The Provo River Project

Features of the Provo River Project are shown in red. Also shown (in green) is the proposed diking of Great Salt Lake, to create a body of fresh water at the point of inflow of the Weber River. This project has attracted a great deal of interest both because of its novelty and apparent practicability. It is not a part of the Provo River Project, however.

The Rock Creek Tunnel, proposed as an addition to the Provo River Project, is shown in black near the Duchesne Tunnel.

Familiarity with this map, which was prepared by Mr. L. Clyde Anderson and lettered by Mr. L. W. Myers, will aid greatly toward a thorough and comprehensive understanding of the subject matter of this volume.
100 Years of Water Development

A Report

Submitted to the Board of Directors

of the

Metropolitan Water District of Salt Lake City,
the Board of Commissioners of Salt Lake City Corporation,
and to the
Citizens of Salt Lake City

by

Fisher Sanford Harris

General Counsel and Manager of the
Metropolitan Water District of Salt Lake City

April, 1942
Foreword

During the year 1933 the Board of Commissioners of Salt Lake City by ordinance declared that "the public convenience and necessity required the incorporation of a Metropolitan Water District." In that declaration the electors of the City concurred, and, in response to the expression of that concurrence at the polls, the Metropolitan Water District of Salt Lake City came into being, and has since functioned upon the background, with the powers and obligations, associations and accomplishments, and it has met and overcome the difficulties, and has yet before it the problems—all of which we have outlined in this report to its Board of Directors, to the Board of Commissioners, and to the people of Salt Lake City, to whom both are answerable.

It is only when viewed upon that background that any of these can be appreciated or understood or that the significance of any of them can be estimated.

The Metropolitan Water District of Salt Lake City was created at the will of the people, and, at their direction and for their sole benefit, it has embarked upon a public enterprise of a magnitude and of an importance to them beyond anything ever before undertaken in Utah. Concerning every aspect of this, the public is entitled to be fully informed. It is for that reason that the publication of this report has been thought not only worth while but as something obliged.

Most of it is mere matter of fact, an outline history, but even the conclusions, the expressions of opinion, while the writer alone is responsible for them, follow inevitably.

It is hoped that this report will be both valuable and interesting. If it is either, then grateful acknowledgment must be made to Mr. Hampton C. Godbe, Executive Secretary of the District, for substantial and indispensable assistance in its preparation; and to W. D. Beers, City Engineer, and W. A. Knight of the City Engineer's staff.

FISHER HARRIS
Counsel and Manager

Salt Lake City
January 2, 1942.
Explanatory

"SECOND FOOT." The rate at which water flows is commonly measured in second feet. A second foot is a flow of one cubic foot of water per second. It may be visualized by imagining a cubic foot of ice passing a given point every second.

"ACRE FOOT." The acre foot is a measure of quantity. It is the quantity of water that will cover one acre (43,560 square feet) one foot deep. The block in Salt Lake City upon which the City and County Building stands, contains ten acres. It would therefore require 10 acre feet of water to cover the entire block one foot deep.

Water flowing at the rate of one second foot during 24 hours will cover an acre 1.98 feet deep, or in other words will result in a quantity of 1.98 acre feet.

Geography. The text of this report assumes a familiarity with the geography of the Salt Lake Valley and vicinity, and of those parts of the State of Utah to which reference is made. The topographic map preceding the title page will supply any deficiencies occasioned by this assumption, and will also afford an interesting view of the physical situations and relationships.
In the Beginning

The founding of Utah is celebrated on the 24th day of July because on that day the main body of the Mormon Pioneers under Brigham Young arrived at their destination, the Valley of the Great Salt Lake. But two days before that an advance company under Orson Pratt "camped on City Creek, near a spot where the City and County Building now stands... The camp was organized for work and the ground was broken by William Carter, George W. Brown and Shadrach Roundy, who ploughed a number of furrows for the planting of potatoes. A few men were directed to the stream where they dug a ditch and ran the water on to the soil." ("The Founding of Utah," by Levi Edgar Young.) Thus it was, and there and then, that Anglo Saxons first used the waters of the earth for irrigation.

By the Spring of 1848 over 5,000 acres had been brought under cultivation and as early as 1850 flourishing farming communities had been established throughout the Valley; on Big Cottonwood Creek and Mill Creek and Emigration and Little Cottonwood, on Parley's Creek and on the Jordan River.

It was during this period that there were constructed many of the various canals—"ditches" they were called—from the several mountain...
streams which enter the Valley from the east, canals which are still used by the prosperous farming communities and suburban areas to the south and southeast of Salt Lake City. The "Big Ditch," for example, was begun during 1848, the "Big Cottonwood Tanner Ditch" and the "Green Ditch" that same year, the "Walker Ditch" during 1849 and the "Hill Ditch" in 1851.

These ditches were not financed by bond issues nor were they constructed by contract or by machinery, but by labor of the people themselves, those who used the waters thus diverted and controlled upon their own lands.

**First Appearance of "The Water Problem"**

By 1860 practically all of the waters of the mountain streams had been appropriated for agricultural uses and for use by the families of those largely dependent upon farming for their livelihood. The municipality itself was almost entirely dependent upon City Creek and very soon the need for the further development of water resources was recognized.

**Utah Lake Development Suggested**

It is recorded in the minutes of the Board of Aldermen of "Great Salt Lake City" that on August 9, 1864, "Alderman Sheets reported that he had inquired into the propriety and practicability of introducing a greater supply of water to meet the pressing wants of the citizens in watering their lots. He said that the plan of obtaining water by boring artesian wells, though an untried experiment in these valleys, was an object worthy the trial of our enterprising citizens, and should such a measure be adopted successfully by the leading men in the city and vicinity, three or four wells in suitable localities would save the orchards and gardens from serious losses now sustained by our citizens. A general feeling was awakened for the accomplishment of so desirable an object.

"He also reported that the waters of the Jordan River were almost entirely unavailable for irrigation purposes, but might be rendered available by raising a dam at its headwaters and bringing a canal from thence around to the city, which, though requiring a great expenditure, would be attended with great results in saving our gardens in times of drouth. He suggested the propriety of having a mass meeting called and adopting such measures by the voice of the people favorable to such a project, for the getting up of suitable plans and of deciding upon the mode of raising funds by tax or otherwise for the accomplishment of the work."
On January 10, 1865, Brigham Young spoke of the "beneficial results that would accrue by irrigating and cultivating an increased amount of land." He said that "the bringing of the waters of Utah Lake would be the means of sustaining a population in Great Salt Lake County of one hundred thousand inhabitants."

A committee of the City Council was appointed to look into this proposal and numerous surveys and reports were made. On October 21, 1879 the "Committee of Aldermen" reported to the Mayor and City Council in language reminiscent of reports upon the same general subject in recent years:

"Your committee of Aldermen, appointed to act in conjunction with the Mayor, to investigate matters pertaining to the construction of the contemplated canal for conveying water from the Jordan River into this city, and to take the necessary steps for commencing said work, beg leave to report that they have had the matter under consideration and find that the past season has fully demonstrated the fact that the supply of water from all sources to this city, in

4. Looking northwest from North Temple and West Temple Streets in the 1860's. Water to supply the acreage around each dwelling was, even then, a problem which taxed the ingenuity of the inhabitants.

5. Salt Lake City as it appeared in 1853. This picture is reputed to be the first ever made of this city.
any dry season, even when managed with frugality and distributed to its utmost capacity both day and night, is wholly inadequate to keep alive the trees and shrubbery of the city, to say nothing of garden crops and lawns. Nor does the supply under the most favorable circumstances admit of any increase in the area to be irrigated, without which increase our city cannot extend in size nor advance in beauty: for, without water all efforts in these directions will be futile.

"Your committee find that there are two classes of land owners within the corporate limits: one who by appropriation and use of the waters flowing into the city for many years have secured a permanent title in said waters; another, who purchased or took up lands on the outskirts of the city proper, after the waters flowing therein had been appropriated and used by the class first named. This latter class, although they have been allowed to use surplus water, when there was any, have no permanent water right, and when the waters are deficient, as during the past summer, they are left entirely without, and are the greatest sufferers as they are not only deprived of irrigating water, but also of water for household purposes . . .

"In view of these facts, and many others which might be enumerated, your Committee are fully convinced that it is the duty of the Corporation to take immediate steps to secure a larger water supply for irrigating and household purposes for the city. Your committee believe that the inhabitants are looking to the City Council to inaugurate ways and means for this object, and that any practicable scheme for accomplishing the end desired will meet a hearty response from every property owner who wishes to see the value of his property enhanced by the growth and increase of the City."

3. An early photograph of Main Street, Salt Lake City. Note the water flowing in the "ditches" on each side of the street.

E. L. Tribune
CONSTRUCTION OF JORDAN AND SALT LAKE CITY CANAL

During this same year (1879) actual construction of the "Jordan and Salt Lake City Canal" was commenced and was finally completed in 1882. During subsequent years it was improved and enlarged to a capacity of 150 cubic feet per second. It is an interesting fact that part of it was the canal commenced many years before for the purpose of conveying rock from Cottonwood for the Latter Day Saints' Temple.

INCREASE IN POPULATION NECESSITATES MUNICIPAL RECOURSE TO MOUNTAIN STREAMS

Between the years 1880 and 1888 there had been a relatively rapid rise in the population of Salt Lake City. In 1880 it was 20,000 and during the next eight years it had more than doubled. By this time it had become apparent that the water problem was not merely one affecting agriculture or gardens and trees and shrubbery, but of the actual sustenance of the people.

Utah Lake water, while perfectly adequate to irrigation and in some respects superior for that purpose to mountain stream water, was not suitable to domestic use. The City's rights in City Creek and some other relatively small rights were not sufficient to actual necessities and already complaints of unlawful encroachments by the municipality were being received from farmers on Parleys and Emigration.

THE FIRST "EXCHANGE AGREEMENT"

This situation led to the making in 1888 of Salt Lake City's first "Exchange Agreement" between certain users of water from Emigration and almost all of those from Parleys; agreements by which the city acquired the right to take and use the waters of those creeks and by which it was required to give in exchange therefor "an equivalent quantity of water from the Jordan and Salt Lake City Canal."

To utilize this Exchange the City built the Parley's low line conduit with a capacity of 26 second feet and the "Suicide Rock" reservoir near the mouth of the canyon.

Most of the lands then irrigated from Parley's Creek and the canals taking water from it are now within the corporate limits of Salt Lake City. Hundreds of acres are nevertheless

6. The Jordan and Salt Lake Canal, constructed to bring the waters of Utah Lake and the Jordan River into Salt Lake City to augment the inadequate supplies from mountain streams.

still devoted to agriculture but the greater part of them is occupied by city homes to which Utah Lake water is still delivered and used for small kitchen gardens and surrounding beautification.

**Temporary Relief**

But the problem was far from solved; in fact no more had been accomplished than to satisfy the exigency of the present, and the year 1890 was a drouth year. As yet no long-range plan for a purely municipal water supply had been devised; no carefully worked out scheme of continuing development had as yet been conceived. The Utah Lake development, though it had in it the possibilities later realized and indicated by the Parley’s Exchange, was an irrigation project, a project originally designed, as stated by Brigham Young, to support a population, not merely in Salt Lake City but in “Great Salt Lake County,” and the water thus made available was not suitable for culinary uses.

The matter, however, continued to receive the attention of the municipal authorities. On February 19, 1889, Mayor Francis Armstrong said in his message to the City Council:

“It is too well known to need restatement that the question of an increased water supply has for many years been the most important consideration connected with the government of Salt Lake City. The situation has certainly been greatly relieved by the past wise and intelligent action of your honorable body in the construction of artificial waterways from various sources into the city so that it is believed in or-

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7. Main Street of Salt Lake City (left) in 1880, one year after work had begun on the Jordan and Salt Lake Canal.

8. Suicide Rock Reservoir (right) near the mouth of Parley’s Canyon. This was the first important storage reservoir to be constructed for municipal use. The photograph was taken at a time when the reservoir had been drained for repairs and cleaning.

dinary years there need be no concern as to the actual necessities of the present population, or the sustenance of existing vegetation. But the experience of the past year, the meagerness of the present snowfall, the extra supply necessary to the successful operation of the contemplated sewer system and above all proper provision for the future advancement, growth and beautification of our city, continue to re-engage the attention of the municipal mind to this topic and to emphasize its importance as the question of the hour.

"The exchange made last year with certain owners of Parley’s Creek and the subsequent construction of a canal from Parley’s Canyon to the city, with the attendant necessary purchase of mill, power and water rights—all at an expense of $45,635.00—was a wise and judicious move which, if I am not mistaken, will prove advantageous to all the parties of interest. The extra supply so obtained will go far towards relieving the city the coming season and in ordinary years, when there is the usual storage of snow in the mountains, it will be all sufficient, taken in connection with the City Creek house supply and the Jordan and Salt Lake City Canal supply for irrigation ... ."

10. This rock-lined creek channel, located on the “Strevell Estate” on Ninth East Street, carries Utah Lake water as a result of the Parley’s Exchange agreement.

Hampton C. Godbee

9. Ninth East Street, viewed north from Twenty-first South Street, is typical of lands still irrigated under the Parley’s exchange and now within the incorporated area of Salt Lake City.

Hampton C. Godbee
THE LEHI WELLS

Shortly thereafter, "to increase the City's water supply through the Jordan and Salt Lake City Canal" a large number of wells were sunk on the Jordan River bottom near Lehi. These produced "seven to eight million gallons of water in twenty-four hours" but they also resulted in litigation and finally in a judgment of $88,775.00 damages which was settled and thereupon the enterprise was abandoned though the city has retained title to the lands upon which the wells were driven and in recent years has filed upon the water supply.
City Wells

About the time of the Lehi well venture numerous wells were driven in various part of the city; several of them, since capped, on what is now the public ball grounds on the southeast corner of Thirteenth South and Seventh East. One at the southwest corner of Eighth South and Fifth East still runs and is drawn on by the public in the mistaken belief that the water is of superior quality.

Further Development under Pressure of Necessity—New Exchanges Proposed

During the early 1890's the Jordan and Salt Lake City Canal was improved and extended. This action was strongly advised by the “Water Commission” composed of J. Fewson Smith and W. E. Jacobs, who said: “Upon the canal mainly depends the solution of our water problem. Put into the condition suggested, it is capable of bringing nearly ninety millions of gallons daily for use in the city and exchange elsewhere. There is little doubt that from 40 to 30 per cent of the Cottonwood stream may be obtained when once the canal’s efficiency is established. . . .”

Big Cottonwood Conduit and Jordan Canal Extension Recommended

In 1892 A. F. Doremus, then City Engineer, recommended that Utah Lake be taken “as a source or base of supply” and that its capacity be increased by constructing a dam for the storage of water which then ran to waste through the Jordan River. He also proposed the construction of “a high line conduit extending along the base of the mountains from the mouth of one canyon to another in which to transport the waters of the respective mountain streams into the city.” He went on to relate the deficiencies of the lake water as a culinary supply and to urge the practicability and the necessity of exchanges.

[Note: Flowing well located on what is now the public baseball grounds on the southeast corner of Thirteenth South and Seventh East Streets. This well, now capped, was one of many driven in various parts of the city to help overcome deficiencies in irrigation and culinary supplies.]

"The lake water is not potable, and its elevation above the city is not sufficient to admit of a satisfactory gravity supply to the city.

"The cost of its purification and its elevation to afford sufficient pressure will be expensive items in connection with its transportation. Its temperature is too great to make it desirable for culinary purposes. It is, however, most admirably adapted and well situated for irrigating a greater portion of the lands which lie between the city and the lake, and which are now irrigated by the mountain streams that issue from the several adjacent canyons. The water from these mountain streams is cold, clear, pure and perfectly adapted and situated for a city supply. This mountain water is all appropriated and used for irrigation by the farmers. To acquire a right to its use the city must pay for it either by direct purchase from each of the numerous owners or through condemnation proceedings or by the exchange or substitution of lake water.

"To purchase outright would be an endless and impracticable undertaking, both on account of the great number of individuals to be dealt with, and for the reason that after the object had become known prices would advance to impossible figures.

"To condemn would be the only practical method of purchase. But either plan involves the purchase also of every farm and improvement affected, for without the water these would be valueless and the land would soon return to its original condition of barrenness.

"The degradation of these lands through the withdrawal of the water for their irrigation, would be most unfortunate to say the least. It is a question whether the City's growth would not be retarded rather than advanced through such a course.

14. An early view of Utah Lake. Although unfit for drinking, the waters of Utah Lake form the basis of exchange agreements whereby, to this day, potable canyon water is obtained for Salt Lake City.

"To substitute lake water for mountain water to irrigate these lands appears the least expensive and most practical means of securing the mountain water for city use and is certainly the most desirable . . .

"The exchange of lake for mountain water would be a mutual benefit, inasmuch as the growth of the city is essential to the prosperity of the farmer, and the farmer is equally as necessary to the growth of the city."

This is more than ordinarily interesting, not only because it is the first clear-cut expression of the exchange idea on the large scale afterwards carried out, but also because it recognizes the interdependence of the municipality and the adjacent farming and suburban territory.

It is a striking fact that the action repudiated by Mr. Doremus as contrary to the municipal interest again was proposed and rejected some forty years later. At the time of the Metropolitan Water District election in 1935 it was proposed as an alternative to the "Deer Creek" Project that the City buy up all of the waters remaining still used by farming interests to the southeast of the valley and thus, as Mr. Doremus put it, "degrade" them to arid wastes.

**First Suggestion of Federal Aid for Utah Lake Improvement**

Still another report of peculiar relation to recent developments is that of J. M. Harvey, "Water Master," also made during 1892: "I recommend that Congress be asked to appropriate $100,000 for the improvement of Utah Lake as a storage reservoir, but if Congress will not grant the amount, I do most earnestly recommend the different canal companies unite" to this end.

Here, though the plan in mind was somewhat different, we have the germ of the idea which, also about forty years later, became that of the Utah Lake Division of the Provo River Project of the United States Bureau of Reclamation.

**Big Cottonwood Conduit and First Big Cottonwood Exchange Agreements**

The Big Cottonwood conduit, proposed by the City Engineer in 1892, was commenced during 1904 and was completed in 1905 with a capacity of 62 cubic feet per second, and during those years there were also completed four Exchange Agreements between the city and various ditches diverting water from Big Cottonwood Creek; part of the Hill Ditch and the Big Ditch in 1904, the Lower Canal and the remainder of the Hill Ditch in 1905.

These exchanges were eminently fair and satisfactory to the city and have continued to be so. By them it acquired the right to approximately 90 per cent of the primary flow of Big Cottonwood Creek. It gave to the former owners very little more than it received of mountain water during the irrigation season and during the remainder of the year it gave nothing at all except a small amount for culinary use largely supplied from return flow and seepage.
Big Cottonwood Creek (above), once used almost exclusively for the irrigation of farmlands, is now almost entirely devoted to household uses within the city. This change was wrought through the Exchange Agreements of 1904, 1905 and 1920, under which the City supplies water from Utah Lake for irrigation in exchange for creek water for municipal use.

16. Typical of farmlands dependent upon the lake supply is the cultivated area shown below.

CONSTRUCTION OF RESERVOIRS AND DISTRIBUTION FACILITIES

From this time on until 1920 very little was done toward the direct acquisition of new water resources. It was, however, a time of reservoir construction, resulting in the conservation of resources already available. For example, at the head of Big Cottonwood the Twin Lakes Reservoir with a capacity of 934 acre feet and the Lake Phoebe-Lake Mary Reservoir with a capacity of 742 acre feet were constructed during 1915 and 1916, and in 1917 the Mt. Dell Reservoir was built to store 935 acre feet of Parley's Creek water which theretofore had been wasted. It was raised to a height of 98 feet in 1925 and by that means its capacity was increased to 3514 acre feet.

During this same period distribution facilities were enlarged and improved and small storage and equalizing reservoirs were constructed on City Creek and the "New City Creek Highline" conduit was built to serve the Avenue section of the city and the fast growing northeast section.
The East Jordan Canal Extension

All of these were essential to immediate demands of the rapidly increasing population, but of more far-reaching importance was the action taken toward the enlargement and extension of the East Jordan Irrigation Company canal, which had been constructed many years earlier from Utah Lake for the irrigation of lands south of the city. In 1905 the city had acquired about 20 per cent of its capital stock and as early as 1899 the City Engineer had predicted the necessity of using that canal "to get our water on higher ground so as to facilitate an exchange of water of Big and Little Cottonwood."

