"From Bucket To Basin"

100 Years of Water Service

Prologue

A hundred years ago the residents of Fort Collins decided to build a waterworks to improve the health and welfare of the community. Since that special day, April 4, 1882, Fort Collins has grown from a small community of 1,400 to a city of 75,000. Over the years the Water Utilities have made numerous improvements and modifications to the original water works of 1882; always guided by the entrusted responsibility of providing a safe and reliable supply of water to the residents of Fort Collins.

The history of the Water Utilities has been imprinted on the succeeding pages of this document; a history of progress and accomplishments of which the community can be proud. Many have contributed to this history; Councils and City Administrators provided guidance, the community provided support, and the employees of the Water Utilities provided dependable service.

Recognition of the hundreds of employees who have served this community during the past one hundred years would be difficult. Few have ever enjoyed public recognition for the accomplishments and progress of the Water Utilities and the names and faces of many have been forgotten. Therefore, it seems appropriate that this document be dedicated to all those employees, past and present, for their efforts in providing our community with a safe and reliable supply of water.

"From Bucket to Basin"
100 Years of Water Service

Fort Collins Water Utilities
1882-1982

By: Molly Nortier and Michael Smith

Special appreciation and thanks to the following people for their contributions and help in preparing this document:

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Early History

"From Bucket to Basin" — Celebrating 100 Years of Water Service in Fort Collins

History reveals that about 140 years ago, Fort Collins, or "Camp Collins" as it was called then, had been a military post for a number of years prior to the settlement by civilians. The last of the soldiers were evacuated in September of 1866.

According to a local historian, Charlene Tresner, "A few farms and ranches were located around Fort Collins and squatters settled on the abandoned military reservation in old town along the Cache La Poudre River before legal snarls were untangled to open government land to settlement. On May 15, 1872, Congress opened the reservation to pre-emption homesteading and that same year the Agricultural Colony arrived to buy land and plot out Fort Collins. Old town had been built parallel to the River, while New Town was attached to it being square with the compass." Thus, although it began as a military post, Fort Collins became a center for the surrounding farming community.

Street scene in early Fort Collins prior to waterworks — 1880.

Located on the front range of the Rocky Mountains, Fort Collins has a semi-arid climate receiving an average of 15 inches of precipitation per year. Hence, the settlers realized that irrigation was necessary in order to grow vegetation that was not indigenous to the area or for farmers to grow crops. The first irrigation ditch was dug in the foothills near Bellvue in 1860 taking water from the Poudre River. Later on in 1882, the Cache La Poudre Valley was declared to be "one vast network of irrigating canals."* Irrigation was extremely important since the town's prosperity depended upon agriculture-related industries. Education was one of them. In 1862 Congress passed the Morrill Act authorizing land grant colleges. 1870 saw the territorial legislature establish the Agricultural College of Colorado to be located in Fort Collins. Supporters of the College were patient and optimistic during the early years of its development. In 1886 several declared firmly: "The Agricultural College is a success" when they were interviewed by H. H. Brancroft's staff visiting the *Tedmon House* to collect data for his history of Colorado. The college

Linden Street — Tedmon House in the foreground on the right.

**History of Agriculture in Colorado,* Alvin T. Steinel, Chapter, "When Irrigation Begins", 1926

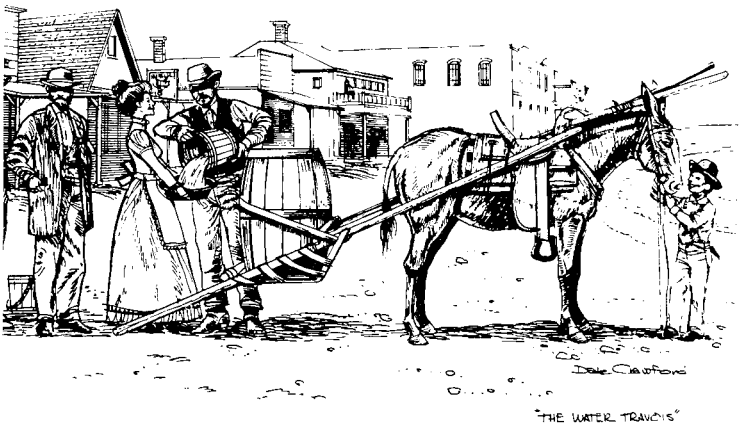
pioneered in two developments which revolutionized life in the county and town — irrigation and sugar beet culture. In matters of irrigation, the town leaders had quite a head start on the college since water was the first thing people needed. It was only in the late 1890's and the early 1900's that engineering knowledge and ingenuity emerged in the tiny faculty to help solve practical problems for the region. The pioneers needed engineers as well as water lawyers. The practical aspects of the college research led to the invention of the Parshall flume to measure diverted water. Ralph Parshall, a member of the faculty, had worked out the main features of this device by 1920. In 1932 there were more than 1500 installed in Colorado ditches. A grandson of Mr. Parshall still lives in Fort Collins. The town, of course, had several ditches for sources of water that were important from its very beginnings.* The Agricultural College, currently, Colorado State University, has become a world leader in hydrology and irrigation practices.

The town constructed a mill-race in 1866-1867 to divert water from the River for two flour mills; the Hottel Mill and the Hoffman Mill. While its purpose was to supply energy to operate the water wheels, people living nearby took advantage of this more convenient water supply.

In 1873, the Fort Collins Irrigation Canal (presently Arthur Ditch) was constructed and provided another source of water to the town residents. It came out of the river somewhat west of the millrace headgate and looped its way south near the western boundary of early town. It crossed Whitcomb several times, and entered the area later used for the campus near Meldrum and Howes.

Over one hundred years ago the small farming community of about 1356 residents hauled their own water by means of buckets or barrels from the nearby river, and from irrigating canals, or if they lived near it, the mill-race, but they had no domestic water

**Fort Collins Yesterdays,* Evadene Swanson, pp. 42-50, 1976



Ralph Coyte selling water to town residents prior to 1882.

supply. In 1877 Ralph Coyte, an enterprising fellow, began supplying the town residents with a barrel strapped to a travois which was hitched to a mule. Ralph roamed the dusty streets selling water by the bucket. As a point of interest, thirty-six years later in 1913, it was related in the local newspaper that Mr. Coyte of Denver, was honored at a dinner at the Linden Hotel for his contribution to the history of supplying water to the citizens of Fort Collins by his primitive but appreciated system.

Later, another more innovative man who remains unidentified, hitched horses or mules to a water wagon, to haul water from the river to town residents for 25¢ a barrel or a nickel a bucket-full. It is reported that this "less primitive" method supplied the people of the town with water for cooking and drinking while water needed for laundry and cleaning purposes was obtained from various laterals that traversed the town.

However, technology was not to be denied. In the late 1870's and early 1880's, town residents became more concerned about the need for a waterworks. Typhoid was no stranger to this small community and

The coming of the water wagon.

two disasterous fires; one in 1880 which destroyed the prosperous Jacob Welch building and caused the deaths of two people, and the other in 1882 which broke out in F. P. Stover's new drug store, quickened and intensified the appeal for a waterworks.

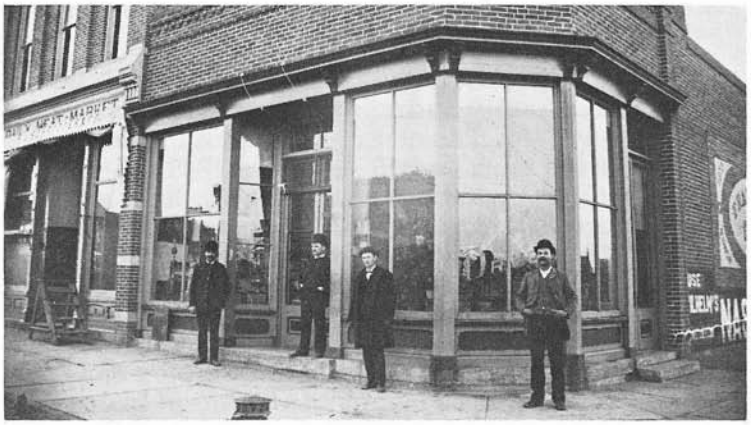
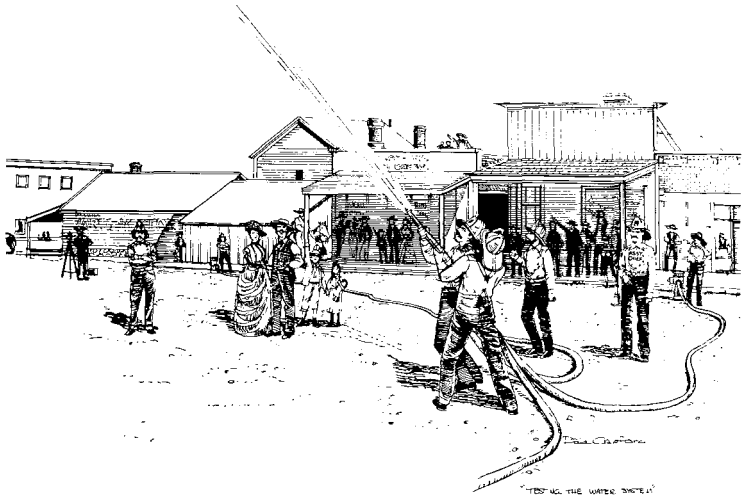


Photo of Stover's Drug taken years after the fire. Note the fire plug in the foreground.

On April 4, 1882, a municipal election was held at which the town residents "emphatically declared", by a vote of 268 to 44, in favor of constructing a system of waterworks to provide water for domestic and fire protection purposes.



The big celebration and testing of the water system. Note Engineer Handy with his transit.

Design and construction of the waterworks started almost immediately and was to be completed almost a year later in 1883. The completion of the waterworks was by far the most notable event of 1883. There was great rejoicing by the citizens when the long awaited event occurred, and nearly the whole town showed up to watch "six streams of water under 120 pounds of pressure from 1⅛ inch nozzels carried to a height of 90 feet." After this spectacle had been watched about 30 minutes, the awed citizens were treated to a two inch stream of water sent 142 feet into the air by means of a Siamese nozzle (hoses from three different hydrants). The height was measured by Engineer Handy and his transit. It was also reported that after the final demonstration, on that historic day in June, the

contractors, Mr. Russel and Mr. Alexander, treated the old and new town councils to a champagne dinner at the local Tedmon House.

Original waterworks building constructed in 1882.

The initial waterworks consisted of a filter plant, 43,400 feet of water main, 20 fire hydrants and 15 water gates. Pressure for the system was obtained from four Gaskill pumps and two American turbine water wheels. All the pumps and the water wheels were located in a brick structure on a stone foundation. (This structure still stands although in very poor condition. It was declared an historic landmark in 1971-72). The water for the waterworks was diverted from the Cache La Poudre River and carried through an open ditch three-fourths of a mile to the pump house. From there the water was forced into and through City mains by the four pumps, each having a capacity of 1½ million gallons per day, which were driven by two turbine water wheels of 75 horsepower each. In the winter a steam powered engine was used to drive the pumps. When a fire hydrant or any other

Firemen testing a pumper on the corner of Mulberry and Sherwood around 1914-15.

large amount of water was used, the pumps speeded up through an automatic device to increase pressure.

It was reported that "the new waterworks helped to celebrate the Fourth of July that year (1883). A prize of $5.00 was given to the man, holding a specially constructed shield, who could force his way the nearest to a stream of water coming from a one inch nozzle."

Ansel Watrous informs us in *History of Larimer County*, that Fort Collins then had, in the opinion of experts, as good a system of waterworks as there was in the state and naturally people were proud of it. They appreciated more than words could express, the privilege of turning a faucet in their kitchens and getting an abundant supply of pure water for all uses. The filthy old water wagon was relegated to the rear, never more to do service in the progressive City of Fort Collins. Following are a few excerpts from the year 1883 as printed in the *Daily Express*:

It is now six months since the waterworks system was introduced to the City — It may be said that the

favor which the system has sprung is suprising, and Fort Collins could not possibly get along without it. Every day finds new applicants at city hall desiring to tap the City's mains and connect their houses to the system.

Also — The *Express* pointed out to the citizens that "Water brought right into your house and yard is the best thing the amount of money that it will cost can obtain in Fort Collins."

And — Water Superintendent Handy said the new waterworks "are working to charm." There were 65 "consumers", with 20 more in the prospect.

Not all was praise, however — "From the look of the water that came through the City's pipes this afternoon, it appears as though a cow was drowned in the City reservoir."

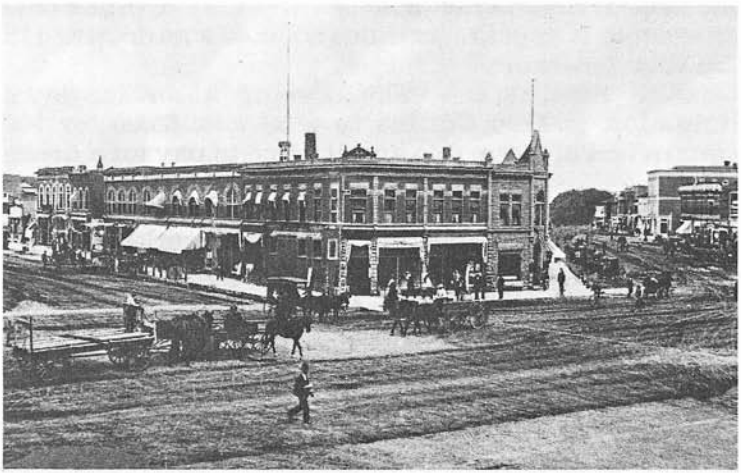
And note this — The cost of water for lawn irrigation in Fort Collins in 1883 was $5.00 for 100 square feet of lawn. (No small price to pay for a green lawn.)

