

Historic Ditches of Rockville, Utah

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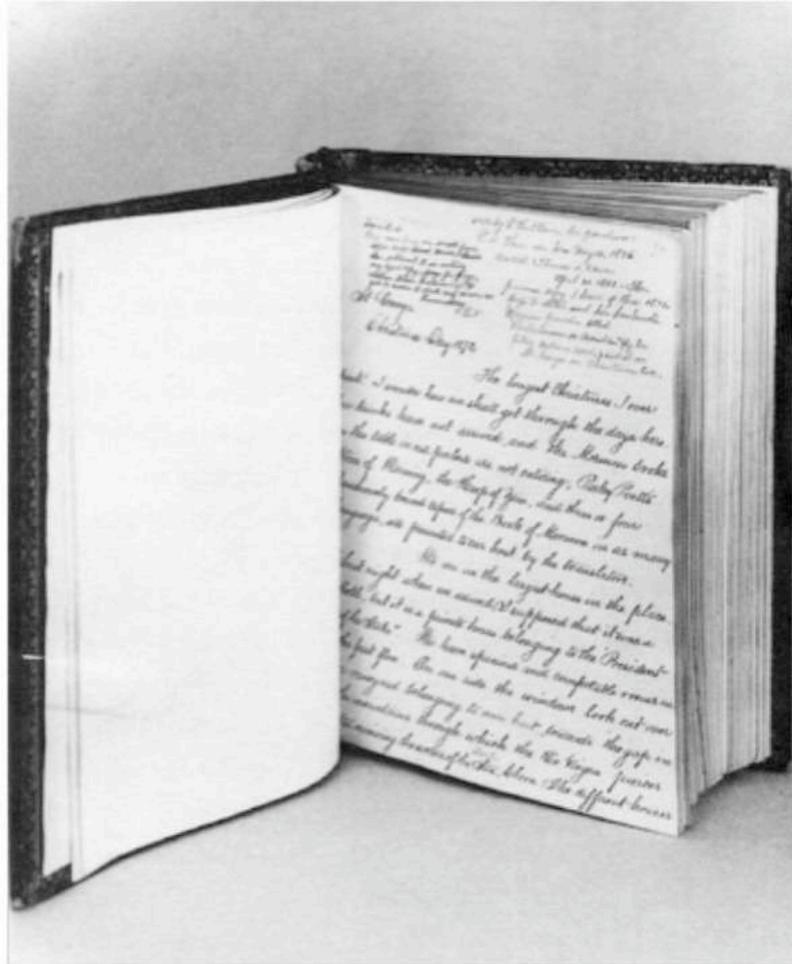
Washington County Historical Society

Parts of T41S R10W Sec 32, T42S R10W Sec 5, T42S R10W Sec 6, T42S R11W Sec 1 SLBM



Stone-lined Ditch along Main Street in 2010

It would be difficult to understand the historic significance of the stone ditches which line Rockville's Main Street without some knowledge of their original use. Elizabeth Kane, the wife of Colonel Kane after whom Utah's Kane County is named kept a journal while in Saint George during 1872-73. (footnote 1)



Elizabeth Kane's Journal

A brief excerpt from her journal should aid our understanding of pioneer irrigation.

"...but passing Mrs. Lucy's [Young] house we saw her in the garden. She begged us to come in and let the children see the process of watering it. The result was that we spent a couple of hours there. At this time of the year there is no limit to the time allowed for watering, but later when the crops start, each lot has but three hours in the twenty four assigned to it. The lots in the town are 80 x 160 but most families own two. She has three, one of which is allowed to remain uncultivated, so that she has nine hours water-time for the two lots. The time she says, occurs to each in turn and when it is in the night-time the gardener stays up to superintend it, and at the end of the time wakes the man whose garden is to have the benefit next.

Her garden is the best looking in the village, and I suppose its arrangement is a model. From the acequia in the street which runs very rapidly there are two troughs made of board

which traverse her lots, one in the front, the other about the middle. At intervals there are "gates" in the sides of the troughs--- that is slices of board mitred out, and when replaced acting as valve which are kept closed by the pressure of the water."