Negotiations with the East Jordan Irrigation Company having been fruitless, the City during 1908 commenced condemnation proceedings by which it sought the right to enlarge the East Jordan Canal sufficiently to carry the City's Utah Lake and Jordan River waters, stating as a ground of necessity that "the growth of the city since 1880 had been and now is in the direction of the higher lands and above said


17. The Big Cottonwood Conduit (above) as it appeared under construction.

18. The diversion dam in Big Cottonwood Canyon. At the extreme left of the dam is the intake of the Big Cottonwood conduit, through which the Creek waters are delivered into the municipal mains.
canal (the Jordan and Salt Lake City) so that a large part of the city is now above the said canal, and is without an adequate supply of water for irrigation and other municipal purposes."

20. Twin Lakes dam under construction. It also is located at the head of Big Cottonwood Canyon. Completed in 1917, this reservoir has a capacity of 934 acre feet.

This action resulted in a judgment in favor of the city and finally, on January 29, 1920, in a written agreement between it and the East Jordan Irrigation Company under which the canal was enlarged sufficiently to carry the 150 cubic feet per second of the City, the East Jordan’s “Morse Decree” right of 170 second feet and an additional 50 second feet capacity for the irrigation company. The enlargement was commenced in 1920 and by 1924 the canal had been extended to its present length, and the “Sixtieth South Street” pumping plant had been completed.

All this was of far-reaching importance because it is only by means of this canal that it is possible to fulfill the “Exchange Agreements” with several “Ditches” on Big and Little Cottonwood, exchanges by means of which a vital part of the city’s water supply has been obtained since 1924.
BUILDING MT. DELL DAM

21. (Upper left) Abutment anchorages of the original dam.

22. (Upper right) View upstream of the original dam as it neared completion in August, 1917.

23. (Center) Upstream view of the enlarged dam.

24. (Lower left) A downstream view of the enlarged dam in which the added twenty feet of height is clearly discernible.

25. (Lower right) The Parley’s High Line conduit, constructed to deliver Mt. Dell reservoir water into the city mains.

All photos S. L. Eng. Dept.
STILL MORE EXCHANGES BUT NO NEW SOURCES DEVELOPED

In 1900 the population of Salt Lake City was 53,351. By 1920 it had again more than doubled; it was then 118,110. In the meantime the city’s domestic supply from City Creek, from Parley’s and Emigration, from its first three exchanges from Big Cottonwood, the wells, and the irrigation waters from the Jordan had barely sufficed, and during many years of that period restrictions upon the use of water were necessarily imposed.

Once more, as on previous occasions, some new water supply was essential, and not for the future but to meet “the pressing demands” of the immediate present, and once more that was done, the only thing that could be done, to relieve the pressure of imminent want. Sources naturally contributing to the valley had to be looked to, sources available at relatively small expense and comparatively quickly. The possibilities of City Creek, Emigration and Parley’s had been approximately exhausted; the City already owned the right to 50/120 of the primary flow of Big Cottonwood which it had increased by 1700 acre feet of storage in the Brighton lakes. The Little Cottonwood conduit was some ten years distant. There remained only Mill Creek and the remainder of Big Cottonwood Creek. Mill Creek was not readily susceptible of exchange because the city had no distribution facilities for the farming and suburban area affected. The same was true of the upper Big Cottonwood area but the East Jordan enlargement and extension had long been projected and work upon it was commenced during the year 1920. In anticipation of its early completion the City, on the second day of January of that year, entered into an exchange contract with the Big Cottonwood Tanner Ditch Company, which owned almost all of the rights in Big Cottonwood Creek used through the Big Cottonwood Tanner Ditch. During August of the next year a similar agreement was made with the Upper Canal Irrigation Company and in 1922 with the Green Ditch.

EFFECT AND SIGNIFICANCE OF EXCHANGE AGREEMENTS

By these agreements the City acquired valuable and essential rights to the waters of Big Cottonwood Creek, but in many respects it paid dearly for them. The first exchange contracts, those of 1888 and 1904 and 1905, required the city to deliver very little more of irrigation water than it re-

26. The East Jordan Canal extension, viewed north from the Big Cottonwood Canyon highway just below Sixtieth South Street.

Kempson C. Godbe
ceived of mountain water. They were approximately "straight across" trades except during the non-irrigation season when the advantage was greatly in the city's favor. This last is also true of the Tanner and Upper Canal contracts but the amount of irrigation water required of the city, in these, bears no relation to the quantity it receives, but instead is a quantity definite and certain, regardless of the fluctuations of the creek from year to year and from season to season. The result, in this alone, has been very greatly to the advantage of the lands under these ditches. A notable example of this occurred during the year 1931 when the City received almost nothing


29. (Below) The "Sixtieth South Street" pumping plant, where Utah Lake water in the East Jordan canal extension is pumped to the Upper Canal and Big Cottonwood Tanner ditches for irrigation use. The plant is located on the Big Cottonwood canyon highway, but is usually referred to as the "Sixtieth South" plant.

All photos S. L. C. Eng. Dept.
under the Upper Canal Company agreement during the irrigation season of that year, and delivered to the Company an adequate culinary supply and, for irrigation, a very great deal more than the company's pre-exchange right, and yet was compelled to pay damages for failure to deliver the contract quantity.

In addition to the irrigation supply accruing to the users under these ditches, they reserve an ample domestic supply and under the contracts the City was required to and did construct modern distribution systems which it is obliged to maintain forever.

During the time from 1921 to 1931 other exchange contracts were entered into with other water users from Big Cottonwood Creek and from Mill Creek and Little Cottonwood but some of those on Big Cottonwood have not yet been found practicable of operation, nor, except rarely, have those on Mill Creek. Most of the city's rights on Little Cottonwood have been exercised since the construction of the Little Cottonwood conduit during 1931 and 1932.

Whether the exchanges, except as emergency measures have been worth while, economically and socially justifiable, is a matter in regard to which there may be reasonable difference. In at least one instance the disproportion between what the City receives and gives out, and must perpetually give out, is so great as to mark the trade as bad business from almost every point of view. In other instances there is practical equality and in still others the disparity between benefits and burdens is frequently great and obvious and frequently neither. But in all cases the obligations of the City are perpetual. It must deliver a large quantity of water every year, with liability for deficiencies whether due to its fault or not, and regardless of what it receives. The practical effect is that the performance of its obligations is most difficult and onerous during those years during which it receives the least. It must perpetually incur a large expense in pumping costs and for the mainte-

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38. City Creek Canyon reservoir, shortly after its completion in 1915. This reservoir still plays an important role in supplying the community with drinking water.

nance of irrigation and culinary water systems outside of its corporate limits and for the benefit of large areas outside the scope of its strictly legal interest.

On the other hand—! One of the recitals of the Big Cottonwood Tanner Ditch contract is, "Whereas the city is desirous of exchanging water with the Company . . . and looking also to the future development of the area and interest under the Big Cottonwood Tanner Ditch."

That objective has been realized. Not only has the interest and area under that ditch been fostered and developed, but the interests of the areas under all of the exchange ditches have been furthered to an extent otherwise impossible. Adjacent to the City is a prosperous farming and suburban district which without the liberal terms of the Exchange Agreements would never have existed. Who can say that it is not worth all it has or will cost? As the City Engineer put it in 1892, "The growth of the city is essential to the prosperity of the farmer and the farmer is equally necessary to the growth of the city."

The relationship between the exchange areas as they exist today, more nearly suburban than farming, and the municipality, is even more intimate, and the intimacy will, in all probability, increase rather than diminish. Who in 1888 foresaw that by 1911 a large part of the lands under the Parley's ditches would be within the corporate limits, subdivided into small lots occupied by city residences, or even in 1905 that the Big Cottonwood Lower Canal was serving territory which by 1930 would be within the boundaries of Salt Lake City?

The failure to apprehend possibilities such as these, a too narrow vision and possibly even a too narrow self-interest, have been the occasion of our ever-recurring water problem. Development has rarely been purposefully anticipatory or it has anticipated little beyond the obvious. Nearly always it has been under the pressure of immediate or nearly impending events.

Recapitulation of History of Water Developments from 1864 to 1928

It has doubtless been noticed that in 1864 the suggestion of introducing a greater water supply was "to meet the pressing wants of the Citizens"; that in 1879 the "Committee of Aldermen"

14. Little Cottonwood conduit, constructed during 1931 and 1932. This conduit enabled the city for the first time to use the waters of Little Cottonwood creek for municipal purposes.

S. L. Tribune
reported that "The past season has fully demonstrated the fact that the supply of water from all sources to the city, in any dry season, even when managed with frugality and distributed to its utmost capacity, both day and night, is wholly inadequate"; that the Parley's Exchange of 1888 was a matter of immediate necessity which the Mayor spoke of in 1889 as having "greatly relieved the situation." so that with the Utah Lake supply "there need be no concern as to the actual necessities of the present population or the sustenance of existing vegetation."

In the early 1890's wells were driven in various parts of the city to relieve the effect of a drouth in 1890. In 1904 and 1905 a conduit was built which the City Engineer had recommended more than ten years previously and during those years three "Exchange Agreements" were entered into in order to provide an increased supply needed at that time. Those required by the necessities of 1920 were not effected in 1905 but in 1920.

The 1892 recommendations of City Engineer Doremus concerning the construction of a high line conduit and the Cottonwood Exchanges, the improvement of the Utah Lake supply, the taking of it as the basis of future development; the 1908 action looking toward the enlargement and extension of the East Jordan Canal—all this has the appearance of foresight, but the appearance is blurred by the fact that in 1910, after the purchase of 20 per cent of the stock of the East Jordan Irrigation Company about 1905 and after the City had obtained a decree right of 34,000 acre feet in Utah Lake, this same Engineer testified that the future of Salt Lake City required no more than 36,000 acre feet and so gave countenance and support to the "Booth Decree" of that limitation.

The First Long Range Planning

1924 was a drought year and the precipitation of 1928 was below normal; in his 1929 report the City Engi-
neer wrote of the low level of Utah Lake and since 1920 there had been a population increase of about 20,000, and once again there was a flurry of activity.

During 1928 the Board of Commissioners, at the instance of Mayor John F. Bowman, also Commissioner of Water Supply and Waterworks, appointed a Water Supply Advisory Board composed of Sylvester Q. Cannon, a former City Engineer; William Peterson, A. Z. Richards, and H. C. Jessen, then City Engineer, Chairman.

The Mayor informed the Water Advisory Board that its problem was to make an exhaustive investigation of possible water sources and to recommend a program of water supply development which would "provide for a minimum population of 400,000."

Surely, and however belated, this was foresight indeed.

In March, 1929, the Advisory Board filed its report. The Board's investigation and report covered a broad field under two general headings, "Local Sources" and "Outside Sources."

E. Clyde Anderson

33. Sugarhouse. The business district of this thriving section of Salt Lake City is in sharp contrast to the farms which, not so many years ago, were irrigated from Parley's Creek at this same site.

34. Hillsden Drive, located in the heart of the Cottonwoods, is one of Salt Lake City's newer suburban districts. Developments such as this mark the intermediate stage in the transition of farm land, dependent upon irrigation water, into urban residential districts requiring culinary water.
Under “Local Sources” the Board considered the following possibilities:


2. Additional Storage in Parley’s.

3. Big Cottonwood Storage.

4. Little Cottonwood.

5. Reservoir Sites in Adjacent Canyons.”

Under “Outside Sources” the Board considered:

“Project No. 1—The supply for this project is the winter and flood stage flow of the Upper Duchesne watershed, conveyed by means of a tunnel to the Upper Provo River.

“Project No. 2—Unappropriated water from the upper Green watershed.

“Project No. 2a—The Weber River to furnish the supply for this project with direct storage in Echo Reservoir located at Echo on the Weber River.

“Project No. 3—The source of supply for this project is also the Weber River, storage to be provided in the proposed Larrabee reservoir, located about fifteen miles above Oakley, on the upper Weber River.

“Project No. 4—Runoff from the upper Duchesne watershed during period of winter flow and flood stage months constitutes the supply for this project.

“Project No. 4a—It is assumed, in connection with the initial development of this project, that the City can secure sufficient capacity in the proposed Deer Creek reservoir, and in the Echo reservoir now being constructed, to effect exchanges with the Provo River lower forks; ultimate development to be supple-

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3. Feed channel for the Utah Lake pumping plant. Receding waters of Utah Lake forced the users to deepen the intake channels in order to reach waters not accessible to the pumps.
mented by a supply from the upper Duchesne watershed.

"Project No. 4b—The operation of this project is based on the use of stored water direct, no exchanges, the supply to be obtained from the Provo River and Weber River watersheds with storage in the proposed Deer Creek reservoir located on the Provo River southerly from the town of Charleston. Further supply may be added, as in Project No. 4a, by making available the runoff from the upper Duchesne and also by means of any storage capacity obtained in the Echo reservoir. A conduit, with necessary tunnels and siphons, is to be constructed from Deer Creek reservoir to the mouth of Provo canyon, thence northerly along the east bench to Big Cottonwood Canyon.

Project No. 5—Water to be obtained from East Canyon watershed through exchange for water from Chalk Creek in excess of demands for irrigation, power and Echo storage, supplemented by any right to storage capacity in Echo, obtained,
“Project No. 3 a—In the initial development the supply is to be obtained from East Canyon, acquired through exchange of storage capacity in the Echo and proposed Magpie reservoirs for the East Canyon reservoir, involving the construction of a thirteen mile tunnel from East Canyon to Emigration, a conduit from Emigration to the Sunnyside reservoir.”

How it was proposed to finance all or any of these does not appear.

“Outside” SOURCES RECOMMENDED

The Board concluded that in order to provide a long-range program for a very substantial increase of population “Outside Sources” must be looked to; that, while the various “Local Sources” enumerated ought to be developed to the limit of their possibilities, “the better policy is to acquire the rights to a large supply now and develop the ‘remnants later.’” To that end they recommended a series of continuing larger acquisitions of “Outside Sources” over a long period of time and one “Local Source” project for immediate construction.

The “Outside Source” recommended for initial acquisition was Project No. 4-b, and subsequent to that, various water supplies which have subsequently become a large part of the water supply sources of the Deer Creek Division of the Provo River Project and the Echo Project, the latter then under construction and the former then being planned by the United States Bureau of Reclamation.

The “Local Source” supply recommended for immediate action was the construction of the “Argenta Dam” in Big Cottonwood Canyon to store flood waters of Big Cottonwood Creek. It was estimated that this would make
An upstream view of Echo reservoir from atop the dam. At full capacity of 74,000 acre feet, water extends five miles back from the dam and inundates 1,475 acres. The Deer Creek reservoir impounds 150,000 acre feet and covers 2,600 acres.

The Ever Recurring Emergency

Before anything was actually accomplished, that occurred which had so often before; the pressure of the present made itself felt. 1931 was another drouth year and because of excessive drafts on Utah Lake during 1930 and shortages of mountain stream flow its level reached a then all-time low. Something had to be done at once.

General public interest was aroused; citizen water advisory committees were appointed and there developed sharp differences of opinion concerning the most desirable action. City Engineer Jessen, who was chairman of the Water Advisory Board appointed in 1928 which had formulated a farsighted plan, now urged, as the Board available to use 12,000 acre feet of water, enough, it was said, for an additional population of 80,000 persons.
had in 1929, that there be immediately constructed the Argenta storage dam in Big Cottonwood Canyon. The financing of the enterprise required a bond issue and accordingly the proposal was submitted to the vote of the taxpayers.

An acrimonious controversy arose; alternate plans were proposed; it was claimed that there was no sufficient supply available to storage, that the cost was greatly disproportionate to any benefits which might accrue. The Bond proposal was defeated.

Something else had to be done. A bond issue of $2,000,000 was authorized and spent. The Little Cottonwood conduit was built and Exchange Agreements with users from that source were effected.
Temporary Relief

The 1929 report of the Water Advisory Board had stated its conclusions concerning underground water sources as follows: "Due to difficulties encountered in economically developing underground water sources; relatively high cost of water acquired, together with the small amounts obtained and the uncertainty of gaining a permanent flow; laws which do not clearly define the relative rights to underground water developed, involving lawsuits for infringement of existing right; it appears that the sphere of an underground supply is limited to a supplemental or emergency use. In other words, it might be desirable to develop such a supply to tide over short periods of deficiency in other supplies."

It must have been considered a time of extreme emergency, for the City at this time embarked upon an extensive program of underground water purchases. Flowing well rights were bought for large sums of money and the supposed underground rights of thousands of acres of lands in the "artesian basin" were bought up. These last in reliance upon a legal theory...
even then of doubtful application and since probably completely repudiated by the Supreme Court.

The well rights purchased were helpful and have been since, but only as supplemental and emergency sources. The rights in lands acquired were then and are now of doubtful value.

During the same year the City paid out a large amount for a number of miscellaneous water applications and paper rights relating to further development of various "Local Sources." This purchase has since been bitterly denounced as one involving so many hundred thousand dollars wasted and, on the other hand, as one of great value. Whatever may have been its value, it had little relation to the problem of long-range planning, but neither, for that matter, did most of the things done during this period.

**Changing Administrations**

What might have been accomplished toward the plans proposed by
the 1928-29 Water Advisory Board report except for the emergency of 1930-1931, or afterwards in spite of it, by those then charged with responsibility will never be known, for another circumstance also of common occurrence intervened. By the election of that year they were relieved of that responsibility. A new mayor was elected, Louis Marcus, who became head of the Department of Public Affairs and Finance; George D. Keayser was elected and became Commissioner of Water Supply and Waterworks, and a new City Engineer and City Attorney were appointed.

What this new administration would have done except for the continued pressure of necessity and except for the culmination of work done over a long period by two outside agencies is also something which cannot be known. The fact is, however, that necessity did continue to press and still does, and the fact is also that two outside agencies, the Utah Water Storage Commission, under the leadership of William R. Wallace, and the United States Bureau of Reclamation, then under the direction of Dr. Elwood Mead, about this time brought to a conclusion work of profound significance to the water problem of this community, and the fact is that that administration together with those agencies, aided and encouraged by various public-spirited citizens and the public press, did initiate action which it seems probable will settle for all time the problem of water supply for Salt Lake City.

They brought about the creation of the Metropolitan Water District of Salt Lake City and thus insured the construction of the Provo River Project of the Bureau of Reclamation.

Recapitulation of Utah Lake History

It seems to us that it will be more helpful toward complete understanding, if, before going into the field of activity just mentioned, we give something additional of the Utah Lake history and then of other water activities from 1932 to the present.

We have already related how the Utah Lake and Jordan River development was suggested in 1864; how the Jordan and Salt Lake City Canal was commenced in 1879 and ultimately completed with a capacity of 150 cubic feet of water per second, but we have said very little, and that only incidentally, concerning the extent of the actual use of the water supply thus made available, but rather we have merely told how some part of it was utilized by way of exchange in the acquisition of a municipal supply from the various mountain streams.

In 1900 action of a predecessor of the Utah Power and Light Company precipitated litigation which, with immaterial exceptions, involved all the then Salt Lake Valley users of Utah Lake and Jordan River. This resulted in what is known as "The Morse Decree."

That decree established the right of the City and "Associated Canal Companies" to take from the river water to the full capacity of their respective canals. It established also their right to treat Utah Lake as a storage reservoir and to hold its waters for future use "to the extent to which, in their judgment, their interests may require."
Among themselves it established no priorities; it decreed equality. "They shall have an equal right to the use of all such water to the extent of the capacity of their several canals, and, while there is sufficient water for that purpose, they may each take the full quantity of water their respective canals will carry, and when the water is insufficient to fill all the canals to their maximum capacity, then the City and Canal and Irrigation Companies shall be entitled to an equal division thereof."

The "Morse Decree" defined the right of the city to 150 second feet of water for an irrigation season of 180 days, or a total of 54,000 acre feet. The "Booth Decree" about ten years later held its right limited to 36,000 acre feet, the amount its witnesses had stated to be the utmost of its requirements. "The court thus gave to the city all the water the witnesses said it required regardless of whether it had already applied that quantity to a beneficial use or not."

The then City Engineer, in fixing
48. W. D. Beers, who became City Engineer in 1932 under the Louis Marcus-George D. Keyser water administration.

the City's requirements at 36,000 acre feet, did so in response to his estimate that its growth and future development might some time in the future demand that quantity.

During each of many years prior to 1931, there was actually drawn from the Lake by the Primary (the City and "Associated Canal Companies") and Secondary rights an amount in excess of the total awarded to the City and the Canal Companies by the "Morse Decree" and in 1931 an amount in excess of that awarded to them by the "Booth Decree," and during every one of them the rights subsequent to that of the City received a quantity of water greater than that received by it. In each of them except 1931, Utah Copper Company alone received more than three times as much and Utah Lake Distributing Company alone a greater amount.

Why this was permitted is something difficult to understand. When certain interests about 1909 sought to establish a right to the use of the waters of Utah Lake, the City and its associates protested and carried the case to the Supreme Court. They earnestly contended that there was no unappropriated water available and that no other appropriation could be allowed without encroachment upon their rights. But the case went against them and they were bitterly aggrieved. Naturally, but consider the almost incredible fact that that appropriation having been allowed, subsequent appropriations were scarcely noticed, though the City had found it advisable to acquire one-fifth of the capital stock of the
East Jordan and was having difficulty in fulfilling its Exchange Agreements which now involve, all in all, an annual delivery of approximately 70,000 acre feet.