In 1884, the *Daily Express* had advocated reduction of water rentals under the new waterworks system. Accordingly, the City Council made reductions for service to some properties. The *Express* listed some of

After waterworks was completed the streets could be sprayed to keep down the dust.

the rates: "The old rates for residences were, for a house of four rooms or less, if the house was occupied by one family, $10.00 a year; five or six rooms, $20.00; 9 or 10 rooms, $25.00; 11 or 12 rooms $30.00. The rates as revised will be $3.00 instead of $5.00 for each additional room." (Imagine rates going down!)

A year after the waterworks became an integral part of life in Fort Collins, this quote appeared in the health section of the *Express*: "Fort Collins is in a remarkably healthy condition, so our physicians say, and they account for it largely by the introduction of waterworks, which give us the best water in the state."



Intersection of Linden, College, and Mountain before 1907.

Source of Supply

From written records of travelers to this region in the pre-settlement days, we have learned about the hydrologic conditions that existed then. Only a few of the early explorers of the Cache la Poudre River Basin could give an accurate account of riverflow conditions in the area for the simple reason that the timing of their expeditions was generally such that they reached the basin sometime in July and were not in a position to report on flood conditions during May and June nor on river conditions existing in August and September or during the winter period.*

An excellent account of the existing conditions was given by Horace Greeley in his report entitled "Overland Journey to California in 1859":

> *All the streams of this region are largest where they emerge from the mountains, unless reinforced below by other streams having a like origin, the thirsty prairie contributed nothing, but begins to drink them up from the time they strike it. The smaller streams are those entirely absorbed in the course of five or ten miles, unless they happen sooner to be lost in some larger creek. Drought, throughout each summer, is the inexorable and destroying tyrant of the plains.*

Writing about the Box Elder and Lone Tree Creeks in Water Supply Paper No. 9 in 1897, the following remark was made by David Boyd:

> *These and other channels rarely receive water. For the greater part of the year their beds, their well marked features, are dry; but after heavy rains or unusual rainstorms, locally known as cloudbursts, they become filled with raging torrents which destroy everything in their paths.*

The water supply of the Cache la Poudre River is derived mostly from snowmelt in the high mountains.

*From the M.W. Bittinger Report, March, 1977.

Clearing the snow from the Michigan Ditch prior to spring runoff.

The amount of snowmelt is a function of snow accumulation, and its timing is a function of the temperature. Peak flows on the Poudre River generally arrive in the period between mid-May and late June. After the major portion of the snowpack has melted, riverflow diminishes rapidly and originates from the melting of snow on north-facing slopes and from seepage flows temporarily retained in the mountain soils. These soils are extremely shallow on most parts of the mountain watershed, releasing their excess water over a short period of time. The summer thunderstorms are normally only adequate to replenish the soil moisture and do not yield a significant supply that reaches the plains.

The hydrology characteristics of the area have not changed for many centuries, but the way that man has

learned to manage them has. As settlement began in the Poudre Valley, agriculture and the complex irrigation systems that resulted in this arid land became the backbone of development and the economy. Those familiar with western history can attest to the important part that water played in the settlement and growth of this part of the country. Because of limited water supply, a complicated system of water law emerged in Colorado. In the past, "water wars" were common and conflicts even occur today in regard to water rights. The ownership of water by private corporations and individuals was a new phenomenon of the Rocky Mountain States and a puzzling feature of western law for people whose background had been shaped by water law recognizing reparian rights. The latter system, as implied by the name, associated water with the land through which the river flowed. This was traditional in the eastern United States and in English law. The arid west developed quite a contrary viewpoint. Water needed for mining in the days of the gold rush supported an industry far distant at times from the course of the river. Colorado miners and ranchers in territorial days seized upon this doctrine of prior appropriation and water became a commodity to buy and sell independent of the land.*

Colorado became a leader in developing a new concept of water rights called priority of appropriation. Following is a simplified explanation from the Colorado Constitution:

1) *All waters of natural streams are property of the public and dedicated to the use of the people, subject to appropriation.*
2) *An appropriation is the right to divert the unclaimed water and the right to do so is never denied.*
3) *In allocating water, priority in time gives the better right or undisputed claim.*

**Fort Collins Yesterdays*, Evadene Swanson, pp. 44-50, 1976

The Cache La Poudre River above the Poudre Canyon Water Treatment Plant.

4) *Preference for use when water is not available to all: First - domestic, Second - agriculture, and Third - manufacturing and mining.*

To explain further, an appropriation of the water is made when an individual or group has diverted water from a natural stream and applied it to a beneficial use. "Beneficial use" is not restrictive but includes any use which can be shown to be beneficial and not wasteful.

Historically the City of Fort Collins has depended primarily on its direct flow rights from the Poudre River. Although supply must be supplemented with water from other sources, these rights continue to provide over half of the City's requirements. Because these rights are senior to most on the river, they provide a dependable source of water not only in average and wet years, but also in dry years. The first water right the City obtained was in the summer of 1889 when the water got so low in the river there was barely enough for domestic use. At this time the Council purchased a direct flow right of 4.0 cubic feet per second (cfs) from Thomas Gilkinson. It was transferred to the City from a ditch known as the John R. Brown Ditch. In 1904, 2.651 cfs of priority No. 1 on the Yeager Ditch was purchased and the total of 6.651 cfs was moved by decree to the present diversion dam near the Poudre Canyon Water Treatment Plant. Three other senior direct flow rights were subsequently obtained which now entitle the City to divert approximately 12,000 acre feet of water annually. (An acre-foot is the volume of water required to cover one acre to a depth of one foot, or 325,851 gallons.)

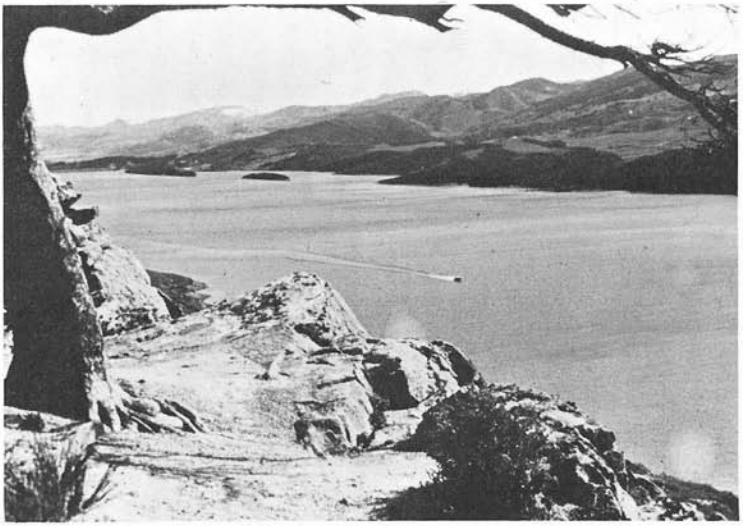
As we have seen in the early history of Fort Collins, the residents developed a water supply system sufficient for the needs of the City as far as those needs could then be foreseen. It is not surprising that they, like others, could not imagine the tremendous population growth that would occur in Colorado, and particularly along the front range, following the Second World War. As the City acquired

new residents, it found all of its resources taxed including its water supply. In the spring of 1954, this excerpt came from the *Express-Courier*: "The belief that the City of Fort Collins must have a larger water system if it is to grow in future years and retain its present beauty of trees, lawns and gardens, was voiced Friday at a public meeting called to discuss the $1.5 million water bond issue on the ballot for the City election of April 6." The citizens agreed that the water system needed to be updated, and the bond issue passed by a substantial margin; the actual vote was 1496 to 838.

Even with this update in the water system, by the late 1950's, the inadequate water supply became intolerable and the City was forced to act. It did act; and it turned out, it acted precipitously. It agreed to purchase substantial amounts of water from existing irrigation ditches, but it failed to adequately consider the legal limitations which would constrain the use of such water and make it possible for the City's plans to reach fruition. The City's plans were perceived by irrigators of the basin to totally disrupt the historic regimen of the Cache la Poudre River which, of course, satisfies the independent but interrelated needs of other water users of the River. The result was an historic legal battle which reached the Colorado Supreme Court; and, when all was done, the City found that it was to be denied the ability to effectuate its plans on the grounds that its plans were ruled injurious to other water users of the basin. An additional detriment was the ill feelings that were generated between the residents of the City and the rural community.

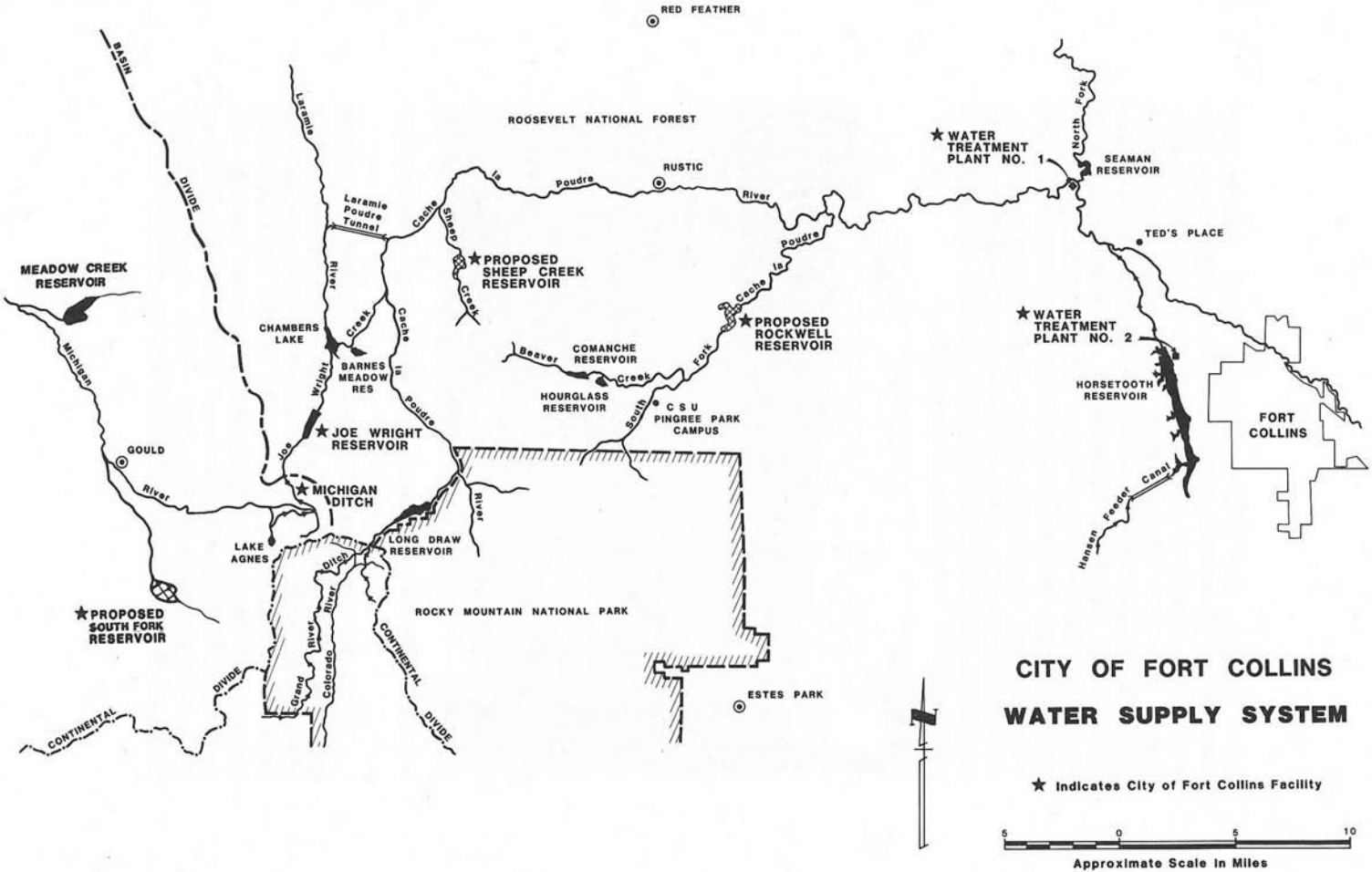
While the City's plans were frustrated, its water supply problem remained, and became yearly more acute. However, for those who are perceptive, defeat brings wisdom, and rejections can present opportunities. The City Council concluded, correctly enough, that additional water sources were available and that the error had been with the method rather than the goal of acquiring them. At the suggestion of Mr. Harvey Johnson, then mayor, the City established a

new entity, the Water Board. That Board was instructed to recommend solutions to what was then becoming a critical problem, water rationing having been imposed throughout the City; and more importantly, it was directed to develop and maintain long-range plans to assure an adequate supply of water for the future needs of the community. It was charged with the philosophy that water rights for the City should be acquired only from sources and by means which fully meet all legal requirements and in recognition of the legitimate needs and rights of the surrounding irrigation community.



