsurface overflow from the main basin. Whatever the actual geologic conditions may be at this point, it is clear that the drilling of numerous wells in the main basin, supplemented perhaps by the effects of a cycle of dry years, cut down the supply to the Recreation Park wells until their diminished output forced the acquisition of a new pumping site.

One of the peculiarities of the Long Beach ground water supply, the source of which has just been described, is that part of it is clear and relatively hard and part of it is amber colored and soft. It is generally believed that a portion of the clear San Gabriel River water, ranging in hardness from 150 to upwards of 200 parts per million, percolates through buried peat beds of irregular extent as the Long Beach pumping zone is neared, and that a natural softening process takes place in them, probably a base exchange akin to the zeolite process, resulting in water as soft as 10 to 13 parts per million in the Wilson Well, drilled in 1931-32. During this process, the water acquires its amber color and a slight amount of hydrogen sulphide gas which

is responsible for the odor sometimes noticed in water freshly drawn from the faucet.

Owing to the great depth of many of the wells, the temperature of the water is relatively high, ranging from about 72° to 96° F. No two wells have the same characteristics as to color, chemical analysis and temperature. The product from most of them is blended, giving an average hardness of 40 parts per million (see Figure 3) and an average temperature of 80° to 85° F. as it leaves the reservoir.

Other peculiarities have been discovered while drilling. For example, the fossil toe bone of a young bison was taken from North Long Beach Well No. 1 (Harding Park Well) at a depth of about 360 feet. A pine cone was recovered from Commission Well No. 6 at a depth of around 600 feet. A section of fossil rib and a piece of petrified wood with unpetrified bark attached were taken from the South Gardena Well at about 630 feet. Charred wood was encountered in Wise Well No. 1 below 700 feet. Development Well No. 1 was bottomed in a pine log at 1017 feet. Wood fragments were taken from the Wilson Well at 1700 feet, while other fragments of wood and shells of various kinds and sizes have been taken from many wells at various depths. At least one such wood fragment was identified as redwood, although no redwood trees now grow within many miles of this vicinity. Most of the wells specifically mentioned will be referred to hereinafter.

*New Alamitos Source of Supply*

When faced by the dwindling supply in its original Recreation Park wells, the Alamitos Water Company found a new source of supply in a 40-acre tract about three quarters of a mile northeasterly from the summit of Alamitos Hill. It lay on the north side of Stearns Street near a large flowing well previously brought in by the Bixbys; and in 1901, the erection of a new Alamitos Plant was begun on this property. It consisted of an 85 H.P. boiler and a Worthington duplex, triple expansion steam pump with the necessary accessories. Upon its completion the original Recreation Park plant was abandoned.

In 1904 the new plant was enlarged by the addition of a Byron Jackson three-stage centrifugal pump, belt-driven by a Bates tandem compound Corliss steam engine, 12x22x36 inches, together with a 100 H.P. boiler and the usual boiler feed, oil, and vacuum pumps, feed water heater and other accessories; and in 1909, 250 H.P. of additional boiler capacity was added, together with the necessary auxiliary boiler room equipment. This Alamitos Steam Plant, augmented later by an Ingersoll-Rand duplex air compressor 12x14x16 inches, remained in service until 1924, a fire being maintained under one boiler for possible emergency service until August, 1932, and was finally dismantled and sold as scrap in 1943.

It had a capacity of approximately 5,500,000 gallons a day, and obsolete

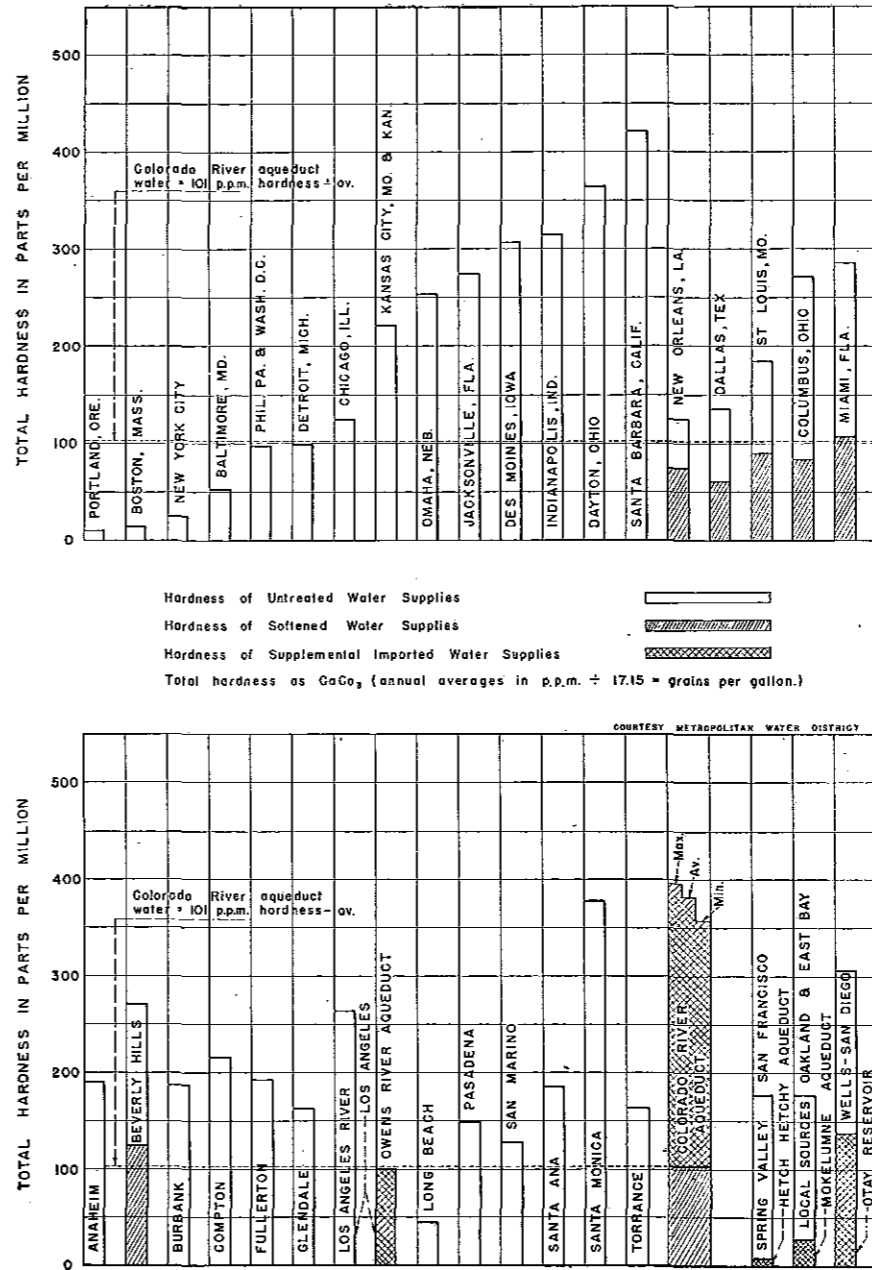
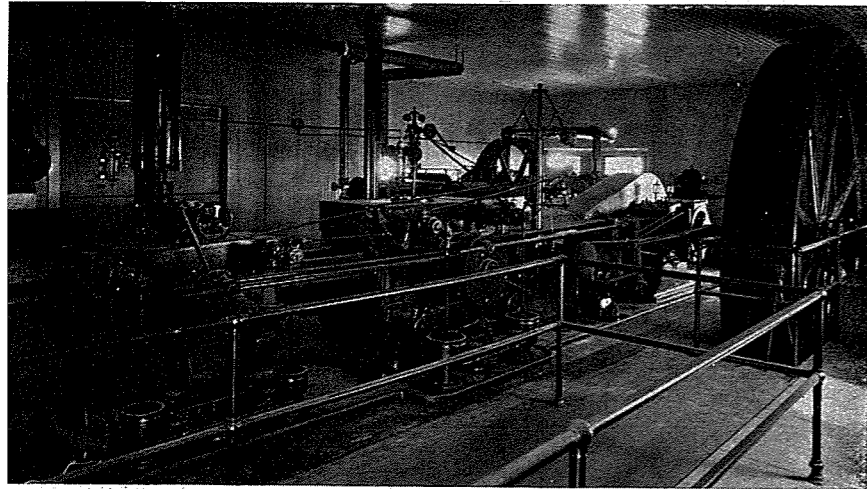


Fig. 3—HARDNESS OF VARIOUS WATER SUPPLIES

though it had become, it provided for several years the only "stand-by" pumping equipment available to the Long Beach Water Department in the event of an interruption to its electric power. This condition has long since been corrected by additional hook-ups to various substations of the Southern California Edison Company, whereby electric power from several different sources can be supplied over different transmission lines.



**CORLISS STEAM ENGINE**

Installed by Alamitos Water Company in 1904

Five wells were drilled on this second Alamitos site before the Alamitos system was acquired by the City of Long Beach. Two artesian wells were located in the center of the collecting reservoir and for some years overflowed directly into it, furnishing the unique spectacle of a reservoir that needed neither pumps nor pipe lines to replenish it—a reservoir that supplied itself. An engineer not posted on the situation, measuring the intake and the output of this reservoir, would find himself at grips with a regular Sherlock Holmes' problem.

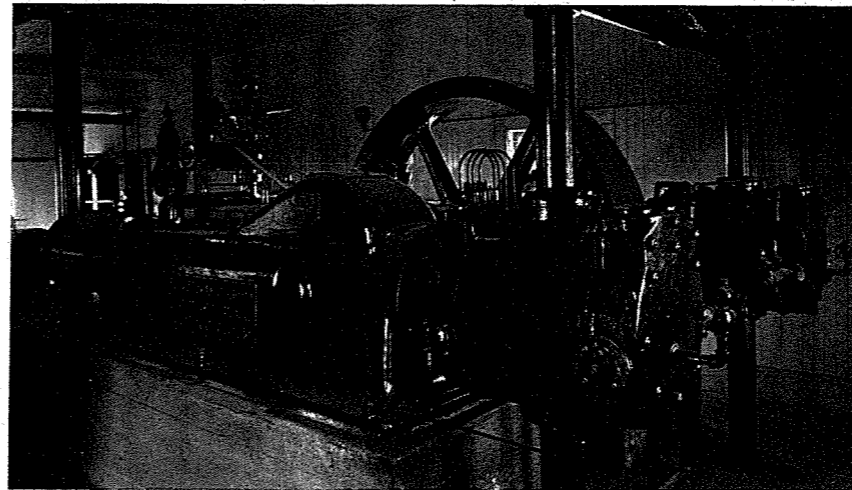
As the artesian pressure decreased, air lift was installed to increase the capacity of the Alamitos wells. Deep well turbines direct connected to electric motors were used in all wells larger than 12 inches in diameter, air lift being used in the smaller wells until 1932.

In 1906 the Alamitos Beach Water Company ran a four-mile line of 14-, 12- and 10-inch pipe northwesterly from its No. 2 or high pressure reservoir to the Bixby home place at Los Cerritos Heights. In the following year more than six miles of 4-, 6- and 8-inch distribution mains were laid in that vicinity, including Bixby Heights.

August 31, 1908, the second Alamitos Water Company was incorporated with a capitalization of \$200,000; and on September 24, 1909, the Alamitos Beach Water Company conveyed its properties and franchises to the new company. Presumably the first Alamitos Water Company, incorporated in 1888, was dissolved or became defunct long before this time, leaving the way open for the incorporation of this second company of the same name, more than twenty years later. The Bixbys were again represented among the incorporators, this time by Jotham W., son of Jotham.

*Bouton Co. vs. Development Co.*

In July, 1888, the Townsite of Bouton was platted by General Edward Bouton, who, according to General Harrison Gray Otis, was at one time chief of artillery under General Sherman during the Civil War. The proposed townsite was located east of Cherry Avenue and north of Carson Street. It was never recorded.



**DUPLEX AIR COMPRESSOR**

Was Used to Increase Flow of Alamitos Wells

In June, 1891, the Los Angeles Terminal Railway, now a part of the Union Pacific system, constructed its line from Los Angeles to East San Pedro, crossing both the Bouton property and that of the Long Beach Development Company.

Some phases of the development of water on the Bouton property are already obscure. According to Charles I. Goucher, a pioneer civil engineer prominent in the affairs of Long Beach, a well was drilled by General Bouton in 1893 "but never was used". There is also a story to the effect that the first Bouton pipe line was a riveted steel line into which no water was turned

for several years, and which was so badly corroded by the time it was put into service that it would not hold water.

Some substantiation of these statements is to be found in an old Bouton map which shows a 15-inch riveted steel line on California Avenue, west of the former railroad tracks, marked "laid in 1894"; and also in an agreement made February 7, 1896, by L. A. Ward with the Bouton Water Company "to take up your main water pipe from Signal Hill to your wells, clean the pipe, repair it, redip it with two coats, relay it, and backfill the ditch over the pipe, all in good workmanlike order, for the sum of twelve cents per lineal foot as laid in the ditch."

According to Mr. Goucher, General Bouton commenced work upon a second well but was unable to complete it because of lack of funds, and the Los Angeles Terminal Railway finally provided the money necessary for the purpose.

October 10, 1894, the Bouton Water Company was incorporated with a capitalization of \$100,000, half of which was subscribed by the incorporators. Of this amount, E. Bouton subscribed the sum of \$24,500, four other directors subscribed \$100 each, and \$25,100 was subscribed by "T. B. Burnett, Trustee". Presumably, the Terminal Railway was the undisclosed beneficiary of this trust, for Mr. Burnett was vice-president and general manager of the railway company at the time. Moreover, when bonds of \$50,000 were authorized by the Bouton Water Company on January 25, 1900, a majority of its stock was voted by the railway directors.

The bringing in of the second Bouton well was an outstanding event in Southern California. Quoting Mr. Goucher again, "The big Bouton well came in about 1895. It made 257 inches of water (slightly more than 2300 gallons per minute) and the pressure was so great that they couldn't handle it—threw mud and dirt and cobblestones until it choked itself and they had to get a rig and clean it out. They tried to cap it but the force was too great. Dirt would fly—you'd think it was a geyser. It ran wild and made Bouton Lake. When they did get it capped, it spouted 80 feet above the ground through a two-inch pipe—about 35 pounds pressure."

The "log" of this well shows the following notes by the drillers: "All sand and gravel bears water on high pressure. The largest stream 210' in depth, from 320' to 530', so far as now known, constitutes the largest underground stream of artesian water in the world. For a continuous distance of 150' the gravel in this stream is coarse enough to permit perforating the well casing, which exceeds the entire depth of many of the artesian wells in California. The 'log' of the formation passed through in boring this well shows a total of 467' of water-bearing sand and gravel."

The use of the word "stream" in this connection is misleading, for, as has been shown before in these pages, the artesian basin of the coastal plain from

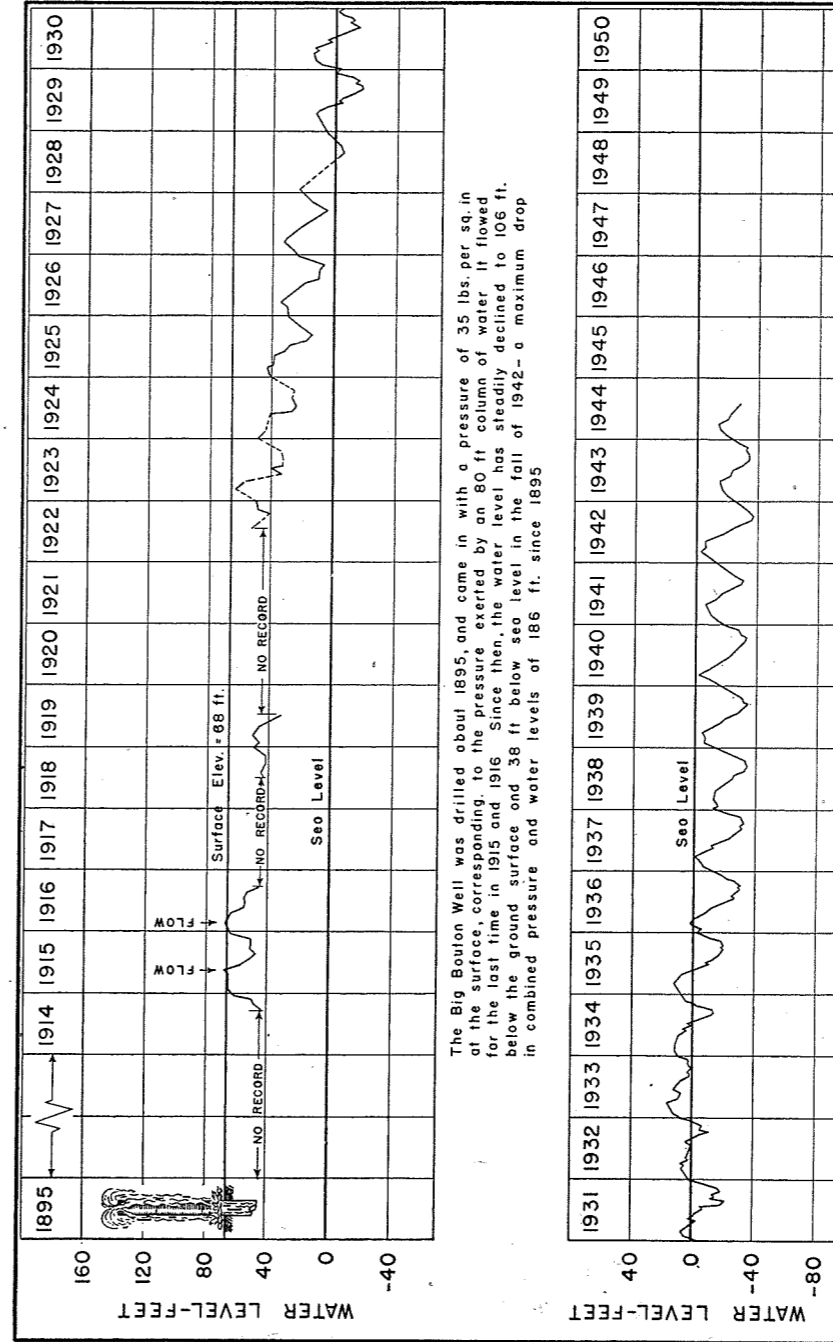


Fig. 4—PRESSURE AND STATIC WATER LEVELS AT BOUTON WELL—1895-1944



which Long Beach secures its water supply consists of saturated gravel beds confined between layers of clay and under pressure due to higher intakes. There are no underground rivers or "streams", although the varying porosity and thickness of the gravel beds makes for a more rapid percolation and a greater volume in some than in others. The "big Bouton well" undoubtedly penetrated one of the best of these.

