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Salt Lake City's Water Supply—Past and Present

By F. E. Morris, Secretary to Mayor C. C. Neslen

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For many years after the coming of the pioneers the only means of getting water to the homes of the people was through a system of small ditches which were gradually extended until practically every street in the city had an open ditch on each side. The city became famous for the beauty of its streets lined with trees and streams of clear mountain water flowing beside the walks. But besides adding to the attractiveness of the streets, the water in these ditches served other purposes—for irrigating the gardens, watering the livestock and for household use.

Many of the people were rather thoughtless of the manner in which they used these ditches and naturally the water was more or less contaminated. It was not uncommon for people to water their stock in the ditch that furnished culinary water to their neighbors lower down the stream. Water that had been used for cleansing dishes, bathing, or washing clothes frequently found its way into water that was later used by other families for cooking and drinking.

Some sections of the city were more fortunate in this regard, being supplied with numerous springs of clear water, which were often walled up with rock and kept fairly free from pollution. To these springs people from blocks around would come each day with buckets for a supply of drinking water. Chil-

Sunnyside Avenue Supply Main. Laying 30-inch cast iron pipe.

dren generally quenched their thirst from the open ditches, either dipping the water with their hands or lying prone on the ground and drinking from the ditch. The principal concern of the city at that time was to keep the ditches open, and men were constantly employed shoveling out accumulated silt and raking out the cress and other growths that sometimes choked the streams.

The first change from this system was the installation in the year 1873 of a wooden tank near the mouth of City Creek canyon and the laying of a wooden pipe line from this tank to the northeast corner of Main and South Temple streets. The pipe was of the wooden stave variety bound spirally with "hoop" iron. The purpose of the line was to supply water for fire protection and to sprinkle the streets of the business district. Its construction was the occasion for a great public ceremony, being a mammoth undertaking for the small, isolated city with its limited resources.

Later this line was extended and the water used for domestic purposes, each family fortunate enough to secure city water having a small hydrant in the front yard from which water was carried in buckets. Such a thing as piping water into the house was then unthought of, while the use of hot running water, the installation of baths and toilets in homes is of comparatively recent origin.

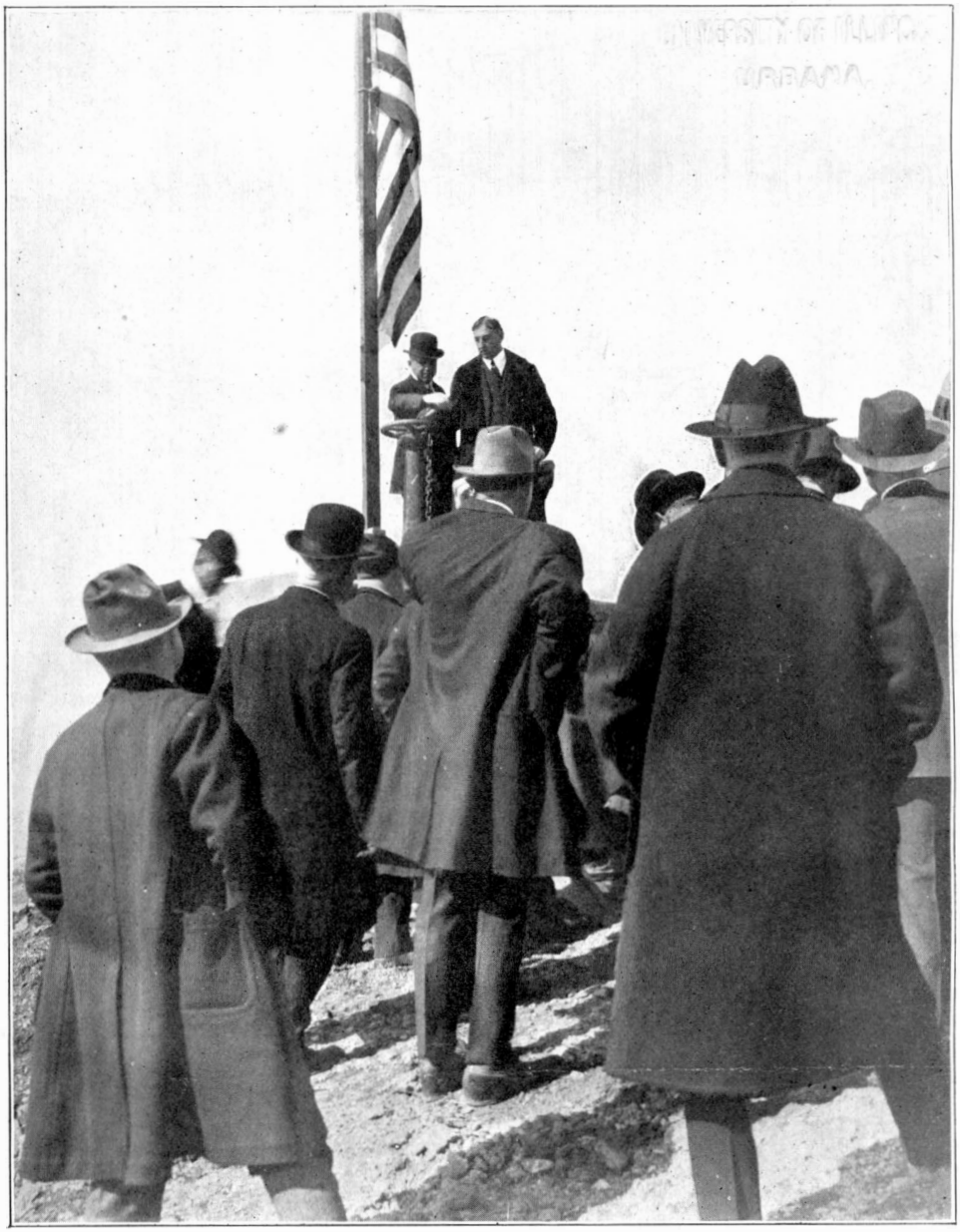
Former City Commissioner Henry W. Lawrence, 86 years of age—Telling the crowd that he remembers when the sole supply of water for culinary purposes ran in open ditches.