Horsetooth Reservoir located in the foothills west of Fort Collins.

The Water Board immediately recommended several courses of action, all of which were adopted by the City Council. The initial critical water needs were met by the purchase of waters of the Colorado-Big Thompson Project. This project whose waters are produced from the headwaters of the Colorado River was completed in 1953. The water is transported through the Continental Divide via the Adams Tunnel

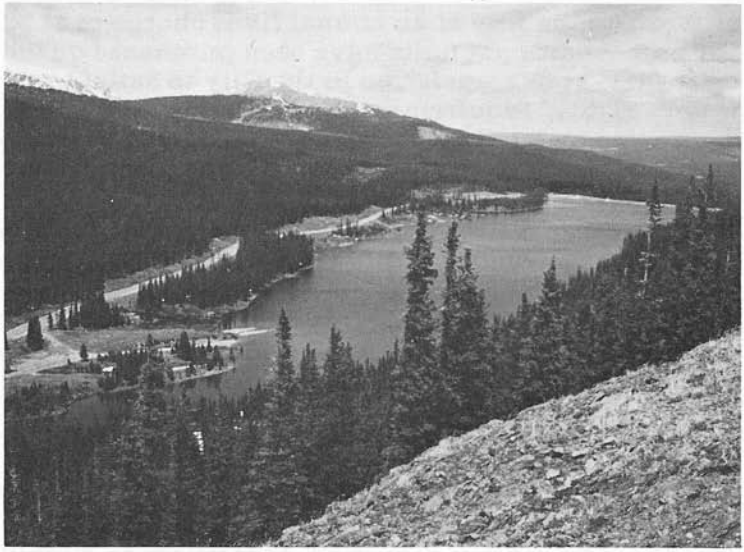

RED FEATHER
ROOSEVELT NATIONAL FOREST
RUSTIC
WATER TREATMENT PLANT NO. 1
SEAMAN RESERVOIR
North Fork
TED'S PLACE
WATER TREATMENT PLANT NO. 2
HORSETOOTH RESERVOIR
FORT COLLINS
Hansen Feeder Canal
MEADOW CREEK RESERVOIR
CHAMBERS LAKE
BARNES MEADOW RES
JOE WRIGHT RESERVOIR
PROPOSED SHEEP CREEK RESERVOIR
PROPOSED ROCKWELL RESERVOIR
COMANCHE RESERVOIR
HOURGLASS RESERVOIR
C S U PINGREE PARK CAMPUS
GOULD
MICHIGAN DITCH
LAKE AGNES
LONG DRAW RESERVOIR
PROPOSED SOUTH FORK RESERVOIR
ROCKY MOUNTAIN NATIONAL PARK
ESTES PARK
CONTINENTAL DIVIDE
Laramie Poudre Tunnel
Laramie River
Cache la Poudre River
Sheep Creek
Wright Creek
Joe
Michigan
Beaver Creek
South Fork
Ditch
Grand River
Colorado River
CITY OF FORT COLLINS
WATER SUPPLY SYSTEM
★ Indicates City of Fort Collins Facility
5 0 5 10
Approximate Scale in Miles

and stored in various reservoirs on the Eastern Slope, including Horsetooth Reservoir west of the City. The City originally purchased 6,052 units of Colorado-Big Thompson water on August 8, 1958 from the Northern Colorado Water Conservancy District, the management agency. These units were available and still are, to the City at an annual fixed charge of $1.50 per unit. Additional units have been purchased on the open market or transferred to the City to satisfy raw water rights requirements. Not being originally contracted by the City, these latter units are subject to varying rates as imposed from time to time by directors of the district.

The other courses of action recommended by the Water Board included additional treated water storage capacity and the upgrading of the distribution system to meet the needs of the City which had expanded considerably. While water rationing had to be maintained for a short time, the City was, within a few years, able to acquire and distribute sufficient additional water so as to remove the necessity for rationing.

Turning to more long-term solutions, the City Council, upon the Water Board's recommendation, established a policy requiring developers to supply raw water sufficient to satisfy the need of new development or annexations, thus to avoid placing unwarranted burdens upon existing users. The City also conducted extensive investigations as necessary to develop water acquisition and storage plans to meet future needs. As a result of the policies adopted in the mid-1960's, the City has, in fact, continued to acquire sufficient water to meet its ever-growing population. While a certain portion of these supplies have come by the purchase of units of the Colorado-Big Thompson project, the City has attempted, particularly in later years, to develop its own water supply, or to acquire water from sources which would avoid putting the City in competition with rural water users. As Fort Collins has grown, many acres of irrigated farm land have been developed. Since the mid-1960's, the City has

accepted the irrigation water from these lands to help meet the City's increasing demands. In this way, the City is able to directly convert the use of this water to municipal use without requiring the acquisition of water from outlying agricultural lands.



Joe Wright Reservoir near Cameron Pass.

Raw water supplies were increased substantially with the acquisition and improvement of the Michigan Ditch and Joe Wright Reservoir system located near Cameron Pass. The ditch and reservoir were originally owned and operated by the North Poudre Irrigation Company. These facilities were built through the efforts of early settlers in the late 1800's and early 1900's. A system of ditches and wooden stave pipe, totaling more than five miles in length, was constructed along steep mountainsides at elevations of more than 10,000 feet. The ditch intercepted water from the Michigan River Basin and transported it across Cameron Pass into Joe Wright Creek (named for an early trapper), a tributary of the Poudre River.

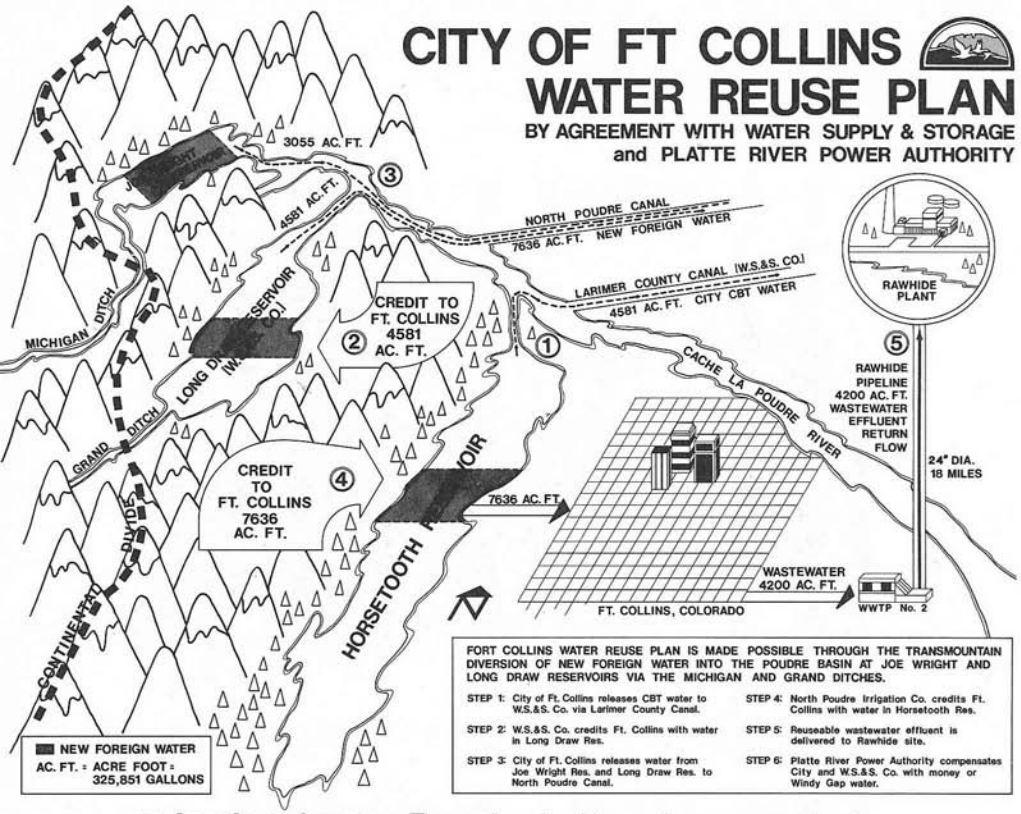
Pipeline being installed at the Michigan Ditch is a part of the renovation work.

This photo shows the Michigan Ditch winding along the steep mountain sides near Nokhu Crags.

This water could be stored in the old Joe Wright Reservoir, which had a capacity of about 800 acre feet. After the construction of Horsetooth Reservoir in the early 1950's, the Michigan Ditch and Joe Wright Reservoir were left largely unused because of more accessible supplies at lower cost to the irrigation company.

In 1971 the City of Fort Collins acquired the system from North Poudre Irrigation Company in exchange for shares of irrigation ditch company stock owned by the City. Renovation of the Michigan Ditch began in 1972 and will continue for the next few years. Joe Wright Reservoir was rebuilt to hold about 7200 acre feet of water. Construction began in 1977 and was completed early in 1980.

In 1978 the City entered into an agreement with the Platte River Power Authority (PRPA) and the Water Supply and Storage Company (WSSC) to provide for the reuse of a portion of the City's wastewater effluent at the Rawhide Power Plant. The reusable water comes from either transbasin diversions or from previously



undeveloped water. Transbasin diversions come from the City's Michigan Ditch and WSSC's Grand River Ditch, which diverts from the upper Colorado River. In-basin water stored in Joe Wright Reservoir and Long Draw Reservoir is also eligible for reuse. This water is used by City customers and the return flow effluent is pumped to the Rawhide Power Plant. In exchange, Fort Collins and WSSC will receive an equivalent amount of clear mountain water from PRPA (see reuse chart).

The result of these courses of action is that Fort Collins now has sufficient water to serve a population exceeding 100,000. All of this water, since the early 1960's has been acquired without objection by, and indeed with the cooperation of, the agricultural irrigation community. As Fort Collins continues to grow, the City will continue to do so in full recognition of the rights of other water users of the basin, and a result of cooperation with them to the benefit of the entire Larimer County Community.

Raw Water and Stock Owned by City of Fort Collins

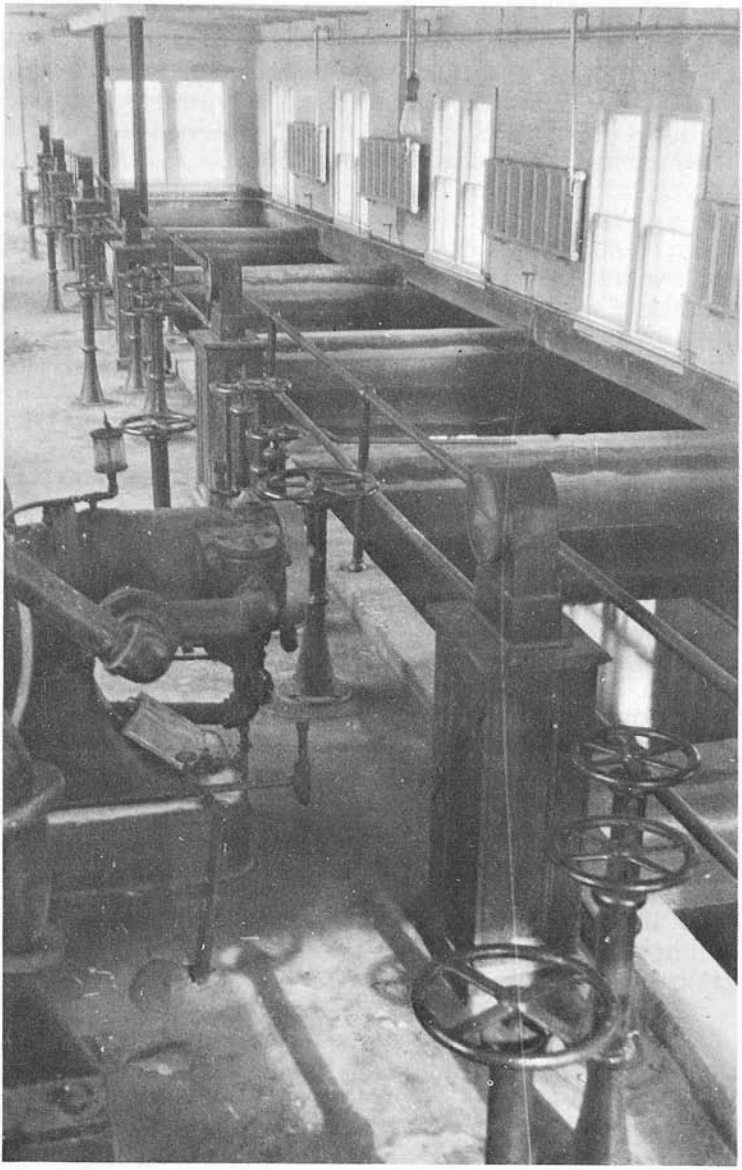
Source	Conversion Factor (Ac-ft/sh)		Ac-ft Received 1977	1978	1979	1980	1981	Balance-Jan. 1, 1982 Shares	Ac-ft
Primary Sources Available for Treatment									
Poudre River Direct Flow	—		—	—	—	—	—	—	11,300
Joe Wright-Michigan Ditch System	—		—	—	—	—	—	—	4,800
NCWCD (CBT)	.76	(1)	1	61	80	313	2	10,892	8,280
North Poudre Irrigation Co.	5.98	(1)	0	0	0	69	236	890.75	5,330
Water Supply and Storage Co.	84.	(2)	0	252	336	84	0	17.917	1,500
Subtotal			1	313	416	466	238		31,210
Other Raw Water Resources									
Arthur Irrigation Co.	3.442	(2)	63	106	101	9	-27	100.2627	350
Dixon Lateral Ditch Co.	—		—	—	—	—	—	4.8	—
Emigh Lateral Ditch Co.	—		—	—	—	—	—	23.0	—
Harmony Lateral Ditch Co.	—		—	—	—	—	—	1.75	—
Lake Canal Co.	30.	(1)	—	—	180	—	—	6.0	180
Larimer County Canal No. 2	42.687	(2)	128	598	206	116	89	42.118	1,800
New Mercer Ditch Co.	30.236	(2)	39	30	174	0	121	22.01706	670
Pleasant Valley and Lake Canal Co.	39.74	(2)	810	190	367	425	169	126.94845	5,040
Taylor and Gill Ditch Co.	—		—	—	—	—	—	.0625	—
Warren Lake Reservoir Co.	10.0	(2)	17	0	0	50	50	41.3832	410
Subtotal			1,057	924	1,028	600	402		8,450
Total			1,058	1,237	1,444	1,066	640		39,660