A stone water gateway along Rockville's Main Street with a slot for a board valve visible

Continuing from Elizabeth Kane's Journal.

"The gardener had flooded her little grass plot: he meant to let the water lie on it twenty minutes. Then he had set over a new strawberry bed, of dry runners planted in ridges; when he drew out the "gate" the water trickled down the dirt channels successively. It the plants had been set out on a lower bed, and the whole flooded at once, he said in answer to the suggestion, that the "mineral" in coming to the surface would have caked hard round the young plants and killed them.

She invited us to come and look at her grape arbour. On a long trellis runs back some distance from the house, and it had several thousand vine-cuttings in a bed ready to set out. She means to have a 'pleached [plaited or interlace] alley' round the lot. She has a a very pretty garden, and part of her wee Estate is planted with thriving peach, plum, apricot and apple trees."

The Rockville Town Ditch, the Rockville South Ditch and the Dalton Ditch were delivering water to Rockville residents in 1902 and had been for some time. (Only the Rockville Town Ditch is documented here.) These three ditches provided water to 293 acres of land. In a 1903 report of the United States Department of Agriculture the water supply for Rockville was singled out as being plentiful.

“Rockville is the only settlement on the Virgin River in which a strict time-rotation system of distribution is not followed. As there is abundant water in the river at Rockville, no strict regulation is exercised over the amount of water used.” (footnote 2)

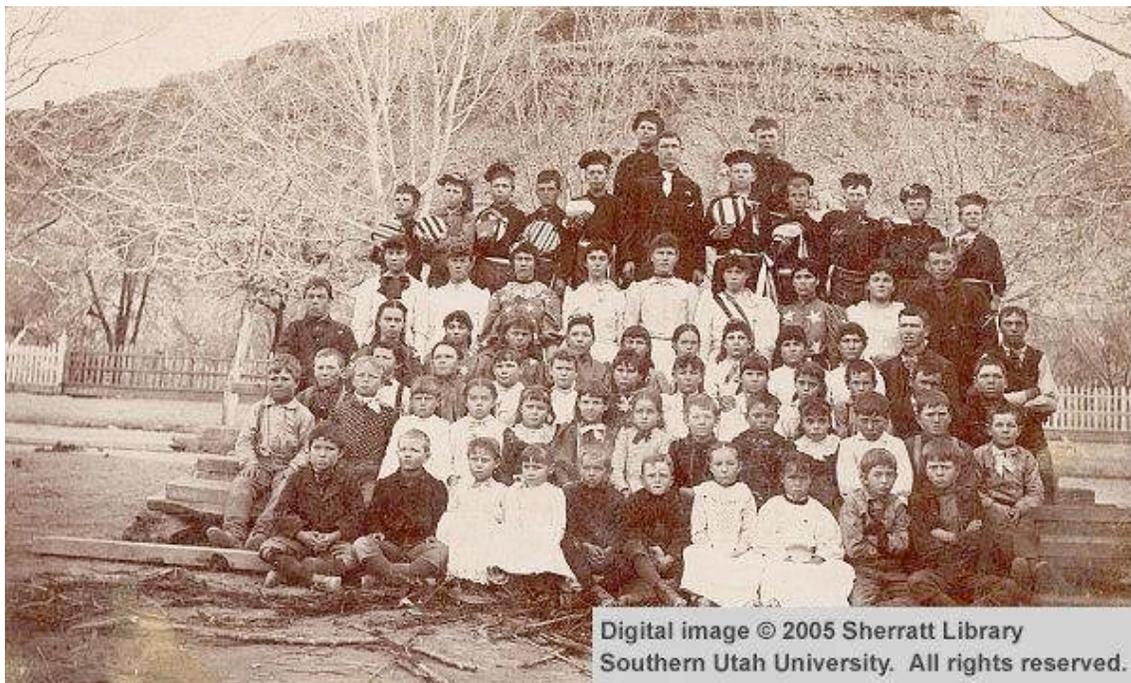


Irrigation near St. George, Washington county, Utah early 1900's

By the turn of the 20th century the lack of irrigable land compelled Rockville families to collaborate with their neighbors in development of the Hurricane Canal Project which provided water to some 3,000 acres on the Hurricane Bench where many of their descendants relocated to after the canal's completion.