The Utah Lake rights are now in litigation and a complete history of them is therefore inadvisable. The facts stated above, however, are of record and available to whomever is interested and the problems they suggest, both legal and practical, are fairly obvious. We nevertheless add a paraphrase of a summary of that history and its possible effects made in 1932 by the City Attorney at the request of Commissioner Keyser:

"In 1900 we had a right to 34,000 acre feet of water from Utah Lake which long since ought to have become impregnable established. We had absolute equality as against the other primary users. We had the unquestioned right to use the lake as a reservoir and conserve our supply in accordance with our probable necessities and good business practice. We had a right unquestioned, superior to that of any of those whose demands now jeopardize our interests and put us to the hazard of dangerous litigation. In 1910 it was asserted that our 34,000 acre feet was cut to 36,000. It is now claimed that it is still further reduced, and now also our claim of equality with the other users is being ignored. The lake has to some extent been used as a reservoir, but depletion has been permitted, largely by subsequent rights, and is again threatened. Secondary users during periods of shortages have asserted and are now asserting a right which, in result at
least, denies our priority. The next step may well be an assertion of our inferiority.

"Beyond doubt the right of Salt Lake City with respect to the waters of Utah Lake has been the subject of gross neglect during the last 20 years. It may be seriously questioned if it is now too late to accomplish any substantial good other than the definite ascertainment of the extent of our supply from this source. Even that will be well worth while, for it will enable the future to be faced and met with a clear understanding of our problems and obligations."

Whether that criticism was justifiable or not, it cannot be repeated as to the ensuing period, for, since it was made, the City's Utah Lake rights have, of necessity, been the subject of the unremitting attention of Mr. Keyser, then and now Commissioner of Water Supply and Waterworks, and of Mr. Beers, then and now City Engineer. They have been compelled, however, to labor in this behalf under the burden of the past, under the burden of precedent and its effect; the heavy obligations of the various exchanges, for example; the establishment and necessities of subsequent appropriators; the practice of inequality, the depletion of the reservoir, and in addition, and sufficiently difficult in itself, the aggravation of the past by the present and long-continued dry cycle.

At least one thing else the present water administration has to its credit. A general adjudication suit was commenced in 1933, an action which will result in a re-definition of the City's rights in Utah Lake, and not only in Utah Lake but from its tributaries as well. The importance of this is considerable, because Utah Lake, whether rightly or wrongly, has come to be the basis of the City's water supply so far, and present supplies and uses and facilities must of course be coordinated with those of the future and, equally
of course, planning must be based upon
the knowledge of the material and its
limitations with which one has to plan.
Plans must be made on the assumption
of minimums and not as has been done,
upon maximums or upon averages.

\textbf{Nineteen Hundred Thirty Four}

The climax of the dry cycle came
in 1934, so far the worst of record. Utah
Lake receded to a lower level than ever
before, so far that a large part of the
comparatively little water remaining
was inaccessible to the existing facil-
ities. A new pumping plant and canal
had to be and was quickly constructed.
But the water shortage was not con-
fined to the Utah Lake supply; it very
seriously affected the purely municipal
supply as well. Mountain supplies
which in ordinary years were avail-
able from the exchange streams had
to be used toward the satisfaction of
exchange obligations, and, instead of
supplying them from stream flow, as
usual during the early part of the ir-
rigation season, Utah Lake water had
to be delivered at the beginning. Water
restrictions were imposed. It was a
year of real crisis.

\textbf{The Emergency Well Program}

The 1934 crisis was so acute that
the ordinary methods, the doing this
year what reasonable foresight dictated years before, would not suffice. Something had to be done at once, something that would result in a new water supply, and not next year or even months hence, but that very summer. The Water Commissioner was deluged with suggestions but he did the one thing adequate, as nearly as anything could have been adequate, to the imminent hazard. He embarked upon a well-drilling program on a "no water no pay" basis. Nearly twenty new wells were drilled and a flow of approximately 40 cubic feet of water per second was thus brought in. The initial cost was heavy; operating expenses were heavy, and a great deal of litigation resulted, but the total expense was trifling as compared to the losses averted by this and the coordinating action of City Engineer Beers on Utah Lake.

The wells drilled that year and some wells acquired during 1931 have since been utilized to a lesser extent and steps have been taken toward the

33. One of the most productive of the emergency pump wells driven in 1934. This well produced a flow of approximately 10 cubic feet of water per second. Uncertainties of the underground water supply and the expense of pumping preclude reliance upon such wells as permanent sources.
establishment of the City's rights to the supply thus developed. This supply, however, is an emergency one only, but to that purpose invaluable.

THE LESSON OF EXPERIENCE

1934 demonstrated one fact, perhaps worth the cost—the fact that, as from the beginning water development had not kept pace with water demands. It had always lagged, had always been stimulated (and rarely without it) by the spur of necessity. The City had nearly always been on the "ragged edge," never "ahead of the game."

The experience and what might be gained from it was very well expressed by The Salt Lake Tribune:

"Salt Lake City has just passed through the greatest water crisis in history. With the aid of its wells, water restrictions, and the absence of any large fires that might have required a large supply of water, the city was able to get over the summer without great discomfort or suffering. So far, we have been fortunate. During this period of drought the city has been given the opportunity to realize the relation of water to civic existence, as well as growth and development. Always has it been known that a city is no larger than its water supply. What we have not fully comprehended is that the city's existence, to say nothing of its progress, is restricted to the low point in its supply, rather than to its normal water supply.

"This year's experience should teach that Salt Lake City must at once look into the future of its water supply and development with the idea of some permanent plan and operation."

The appropriateness and validity of these expressions is made manifest by the "Water Development, Population and Precipitation" Chart appearing on the opposite page.

VI-A. Water from an emergency well at Twenty-seventh South and Thirteenth East Streets, temporarily flowing into an irrigation canal, provides excellent washing. Later the well was connected direct to city mains.

S. L. C. Water Dept.
The Provo River Project and the Metropolitan Water District of Salt Lake City

Settlement of the Salt Lake Valley began with the establishment of individuals and communities upon the various streams where land was suitable and water readily available for irrigation, but because of the conditions surrounding pioneer life, lack of capital and the absence of long-time planning, only those waters easily and cheaply controlled were put to beneficial use, leaving flood waters to run to waste. Also almost all water sources were over-appropriated. Both agriculturalists and municipalities counted their water supplies in averages and upon stream flows of years and seasons of plenty, instead of upon a dry or minimum basis and, since floods of the spring can not be used in the summer or the average of the last ten years be utilized this year, there has always been very great hardship during every season and every year below the normal. Not only has this been the situation in the Salt Lake Valley, but elsewhere in the State.

57-B. (Below) Illustrating why an average stream-flow record is unreliable in calculating water supplies.

**HOW DROUGHT AFFECTS STREAM FLOW**

Shaded columns represent average July flow from 1928 to 1935 inclusive; solid columns represent the flow in July, 1934. All figures in second feet.
54. William R. Wallace (left), former Chairman of the Utah Water Storage Commission, who has been for many years an outstanding figure in Utah water development work. In the 1931 report covering Salt Lake Basin investigations, the United States Bureau of Reclamation, through Engineer E. O. Larson, pays especial tribute to Mr. Wallace for his "unflagging interest and encouragement" in promoting the Provo River Project.

55. E. O. Larson (below), formerly engineer in charge of the Salt Lake City office of the United States Bureau of Reclamation, now Construction Engineer of the Provo River Project which stands a monument to his vision.

S. L. Tribune
For many years, commencing about 1920, the United States Reclamation Bureau, in cooperation with the State of Utah (represented by the Utah Water Storage Commission, under the leadership of W. R. Wallace), had been planning the ultimate beneficial use of all the waters of the Great Salt Lake Basin, supplemented by transmountain diversion of the surplus waters of the Duchesne and Weber Rivers. Each unit was so planned as not to interfere with the completed whole. The Echo unit of the Weber River, the Hyrum unit of Little Bear River, the Pine View unit on the Ogden River, and the Ephraim unit in Sanpete County had already been constructed. The Strawberry Project, completed some twenty years ago, fits into the general plan.

**Outline of Project Plan**

In the latter part of 1931 E. O. Larson, District Engineer of the United States Bureau of Reclamation, rendered to the Bureau his first complete report on the Provo River Project, the largest unit of this general plan. That project, of which we shall give the detail later on (See page 68) included two divisions, the Deer Creek Division and the Utah Lake Division.

The Utah Lake Division contemplates the diking of Utah Lake in such manner as to confine a large part of its waters now spread over a shallow area of 97,000 acres, into a much smaller and deeper enclosure, and thus the saving of the loss by evaporation due to the present wide extent and shallowness of the lake.

The Deer Creek Division contemplates the construction of a dam with a capacity of 150,000 acre feet on the Provo River and the storage there of the flood waters of the Duchesne River, the flood waters of the Weber River and waters of the Weber River which pass through the plants of the Utah Power & Light Company and thence into Great Salt Lake.

The plan as reported by Mr. Larson required a substantial participation in the interest of Salt Lake City and others of some lesser extent by relatively small municipalities in Salt Lake County and Utah County.

The Project cost was estimated, as to the Deer Creek Division, at $7,600,000, and as to the Utah Lake Division at $2,374,000; all to be advanced by the Federal Government and to be repaid in 40 equal annual installments without interest.

It was possibly fortunate, as we have already suggested, that this occurred during a time of shortage of long duration, for that circumstance insured not only prompt but continued interest and action toward the consummation either of that plan or some other of similar effect.

**Early Municipal Interest**

But however that may be, the Government proposal received the prompt interest
and scrutiny of the civic authorities, and in October of 1934 City Engineer Beers delivered to Mayor Marcus his written report recommending, upon certain conditions, that the City subscribe for 44,000 acre feet of the water supply to be developed from the Deer Creek Division. His conclusions were stated in part as follows:

"In order to adequately provide for the future water supply of Salt Lake City, it is essential that a definite plan should be adopted, so that necessary provisions for delivery of such water to the City may be made sufficiently in advance of its actual need, to prevent any serious future water shortage.

"The City is interested in the Deer Creek Project primarily for the purpose of determining to what extent and at what price water can be obtained for future needs; and it is evident, without any extensive investigations, that if water in sufficient quantity can be obtained from the Deer Creek Project, it will be cheaper than a similar quantity obtained from any other source."

Preliminary Work

From then on preliminary work on the Project was carried forward by representatives of varied interests. W. R. Wallace and C. C. Parsons of Salt Lake City, John D. Rice of the Attorney General's staff, Fisher Harris, City Attorney of Salt Lake City, A. V. Watkins of Provo, Abel John Evans of Lehi, J. W. Gillman of Provo, and Louis Marcus, Mayor, and George D. Keyser, Water Commissioner, of Salt Lake City, were all active in this work.

57. Map of Provo River Project, showing areas irrigated or proposed for irrigation under the main project divisions.

Bureau of Reclamation

[Map of Provo River Project]
PROVO RIVER WATER USERS ASSOCIATION

- 100,000 shares of stock (one acre-foot of water per share)
- Owns, operates, and maintains Deer Creek Reservoir & Canal System

BOARD OF ELEVEN DIRECTORS

EXECUTIVE COMMITTEE
- Fisher Harris
- J.W. Gillman
- W.D. Beers
- S.O. Bennion

SUBSCRIPTION CONTRACTS

- M.W.D. of Salt Lake City owns 100%
  - Distribution of water
  - Industrial, irrigation & culinary

- M.W.D. of Salt Lake City
  - 40,000 shares
    - Industrial, irrigation & culinary

- M.W.D. of Provo
  - 80,000 shares
    - Irrigation uses
  - Industrial, irrigation & culinary

- M.W.D. of Oquirrh
  - 500 shares
    - Industrial, irrigation & culinary

- M.W.D. of Salt Lake Dist. Co.
  - 8200 shares
    - Irrigation uses
  - Industrial, irrigation & culinary

- Utah Lake Dist. Co.
  - 4200 shares
    - Irrigation uses
  - Industrial, irrigation & culinary

- Highland Cons. Dist.
  - 500 shares
    - Irrigation uses
  - Industrial, irrigation & culinary

- Pending
  - Qualified 6,790 shares
  - Industrial, irrigation & culinary

- M.W.D. of Orem
  - 2500 shares
    - Industrial, irrigation & culinary

- M.W.D. of Provo Users Co.
  - 500 shares
    - Industrial, irrigation & culinary

- M.W.D. of Ogden
  - 500 shares
    - Industrial, irrigation & culinary

- M.W.D. of Pl. Gr. & Lindon
  - 500 shares
    - Industrial, irrigation & culinary

CONTRACTUAL OPERATING RELATIONSHIPS of the PROVO RIVER PROJECT
METROPOLITAN WATER DISTRICT OF SALT LAKE CITY
Jan. 1, 1942 H.C.G.
In the dissemination of information and the creation of the necessary public interest, The Salt Lake Tribune, The Telegram and The Deseret News were invaluable.

**Organization of Provo River Water Users Association**

The Reclamation Bureau plan demanded one contracting entity, one water users association, primarily responsible to the Federal Government for the repayment of project costs and ultimately responsible for the operation and maintenance of the project works, with the actual water users as subscribers to its capital stock. The organization plan as it has developed, substantially as first outlined, is shown graphically on the preceding page.

In order to meet this requirement a committee consisting of A. V. Watkins, Abel John Evans, E. A. Jacob and Fisher Harris was appointed to formulate and submit articles of incorporation of the Provo River Water Users Association.

This was completed and accepted on May 2, 1935 and the Association became a corporation with the following as incorporators and its first board of directors: Lawrence M. Atwood, W. D. Beers, A. J. Evans, J. W. Gillman, George D. Keyser, Fisher Harris, Louis Marcus, Virgil H. Peterson, A. V. Watkins, Walter P. Whitehead, and H. Clay Cummings.

The first officers were Louis Marcus, President; J. W. Gillman, Vice President; and E. A. Jacob, Secretary-Treasurer.

Four of the original incorporators, J. W. Gillman, Walter P. Whitehead, W. D. Beers, and Fisher Harris, are still members of the Board. Mr. Gillman is now the President, and Chairman of the Executive Committee; E. A. Jacob is still Secretary-Treasurer, and W. D. Beers, then and now City Engineer, and Fisher Harris, then City Attorney and now Counsel for the Water District, are directors and members of the Executive Committee with S. O. Bennion, who since 1938 has been a director representative of Utah Lake Distributing Company, A. V. Watkins, one of the original incorporators, is the Association Counsel.

Three of the other directors of the Association are S. A. Kennedy, who has served as such and as a director of the Metropolitan Water District of Salt Lake City since 1935; J. A. Nelson.
who has been a director and Controller of the District since 1935, and Blair Richardson, Chairman of the District’s Board of Directors.

We mention these facts in passing because they are an example in practice of one of the basic concepts of the Metropolitan Water District of Salt Lake City—continuity of service, of experience, responsibility and interest, and because they indicate also the close relationship between the Association and the Water District, its largest stockholder.

**The Metropolitan Water District Idea**

District Engineer E. O. Larson in his 1931 report suggested the formation of a Metropolitan Water District modeled upon the Metropolitan Water District of Southern California—not entirely for the reasons which afterwards led to that result, but primarily as a project subscriber representing the several and common interests of "East Salt Lake Valley" users, then proposed to include not only Salt Lake City but also Midvale and Sandy and "East Valley" agricultural interests. But there were other reasons which prompted that result. It soon became evident to the "Ways and Means" Committee composed of W. R. Wallace, John D. Rice, C. C. Parsons, and Fisher Harris, that there were insuperable legal obstacles to the making of a subscription to the project by Salt Lake City and that to serve its purpose some new public entity would have to be created. They agreed upon a public corporation of the nature suggested by Mr. Larson.

This decision coincided with the crystallization of a public sentiment which had been expressed by both The Salt Lake Tribune and The Deseret News some months before:

"The Salt Lake Tribune doubts the feasibility of any ... water program and its proper operation under existing organization. We believe an independent water board, with a majority membership which holds

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61. Henry H. Blood, Governor of Utah from 1932 to 1940, who was active in aid of the Provo River Project and the Metropolitan Water District of Salt Lake City.
over from year to year is vital to any well-rounded and continuous program. We know that the present system which brings periodical changes in the administration of the water system and attendant changes in policy and viewpoint is responsible for a large part of our present difficulty.” (The Salt Lake Tribune)

“In this city there is a need for the water problem to be under the care and general direction of a non-partisan board, appointed by the city fathers, but with long-term of office, not changing with each administration but alternately so that the continuity of the board and its plans is maintained. Water problems must be studied years in advance and a change of administration should not throw the water department as far as its long view policy is concerned into confusion. In this manner it is manifestly better for the citizens to decide on whether they need a water board.” (The Deseret News)

Preparation and Passage of the “Metropolitan Water District Act”

The first draft of the Metropolitan Water District Act was prepared by C. C. Parsons and was afterwards amended in some particulars by A. V. Watkins and Fisher Harris. It was introduced in the Legislature by Grant Macfarlane, then a member of that body and a member of the City’s legal department. It was strongly recommended by Governor Henry H. Blood, and became a law in the form presented, on March 15, 1935. (Chapter 140, Laws of Utah 1935.)

The Act Sustained by the Supreme Court of Utah

It was deemed advisable before taking any action under this act to have its validity in every respect passed upon by the highest court of

39. Editorial discussion of City-Water District relationships, by The Salt Lake Tribune of February 15, 1936. The basis of this relationship was established by the Utah Supreme Court in a decision rendered July 16, 1936.

The Salt Lake Tribune

For Unity of Purpose

IF THERE is any one thing which has come out of recent discussions of the Salt Lake City water program it is an understanding that close cooperation between Salt Lake City and the metropolitan water district is of the utmost necessity. Under existing laws and statutes, one cannot function without the other and, because of this, they must work together, while recognizing and maintaining their separate identities.

Salt Lake City, by the law and the constitution, is prohibited from selling or leasing its water resources to the metropolitan district. On the other hand, it is more or less apparent that Salt Lake City has reached the end of its rope, so far as it can finance water projects of any considerable proportions for the future. If either one or both should attempt to function without regard for the other, the whole water program would be doomed to serious delay, if not absolute failure.

It is apparent that the metropolitan water district alone can raise the funds necessary for major water expansion and improvements. With a direct obligation to the people, it, of course, would want to exercise immediate supervision over the expenditure of funds raised by it. It could ill afford to assume the position that it was merely raising funds with which the city might purchase new water. On the other hand, the city officials could not afford to abandon an interest, the responsibility for which is placed upon them directly by the law.

In the light of this situation, it is pleasing to note that both the city and the district have assured each other of their willingness to cooperate in the main project of enlarging and improving the Salt Lake City water supply. Mayor E. H. Erwin, on behalf of the commission, assured the board that it would cooperate to the fullest extent, without assuming to dictate the action which the district may take or the personnel it may select. The district board, in return, iterates a desire to cooperate with the city commission and courts any suggestions which the city may desire to offer.

This, at least, provides the basis for a harmonious working organization, which is the first assurance to the citizenship, that of obtaining water for Salt Lake City, will not be neglected or made subservient to political expediency. With this unity of purpose and a sincere effort on the part of all those engaged in this work, whether employed by the city or the district, Salt Lake City soon should be on the way to a well-ordered solution of existing water problems, particularly as they apply to the future needs of the city.
the state, and to that end there was commenced in the Supreme Court a proceeding by which was raised every question which it was thought might be raised touching its constitutionality. The questions thus presented were ably briefed and argued—as against the act, by Athol Rawlins of Salt Lake City, and in favor of its validity, by A. V. Watkins of Provo.

On July 16, 1933, the Supreme Court rendered its decision upholding the Act as against every contention urged against it.

It had been most strongly urged that in spite of the express declaration therein that when organized a metropolitan water district would be "a separate and independent political corporate entity" it would in fact be either a municipal corporation or a subdivision or "dummy" of a municipal corporation, and this, it was said, was especially so in those cases where the District embraced the area of only one city; and hence that the act was invalid because it permitted the doing of acts which neither a municipality or a subdivision of a county or a municipal corporation could legally do.

In regard to this the Supreme Court held that it would be neither a municipal corporation nor a subdivision of one or of a county: that the coincidence of physical boundaries was of no significance to the matter of identity, any more than in case of a school district; that a metropolitan water district when organized under the act, whether composed of the area of only one city or of severnal, was, as the act itself specifically provided, "a separate and independent political entity, separate and distinct from the city or cities included within its jurisdiction."