(1) Approximate Average Yield
(2) City Conversion Factor

Water Treatment

At the turn of the century the increased demand for water for domestic purposes and a typhoid epidemic resulted in the need to make modifications to the water system which was completed in 1883. Dr. P. J. McHugh, Mayor of Fort Collins in 1903, was campaigning through the press for a favorable vote on a bond issue of $160,000 for building a new waterworks system to replace the old one. He was quoted as saying that, "The supply of water is not only inadequate in volume, but poor in quality." The water was also continually in danger of contamination from sewage from Bellvue and settlements on the north fork of the Poudre River. Thus, as was stated in *History of Larimer County*, "To remedy these evils, and to insure a larger supply of better water, it was decided, after a series of investigations, to extend the supply pipes up into the canyon to a point on the main stream above the confluence of the North Fork. In the summer of 1903, the people voted to issue municipal bonds to the amount of $150,000, the proceeds of the sales to be used in the extension and enlargement of the City's water system." The job was completed in the spring of 1904. "The contract called for a gravity system that would supply the City with 4,000,000 gallons of water every 24 hours with a pressure of 90 pounds to the square inch at the intersection of College and Laporte Avenues." The local newspaper was quoted as saying, "The water can be used for power purposes, and there ought to be a great plenty for sprinkling lawns at all hours of the day. The system of dividing the town into water districts and restricting the time for sprinkling was a great nuisance."

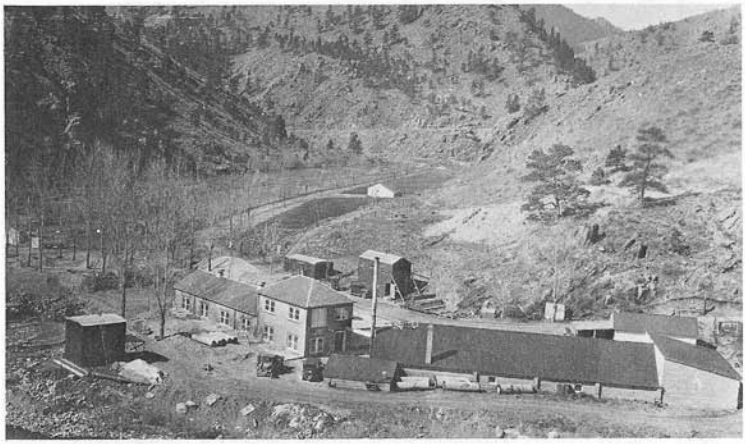
This system provided an ample supply of unfiltered water for all purposes, but during the spring floods, the stream carried a great many impurities making the water unfit for use for a few days at a time. "To remedy this, the City in 1909 installed near the head works, a mechanical filter of sufficient capacity to cleanse and purify all the water the system could



The original six sand filters constructed in 1913.

The Poudre Canyon Plant in the early 1920's.

carry. Since then Fort Collins has enjoyed the luxury of a bountiful supply of the best and purest water at all time," according to Watrous. Later to be known as the Poudre Canyon Plant, the facilities constructed in 1909 provided for lime addition and sedimentation. These

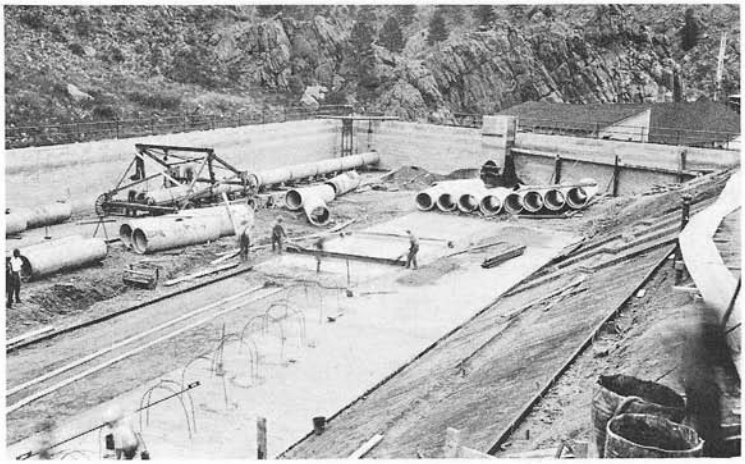


A 1926 view of the Poudre Canyon Plant prior to the construction of the filter building.

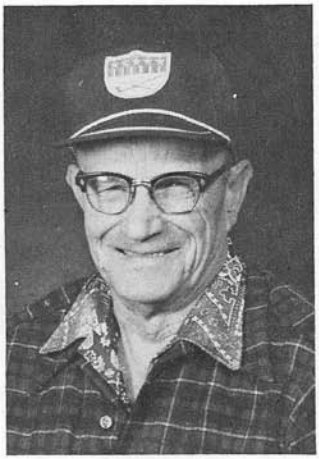
The Poudre Canyon Plant shortly after the "1925" filter building was completed. At the top-center is the sedimentation basin, and chemical feed and storage building.

facilities were located in the lower Poudre Canyon about 15 miles northwest of Fort Collins.

The continuing concern about the purity of the domestic water supply resulted in the construction of the first sand filters for the City's water system. In



Construction of the flocculation-sedimentation basin — 1926.



Herb Alexander, Poudre Poudre Canyon Plant Superintendent from 1942-1979, retired in 1979 after many years of dedicated service to the City of Fort Collins.

1913, six sand filters were added to the Poudre Canyon Plant increasing the treatment capacity to 6 million gallons per day.

In 1925 a considerable number of improvements were made to the Poudre Canyon Plant. A new filter building containing six sand filters was constructed adjacent to the 1913 filter building. A 185,000 gallon washwater tank was constructed on the side of the hill next to the plant. This new tank provided a gravity backwash system which replaced the old pump system. Also, a new presedimentation basin, flocculation-sedimentation basin and a chemical feed and storage facility were constructed. These additions increased the plant treatment capacity to 9 million gallons per day. Construction was completed in 1927.

The next addition to the Poudre Canyon Plant did not occur until 1947 when a new flocculation-sedimentation basin and a new chemical feed and storage building were constructed by Roy Nye Construction. At this time, the presedimentation and flocculation-sedimentation basins constructed in 1925 were converted to settled water holding basins.

In 1955, Stearns and Rogers constructed six new sand filters adjacent to the 1925 filters and the six

Poudre Canyon Water Treatment Plant — 1981.

filters constructed in 1913 were taken out of service. The 1913 filters were placed back in service in the early 1960's and were used until 1973, when they were permanently taken out of service. With the 1913, 1925 and 1955 filters in service, the Poudre Canyon Plant had a treatment capacity of 20 million gallons per day.

In 1960 a second flocculation-sedimentation basin was constructed adjacent to the 1947 basin. Later in 1973, a new presedimentation channel was constructed and modifications were made to the existing intake structure. Also, the filter bottoms in the 1925 filters were replaced and the sand media in both the 1925 and 1955 filters was replaced with dual media (coal-sand). As was mentioned previously, the 1913 filters were permanently taken out of service. With the dual media in the 1925 and 1955 filters, the treatment plant capacity remained at 20 million gallons per day.

During the summer of 1976, a flood of approximately 8,000 cubic feet per second caused damage to some plant facilities. The U.S. Army Corps

of Engineers made repairs to embankments and the pretreatment channel. Plant personnel replaced a footbridge and repaired the access road. Also in 1976, the plant changed from using dry alum to liquid alum which helped simplify chemical feed operations and reduce chemical costs.

In 1977, the Poudre Canyon Plant underwent considerable modifications to improve its solids collection and treatment system, provide additional chemical feed and storage facilities, and additional office space. The improvements consisted of a new interceptor drain, pumping station, and multi-celled solids drying basins. A new two-celled wash water lagoon and return pumping station were also added to process filter wash water. The new chemical handling improvements consisted of a new chlorine and polymer feed and storage facility which was added to the existing filter building. Additional office space was also added to accommodate the plant's supervisory personnel. Also, a new emergency generator system was installed to provide emergency power to operate various equipment in the plant during a power outage.

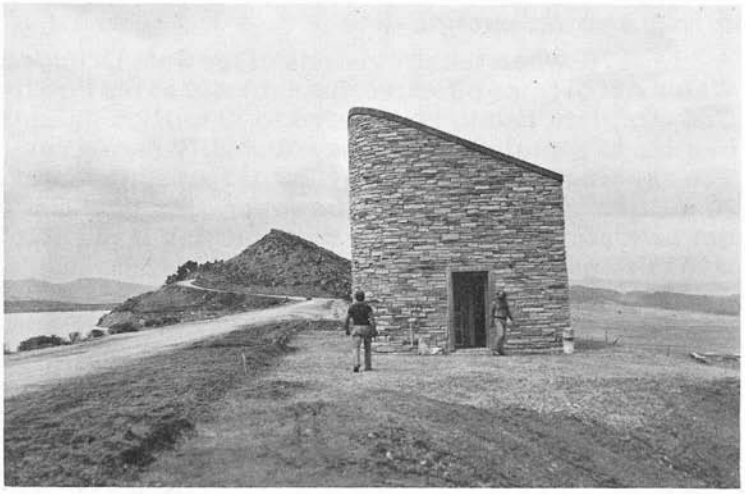
In 1978, when the provisions of the Safe Drinking Water Act became effective, the capacity at the Poudre Canyon Plant had to be lowered to 13 million gallons per day to comply with the new turbidity regulations. The existing filters had the hydraulic capacity to treat 20 million gallons per day, however, this flow could not be maintained for more than one day if the plant was to remain in compliance with the standards.

During the next couple of years two other problems concerning the water quality at the Poudre Canyon Plant were identified. One of these problems was the alum carryover which was coating the transmission lines from the plant and much of the distribution system. The other problem was the corrosivity of the treated water. Both of these problems were recognized to have potentially significant impacts. In 1980, funds were included in the proposed 1981 budget to conduct a detailed study of the

treatment process at the Poudre Canyon Plant. In the spring of 1981, Black and Veatch Consulting Engineers were selected to perform the study for a sum of $150,000. A report on the preliminary findings was presented to the Water Utility staff in March of 1982. The report presented various recommendations concerning improvements to the Poudre Canyon Plant and also outlined future improvements necessary to meet the future water demands of the City during the next 20 years.

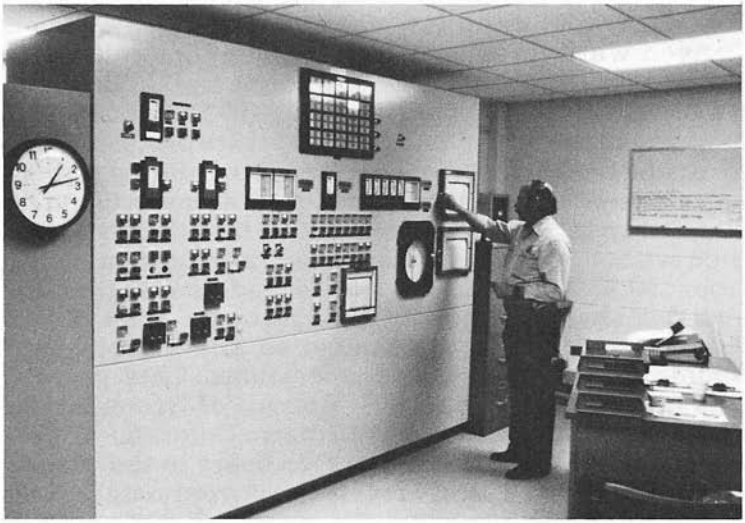
Soldier Canyon Water Treatment Plant

The first phase of the Soldier Canyon water Treatment Plant was constructed in 1969. The plant, located at the base of Soldier Canyon Dam, consisted of a two circular clarifiers, a micro-strainer and eight rapid sand filters. The treatment capacity was 16 million gallons per day. The first phase of the plant was designed by J. T. Banner & Associates and constructed by Dugan Construction. Prior to the construction of the plant, small high rate pressure filters were used to meet peak water demands. This



An elevator from the crest of Soldier Canyon Dam to its interior provides access to the gate chamber of Soldier Canyon Outlet.