“Residents of Toquerville, Virgin City, Rockville, Springdale, Grafton and Shonesburg, with very limited resources have undertaken the construction of irrigation works of a most difficult character and the enterprise is now well under way. The Hurricane Canal company was

organized in September 1893, with a capital stock or \$80,000. The stockholders are all men of moderate means, and much of the stock is paid for in labor. The purpose is to construct a canal six and three-quarters miles in length, taking water out from the south side of the Rio Virgen. The greater part of the labor is performed by the stockholders themselves during the winter months. The canal is eight feet wide at the bottom and four feet deep. It will carry sufficient water to irrigate nearly 3,000 acres. Much of the work is of the heaviest and most difficult character. For the first three and a half miles it is blasted out of solid rock along a very steep hillside. There are six tunnels of a total length of 900 feet. It is essentially, a poor man's enterprise, and its prosecution illustrates the independence and industry of Utah's Dixie people. The land to be reclaimed will produce grapes, figs, pomegranates, almonds, and all kinds of semi-tropical fruits besides grain and alfalfa." (footnote 3)



Pupils outside Rockville School 1893
(Earthen Ditches, Street Trees and Picket Fences Visible)

A few years after the Hurricane Canal was completed, Mukuntaweap Canyon above Springdale was designated a National Monument and ten years later, in 1919, it became Zion National Park. Road improvements from the Zion Canyon to Cedar City were undertaken by the National Park Service between 1922 and 1926 including improvements to Rockville's Main Street.



Rockville's Tree-Lined Main Street with Stone Irrigation Ditches circa 1940

In 1938, the Town of Rockville and the WPA (Works Progress Administration) improved the original earthen ditches by lining them with hand worked sandstone slabs. The concrete sidewalks and ditch bridges date from this same period. This handsome new look reflected an increase in tourism to Zion National Park and the community's desire to participate in the new tourist economy. On a more practical note, the stone lined ditches required significantly less maintenance and reduced water lost through seepage than their earthen predecessors. About the same time that the ditches were lined with stone, Rockville began to recognize its historic character. In 1940, Historic American Building Survey drawings and photos were made of the Deseret Telegraph and Post Office Building. (footnote 4)

There are three different shapes of stone-lined ditches along Main Street. The most common is a “V” shape with a vertical curb stone with sloping stones on the street side.



A “V” shaped ditch along the south side of Main Street in 2010

The next most common is a small “U” shaped ditch with vertical stones along both sides of the ditch. The distance between vertical stones is approximately one foot.



A small “U” shaped ditch along the south side of Main Street in 2010

The least common type is a large “U” shaped ditch which only occurs along the southern side of Main Street at the eastern end of town. Here the distance between stones is approximately two and a half feet and the ditch depth is approximately one and a half feet when emptied of silt and debris.

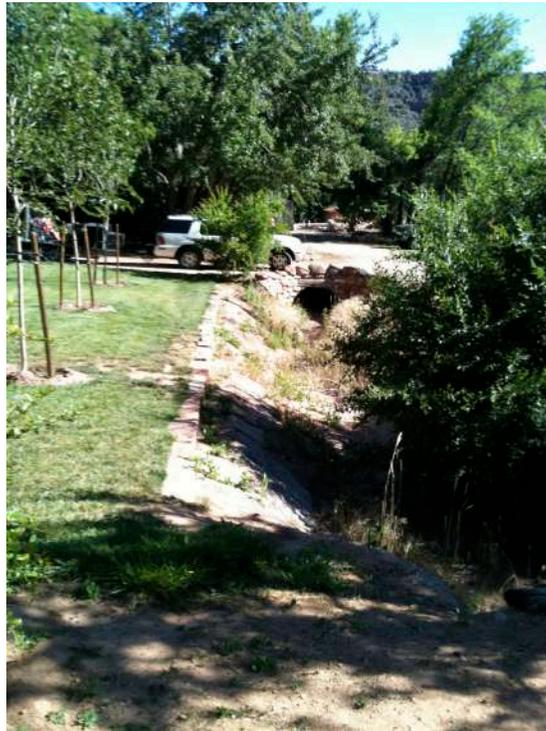


A large “U” shaped ditch in 2010



An abandoned portion of main ditch at the northern edge of town near Dennett Lane in 2010

In addition to the stone irrigation ditches lining Main Street, there are drainage ditch improvements in Rockville which appear to date from the same era. These improvements may have been by the WPA at the same time or the Civilian Conservation Corps a few years prior.