"It is connected with the cities and towns which are included within its territorial limits over which it operates but it is entirely distinct from any of those entities. While its activities embrace the same portion of the earth's surface as do those of the cities and towns which are included within its confines, that does not make it a mere combination or addition of a city and town entities."

ANALYSIS OF THE METROPOLITAN WATER DISTRICT ACT

Purposes

The act provides that metropolitan water districts may be organized for the purpose of acquiring, appropriating, developing, storing, selling, leasing and distributing water for, and devoting water to, municipal and domestic purposes, irrigation, power, milling, manufacturing, mining, metallurgical and any and all other beneficial uses, and such districts may be formed of the territory included, which need not be contiguous.

Toward the accomplishments of those general purposes the District is vested with power:

General Powers

To take by grant, purchase, bequest, devise or lease, and to hold, enjoy, lease, sell, encumber, alien or otherwise dispose of, water, water works, water rights and sources of water supply, and any and all real and personal property of any kind within or without the district and within and without the state necessary or convenient to the full exercise of its powers; also to acquire, construct or
operate, control and use any and all works, facilities and means necessary or convenient to the exercise of its powers; also to acquire, construct or operate, control and use any and all works, facilities and means necessary or convenient to the exercise of its powers, both within and without and within or without the district and within and without the state, and to do and perform any and all things necessary or convenient to the full exercise of the powers herein granted.

Power of Eminent Domain
It is vested with the power of eminent domain.

May Utilize Public Property
It may construct and maintain works and establish and maintain facilities across or along any public street or highway and in, upon or over any vacant public lands which public lands are now, or may become, the property of the State of Utah, and it may construct works and establish and maintain facilities across any stream of water or water course.

May Borrow Money
It may borrow money and incur indebtedness not to exceed 10 per cent of the value of the taxable property within the District.

Power of Taxation
It may levy and collect taxes for the purposes of carrying on the operations and paying the obligations of the district, without limitations so far as necessary to the payment of an obligation due the United States, but otherwise not in excess of twenty-five cents on each one hundred dollars of assessed valuation.

May Employ Assistance
It may enter into contracts, employ and retain personal services and employ laborers: create, establish and maintain such offices and positions as shall be necessary and convenient for the transaction of its business.

Join With Others
It may join with one or more other corporations public or private for the purpose of carrying out any of its powers, and for that purpose it may contract with another corporation or corporations for the purpose of financing acquisitions, constructions and operations, and obligate itself severally or jointly with them.

Broad Powers
It is expressly authorized to acquire water and water rights within or without the state; to develop, store and transport water; to subscribe for, purchase and acquire stock in canal companies, water companies and water users associations; to provide, sell, lease and deliver water for municipal and domestic purposes, irrigation, power, milling, manufacturing, mining, metallurgical and any and all other beneficial uses; to fix the rates therefor, and to acquire, construct, operate and maintain any and all works, facilities, improvements and property necessary or convenient therefor.

Field of Primary Interest
An important provision of the law is that in the sale, leasing and delivery
of water preference shall always be given to the water requirements within the district and the supplying of water to purchasers or users without the district shall, in every case be subject to the paramount right of the district to discontinue the same, in whole or in part, and to take and hold, or to provide, sell and deliver, water for beneficial uses within the district, upon one year’s written notice to the purchaser or user without the district.

Each city, the area of which is a part of all or any district, is given preferential right to purchase from the district for distribution by it for domestic, municipal and other beneficial uses within such city, a portion of the water served by the district which shall, from time to time, bear the same ratio to all of the water supply of the district as the total accumulation of amounts paid by such city to the district on tax assessments and otherwise, excepting purchase of water, toward the capital cost and operating expense of the district’s works, shall bear to the total payments received by the district on account of tax assessments and otherwise, excepting purchase of water, toward such capital cost and operating expense.

Must Pay Expenses from Income

Another provision worthy of special attention is that requiring the Board of Directors to fix such rates for water furnished as will pay the operating expenses of the District, provide for repairs and depreciation of works owned or operated by it, pay the interest on any bonded or other debt, and, so far as practicable, provide a sinking or other fund for the payment of the principal of such debt as the same may become due; “it being the intention of this section to require the District to pay the interest and principal of its indebtedness from the revenues of such district, so far as practicable.”

Civil Service

The Board of Directors may prescribe by ordinance a system of civil service.

Proposal to Create Metropolitan Water District Submitted to the Electors

The Metropolitan Water District Act provides for the incorporation of a District upon the initiative of the governing body of some municipality, and accordingly the Board of Commissioners of Salt Lake City passed an ordinance by which it declared, in the language of the Act, that the public convenience and necessity required the incorporation of a metropolitan water district; that it was proposed to incorporate one which should include the area of the city of Salt Lake City only; that when organized it should be known as the Metropolitan Water District of Salt Lake City; and, as provided by the Act, an election was called by which the proposal was submitted to the decision of the electors of Salt Lake City on August 15, 1933.

The People Are Informed of Purpose and Effect of Proposal

In the meantime, by the public press and by public gatherings and speeches, the people were informed of the reasons and effects of the proposal submitted to their judgment.
It was explained that while the organization of the Metropolitan Water District would make possible a participation in the Provo River Project, impossible without it, that no commitment to that purpose had been made or would be unless or until after a complete investigation demonstrated the propriety of that action. In regard to this the City Attorney said at a public meeting on August 1, 1935:

"I am assuming, of course, that the water district directors will not enter the project until they have satisfied themselves of its soundness."

and on August 3, Mayor Louis Marcus explained:

"Voting for a water district does not mean that the city will be obligated to participate in Deer Creek, or the Utah Lake diking project or to impose a tax levy of one mill on the taxpayers for construction of a $4,000,000 aqueduct to serve Salt Lake City.

"Voting favorably August 15 would merely mean that Salt Lake City will put itself in a legal position to do so, if it wants to."—The Salt Lake Tribune

On August 14, 1935 The Salt Lake Tribune was equally clear on this question:

"The question of where additional supplies are to come from is not at issue at this time. Nevertheless, the general purpose of the special election is to put the city in a position to avail itself of more water. While some points in the possibilities of the election are seriously questioned, there is no dispute concerning the apparent need for additional city water. Both proponents and opponents agree that more water is needed if the population possibilities are to be advanced."

It was also made perfectly clear that while the possibility of participation in the Provo River Project was the immediate occasion for the organi-

62. Cover sheet of pamphlet issued by the City in connection with the 1935 Metropolitan Water District election.
long-range programs can be launched and finished with ultimate low costs.

"Salt Lake City's water system now is a patchwork proposition," Mr. Harris said, "because nothing has ever been done to improve it until an emergency arose."

"Many of the obstacles which now prevent a city water commissioner from launching long-range projects would be removed by the district, he pointed out."

The Chamber of Commerce of Salt Lake City urged a favorable vote on the proposal, on the ground that "creation of a metropolitan water district is a prerequisite to the establishment of a future water supply policy."

And again, Mayor Marcus said: "If you vote in favor of a metropolitan water district on the 15th, you will not be voting to tax yourselves, but merely to create the district, which can then function to obtain the necessary water supply from Deer Creek or elsewhere."

And again: "The primary purpose of creating a district is to place the city in a position where it can increase its water supply at any time in the future."

Mr. Grant Macfarlane, then a member of the City's legal department and the member of the state legislature who introduced the Metropolitan Water District Act, said: "The Metropolitan Water District will be a public corporation. Its main objectives are to acquire additional water sources, water rights, reservoirs, and diversion works for the benefit of the inhabitants of Salt Lake City. It will provide a per-
permanent water committee to study the future needs for the water development of Salt Lake City."

The most clear-cut statement of this point of view was that of The Salt Lake Tribune of August 14, 1935:

"Qualified voters of Salt Lake City next Thursday will determine whether or not they will put the city in a position to work an orderly water development program or whether they will insist that the hit and miss policies of the past will continue. In this week’s election there is but one issue, and that is whether or not the city shall organize a water district to administer municipal water affairs and resources.

"More water is needed, and the only question at issue is whether the city will get it through this form of organization or some other. The fact of the matter is that close investigation seems to reveal that there is no other way of adding materially to the water supply of Salt Lake City. In no other way can the city hope to obtain federal or private funds with which to conduct an adequate program for the future.

"In the recent negotiations with regard to Deer Creek, we found that the city could not participate without some such preliminary action as is now proposed. The same thing would hold true of any other supply which could add materially to existing resources, whether they were to be financed by private or public funds."

The editorial went on to say:

"We are not alarmed by the fact that this board will be named by the city commission. We have enough confidence in the commission and the integrity of the electorate to believe that this plan has as many advantages as disadvantages. It is to be borne in mind by the public that Salt Lake City is not disposing of its water resources, is not selling them or giving them away. Section 6 of article 12 of the constitution prohibits any such departure, and so we are to conclude that the proposed departure is primarily one of administration and one that is designed to improve the situation, rather than to add to existing woes.

"The Salt Lake Tribune believes that the metropolitan water district is a step in the right direction, that it points the way to the ultimate solution of our water problem and for that reason urges support of the project at the election on Thursday. In reality, the proposed district is nothing more nor less than the answer to the criticisms of the past and a response to the public urge for a water unit which could have consistent and enduring policies and objectives, and at the same time bear the attributes of a utility which could and would return a profit on its operation. When we stop to consider that city water purchases are largely for resale to the consuming public, there is little to fear if its business possibilities are competently managed and directed."
The Opposition

Opposition to the proposal centered in what came to be known as the “Property Owners Investigating Committee.” This organization sought to defeat the proposal on the grounds that the board of directors of the district would degenerate into “political dummies,” “a tool of politicians”; that the possibility of participation in the Provo River Project need not be considered but that instead, “local sources” ought to be looked to, such as further development of artesian waters, additional acquisitions of mountain stream water, and the purchase of water issuing from the Spiro tunnel near Park City.

The issues were thus clearly and sharply defined and were argued on both sides over a considerable period of time before almost every public and civic body interested in the welfare of the community, and all opinions and the statements on both sides were widely publicized in the public press.

The Electors Create Water District

The election was held on August 15, 1935, and a majority of the electors of Salt Lake City who voted on the proposal voted in favor of it, with the result that on August 30, 1935 a certificate of incorporation was issued by the Secretary of State incorporating the Metropolitan District of Salt Lake City.

The Board of Directors of the Metropolitan Water District of Salt Lake City

The Metropolitan Water District Act left it open to the Board of Commissioners of Salt Lake City prescribe the number, character, and tenure of office of the District’s directors. That was the next subject of interest and consideration of both the Commission and the public. On this the Salt Lake Telegram commented editorially on August 24, 1935, and well expressed the attitude and point of view of both the Commissioners and the public generally:

“In the appointment of a board of directors for the Salt Lake City water district, recently authorized by the electorate, Mayor Louis Marcus faces a vital task. On his selection will depend, in a large measure, the success or failure of the project.

“No more intricate problem confronts Salt Lake City than that pertaining to its water supply. Our water history is not calculated to create any degree of civic pride. One mistake has been piled on another with the result that the new board will have to accept a lot of ancient difficulties as well as current responsibilities.

“... The selection of technical help ought to be the function and the prerogative of the new board.”

A city ordinance on this subject was passed by the Board of Commissioners on September 11, 1935, which set up a directorate of seven members, one of whom it was provided should be
the Commissioner of Water Supply and Waterworks, and the other six of whom were to be men of the highest integrity and ability, to be selected without regard to political affiliation.

Two of the first directors were appointed to serve for two years, two for four years and two for six years. All subsequent appointments were for six years. This in order that there be at all times at least four directors who had served at least four years, and so that their term of office would exceed that of the members of the Board of Commissioners and thus that their appointment should be as little as possible related to political affairs.

THE FIRST BOARD OF DIRECTORS

The first directors appointed were: Herbert S. Auerbach, Samuel A. Kennedy, J. A. Nelson, Phil J. Purcell, Robert L. Judd, and George A. Critchlow. George D. Keyser, Commissioner of Water Supply and Waterworks was ex officio the seventh member.

Mr. Auerbach served on the board from 1935 to 1941, was succeeded by Blair J. Purcell, now chairman. Mr. Auerbach served as treasurer from 1935 to 1941, succeeded by George W. Nelson, who held that office from 1941 to 1947. Mr. Snyder has held the

Public Comment upon District's Board of Directors

Commenting upon these appointments and the functions of the Board, The Salt Lake Tribune said on October 12, 1935:

"Mayor Marcus is to be commended for the type of citizenship chosen to direct the destinies of the newly created metropolitan water district. The six men selected for directorships, Herbert S. Auerbach, J. A. Nelson, Robert L. Judd, George A. Critchlow, Samuel A. Kennedy, and Phil J. Purcell, command the utmost public confidence. Each of them is outstanding in his chosen

64. Herbert S. Auerbach, First Chairman of the Board of Directors of the Metropolitan Water District of Salt Lake City. Mr. Auerbach was a member of the Board from its organization in October, 1935, to April, 1941.
OFFICERS AND EMPLOYEES
OF THE
METROPOLITAN WATER
DISTRICT OF SALT LAKE CITY

Blair Richardson (upper center), Chairman of the Board of Directors.
S. A. Kennedy (upper left), Vice Chairman and Director.
J. A. Nelson (upper right), Controller and Director.
George W. Snyder (left center), Secretary-Treasurer and Director.
George D. Keyser (right center), City Commissioner of Waterworks and Water Supply, and ex officio Director.
Fisher Harris (lower left), General Counsel and Manager.
Hampton C. Godbe (lower center), Executive Secretary and Assistant Controller.
Emma F. Beck (lower right), Assistant Secretary.
RELATION BETWEEN
WATER DEVELOPMENT
AND
POPULATION AND PRECIPITATION

Population Curve

Precipitation at Salt Lake City

Average Precipitation (in.)

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Water development
- St. Marys Canal
- Parleys Reservoir
- Little Cottonwood Canal
- Salt Lake City
- Ogden Canal
- Goodland Canal
- Cottonwood Canal
- 3rd Canal
- 4th Canal
- 5th Canal
- 6th Canal
- 7th Canal
- 8th Canal

Population growth
- 1874
- 1875
- 1876
- 1877
- 1878
- 1879
- 1880
- 1881
- 1882
- 1883

Precipitation
- 1874
- 1875
- 1876
- 1877
- 1878
- 1879
- 1880
- 1881
- 1882
- 1883
field and each one has been eminently successful in private affairs. In short, the personnel of the board is such as the public might expect to work out a reasonable solution of the city’s water problem.

“Salt Lake City, therefore, has made an excellent beginning in water reform. How far the board may go in the ultimate solution of Salt Lake City’s problem will depend upon the determination of the board members and the degree of cooperation which is extended by the city itself.

“Mayor Marcus says:

"It is to be hoped that they (the directors) will largely determine the policies of the water department of the city. I am sure eventually the policies they adopt will be adopted by the water department.”"

A similar point of view was expressed by Mayor Marcus on many other occasions and by the Commissioner of Water Supply and Works, Mr. Keyser; Mr. Keyser saying that “We can’t ask the Board to be responsible for acquiring water if it hasn’t the power to say how water shall be distributed and how much shall be charged for it.”

Mr. Keyser also expressed the point of view that water administration should be under civil service. He said, “The success or failure of water development plans depend on their being initiated over a long period of time. As it now stands, any program, regardless of how economically it may be planned, is liable to be thrown out merely by a change of administration, at great ultimate expense to the city. This is a condition that must be remedied. It is too costly to train a person in all the technicalities of water administration and then have him summarily removed by a change of officers.”

IMMEDIATE PROBLEMS AND WORK OF THE DISTRICT

Immediately upon its organization the Board of Directors of the District commenced the work it was created to accomplish. While not committed to any particular project but rather to ends both immediate and remote—the immediate end of acquiring a water supply for the present and near future, and a future relatively distant, and a more remote end of planning for a long-time inter-related and continuous development—it nevertheless was the most active agency in working out the many relationships necessary to the Provo River Project, so that if that should turn out, as most supposed, to be the most desirable source of a long-time water supply it would be, and would in advance be known to be, in all of its aspects, of a form and substance most nearly acceptable.
Preliminary Interest in the Provo River Project

It was for these reasons that, though not committed, the employees and officers of the District worked with the officers and employees of the Provo River Water Users Association and with the Bureau of Reclamation in the preparation of the "Deer Creek Repayment Contract," the fundamental contract to be executed by the Association and the United States, the contract defining the rights and obligations of the ultimate project owner and its stockholders, the project works and water rights, their costs and financing, the terms and methods of repayment and the like. They worked also upon the Subscription Contracts and the various forms of security and other agreements demanded by the government.

All of these were of a complexity and variety without precedent, both because of the unusual complexity of the project itself and because of the number and variety of the different interests expected to be finally associated, interests separate and distinct but also inter-related.

This work was carried on by directors George A. Critchlow and Robert L. Judd, and by A. V. Watkins, J. T. Hammond, Jr., and Fisher Harris. The "Repayment Contract" was finally agreed upon and executed on June 27, 1936. (See page 80 for detail.)

Organization of Utah Lake Water Users Association

In the meantime, the Metropolitan Water District interested itself and was the most active agency in the organization of the Utah Lake Water Users Association, a corporation which it was planned would and which probably ultimately will serve the same purpose and fulfill substantially the same functions relative to the Utah Lake Division of the Project as the Provo River Water Users Association does as to the Deer Creek Division. The work-

66. Water at Brighton, at the head of Big Cottonwood canyon. A water measurement is being made at a point below Silver Lake.

ing out of that organization was carried on by the same persons and by representatives of the "Associated Canal Companies," water users from Utah Lake. The Articles were filed on December 11, 1935.

Since then, until recently, this division of the Provo River Project has received comparatively little attention. This has been largely due to lack of cooperation among Utah Lake water users, the pending Utah Lake general adjudication suit and the fact that due to the pressing necessities of the Deer Creek Division beneficiaries the Bureau of Reclamation desired that division to be commenced first.

The Utah Lake Division, however, ought to be constructed and doubtless will be. By means of it some 60,000 acre feet of water will be conserved at a cost relatively small. It seems probable that this work will receive a new impetus from the National Defense program.

Finally it seemed advisable to the Board to seek the advice of an "outside" authority of high character and reputation; an authority from outside in order to minimize the effect of local self-interest, and of high character and reputation in order that the advice received would not only be entitled to but would receive public respect.

To that end the Board commenced negotiations with a number of engineering firms of recognized and national standing in the field of water resources planning and development and ultimately fixed upon the firm of Alford, Burdick & Howson, of Chicago, an engineering firm which had performed similar services for the cities of Miami, Florida; Orlando, Florida; Cleveland, Ohio; Knoxville, Tennessee; Lansing, Michigan; Niagara Falls, New York; Bloomington, Illinois; La Crosse, Wisconsin; Milwaukee, Wisconsin, and numerous others, as well as the States of Michigan, Wisconsin, Ohio, Minnesota, Pennsylvania, and New York.

**District's Board of Directors Examines All Water Sources— Obtains Services of Independent Authority**

During the first two years of the existence of the Metropolitan Water District proponents of various water projects other than the Provo River continued to urge the merits of the enterprises sponsored by them. The District's Board of Directors gave respectful and careful attention to all of these and sought as far as possible to keep an open mind until possessed of full information, and that information it obtained from all possible sources.

The "Burdick Report"

This engineering firm, after a most thorough and exhaustive examination, consideration and analysis of all the possibilities, rendered its report on August 8, 1936. It covered the field of the 1928-29 Water Advisory Board, of which City Engineer Harry Jessen was Chairman, and, in addition, other possibilities which in 1929 were not apparent as such. It had also other advantages. In 1929 the Provo River Project investigations were still under way and Mr. Larson's report was not made public until January of 1932. Then also,
The Salt Lake Telegram comments editorially upon the Water District’s decision to employ nationally recognized engineers for a survey of the water problem.

The need for a long-range water program is the most hopeful undertaking in the whole history of the city’s struggling effort to deal with this prime utility. The reservations that the subject be approached with the understanding that the interests of the city commission and the district board are identical in foreknowledge in providing a maximum of assurance against controversy and conflict as the survey is completed.

It is controversial and conflict, coupled with other factors which have muddled as many past undertakings, that the existing water situation is in such chaotic condition. Never has an intelligent long-range program been brought to a focus. Tackling the problem headlong has revealed in inestimable waste of money and unreckonable dissipation of water resources. It is regrettable to have to say it, but in all circumstances it is quite improbable that any local engineering talent, however competent, could present an acceptable solution to the problem presented. There is altogether too much unresolved past history to involve the matter.

No informed engineer or layman has at any time had ground to doubt that adequate water is available for the present and future needs of this city. On this score, the engineering firm retained by the district should encounter no difficulty in discovering where it is most advantageously obtainable and the costs involved. The most confusing element to enter into all calculations is the determination of legal questions, with respect particularly to underground waters. Another knotty problem is in getting the matter of exchanges straightened out without forcing costly and interminable litigation and without precipitating severely injurious lawsuits to the parties to the exchanges. It is of little purpose to remark now that foresight and intelligent calculation many years ago could have avoided this dire prospect.