This well was the marvel of Southern California and the Terminal Railway ran special excursions from Los Angeles to view the wonderful sight. It is said that the geyser-like column of water, shining in the late afternoon sun, was visible from as far away as Whittier.

For two or three years, use of this water seems to have been limited to irrigation, supplying the Terminal locomotives and maintaining the level of Bouton Lake for the benefit of the Cerritos Gun Club. In fact, the well flowed so long and so abundantly that some concern was felt that it might "flood the whole country".

This and other Bouton wells, of which the Department has a record, were undoubtedly among the best artesian wells developed in Southern California, if not in the world. Yet in less than fifty years, because of excessive overdraft, the pressure and static water levels, combined, as shown in Figure 4, have dropped, in the summer season, from 80 feet above the surface to about 106 feet below the surface, or close to 40 feet below sea level. This corresponds to a drop of nearly four feet per year.

When one realizes that it is the Long Beach pumpage which is responsible for the increasing drop in the Bouton wells, and that the same process is continuing in the Long Beach wells themselves, even to a greater degree in some, he will realize that a second source of supply for the Department, as described on a later page, was absolutely essential.

The United States Geological Survey is quoted further on to show that the preservation of the present Long Beach ground water supply depends absolutely upon checking the drop in water levels at a reasonable depth, which experts believe is at, or very close to, the present pumping levels. A fresh water head, a few feet greater than the head of sea water, must be maintained at the barrier; otherwise, continued lowering of the fresh water level will inexorably be followed by an influx of ocean water.

The Bouton irrigation rates in those early days might better have been called "irritation" rates. They were based on the flow through 4-inch "hydrants" and varied according to the hydraulic head. The user whose "head" did not exceed 16 feet paid ten cents an hour, while the user whose "head" ranged between 37 and 50 feet paid twice as much.

In July, 1898, the Bouton Water Company secured a franchise to lay mains in the streets of Long Beach. Early in 1900 a 24-inch redwood pipe line was laid from the big well to a point on the railroad right-of-way just

west of the Water Department's Storage Reservoir, now abandoned, in the *cienea* north of the continuation of 28th Street and west of Orange Avenue. It replaced two and one-quarter miles of the original 15-inch riveted steel line.

From the southerly end of the 24-inch main, two 15-inch riveted steel lines continued south on California Avenue, one on each side of the then existing railroad tracks. The more easterly branch extended to Hill Street, where a 10-inch riveted steel pipe was laid west to American Avenue and thence south to Tenth Street, from which point 6-inch lines were laid south and west—south to American and Sixth, and west to Tenth and Cedar. A 10-inch redwood pipe line was also laid west on Anaheim to Loma Vista Drive, whence an 8-inch redwood main was extended southerly on Chestnut Avenue to Tenth Street and thence west to Daisy Avenue. From this point a 6-inch redwood pipe was laid south on Daisy to the vicinity of Ocean Boulevard, whence 5-inch redwood was run to Terminal Island and East San Pedro.

In consideration for the privilege of laying its pipe lines on the railroad right-of-way, the Bouton Water Company agreed to supply the Terminal Railway Company with free water for its locomotives and cars for a period of twenty-five years.

The "big Bouton well" has an elevation of about 68 feet, corresponding closely to the elevation of Reservoir No. 1 of the Alamitos system. For some time the Bouton system had the benefit not only of the pressure due to the elevation of the well, but also of the artesian force of the well itself. It is probable that the pressure of the Bouton water in the downtown area was for a period comparable to that of the Alamitos low pressure system as supplied by its reservoir on the Community Hospital site.

At any rate, it was a pressure equal to, or better than, that of the Development Company; and with its abundance of water, reasonably satisfactory pressure and aggressive methods of going after new business, the Bouton became a formidable competitor of the earlier company. The first water rate war ensued, each company trying to outdo the other in its concessions to new consumers.

The Development Company found itself compelled to better its system in order to hold its business. Accordingly, in 1898, it built a new Development reservoir on the top of a hill a short distance west of Orange Avenue, about midway between 27th and 28th streets, projected. It had an elevation of 144 feet and a capacity of 1,280,000 gallons and gave the Development Company an advantage over its competitor in the matter of pressure, but was decidedly hard on the Development transmission mains, many of which were too light in weight or too badly corroded to hold up under the increased pressure.

Early in 1900, the Development Company further improved its system by erecting a new brick pumping station on Farm Lot 25 of the American Colony Tract, west of Cherry Avenue and about 1000 feet north of Spring Street.

This station was equipped with two 50 H.P. oil-burning boilers and two Worthington duplex compound pumping engines, 8 and 14x8½x10 inches. Each pump was rated at 600 gallons a minute, giving a plant capacity of 1,728,000 gallons in 24 hours. The plant went into commission February 25, 1900, pumping from several wells, long abandoned, in the previously described *cienea*, into the Development reservoir against a head of about 85 feet. It went out of service some time prior to the acquisition of the system by the City—probably about 1909. The old brick building was occupied for many years as a warehouse by the Associated Telephone Company and later was demolished in 1934.

The period of unrestrained competition between the Bouton and the Development companies continued until late in 1901 when both were absorbed by a new corporation, the Seaside Water Company. This corporation was organized by Los Angeles capitalists May 28, 1901, with a capitalization of \$750,000, of which \$600,000 was subscribed by the incorporators. Two weeks later it authorized the issuance of \$600,000 in bonds. It acquired the system of the Long Beach Development Company by deed dated October 15, 1901, and that of the Bouton Water Company by deed dated November 30, 1901. By this consolidation, it took over most of the water service west of Alamitos Avenue.

*Citizens Co. vs. Seaside Co.*

A brief survey of the situation in Long Beach about that time is worth while. The United States census of 1900 credited the City with a population of 2254. In 1902, the Pacific Electric Railway Company extended its rails into the City, and the marvelous growth of Long Beach began—that growth which for years brought it fame as “the fastest growing city in the United States”. By the Summer of 1904, its population had increased to nearly 10,000.

Some of the business men of Long Beach, attracted by the rapid growth of the City and believing that there would soon be business enough for two water utilities, incorporated the Citizens Water, Light and Power Company, January 31, 1903. It was capitalized for \$250,000, forty per cent of which was subscribed by the twelve incorporators; and the avowed purpose of its organizers was to furnish domestic water at a flat rate of \$1.00 per month.

They purchased approximately 150 acres of water-bearing land lying south of Spring Street and on both sides of Newport Avenue, erected a pumping plant, constructed a reservoir at Temple Avenue and Hill Street, at an elevation of 218 feet, laid their mains into the downtown district, and went after business. As an old chronicle has it,

“The business came with a rush. With clear, cold water, under an eighty-pound pressure, at \$1.00 per month, there were plenty to forsake the old company and a \$1.50 rate. Then comes the

old company, in its efforts to hold its customers, and offers service at 75c—just half its former rate. And as the human mind is so constituted that few can resist the temptation to grab when something seems to be offered for nothing, many of the \$1.00 customers swung back to the old love and the consolation of saving six bits a month. In all this whipsawing back and forth, both companies were put to an extra expense in making and disconnecting services, with no prospects of any betterment in the situation.”

Thus was inaugurated Long Beach's second water rate war in a period of less than five years. The result was inevitable. Both companies were losing money, and it was not long until they got together and worked out a plan for consolidation. The Long Beach Water Company was incorporated February 18, 1904, by the same people who controlled the Seaside Company. It was capitalized for \$750,000; and by deeds executed on the 5th and 8th of March, respectively, it acquired the holdings of the Seaside and Citizens companies. From this time forward, until municipal ownership became an accomplished fact, the distribution of water in Long Beach was controlled by two companies—the Long Beach and the Alamitos. These companies appear to have worked in considerable harmony, even to exchanging competing lines, and thereby restoring Alamitos Avenue as the dividing line between their respective territories.

It should be noted that the Citizens Company, with its Temple-Hill Reservoir, first brought “high pressure” west of Alamitos Avenue and gave the business district a service comparable to that of the Alamitos system at its best. This reservoir had a capacity of 475,000 gallons. It was used for a number of years to serve the City of Signal Hill, and went out of service when that community installed its own water system in 1929.

*Duplication of Pipe Lines*

The records of those early days were probably not very complete at any time. At this late date, they are extremely fragmentary. It is only now and then that a comprehensive glimpse is to be had of some phase of the business of distributing water in Long Beach. One such glimpse is afforded by certain exhibits prepared by the Seaside and Citizens companies in connection with their absorption by the Long Beach Water Company. In those submitted by the Seaside Company, the pipe lines of the Development and Bouton systems were segregated, thus permitting a comparison to be made of the extent of the Development, Bouton and Citizens systems, as shown in Table “A”.

While this table shows the number of feet of pipe in each of these systems as of the year 1904, it gives no idea whatever of the extent of the duplication of lines which had come about during the various periods of intensive competition. Nor does it reflect the condition of the Bouton and Development systems at the time of their absorption by the Seaside Water Company in 1901, since the latter company appears to have followed the policy of crediting its

TABLE "A"

## DISTRIBUTION SYSTEM OF LONG BEACH WATER COMPANY—1904

Number of Feet of Pipe of Various Sizes and Kinds in the Three Water Systems Consolidated Under the Ownership of the Long Beach Water Company in March, 1904.  
SEASIDE

DIAMETER	KIND	DEVELOPMENT	BOUTON	CITIZENS	TOTAL FEET
		REPORT DATED Oct. 10, 1904	REPORT UNDATED	REPORT DATED FEB. 29, 1904	
24"	Redwood .....		11,836		11,836
16"	Riveted Steel Casing.....			7,951	7,951
15"	Riveted Steel Casing.....		14,336		14,336
14"	Riveted Steel Casing.....	1,320		6,657	7,977
12"	Riveted Steel Casing.....	300	1,254	9,540	11,094
12"	S. D. Cast Iron.....	3,530			3,530
10"	Redwood .....		1,870		1,870
10"	Riveted Steel Casing.....		12,730		12,730
8"	Redwood .....		2,260		2,260
8"	Cast Iron .....	21,170			21,170
8"	Riveted Steel Casing.....	4,587		19,307	23,894
6"	Redwood .....		4,120		4,120
6"	Riveted Steel Casing.....		7,140	7,804	14,944
6"	Screw Casing .....	590		4,050	4,640
5"	Riveted Steel Casing.....		5,460		5,460
5"	O. D. Screw Casing.....	120		841	961
4"	Screw Casing .....		18,620		18,620
4"	O. D. Screw Casing.....			587	587
4"	Riveted Steel Casing.....	10,940	26,660	85,320	122,920
4"	S. D. Screw & Cast Iron....	41,920			41,920
3"	Riveted Steel Casing.....		12,660		12,660
2"	Standard Screw .....	56,720	47,720	62,289	166,729
	Total Feet .....	141,197	170,716	200,296	512,209
	Total Miles .....	26.741	32.332	37.935	97.009

new lines and extensions to the system with which they were connected. Pipe installed by it, therefore, appears to have been listed either as "Bouton" or "Development" and not as "Seaside".

The duplication of pipe lines in the early years of Long Beach is best exemplified by a map of the Long Beach Water Company, prepared in 1908. It shows that portions of the streets south of Tenth and between Short Street (now Western Avenue) on the west and Alamitos Avenue on the east, aggregating 7.25 miles, were occupied by parallel lines of the Bouton and Citizens systems, one on each side of each street so occupied, while competing lines of the Development system lay in the adjoining alleys. In addition to the 7.25 miles of streets served by three competitive systems, additional portions of streets in the same area, aggregating 25 miles, were served by two of the competitive systems; and only 2 miles were served by a single system. In other words, 34.25 miles of streets were served by 73.75 miles of water mains, or 115 per cent more than was necessary.

The Water Department's inventory of June 30, 1944, shows 502 miles

of distribution mains. If the same competitive condition shown above still prevailed in Long Beach, the distribution system would have comprised 1079 miles of mains, 577 of which would have been unnecessary.

The saving of the cost of duplicating lines, together with the reduction in the expense of maintaining two or three competing companies, is not the least of the economies effected by municipal ownership of water in Long Beach.

For many years, the history of water service in Long Beach is a story of unmetered service. For the most part, the early water companies rendered service at flat rates. They attempted to establish an equitable system of charges based on the number of rooms in a house, the number of houses on a lot and the size of the lot, the number of bath tubs in a barber shop or bath house, the number of horses in a livery stable, the number of barrels of flour consumed in a bakery, the number of brick laid or yards of plaster spread in building operations, and other like variables. The rates were a constant source of irritation to the consumers and must have given their originators many a headache, as well.

When meters first came into use, it was more for the purpose of curbing the waste of the extravagant few than for the purpose of equalizing the rates to all. The Alamitos Beach Water Company appears to have been the first to install meters. Quoting again from Charles H. Thornburg:

"We didn't have water enough to supply our consumers and when we put in meters it was just like doubling our water supply. There was one man who, we knew, was using lots of water. We didn't have meters enough to go around so we put an old shell on his service—without any insides; but he didn't know the difference, and his consumption of water fell off enormously. . . . We used to catch them raising the dial; but I told the men whenever they discovered that, to look the ground over and estimate the amount of the bill, then double it and send it in. We saw to it that we had it big enough, and they always paid it without kicking."

No sooner had the Long Beach Water Company absorbed the Seaside and the Citizens companies than it undertook to revise the water rates upward. The company officials claimed they were merely restoring the old rates as they existed before the Citizens Water, Light and Power Company came into the field. But so many concessions had been made by both companies during their rate war that, in many instances, the restoration of the old rates meant doubling and even trebling bills to which the consumers had become accustomed. Consequently, the response to the promulgation of the new rates was a state of general and clamorous indignation.

The annual statement of the Long Beach Water Company for the year 1904 does not reflect any great profiteering. The gross income of the company was shown as \$58,646.60. After writing off interest and discount, taxes,

operating and general expense and depreciation, the statement showed a net profit of \$2,898.11 for the twelve months, on an investment of \$840,813.71.

#### *Municipal Ownership Defeated*

It is probable that if the Long Beach water system had been metered at that time, the restoration of the old rates would have caused far less friction and ill feeling. But the metering of the system, with its resultant economies, was to come later, and municipal ownership of water became a popular issue. The plan first advocated was the purchase of water-bearing lands and the installation of a complete new system by the City of Long Beach. This would have continued the competition which had proved so disastrous to the privately owned companies and the results probably would have been just as unhappy for the City.

However, the low bonding power of the City interposed a serious obstacle. The taxable property valuation of Long Beach in 1904 was about \$4,000,000. This valuation would not permit a bonded indebtedness in excess of \$600,000. Outstanding bonds already totaled approximately \$170,000, leaving a maximum bonding power of \$430,000 still available.

Estimates of the cost of installing a municipal water system varied from \$200,000 to \$400,000. The bonding of the City even for the smaller amount was, therefore, a matter for careful consideration, more particularly as the leading bond houses made it clear that they did not care to underwrite a bond issue if the City was to face the competition of the private water companies.

It was then proposed that the City secure a five or ten-year lease, with option to purchase, upon the property and equipment of the Long Beach Water Company. On September 13, 1904, a petition was presented to the City Council requesting that body:

"To take such action as you think best towards the construction of a municipal watering plant for the furnishing to the citizens of the City domestic water at a reasonable rate."

At the same council meeting, the Long Beach Water Company offered to sell its system to the City at a price "much lower than its actual value". Further negotiations resulted in a definite offer to sell its entire holdings, with the exception of the Bouton system, for the sum of \$400,000.

About this time the question of municipal ownership of the water system became involved with other issues. The burning of the city pavilion, the predecessor of the old auditorium at the foot of Pine Avenue, resulted in the calling of an election to vote bonds for an adequate fire protective system. After this issue had been favorably decided at the polls, action on the water question was further delayed pending the calling of an election for the annexation of the Alamitos Beach district.

About June 1, 1905, the Long Beach Water Company submitted a new

offer covering its entire holdings, including the Bouton system. The price was \$650,000. A few days later, the Alamitos Water Company offered to sell its holdings for \$225,000, or to deliver water to a municipal reservoir at a flat rate over a long term of years. Both companies agreed to hold their respective offers open until June 1, 1906.

It is not easy at this date to follow the entire course of these negotiations. Public sentiment seems to have favored the purchase of both companies or neither. The purchase of both involved a larger sum than the City could legally bond itself for. It is probable, therefore, that definite action was deferred from time to time because of this *impasse*, and because of various other issues which came up to distract popular attention.

Among these issues was the question of modernizing the form of the City government. A new Freeholders' Charter was adopted February 5, 1907, effective January 6, 1908, at which time Long Beach became a city of the first class.