A stone lined drainage channel just south of Main Street in 2010

We have documented the ends of the ditches in 2010. There is no extant evidence that the ditches had been extended farther than these points in earlier times.



The end of the stone-lined ditch along the south side at the western end of town in 2010



The end of the stone-lined ditch along the south side at the eastern end of town in 2010



The end of the stone-lined ditch along the north side at the western end of town in 2010



The end of the stone-lined ditch along the north side at the eastern end of town in 2010

While the stone-lined irrigation ditches are of primary interest, there are other structures of historic interest along the ditch banks. These include the original ditch bridges.



*Ditch bridge along the south side of Main Street in 2010
(notice that street side of ditch bridge is considerably lower than current pavement level)*

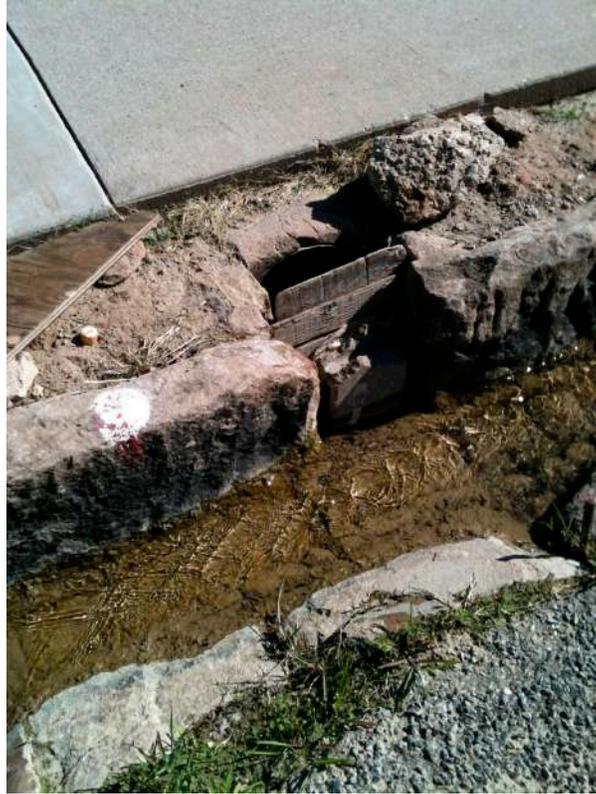


Replacement ditch bridge (note metal form on underside of concrete) in 2010



Replacement ditch bridge (note bridge is near level of current pavement) in 2010

The head gates which allowed or prevented water from leaving the ditch are also of interest. These come in a wide variety of types and vintages. In a few instances, the original stone niches which provided a place for a guillotine type board valve to regulate the water remain.



Headgate with stone niche along Rockville's Main Street with a board valve in the stone slot.



Headgate with stone niche and the board valve removed.

Individual variations in headgates evolved over the years because these were working ditches where a newer, better way was wanted.



Custom headgate with a plywood valve which lies in place at an sloped angle with the wide end down in the ditch and the narrow end up near the sidewalk.



Modern sheet metal headgate in new concrete box.



Headgate where a pipe has been extended below ground to the edge of the ditch (above) with the other end of the pipe entering concrete water box and a screw-type valve for regulating flow through the buried pipe (below).