It will be in the public interest if the projected survey may now proceed without interference of those with hobbies to promote and voice to grind. The great need of the municipality is that a competent, unbiased, unconfused and wholly dispassionate examination be made of the present confused situation and that an adequate program be worked out with sound and tolerable financial proposals. When that is laid before the public, proposals with conditions will be possible under wise-minded cooperation and collaboration between the city commission and the metropolitan water district board.

Their final conclusions were stated as follows:

“In our opinion the participation of Salt Lake City in the Deer Creek Project presents the most advantageous opportunity to augment the City’s supply that is available at the present time, for the following reasons:

1. In our opinion it will supply Salt Lake City at less annual cost than any other project.

It insures an adequate supply of water for Salt Lake City for the indefinite future.

3. The water will be cleaner than the present creek supplies and softer than any available ground water.

4. It will provide a storage reservoir capacity about twice the present yearly consumption of the City; thus permitting storage in wet years to be used in dry years.
3. It helps to augment the water supply of the region adjacent to Salt Lake City, thus increasing the population tributary to the city and thus increasing the opportunity for the city to grow.

6. The City's participation probably insures the construction of the Deer Creek Project, thereby tending to benefit the City, County and State by increasing the opportunity for the City to grow.

7. It is the first step in the utilization of Colorado River water in the Salt Lake Valley, Utah should develop these waters before they are appropriated elsewhere.

This is a semi-arid state. Water is the life blood of it. It can progress only if and as the water supply is increased. Without more water there can be no great progress. With water, progress is limited only by the resources to support population; and water will create resources, through agriculture and industry, that will benefit the State, the Salt Lake Valley, and the citizens of Salt Lake City.

The report also recommended participation in the Utah Lake Division:

Utah Lake Diking Project —

This project involves the construction of a dike subdividing Utah Lake for the purpose of diminishing the evaporation losses. This is a reclamation project designated as Utah Lake Division, Provo River Project. The present tentative contract contemplates the participation of Salt Lake City. It is proposed that Salt Lake should subscribe for 22 of the 65 proposed shares. This would cost Salt Lake City $20,000 per annum.

Charles B. Burdick, member of the firm of Alvord, Burdick & Howson, author of the "Burdick" report. This report is the result of the first independent survey of Salt Lake City's water resources and necessities by non-resident, nationally recognized engineers.
"The project is estimated to increase the normal yield of the lake 60,000 acre feet per year, of which Salt Lake City would receive about 20,000 acre feet.

"The irrigation water supply from Utah Lake is vital to the present and future water supply of the City, in that the present creek ownership constituting the major part of the present and nearly one-half of the future supply is dependent upon an adequate supply of Utah Lake water to fulfill the exchange obligations. In our opinion, these obligations can only be fully met under present conditions and future probabilities if Salt Lake City participates in this project. We recommend that this be done."

The Board of Directors Seeks Federal Aid in Financing of Aqueduct from Deer Creek Reservoir to Salt Lake City

That settled the problems of water source, but there remained another, in many respects far more difficult.

The Reclamation Bureau had at one time considered the propriety of including in the Provo River Project an aqueduct by means of which the Salt Lake City supply might be delivered to it, and upon the lands within the field of its interest. But that plan was soon rejected. It was thought that the provisions of law which permitted municipalities to participate in rec-
lamination projects at all had gone far enough, and that the Salt Lake City area might count itself sufficiently fortunate in obtaining the water supply the acquisition of which was to be financed by the federal government on terms which permitted repayment of costs over a period of 40 years without any interest payment. But as to an aqueduct—that was thought of as something quite different.

As the Chief Engineer of the Bureau of Reclamation at one time put it, “We are building no aqueducts for cities.” The City of Los Angeles, it was many times pointed out, was constructing an aqueduct at a cost of many millions of dollars raised by a bond issue, on which the interest charges were between four and five per cent, and there was no reason, so it was said, why the city of Salt Lake City could not finance an aqueduct on the same terms.

The 1928-29 Water Advisory Board report discussed the possibility and the expense of constructing a conduit from the Deer Creek reservoir to Salt Lake Valley, and it assumed that it would have to be paid for in its entirety by the municipality. The “Burdick Report” had advised participation

28. Graphic comparison of financing costs of major projects. Because no interest is charged, the Provo River Project costs are substantially smaller than of any other. This chart was originally published in the news columns of The Salt Lake Tribune.

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<th>Base and Total Cost</th>
<th>Interest</th>
<th>TOTAL</th>
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<tr>
<td>Provo River, Without</td>
<td>$187</td>
<td>$153</td>
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<td>Interest</td>
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<td>Interest</td>
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<td>Los Angeles Aqueduct</td>
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<td>Moffat Tunnel</td>
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<td>$455</td>
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<td>Hetch-Hetchy (San Francisco)</td>
<td>$285</td>
<td>$233</td>
<td>$518</td>
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Comparison of the per acre cost of water from the Deer Creek reservoir, delivered to the city, with costs of water from other major projects. The first bar represents the cost under the interest-free financing plan which is now available. The second represents what the cost would be if interest were charged. The others represent per acre cost in major projects of other cities. A financing plan of 60 years to repay with 4 per cent interest is assumed for the interest financed projects.
finance its construction and permit the repayment of costs on the same terms as the costs of other parts of the project.

It seemed at the outset that the obstacles to this result were insuperable, but even so, it was resolved to make the attempt, which, if successful, would save the taxpayers of Salt Lake City interest charges of substantially $200,000 per annum.

The first step to that end was the making of a cooperative agreement with the United States Bureau of Reclamation and the Utah Water Storage Commission for the making and financing of a survey to determine expense and engineering feasibility.

Next, on May 25, 1936 the Board commissioned Mr. George A. Critchlow, then a member of the Board and its Secretary, who had other business in the East, to call on Commissioner Page of the Bureau and urge the interests of the District, and the propriety of federal financing of the aqueduct.

Then in March, 1937, and on the same mission, they sent Mr. Fisher Harris and Mr. Leland H. Kimball, who were accompanied and greatly helped by Mr. William R. Wallace, at his own expense.

This was all preliminary work and during the month of April, 1937 the Board determined to present its case directly to the Secretary of the Interior, and to that end directed to him a carefully prepared petition containing every fact and every argument which it was thought might appeal in favor of the desired action.
SECRETARY OF INTERIOR FAVORS
FEDERAL CONSTRUCTION AND
FINANCING OF AQUEDUCT

In this work the board enlisted the aid of Governor Henry H. Blood, and during the month of June he, Congressman J. Will Robinson, and Fisher Harris presented the petition to the Secretary of the Interior and went over the entire matter with him at length, with the result that some days later the Secretary of the Interior expressed himself in writing to the effect that "the construction of facilities for delivery of water from the Deer Creek reservoir to the Salt Lake area is recognized and favored by the Department as a desirable unit in the ultimate development of the Provo River Project."

While this expression was not of binding effect, it was thought by the District's Board of Directors, accompanied as it had been, by personal assurances, to be sufficiently definite that a subscription to the project itself might be safely made, and that in due time whatever might be necessary to a final and definite and binding agreement for the aqueduct construction on reclamation terms would be accomplished.

This decision was arrived at about the time federal reclamation officials evinced their readiness to receive a subscription from the Metropolitan Water District, and accordingly steps were at once taken toward the calling of an election by which the proposal to subscribe to the project and to enter into a contract for the construction of the aqueduct would be submitted to the taxpayers within the District.

BOARD OF DIRECTORS OF DISTRICT CALLS SPECIAL ELECTION TO SUBMIT
DEER CREEK SUBSCRIPTION AND
MAKING OF AQUEDUCT CONTRACT TO TAXPAYERS OF
SALT LAKE CITY

An election for that purpose was called, as provided by the Metropolitan Water District Act, by ordinance passed by the Board of Directors of the District on September 13, 1937. The propositions submitted to the taxpayers were:

"Proposition No. 1—

"Shall the Metropolitan Water District of Salt Lake City, for the purpose of obtaining a water supply for the District, be authorized to enter into a contract by which it shall subscribe for 50,000 shares or so much thereof as may be available to subscription, of the capital stock of the Provo River Water Users Association, on the terms and conditions and for the purposes set forth in the Ordinance by which this election is called?"

"Proposition No. 2—

"Shall the Metropolitan Water District of Salt Lake City be authorized to enter into a contract with the United States of America or the Provo River Water Users Association, or both of them, for the acquisition and construction of distribution facilities for the water supply of the District, on the terms and conditions and for the purposes set forth in the Ordinance by which this election is called?"
It will be noticed that a favorable vote on proposition No. 1 would authorize a subscription for 50,000 shares of the capital stock of the Provo River Water Users Association in the event that amount might be available to subscription. The 1928-29 recommendation of the Water Advisory Board proposed 40,000 and the reports made by Alvord, Burdick & Howson and by City Engineer Beers recommended 44,000. In putting the amount to be authorized at 50,000 the Board of Directors of the District had in mind the possibility that no other large scale water project might hereafter be constructed and that it would be better to have relatively complete freedom of action, and at the same time, if any error of judgment should be made, it would be better that it be on the side of an over-subscription rather than one which might turn out to be inadequate.

**Taxpayers Informed of Purpose and Effect of Election**

The Board of Directors of the District were of the opinion that their obligation to the public would not be satisfied by a mere submission of the proposals but that the taxpayers were entitled to be furnished with all possible information, both because of the importance of the matter submitted to them and in order that they might fully comprehend the nature and extent of both the benefits and the burdens they were called upon to assume or decline.

With these things in mind the Board determined upon a campaign of education and, while they did not urge action either for or against either of the propositions, they let be known that it was their well-considered and mature judgment that the interests of this community required an affirmative vote. Accordingly, they caused to be distributed thousands of informative pamphlets; billboard advertising was resorted to; newspaper advertisements were published; motion picture trailers were used; and hundreds of speeches were made to every service and civic club of the city and at many public gatherings.
The election was conducted entirely by the District itself. It set up its own election machinery, prepared all the necessary forms, notices, instructions, ballots, etc.

A few of the means of disseminating information are shown on the following pages.

Citizens Favor Deer Creek Subscription and Aqueduct Contract

The result was that a greater number of the taxpayers of Salt Lake City voted on these proposals than have ever before voted at any special election in Salt Lake City: 13,986 voted in favor of Proposition No. 1 and 618 against it; 14,064 voted in favor of Proposition No. 2 and 616 against it.

District Subscribes for Deer Creek Water Supply

A formal subscription contract with Provo River Water Users Association calling for the purchase of 46,000 shares of its capital stock was entered into on December 1, 1937. 46,000 shares were decided upon because that number would surely satisfy every recommendation which had theretofore been made and because it was the largest subscription at that time acceptable to the Provo River Water Users Association and the Reclamation Bureau.

73. Governor Henry H. Blood and Director S. A. Kennedy of the Metropolitan Water District. This photograph was taken at a luncheon meeting during the 1937 special election.
NO MORE WATER SHORTAGES!

for WATER VOTE Yes on both questions NOVEMBER 23

NO INTEREST TO PAY! NO BONDS TO ISSUE!

THERE IS NO SUBSTITUTE FOR WATER!
Display Features of the 1937 Special Election

74. (Opposite page.) Window poster vividly reminding Salt Lake residents of past water troubles.

75. (Upper left.) Chart illustrating interest savings afforded by Reclamation Bureau financing terms.

76. (Upper right.) Billboard display.

77. (Right.) Chart illustrating Salt Lake City's increased water requirements.

78. (Lower right.) Exhibit headquarters at 121 South Main Street. Use of this space was donated by Herbert A. Snow. Similar space for a second exhibit at 340 South Main Street was donated by J. A. Hogle & Company.

79. (Lower left.) Street sign used in front of exhibit headquarters.

Bill Shipley Photos
Contract Entered into Between Metropolitan Water District of Salt Lake City and United States for Construction and Financing of Salt Lake Valley Aqueduct

There remained as a vitally important immediate objective, the consummation of a contract for the construction of the aqueduct. Preliminary to that, further and more definite federal commitments had already been obtained, in the form of statements as to the scope of the Provo River Project, made before congressional committees by Senators Thomas and King and by Congressman Robinson and Murdock.

On May 18, 1938, the board directed its counsel, Fisher Harris, to go to Washington and commence the negotiation of the necessary agreement. It was most fortunate that his arrival there coincided with the consideration by Congress of what was known as the "Work Relief Bill," which provided for the expenditure of large sums of money in public work. As far as concerned reclamation construction, funds were available only for projects already approved. It therefore turned out as having been essential that work had been done resulting in the consideration of the aqueduct as a unit of the Provo River Project. It was that which made worthwhile the efforts made at that time to have a part of the Work Relief fund allotted to the Aqueduct Division. Mr. Harris returned with a draft of the Aqueduct Contract and shortly thereafter an allotment of $2,500,000 for its construction was made by Presidential order. Following that, Chief Counsel for the Bureau of Reclamation and the Board of Directors of the District met in Salt Lake City and a formal contract was completed and executed.

It provides for the expenditure of $5,550,000, to be advanced by the United States and for repayment by the District in 40 annual installments without interest. Some detail of its provisions is given under the heading, "The Aqueduct Division" of the Provo River Project, at page 88.

Significance of Salt Lake Valley Aqueduct

This result, stated here in a few lines, was brought about only after long and persistent and carefully prepared effort. It represents an accomplishment without precedent and one the importance and significance of which cannot be exaggerated. Failure
to participate in the Provo River Project to an extent substantially as the District had, would have been equivalent to a renunciation of the ambitions of this community, to an acceptance of a philosophy of despair; because, except for the water supply which will shortly accrue from that Project, the City of Salt Lake City and the Valley of the Great Salt Lake would be "through,"—finished and done for as things of vitality, as living organisms, which, when they cease to grow, commence to decay.

It would have been difficult indeed to have renounced the water supply available from the Provo River Project, but without the Aqueduct it was many miles distant, could not have been devoted to municipal uses and, in all probability, had an aqueduct to be financed as other communities have been compelled to finance similar enterprises, it would never have been built, and with that probability in prospect the obtaining of the water supply itself would have been of doubtful advisability.

It is only financing upon Reclamation terms, the repayment of costs without interest, which makes possible to the Salt Lake valley or Utah County a water supply comparable to that of the Provo River Project.

That Project and those terms save the people of Salt Lake City annual interest charges of $140,000. The opportunity for that saving was afforded by the far-sighted and benevolent policy of the Utah Water Storage Com-

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81. Neon-lighted relief map of the Provo River Project in the 1937 special election. Two such maps, each measuring 10 feet square, were displayed, one at each of the exhibit headquarters.
Bill Shiplet.
mission and the United States Bureau of Reclamation, and the good judgment of the District's Board.

The opportunity to save annual interest charges of approximately $200,000 per annum in the financing of the aqueduct, without which the entire enterprise was of doubtful feasibility, was afforded by the foresight, the diligence and the energy of the Metropolitan Water District of Salt Lake City.

The Provo River Project

Up to this point we have given, except in a few instances, very little more than a bare outline. It is now our purpose to elaborate somewhat, to give something more of detail of the Provo River Project, the Provo River Water Users Association and the Metropolitan Water District of Salt Lake City in all of their aspects and relationships, as follows:

1. The Deer Creek Division

The Water Supply

The project water supply will come, almost entirely, from the Weber and Duchesne Rivers.

From the Duchesne River there will be diverted an annual average of about 30,000 acre feet of surplus water, and from the Weber River an annual average of 54,000 acre feet of surplus and 20,000 acre feet of "Power Water."

The Duchesne River water is entirely of "Surplus," that is water which is available during the flood season and which now flows into the Colorado and is thus lost to the State of Utah. It will be diverted from the Duchesne and to the Provo River by the six mile Duchesne Tunnel now under construction.

The Weber River water is both "Surplus" and "Power Water."

The Surplus here also is that which is now lost to beneficial use into Great Salt Lake during the high water stages of the Weber.

The "Power Water" of the Weber River is a large part of the water which has heretofore been passed for the generation of electrical energy through the power plants of the Utah Power & Light Company, and thence into Great Salt Lake. This water will be diverted to the Provo River through the Weber-Provo Diversion Canal and compensation to the Power Company will come from an augmented supply to its power plants on the Provo.

Some additional supply will come by way of exchange with Provo River and Utah Lake users. That amount of Provo River or Utah Lake water will be withheld for storage in the Deer Creek Reservoir which is equal in quantity to that by which the river and lake users are benefited by return flow and seepage of the project waters into their sources of supply after use on the project lands. This will amount in effect, to a recapture and reuse of a part of the reservoir supply.

The reservoir capacity of 150,000 acre feet permits the holding over of the surplus of one year to make good
deficiencies of another, and thus tends to insure the annual yield of 100,000 acre feet.

Physical Features
Deer Creek Dam
The Deer Creek dam, construction of which is complete, is located in Provo Canyon, about 17 miles northeast of Provo City. It will store 150,000 acre feet of water. It rises 155 feet above stream bed, and extends 1300 feet between the canyon walls at the crest elevation. It is 1000 feet wide at the base and about 55 feet wide at the roadway level. It contains about 3,000,000 cubic yards of earth and rock. The Deer Creek dam is the third largest earth-fill dam to be built by the Bureau of Reclamation. The only larger dams of this type are the Green Mountain Dam (4,356,000 cubic yards) of the Colorado-Big Thompson project, and the Vallecito Dam (5,445,000 cubic yards) of the Pine River Project, both in Colorado.

A concrete cutoff wall, with its footing extending to bedrock, 240 feet below the crest of the dam, has been constructed under the upstream portion. A similar wall is under the axis of the dam and is anchored into the abutments and the dam foundation.

During construction operations the Provo River was diverted through a concrete lined tunnel piercing the solid rock of the left abutment. The tunnel now serves as the main outlet for storage water from the reservoir.

The outlet works consist of a trashrack structure leading to a 12-foot diameter circular tunnel 441 feet long; a transition section 32 feet long approximately midway to the tunnel length, in which there have been installed two 3-foot by 6-foot high-pressure slide gates, operated by hydraulically oper-

82. A distant view, upstream, of the Deer Creek dam. In the foreground are tracks of the Denver & Rio Grande Western Railroad which formerly traversed the floor of the canyon. The old highway may also be seen on the canyon floor. This photograph was taken from the new highway, which will divert traffic directly over the top of the dam.

A.Clyde Anderson
ated hoists housed in the gate chamber overhead; a horseshoe-shaped tunnel 11 feet 6 inches high, 17 feet wide and 391 feet long in which two 72-inch diameter welded steel outlet pipes have been installed; a concrete flume 20 feet wide and 217 feet long, in which the outlet pipes are encased in concrete; and a valve house substructure at the outlet wherein structural provisions have been incorporated to permit the installation of electrical generating equipment.

A concrete lined, open channel spillway, 952 feet long, terminating in a stilling basin, is located at the right abutment. Discharge through the spillway will be controlled by two radial gates, each 21 feet long by 20 feet high. These gates will be operated only during periods of high runoff.

The dam was completed except, for oiling of the road which traverses the crest, in the autumn of 1941. The road oiling was to have been finished before the summer of 1942.

Provision has been made for the ultimate development of power possibilities.

**Relocated Railroad**

Construction of the reservoir compelled relocation of the Denver & Rio

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83. Gate chamber at Deer Creek dam, showing the valve upper-structures. The gate chamber is located inside the dam about 500 feet from outlet side, and is reached by a catwalk between the two steel outlet pipes. (See photograph No.191, page 83.) The two huge hydraulically operated valves regulate the flow of water from the reservoir into the Prado River channel below the dam.

L. Clyde Anderson
Grande Western Railroad branch line formerly traversing the entire length of the reservoir area. The new grade extends 10½ miles around the west side of the reservoir. A railroad detour along the toe of the right abutment was constructed to serve temporarily prior to completion of the relocated line.

All of the construction work on the relocated line has been completed, and the railroad now is operating over it.

**Relocated Highway**

As the railroad, the state highway formerly traversed the floor of the canyon through the reservoir site. A temporary roadway was first built to detour traffic around the damsite during construction. The portion of this road extending downstream from the dam will later be used as a stock trail to avoid congestion from the trailing of sheep across the dam. The new highway crosses the river on the crest of the dam and connects at both abutments with short sections of highway constructed under the present contract.

Other than this ¼-mile section, the road relocation is being undertaken by the Utah State Road Commission and involves a new road from a point downstream and around the east side.
85. Upstream view (above) of Deer Creek reservoir showing, at left, the partially submerged old highway, and, at right, the new highway cut into the hillside. The town of Charleston is in the far distance. Trees and other vegetation in the foreground were removed shortly after this picture was taken.