Apparently it was not until the new form of government became effective that any definite step was taken to allay the general dissatisfaction with the water service and its cost. In the early Spring of 1908, the City Council passed an ordinance providing for a drastic cut in the water rates, effective July 1 of that year.

The Long Beach Water Company promptly petitioned the Superior Court for an injunction to restrain the City from enforcing the new rates, and again the agitation for municipal ownership flared high. The Water Company won a partial victory when a temporary injunction was granted, but the case was set for early trial on its merits.

In September, 1908, renewed offers to sell were made by the two water companies. The Long Beach Company submitted its properties for \$499,000, and the Alamitos Company asked \$251,000 for its system. An election was finally ordered for December 15, 1908, to determine whether the City should bond itself to purchase either or both of these systems. Following a hectic campaign, municipal ownership was decisively defeated.

The assessed valuation of the City at that time was approximately \$17,000,000, giving a bonding power of approximately \$2,350,000, over and above the \$200,000 in bonds then outstanding. Nevertheless, the defeat of the proposed bond issue seems to have been due to a conviction on the part of the electors that the City was not justified in assuming so large a burden of debt.

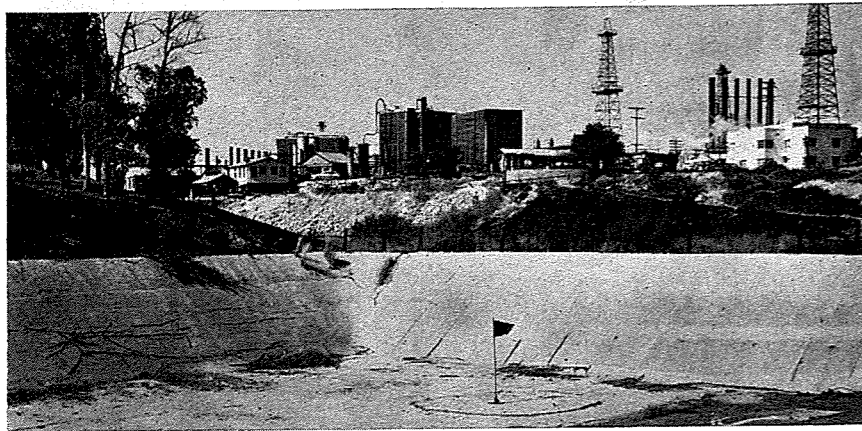
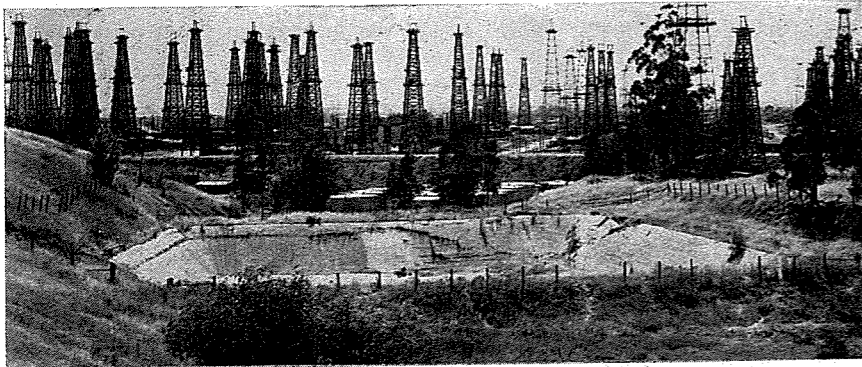
#### *Era of Expansion*

In the meantime, the little City had entered upon an era of expansion. In October, 1905, that portion of Alamitos Beach Townsite lying south of Third Street and extending from a half block east of Orange to a half block east of Paloma was annexed; and in December of the same year, the area between

Anaheim and State streets west of Atlantic Avenue, together with the area between Atlantic and Pacific avenues, State and Hill streets, was also added to the City. That portion of the annexed territory lying west of Oregon Avenue had been laid out at an early date, as the City of Seabright.

August 16, 1906, Terminal Island voted in favor of annexation to Long Beach, by a vote of 73 to 72. But fifteen days later another election gave this territory to San Pedro and subsequently the result of the second ballot was upheld by the courts.

A second small section of Alamitos, centering around Carroll Park, was annexed August 17, 1908. And on November 9 and 22, 1909, two successive elections brought into Long Beach all of Alamitos Beach Townsite lying west

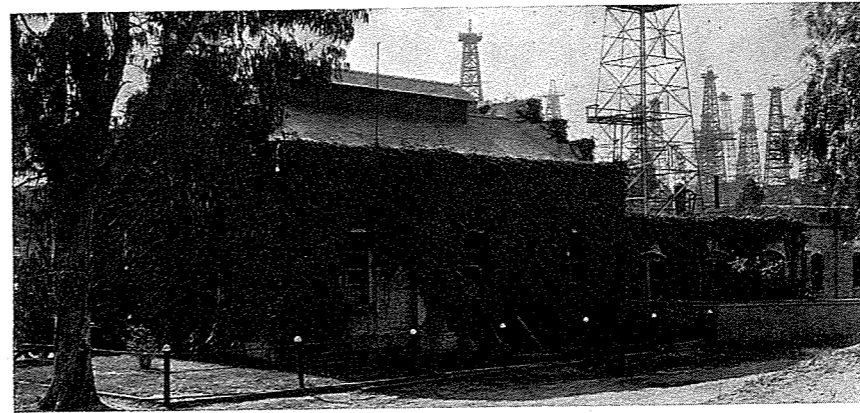


Upper View—ABANDONED "STORAGE" RESERVOIR  
Tanks in background are for oil produced from Water Department land.

Lower View—SITE OF ORIGINAL WATER WELLS THAT SUPPLIED LONG BEACH  
Flag indicates their location in the N.E. corner of "Storage" Reservoir. Gasoline Refinery in background is on Water Department property.

of the line of Nieto Avenue and its southerly continuation, and south of Eleventh Street, together with an additional area lying between Temple and Loma avenues and extending as far north as Pacific Coast Highway, and another lying between Loma and Ximeno and extending north to Anaheim Street.

January 10, 1910, a large area was annexed in the northwest section, extending the northerly boundary of the City to Willow Street as far east as



"ELECTRIC PLANT"  
Built by the Long Beach Water Company

Myrtle Avenue, with some small irregular areas included north of Willow, and a narrow strip excluded on each side of American Avenue almost as far south as Hill Street. The City boundaries as thus established suffered little or no change during the following decade.

During the year 1909, the Long Beach Water Company made extensive improvements in its system, evidently feeling that the defeat of municipal ownership the previous December had effectually disposed of that question.

A pumping plant was erected on the Bouton property for the first time. It consisted of a 10-inch Eclipse centrifugal pump and a 40 H.P. electric motor. The Storage Reservoir, already referred to, was constructed on the site of two of the original wells which supplied Long Beach. It had a capacity of 4,250,000 gallons and remained in service until about sixteen years ago.

A new pumping plant, electrically operated, was also constructed on the west end of Farm Lot No. 59, a short distance east of California Avenue, between 27th and 28th streets. It was sometimes known as the Electric Plant; at other times, as the Anderson Street Plant. It consisted of four motors of 35, 75, 85 and 150 H.P., respectively, and five Eclipse centrifugal pumps varying in size from 5 to 12 inches. No two of these motors or pumps were

of the same size, and the four motors were of three different makes. Standardization had not yet come to the Long Beach system.

The Electric Plant went out of service about the year 1932 and the brick portion of the building was torn down in 1933; then in 1936 the remaining cement portion of the building was removed. The Eclipse pumps, together with most of the other equipment formerly stationed there, were disposed of several years ago.

#### *Municipal Ownership*

The dream of municipal ownership was not dead and in the Spring of 1911, a citizens committee called the "Water Commission" was named to investigate its feasibility, with particular emphasis on the advisability of acquiring one or both of the private water systems or of installing a new municipal system to compete with them. On May 18, the committee recommended the purchase of both privately owned systems, and on June 27, 1911, the citizens of Long Beach voted a bond issue of \$850,000 for the purpose. By previous agreement, the purchase was to become effective July 1. June 30, the City Council passed an emergency ordinance creating the Water Department. The two private companies continued the operation of their respective systems, for the City, until the newly authorized department could be organized.

TABLE "B"  
PRIVATE DISTRIBUTION SYSTEMS—1911

	LONG BEACH WATER COMPANY	ALAMITOS WATER COMPANY	TOTAL
Cast Iron .....	\$ 99,444.00	\$ 31,055.68	\$130,499.68
O. D. Casing.....	17,152.60	30,599.47	47,752.07
Standard Screw Pipe.....	30,453.46	18,471.54	48,925.00
Riveted Steel & Wooden Pipe....	*83,969.70	*168,259.39	*252,229.09
	<u>\$231,019.76</u>	<u>\$248,386.08</u>	<u>\$479,405.84</u>

\*Although appraised at these figures, the citizens committee allowed only \$125,000 for the riveted steel and wooden pipe in both systems.

It is worthy of note that the Water Department began its operations without a cent of working capital, the entire amount of the bond issue being used in payment for the properties. From the very start, the Department was compelled to rely upon its operating revenues not only for its operating expense, but also for the carrying charges upon its bonded indebtedness. As a further handicap, it commenced its operations under a schedule of rates approximately twenty per cent lower than those previously charged by the private companies. Nevertheless, it completed its first fiscal year with a cash balance of nearly \$5,000 after paying all of its operating expenses, putting about \$40,000 of its \$150,000 gross earnings back into the system in the form of replacements, extensions and betterments, and paying interest charges of \$38,250 upon its bonded indebtedness.

It will be observed from Table "A" that the system of the Long Beach Water Company in March, 1904, embraced only 24,700 feet of cast iron pipe out of a total of 512,209 feet of pipe of all sizes and kinds, or less than five per cent.

When the citizens committee rendered its report in May, 1911, it set up valuations of the pipe in the two systems as shown in Table "B".

Cast iron comprised about 27 per cent of the value of all pipe in both systems when the City took them over.

The trend toward cast iron was given further impetus under the newly created municipal Water Department. A report of the first two years of operation by the City discloses the installation of a total of 108,927 feet of pipe during the period, of which 75,158, or 69 per cent, was cast iron.

The report states that two new 12-inch artesian wells were sunk during the year 1912-13, both of which were flowing with 12½ pounds pressure, corresponding to a head of nearly 29 feet above the surface. The wells were Alamitos No. 6, 947 feet deep, and Citizens No. 4, 1156 feet deep. It also shows the installation of "air lift pumping machinery at the Citizens Pumping Station, increasing the delivery of water more than one hundred per cent."

An inventory as of June 1, 1915, lists the pipe in the municipal system as shown in Table "C", but gives no valuations.

TABLE "C"  
PIPE IN MUNICIPAL SYSTEM—1915

KIND	RANGE OF SIZES	NO. OF FEET	% OF SYSTEM
Standard Screw .....	2" to 6"	257,882	27.61
Cast Iron .....	4" to 24"	270,343	28.94
Riveted Steel .....	4" to 24"	280,826	30.07
O. D. Casing.....	4" to 10"	112,857	12.08
Wood Stave .....	24"	12,130	1.30
		<u>934,038</u>	<u>100.00</u>

#### *Floods and Flood Control*

In the Summer of 1914, the assassination of an Austrian archduke, in a Balkan city of which the average American could not even pronounce the name, set the armies of Europe on the march. But Long Beach and her neighboring communities were not thinking of the possibility of a World War. They were much more concerned with the severe damage wrought throughout the County by the heavy floods of the preceding Winter.

The season of 1913-14 was an exceptionally wet one, with rainfall 156 per cent of normal and run-off from the combined watersheds of the Los Angeles and San Gabriel rivers of 536,000 acre feet against a normal of 192,000.

During January and February, 1914, 17.39 inches of rain fell in the City of Los Angeles, with probably more than twice as much along the crest of the

Coast Range. The result was a devastating flood on February 20 and 21, to which both the Los Angeles and San Gabriel rivers contributed. East of Vernon, the Los Angeles River deserted its former bed and carved a new channel fully half a mile from the old. Thousands of acres of rich agricultural lands were destroyed and property damage throughout the county exceeded \$10,000,000, exclusive of damage to the Long Beach-Los Angeles Harbor caused by the influx of about 4,000,000 cubic yards of silt. For two or three days, while the floods were subsiding, Long Beach was practically an island.

For some years previous, there had been considerable agitation for flood control. The 1914 floods, followed in January, 1916, by floods of almost equal severity, served to crystallize public opinion. Early in 1915, the State Legislature created the Los Angeles County Flood Control District, the Governor approving the bill on June 12 of that year.

In 1916, Congress appropriated \$1,080,000 for the diversion of the waters of the Los Angeles River from Los Angeles and Long Beach harbors, with the provision that local authorities provide the necessary right-of-way, defray the cost of roads and bridges and maintain the improvement after construction.

In 1917, a bond issue of \$4,450,000 was voted by the Flood Control District, and the State of California matched the federal grant of 1916 with a like amount.

The newly created Flood Control District undertook to acquire the necessary right-of-way for a channel to confine the waters of the Los Angeles River. The City of Long Beach vacated all conflicting streets and alleys, and on October 21, 1919, the Flood Control District conveyed to the United States Government a continuous right-of-way 720 feet wide extending through the westerly portion of the City from its northerly boundary south to the sea.

Four days later, the Government awarded a contract for dredging a flood control channel with a bottom width of 530 feet.

A comprehensive plan of flood control and water conservation was revised in October, 1941, by the Los Angeles County Flood Control District. As of that time, 21 regulating and debris dams with a total capacity of 156,700 acre feet to their spillway lips had been constructed in the canyons of the San Gabriel mountains or on stream channels leading therefrom, partly by the Flood Control District and partly by the United States War Department, together with 12 debris basins, 93 miles of flood channels, 1803 acres of spreading grounds and one reservoir and pumping plant.

About \$186,380,000 in new work under the comprehensive plan has been authorized by Congress, but only partial appropriations have yet been made. It is scarcely probable that any further federal funds will be expended until after the war. Total expenditures under the comprehensive plan, including work completed and prospective, will exceed \$350,000,000, because the Flood

Control District itself plans many future improvements which are not included in the foregoing estimates.

Expenditures to December 31, 1942, were as follows:

Flood Control District Funds.....	\$ 67,623,000	
State Funds (by Flood Control District).....	5,023,000	
Federal Funds		
By War Department.....	\$86,674,000	
By Department of Agriculture.....	707,000	87,381,000
		<hr/>
		\$160,027,000

The main features completed include the Flood Control District's Tujunga No. 1 and Pacoima dams on tributaries of the Los Angeles River, and San Gabriel dams Nos. 1 and 2 on the San Gabriel River, supplemented by the following dams constructed by the War Department: Sepulveda and Hansen retarding basins on the Los Angeles River and its chief tributary, and the Santa Fe retarding basin on the San Gabriel River. Two additional War Department dams have been approved—the Whittier Narrows retarding basin just above the Whittier Narrows and the Lopez retarding basin below Pacoima and Lopez canyons, discharging into the Los Angeles River.

Practically this entire program not only contributes to the security of Long Beach against flood damage but also serves to conserve the flood waters of the two rivers, and especially the San Gabriel, by "spreading" them upon the gravels both in the bottom of the Santa Fe retarding basin and on developed spreading grounds below the Whittier Narrows, thereby increasing the ground water supply for the Long Beach pumps.

On October 15, 1914, the voters of Long Beach, by a small majority, adopted a City Charter setting up a commission form of government and creating a legislative body of five commissioners. This charter was filed with the Secretary of State on February 15, 1915. Shortly thereafter, the Board of Commissioners assumed office and thereupon the Water Department passed under the management of the Commissioner of Public Property.

A 24-inch cast iron transmission main from the Alamitos Pumping Plant to the Alamitos Reservoir was completed and put into service in July, 1915; and on August 15, of the same year, water was turned into a newly completed 16-inch cast iron main on Obispo Avenue, from 10th Street to Anaheim. The monthly report for August states that "This completes the last portion of the construction necessary to bring Alamitos water downtown." It also notes a resulting increase of pressure in the downtown area from a minimum of 12 and a maximum of 35 pounds to a minimum of 35 and a maximum of 70 pounds, "giving an increased service in this district, especially to the taller buildings."

The October report for 1915 records 244 irrigation services in the system;

and the November report refers to an agreement being worked out with the San Pedro, Los Angeles and Salt Lake Railroad, now a portion of the Union Pacific system, for a crossing near a new store room and yards at California Avenue and Prospect, now Patterson, Street. This refers to the site of the Electric Pumping Plant.

Another monthly report records that on February 25, 1916, "the low reservoir at Alamitos was abandoned and the territory formerly under that reservoir is now being served from the Development Reservoir No. 1, with an increased pressure of 15 pounds over the entire district." The "low reservoir" at Alamitos was the reservoir that formerly stood on the present site of Community Hospital.

Extracts from a report dated December 31, 1916, covering the first five and one-half years of operation of the Water Department, are shown in Table "D".