Rockville's water turns have remained fairly constant over the years with half acre town lots entitled to 1/3 of a full ditch for 1 hour once a week and 10 acre fields allotted a full ditch for 12 hours once a week. (footnote 5) The amount of water in a "full ditch" varies throughout the year and from year to year

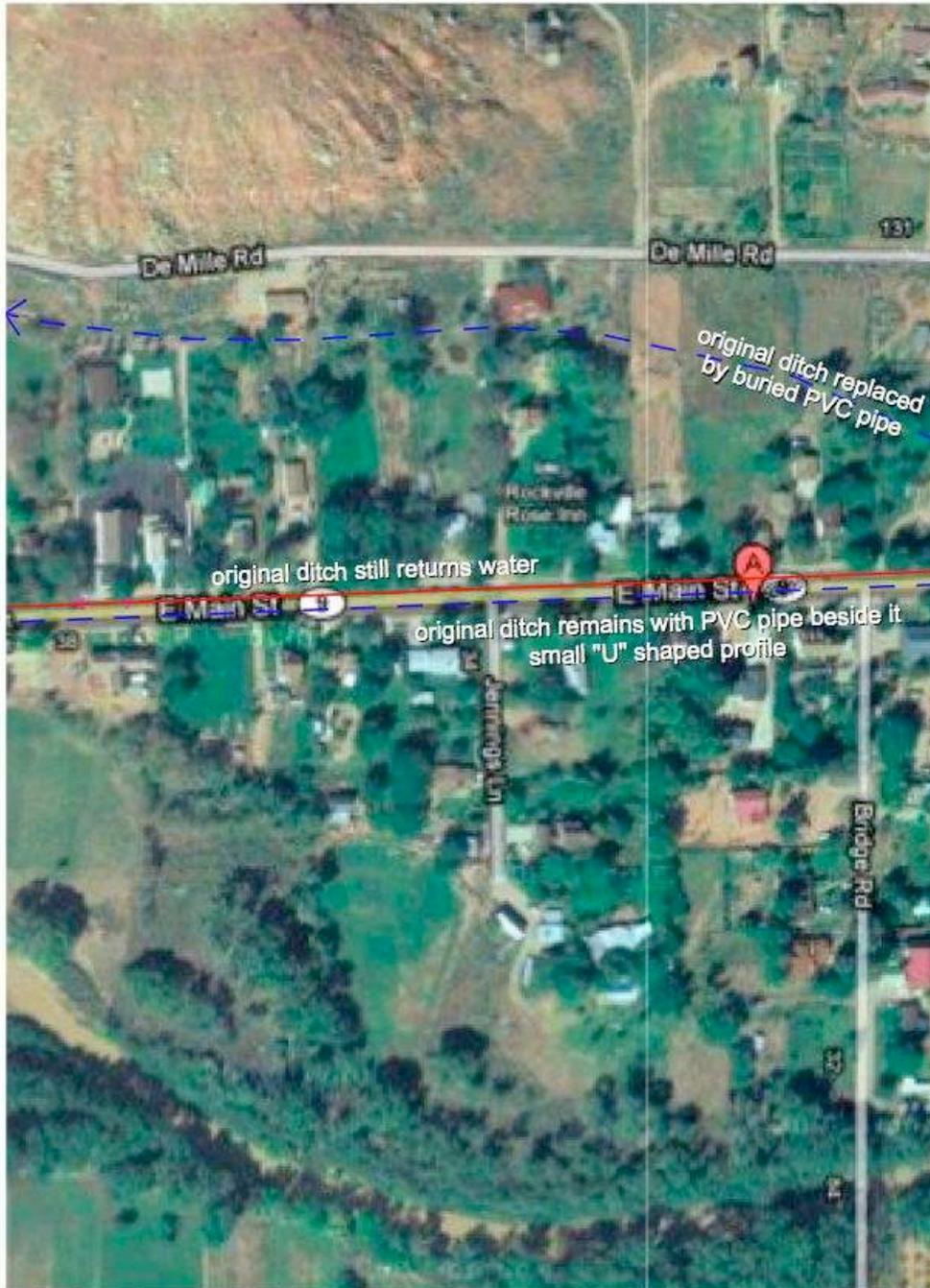
Rockville's ditch network is composed of both supply ditches and return ditches. In the following diagrams the supply flows are shown in blue and the return flows are shown in red. A dashed line indicates that the original ditch has been replaced with a buried pipe. (footnote 6)

As the Rockville Town Ditch enters town from the east it is now buried in a large PVC pipe buried along the alignment of the original earthen canal. A short portion of the original main ditch was lined with stone circa 1940 after the small ditches along Main Street had been improved. The main ditch continued at an angle to the north side of Main Street while a supply branch ran along the south side of the street.