86. Close-up view (below) looking upstream, of Deer Creek dam. At left is the spillway and at lower right are the outlet works, showing the power house foundations.
Hampton C. Godbe

87. Reservoir water (above) gushes from the two by-pass pipes of the outlet works into a stilling basin at Deer Creek dam. Note the reinforcement bars already in place in preparation for construction of the power house.

88. The spillway of Deer Creek dam (below), as seen from upstream. Discharge of water through the spillway is controlled by two radial gates, each 21 feet long by 20 feet high. These gates will be operated only during periods of high runoff.

Hampton C. Godbe
of the reservoir to the town of Charleston. The project portion of the road was completed in the autumn of 1941, except for the oiling as previously detailed.

Relocation of the railroad, highway and building of the dam were let as one contract to the Rohl-Connolly Company of California. The contract price was $2,189,096.50. The contract was let on April 11, 1938, 1390 days having been allowed for completion.

Duchesne Tunnel

The Duchesne Tunnel will be about six miles long, and will divert flood waters of the Duchesne River in the Colorado River watershed, not now used or required in the Uintah Basin area, for storage in the Deer Creek reservoir. It will have a capacity of about 375 cubic feet of water per second. The outlet is about 18 miles east of the town of Kamas.

A contract for building one-half of the tunnel from the Kamas side was let to the Utah Construction Company September 11, 1940. On January 1, 1942, the contractor had excavated about 6,200 feet out of 15,800 feet. The contract allows 900 days for completion. On the basis of completed excavating the work on January 1, 1942 was about 45 per cent finished.

Construction of the upper half of the Duchesne will depend upon the final defense status of the Provo River project and the availability of steel and other construction materials.

In order to allow of some further development of water from the Colorado River watershed, this tunnel is being constructed with a capacity beyond the present needs of the Project. This capacity can be nearly doubled by concrete lining.

89. Deer Creek reservoir as seen from the top of the dam. In the center is one of the first trains to operate over the relocated railroad. The new railroad grade, extending 9½ miles around the west side of the reservoir, was one of the first units placed under construction.

Hampton C. Godbe
**The Duchesne Tunnel**

90. (Upper left) Downstream portal of the Duchesne tunnel as it appeared in September, 1941. The dump car tracks are on the floor of an excavated channel extending approximately 700 feet from the tunnel portal to the Upper Provo River channel.

91. (Upper right) Site of the Duchesne tunnel, on the Mirror Lake road, before construction.

92. (Center) Interior of the tunnel.

93. (Lower right) The Upper Provo River, at the point where the excavation channel will meet the river.

94. (Lower left) A view downstream of the excavation channel.
Weber-Provo Canal Enlargement

This canal, nine miles long, from the Weber River to the Provo, originally was constructed with a capacity of 210 second feet under a contract between the United States and the Weber River Water Users Association as a part of the Echo reservoir unit of the Salt Lake Basin project, and the right was reserved in this contract for the government to enlarge it to 1,000 second feet for diversion to the Provo River of surplus Weber River water and water now used on the Weber River for power.

Work already has been begun on enlargement of the first 1.5 mile section and on January 1, 1942, the construction was about 5 per cent complete. Some sections will be done by force account.

The canal operation was taken over by the Provo River Water Users Association about two years ago. It is now a part of the Deer Creek division and its cost has been assumed by the Provo Association. By its use in the diversion of waters of the Weber River some benefits have already accrued to irrigation subscribers and it is reasonable to expect something of really substantial effect during 1942.

Provo Reservoir Canal Enlargement

Extending along the Provo Bench in Utah County, this canal is the highest and largest canal carrying water from the Provo River. It is being enlarged from approximately 210 second feet capacity to a capacity of 550 second feet through a 23-mile distance from Provo Canyon to the Jordan Narrows. It will serve about 40,000 acres in Utah County and some lands in Salt Lake County.

The enlargement work is to be carried out during the non-irrigation season.

The Metropolitan Water District of

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95. *The Weber-Provo diversion canal, as it appeared before enlargement work began.*

Hampton C. Godke
THE PROVO RIVER PROJECT

Total Cost: $15,524,000

AQUEDUCT Division
Cost: $5,550,000
- 40.8 miles of Aqueduct to S.L. Valley
- Rights of Way
  - 3 miles Alpine-Deer Creek Tunnel
  - 7 mile Dimmered Tunnel
  - 371 miles of covered pipe-line
- Storage System
  - Deer Creek Dam $2,650,000
  - Highway Relocation $100,000
  - Railroad Relocation $600,000
  - Rights of Way $550,000

DEER CREEK Division
Cost: $7,600,000
- Examinations, Surveys and Preconstruction $185,000
- Goshen Bay Dike Section $1,954,000
- Examinations, Surveys and Channel Unit $45,000
- Jordan River Channel Unit $375,000

UTAH LAKE DIKE Division
Cost: $2,374,000
- Duchesne Tunnel $2,107,000
- Weber Provo Canal $500,000
- Provo Res. Canal $508,000

CONSTRUCTION UNITS of the PROVO RIVER PROJECT
METROPOLITAN WATER DISTRICT OF SALT LAKE CITY
Jan. 1, 1942 N.C.G.
Salt Lake City is given a specific right to 155 second feet of capacity in the enlarged canal. This will enable the District to bring irrigation water into Salt Lake Valley without pumping and without using aqueduct capacity.

**Costs, Financing and Project Administration**

**The Provo River Water Users Association**

We have already related the fact that the Government required as a condition to the construction of the Provo River Project that there be created one contracting entity directly responsible to the United States for the repayment of costs, and that in order to satisfy that requirement, as to the Deer Creek Division, the Provo River Water Users Association was organized during the year 1933.

**Capital Stock**

The capital stock of this water users association is divided into 110,000 shares of no par value. 110,000 shares was agreed upon because at the time of organization it was expected that the annual reservoir yield would be 110,000 acre feet, but since then the estimate concerning annual yield has been revised to 100,000 acre feet and, since each share of stock was intended to entitle the shareholder to one acre foot of the estimated annual supply, it has been agreed that, unless the water supply is increased, no more than a total of 100,000 shares of capital stock will be disposed of.

**Corporate Powers**

The general powers of the Association are stated in its Articles as follows:

"This corporation is organized for the purpose of purchasing, condemning, leasing or otherwise acquiring, for the purpose of selling,

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96. Westward view of the Provo Reservoir Canal. This canal, extending 25 miles from Provo Canyon to the Jordan Narrows, is to be enlarged from its present capacity of approximately 200 cubic feet per second to 350 cubic feet per second.
or otherwise disposing of, for the purpose of operating, maintaining and constructing, dams, reservoirs, canals, irrigation works, power plants, pumping plants, transmission lines, water and water rights, lands, easements, power systems, telephone systems, and other systems of communication, irrigation systems, drainage systems, and works, roads, buildings and water works, and to do any and all things, whether herein mentioned or not, necessary or incidental to the carrying out of the above purposes, or which may be necessary or incident to the enjoyment of and/or beneficial use of the property and holdings of this corporation.

“Notwithstanding anything herein contained to the contrary, water will be furnished only to the stockholders of this corporation, it being the intention of the parties hereto to form a water users’ association with all necessary, incidental and implied powers to meet the requirements of the United States Reclamation Act of June 17, 1902, and acts amendatory thereof or supplementary thereto.”

Stock Assessable

The stock of the Association is assessable. In fact, though it is possible that the Association may have other
income, it is probable and was expected that the expense of the Deer Creek Division of the Provo River Project would be met by the assessment of the Association stockholders. The Articles provide in regard to assessments that:

"Assessment against the outstanding shares of stock for the raising of revenues shall be equitably, but need not be equally, assessed.

"This provision for equitable but unequal assessments is to take care of situations where expenditures are made or are necessary for purposes that are of benefit to a part only of the stockholders; or where existing or future contracts with the United States, or the laws or regulations of the United States, now or hereafter, require unequal assessments; or where unequal assessments are required or permitted by the terms or conditions of any contract between this corporation and any stockholder."

**Stockholders**

The stockholders of the Association and their subscriptions, as recorded January 1, 1942, are:

- Metropolitan Water District of Salt Lake City: 46,000 shares
- Metropolitan Water District of American Fork: 500 shares
- Metropolitan Water District of Lehi: 500 shares
- Metropolitan Water District of Orem: 1,500 shares
- Metropolitan Water District of Pleasant Grove-Lindon: 500 shares
Metropolitan Water District of Provo 8,000 shares
Highland Conservation District 5,010 shares
Utah Lake Distributing Company 15,200 shares
Provo Reservoir Water Users Company 16,000 shares

The Deer Creek "Repayment Contract"

On June 27, 1936, the Provo River Water Users Association entered into a contract with the United States "for the construction of the Deer Creek Division of the Provo River Project."

The United States to Construct Project Works and Advance Construction Costs

This contract provides that, subject to the availability of funds, the United States will expend the sum of $7,600,000 in the construction of the works described in the contract (analysis of which begins on Page 68 under the caption "The Deer Creek Project") and that subject to compliance with the obligations assumed by it the Association shall have the right to utilize them and the water supply thus and by the project water rights made available.

Terms of Repayment

The Association agrees to repay the United States the construction cost in forty equal annual installments, commencing the year following the completion of the project works as certified by the Secretary of the Interior. There are no interest charges except in the event of delinquency.

Project Works to be Operated by Association

The project works, after completion, must be taken over by the Association and be operated at its expense when directed by the Secretary of the Interior. In the meantime the expense of operation and maintenance must be repaid the United States.

The Association Superintendent

The Association Engineer or Superintendent must be and remain a person satisfactory to the Secretary of the Interior.

Association Must Exercise All Powers Toward Payment of the United States

The Association is required to use all of its powers and resources toward the payment of its obligations to the United States, and, among other things, it must levy the necessary assessments and withhold delivery of water to those of its stockholders who may be in default.

Holdover Storage Rights of Stockholders

An important provision, and one peculiar to this contract, is that by which the stockholders are given the right of "holdover storage," the right to store in the reservoir in years of plenty, water which is not then required but which may be during the seasons or years following. This privilege, then unique in Reclamation contracts, is further defined and amplified in the Subscription Agreements and in a Supplemental Contract executed during 1957.
Association to Obtain Rights of Way

The Association is required at its own expense to negotiate for and acquire and to conduct all legal proceedings necessary to the acquisition of rights of way. The United States will advance funds for rights of way which may be acquired by agreement. Those acquired by condemnation must be paid for by the Association, which will be reimbursed by the United States to the extent of their reasonable value as determined by the Secretary. All sums paid by the United States direct or to the Association for rights of way are included in construction costs.

Public Fishing and Recreational Right Provided

The Contract provides that the public shall have the right to fish in the reservoir without charge and that lands purchased for the reservoir right of way shall be open to public recreational use.

Power Development

Either the United States or the Association, with the approval of the Secretary of the Interior, may develop the power possibilities of the project as far as that can be done consistent with the use of the water supply for other purposes.

The project will develop 2,500,000 kilowatts.

The Subscription Contracts

Each subscriber has agreed to pay to the Association, not only its proportionate share of the obligations of the Association, but such additional amounts, up to 35 per cent of its own total original obligation, as may be necessary to make good deficiencies in the payments of other stockholders. Each therefore has a direct interest in the prosperity and consequent financial resources of all others.

99. Closeup view of the Deer Creek dam spillway, showing construction about half completed.

Bureau of Reclamation
Security Given by Certain Subscribers

All stockholders except those who are public corporations executed mortgages to secure their subscription obligations. These cover all of their canal systems, lands and water rights—all of their tangible and intangible property of every nature.

Nature of Work and Problems of the Provo River Water Users Association

Past Work—Education and Organization

The first work of the Association was one of education and organization. Of the organization of the Association and of the "Repayment Contract" between it and the United States we have already told. Numerous other legal and practical relationships had to be worked out. It is not possible to give here more than a bare enumeration, and only a small part of that, but even this will afford an idea of the scope and difficulty of what has been done.

Water Districts Organized

Six separate metropolitan water districts were organized—those of Salt Lake City, Provo, Lehi, Orem, American Fork, and Pleasant Grove-Lindon.

Legal Problems and Security

In every instance the Association had to be assured of the legal and practical sufficiency of the corporate entities with which it would be called upon to deal, as subscribers and stockholders to whom it could safely look.
for the ultimate payment of its direct obligations to the United States. In addition, company subscribers were organized, their Articles re-established and amended to meet the requirements of the Federal authorities. In several cases legal problems concerning these were carried to the Supreme Court of Utah and in one instance to the Supreme Court of the United States.

New Legislation Formulated

In addition to the Metropolitan Water District Act, other legislation essential to the security of the Project water rights and to satisfy Federal requirements had to be formulated and enacted into law.

Subscription Contracts and Elections

Subscription contracts and contracts of security, of form varying as to the various kinds of subscribers, and without precedent, had to be made up, and elections and stockholders' and directors' meetings to authorize their execution had to be called and planned and the proceedings checked and supervised, and the attendant publicity and information to voters and stockholders had to be prepared and disseminated. It was arduous and exacting labor.

Weber River Winter and Power Water

One of the most important and complicated of the Association's contracts is that with the United States, Utah Power & Light Company, and Weber River Water Users Association, for the transfer and exchange of Weber River winter and power water to the Provo River and for credits in power generated. Operations under its terms are exceedingly complex. No one not a combination of a "Philadelphia Lawyer" - McCaulay - Electrical Engineer would dare to attempt a brief explanation.

101. The catwalk and outlet pipes leading from the gate chamber in the center of Deer Creek dam to the power house foundations. Generators ultimately will be attached to each of the two welded steel outlet pipes.

L. Clyde Anderson
River Water Users Association for the delivery of Echo Project water to the Provo were carried on over a period of more than a year, and a contract of purchase was finally formulated and executed by the two Associations. By this contract the Provo Association assumed an obligation amounting to $190,000.

Miscellaneous Relationships

Other contracts of importance were those with the Denver & Rio Grande Western Railroad for the removal of its track from the reservoir area and its relocation above the high water line. Another of the same purpose as to its lines was entered into with the Mountain States Telegraph and Tele-

Page 102. Weber River station of the Utah Power & Light Company. Revision of the operating plan of this plant was necessary in order to permit diversion of winter power water from the Weber River for storage in Deer Creek reservoir.
A contract was made with the United States, the State of Utah, and Wasatch County covering the removal of state and county roads from the reservoir area and their relocation above it. An agreement was effected with the State Road Commission for the crossing under the highway at the "Point of the Mountain," by the Provo Reservoir Canal enlargement. A contract was arranged with the United States, Provo Reservoir Company and the Provo River Water Users Association covering the purchase of the canal and right of way from the Provo Reservoir Company from Olmsted to the Jordan Narrows. An agreement was consummated with the United States, Provo Reservoir Water Users Company and Provo River Water Users Association covering the maintenance and operation of the Provo Reservoir Water Users Company canal which had been purchased from the old Provo Reservoir Company.
Rights of Way

Right of way matters have been extremely difficult. Approximately one-third of the most fertile and intensely cultivated areas needed for the project could not be purchased by negotiation. Under the terms of its repayment contract with the United States the Association was required to bring condemnation suits to acquire title and settle the differences in regard to compensation. Twenty-seven tracts, with an acreage of approximately 1658 acres, were involved. On most of these, suits were filed in the District Court at Heber. Four cases were actually tried, three in Wasatch County and one in Cache County. The cases in Wasatch County resulted in excessive verdicts, in the opinion of the Association, while the one in Cache was accepted as being fair.

As a result of the determined defense put up against excessive claims, fair settlements were worked out in all cases except the three in Wasatch County. Two of these, however, have been finally settled, at many thousands of dollars less than the judgments. The third is still pending. Of the 27 cases all have been settled except three, many at the appraised value, and others at slight increases accorded because they were at least one-third less than the cost of continued litigation.

This enumeration leaves out a great deal more than it includes, but nevertheless indicates the general nature and variety of the Association's work so far.
Work of the Association in Immediate Prospect

In this also, it is not possible to give more than a suggestion of the whole.

Water Rights Must be Protected and Perfected

A great deal remains to be done toward the perfection of the Association's water rights. For example, on the Weber River the unrestricted exercise of the Project rights requires the extinction of a mill right and certain small rights of domestic use. Also a number of "nuisance" water filings must be lapsed by action before the State Engineer. Preparation must be made to meet the claims of land owners along the Weber-Provo Canal that their ground water supply will be interfered with by the Canal enlargement. The Town of Kamas may resist the existence of the enlarged canal. Filings and other possibly conflicting rights on the Duchesne must be guarded against. The Provo River channel must be enlarged to accommodate the increased flow from the Weber and Duchesne which will frequently more than double the normal flow of the Provo. Rights of way for this must be acquired. Preparation must be made against upper Provo River claims of excessive losses in the transport of project waters.

The Association must see to it that the Project waters after use are recaptured for use of the Project subscribers or that they are exchanged for others.

Three right of way cases involving several thousands of dollars are pending on appeal to the Supreme Court.

All of the organization and subscription contracts must be confirmed by judicial proceedings satisfactory to the Secretary of the Interior.

Rights of way on two irrigation systems must be acquired: the Provo Reservoir Water Users Company and the Utah Lake Distributing Company.

A hundred items might be added, but an enumeration of this nature is not very enlightening except as it indicates that very much of important work must receive immediate attention and careful preparation for all eventualities.
2. The Aqueduct Division

Physical Features
Location, Capacity and Materials

The Salt Lake Aqueduct will extend 40.8 miles from the Deer Creek dam into Salt Lake Valley. It will follow the Provo River below the dam, to avoid the hazard of mud and snow slides, to the Olmsted tunnel at the mouth of Provo Canyon.

From the tunnel the aqueduct traverses the bench above the Pleasant Grove district to the Alpine-Draper tunnel, and from Draper will extend north to a reservoir near Salt Lake City. Its capacity is 150 cubic feet of water per second.

The aqueduct is constructed of reinforced concrete, precast in 20-foot segments weighing 22 to 25 tons each. The inside diameter is 60 inches, and the walls are 7 1/2 inches thick. Pipe segments are joined by use of a specially designed expansion joint utilizing a rubber gasket. Exhaustive tests indicate unusually long life for the joints, together with an exceptionally low loss by leakage and absorption. The pipe is being laid in a trench, backfilled, with a minimum of three feet of cover.

The Olmsted Tunnel

The Olmsted tunnel at the mouth of Provo Canyon is complete. It is 3600 feet long, concrete lined in horseshoe shaped sections 6 1/2 feet in diameter. It was begun in January, 1939 and completed November 15, 1939, by the George K. Thompson Company of Los Angeles, California.

Alpine-Draper Tunnel

The Alpine-Draper tunnel, 15,000 feet long, is of the same type of construction as the Olmsted tunnel and penetrates the "Point of the Mountain" between Alpine and Draper. This tunnel, also being constructed by the Thompson Company, was begun December 22, 1938 and was holed through
December 17, 1940. Concreting was completed in October, 1941.

The Thompson Company originally bid $129,087.30 for the Olmsted tunnel and $617,448 for the Alpine-Draper tunnel. The latter figure has been increased by extra work orders resulting from unforeseen difficulties in the tunnel construction due to geological conditions.

Trenching and Pipe

The contract for the first 9.1 miles was awarded to Utah Concrete Pipe Company. This company bid $322,335 on eight miles of pipe, and was later authorized to build 1.1 miles additional on orders for changes. All pipe for this distance was made at a specially constructed plant in Pleasant Grove. Work on this contract was completed in 1941. Additional contracts are to be advertised for bidding in the near future.

Aqueduct Right of Way

Work on the Aqueduct right of way was commenced on November 28, 1939, and has been continued up to the present time. So far the District has acquired title to 15 miles of right of way exclusive of a number of roads and other collateral easements. This work has involved negotiations resulting in the acquisition and clearing of the title to approximately 100 separate pieces of property, title to all of which is presently vested in the Metropolitan Water District of Salt Lake City but which eventually will be passed to the United States. The Government requires a fee title on the aqueduct line.
BUILDING THE AQUEDUCT

109. (Upper left.) Workmen assemble a 20-foot iron reinforcement cage for a section of pipe.

110. (Upper right.) A complete cage ready for hauling to the casting division for insertion into a pipe mold.

111. (Center.) Completed pipe castings.

112. (Lower left.) Giant crane lowers a 22-ton pipe section into place on the aqueduct line.

113. (Lower right.) Lifting steel mold from a newly cast pipe section at the Pleasant Grove casting plant.

All photos Bureau of Reclamation.
Building the Aqueduct

114. (Upper right.) Special 22-wheel truck-n-trailer hauls a pipe section to aqueduct line.

115. Center.) Aqueduct trench, 20 feet deep, above Pleasant Grove.

116. (Lower right.) Newly joined pipe sections ready for backfilling. The sawdust-filled tubes or "sausages" in the foreground were placed around each joint to keep out dirt during the backfilling.