Soldier Canyon Water Treatment Plant — 1981.



Plant Supervisor Frank McCumber monitoring controls and instrumentation at Soldier Canyon Water Treatment Plant.

temporary installation did help in meeting the peak demands but also resulted in numerous water quality complaints because of the filters poor treatment capability.

Major modifications to the Soldier Canyon Plant were made in 1976. These modifications consisted of changing the filter bottoms, replacing the sand media with dual media, installing tube settlers in both of the clarifiers, installing a backwash pump and an auxillary generator, and changing from dry alum to liquid alum. As a result of these modifications, the treatment capacity was increased to 24 million gallons per day. These modifications were designed by CH²M-Hill and constructed by Bargelt Construction and cost the Water Utilities $753,839.

In 1977 a new chlorination system was installed replacing obsolete equipment.

As the volume of water used from Horsetooth Reservoir has increased, it became apparent that the outlet at the Soldier Canyon Dam was inadequate to supply the future needs of all the users. The Soldier Canyon Outlet supplies water to the City's Soldier Canyon Water Treatment Plant, to the Colorado State University Hydraulics Laboratory, and to several water districts. A mudslide in 1977 reduced the capacity of the outlet. To alleviate future problems and to equalize water pressure for all of the users, an enlargement of the outlet structure was undertaken in November of 1978. Replacement of the 30-inch outlet pipe with a 54-inch pipe increased the flow capacity from 100 to 500 cubic feet per second. In addition, an elevator shaft was constructed from the crest of the dam down to the gate chamber to allow access for maintenance, repairs, and operations. This project was constructed by the U.S. Bureau of Reclamation under contract with the Northern Colorado Water Conservancy District for the five users of the outlet. The City of Fort Collins receives approximately 76% of the increased capacity. The City's corresponding share of the cost of the construction, about $2,000,000, was financed out of a $5,000,000 general obligation

bond issue in October of 1977. The Soldier Canyon Outlet was completed in July of 1979.

The next expansion at Soldier Canyon Plant started in 1979. The major thrust of this expansion was to construct facilities to increase the treatment capacity to 34 million gallons per day. The project was also designed to include oversized pipelines and physical layout which would facilitate and reduce the cost of future expansions up to 64 million gallons per day. The project included three new filters, flocculation-sedimentation basin, settling ponds, chemical treatment equipment, a new energy dissipation flow control system, a new plant control console, garage, a new access road, and a security fence. Additional filters were partially constructed during this project and it is expected that these filters will be completed in 1983 which would increase the treatment capacity to 44 million gallons per day. This plant expansion was designed by CH²M-Hill, Consulting Engineers and constructed by E. B. Jones Construction. The total cost of the project was $5,658,858. As stated previously, future expansions at the Soldier Canyon Plant were outlined in the preliminary study prepared by Black & Veatch, Consulting Engineers.

Future modifications at Soldier Canyon Plant for 1982-83 include completion of the three filters and installing chemical feed and storage facilities to correct the corrosivity problem.

City of Fort Collins

Treated Water
(Million Gallons)

Year	*MG*	*Year*	*MG*
1925	583	1955	2,007
1926	770	1956	2,032
1927	1,103	1957	1,717
1928	1,231	1958	1,951
1929	1,278	1959	2,076
1930	1,096	1960	2,799
1931	1,198	1961	2,189
1932	1,177	1962	2,753
1933	1,104	1963	2,867
1934	1,201	1964	3,113
1935	1,196	1965	2,752
1936	1,274	1966	3,419
1937	1,203	1967	2,810
1938	1,138	1968	3,326
1939	1,468	1969	3,366
1940	1,332	1970	3,668
1941	1,006	1971	3,926
1942	1,199	1972	4,564
1943	1,282	1973	4,679
1944	1,691	1974	5,478
1945	1,256	1975	4,948
1946	1,546	1976	4,940
1947	1,729	1977	4,958
1948	1,915	1978	5,352
1949	1,884	1979	4,617
1950	1,930	1980	5,648
1951	1,791	1981	5,305
1952	1,941		
1953	2,016		
1954	2,122		

Transmission and Distribution

After the first waterworks was completed in 1883, the town of Fort Collins could boast of having a total of 43,400 feet of water main in the system. The early water supply came through pipes that were made of an iron combination, as well as some segments of wooden line.

As was mentioned earlier in the Water Treatment section of this history, in 1903 the town began to have

Repairing wooden water line in Poudre Canyon in the 1920's.

Broken wooden water main at the intersection of Loomis and Oak — 1920's.

24-inch concrete water line in the Poudre Canyon — 1926.

Installing 24-inch concrete water line in Poudre Canyon.

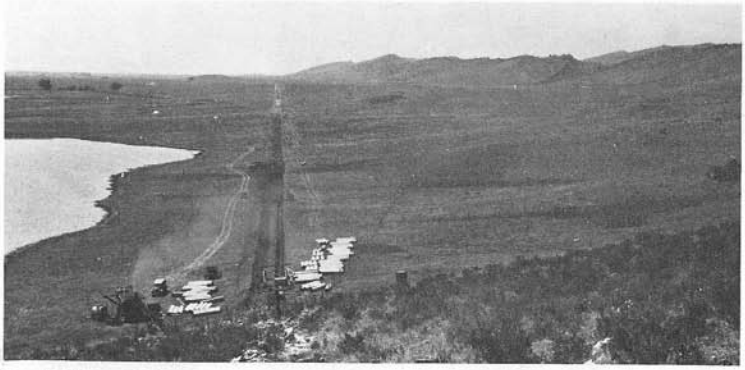
problems with the quality of the water along with an inadequate supply. As a result, a wooden raw water line was extended up the canyon "to a point on the main stream above the confluence of the North Fork." The people of the town voted to issue bonds to the amount of $150,000, the proceeds to be used in this

Installing 24-inch concrete water line in Poudre Canyon — 1926.

extension of the pipeline and to enlarge the City's water system.

In 1926, a 24″ concrete line from the Poudre Treatment Plant to Bingham Hill Reservoir was completed, and a 20″ concrete line to the new reservoir at Soldier Canyon was installed replacing the wooden

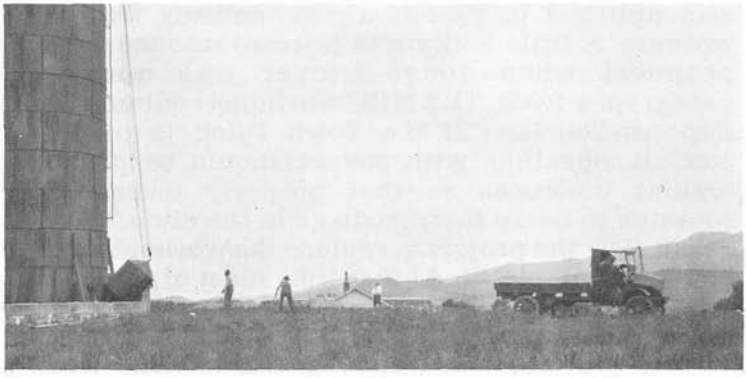
Installing 24-inch concrete line at the mouth of the Poudre Canyon — 1926.



Installing 20-inch concrete line south of Bingham Hill just west of Claymore Lake.

line installed in 1903. A 27″ line was constructed from Soldier Canyon down Laporte Avenue to the vicinity of Grandview Cemetery. A large number of photographs recorded this important project. In many areas the pipeline followed the same route of the line that was constructed in 1903.

The Bingham Hill Reservoir was constructed in 1910. An 18″ wooden line was installed at the same time. That 18″ line was replaced in 1948 with an 18″ steel line. Records show that a substantial part of the wooden pipe was replaced in 1926. During the Depression years in 1933, the local newspaper recorded the following event: Fort Collins' application for federal funds to create employment was formally



Construction of the standpipe near Lee Lake — 1926.

Enclosing the town ditch.

presented before the public works advisory board in Denver. "Accompanied by a delegation of 25 citizens, City Engineer Burgis Coy and City Attorney Fred W. Stover urged the board to approve federal advances of $100,000 for necessary pipe to replace wornout wooden pipe still in the City's system, and $125,000 for the cost of conduiting the Town Ditch through Fort Collins. In the early years the town ditch was a major source of domestic water supply. Covering the Ditch was

accomplished in 1933-34 almost entirely with WPA workers. A little levity was injected into the original proposal when Judge Stover was quoted in paragraphs from "Old Mill" the humor column of the *Express-Courier;* "If the Town Ditch is placed in conduit, openings with covers should be placed at regular distances so that property owners may continue to dump their garbage in the ditch."

In 1935 the project to replace the wornout wooden pipe was completed. At that time most of the wooden pipe that had served the City for so many years was nearly all removed. In April of 1982 the last segment of wooden pipeline was removed; the 18" line feeding Bingham Hill Reservoir. It is interesting that this should occur during the centennial year.

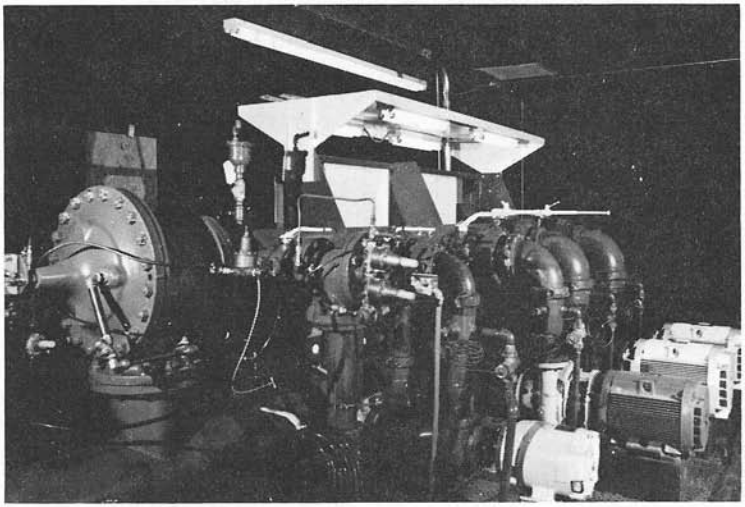
In 1955 another major capital project for transmission and distribution was the construction of a 27" steel line out of the canyon into the City.

A 42" ductile iron pipe was installed in 1965. It began at Soldier Canyon, ran cross country to the intersection of Mulberry and Overland, continued down Overland Trail all the way to West Lake Street, on to Taft Hill Road, and ended south of Prospect. Continuing on to the east it reduced in size to a 36" line, and eventually connected with two 24" lines that feed the City's distribution system.

As previously discussed in the Water Treatment section, the Poudre Canyon Plant had some problems with alum carryover. This alum carryover was coating the inside of the two transmission lines that run between the Poudre Plant and the City distribution system. The coating had gradually reduced the capacity of the two pipelines from 20 million gallons per day to 13 million gallons per day. In 1979 it was decided to clean the two pipelines by means of inserting a "pig" (a large piece of foam rubber like material in the shape of a bullet and wrapped with abrasive tape) into the lines. The "pig" was inserted at the Poudre Canyon Plant and retrieved at Blackstock Hill. With only a couple of minor problems, the two lines were cleaned and the original capacity restored.

In order to correct a low water pressure problem on the west side of town, a temporary booster pump station was constructed in 1980, just west of the intersection of Prospect Street and Overland Trail. The temporary system worked well, but with the "high pressure" service area expanding, it became necessary to make plans for additional improvements in order to maintain system reliability for meeting peak summer demands and providing adequate fire protection. Plans for these improvements are being developed at the present time.

Today the transmission and distribution system has a total of 320 miles of pipeline, a far cry from the 43,400 feet when the system began in 1883. A chart on the following page indicates the total amount of pipe in the system within the years chosen to represent selected periods of time. A total breakdown of the installations is given for 1981.



West Prospect Booster Pump Station constructed in 1980.

Former T & D Superintendent, Ed Hilgenberg, started working for water utilities in 1954 and retired in 1981. Ed had worked for other city departments prior to coming to water utilities. He had accumulated over 42 years of service with the City of Fort Collins at the time of his retirement.