TABLE "D"

## WATER DEPARTMENT REPORT AS OF DECEMBER 31, 1916

Receipts	
Accrued interest, sale of bonds.....	\$ 9,923.75
Plant revenues .....	983,634.47
<b>Disbursements</b>	
Interest prior to sale of bonds.....	\$ 12,041.50
Bond interest .....	212,358.28
Bond retirement .....	10,000.00
Operating and maintenance expense.....	306,966.71
Taxes .....	5,803.30
Permanent improvements .....	337,763.13
Salaries and Wages, July 31 to December 31, 1916.....	26,471.23
Stores Account .....	48,267.39
	<hr/>
	\$961,671.54
Cash on hand, January 1, 1917.....	31,886.68
	<hr/>
	\$993,558.22
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	\$993,558.22

Pipe Laid First 5½ Years	FEET	MILES
Cast Iron, 4" to 24".....	288,989	54.732
O. D. Casing, 4" to 10".....	7,723	1.463
Standard Screw, 2" to 6".....	86,038	16.295
Steel Riveted, 8" to 18".....	13,213	2.502
	<hr/>	<hr/>
Total laid .....	395,963	74.992
Additional cast iron pipe on hand, not laid.....	37,961	7.189

Miscellaneous Installations	JULY 1, 1911	DEC. 31, 1916
Services .....	4,500	9,638
Meters in service .....	450	6,768
Fire Hydrants .....	93	571
Services renewed .....		3,000

In 1919, a small brick building was erected at the Alamitos Pumping Plant and additional electrically operated pumps were installed therein, supplementing the original steam plant erected in 1901.

In 1920, two new wells were completed and put on production. These were Alamitos Well No. 7 and Development Well No. 3, the latter on the site occupied by today's Municipal Airport.

*San Gabriel River Litigation*

In the same year, 1920, the City of Pasadena began a quiet investigation of the possibility of securing an additional water supply from the San Gabriel River; and about the same time, the San Gabriel Valley Protective Association was organized "to prevent the obstruction or improper use or diversion of the flow of said San Gabriel River . . ." and "to protect the rights of its members in all matters pertaining to the flow of said San Gabriel River . . ."

In March, 1923, Pasadena purchased all outstanding filings on the San Gabriel River and filed other applications of its own in that year and again in 1925, to appropriate flood waters of the stream. This action was taken on the theory that such waters, when salvaged, did not necessarily belong to the San Gabriel Valley but were "new" waters, subject to appropriation by the first comer. Pasadena proposed to build a dam just below Pine Canyon with which to salvage flood waters which, if not intercepted, would waste into the sea.

News of the Pasadena applications precipitated a flood of protests and a flood of other filings by municipalities and water users all the way from the foothills to the ocean. The City of Long Beach joined the stampede on May 15, 1925, by filing an application to appropriate 155 cubic feet per second for municipal use. Long Beach proposed to build a dam at the Granite Dike site, somewhat below Pasadena's Pine Canyon site.

With the filing of this application, Long Beach found itself in the ambiguous position of denying, insofar as Pasadena's application was concerned, that there were any unappropriated San Gabriel waters and, in the next breath, of endeavoring to appropriate for itself 112,000 acre feet of such waters annually.

On July 5, 1928, after four years of investigation of conditions on the San Gabriel River, the Division of Water Rights of the Department of Public Works, State of California, issued its 117-page *Opinion and Order* which sustained practically all of Pasadena's contentions and granted that City four permits to store and divert flood waters from San Gabriel Canyon.

These permits allowed Pasadena to construct a dam in the canyon about four miles above Azusa to store not to exceed 65,000 acre feet of water and to divert to Pasadena through a conduit not exceeding 80 second feet capacity. They further limited diversions to Pasadena to not more than 40,000 acre



feet in any one year and to not more than 150,000 acre feet in any five-year period.

On May 1, 1929, the Secretary of the Interior granted Pasadena the right to flood lands of the United States embraced in its reservoir site. And on June 18, 1929, the Pasadena electorate authorized a bond issue of \$10,000,000 to finance the construction of a dam and appurtenant works, including a conduit from the dam to the City.

In the meantime, the San Gabriel Valley Protective Association had engaged a staff of attorneys and engineers and was preparing to oppose Pasadena's efforts to divert the San Gabriel flood waters. Long Beach joined its fortunes to those of the Association. Finally, when Pasadena moved construction machinery upon the Pine Canyon site, the Association, on March 21, 1932, filed suit in the Superior Court of the State of California, seeking to enjoin the City from constructing the dam or diverting any of the San Gabriel River flow.

In April, 1932, negotiations were opened between Pasadena and the Association for a compromise settlement. Pasadena was committed to two very expensive water projects: its San Gabriel project, and membership in the Metropolitan Water District. For some time, it had been seeking an agreement whereby the Pine Canyon Dam would be purchased by the District for terminal storage as soon as Colorado River water was made available to the City, thus permitting the latter to recover the bulk of its San Gabriel expenditures. Such an agreement was finally executed on November 23, 1932.

On June 27, 1934, Pasadena executed a compromise agreement with the San Gabriel Valley Protective Association and its members. The Board of Water Commissioners had signed this agreement on behalf of the City of Long Beach on March 22, 1934.

By the terms of this compromise, the plaintiffs agreed that the City of Pasadena might proceed with the construction of its Pine Canyon Dam and diversion of flood waters in accordance with the permits issued by the Division of Water Rights; and Pasadena agreed that as soon as Colorado River water was made available to it and when the Metropolitan Water District should have purchased the Pine Canyon Reservoir, the City would abandon all right which it asserted to waters of the San Gabriel River by reason of its State permits and certain other applications then pending but subsequently dismissed.

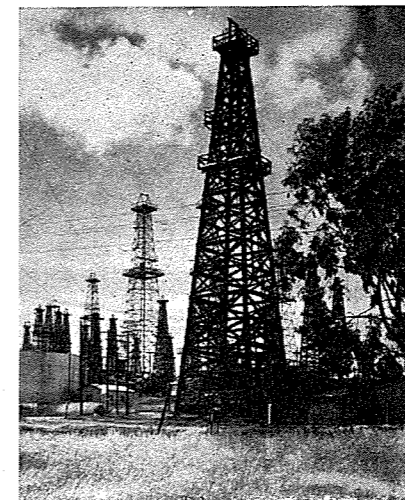
On September 18, 1937, the San Gabriel Valley Protective Association, acting on behalf of its members and other Valley and Coastal Plain water users, filed with the Division of Water Resources two concurrent and overlapping applications to appropriate the flood waters of the San Gabriel River. Each application was for 200,000 acre feet per annum, one being for irrigation and domestic use and the other for municipal use. All adverse San

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### ALAMITOS NO. 1

#### Shell Oil Company's Discovery Well

The first producing oil well in the Long Beach field, brought in June 23, 1921. Located at Hill Street and Temple Avenue, across the street from Water Department property.



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Gabriel filings had been dismissed, and only the Pasadena permits had priority over the Association's applications.

The Metropolitan Water District began the distribution of Colorado River water on August 1, 1941, and shortly thereafter took over Pasadena's dam, the name of which had been changed in the meantime from "Pine Canyon" to "Morris," in honor of Samuel B. Morris, under whose management it had been planned and constructed. All the terms of the compromise agreement between the City and the Association had now been complied with. Accordingly, on November 4, 1941, Pasadena filed a formal abandonment of its San Gabriel water rights with the Division of Water Resources, and the suit filed by the Association and its members nearly ten years before was dismissed. There are now no filings on the flood waters of the San Gabriel River other than those of the San Gabriel Valley Protective Association. Long Beach still maintains its membership in the Association.

#### *Oil Development*

Long Beach was electrified when, on June 23, 1921, the Shell Oil Company brought in its discovery well on Signal Hill at Temple Avenue and Hill Street. The oil boom that followed was nothing short of fantastic. It is doubtful if town lot drilling has been carried to such an extreme anywhere else in the world.

The Water Department found itself in possession of two acres (the Temple-Hill Reservoir site) just across the street from the Shell discovery well; the 26-acre Alamos Reservoir site about one-half mile southeasterly therefrom; and a much larger acreage north of 27th Street and west of Orange Avenue, about one and one-half miles northwesterly from the discovery well, much of which lay squarely across the axis of the new field.

The Division of Oil and Gas, Department of Natural Resources, State of California, reports that on June 30, 1922, 53 weeks after the bringing in of the discovery well, there were 40 producing wells in the Long Beach field, that six months later this number had increased to 144, and by June 30, 1923, had reached 183; and that the maximum number of producing wells at any one time was reached in August, 1938, during which month there were approximately 1260. Furthermore, the average daily production during June, 1922, was about 43,000 barrels; and the peak production of the field was reached in January, 1924, when it yielded an average of 245,000 barrels per day.

The following oil leases were granted on Water Department lands:

Temple-Hill site to W. R. Ramsey (Lease "A").

Alamitos Reservoir site to W. R. Ramsey (Lease "B").

Development acreage north of Sunnyside Cemetery to Jergins Trust.

The first oil wells on these leases were brought in on the following dates:

Well A-1 (No. 1 well on "A" lease), November 24, 1921.

Jergins No. 1, July 27, 1922.

Well B-1 (No. 1 well on "B" lease), April 14, 1923.

Although the total income from oil royalties derived from Water Department lands to June 30, 1944, has amounted to \$12,568,601.24 as shown in Table "E", the Water Department has had the use of only about one and one-third million dollars from this source. All the rest of it has gone into the City General Fund and has been used for a multiplicity of purposes. In addition to the above, the Gas Department has received from these lands free gas valued at \$446,609.65.

The sudden expansion of the City, caused by the rapid development of the Long Beach oil field, created a critical situation for the Water Department that called for a corresponding enlargement of the water system. The Water Department, in order to meet the situation, had to initiate a bond issue of \$2,378,000 in the Spring of 1927, at a time when royalties from Water Department lands were averaging about \$100,000 per month, and when a total of more than \$5,000,000 of such royalties had already been paid to the City. The Water Department is still paying interest, out of its earnings, at rates varying from four to five per cent, on \$1,280,000 of the 1927 bond issue, in addition to \$440,000 of previous issues still outstanding. It is worth a passing thought that had the oil royalties been conserved for the upbuilding of the Water Department, they would have retired its entire bonded debt antedating 1927, eliminated the need of the 1927 bond issue, and paid about sixty per cent of Long Beach's share of the capital cost of the Metropolitan Water District down to June 30, 1944.

TABLE "E"

## INCOME FROM OIL, GASOLINE AND OTHER PETROLEUM PRODUCTS

FISCAL YEAR	JERGIN'S LEASE	RAMSEY		TOTAL	TOTAL TO DATE
		RIO GRANDE	RICHFIELD LEASE		
1921-22	\$	\$ 21,167.85		\$ 21,167.85	\$ 21,167.85
22-23	425,715.95	45,410.88		471,126.83	492,294.68
23-24	1,019,411.35	206,986.92		1,226,398.27	1,718,692.95
24-25	1,082,216.40	346,895.41		1,429,111.81	3,147,804.76
25-26	1,016,514.45	190,807.68		1,207,322.13	4,355,126.89
26-27	917,371.25	193,462.00		1,110,833.25	5,465,960.14
27-28	773,569.57	155,949.21		929,518.78	6,395,478.92
28-29	1,099,297.38	367,443.09		1,466,740.47	7,862,219.39
29-30	788,113.48	171,460.00		959,573.48	8,821,792.87
1930-31	415,682.67	97,121.27		512,803.94	9,334,596.81
31-32	238,866.86	61,369.79		300,236.65	9,634,833.46
32-33	255,540.42	84,954.39		340,494.81	9,975,328.27
33-34	220,871.32	76,892.01		297,763.33	10,273,091.60
34-35	195,342.84	76,044.21		271,387.05	10,544,478.65
35-36	173,045.87	116,649.71		289,695.58	10,834,174.23
36-37	179,523.79	119,286.98		298,810.77	11,132,985.00
37-38	172,383.96	104,260.08		276,644.04	11,409,629.04
38-39	142,098.04	84,503.39		226,601.43	11,636,230.47
39-40	113,241.93	61,126.50		174,368.43	11,810,598.90
1940-41	121,136.69	67,329.57		188,466.26	11,999,065.16
41-42	134,360.42	68,915.36		203,275.78	12,202,340.94
42-43	119,281.18	75,960.71		195,241.89	12,397,582.83
43-44	103,261.86	67,756.55		171,018.41	12,568,601.24
TOTAL INCOME		\$9,706,847.68	\$2,861,753.56	\$12,568,601.24	
Value of Dry Gas received by Gas Department				446,609.65	
TOTAL VALUE OF ROYALTIES				\$13,015,210.89	

*Another Era of Expansion*

A collecting reservoir of 600,000 gallons capacity was erected at the Citizens Plant in 1922. And the September report of that year refers to the removal of 24-inch wood stave pipe from Cherry Avenue north of the Union Pacific crossing, presumably the last of the Bouton wood stave transmission main.

Water consumption at this time is indicated by the report for July, 1922, which records a production of 317,000,000 gallons, or slightly more than 10,000,000 gallons daily, of which 400,000 gallons passed through a small booster plant known as the Signal Hill Plant, and was pumped partly into the Temple-Hill Reservoir and partly into the Denni Tank on the crest of the hill, for use in the oil field, particularly in areas too high to be served by the Alamitos Reservoir. About half of the total production came from the Alamitos Plant and the other half was almost equally divided between the Citizens Plant on the one hand, and the combined Bouton, Development and Electric plants on the other.

As a temporary step in the water crisis forced upon it, the Water Department leased the Burgess Well, located north of the prolongation of 32nd Street, nearly half way between Orange and Walnut avenues, and began pumping from it into the distribution system in June, 1923, at the rate of about 1,000,000 gallons daily. This well remained in service until December 18, 1925.

An interesting sidelight on Long Beach at this period is given in the City Auditor's statement in the report for the year ending June 30, 1923, that the City had \$5,000,000 worth of "Own Your Own Apartment" buildings, or "Homes in the Air."

During 1923 and 1924, nine new wells were completed for the Water Department. They were Development Wells Nos. 4 and 5, Citizens Wells Nos. 5, 6 and 7, and Alamitos Wells Nos. 8, 9, 11 and 12. The first two are included in the Airport property. During the improvement of the landing field in 1940, the equipment was removed from Development Well No. 5. An underground chamber was constructed and paved over as part of a Works Progress Administration project, in anticipation of the reinstallation of the machinery. But no provision was made by the W.P.A. for a tunnel to provide access to it. Consequently, the well, one of the best in the Long Beach system, remains out of service, pending the end of the war, at least.

June 6, 1923, saw the completion of a 30-inch cast iron transmission main 5793 feet long, extending from the new Citizens Pumping Plant on the east side of Newport Avenue, south of Spring Street, to the Alamitos Reservoir, at a cost of \$67,449.32. And during 1923 and 1924, 14,420 feet of 30-inch cast iron distribution main was laid on State Street (now Pacific Coast Highway) from the Alamitos Reservoir to Pacific Avenue. Its cost was \$299,465.45.

A special election known as the "Greater Long Beach Annexation" election was held December 28, 1923. It had for its purpose the annexation of the larger part of the area now known as North Long Beach, together with two protective "shoestring" strips 100 feet wide, enclosing approximately 33 square miles of undeveloped ranch land lying both east and west of the main area to be annexed.

The validity of the annexation proceedings was attacked by interests affected by the inclusion of the westerly "shoestring" strip. After the litigation had reached the Supreme Court, the City of Long Beach at a special election voted the dissolution of the "shoestring", whereupon the suit was dismissed.

One of the conditions precedent to its dismissal was that the Water Department should have drilled and equipped a well on its South Gardena Tract, and installed a 6-inch water main along Harbor Boulevard (Main Street) from Wilmington Street to a point about 2520 feet south, with fire hydrants

every 300 feet and outlets for each residence fronting on the main. The required well had already been drilled in 1925, a pump was installed in April, 1928, and the water main was completed the following May 17. Service in this line was discontinued in May, 1935.



**CITIZENS PUMPING PLANT**

With the dismissal of the annexation suit as agreed, the annexation of North Long Beach, proper, and of the easterly "shoestring" strip stood unchallenged. In 1924, the Water Department had contracted for a well in Harding Park, and had acquired a small well in Vetter Park. These are now known as North Long Beach Wells Nos. 1 and 2, respectively. They are located on Poppy Street, east of Orange Avenue, and on Neece Street, east of Long Beach Boulevard.

Pending the outcome of the annexation litigation, the Water Department provided fire protection for the growing business section of North Long Beach by laying 5735 feet of 6-inch standard screw pipe in 1925 and connecting it to a leased well. And in 1927 and 1928, it laid more than 32,000 feet of 12-inch cast iron pipe on Long Beach Boulevard, ahead of a paving program, thereby connecting the water systems of the two sections of the City.

The "Greater Long Beach Annexation" proceedings had contemplated the inclusion of the major part of the area now embraced in the City of Signal Hill. But the oil interests of that section had no desire to pay city taxes, and, finding a defect in the proceedings, promptly took advantage of it and had the election called off as to that area. The story of subsequent events is most interesting but it is too long to be told here.

It must suffice to say that while Long Beach was circulating new annexation petitions and setting another date for the election, Signal Hill interests

were petitioning the County Supervisors for the creation of a sixth class city, with the result that the City of Signal Hill was incorporated on April 4, 1924, and Long Beach lost a very rich area of 2.14 square miles, which is now entirely surrounded by the City of Long Beach.

Three parcels of water-bearing land were purchased in 1925, constituting the first such acquisitions since the City acquired the privately owned water systems in 1911. They were:

Wise Ranch, 20 acres, cost.....	\$20,000
Wilson Ranch, 8.6 acres, cost.....	\$ 8,600
Texas Ranch, otherwise known as South Gardena Ranch 5 acres, cost.....	\$21,000

These prices are exclusive of incidentals such as escrow fees, title insurance, *et cetera*.