117. (Upper left.) A ravine section showing track gantry by means of which pipe segments were lowered into place.

118. (Lower left.) Another view of the ravine, showing pipe in place.
The Aqueduct Tunnels

119. (Upper left.) The Olmsted tunnel as it appeared during construction, and (120, upper right), after completion. The later photograph shows a real structure, only portion of either tunnel or aqueduct now visible, being examined by Deputy County Attorney Walter M. Critchlow.

121. (Center.) Interior of the Alpine-Draper tunnel during construction.

122. (Lower right.) Draper portal of the Alpine-Draper tunnel as the final charge of concrete was placed.

123. (Lower left.) The Alpine-Draper tunnel is inspected by approximately 50 officials representing project subscribers. The visitors ride on flat cars powered by an electric locomotive.
although easements are acceptable on construction and maintenance roads and on blowoffs and turnouts.

Purchase of the aqueduct right of way has been an exceedingly difficult problem because of the fact that an unusually wide strip is required to accommodate the large pipe sections and heavy machinery necessary to handle them. In many instances a right of way 150 to 250 feet wide has been required through the center of choice orchards, irrigated farm lands or pastures, thus giving rise to many complex problems of compensation.

All negotiations for rights of way already acquired have been conducted by Mr. Hampton C. Godbe, Executive Secretary of the District. The cost has been substantially less than original estimates, and at the same time such pleasant relationships with land owners have obtained that very few condemnation suits have had to be filed.

It is estimated that approximately 500 additional tracts will have to be purchased for the remaining aqueduct line. Land purchases are about 32 per cent complete as to mileage, and about 15 per cent complete as to number of tracts. A map showing the present status of the aqueduct right of way appears on page 94.

Other Aqueduct Problems

There remains not only the additional right of way work, but the detailed engineering which must be done on the design and location of additional aqueduct units, contracts for which it is expected will be let during the present fiscal year. The final location of the line in Salt Lake Valley must be determined, and the City, the District and the Government must decide upon the location of turnouts in order to insure the best utilization of the aqueduct supply to meet various possibilities of future uses. Location, design, scope and financing of a filtration plant and the possibility of water softening treatment must be considered. Consideration must also be given to terminal reservoir facilities for the aqueduct.

The problems relating to all of these the District must approach with the idea of attaining the greatest possible flexibility of operation, the greatest possible benefits from its investment and, in accord with its fundamental objects, the results must be carefully planned and coordinated.

124. J. B. Allen, a Salt Lake County property owner, watches measurement of a spring in the course of a right of way negotiation.

Hampton C. Godbe
125. Showing the status of the Salt Lake Aqueduct on January 1, 1942. Construction is complete along the route shown by the heavy black line.
The Salt Lake Valley Aqueduct is being constructed for the exclusive benefit and at the ultimate expense of the Metropolitan Water District of Salt Lake City, under a contract between it and the United States.

The contract provides:

That, subject to the availability of appropriations, the United States will expend the sum of $5,550,000 or so much thereof as may be necessary toward the construction of an aqueduct of 150 second feet capacity.

All necessary rights of way must be acquired by the District.

The District must initiate a proceeding, satisfactory to the Secretary of the Interior, which shall result in a judicial confirmation of the Contract.

The cost of construction, the District agrees to repay the United States in 40 annual installments, without interest, following the completion of the works and the availability of the water supply to be carried by them.

The works when completed will be operated and maintained at the District's expense and for its exclusive benefit. Title, however, will remain in the United States until otherwise provided by Act of Congress.

Water supplied by the District for irrigation use outside of its territorial limits must be sold at cost as determined by the Secretary of the Interior.

Until the construction cost has been repaid in full, the District's superintendant or engineer in charge of the Aqueduct must be a person satisfactory to the Secretary of the Interior.

3. Utah Lake Division

Physical Features, Effects and Cost

The Utah Lake Dike project contemplates construction of a dike across Goshen Bay to reduce the present area of the lake from 95,900 acres to 68,500 acres at "compromise" elevation.

By reducing the area and increasing the depth of the lake, a reduction of 60,000 acre feet or more will be made in the evaporation losses which, in the past, have amounted to as much as 326,000 acre feet in one year—more than has been available for irrigation at any time since 1931.

The Goshen Bay dike will be about 71/2 miles long, 20 feet in average height, containing 3,000,000 cubic yards of earth and rock fill. Changes proposed for the Jordan River channel, the natural outlet of Utah Lake, will improve the control and spilling facilities for lake storage. The revision will also permit the gravity delivery of water to various canals diverting from the channel during the higher stages of the lake, and will also reduce the cost of pumping lake water into the Jordan River during the lower stages.

Progress

The cost of this Division has been estimated at $2,374,000.00.

Nothing has been done toward the actual construction of this division of the Project beyond the organization of the Utah Lake Water Users Association in 1935, but it seems probable that renewed interest will result from the National Defense program and the ever increasing appreciation of the fact that all community progress is dependent upon an ample and dependable water supply.
The Metropolitan Water District of Salt Lake City

The occasion and necessity for the organization of the Metropolitan Water District of Salt Lake City, its immediate and continuing objects and purposes, the expectations and hopes of those responsible for its creation, and somewhat of its accomplishments, we have already related in some detail. The Act under which it functions we have outlined at length beginning at page 44. Something additional of that, as affecting a particular relationship, that with the municipal corporation of Salt Lake City, we shall give hereafter.

Now somewhat more of detail of the past and something also of the future.

Past Activities

Meetings of Board

The District's Board of Directors has held 179 formal board meetings, in addition to more than 100 committee meetings and innumerable individual conferences.

Projects Examined

It has minutely examined twelve major water supply proposals, exclusive of the Provo River Project, each of which was highly technical and demanded patient and careful study and analysis.

Among those given exhaustive study by the board are the Argenta project; Big Cottonwood Canyon; Beaver Pond and Dimple Dell projects; Silver King; Little Cottonwood; Big Cottonwood-Little Cottonwood interlocking canal and reservoir project; ground-water and pump well program; Parley's Canyon reservoir enlargement project, and all projects of the 1929 water investigation board.

Reports Received and Studied

It has received and studied a total of 222 engineering, legal and similar technical reports, of which 88 were written documents of varying length with maps and charts, etc., and 134 of which were given orally by various water experts, project officials and other authorities.

Contracts

It has executed, either directly or indirectly, or it has studied and passed upon, nearly a score of important contracts pertaining to projects and surveys or other phases of the District's work.

Aid to Provo River Project

In the interest of developing all possible water supplies the board has made, purchased or otherwise acquired numerous filings for the use of water in and out of this valley. Some of these have been transferred or amended to help further the Provo River Project; others are designed to help increase the available community supply of water and to permit greater flexibility of distribution.
Independent Survey, Election and Financing Accomplishments

It is of interest to note that the District’s Board of Directors arranged for the first independent outside survey of Salt Lake City water resources ever made (the Alvord, Burdick & Howson study of 1936); that it broke all precedent by financing the Aqueduct on terms of 40 years of repayment without interest, a financing basis never before granted to any public agency; and smashed all voting records for special elections in Salt Lake City history when its Deer Creek and Aqueduct proposals were indorsed by the taxpayers on November 23, 1937 by a vote of more than 22 to 1.

Has Participated in all Association Work and Activity

In addition, see the enumerations under the heading “Past Work” of the Provo River Water Users Association, beginning at page 82, for, though not directly responsible for these, the interest of the District is such that all of them directly and vitally affected it and all of them have therefore received the closest scrutiny of the District’s Board of Directors. Their direct and indirect participation in all of them is very clearly manifested by the District-Association relationship outlined by the chart preceding page 41, which for convenience of reference is reproduced on the opposite page.

Future Activities

This classification necessarily begins where the next preceding one ends, from the past activities of the Association to those yet to come, for just as every aspect of its business has been the business of the District, so its future problems and work are those of its largest stockholders. (See page 87.)

Causes and Effects of District-Association Relationship

The causes and effects of the Association-District relationship were stated generally in a report of May 20, 1940 made by the District’s Attorney and Engineer which, the matter being of such importance, it seems worth while to repeat.

General District Objects

“The purpose of the District’s organization was the acquisition for this community of a water supply which would surely and safely meet its requirements for many years to come—a water supply of a quality and quantity sufficient, including that already available, for the needs of a metropolitan area with a population of approximately 350,000.

Complicated Problem

“If there had been water available to that area of such quality and in such quantity that acquisitions of water might have been made progressively, in installments as increases in population and the requirements of industry and business accrued, or if the future of this city had been regarded with such pessimism that none, or acquisitions comparatively trifling, had been thought essential, then many of the problems with which you are now confronted would never have arisen. But there was no water supply which could
or even might have been acquired progressively to meet the exigencies of increased demand as it arose, and even a tempered optimism impelled provision for the future. Those facts and that point of view resulted in plans for the acquisition of a supply adequate to satisfy, not merely present necessities, but all reasonable contingencies of the future as well.

"And here again you were met by a circumstance which has greatly complicated your immediate obligations. A water supply sufficient to satisfy the ever-present probability of shortages in present supplies and the reasonable probabilities of the future, was not obtainable without federal aid or without the cooperation of other agencies and of other communities and water users. All of this led to the District’s participation in the Provo River Project of the United States Bureau of Reclamation, its subscription to the capital stock of the Provo River Water Users Association, and its contract directly with the United States for the construction of the Salt Lake Valley Aqueduct.

**Involved Relationships**

"Participation in that project and the making of that contract has involved the District in somewhat complex relationships with others, the United States, the Provo River Water Users Association and its individual stockholders, other metropolitan water districts, water conservation districts, and a number of irrigation companies.

**Obligations Arising from Relationships**

"From these situations and relationships there have arisen the following immediate obligations the satisfaction of which are necessary to the satisfaction of the ultimate obligation of the District.

**Must Observe Work and Progress**

"1—You must see to it that proper progress is made in the construction of the Provo River Project, and that its works, facilities and water rights are adequate to the purpose of your interest.

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127. The Salt Lake Aqueduct as seen from the state highway in Orem in the spring of 1941, Hampton C. Godbee
“This requires that account be kept of the work as it progresses, of the expenditures for it, and the insemination of the necessary congressional appropriations. All of these, in turn, require the establishment and maintenance of friendly relations with many officers and employees of the United States, whom we cannot command but with whom we can work toward the same ends.

**Must Participate in Work of Provo Association**

“2—You must see to it that the Provo Association functions efficiently and economically. This is of first importance since it is the contracting agency with the United States; the entire water supply of the Project will accrue to it and will be distributed by it. Over three million dollars of the District’s money will ultimately be paid to it and will be disbursed by it; and the works and facilities by which your water will be delivered to your aqueduct and to other of the District’s and City’s facilities will belong to and be operated by it. Every inefficiency and every mistake and every extravagance of the Provo Association, its officers and agents, will redound to your disadvantage.

“All this requires your active and intimate participation in the business and affairs of the Association. So far, that has been attended to by your representatives upon its Board of Directors.

**Interest in Other Stockholders**

“3—You must interest yourself in the affairs of other stockholders of the Provo Association. The proper conduct of their business and their resultant prosperity, or the lack of it, is of real concern to you, for the District is the guarantor of a large part of their financial obligations to the Association and the United States, and the failure of any one of them will inevitably augment the District’s burden both as a matter of law and practically.”

128. Downstream view of Deer Creek dam, with Mt. Timpanogos in the background.
Proposed Supplemental Contract
Between Association and
United States

This last naturally brings to mind the fact that the Association now has under consideration the making of a supplemental contract with the United States, a contract by which it is proposed to enlarge the Deer Creek Division to the extent necessary to the efficient operation of the Utah Lake Distributing Company and the Provo Reservoir Water Users Company, the two largest of the Project’s Irrigation subscribers.

The expenditure involved is $100,000, and though it is proposed for the exclusive benefit of these two large irrigation companies and though its making would increase the secondary liability of the District, it still may very well be to the ultimate good of the District to permit it and thus by bringing about the prosperity of these of its associates, obviate the probability of their business failure and the consequent indirect loss to the District itself.

Aqueduct Problems

Some other of the future work of the District has been touched upon under the Aqueduct Division of the Provo River Project, at page 88 and we have pointed out that all of the future workings and problems of the Provo River Water Users Association are its also, and that in the future, as it has in the past, the District must actively participate in all of them.

Other District Problems

In addition, however, the District has, besides those arising in connection with its Aqueduct, several problems peculiarly its own—the problem concerning the disposition of the water which not so long hence will accrue from its ownership of approximately one-half of the capital stock of the Provo River Water Users Association and that arising out of its proposed subscription for an additional 4000 shares.

Effect of District’s Deer Creek Subscription and Aqueduct Contract

Before a discussion of these it may be more appropriate and enlightening to say something about the practical effect of what the Metropolitan Water District has done.

The District’s subscription for 40 per cent of the Deer Creek Division of the Provo River Project has been often referred to as the source of a water supply sufficient to the present requirements and the future necessities of the City, and it may be asked: The necessities for a future how far distant and of what extent, and upon what assumption or information have plans been made?

Estimates and Assumptions of Alvord, Burdick & Houson Report

The “Burdick Report” summary of reasons which recommended the Provo River Project included the following:

“2. It insures an adequate supply for Salt Lake City for the indefinite future.”

Although the phrase “the indefinite future” is used, the writer had in mind
an approximate future time for which water supply plans ought to be made. He called attention to the foresight of other cities and particularly to that of Denver and Los Angeles.

"Denver with about twice the population of Salt Lake now uses 73,000 acre feet per year and it is now developing the first of the Colorado River water from the upper waters of the Fraser River where it has acquired the right to 100,000 acre feet, which is being diverted to Denver through the pilot bore of the Moffat Tunnel. It has also acquired the rights on Blue River amounting to 200,000 acre feet for diversion when the city needs it. This is also Colorado River water.

"The East Bay Utility District in California has acquired the necessary water rights to provide for expected requirements up to the year 2000, and 400,000 people have recently spent $29,000,000 for the first step in utilizing this water through a 110 mile conduit recently completed.

"The Los Angeles district with 1,666,000 people, with a supply now capable of furnishing 450 million
gallons per day, or 300,000 acre feet per year, is now engaged in an expenditure of $219,000,000 to double the water supply for the future Los Angeles district through a 242 mile conduit from the Colorado River.

"Unless the City of Salt Lake adopts a long range supply program, its opportunities for the future are quite limited and it is likely to surrender supremacy in the mid-mountain region."

His recommendations for Salt Lake City and some of the considerations upon which it was founded appears from the following:

"As a basis for providing an adequate water supply for the City a special study has been made by Ralf B. Woolley of Salt Lake City, who is especially well informed upon population trends in Utah and the Rocky Mountain region. He has presented two forecasts for the present area of Salt Lake City and Salt Lake County, namely, the minimum prediction and that he regards as a well justified maximum prediction, assuming an adequate future water supply for the city.

"It is the history of practically all cities that as they grow, adjacent territory is annexed or served with water. It seems to us probable that the greater part of the population in Salt Lake County lying east of the Jordan River, will be served by Salt Lake City within the next fifty years.

"Upon this basis, we show the accompanying diagram (see page 104), our forecast of about 270,000 population to be served by the year 1950. In making this forecast, it must be appreciated that predictions of this kind related to time are essentially uncertain. We feel confident, however, that the future water supply of Salt Lake should be based upon a growth not less than this."

W. D. Beers-A. B. Larson Report

During October of 1937 W. D. Beers, City Engineer, and his Assistant City Engineer A. B. Larson published a report entitled, "What Forty-four Per Cent of the Deer Creek Water Supply Will Do for Salt Lake City."

Their conclusions were stated as follows:

"It will increase the present water rights of the City, if properly handled, to such an extent that it will not be necessary for the City to purchase any further rights for culinary or irrigation use until the development of the City has progressed to a point where 70,000 acre feet annually will be required for culinary purposes, or to a point where the population shall have increased to approximately 315,000.

"... It will eliminate not only the inconvenience, but the damage caused by water shortages, and prevent advertising to the country that Salt Lake City has an inadequate water supply.

"Participation in the Deer Creek Project by Salt Lake City will advertise to the country that the City has a plentiful water supply and that is the most important asset than any City can have, as no important industry is going to establish itself in a City where the water supply is insufficient."
Reference to Mr. Ralf R. Woolley’s population graph discloses that he has estimated a population of 500,000 some substantial length of time after 1980, but in regard to this it may be said that he had in mind no more than normal rates of increase and not the accelerations due to the fact of availability of a large water supply, the consequent establishment of new industry and the extraordinary conditions of 1942.

**Sufficient Supply for Population of 300,000**

But however that may be, it may be conservatively estimated that forty-six per cent of the Deer Creek water supply will be sufficient for a population of 300,000 whether that will accrue by the year 1980 or later or before that time. Of course, as the “Burdick Report” states, “In making this forecast, it must be appreciated that predictions of this kind related to time are essentially uncertain.” But uncertain or not, the Metropolitan Water District must plan for the future. Its obligation, stated broadly, is to realize to the people of this community the greatest possible advantage from the large investment made for their benefit and at their direction.

**The District Must Make Plans for Most Advantageous Use of Water Supply**

Towards the fulfillment of this gen-

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eral obligation the District must make plans for the disposition of its water supply so that there may be realized from it the ultimate of social and economic values and reduce as far as may be the burden of its cost to the inhabitants of the area under its jurisdiction.

Outline of General Principles Offered as Basis of Discussion

During the early part of 1940 the District’s Board of Directors ordered their Engineer and Attorney to express in writing their ideas of the principles by which the Board, in their judgment, ought to be guided. They responded with the following, not, however, as dogmatic conclusions but rather as a basis of discussion and deliberation.

Occasion of Difficulty

“If your fundamental object has been merely to make good the deficiencies which occur from time to time in present supplies, or if it had been possible to acquire a water supply progressively as required, or if the population of the District could be expected to be doubled or even very substantially increased by the time of the completion of the Provo River Project, then this problem would not loom so large. But none of these conditions obtained, or will, and it must therefore be anticipated that your water supply will accrue to you at a time when comparatively little of it will be required for use within the present area of the District.

Various Possibilities Stated and Discussed

“This fact gives rise to several possibilities, which we shall state and comment upon:

“(A)—It can be ignored, and the District’s water supply of 46,000 acre feet annually can be wasted or left to be utilized by whomever may desire it, and its entire cost and the entire expense of the District’s share of the operation and maintenance of the Provo Association and the entire cost and expense of the aqueduct can be borne by the taxpayers until such time, whenever that may be, as it can be utilized within the District.

“This possibility, quite obviously, it seems to us, is no more than theoretical, for by such action the water right itself might be jeopardized. Then also, no one can predict with any assurance of accuracy the length of time during which such a policy of non-action would have to be continued, and in the meantime, even if not irretrievably lost, an invaluable community asset would be wasted. In the meantime also, taxpayers of the District would be called upon each year to pay substantially a quarter of a million dollars from which they would realize no direct or indirect benefit.

“That such a policy should be seriously considered, or if seriously considered would be tolerated, is scarcely conceivable, especially in view of the public assurances given to the taxpayers on every occasion that participation in the Project has been submitted to them, that every reasonable effort would be made to realize from the water supply itself the cost of its acquisition.

“(B)—Your water can be utilized by lease outside the present area of the District, but only at such places and for such purposes that as a practical matter, as distinguished from a matter of strict legal right, the use can surely be discontinued in favor of uses within the District and City limits.
That policy would also very probably reduce to a negligible quantity the part of your water supply which would be beneficially utilized, and so would alleviate but very slightly the burden of its expense and cost to the taxpayers of the District. It would in fact be of little, if any, greater benefit that the policy just outlined above.

"(C)—You can lease water for use at any place outside the present limits of the District and wherever users can be found, with the right reserved of cancellation upon one year's notice, entirely regardless of the fact, if it be such, that the contemplated use and discontinuance might be such that as a practical matter withdrawal of the supply may be difficult.

"A policy of that nature would, of course, enlarge the possibilities for the utilization of the District's supply and the realization of revenue from it. It is suggested, however, that it is too broad, and that if your policy shall include uses outside the limits of the District, that they ought to be confined to the field of influence and practical interest of Salt Lake City.

Prediction of Future Necessities

"(D)—It seems obvious to us that it cannot be expected that there will be within the present limits of the District, within any reasonable length of time, a population or uses of such nature or extent that all of your water supply, plus that already available for use, will be required for use within that area; but that nevertheless some increase will accrue and some shortages will occur within a time for which good business and reasonable foresight demands provision be made.
Municipal Use Must Be Assured

"If you accept this hypothesis, you can allot or reserve to your present area that part of your supply deemed ample to provide for the expected increases of population and use and for shortages in present supplies within it. As to that part, no disposition should be made except such as to leave it, both legally and practically, available to use within the present area of the District whenever required.