Total Lengths of Water Main in Use

Year	Total In Use (Feet)
1910	100,910
1926	244,840
1940	427,850
1950	604,240
1960	787,180
1970	1,076,653
1981	1,711,150

Total Lengths of Each Size Water Main in Use in 1981

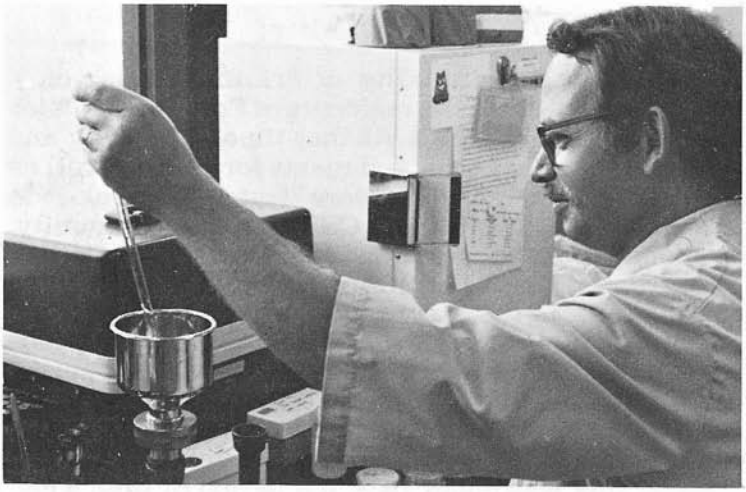
Pipe Size (Inches)	Total In Use (Feet)
3	14,190
4	229,040
6	740,980
8	210,890
10	34,700
12	144,000
16	91,070
18	16,590
20	50,940
24	71,900
27	72,140
30	10,120
36	5,530
42	19,050

Water Quality

Monitoring the quality of drinking water on a continuing basis for the residents of Fort Collins dates back to the early 1900's. At that time, the safety and wholesomeness of milk and meats for sale, as well as the City water supply, were tested by Colorado Agricultural College (now CSU) for the community. Evadene Swanson revealed in her book, *Fort Collins Yesterdays*, that typhoid epidemics occurred occasionally in the early 1900's. Jess Harris gave the students at the college a drinking fountain in 1902 when he was on the Board of Agriculture. At one period those residents living nearby went to the campus with buckets for their drinking supply because of fear of contaminated City water. As was stated in the early history, this was about 1903, the period of time when the City found it necessary to extend the supply pipes up into the Poudre Canyon where the water was purer.

Subsequent testing service agreements between the City and the university which date from the early 1950's show a long term cooperative commitment to drinking water quality. This effort continues today with the City taking an even more active role.

With the completion of lab facilities on East Drake Road, at Wastewater Treatment Plant No. 2, City personnel began microbiological testing of drinking water samples on January 4, 1977. At that time, duplicate samples were collected each week at locations throughout the City. One set of duplicates was processed by the State Health Department and the other at the City lab. Testing samples at the City lab provided the advantage of having initial results in 24 hours. This, in turn, increased our ability to respond to consumer complaints and any problems detected during routine surveillance. Testing duplicates each week continued until April, 1978, when our lab was granted interim certification by the EPA, the first municipal lab to be certified in the state. Certification indicated that our analytical results were acceptable to both the EPA and State as official monitoring data



Dr. Keith Elmund, Environmental Services Superintendent.

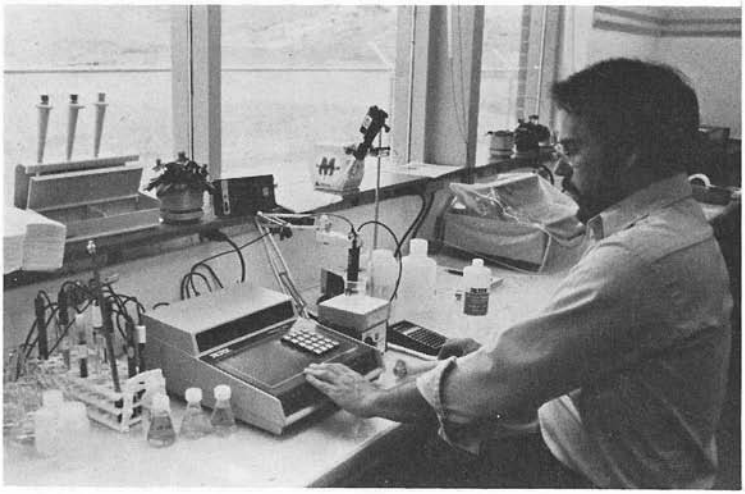
for total coliform organisms. The lab and its staff were commended by the State Health Department in its report of findings during the 1980 certification inspection. From January, 1977 through July, 1979, the City lab tested approximately 20 drinking water samples each week. Beginning in 1979, triplicate samples were collected once each month at 10 locations in the City and one set tested at the State Health Department, the certified lab at M&I Consulting Engineers and our own lab. These cross checks provided added assurance to the safety of our drinking water as well as to the use of proper laboratory techniques and procedures. In addition to regular sampling, the lab also tested complaints, check type and special purpose type water samples, as well as the City operated swimming pools. Furthermore, the Microbiology Department lab at CSU tested a minimum of 30 water samples for various campus locations supplied with City water. This provided additional protection for the University community. During 1980 and 1981, approximately 140 samples collected each month from various sites in the

Janie Dodds — Settlable Solids

City's distribution system were tested for bacteriological quality.

In addition to extensive microbiological and chemical testing at the City lab, operators at the water plants monitor and test various phases of the treatment process throughout each day. The tests include measurements of pH, free chlorine, turbidity, fluoride, alkalinity, hardness, and particle size. The Poudre River Treatment Plant operators also use a Zeta-meter instrument to quickly fine-tune coagulant dosages for corresponding rapid changes in river conditions.

In cooperation with CH²M-Hill Consulting Engineers, the City began monitoring the types and relative concentrations of trihalomethanes (THMs), in our drinking water during 1978. Studies at other laboratories suggested that THMs induce cancer in test animals. Data collected quarterly since the summer of 1978 showed that concentrations of these substances in City water average less than half the proposed EPA limit of 100 parts per billion. Although we continue monitoring our drinking water each



Dave Onn — Fluoride Analysis

month, the results to date indicate that, under the established standards, THMs are not a problem.

Demonstrating the City's commitment to implementing an effective water quality program, a new water quality lab was opened in 1981 at the Soldier Canyon Water Treatment Plant. This new lab is one of the best facilities of its kind in Colorado. It provides facilities for extensive chemical and microbiological testing of our drinking water as well as additional process control monitoring for the water treatment plants.

Also during 1981, the Water Quality Control and Water Pollution Control Laboratories were consolidated into the Environmental Services Division of Water Utilities. The mission of the division is to provide analytical testing and monitoring services in both drinking water and pollution control to meet the operations, planning and management needs of the water utilities.

Through all of these efforts, the City continues its intent to fulfill the responsibility of ensuring the safety and quality of our drinking water and disposing

Janie Dodds testing for Volatile Solids

of wastewater in an environmentally acceptable manner.

Water Conservation

Preface

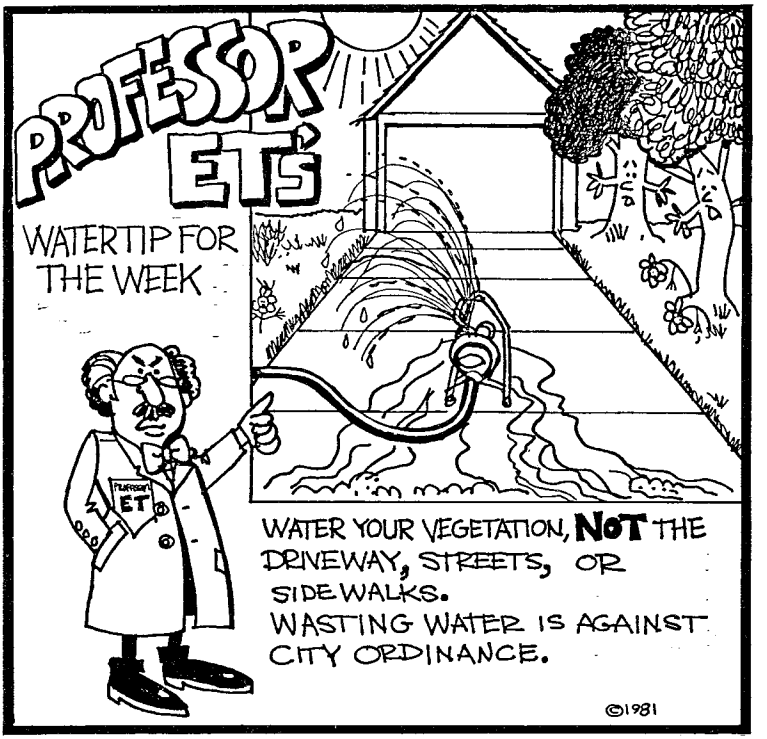
The early settlers in the Fort Collins area realized how precious water was in this arid land. There was no need to convince them not to be wasteful of this priceless resource.

Conservation Through Ordinances

During the 1960's when Fort Collins began to acquire additional water supplies, and update the treatment and distribution systems anticipating future growth, a conservation awareness also began to emerge. At this time two ordinances were enacted, one prohibiting sprinkling waste and the other pertaining to watering restrictions.

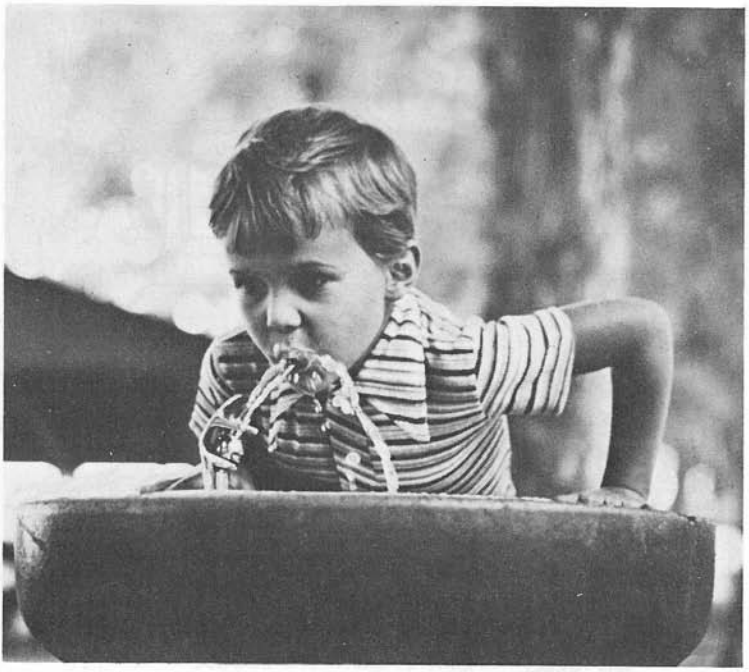
(Sprinkling Waste Prohibited) The ordinance prohibiting sprinkling waste reads: "It shall be unlawful to permit water to flow, run or be discharged in the streets or sidewalks of the City in a wasteful manner." The ordinance was designed to encourage efficient use of water on lawns, gardens and for other outdoor purposes. It also requires sprinkler attachments on hoses. Since Fort Collins receives only about 15 inches of precipitation a year, lawns, trees and shrubs must get extra irrigation to keep them

Sprinkling waste prohibited.



alive and healthy. Consequently, since most residents enjoy having a green environment, about 70% of the total water used in the City during peak summer days, can be attributed to irrigation. Of course, this is the time of year when the greatest waste occurs. Thus, the ordinance was meant to help prevent these wasteful habits.

(Imposing Watering Restrictions) This ordinance which allows the City Council the discretion to impose rationing or restrictions is used in periods of extreme drought or emergency situations to ensure that there is at least a minimal supply of water for the most essential uses during the entire year. Water rationing can be imposed by the City Council upon the recommendation of the City's Water Board. Because

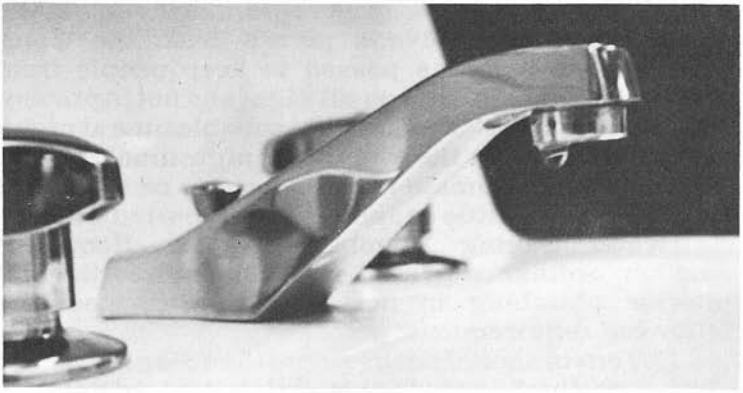


Water rationing is imposed during periods of extreme drought or emergencies to ensure that there is water for essential uses.