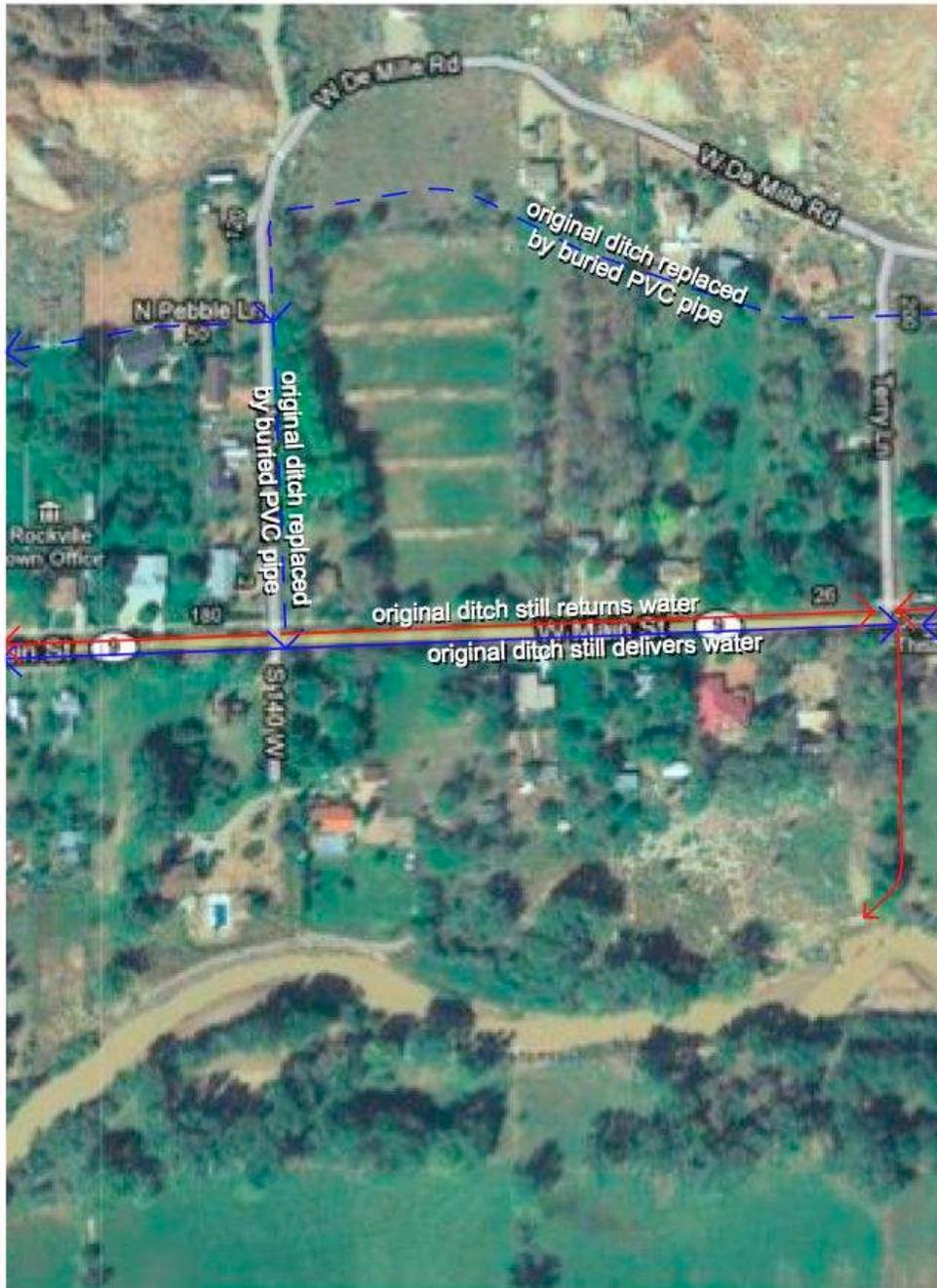
Rockville Ditches Diagram (Eastern Portion)

The main ditch continued along the northern fringe of town below De Mille Road. The stone-lined ditch along the north side of Main Street collects return flows. The small “U” shaped ditch along the south side Main Street originally provided water supply to each lot, but now that water comes from a PVC pipe buried along side the ditch.