Once the people saw the benefits of having water piped direct to their homes the demands on the wooden pipe system became too great to be met and in 1882 a new supply main was laid, known as the Twentieth ward line, which supplied the northeast bench. This line started about two miles from the mouth of City Creek canyon and delivered water at about the level of Sixth avenue.

The Capitol grounds having been set aside on the west side of City Creek canyon, the Territory of Utah joined with the city in constructing a new pipe line to Capitol Hill during 1888-1890, and in the latter year the city drove a tunnel in Emigration canyon and laid a twelve-inch supply main about three miles long to bring the water to the east

bench. Up to this time the direction of the water system had been a part of the duties of the chief of the fire department, but the system grew so rapidly that a separate department was created and a superintendent of waterworks appointed April 1, 1890.

In 1888 the demands on the water system became so great that it was considered impossible to secure sufficient water from the then available sources of supply — City Creek and Emigration Tunnel. To meet this situation, the city began exchanging water with the farmers living southeast of the city. The first of these exchanges was for part of the Parley's canyon supply, for which the city gave irrigation water brought from Utah lake in the Salt Lake and Jordan canal, constructed in 1882 and of which the city is sole owner. By 1904 this source was considered well-nigh exhausted and the city entered into exchanges with the farmers having water rights in Big Cottonwood creek.



P. J. Moran, the builder of the Big Conduit, turning over the valve keys to Mayor Neslen.

To Bring the waters of Parley's creek into the city a conduit 5.1 miles long, with a daily capacity of over 17,000,000 gallons, was constructed about 1892, and after the exchanges of 1904 with the Cottonwood Creek farmers, the Big Cottonwood conduit, with a capacity of 40,000,000 gallons daily, was constructed to deliver the water of Big Cottonwood to the mouth of Parley's canyon, where a part of it entered the Parley's conduit and was delivered to the city. This conduit, which is 7.32 miles in length and cost $442,000, was completed in February, 1908.

Since then the waterworks system has rapidly grown to a property conservatively valued at $8,000,000, though it is doubtful if the citizens would consider parting with its ownership for any price. It comprises a distribution system of over 272 miles of pipes laid in the streets of the city, while the supply mains bringing the water from the various reservoirs and canyons represent over 42 miles of pipes and conduits from twelve inches to four feet in diameter. This supply system has a capacity of over 74,000,000 gallons of water every twenty-four hours—providing there is that much water to be had—

and would seem to be ample for many years to come.

Records in the waterworks department show that the daily consumption of water by the city during 1919 ranged from twenty to forty million gallons, or from 150 to 350 gallons daily for each person in the city. Of course no one individual consumes or properly uses personally even the minimum amount of water here given. The greater part of this water goes for purposes other than personal use, such as watering lawns and gardens feeding industrial plants, railroads and business houses, sprinkling and washing streets, and waste. What the matter of waste amounts to is little dreamed of by the ordinary person.