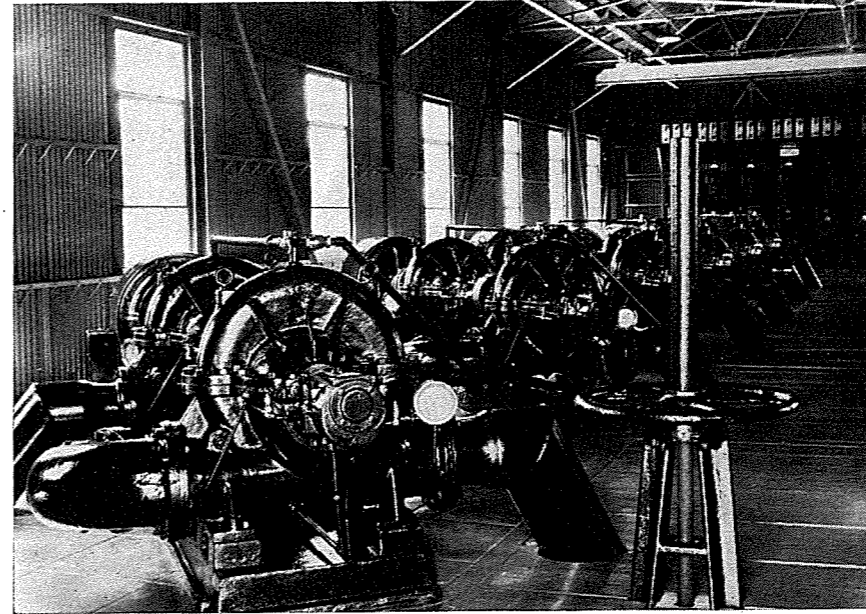
A special report to the Mayor and City Council, dated September 28, 1925, disclosed the following situation:

There were twelve wells in the Alamitos group, of which Nos. 3 and 4 had been abandoned, while No. 10 was never developed because of its disappointing "log", although drilled to a depth of 1290 feet. Nos. 1, 2, 5, 6 and 7 were pumped by air lift, while the newer wells, Nos. 8, 9, 11 and 12, were equipped with direct connected deep well turbines.

There were two pumping plants at the Alamitos property. One was the original steam plant built in 1901, equipped with a horizontal triple expansion duplex pump with a capacity of approximately 2,500,000 gallons per day, a horizontal three-stage centrifugal pump driven by a Corliss engine, with a capacity of 3,000,000 gallons per day, and a steam duplex air compressor acquired about 1913 for operating the air lift wells. This equipment was declared to be obsolete.

The second pumping plant, built in 1919, was housed in a small brick building and was electrically driven. It was equipped with three horizontal single-stage centrifugal pumps, which are still in operation.

There were seven wells in the Citizens group and all of them were in service. The four oldest were pumped by air lift; the three newest were equipped with direct connected deep well turbines. The Citizens Pumping Plant comprised six pumping units, each consisting of two single-stage 10-inch type "S" Byron Jackson centrifugal pumps mounted in series and driven by a direct connected 150 H.P. electric motor. It also contained two belt driven 14" x 16" duplex air compressors for pumping the air lift wells. The building was brick. Except for the replacement of the original structure in 1933 by a steel frame and steel covered building, this is the Citizens Plant of today. In 1925, part of the pumpage from the Citizens Plant could be delivered into the original Citizens Reservoir at Temple and Hill, for use on the high ground in the City of Signal Hill.



**CENTRIFUGAL PUMPS AT THE CITIZENS PLANT**

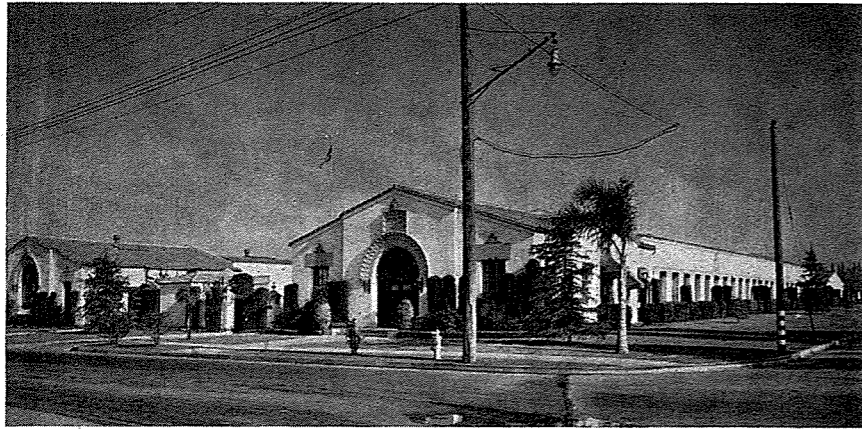
The Development group consisted of five wells, one of which had been abandoned. The other four were all equipped with direct connected deep well turbines, and were so connected that the product of two of them might be delivered into the Storage Reservoir in the *cienea* north of 28th Street and west of Orange Avenue; or the production of all four might be delivered into the Citizens Collecting Reservoir.

The Storage Reservoir served as a collecting reservoir for the Electric Plant, a short distance to the southwest. This plant has been described on a previous page. It pumped into Development No. 1 Reservoir, already described, which served the "low gravity" area lying west of California Avenue and north of Anaheim Street, to and including Willowville.

The Alamitos Reservoir then consisted of three compartments of brick and concrete, with an elevation of 206 feet above sea level and a capacity of 3,850,000 gallons. The total gravity reservoir capacity for both the high and low gravity systems was 5,130,000 gallons, or about six and one-quarter hours' supply based on the maximum draft experienced during the preceding Summer—19,118,500 gallons per day.

This 1925 report, after labeling the City's reservoir as "grossly inadequate," stated that plans had been prepared for a reservoir of 50,000,000 gallons capacity, but that they "were ordered to be altered and reduced in size to approximately 30,000,000 gallons to accommodate oil development under the Ramsey lease."

Development Well No. 1 collapsed and was abandoned in November, 1927; and in May and July, 1928, two new Development wells were drilled. No. 6 is located at the Water Department's Service Plant, 1612 East Wardlow Road, between the two westernmost gates. No. 7 lies on the south side of Wardlow Road, about 200 feet west of Cherry Avenue. It went into service August 22, 1928.



#### SERVICE PLANT

##### Headquarters of the Construction and Maintenance Division

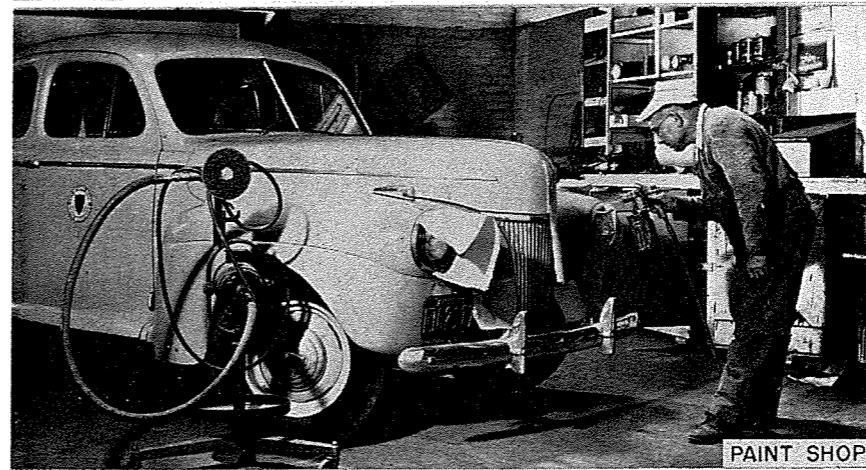
In the meantime, the City of Signal Hill had developed an ambition to go into the water business. For some time it had been negotiating for the purchase of that part of the Long Beach system which lay within its boundaries. This sale was consummated in the Fall of 1929, and the Long Beach Water Department read its Signal Hill meters for the last time in October. About 940 metered services were transferred, in addition to most of the distribution mains installed in the Signal Hill streets. Long Beach's Signal Hill booster pumps were closed down at 1:20 P. M. on November 1.

During the latter part of 1929 and the early part of 1930, a modern Service Plant was erected on the westerly 13 acres of Farm Lot 7, lying on the south side of Wardlow Road between Walnut and Cherry avenues. This plant was dedicated with appropriate ceremonies on July 5, 1930.

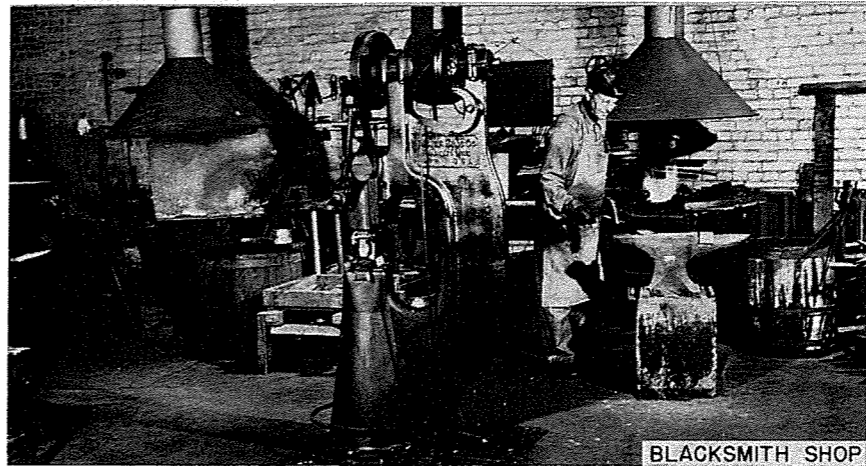
Many people thought the new plant was "way out in the country." But study of a City map will show that in a few more years it will be centrally located. It was designed to fit the surroundings, a growing area of homes. Wide and well-kept lawns with rows of ornamental shrubbery add beauty to the neighborhood. The plant includes storage for pipe, fittings and miscellaneous supplies, besides serving as headquarters for the Construction and Maintenance Division. It also includes the Department's shops, a number of which are shown on the next two pages.



METER SHOP



PAINT SHOP



BLACKSMITH SHOP

SHOPS LOCATED AT THE SERVICE PLANT

*Origin of the Water Commission*

At the time the report of September 28, 1925, was written, water levels in the Long Beach pumping area had begun a precipitous decline. During the five year period 1924-1929, water levels at the Alamitos, Citizens and Development wells dropped 53 feet, or at the average rate of 10.6 feet per year. To make matters worse, 31.3 feet of the drop occurred during the last two years of the period. The Long Beach pumps appeared to be pulling the bottom out of the basin.

The Chamber of Commerce became interested and appointed a Water Rights Committee which, in turn, named a subcommittee to prepare a report of findings and recommendations. Aided by Water Department engineers, the subcommittee made a thorough study of the situation and on January 29, 1930, submitted a 15,000-word report to the main committee and through it to the Board of Directors of the Chamber of Commerce.

In its letter of transmittal, the subcommittee made the following recommendations, in addition to those contained in the report itself:

"First: That steps be taken to hold a bond election in harmony with the report herewith submitted at the earliest opportunity. . . .

"Second: No recommendation has been made in the report relative to entrance in the Metropolitan Water District. . . . The Committee hopes the program presented will care for our needs until outside waters are available and it recommends that the Committee . . . be authorized to continue its study and investigation of the Metropolitan Water District and the Boulder Dam . . . or that another committee be appointed to undertake this work.

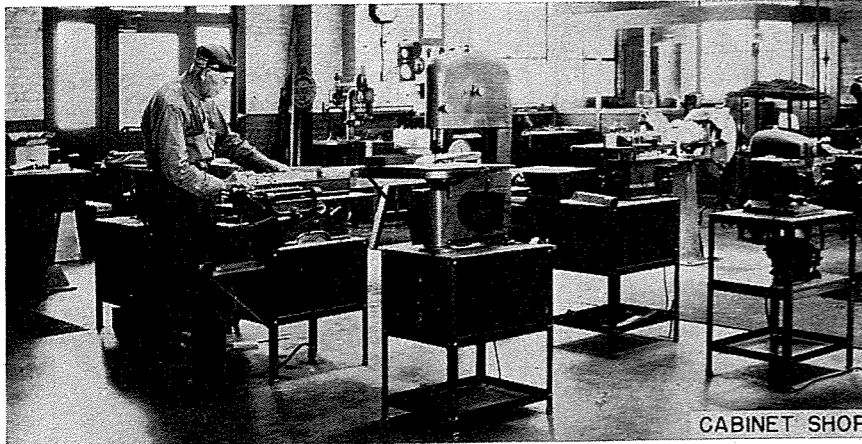
"Third: While the matter of administration of water affairs was not referred to the Committee, the need of a Water Board or similar organization to constantly study, investigate and administer the affairs of the Department is most apparent. . . . The Committee therefore most heartily makes such a recommendation. In making the suggestion the Committee disclaims any criticism whatever of the present Department or the efficient men in charge. . . ."

The Committee signing this letter of transmittal consisted of James K. Reid, R. O. Baldwin, Secretary, J. H. Chamness and Frank F. Merriam, Chairman.

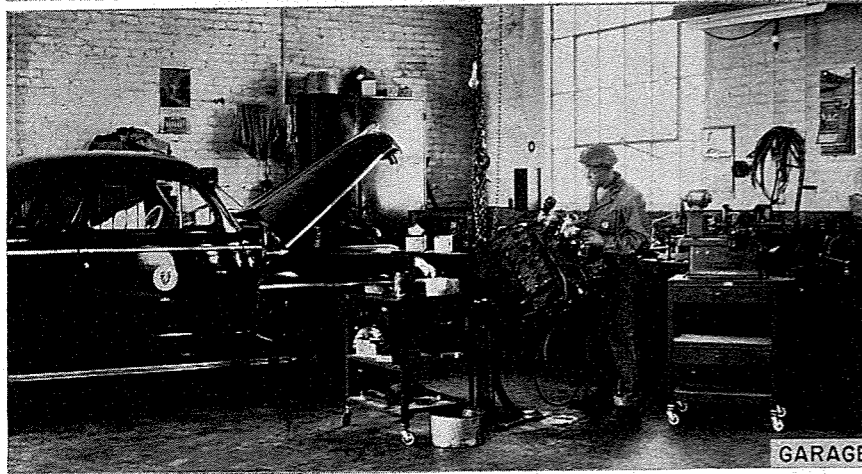
The main report recommended a bond issue of \$4,460,000, to be used for the purchase of water-bearing lands and water rights in five different areas or zones. The most important acquisitions recommended were:

"(A) A continuous strip of land extending easterly from the Alamitos Pumping Plant for a distance of six miles, more or less, across the coastal plain.

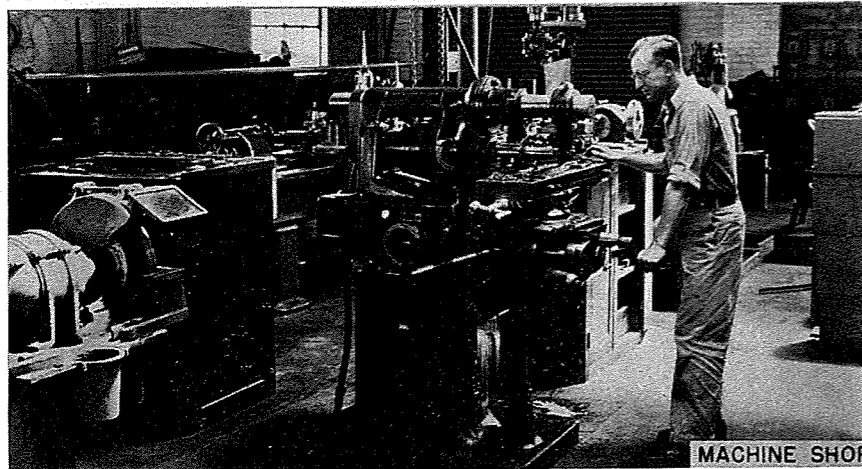
"(B) Such water-bearing lands and/or water rights in the Whittier Narrows or that immediate vicinity as will enable us to



CABINET SHOP



GARAGE



MACHINE SHOP

SHOPS LOCATED AT THE SERVICE PLANT

cross section the entire width of the Narrows as completely as possible with a line of wells."

A special election was called for May 13, 1930, and a particularly bitter and acrimonious campaign ensued, which ended in the defeat of the proposed bond issue by a vote of 15,890 to 13,370.

Two days after the election, City Manager G. L. Buck appointed a Citizens Water Committee "to make a study of local water conditions and to report their findings and recommendations." The Committee consisted of Chas. H. Bean, H. S. Beckman, C. A. Buffum, J. Mortimer Clark, Judge Ralph H. Clock, P. E. Hatch, Col. Chas. L. Heartwell, W. J. Kellegher, Dan McDavid, Hugh V. Ketcherside and C. J. Walker. It submitted its first report under date of June 24, 1930.

The entire report deserves repetition, but only its highlights can be given here:

"We find that the situation with reference to available water is much more critical than we had supposed, and we have no doubt but that it is more serious than the public generally has any idea; and we firmly believe that it is the duty of this Committee, as well as the city officials, to speak frankly on the subject, and to apprise the public generally of the situation, not for the purpose of alarming anyone, but for the purpose of enabling our people to act intelligently on the matter, and in order that property values, as well as industry and homes, may be protected. . . .

"We believe that the greatest fault with the present production of water is that it is entirely too centralized. It is the desire of this Committee, . . . to recommend . . . the acquisition of such additional water bearing lands so located as to spread the pumpage over a large area, . . . and . . . remove the hazard which we are now facing of a shortage of water, before any arrangement can be made for a more extensive or more permanent supply.