Rockville Ditches (Central Eastern Portion)

The main ditch continues along the northern fringe of town below De Mille Road. As the main ditch crosses Dennett Lane it branches to deliver some water down to Main Street. A portion of this water flows from west to east to supply lots along the south side of Main between Dennett and Terry lanes via the original stone-lined ditch.



Rockville Ditches (Central Western Portion)

The main ditch continues along the northern fringe of town at the base of the cliffs. The stone-lined ditch along the north side of Main Street collects return flows and the stone-lined ditch along the south side provides irrigation water to lots. Return flows run to the river in unlined ditches.



Rockville Ditches (Western Portion)

The water in Rockville's ditches comes from a diversion below Springdale and above the confluence of the North Fork and East Fork of the Virgin River.

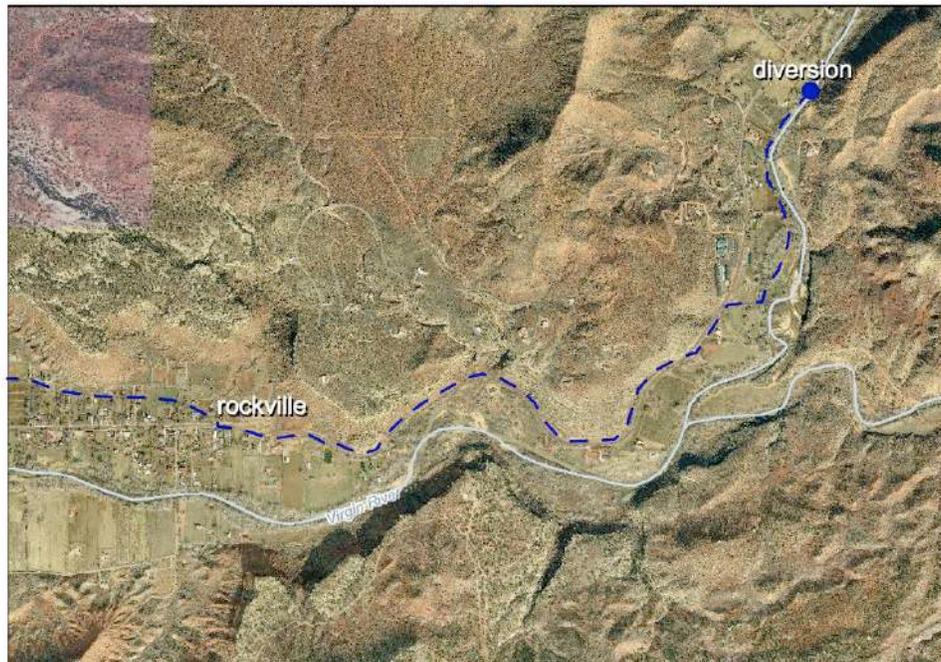


2009 Aerial Photo of Rockville and Grafton Diversion Dam

The present diversion was constructed in 1965. (footnote 7) It consists of a small concrete dam which crosses the river diverting a portion of the flow to the concrete control box structure. The water diverted here supplies both Rockville and Grafton. A short distance below the dam, the diverted water is divided with the flow apportioned between the Rockville Town Ditch and the Grafton Town Ditch.

Prior to the construction of this concrete diversion dam, seasonal (temporary) diversion dams were constructed by stretching a steel cable between large cottonwood trees on both sides of the river. Cedar posts, cut from the surrounding hillsides, were floated downstream to the cable where young men and boys fastened one end of each post to the steel cable with bailing wire. The other end of the posts was angled upstream and the pressure of the water forced these to the river bottom. When sufficient post were in place, the water was diverted. These structures were damaged each time the river flooded requiring repair. (footnote 8)

Historically, the water arrived via an earthen canal. Now, the old canal has been replaced with a large buried PVC pipe which follows the historic alignment and can be distinguished by the few remaining cottonwood trees which lined its banks. This is a not a pressurized system. The water flow is still controlled only by gravity. Originally, only the land “under ditch” (below the height of the canal) could be irrigated. Presently, pumps allow some land above the canal to receive water.