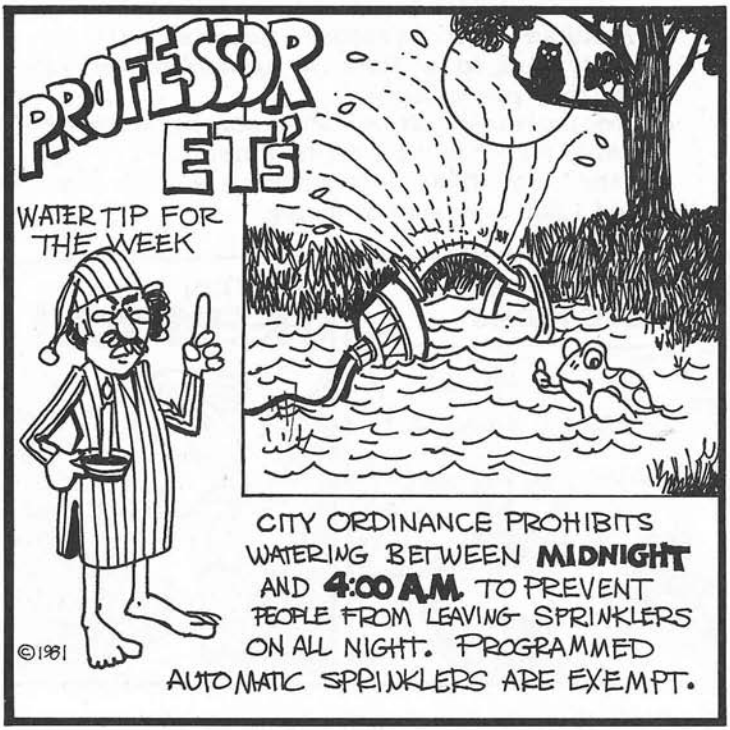
the City has used other measures to conserve water during the past 20 years, adequate supplies seem assured at least for the forseeable future. Rationing is imposed only when conservation measures fail.

(Plumbing for Meters Required in New Homes) Currently most single family residences in Fort Collins are unmetered. Customers are billed on a flat rate according to their lot sizes. Anticipating the time when the City would become metered, the City passed an ordinance in 1977 which requires that all new homes have plumbing installed that can someday be hooked to meters.

(Watering Prohibited Between Midnight and 4:00 A.M.) In 1978 an ordinance was enacted prohibiting watering between the hours of midnight and 4:00 A.M.



Leaks waste lots of water.



except for people with programmed automatic sprinklers who receive a permit from the Water Utility. This ban was passed to keep people from leaving their sprinklers on all night and not to prevent residents from watering for a reasonable time at night. In fact, watering in the evening or nighttime hours in this sunny, dry climate is considered to be beneficial because there is little evaporation due to wind and sun.

(Water Saving Plumbing Devices Required) Another ordinance passed in 1978 requires that all interior plumbing in new construction meet the following requirements:

1) *Toilets should not use more than 3½ gallons per flush, except that toilets and urinals with flush valves may be installed.*
2) *Shower heads will be limited to a flow of approximately 3 gallons per minute.*
3) *Kitchen and lavatory faucets will be restricted to a flow of approximately 2 gallons per minute.*
4) *Replacement fixtures shall comply with the same water saving requirements.*

By the year 2000, this ordinance will save an estimated 1,600 acre feet of water.

"Captain Hydro," the champion of water conservation!

(Homeowners Required to Repair Leaks) Another ordinance requires homeowners to repair leaks which can account for a significant portion of leakage in the City water distribution system.

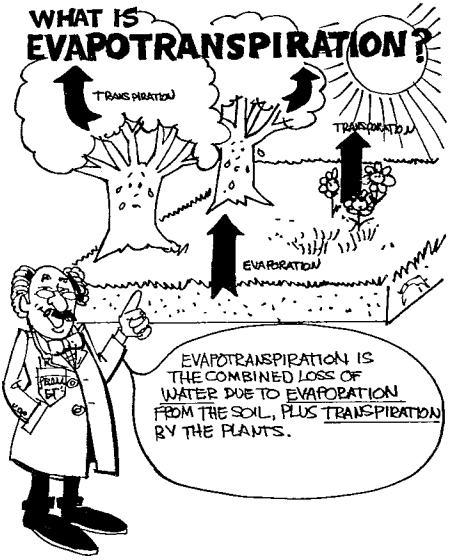
Conservation Through Public Education

Since 1976, the Water Utility has financed a water conservation program for the local school district called "Captain Hydro." Its purpose is to encourage a conservation ethic in young people, with the hope that they will be a good influence on their parents and other adults, as well as grow up to be conservation-minded adults. The Captain Hydro workbooks, in a comic book format, have been adapted locally as a part of the Poudre R-1 School District's water units.

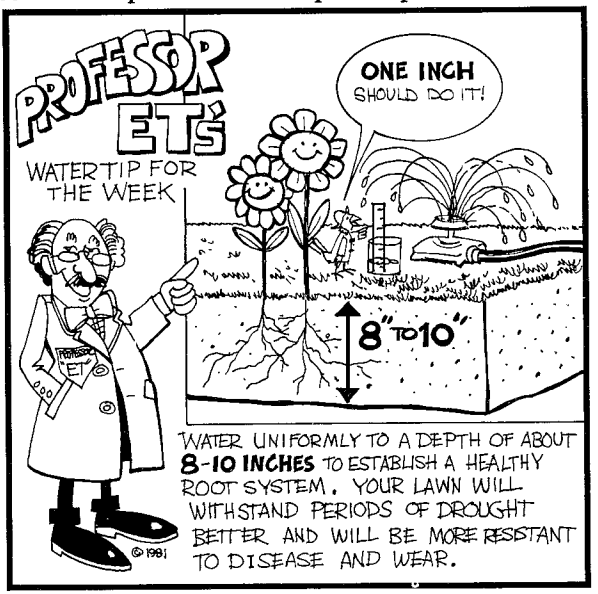
During the severe drought of 1977, the Water Utility hired a water conservation officer. Her duties are to enforce the conservation ordinances, speak to groups about water conservation, and work with the media to publicize conservation and watering restrictions. She also distributes conservation publications throughout the community and tries to stay up to date on the latest conservation information.

The water conservation officer and the energy conservation representative from the City's Light and Power Department have set up a "Conservation Corner" display at the Public Library. The supply of publications at that display run out frequently, indicating City residents are interested in water and energy conservation.

Symbol of water conservation.



Professor ET's Explanation of Evapotranspiration.



Water your lawn efficiently.

During the summer and fall of 1981, the Water Utility published a lawn watering guide in the *Coloradoan* on a daily schedule, giving the "evapotranspiration" (ET) that had occurred during the previous 3, 5 and 7-day periods for area bluegrass lawns. This guide can be used to help determine the proper amount of water needed to maintain a healthy and pleasingly green lawn, thus, helping to prevent overwatering. The Water Utility also hired a local artist to draw cartoons for the Sunday paper depicting "Professor ET's conservation tips for outdoor use of water." "Professor ET" is the Water Utility's original character and he will be used extensively to publicize good conservation habits. It is also hoped that publishing the lawn watering guide will become an annual educational tool for encouraging efficient irrigation practices during the summer months.

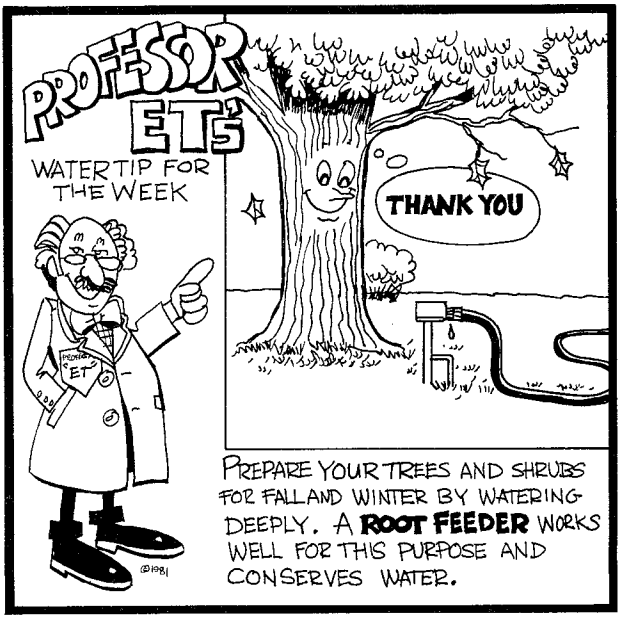
The Water Utility has used the "City News" which is included in each month's utility bill to publicize conservation information. In the future, the Utility

Another Water Conservation Tip from Professor ET.

plans to make available a water conservation brochure with water conservation information that is geared to the local climate and water situation.

In 1980, the City Water Utility Staff completed a comprehensive conservation and metering study. Its purpose was to examine the applicability of various conservation measures and the feasibility of universal water metering in Fort Collins.

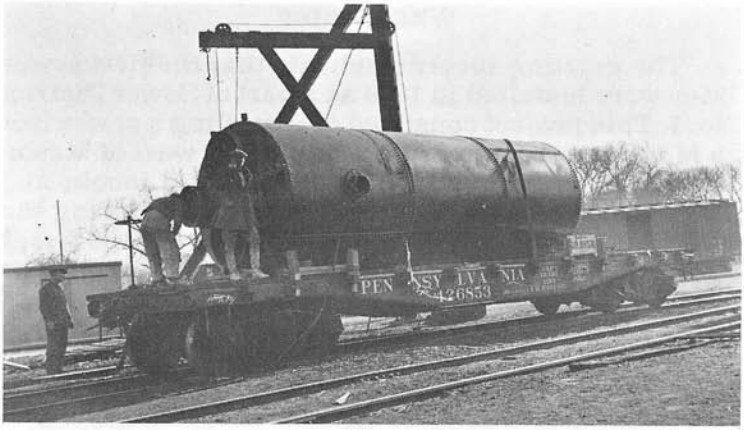
The City's Parks and Recreation Department revised and enlarged its Landscape Guide for Fort Collins in 1981. It contains valuable information regarding plants that are desirable for our area, and is available free at the Department.



Wastewater

The existing records indicate that the first sewer lines were installed in 1888 as a part of Sewer District No. 1. This project consisted of installing a sewer line in Mountain Avenue from a half block west of Mason Street to the intersection of Mountain, Lincoln and Jefferson; then down Linden to the river. During the next 20 years the City would install over 100,000 feet of sewer lines in what we now refer to as "Old Town". The sewer system now consists of over 1,562,880 feet of trunk and collection lines.

Construction of a Lift Station on the 100 block of East Prospect — 1920's.



Lift station which was installed on the 100 block of East Prospect — 1920's.

Prior to about 1945, there was not a preventative maintenance program, and as long as the sewer system did not stop up it was more or less ignored. If a stoppage did occur, the Water Utility service crew would clear the stoppage. At that time the only method of cleaning sewer lines was by using wooden sticks that fastened together with a hook and eye device on the ends of the 36 inch sections. The rods were put together in the manhole, located downstream of the stoppage, and then pushed through the sewer line to the stoppage. The stoppage was then jabbed and prodded until the rod had penetrated the stoppage. This usually freed the sewage which had been stopped up and the rods would have to be retrieved as fast as possible before the freed sewage came into the manhole. Needless to say, if the worker in the manhole could not retrieve all the rods he usually had to scamper up the manhole steps to avoid the sudden surge of sewage flow. After the surge had passed, the remaining rods were retrieved. However, sometimes the rods would come apart and go on down the line. Many times these sections were lost or picked out at some future stoppage.

Trunk and collection supervisor, Jack Kennedy, demonstrating how the old wooden sewer rods used in the 1940's connected together.

In 1946, a steel rod was purchased from the Flexible Sewer Rod Company. The rod was also in 36 inch sections. The individual sections of rod screwed together and could be wound on a large wooden spool, which was mounted on a pickup truck.

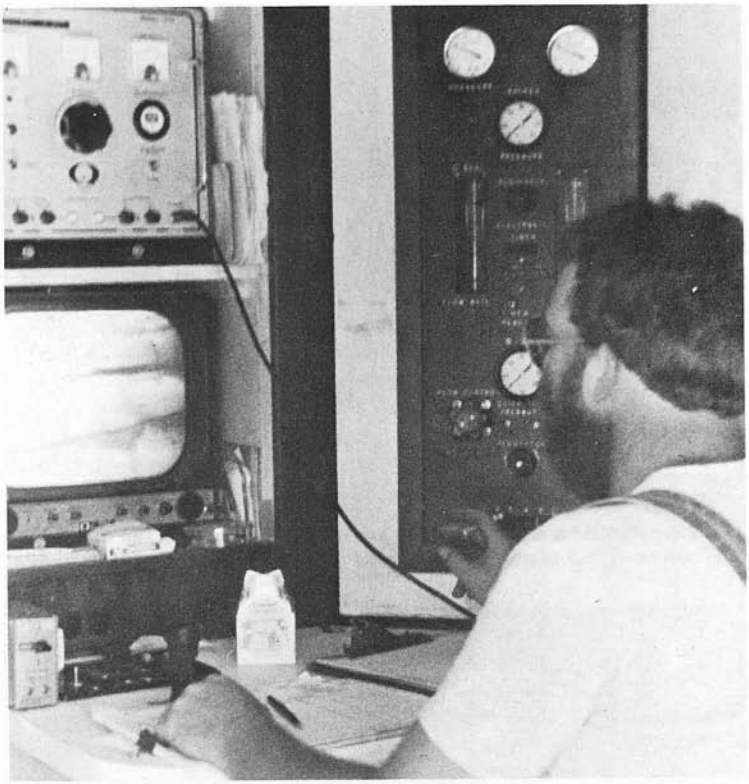
The first systematic maintenance program was initiated in 1954. It was about this time that the sleepy little town of 15,000 or so started to grow. With more and more stoppages, a new O'Brien Sewer King Power

Washer Truck operators, Toby Cortez and Tom Blackwell.

Rodder was purchased in 1959 and a program was initiated to wash and rod every line at least once a year. At that time washing was done by using water from the nearest fire hydrant.