"We are unanimous in the opinion that the City of Long Beach is destined to be a large city, and that the problem of a permanent water supply for a large city in this location, under existing conditions of receding water levels and unreliable meteorological conditions, can only be dealt with by a Water Commission that is provided by charter and whose tenure of office can be assured for a sufficiently long period of time to enable it to adopt policies which are impossible with the present management of water affairs, and which would be authorized and empowered by charter provisions to make plans . . . , looking to the future of the City. . . .

"We, therefore, recommend that the City acquire either a strip of land running easterly from the present water lands a distance of three and one-half or four miles, thereby intercepting the percolating waters that come down from the head waters of the San Gabriel at a point sufficiently distant from tide water to minimize the possibility

of invasion of sea water. Such a strip need not necessarily be a wide expanse of land, provided it gives us access to the water in several thousand acres of land without interference, . . . and should be located within a distance of one mile either north or south of Spring Street;

"Or in lieu of said strip of land, the acquisition of pumping sites . . . situated reasonably close together, so that the same results may be attained."

Thus, within a space of seven months, two citizens' committees, appointed under materially different conditions but both constituting representative groups of civic minded business men, studied the water situation and arrived at substantially similar conclusions.

Both groups concentrated on the immediate problem of providing additional local water to tide the City over until larger supplies could be imported from an outside source; both groups recommended the acquisition of a strip of land or a series of well sites extending several miles easterly across the coastal plain; and both groups recognized the complexity of the Water Department's problems and recommended that it be placed under the control of an independent water commission, with the double motive of providing continuity of policy and long range planning and of removing it from political influence so far as possible.

It should be noted that the entire City Council then, as now, was subject to election every three years. The recall, intended to safeguard the people against inefficient public servants, had become a vicious racket. There was no stability to city government. Under the City Charter, the City Manager was the head of the Water Department, yet the average term of office of city managers between July 1, 1921, and July 1, 1930, was 21 months.

The suggestion of a water commission fell on fertile soil, and a charter amendment to accomplish the purpose was presented to the voters, along with many other proposals, at a special election held on February 17, 1931. The amendment provided for a Board of Water Commissioners consisting of five members to be appointed by the City Manager subject to approval of the City Council. The term of office was fixed at five years, one term expiring each year.

The amendment held promise of an efficiently operating board and a continuity of policy that was utterly impossible under city manager control. It was adopted by a vote of 6736 to 3004, and on March 13, 1931, City Manager C. C. Lewis named C. L. Heartwell, R. M. Dickinson, John Schinner, H. F. Ahlswede and J. W. V. Steele as the first Board of Water Commissioners.

*Long Beach Harbor*

At this same election, another charter amendment was adopted under quite similar circumstances, creating a Harbor Department and vesting exclusive control and management of it in a Board of Harbor Commissioners.

Given a sufficient fresh water supply, the most valuable and permanent asset of the City is unquestionably its harbor; and the greater its harbor becomes and the more shipping, industries and population it attracts, the greater are the demands upon the Water Department.

Unfortunately, not much can be said about the Long Beach Harbor in these pages. The Water Department has been requested by the Army and Navy authorities, for reasons connected with the national security, to omit any detailed maps and photographs of the harbor, and for the same reasons, descriptive matter that might benefit the enemy will also be omitted.

Suffice it to say that the development of the harbor began January 1, 1906; that about \$1,500,000 of private money was expended for that purpose, followed by the expenditure by the City of somewhat in excess of \$8,000,000 of bond revenue and about \$6,000,000 of oil revenue; and that, in the meantime, the Federal Government has expended between \$20,000,000 and \$25,000,000 in building breakwaters in the combined area of the Los Angeles and Long Beach harbors, with another \$6,000,000 of such construction in the Long Beach area uncompleted and deferred until the end of the war. These expenditures do not include the cost of federal structures erected within the harbor confines.

In 1937, oil was discovered in the harbor area and a large number of producing wells have been drilled on land controlled by the Harbor Department, with revenues running up to \$3,300,000 for the year 1943. Unlike the Water Department, the Harbor Department has been able to retain much of the revenue from its tidelands. At the present time, one-half of its revenue from that source is set aside in a sinking fund designed to retire practically all City bonds except those of the Water and Gas departments. The remaining one-half is devoted to the financing of harbor improvements and a comprehensive plan for a long-range program, amounting to nearly \$60,000,000, has been adopted and is in progress.

*Purchase of Carson Street Strip*

About the time the Water and Harbor commissions were being created, two other developments of the greatest importance were shaping up. Early in September, 1930, City Manager C. C. Lewis opened negotiations with the Montana Land Company for the purchase of a strip of land across the Montana Ranch, a strip conforming to the recommendations of both water committees. The Montana Ranch, comprising 8139 acres of the Rancho Los Cerritos, had been acquired in 1897 by Wm. A. Clark, the Montana copper king, for \$405,000, and had been held reasonably intact until this time.

The negotiations reached a successful conclusion when, on February 3, 1931, the City Council adopted Resolution C-4888 authorizing the purchase of a strip 660 feet wide, lying along the south side of Carson Street and extending from Lakewood Boulevard to the San Gabriel River Flood Control Channel, with another half-mile lying on the east side of the channel and increasing to a width of nearly half a mile at its easterly end at Pioneer Boulevard. Its area was 355.616 acres, its length about  $3\frac{5}{8}$  miles and its cost \$711,232. It was paid for out of the proceeds of an \$800,000 block of the bond issue of 1927, which was sold April 14, 1931. Because of its shape, it is frequently called the "Shotgun Strip."

The use of that portion of the strip lying west of the San Gabriel River, which is now known as Heartwell Park, is restricted to the production of water and to park and playground purposes. There are no restrictions on that portion east of the river. A collateral agreement between the City and the Montana Land Company provides that the City's use of water from the entire strip shall be without restraint by the Company and its assigns, and that the Company and its assigns shall not export water from the several thousand acres comprising the remainder of the Montana Ranch as of that date.

*Metropolitan Water District*

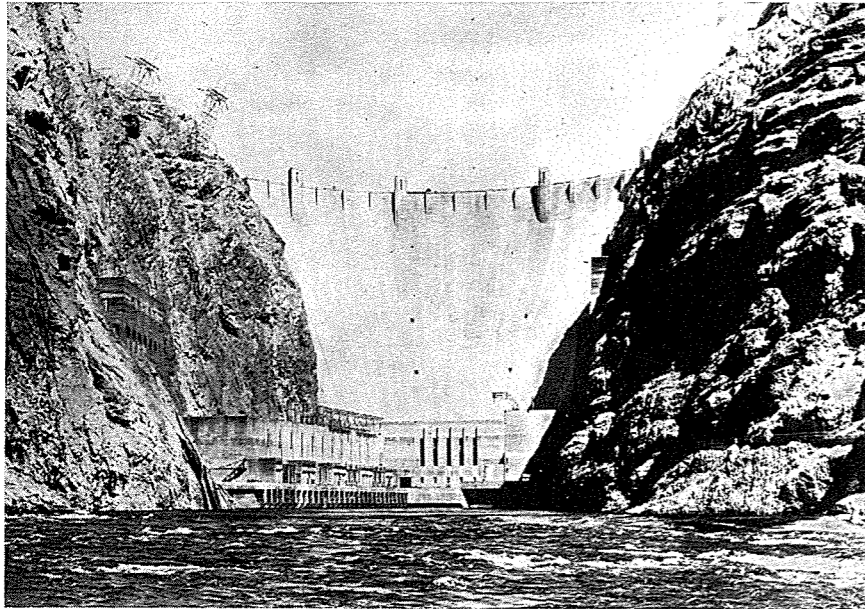
The other development referred to was the annexation of Long Beach to the Metropolitan Water District of Southern California. But, first, a brief statement concerning the organization of the District is in order.

The Metropolitan Water District grew out of the foresight of William Mulholland, for many years Chief Engineer of the Bureau of Water Works and Supply of the City of Los Angeles, whose exceptional fortune it was to father two major aqueducts. Both the Owens Valley project of the City of Los Angeles and the Colorado River Aqueduct of the Metropolitan Water District are monuments to his vision.

Having completed the Owens Valley Aqueduct in the early part of the century, he was one of the first to foresee and appreciate the southland's need of more water than Owens Valley could supply, and early turned his attention to the Colorado River. At his instigation, the City of Los Angeles commenced preliminary studies of this source in 1923, and in 1925 issued Colorado River Project bonds in the amount of \$2,000,000 to finance surveys and investigations.

In 1927, the Legislature enacted the *Metropolitan Water District Act*, permitting non-contiguous cities and districts to cooperate in the acquisition of domestic water supplies. The Metropolitan Water District of Southern California was incorporated under its terms on December 6 of the following year, with eleven cities as members: Anaheim, Beverly Hills, Burbank, Colton,





BOULDER DAM

Courtesy—M. W. D.

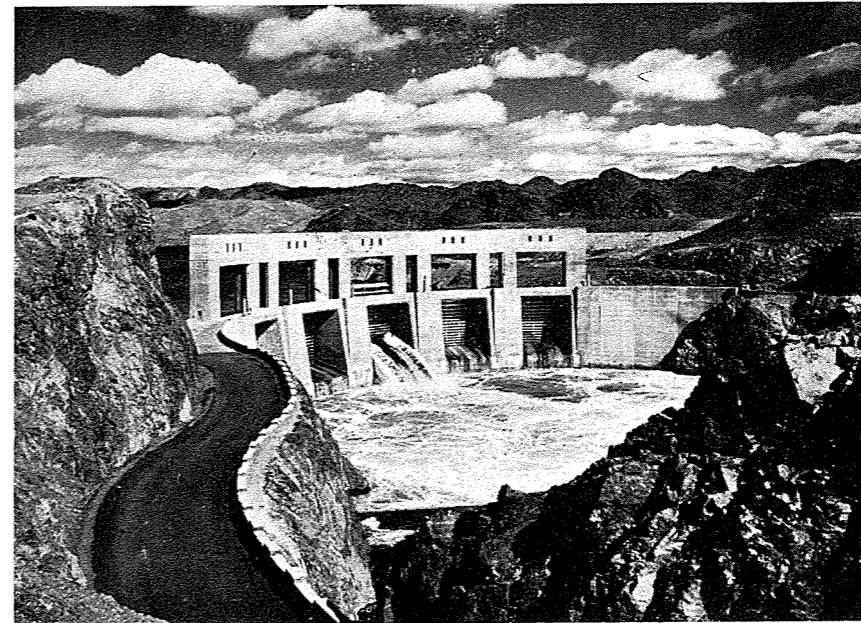
Glendale, Los Angeles, Pasadena, San Bernardino, San Marino, Santa Ana and Santa Monica.

In 1930, the newly organized District took over the preliminary investigations and engineering work begun by the City of Los Angeles. To assist in financing the construction of Boulder Dam, as well as to assure itself cheap power for its pumping operations, the District also contracted with the United States Government for 36 per cent of the firm electrical energy to be produced at the dam, and for the storage of water behind it.

Long Beach took the first steps toward annexation to the District September 5, 1930, when, on motion of Dr. R. G. Christie, Councilman from the eighth district, the City Council made application for a statement of the terms on which the City might join the District. By Resolution No. 79, adopted November 25, 1930, the Board of Directors of the District agreed that Long Beach might become a member on or before March 31, 1931, upon the payment of two years' back taxes, amounting to \$131,533.82, and interest thereon at three per cent from December 2, 1929.

The question of annexing to the District was thereupon added to the ballot for the special election of February 17, 1931, and was decided affirmatively by a vote of 6792 to 4770. The proceedings were ratified by the Board of Directors of the District on March 13, together with the annexation of Fullerton and Torrance. Compton was annexed on July 10, while during the year Colton and San Bernardino withdrew from the District.

During this same year, 1931, a bond issue of \$220,000,000 for the initial development of a 240-mile aqueduct from the Colorado River, with necessary reservoirs and pumping plants to raise the water more than 1600 feet over intervening mountain ranges, and a distribution system to the member cities, was approved by the District electors. The first block of bonds was sold to the Reconstruction Finance Corporation in December of the following year and construction work was begun before the month was out.



PARKER DAM ON THE COLORADO RIVER

Courtesy—M. W. D.

The epic of the building of the Colorado River Aqueduct is too long a story for inclusion in these pages. Table "F", taken from the District's *Fifth Annual Report*, lists its principal features, but does not give the faintest conception of the many difficulties encountered and overcome, such as the herculean task of completing the 14-mile San Jacinto Tunnel, much of it through badly fissured rock filled with water under enormous pressure.

Suffice it to say that no fewer than 54 routes were studied in detail before a final selection was made, and that after eight and one-half years of driving construction, at a cost approximating \$189,000,000, the initial stage of the Colorado River Aqueduct was completed July 31, 1941.

Few construction projects have ever been more timely. It served to relieve unemployment to a marked degree during the greatest and most prolonged

depression of modern times. Its completion less than six months prior to Pearl Harbor made possible the desert training of large numbers of our armed forces, paved the way for victory in Africa and, by assuring every member city of the Metropolitan Water District an enormous reserve supply of water, opened the door to a tremendous development of Southern California war industries.

Even the huge war plant of Basic Magnesium, Inc., near Las Vegas, Nevada, felt its beneficent influence. With a supply of electrical energy vastly in excess of its immediate needs, the District was in a position to provide, and has provided, large quantities of power to B.M.I. Beginning with 5,130,702 KWH in August, 1942, the consumption of B.M.I. built up to a peak of 142,023,375 KWH in October, 1943. From May, 1943, to June, 1944, inclusive, it averaged close to 127,500,000 KWH per month, or better than 4,000,000 KWH per day.

During the Fall of 1933, a bitter campaign was conducted to take Long Beach out of the Metropolitan Water District; but at a special election held on November 21 of that year, withdrawal was defeated by a vote of 18,087 to 13,643.

When the Japs made their sneak attack on Pearl Harbor on December 7, 1941, the Water Department was engaged in laying a 30-inch cast iron main on Wardlow Road between Pacific and Cherry avenues, to connect with a

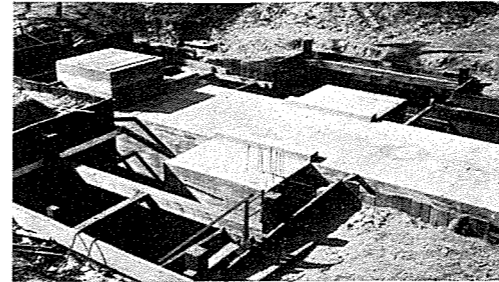
### PRESSURE REGULATING and CONTROL VAULT

Long Beach Connection to Distribution System of the Metropolitan Water District



(Above)

Excavation and Start of Shoring

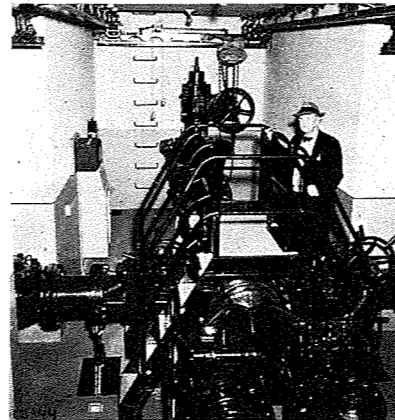


(Left)

Roof with Forms Removed

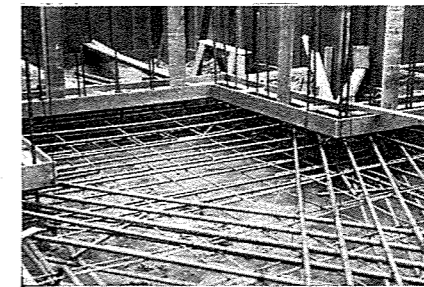
(Below)

Floor Reinforcing



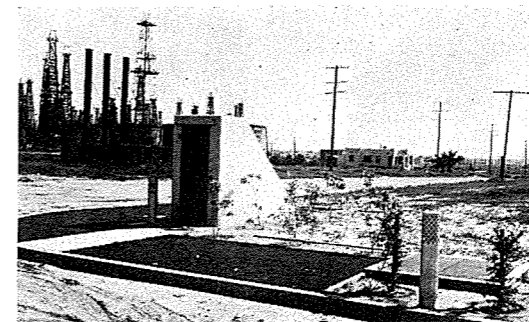
(Left)

Completed Interior



(Right)

Completed Exterior



#### TABLE "F" PRINCIPAL FEATURES OF COLORADO RIVER AQUEDUCT INITIAL CONSTRUCTION

June 30, 1943

FEATURE	UNIT	PRESENT CAPACITY		NET CONSTRUCTION COST
Right of Way and Lands.....	41,421.84 acres			\$ 1,289,972.15
Parker Dam .....				7,218,774.29*
Concrete Lined Canals.....	62.81 miles	1,605 c.f.s.		7,746,711.52
Unlined Canal .....	1.05 miles	1,605 c.f.s.		143,324.37
Cut-and-cover Conduits .....	54.45 miles	1,605 c.f.s.		14,115,469.66
SIPHONS				
16'0" diameter .....	0.88 miles	1,605 c.f.s.		589,419.45
Three 9'9" square barrel.....	5.58 miles	1,605 c.f.s.		2,631,389.72
11'5", 12'0", 12'4", 12'9" diameter .....	22.07 miles	802.5 c.f.s.		6,608,420.27
Tunnels, Concrete Lined.....	92.09 miles	1,605 c.f.s.		68,532,396.33
Pumping Plants and Camps.....		600 c.f.s.		15,880,131.52
Transmission Lines .....	237 miles			2,718,974.86**
Telephone Lines .....	430 miles			339,602.44
Reservoirs, Gene and Copper Basin .....				1,056,548.23

\* Includes \$500,000 grant paid by Public Works Administration.