Suggested Disposition of Surplus

"As to the remainder, it should be utilized to the greatest possible economic advantage within those areas which, even though they are not at present actually within the municipal boundaries, may, broadly speaking, be considered a part of "Greater Salt Lake City" and which it may reasonably be expected will ultimately be legally a part of it.

"Every effort should be first made to induce those areas to incorporation within the City, or if that cannot be done, to become a part of the District, but in neither case should that be regarded as immediately vital, nor should a mistake of judgment as to the ultimate result in that respect be deemed of serious consequence. This last, not because you could, in that event, as a matter of law, terminate the delivery of water upon one year's notice, but because areas of that character are those within which it must always have been expected a large part of your supply would be utilized and because you will in every event and in every case expect as high a rental and see to it that as high a beneficial use is made as circumstances will permit, regard being had both to the income received and to the collateral benefits of a prosperous suburban or economically contributory area.

132. Salt Lake City, viewed from the State Capitol. Although the city's corporate limits extend far into the horizon, it is suggested that the City's sphere of practical interest and influence may extend even farther.

E. L. Tribune
"It is a policy of the general nature outlined under this heading (D) that we recommend to you."

Planning Essential

The expression of these ideas has not been repeated here with the object of affirming their validity but merely to inform in regard to the nature of the problem and the necessity for careful planning in the light of the best information available and with allowance for all reasonable contingencies.

Planning for the disposition of the District’s water supply is not something which can properly “abide the event,” in the hope or expectation that “something will turn up.” It may be perfectly proper—even essential, to set aside a reserve for unforeseeable possibilities, but even that, as all else, must be as the result of a judgment after deliberation in the light of all of the facts and circumstances accessible to research.

Problem Not Remote

As to a substantial part of the District’s supply the problem is not remote. Enlargement of the Weber-Provo diversion canal will be commenced this year and may be completed in time to realize substantial benefits to the Project subscribers during 1942. That some benefits will accrue during that year is as certain as anything in any measure depending upon the elements can be. The Salt Lake Valley Aqueduct will not be completed by that time and those benefits will therefore accrue to agricultural uses, but whatever may be their nature or extent, they must be anticipated and plans must be made to the end that they be realized to the greatest advantage.

Probability of Municipal Expansion

It must at least be noticed and considered that the "Burdick Report" stated, "It is the history of practically all cities that as they grow, adjacent territory is annexed or served with water. It seems to us probable that the greater part of the population in Salt Lake County lying east of the Jordan River, will be served by Salt Lake City within the next fifty years."
It was only upon that assumption that the 1980 population forecast was made, "Upon this basis, we show our forecast of about 270,000 population to be served by the year 1980," and it still seems probable, even in the light of recent events, that the assumption was valid.

**Industry Within Sphere of City’s Interest**

We hope it will not be amiss to note in passing that the suggestion that it might be to the interest of the City to develop contiguous territory, to devote a part of the District’s water supply to areas or interests economically contributory—that the bare suggestion of that effect was "viewed with alarm" most horrified, and yet it was taken as a most obvious matter of course (as it ought to have been) that water be furnished essential to the large industrial enterprises at least a part of which it is expected will be established outside of the municipal boundaries.

**Proposed Additional Deer Creek Subscription by District**

On February 6, 1941, the Board of Directors of the District offered to subscribe for an additional 4,000 shares of the capital stock of the Provo Water Users Association and the offer was accepted. The subscription, however, has not been finally consummated because the District’s offer coincided in time with the receipt by the Association of a number of others, from irrigation interests, whose subscriptions together with that of the District exceed the total of issuable stock. Final action has been delayed in the hope of some adjustment consistent with the interests of all. In the meantime it has been suggested that the United States may not permit any further subscriptions except for agricultural use and that in any event the District ought to give up to such users at least a part of this additional subscription.

**No Danger of Over-Supply of Water**

What stand the District will finally take in regard to this its Board of Directors has not yet decided. It is, however, of the definite opinion that its water resources ought to be increased, that there is no danger whatever of

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*54. The spillway of Deer Creek dam as it appeared, during construction, from within the reservoir.*

- Hampton C. Godde
too large a supply available to the use and disposal of this community but rather the contrary, and since the Deer Creek Division is over-subscribed, consideration has been given and action has been taken toward the enlargement of the Provo River Project to include a development long in the view of the Bureau of Reclamation.

Proposed Enlargement of Provo River Project

The development referred to requires the driving of the eight mile Rock Creek tunnel by which may be tapped the waters of Rock Creek, a tributary of the Duchesne River. By this, approximately 40,000 acre feet of new water can be made available to use through the Deer Creek and associated facilities at a cost now roughly estimated at $5,000,000. Recent events and the probabilities arising out of the national emergency, as well as the renewed optimism and energy now manifest, seem to direct this or any other additional water development.

Proposed Enlargement of General Concern

But entirely aside from the purely local interest, if that can be taken as separated from the interest of the state as a whole, there exists a very good reason for putting to beneficial use in Utah, as soon as may be, all possible of the waters of the Duchesne River and its tributaries.

Under the terms of the "Colorado River Compact," the "Upper Basin" states, including the State of Utah, were allotted "the exclusive beneficial consumptive use of 7,500,000 acre feet of water per annum" from the Colorado River system, but so far there is no project except the Provo River, in any view not remote, by which

155. Even the salty waters of Great Salt Lake, pictured below, have been eyed in Utah's perennial search for new sources of supply. A project has been developed and some day may be constructed to create a body of usable fresh water by diking off a portion of the lake at the point of inflow of the Weber River.

L. Clyde Anderson
Utah's right in that consumptive allotment can be availed of, and water rights not actually exercised, however solemnly guaranteed, are always in jeopardy.

We have called attention to the fact that the Duchesne tunnel is being constructed larger than is required for the Deer Creek Division as now planned, and the fact also is that its capacity can be almost doubled by a concrete lining. It is suggested that in the general interest of the State it must be utilized to the limit of its possibilities and that it be completed as speedily as circumstances will permit.

**Financing**

*District Must Derive All Possible Revenue from Sales*

The Metropolitan Water District Act provides that "The Board of Directors shall fix such rate or rates for water furnished as will pay the operating expenses of the district, provide for repairs and depreciation of works owned or operated by such district, pay the interest on any bonded or other debt, and, so far as practicable, provide a sinking or other fund for the payment of the principal of such debt as the same may become due; it being the intention of this section to require the district to pay the interest and principal of its indebtedness from the revenues of such district, so far as practicable."

**Expenses so Far Paid by Taxation**

Since the water supply of the District has not accrued, the problem of water rates, though it has been a subject of attention, has not so far had to be faced, and operating expense and assessments on account of capital and operating charges of the Provo River Water Users Association have of necessity been met by taxation.

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**Mirror Lake, in the Duchesne Mountains, is but one of many in eastern Utah. The waters draining from these areas represent an important potential supply which may some day be tapped for use in Salt Lake Valley.**

S. L. Tribune
Association Assessments

So far the District has been required to pay assessments of the Provo Association in the total amount of $34,500.

Tax Rates — 1936 to 1941

During the year 1935 no tax was levied. In 1936 the tax rate was 0.38 mills; in 1937, 0.934; in 1938, 0.30; in 1939 none, and in 1940, 0.20 mills. The tax rate for 1941 has been set at 0.10 mills.

City May Avoid Tax

After determining the amount of money necessary to be raised by taxation in each year the law requires the District to inform the governing body of the City and it may then elect to pay that amount to the District and thus avoid the tax which otherwise must be assessed against property within the District. So far the City has elected to make no payment on this account.

District Must Watch Congressional Appropriations

It may have been noticed that neither the "Repayment Contract" of the Deer Creek Division nor that covering construction of the Aqueduct provide that the United States will in every event expend the amount necessary to complete the Works but that in both cases the obligation is subject to the availability of funds. For that reason, as well as to insure that construction will proceed as rapidly as possible, the District's Board of Directors have always been active and successful in inducing larger congressional appropriations than would otherwise have been made. To that end it has on several occasions sent one or more of its employees to Washington. It has also utilized the services of the Nation-

137. A steel span section of the Salt Lake Aqueduct as it appeared during construction. This span is situated above Pleasant Grove.
138. Officials and delegates of the National Reclamation Association at the 1941 convention in Phoenix, Arizona. The work of this association is invaluable to the Metropolitan Water District in obtaining adequate financing of the Provo River Project by Congress. Left to right are F. O. Hagie, Secretary-Manager of the Association; Ora Bundy, Publicity and Industrial Development Commissioner of Utah; J. W. Gillman, President, and W. P. Whitehead, Vice President of the Provo River Water Users' Association; William R. Wallace, former Chairman of the Utah Water Storage Commission; O. S. Warden, President of the National Reclamation Association; and S. A. Kennedy, Vice Chairman of the Metropolitan Water District of Salt Lake City.

al Reclamation Association of which the District is a member.

Recent Congressional Action

This year the District joined with representatives of seven other large reclamation projects in a move to obtain future appropriations from the general treasury of the United States instead of from the limited "Revolving Fund" of the Reclamation Bureau. Its efforts were influential in obtaining passage by the United States Senate of a $1,150,000 increase in the original $1,250,000 appropriation set up for the Provo River Project for 1941-42.

DISTRICT-CITY RELATIONSHIP

District Serves Area of Salt Lake City

The Metropolitan Water District of Salt Lake City came into existence upon the initiative of the governing body of the Municipal Corporation of Salt Lake City, and although it has within its being potentialities beyond the scope of the original intent, it is now what its name implies. Its creation was proposed to the people of Salt Lake City as an instrumentality essential to the future well being of this community, as an agency without which there could neither be acquired nor effectively utilized the water supply prerequisite to continued growth and prosperity.
The law passed by the Legislature in 1935 left it open to the governing bodies of the municipalities of the State to propose a Metropolitan Water District which would include the area of two or more of them or which would include the area of one only. It was proposed to the electors of this city that the district to be authorized by them should be one the primary interest of which would be confined to the area of Salt Lake City and so, as now constituted, it is. Whether the field of that interest ought to be enlarged is a question which we shall touch upon hereafter. (See page 117.)

District Created and Powers Given by Electors of City

It might be well to point out here that though the proposal to create the Metropolitan Water District of Salt Lake City was submitted to the electors by the governing body of the Municipal Corporation it was not that governing body which created it and thus vested it with its powers and imposed its obligations, but the electors themselves. As the Supreme Court expressed it, the Legislature "has permitted the people of the various cities and towns which are to be included in the territorial limits of the entity to set up such entity which, when, and if they do, may exercise certain powers. If the people choose not to set it up, no powers come into being. The people themselves in the last analysis have control of the situation."

City and District Have Common Interest

But whether a metropolitan water district includes the area of one municipality or of several, there exists certain relationships between it and the governing bodies of the one or more of them—relationships some of which are imposed by law and some of which are imposed by common sense, good judgment, and by the common interest in the general welfare of the people of Salt Lake City.

159. Deer Creek dam, complete except for the highway. This view along the top of the dam gives an excellent idea of the size of rock used for rip-rap.
Cooperation Essential Between District and Municipality

In serving this interest neither the governing body of the District nor that of the Municipality should attempt to encroach upon the other as to matters within their respective fields of separate and independent obligation. But even as to those, where they touch, as many as possible of them ought to be finally determined only after consultation and coordination.

In regard to the relationship between the District and the Municipal Corporation which occupies the same area, the Supreme Court of Utah said, "the closest cooperation is contemplated and should result."

District Must Not Be Dependent

It is not inconsistent with this point of view nor is it beyond the scope of this report to suggest that the Board of Commissioners ought to seek the independence rather than the dependence of the Board of Directors of the District, for it may be stated as a simple matter of fact that that end was the object of the original sponsors and creators of the District, of the public officials who caused its creation to be submitted to the will of the people, the electors, whose instrument it is, and the public press, who urged it upon the citizens of Salt Lake City as an independent agency necessary to the permanent solution of the community water problem.

Municipal Authority Appoints District's Board of Directors and Provides Term of Office

The law requires the governing body to fix the number and the terms of office and the qualifications of the District's Board of Directors. The number was originally fixed at seven, including the Commissioner of Water Supply and Waterworks. Of the first six directors other than the Water Commissioner two were appointed for

149. Suggestive of Salt Lake Valley's dependency upon suburban farming is this photograph of the Cottonwood agricultural district.

L. Clyde Anderson
two years, two for four years and two for six years, and all other appointments were for six-year terms.

The six-year term was decided upon in order that the Directors of the District should serve beyond the terms of the members of the appointing power and thus that there be as little as possible relationship between the personality of the District Board and the Board of Commissioners and as little as possible relationship between their tenure of office and the vicissitudes of politics. In order also that there be realized in the District Board that continuity of service and experience, that independence and that freedom from political motive essential to long-range planning and policies which the public and the public press demanded and were promised, and which, so far, they have had.

Recently, however, the Board of Commissioners of Salt Lake City, for reasons sufficient to it, reduced the term of office to four years. This was the first step in the wrong direction. If the term was to be changed, it ought to have been lengthened.

District's Board of Directors Serve Without Pay

The members of the Board of Directors of the Metropolitan Water District serve without compensation.

District Controller Reports to Mayor

The law requires the Controller of the District to prepare and transmit to the Mayor of the City each year a statement of the District's revenues and expenditures and a statement of the amount of water stored or made available to use.

City Has Preferential Right to Water Supply

Under the law the City has a preferential right to purchase from the District such part of its water supply as may be required for beneficial use within its limits, and to protect that preferential right the District may not dispose of any part of its supply for use outside of its boundaries except upon such terms as will permit the outside use to be terminated upon one year's notice.

City May Avoid District Tax

The District is required to afford the Board of Commissioners an opportunity to pay to it each year such amount as it would otherwise be compelled to raise by taxation.

District and City Boards Work Together

The Board of Directors of the District have invited the members of the Board of Commissioners to attend their meetings whenever they desire, and they furnish them copies of their minutes. From time to time they conduct them over the Project workings. In all matters of general policy they are consulted.

Possibility of District Expansion

One other problem of general consequence seems worthy of mention and invites public attention.

The Metropolitan Water District of Salt Lake City includes the same area as that of the municipal corporation of Salt Lake City and, as it now exists, its primary obligation is to serve the interest of that area. It may exercise much of its broad powers wherever
seems desirable, but the statement just made is nevertheless essentially true. The law of its incorporation, its charter, however contemplates the possibility of the enlargement of the territory of the District and of the field of its obligations to include as to both, the area of other cities and towns. The law provides for such enlargement only under conditions agreeable to the interest of the existing area and upon such terms as those representing it may see fit to impose. But the law also contains a provision in regard to the representation of new areas upon the District’s Board of Directors of such a nature as to make it, practically, impossible for the Board now representing the Salt Lake City area to even consider the extension of the District.

Other Salt Lake Valley Communities Require Additional Water Supplies

The Metropolitan Water District of Salt Lake City has provided for the future of the Salt Lake City area. It has assured for it the water supply essential to its growth and prosperity for a long time to come. But there are other municipalities and other territories and communities unincorporated in the Salt Lake Valley which are without any decent water supply either for ordinary domestic use or for irrigation. Many of these have applied to the District’s Board of Directors for assistance, for admission to the District, or for a share of the supply for which it has contracted and which it will acquire for the benefit of territory within the District as far as it may be required there. It is on that account that it is pertinent to mention in this report the public question thus raised.

New Legislation Required

But the District Board, as the law now stands, is helpless. The law does not permit the annexation of unincorporated areas and even those which are cannot be considered for membership in the District because of the de-
perfectly a preliminary organization looking toward the alleviation of the conditions to which we have just referred. The County itself is without legal authority to afford adequate relief, but the Board of County Commissioners has nevertheless interested itself in the working out of plans by which it may be expected considerable good will result.

It is now proposed that there be created a Water Conservation District with jurisdiction over those areas outside of either the legal or practical scope of the Metropolitan Water District Act as now written, and it is proposed that such a District subscribe for 5,000 shares of the stock of the Provo River Water Users Association.

Through the sponsorship of the Salt Lake County Farm Bureau, a central committee representing interested communities has been organized, and from this committee a smaller executive board was chosen to carry on the work. Executive committee members include William M. Kasworm, Chairman; Hyrum Bennion, Vice Chairman; V. L. Martineau, Secretary; Alton C. Melville, C. L. Bello, E. O. Brothers, and members of the Salt Lake County Commission.

This action, while encouraging as an evidence of awakened and enlightened interest, assumes the existence of facts which may not turn out as such. It assumes, for example, the availability of further subscriptions for Association stock and the availability of the Salt Lake Valley Aqueduct for the carrying of the water supply. But the stock of the Association is now over-subscribed and the entire aqueduct capacity will probably be required for the use of the Salt Lake City interests.

Salt Lake County Interest and Activity

It is an encouraging fact that Salt Lake County interests have recently

142. William M. Kasworm, Chairman of a Salt Lake County committee working toward the creation of a water conservation district for communities and areas adjacent to Salt Lake City.
The Provo River Project, however, may very well be enlarged and efficient operation might possibly permit use of the Salt Lake Aqueduct. But, whatever may turn out as to these matters, it is the realization of the importance of the problem and action toward its solution which is gratifying to all who are interested in the prosperity and general well-being of the State.

The officers and employees of both the Metropolitan Water District of Salt Lake City and those of the Provo River Water Users Association have evinced their interest and their desire to cooperate in the Salt Lake County efforts to realize for that area benefits similar to those which the Metropolitan Water District of Salt Lake City has assured for Salt Lake City.

The War

It could not have been foreseen during the year 1935, or even when this report was in preparation, that occurrences would so soon manifest in actuality the wisdom of the organization and subsequent activities of the Metropolitan Water District of Salt Lake City.

It was rather obvious to the directors of the District that no new population could be supported in security without an additional dependable water supply, and that no new industry could be attracted to this area. But it was not expected that by 1942 the demands of either industry or population would compel recourse to or reliance upon the facilities and supplies for which they had contracted. The war necessities, however, have demonstrated and accomplished very

145. The Utah Ordnance Plant near Salt Lake City typifies the type of industrial expansion dependent upon adequate water supplies.

S. L. Tribune
quickly that which in ordinary course could not have been expected for many years.

The necessities of war have brought about an acceleration of growth in population and an influx of industry far beyond anything that could have been foreseen. But that additional population could not be supported in security, nor would that influx of industry have been possible without the assurance of the early completion of most of the works and facilities of the Provo River Project and the early accrual of the greater part of the water supply which they have and will make available to beneficial uses in Salt Lake and Utah counties.

A bare enumeration of a few of the recent developments is impressive and is convincing of the validity of these conclusions:

An alumite plant, to cost approximately $5,000,000 and to employ about 300 workers, is now under construction just outside the City limits.

The Utah Ordnance plant, costing approximately $33,000,000 and now employing about 8,000 men, has been completed and now is being operated by the Remington Arms Company, Inc., under a federal contract.

Construction of a $250,000 radio tube factory has been commenced, which will probably bring into this area about 4500 persons.

Columbia Steel plant, between Provo and Salt Lake City, which will cost about $150,000,000 and employ at least 3,000 workers, is now building.

Salt Lake City has become headquarters of the Ninth Corps Area of the Army. This will increase our population by about 3,000.

These are merely typical of a number of other industries and activities which will tax our water resources to the limit. Some of them have been directly and obviously dependent upon the early accrual of the Provo River Project water supply. Without that they must have been established elsewhere. That was a fact plainly discernible as to some of them, and, though not so clearly apparent, true as to most of them.

The War has directed attention to the natural resources of Utah and toward their development has afforded opportunities which otherwise must have awaited the passing of many years.

It has been a gratifying fact to the directors of the Metropolitan Water District that, as to the Salt Lake valley and vicinity, the ultimate result was foreseen and planned for, and that their judgment has so soon been vindicated, and that they have been able, not only to make such a large contribution to the prosperity of their own immediate community, but to the security of the nation as well.

In the meantime, it may be hoped that industrial expansion and concentrations of population will not be at the sacrifice of agriculture, but rather that, in providing markets for farm products, they will be in aid of the ancient ideal of the permanent and self-sufficient home owner with his roots in the soil of the land.
Conclusion

The Board of Directors of the Metropolitan Water District of Salt Lake City during six years of unselfish service have satisfied their public obligations with fidelity and with integrity, with good judgment and efficiency. During that time they have accomplished not only that which was hoped of them within the time, but even a great deal more of public good than could have been demanded. But the work of the District is continuing and perpetual. It has barely begun. If its fundamental purposes are to be served and the objects of its founders and sponsors are to be realized, it must continue to receive, as long as it continues to merit it, the public confidence and support, and more than that—even the public vigilance that those ultimate purposes and objects shall neither be lost sight of nor obscured.

The Old Tree of Salt Lake Valley—a symbol of progress and accomplishments in what once was a desert waste.
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