Waste of the city's water supply comes from many causes. Leaks in the underground mains are a considerable factor and hard to detect and repair. A more flagrant waste is from taps left running and those out of repair. There are 25,000 original connections direct to the city water mains, and it is safe to say that each one of these original connections represents an average of ten outlets, such as taps in sinks, wash basins, bathtubs, laundry tubs, toilets, and outdoor taps for various purposes. This makes a possible 250,000 openings for loss of water. What one leaky tap amounts to in a day is little realized, but, according to tests made a number of years ago, a tap that is open or worn enough to permit the water to fall in drops will waste 5,475 gallons per year. If this leak amounts to as much as an opening of 1-32 of an inch, the annual loss will be 96,360 gallons. If equal to 1-16 of an inch the loss will be 304,775 gallons, while a half-inch aperture would cause an annual loss of water reaching the surprising total of 25,728,120, or more water than the entire population of the city will consume in one whole day outside the summer months. With over a quarter of a million possible leaks of this kind in the system, it will readily be seen how important it is to have every leak, small or large, stopped as soon as possible.

Mayor Neslen giving a short history of the big conduit after opening the giant valve.

The troubles with which the water department has to contend are many. It would be impossible to give here a complete list, but one or two appear of particular interest. One

of the greatest problems is to equalize distribution so that all parts of the city will be properly supplied. An illustration of what this means may be found in the troubles

Members of the City Commission and County Commission who attended the ceremony of the opening of the new conduit.

that afflicted the southeast bench for many years. When the erection of homes began in that section of the city, a supply main was constructed from the Big Cottonwood conduit near the mouth of Parley's canyon along Twenty-seventh South street to Ninth East street. This line serves a part of the southeast admirably, but that section of the city north of Twenty-first South was frequently without water, even when the main was running full. The reason for this was that the distribution mains were inadequate for the demands on the higher elevations to the north. When any considerable number of the people at the lower elevation were using the water it so reduced the pressure that those on the higher land were without a supply. This condition was corrected by connecting that section of the city with a new pressure line running down Sunnyside avenue from the new high line conduit.

With 272 miles of watermains forming a network throughout the city, care must be taken to avoid dead ends, which not only interfere with the pressure and distribution, but cause the pipes to fill up with dirt and mineral which not only reduce the flow, but make the water unfit for use. This is overcome by connecting these ends to adjacent mains, thereby maintaining continuous circulation of the water and equalizing pressure.

Another costly and annoying trouble is the accumulation of mineral deposits on the interior of the distribution mains, in some instances practically closing the pipe so that only a fraction of the normal supply of water will pass through. This is due to the minerals temporarily held in solution which settle and form a hard lining to the pipes. The deposit is composed of small amounts of silica, magnesia, iron and alumnia and about 90% calcium carbonate. This mineral must be cleaned out from time to time. Under the process in use, mains that had been reduced to 35% of the original capacity have been restored to 99% efficiency.

Electrolisis is another affliction with which the department has to contend. This is

caused by imperfect bonding of the return arteries for electricity used about the city, principally by the street railway company. The power used to run the cars returns by

Part of the crowd gathered on "Point Look Out." Salt Lake Valley in the distance.

way of the rails and if these be not properly bonded this electricity may leave the rails and seek another outlet. It sometimes jumps to the water pipes, and after following them for a distance, will jump back to the rails. Wherever this electric current leaves the water pipes the process of electrolisis sets up, dissolving the mineral of the pipe and so weakening it that breaks soon occur because of the pressure of the water. These leaks are rather hard to detect, though a number have been found and sections of partially disintegrated pipe saved as souvenirs.

The need for continued increase in the water facilities comes not only from growth in population and industries, but also from the fact that large parts of the city have never been supplied with city water, the present mains reaching only about one-half of the streets. Some sections have a limited supply of flowing well water that may suffice for a few years, but which is sooner or later to be replaced with city water, while many of the streets where no mains have been laid have no homes or industries demanding water. There are large sections of the city where there are some homes at present which it is impossible to supply with water because of the lack of finances and often for the reason that the mains would not bring in sufficient revenue to pay for their installation.