\*\* Includes \$257,114.20 for ground wires paid by Defense Plant Corporation.

36- and 30-inch supply line which the Metropolitan Water District had laid into Long Beach and which terminated at Pacific and Wardlow. A pressure regulating and control vault was constructed at this point by the Department and subsequently a 12-inch connection was made with the Metropolitan line at Santa Fe Avenue and 223rd Street, and the Department's own 30-inch line on Wardlow Road was connected to Water Department lines as follows: a 24-inch line extending northerly on Cherry Avenue, a 20-inch line extending southerly on the same avenue, and a 20-inch line extending westerly on Wardlow Road, with provision for the future extension of a 30-inch line easterly and southerly from Cherry and Wardlow to the Citizens Pumping Plant. Colorado River water was turned into the Long Beach mains for the first time on August 17, 1942; but regular consumption of it did not begin until April, 1943. It is used in quantities designed to relieve the draft on our local supply and to prevent water levels from dropping to a dangerous degree.

*Water Commission, 1931-1940*

The year 1931, it will be observed, was a most important one for the Water Department. Almost simultaneously a continuous strip of land  $3\frac{5}{8}$  miles long had been obtained, permitting the spreading of pumping over a new cross section of the coastal plain five times as long as the old cross section; and the electors had voted the City into the Metropolitan Water District and authorized an independent Water Commission to control Water Department affairs and policies.

Apparently it was the intent of the framers of the charter amendment creating the Water Commission to place it in immediate charge of the Water Department, but the City Attorney ruled that it would not become an official body until July 6. Its members, therefore, acted in an advisory capacity from March 13 to July 6, when they organized, elected officers and drew lots for length of terms, with these results:

R. M. Dickinson, five year term, elected Secretary.

John Schinner, four year term.

C. L. Heartwell, three year term, elected President.

J. W. V Steele, two year term.

H. F. Ahlswede, one year term, elected Vice President.

The Board adopted Thursday as its regular meeting day, and has met on that day ever since. A roster of the members of the Board, giving their periods of service, appears in the beginning of these pages; therefore, most references to changes in its personnel will be omitted in subsequent pages.

Among the many questions confronting the new Board were the Department's current financial situation and the establishment of a definite financial policy; early expansion of the system and the spreading of pumpage over a wider area; whether to acquire additional water-bearing lands or water rights; salt water pollution on the west side of Long Beach; the adoption of a policy

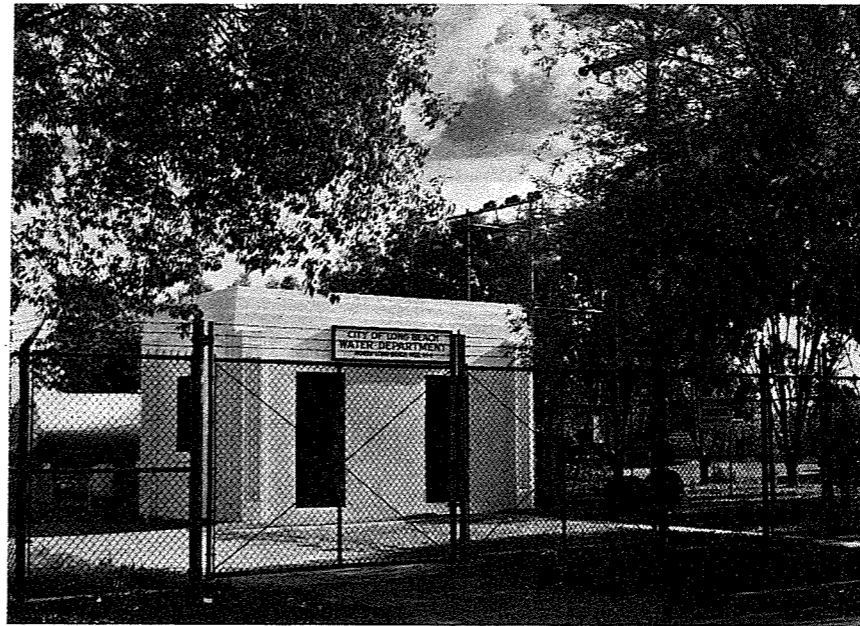
with regard to flood control, water conservation and other related questions on the San Gabriel River; and the annexation of the recently acquired Carson Street Strip, then known as the Montana Land Strip.

As of June 30, 1931, the Water Department had about \$200,000 cash on hand, available for improvements, and unsold bonds of the 1927 issue amounting to \$828,000. Its net earnings were running at the rate of about \$315,000 per year after bond interest and redemption but before depreciation had been provided for.

The Board decided that it would be necessary to use the unsold 1927 bonds to finance an urgent program of expansion but that future improvements should be financed out of current earnings so far as humanly possible. Forty-year bonds, requiring the ultimate payment of two dollars for every dollar borrowed, did not appeal to the Water Commissioners.

One of their first decisions was to placate the water users of Orange County and the Whittier Narrows, who had been aroused by some of the recommendations of the defeated 1930 bond campaign. Later, after acquiring a few North Long Beach well sites, they decided to make no more purchases of water-bearing lands or water rights pending the development of the Carson Street Strip.

It was approximately ten months after the Board of Water Commissioners



**NORTH LONG BEACH WELL NO. 4**  
Typical Pump House Installation

came into office before a General Manager was named for the Department, the Board itself acting in that capacity in the meantime, but on April 29, 1932, Fred S. Porter was appointed to the position, effective May 1.

Between the date of the Board's appointment and May, 1932, ten wells were drilled. They were:

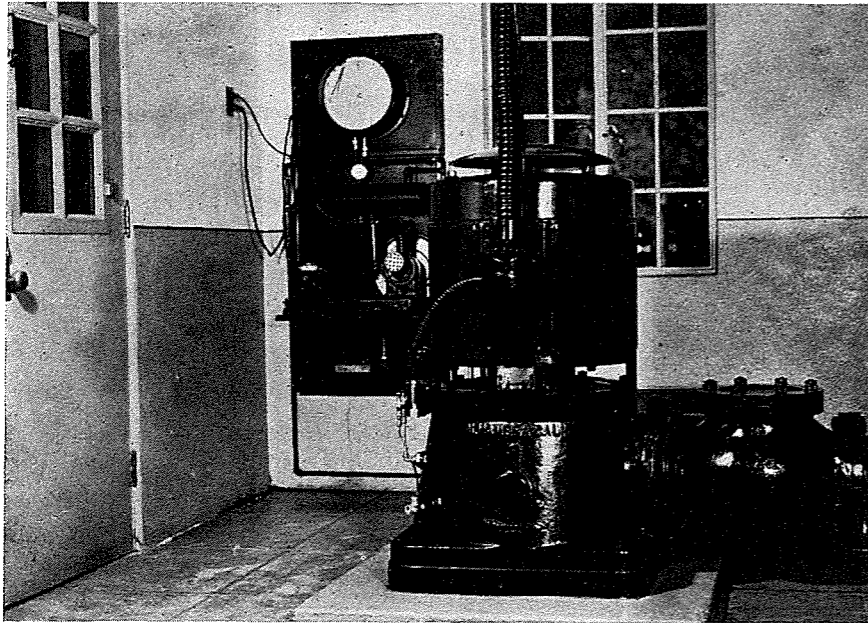
Commission Wells Nos. 1 to 6, inclusive, on the Carson Street Strip.

Wise Wells Nos. 1 and 2, on the Wise Ranch.

Wilson Well, on the Wilson Ranch.

Silverado Well, in Silverado Park.

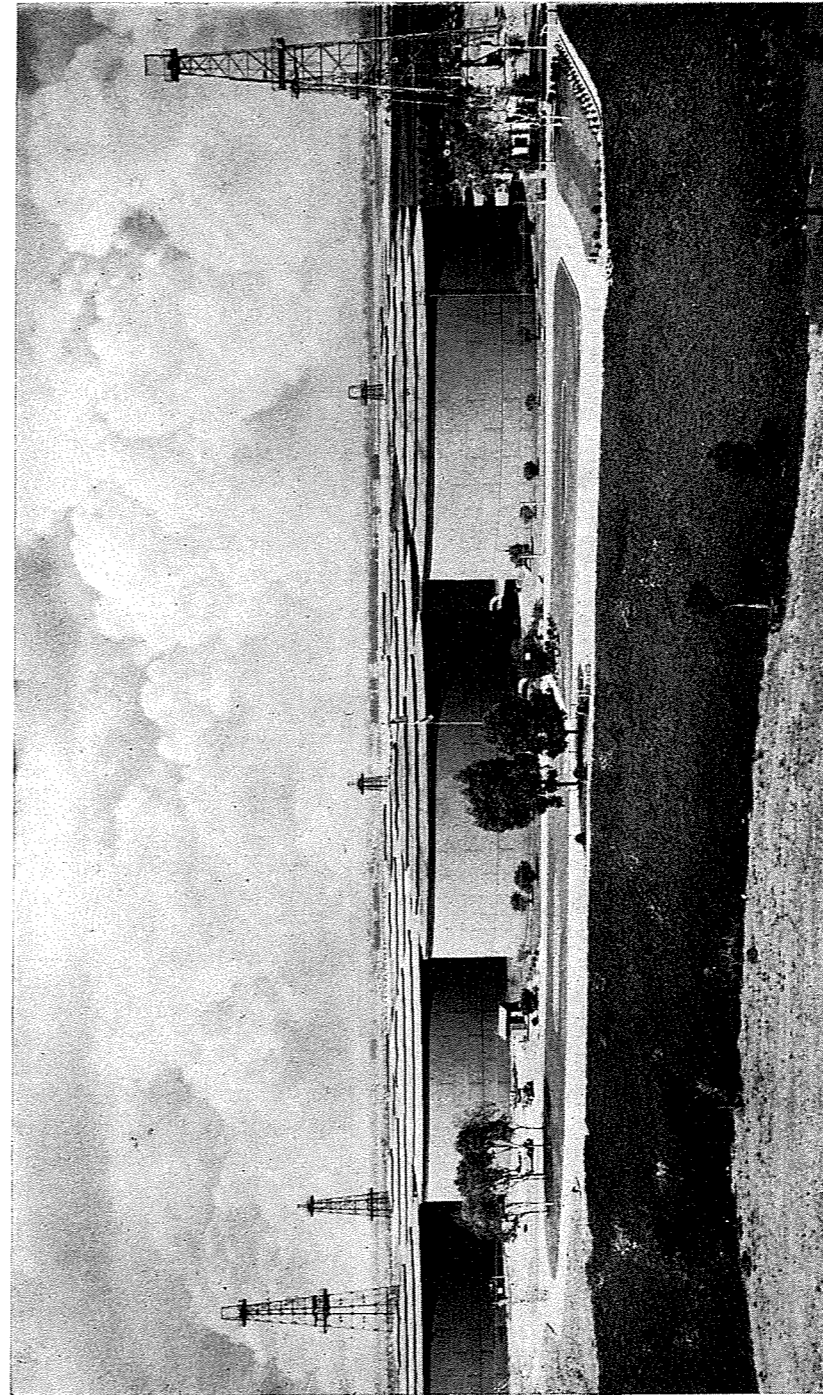
Another well, the North Long Beach No. 4, was completed in July, 1934, near Jackson Street and Orange Avenue.



**DEEP WELL TURBINE AND AUTOMATIC WATER LEVEL RECORDER**

Three of these are the deepest wells in the Long Beach system: Commission No. 1, 1668 feet deep; Commission No. 3, 1570 feet deep; and Wilson, 1700 feet deep.

The September 28, 1925, report, from which extracts have already been given, had declared the gravity reservoir capacity to be "grossly inadequate". Since then the low pressure zone had been eliminated and the low gravity Development Reservoir had been abandoned, reducing the gravity reservoir capacity from 5,130,000 to 3,850,000 gallons. Although nearly six years had elapsed since the 1925 report was submitted, nothing had been done to supplement this dangerously small reservoir capacity for a city of 150,000 people.



**PRESENT ALAMITOS DISTRIBUTION RESERVOIR**  
Consisting of Twelve Steel Tanks

It was known that the surface above the Signal Hill oil field was slowly settling, and it was feared that if a conventional type of reinforced concrete reservoir were constructed, further settling might wreck it, with heavy loss of life and property. Following a study by J. B. Lippincott, then and for several years after, consulting engineer for the Department, the Board of Water Commissioners decided to erect a battery of steel tanks, because of their flexibility.

Contracts were let for leveling the top of Alamitos Hill to elevation 170 feet and for the erection of six steel tanks thereon, each 132 feet in diameter and 35 feet deep, and each having a capacity of approximately 3,500,000 gallons—about 21,000,000 gallons for the battery. By the end of 1932, the six tanks had been completed, the ten new wells had been equipped, and collection mains had been installed connecting all of them, except the Silverado, to the Citizens Pumping Plant. By the middle of the Summer of 1933, two-thirds of Long Beach's water supply was coming from the Commission, Wise and Wilson wells, and water levels in the old pumping areas of the Alamitos, Citizens and Development groups, which had been so long depressed below sea level, were rising for the first time in many years.

August 22, 1935, the Board authorized the filing of a new application for a federal grant to assist toward the construction of a second battery of six steel tanks on Alamitos Hill, a 1933 application under the National Industrial Recovery Act having come to naught. At the same time it authorized the setting aside of \$187,500 of Water Department funds for the construction. An offer of a federal grant for the project not to exceed \$78,900 was accepted on October 10.

January 23, 1936, contracts were awarded for the installation of the second battery of steel tanks, \$37,000 for excavation and \$234,330 for tank construction. The completed project was accepted December 3.

During 1931, City Manager C. C. Lewis arranged for the erection of a three-story, reinforced concrete Utilities Building at the northwest corner of Broadway and West Pacific Avenue, directly west of the City Hall. It was planned largely as a relief measure to put as many men to work as possible, and at the same time to relieve congestion in the City Hall by giving the gas and water utilities quarters of their own. Its estimated cost was \$90,000, to be financed from Gas Department funds. Plans for the third floor, set aside for Water Department executive offices, were approved by the Board of Water Commissioners on September 10. The building was completed and occupied in the latter part of April, 1932, the Water Commissioners meeting for the first time in their own board room on the second floor on June 2.

By 1936, the Gas and Water departments had already outgrown their quarters in the new building. Joint committees of the Board of Water Commissioners and the City Council worked from time to time for nearly two-

years on the problem of enlarging it and submitted one or more applications for federal assistance for the purpose.

July 7, 1938, an offer of a federal grant of \$63,000 was accepted by the Board of Water Commissioners, which had finally been selected to sponsor the project. A contract was awarded September 3 to Duff and Vandenhooen in the amount of \$117,824 for a 43-foot extension on the west side of the building and the addition of a fourth floor. The Sun Building at 240 East Third Street was occupied by the Water and Gas departments while these alterations were being made. The first and last meetings of the Board of Water Commissioners in that building occurred September 29, 1938, and May 25, 1939, respectively.

Upon the completion of the reconstruction of the Utilities Building, both the Water and Gas departments reoccupied it during the last week in May, 1939, the Board of Water Commissioners convening for the first time in its present board room on the fourth floor on June 1 of that year.

At present, in addition to the two utilities, the following City departments occupy quarters in this building: City Treasurer, City Tax Collector, Civil Service Board, Division of Safety, Maternal and Child Hygiene Section of the Public Health Department, and the City Gas and Electric Inspector.

#### *Pollution of Ground Water Supply*

Because the drilling of the Silverado Well had shown that the shallow water-bearing strata in the area around Silverado Park was saturated with salt water, the Board, on November 12, 1931, authorized a survey to determine the source and extent of the saline pollution. This survey disclosed that all of the water courses west and north of the City, including the Los Angeles River channel itself, were being used as dumping grounds for industrial wastes.

The highly saline overflow from the sumps of Oil Operators, Incorporated, located at Golden Avenue and Wilmington Road, now 223rd Street, was being discharged into the Flood Control Channel in ever increasing quantities. This effluent was composed of most of the waste water from the oil wells in the Signal Hill oil field. Oil operators on Dominguez Hill were running their salt water wastes into the crater of a well which had blown out in the course of drilling, entirely engulfing the derrick, while operators in Signal Hill were doing the same thing on a smaller scale in sump holes and abandoned oil wells. Various industries all the way from Macy Street in Los Angeles to Artesia Street in Long Beach were emptying all sorts of undesirable wastes into the Los Angeles River bed, with the result that the quality of underground water was seriously menaced.

Many steps have been taken to remedy the situation. The matter was referred to the Division of Oil and Gas of the Department of Natural Resources of the State of California and it did effective work in stopping such

practices in the oil fields. The Flood Control District and the Board of County Supervisors adopted regulations forbidding the discharge of wastes into the Flood Control Channel unless they passed certain qualitative tests, and various other corrective and preventative measures have been taken from time to time. Sampling of the affected area continues to this day.

The additional danger of sea water intrusion into the Downey or "Coastal" Plain as fresh water supplies are drawn below sea level by continued and increasing pumping, has long been recognized by the Water Department. As early as 1930, the Division of Water Resources of the State of California was requested to make a study of the effectiveness of the so-called coastal barrier running from Dominguez Hill to the vicinity of Newport Beach. The State made some preliminary studies but was unable to finance the extensive investigation required.

August 14, 1936, a letter was addressed to the National Resources Committee, outlining the seriousness of the situation and urging a federal survey. This ultimately led to a cooperative investigation by the United States Geological Survey, financed fifty per cent by the Survey and the balance equally by four local organizations; to wit, the Los Angeles County Flood Control District, the Orange County Flood Control District, the Orange County Water District, and the Board of Water Commissioners of the City of Long Beach.