In 1968, an additional power rodder was purchased from the Flexible Sewer Rod Company and in 1972, a high pressure washer was purchased and put into service. A TV and sealing unit was purchased in 1973 which was put to very good use in locating and repairing leaks and inspecting sewer lines. In 1979, a new high pressure jet washer was purchased and in 1981, a second TV unit was put into service.

During 1980, the clear water infiltration into the sewer system hit an all time high of 9 million gallons per day at various times during the late spring and early summer. In 1981, a major effort was made to reduce infiltration. The majority of the crews' time was spent on sealing and replacing leaky sewers. An evaluation of that year's efforts indicated a fair amount of success and it was decided to continue a concentrated program of inspection, sealing, and main replacement.

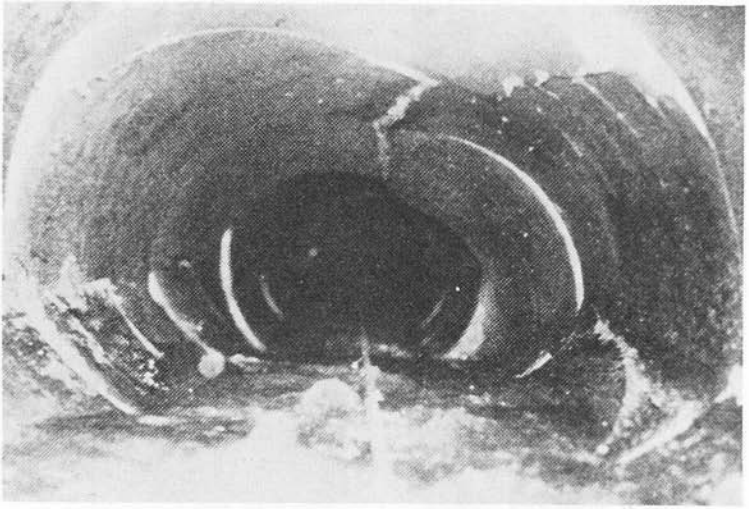


Operator Bill Olsen controlling and monitoring TV camera as it makes its way through a sewer main.

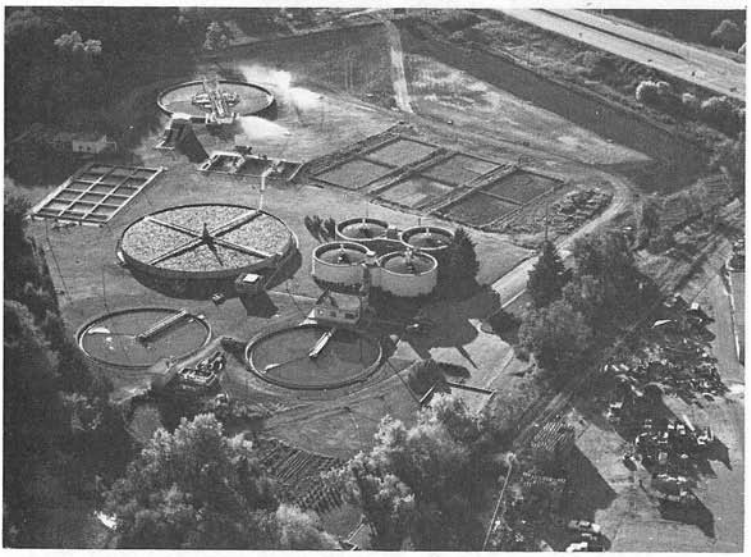
Wastewater Treatment

In 1947, the first wastewater treatment facility was constructed. The plant was located adjacent to the northeast corner of the intersection of Riverside Drive and Mulberry. The initial plant consisted of a grit chamber, two primary settling basins, a trickling filter and four anaerobic digesters. The plant, referred to as Plant No. 1, had a capacity of 3 million gallons per day.

In 1967, Plant No. 2 - South was constructed. This plant was an activated sludge unit which consisted of a



Looking inside a broken sewer main. Notice the cracks on the top and sides of the pipe.



Wastewater Treatment Plant No. 1.

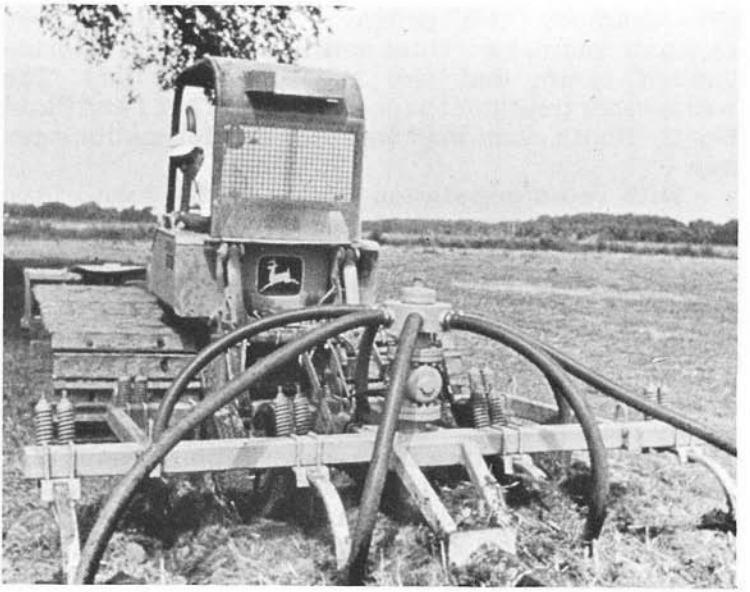
Wastewater Treatment Plant No. 2.

grit chamber, two primary settling basins, one aeration basin, two final settling basins, a chlorine contact basin, and two anaerobic digesters. The wastewater treatment capacity of Plant No. 1 and Plant No. 2 - South combined was 10.5 million gallons per day.

With rapid population growth at the turn of the decade, daily average flows of wastewater were exceeding treatment capacity by 1971. As plans were being developed to expand the treatment capacity, discharge permit requirement standards for effluent released into rivers under the Federal Water Pollution Control Act Amendments of 1972 were being established. Under normal flows, Plant No. 1 would barely meet new discharge standards, and Plant No. 2 had difficulty meeting them under high flows. It was also realized that closing Plant No. 1 would result in drying up a three-mile long stretch of the Poudre River in summer months, interfering with agricultural water rights and aesthetic considerations. As a result, it was determined that Plant No. 1 would have to be upgraded and that Plant No. 2 would have to be

expanded. As part of the proposed improvement, an interceptor sewer was designed to carry excess flow from Plant No. 1 to Plant No. 2.

Construction started in 1974. An activated sludge unit consisting of an intermediate settling basin, aeration basin, final settling basin, and a chlorine contact basin was added to Plant No. 1. The expansion at Plant No. 2 consisted of sand and grit removal facilities, two primary settling basins, two aeration basins, two final settling basins, two aerobic digesters, and two chlorine contact basins. The expansion at Plant No. 2 also included an administration and laboratory building. The cost of the interceptor sewer and the new facilities at Plant No. 1 and Plant No. 2 was $12,220,560. Fort Collins applied for and received grant funds from both the federal and state governments. The federal grant was for $7,463,355 and the state grant was for $2,727,500.



Crawler tractor injecting sludge in a field prior to planting crops.

A major concern which developed during 1978 and 1979 was sludge disposal. The major process for sludge disposal was to haul it by truck to various farms in the area. This was an expensive process because of the equipment required and the cost of labor for loading and hauling. As a result, a 300 acre farm, located just northeast of Plant No. 2, was purchased in October of 1979 by the City for approximately $1,276,000. A sludge management plan which outlined various alternatives of sludge disposal was completed by Black & Veatch, Consulting Engineers in December of 1979. The recommended plan was the subsurface injection alternative. During 1980 and 1981, the City requested and received federal grant funds for design and construction of the project. The design was completed in March, 1982, and construction is expected to start some time in May, 1982. The estimated project cost is $7.5 million dollars. The City will receive almost 5.5 million dollars from the federal government for this project. The project is expected to be completed by January, 1984.

Within the next five years it is expected that Plant No. 2 will have to be expanded once again to accommodate the continuing growth of Fort Collins.

Water Board

The Water Board was created by ordinance on September 6, 1963. The original ordinance stated that "Matters pertaining to water are of the most vital concern to the City of Fort Collins and it is the opinion of the City Council that a water board should be created to which members will be appointed whose advice in connection with water matters will be of the utmost importance to the City Council." The six original members appointed to that board were: Ward Fischer, Norman Evans, Harvey Johnson, John Bartel, Frank Ghent and Fred Feit.

Ward Fischer was elected chairman of the Board and continues to fulfill that function in 1982. Mr. Fischer wrote that, "The Board started because it was apparent at that time that the City needed to develop a more consistent, far-seeing policy concerning water acquisition, treatment and distribution." Within the twenty years since the Board was created, they have helped the City to achieve these goals.

In 1967, the Water Board's expertise and importance to the City were confirmed when the citizens of Fort Collins, by a vote of 3,098 to 990 made it one of only two charter boards. The Water Board continues to provide its expertise to the City with regard to water matters and its members contribute untold hours of their time for this purpose as a service to the community.

In order to recognize these dedicated citizens, all who served on the Board within the past 20 years are listed below:

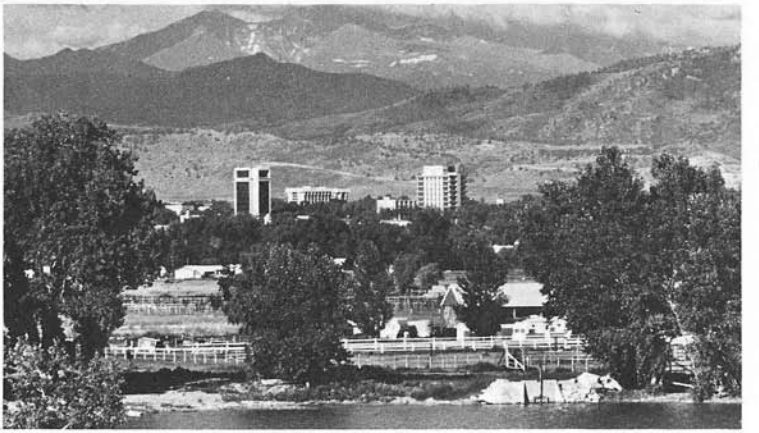
Six Original Members	*Others Who Served - Not on the Board Now*
Ward Fischer	Owen Moore
Norman Evans	W.G. "Dugan" Wilkinson
Harvey Johnson	Karl Carson
John Bartel	James P. Waltz
Frank Ghent	Ronald E. Fulkrod
Fred Feit	Glen Johnson
	Margaret Reeves
	Thomas G. Sanders (alternate)

Present Board

Ward Fischer, Chairman (original member)
Norman Evans, Vice-chairman (original member)
Harvey Johnson (original member)
Henry P. Caulfield, Jr.
Everett Richardson
Raymond Anderson
Thomas Moore
George Wallace
Charles Turner
Bernard Cain, Jr.
David Stewart (alternate)

Present Administration

CITY COUNCIL	Gary Cassell, Mayor John Knezovich, Asst. Mayor John Clark William Elliott Gerry Horak Margaret Reeves Elery Wilmarth
CITY MANAGER	John E. Arnold
PUBLIC WORKS DIRECTOR	Roger E. Krempel
WATER UTILITIES	
Director	Michael Smith
Senior Engineer	Curtis Miller
Water Resources Engineer	Dennis Bode
Superintendents:	
Water Supply and Treatment	Ben Alexander
Water T&D	Jim Hibbard
Wastewater	Chuck Inghram
Environmental Services	Dr. Keith Elmund



Fort Collins today.

Epilogue

In 1880 a bucket of water sold for a nickel. In 1982, eight buckets of water cost less than a penny — what a bargain!

Although water is a bargain, we who live in the arid west know how precious this resource really is. Wise management of existing water supplies and development of new sources will be a continuing and demanding challenge in future years.

There are two other resources that the utility must have to survive and that must be managed with the utmost care in the future. These are the financial resources provided by the community and the employees of the utility. Deriving the full benefit from the financial resources depends on the skill and dedication of the employees. To effectively manage these resources, utility administrators and managers will have to display an even higher degree of technical expertise, responsiveness, and accountability than they have in the past.

Management of our resources will be the challenge of the future in meeting the goal of supplying our community with a safe and reliable and economical supply of water.

Bibliography

Fort Collins, Its History in a Nutshell, Charlene Tresner, August 20, 1981

History of Larimer County, Colorado, Ansel Watrous, 1911.

Fort Collins Coloradoan, "Remember When?" Columns, 1963 and 1964.

Triangle Review, "The Elegant '80's". Dick Baker, March 21, 1974.

Fort Collins Coloradoan, "Water Was in News in 1884, As Now", James R. Miller, January 1, 1964.

History of Agriculture in Colorado, Alvin T. Steinel, Chapter, "When Irrigation Begins", 1926.

Fort Collins Yesterdays, Evadene B. Swanson, 1976, pp. 42-50.

Hydrologic Evidence In Support of Reclassification of Certain Waterways in the Cache La Poudre Basin to Agricultural, M. W. Bittinger & Associates, Inc., March 1977.