Last year, as in a number of years past, it became necessary to impose restrictions on the use of water, though there was an ample supply in the hills. These restrictions were necessary because the city supply mains were not of sufficient capacity to deliver to the city all the water the people wanted to use. During October of this year the contractors completed a new supply main capable of bringing in forty million gallons of water a day. This main consists principally of a gravity conduit four feet in diameter connecting with the old Big Cottonwood conduit at a point a little south of the mouth of Parley's canyon, syphoning under Parley's canyon bed and running along the foothills, connecting with the distributing system at Sun-

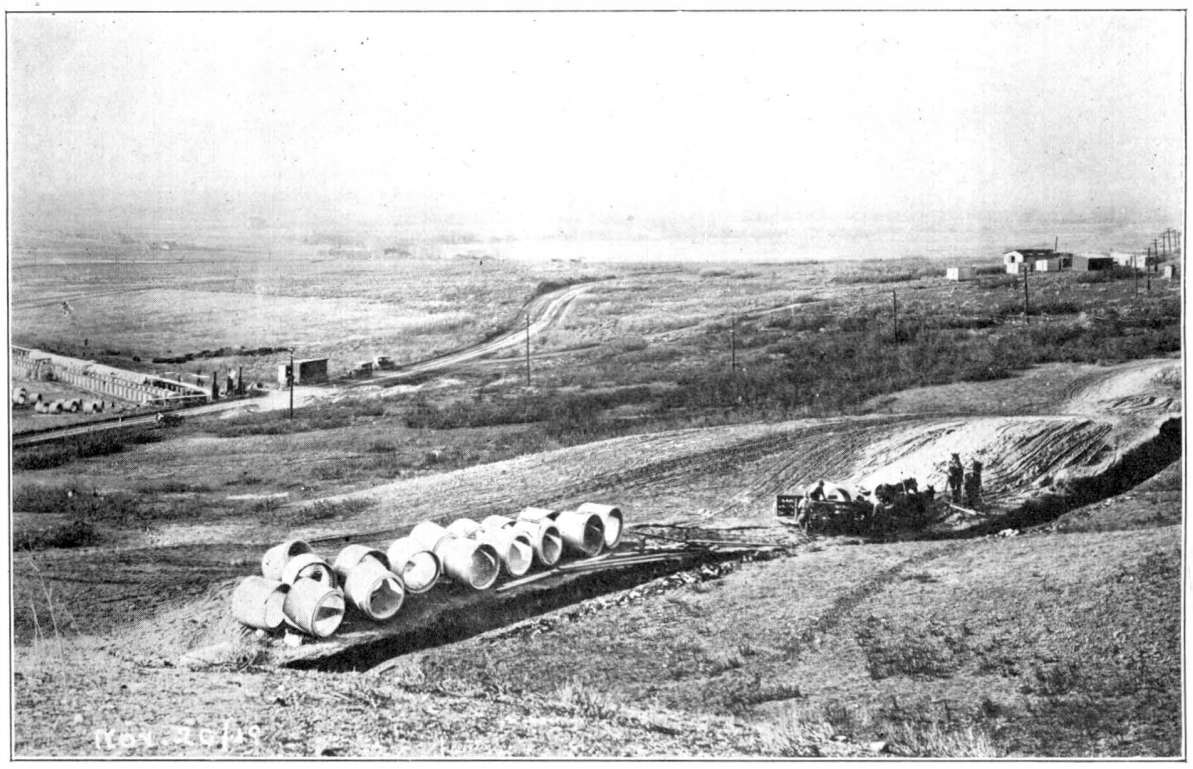
nyside avenue, Fifth South and First South streets. It practically doubles the supply main capacity of the city and will be ample for many years to come. The great problem now confronting the city is to secure enough water to fill these supply mains or to satisfy the needs of the people and industries.

This new conduit was officially opened Thursday, October 21, by appropriate ceremonies in which about one hundred fifty prominent citizens and officials participated. From the top of the valve box on the north side of Parley's canyon addresses to the assembled citizens were delivered by former City Commissioner Henry W. Lawrence, Apostle Richard R. Lyman, Rev. Elmer I. Goshen and Mayor C. Clarence Neslen. City Treasurer R. N. Young was master of ceremonies, and besides conducting the proceedings, gave a resume of the work of constructing the huge conduit, the cost and the amount of water it was capable of delivering to the city, etc. After the formal ceremonies, those in attendance repaired to the camp of the contractor, Mr. P. J. Moran, where an appetizing luncheon was served to all.

The completion of this conduit with the necessary pressure mains has prepared the sufficient water to put into this delivery system to guarantee an ample supply at all times.

The city is almost entirely dependent upon the run-off of the various streams to the east and south. It has ten distributing reservoirs with a total capacity of twenty-four million gallons, about enough for one day's supply in the winter, but little more than half enough for a day in July or August. Three storage reservoirs have a combined present capacity of 846 million gallons —about enough for twenty-five average days. During years when the snowfall has been ample, these reservoirs serve to bridge over the late summer months when the streams are at their smallest flow. But, in comparison with the needs of the city and the water that is actually available, they are pitiably small and leave the city in almost constant danger of a disastrous shortage.