An investigation, planned at an estimated cost of \$70,000, was expected to occupy portions of four fiscal years. As a matter of fact, due to war conditions, the conclusion of this investigation is being carried into a fifth fiscal year but is rapidly nearing a close at the end of 1943-44. While the final report has not yet been issued, a brief progress report was brought out in August, 1943. This properly belongs to the Annual Report of the fiscal year 1943-44; but for the purpose of maintaining continuity of thought, the following pertinent paragraphs from it are quoted at this point:

*From page 1:*

"The coastal plain in Los Angeles and Orange counties, which embraces about 775 square miles, sustains a large urban and rural population, diverse industries, and intensive agricultural developments. Excepting the supply for the City of Los Angeles, which is principally imported from the Owens Valley, probably more than three-fourths of the water requirement for all purposes in all this area is satisfied currently by withdrawals of ground water from wells. The aggregate ground-water withdrawal is currently on the order of 400,000 acre-feet a year, or an average of about 360 million gallons a day."

*From page 45:*

"Inland movement of ocean water is most likely to occur in deposits of Recent age, tongues of which extend inland from the tide-

lands, through the five gaps between the coastal hills and mesas, to the extensive Downey Plain. These tongues contain permeable materials, especially in the Santa Ana and Dominguez Gaps. Also, they extend to a depth of about 100 to 150 feet below sea level and in aggregate width amount to some 60 per cent of the length of coast. In general, inland movement of ocean water through these tongues can be restrained most feasibly by so controlling inland withdrawals or by artificially recharging the permeable beds, or both, as to maintain a fresh-water head of several feet above sea level within the several gaps."

*From page 46:*

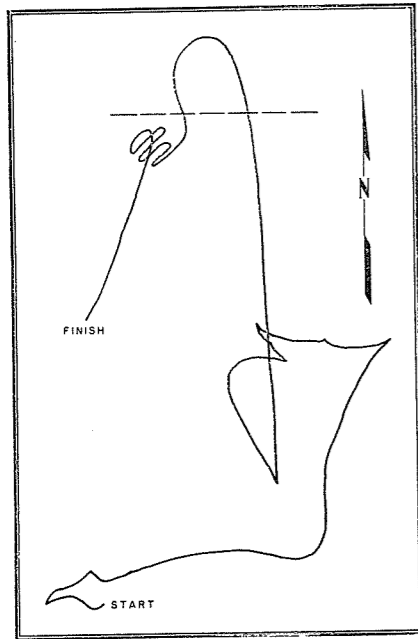
"The upper part of the Recent deposits contains an extensive body of semiperched water which is of inferior quality everywhere along the coast; at some places on the coastal tidelands the shallowest of this water is more than twice as saline as the water of the ocean. This semiperched water is a potential source from which the underlying fresh-water body may be contaminated by way of wells that were not adequately cased when constructed, or whose casings have corroded through. All active wells which penetrate the semiperched water body, or other bodies of water now contaminated, should be kept in good repair and all abandoned wells should be adequately plugged."

The survey has disclosed that a considerable portion of the top of the barrier lies below sea level, which means that the only economically feasible way of preserving the quality of the ground water northeast of the barrier is to maintain a head of fresh water at least a few feet greater than the head of salt water in order to bar the latter out. It is therefore clear, as has already been pointed out, that pumping from the coastal plain must be limited to some reasonable depth—otherwise there will be an influx of sea water into that area. The two particular danger spots that are named by the U. S. Geological Survey are the Santa Ana Gap at one extreme and the Dominguez Narrows at the other. The use of Colorado River water, both by the City of Santa Ana and the City of Long Beach, is a step in the right direction in easing the overdraft upon the ground water supplies of the coastal plain.

*Earthquake of March 10, 1933*

On March 10, 1933, at 5:55 P. M., the earth began to shake, and within a few moments 52 Long Beach lives had been snuffed out and Long Beach property damaged to the extent of \$25,000,000.

Seismologists placed the epicenter of the earthquake a few miles off shore opposite Newport Beach. But the greatest destruction occurred along the line of the Inglewood fault, which runs northwesterly and southeasterly through Signal Hill. The business section of Compton was almost completely destroyed and the zone of heavy damage extended into the southern part of Los Angeles. All told, 119 people were killed in Los Angeles and Orange counties



**Fig. 5 — EARTH MOVEMENT  
DURING THE "QUAKE" OF  
MARCH 10, 1933**

This is a reduced tracing of the mark made by the foot of a gas range stored on a smooth concrete floor. All four feet made the same diagram, with the exception that the loop above the broken indicating line was not made by the southern feet of the range, showing that at this point it "tipped up on its toes."

while total property damage in the two counties was estimated at upward of \$45,000,000.

Millions of dollars worth of inferior brick and masonry construction was ruthlessly exposed. School buildings, not only in Long Beach, Compton and Los Angeles, but as far away as Whittier, suffered more heavily than any other class of structure. The only Long Beach school which emerged unscathed was an old frame building that had been condemned some time before. It was exceedingly fortunate that the schools were not in session at the hour of the earthquake, otherwise the deaths might have been counted in thousands.

The initial shock disrupted power lines and toppled the brick walls of the Citizens and Alamitos pumping plants onto the pumps. The wreckage was cleared away and the Citizens' pumps were started at 7:35 P. M., when power was restored. At 9:15 P. M. another severe shock threw more of the walls among the transformers and bus bars and cut off the power again. This time it was not restored until 11:35 P. M., when the Citizens' pumps were again started and continued in service without further interruption. The Alamitos' pumps did not resume operation until 1:45 the following morning, due to the need of replacing burned off power lines.

Fortunately, there were few fires and none of serious extent. *Fortunately* is truly the word because, when full pumping service had been restored, five of the six steel tanks on Alamitos Hill were empty and there remained only

eight feet of water—possibly 800,000 gallons—in the sixth tank. By that narrow margin, Long Beach, with scores of broken and leaking mains, escaped a disastrous shortage of water.

Mains and services were disrupted in many places, the greatest damage occurring in old river beds and filled ground, where the alluvium shook like jelly. Water Department repair crews were established in temporary quarters at the Service Plant and remained continuously on the job of repairing breaks until human nature could endure no more.

The Los Angeles Bureau of Water Works and Supply sent men and equipment to assist the Department's overworked personnel. Wallace-Tiernan Co. sent portable chlorinators for the sterilization of mains and drinking water, and State and County health authorities were on the ground early and late. Although portable tanks had to be used for several days for the distribution of domestic water in areas where damage was most extensive, no lasting hardship was suffered because of lack of water and no epidemic swept the City.

The Department's records show that more than 160 breaks were repaired in cast iron mains larger than 2-inch. A few of those represented joints pulled apart, but most of them involved varying degrees of damage, ranging from the breaking of bell ends to the more or less complete destruction of the pipe. The total number of service breaks and leaks repaired was never tabulated.

The newly erected steel tanks on Alamitos Hill withstood the initial shock and the hundreds of after-shocks unscathed. The chief damage to Water Department structures occurred at the Citizens and Alamitos pumping plants, at the Service Plant, and at several well houses. Practically all brick structures without concrete bonding had to be rebuilt. The total cost of repairs to the water system exceeded \$60,000.

The earthquake caused the tightening of building restrictions and resulted in setting higher construction standards. From the standpoint of the Water Department, it demonstrated, in the strongest possible way, the absolute necessity of membership in the Metropolitan Water District.

On June 2, an explosion in a Richfield refinery north of 27th Street between Atlantic and California avenues, shook the City again and led many people to believe that another earthquake had occurred. The Water Department's abandoned Electric Plant, a short distance to the east and already damaged by the earthquake, was still further wrecked, as was the roof of the unused low pressure Development No. 1 Reservoir near-by.

#### *Flood of March 2, 1938*

A storm began on February 27, 1938, which lasted until March 3 and reached an intensity on March 2 to be expected but once in sixty years. Rainfall during that 24-hour period ranged from 5.88 inches in Los Angeles to 14.92 inches at Opid's Camp in the San Gabriel Mountains. Rainfall varying from 4.8 to 9.89 inches had already fallen at the same locations during the

preceding three days and the ground was thoroughly saturated. The total precipitation for the five-day storm ranged from 11 inches at Los Angeles to 27.25 inches at Opid's Camp.

The District Office of the United States Engineer Department at Los Angeles estimated that the run-off on the Los Angeles River reached a peak of 100,000 second feet, and on the San Gabriel, a peak of 60,000 second feet. An estimate was also made that the San Gabriel flow would have reached 140,000 second feet if it had not been for the retarding effect of San Gabriel dams Nos. 1 and 2 and the Morris Dam.

The peak flow through the Flood Control Channel in Long Beach was reached about 9:00 P. M. on March 2, and missed overtopping the levees through the harbor district by just a few inches. Several bridges were washed out and a number of lives were lost, some of them in Long Beach when a footbridge across the Channel was swept out to sea with a number of people on it. The flood control levees have been raised several feet since then, providing additional protection.

Had it not been for the flood control dams and debris basins throughout the Los Angeles and San Gabriel River watersheds, the property loss from this storm would have been terrific.

#### *Long Beach Municipal Airport*

The City Manager appeared before the Board on October 31, 1939, to discuss plans for an enlargement of the then existing Long Beach Municipal Airport and to request the Board's financial assistance. This discussion resulted in the purchase by the Water Department from the Montana Land Company of approximately 200 acres adjacent to the airport for \$199,999.11, exclusive of escrow charges, *et cetera*.

The airport, known as Daugherty Field in honor of Earl Daugherty, pioneer aviator of Long Beach, was established in 1924 on Water Department land lying east of Cherry Avenue and north of Spring Street, and was formally dedicated on December 20 and 21 of that year. On August 8, 1928, the voters of the City adopted a charter amendment authorizing the exchange of the Water Department's Bouton property, consisting of 113.9 acres, for 152.36 acres of the Montana Land Company's property lying on the easterly end of the American Colony Tract and forming a direct extension of the original airport. This amendment became effective January 8, 1929, and deeds were exchanged between the City and the Montana Land Company shortly thereafter.

On August 22, 1940, the Board granted permission to the City Council and City Manager to manage and control the surface of those Water Department lands embraced in the field, including the recent purchase from the Montana Land Company, and on the next day authorized the transfer of

\$150,000 from the Water Revenue Fund to the General Purpose Fund of the City.

Because of the excellent facilities and possibilities of the airport, including its comparative freedom from fog, the Douglas Aircraft Company has located its Long Beach plant on an adjoining site, and the Ferrying Command of the United States Air Force has established its Southern California base upon the airport itself, its barracks and other buildings overflowing onto adjacent Water Department property.

When the total area of Water Department lands embraced in the present airport is taken into consideration, it may be truly said that the Water Department made the airport possible. What the Department has meant to the City in general in other respects is partially shown in Table No. 24.

#### *The Period 1940-1943*

Fred S. Porter, who had been General Manager of the Department since May 1, 1932, tendered his resignation on December 19, 1940, and requested that he be restored to his previous Civil Service status of Division Engineer in charge of construction. His resignation was accepted, his request granted, and George R. Wade appointed to fill the vacant position.

Charles L. Heartwell passed away on December 11, 1941. Up to that time he had been the first and only President of the Board of Water Commissioners. Five days later, Geo. M. Winstead was elected President of the Board, J. Will Johnson was elected Vice President, and V. E. O'Neil was held over as Secretary.

Mr. Heartwell's will left to the Department a number of oil paintings which were formally accepted by the Board on February 25, 1943, and are now on display in the Department's offices.

Several months before the attack on Pearl Harbor, the United States Government adopted a series of regulations designed to conserve materials and to prevent the building of top-heavy inventories. The first order directly affecting utilities was Preference Rating Order P-46, adopted September 17, 1941. This was followed by many others from time to time. The purpose of most of these orders was to limit the amount of material that a utility or other producer could receive or withdraw from stores quarterly; to limit the total amount it could carry in inventory to a minimum practical amount; and to make its excess inventories available to other utilities.

In the beginning the system was extremely cumbersome and much hardship was caused by the necessity of filling out innumerable papers that seemed to be unnecessary, but as time went along most of these regulations were eased until now the system works without any great hardship. The Long Beach Water Department has endeavored at all times to comply one hundred per cent with these orders.

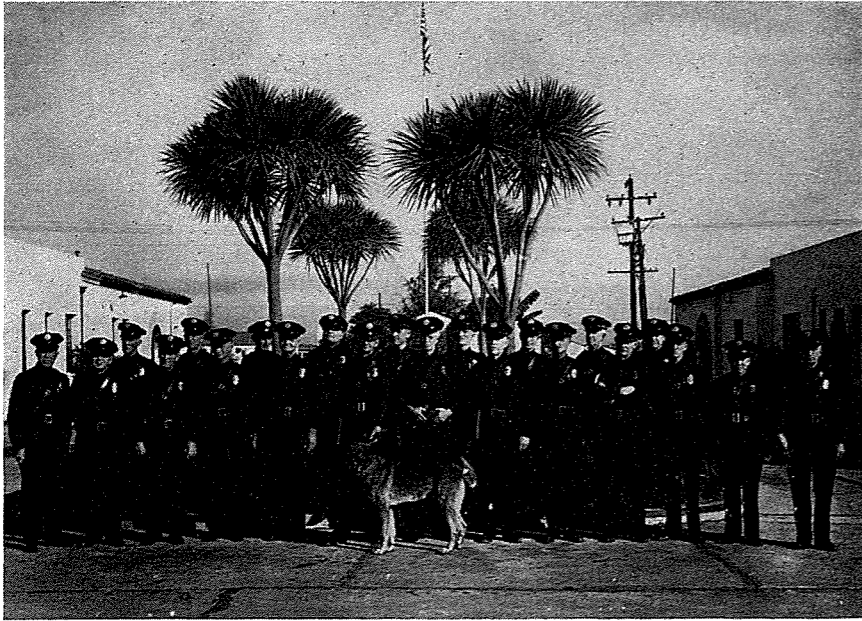
Following the attack on Pearl Harbor and the danger of attack upon the



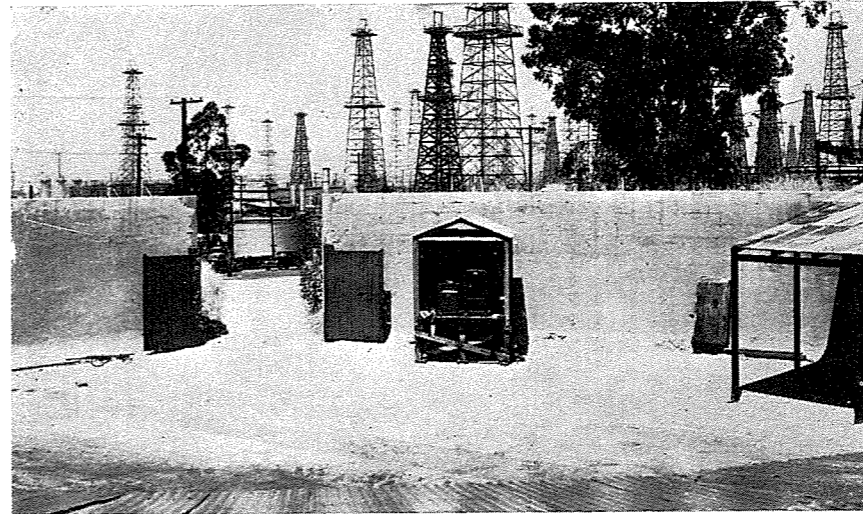
Pacific Coast, various precautions were taken, among them being the organization of an independent police force to protect strategic points of the Long Beach water system, and the making of emergency interconnections with the cities of Los Angeles, Compton, Signal Hill and Seal Beach and with the Clearwater-Hynes County Water District.

The Jergins Oil Company, operating an oil lease on Water Department land and being desirous of protecting its rolling stock against flying fragments in the event of a bombing, was given permission on January 29, 1942, to use the abandoned Development Reservoir No. 1, already described herein, for such purpose. The Company cut away a portion of a side wall, set a pair of gates in the opening, and erected a corrugated iron roof around the inside of the structure, so that we now have the unique spectacle of a water reservoir being used to house automobiles and construction equipment.

The following May 28, the Board adopted a resolution accepting a Federal Works Agency grant for \$40,000 to aid in financing the construction of a 20-inch main on Carson Street extending from Cherry Avenue to a short distance west of Lakewood Boulevard. This construction was designated by Federal Works Agency as *Docket Calif. 4-283*. It took months to secure the necessary authorizations from the War Production Board but the project was finally completed November 10, 1943.



DEPARTMENT'S UNIFORMED POLICE FORCE



DEVELOPMENT NO. 1 RESERVOIR  
Now Being Used as a Storage Garage

A further amendment to the City Charter was adopted on June 2, 1942, and became effective on January 8, 1943, providing that the City Attorney shall be the sole and exclusive adviser to the Board of Water Commissioners. Prior thereto, the Board had been permitted to have its own attorney.

This brings the historical sketch of the Water Department substantially down to June 30, 1943. It is hoped that the reader will accept it for what it purports to be, an historical sketch, not a complete history. Many things have been omitted, either for lack of space or because they were deemed of minor importance. An effort has been made to present the story of water in Long Beach—sometimes fresh, sometimes salt, sometimes too much, sometimes too little. The development of the City itself, from a struggling hamlet to a community of around 245,000 people, has not been dwelt upon, but may be inferred from the growth of the Water Department. Many statistical tables are included in the back of the book, showing that growth, and the Annual Report for the fiscal year 1943-44, which follows this sketch, brings the story down to June 30, 1944.

By WALTER M. BROWN,  
OFFICE ENGINEER.