The annual consumption of water by Salt Lake City is about nine and one-half billion gallons. Careful stream measurements over a period of fourteen years show that in the average year there is available from mountain streams in excess of fifty-three billion gallons. Of this immense amount of water



PARLEY'S HIGH LINE CONDUIT
Placing 48-inch re-inforced concrete pipe along trench.

city to care for the water needs of its citizens and industries for many years to come in the matter of delivery to the distribution system. There yet remains the problem of supplying but one-sixtieth can be stored in all existing reservoirs, while of the actual water consumed less than one-tenth can be stored. For the rest of the supply the city is dependent

on a continuous flow in the streams, which frequently are almost entirely dried up in the late summer.

Waterworks officials have for years called attention to this dangerous condition, and have prepared to provide a remedy by securing advantageous reservoir sites in all the nearby canyons. At relatively small cost the city can secure itself against the danger of water shortage and at the same time abate somewhat the damage of spring floods. Further exchanges with the farmers will not only benefit these farmers by assuring them an enlarged supply, particularly late in the summer when their present sources of irrigating water are largely depleted, but will enable the city to have an ample supply of clear mountain water throughout the year.

The cost of increasing our storage reservoir capacity many fold is trivial when compared with the huge sums spent for the same purpose by other growing cities not so advantageously situated as is Salt Lake. Since an increase in storage capacity is the only thing now necessary to make Salt Lake secure in the matter of its water supply, it is safe to assume that the citizens will shortly authorize the construction of this one needed link to assure present safety and future growth.

Status of Contracts for Public Improvements to November 1, 1920

Ext.	Location.	Contractor.	Ordered by Engineer.	Commenced Work.	Completed Work.	Date for Completion.	Per Ct. Complete.
PAVING:							
No. 141	7th E., 5th to 13th So.	J. W. Mellen	8-21-19	8-16-19		5-12-20	85
No. 143	6th Ave., H to N Sts.; N St. —3rd to 6th Ave.	Moran Pav. Co.	10-15-19	8-27-19	10-30-20	6-26-20	100
No. 144	21st So. — Fire Station to 13th E.	Campbell Bldg. Co.	9-11-20	9-11-20		11-22-20	50
No. 145	Denver St., 9th So. to Harvard	Moran Pav. Co.	10-20-19	8-12-19		2-5-20	99
No. 165	6th So., 13th E. to Mt. Olivet	J. W. Mellen	4-1-20	7-9-20	10-18-20	6-12-20	100
No. 166	1st W., So. Temple to Wall; Wall St., 1st to 2nd West	J. W. Mellen	4-1-20	5-11-20		9-28-20	70
No. 168	12th East, 3rd to 5th South	Moran Pav. Co.	5-6-20	6-4-20		8-23-20	75
No. 172	Z. C. M. I. Ave.—2nd to 3rd West	Enoch Smith	8-24-20	8-16-20	9-25-20	9-29-20	100
CURB AND GUTTER:							
No. 38	7th W., 9th So. to 2nd North	Strange & Vallandingham	4-1-20	4-8-20	9-15-20	9-29-20	100
SEWER EXTENSIONS:							
No. 377	5th So. to Los Angeles & Salt Lake R. R. tracks, between 8th West and Redwood Road	R. E. Campbell					
BATH-HOUSE:							
19-Z1	Warm Springs Bath-house	Lynch-Cannon					
WATER SUPPLY:							
B24-J	Parley's High-Line Conduit	Moran Pav. Co.	10-23-19	10-24-19		6-21-20	99
26-W	Culinary Water System— Green & Tanner Ditches	Mullins & Palm	5-11-20	5-11-20		10-1-20	85
	Reservoir — Culinary Water System	A. J. Gillis	6-10-20			8-21-20	75
	Flow line	H. S. Anderson	6-9-20			8-1-20	91
29-H	East Jordan Canal Ext.	J. L. Griffith Co.	2-26-20	6-25-20		6-24-20	90
BRIDGES:							
B41-A4	5th South, Jordan River	Riley-James Co.	5-10-20	5-15-20	10-2-20	8-26-20	100
LIGHTING:							
No. 1	**Operation:** South Temple to 4th South; West Temple to 2nd East	Utah Power & Light Co.	4-26-19	4-26-19	Expires	4-25-22	
No. 2-B	**Operation:** Main St., South Temple to 5th South	Utah Power & Light Co.	10-29-20	10-29-20	Expires	10-29-21	
No. 5	**Operation:** Regent St.	Utah Power & Light Co.	10-25-18	10-25-18	Expires	10-24-21	