Rockville Town Ditch Map over 2009 Aerial Photo

The old earthen canal has been filled in, but there are visible traces of it.



Old Rockville Ditch corrugated pipe at ravine (new PVC pipe is inside) in 2010.



Old Cottonwood Tree along old Rockville Town Ditch above Highway in 2010



New PVC and Old Corrugated Pipe at Rockville Town Ditch Ravine Crossing in 2010

Getting water from the Virgin River was a prerequisite for settlement and central to Rockville's history. The cooperative construction of the main canal which brought water to Rockville's ditches was among the first undertakings of the pioneers.

Ditches are best understood as part of a functional system. The system includes a source of water, a means of diversion, a main canal, the ditch which carries water to each town lot and a means of controlling the water's flow which might be a shovel in the farmer's hand or a headgate structure traditionally made of stone and wood or more recently of concrete, metal and PVC pipe. The Rockville Town Ditch Company manages the ditches, the canal and the diversion. Rockville residents own shares in the ditch company. The company sends out an annual letter and lists the amount of time each land owner can use the water and at what time. Each land owner is responsible to open and close a headgate allowing water to enter their property at the times scheduled. This is neighbor working with neighbor to move the water throughout town once a week.

These well-crafted and well-preserved stone-lined irrigation ditches on Highway 9 in Rockville are an outstanding example of historic water delivery systems in Utah. They continue to bring water to town lots just as they did during the settlement period.

The present operation of the Rockville Town Ditch Company reflects the historical patterns established in Utah reflected in the 1895 Utah Irrigation Commission report. (footnote 9)

"Utah irrigation systems have many peculiarities, which commend them to the admiration of practical men in every irrigated country. The adaptability of these systems to all classes of farmers and to almost every section of irrigable land within the Territory, and the united actions of shareholders in canals, are characteristics noticed more in this, the coming populous and prosperous state, than in any irrigated division of our continent. Men have organized colonies, entered upon desert wastes, removed the native sagebrush, leveled the fields and made perfect bowers of Eden by the aid of irrigation canals, and, without incurring any indebtedness, floating any bonds or expending any great amount of money in the work. This had been accomplished by means of a system of cooperation inaugurated by the Pioneers of Utah and practiced by their successors, whether Mormon or Gentile. It has been the governing principle of Utah colonization that labor should constitute the basis of stock in every canal, and in all the original colonies this rule has been strictly enforced.

In the beginning of the work of conquering the deserts by the powers of irrigation, people were forced to huddle together in stone forts, erected as protection against Indian depredations. The principles of mutual interests were fostered by reason of existing conditions, and humanity in its best form was fully developed, in training the colonists to protect one another and lend a helping hand whenever necessary. Town plats were laid out round these common enclosures, and lots were drawn by numbers. When the Indians had been driven away, the colonists proceeded to construct dwelling houses upon the lots obtained through the common division. Entries were made upon tracts of land adjoining these townsites, and, by one of the methods of obtaining title to government land, each colonist secured one quarter section of more of the tillable area. The native meadow land, if such was within range, was divided in proportion to

the actual settlers desiring the benefits of pasture of hay. The range of public domain became the property of the entire colony, and was used for horses, cattle and sheep, as agreed by a majority of those interested.

The townsites were located on some living mountain streams having a sufficient flow of water to supply the demands for irrigation in the fields and for culinary purposes in the settlements. By common consent, the city or town authorities have assumed the powers of controlling and distributing the water, both in the corporate limits and in the fields. This method, though not always strictly legal, has proven the most economical and satisfactory plan for general distribution of water of any yet suggested. When no council has existed, the entire people constituted a committee or directory, and employed a watermaster on an annual salary, or with the understanding that the distributor should be paid by levying an assessment on a ratio of acreage under cultivation. The watermaster thus appointed, has usually been paid in the crops grown by the farmers benefitted by the distribution. In some sections, the cost has not exceeded fifteen cents per acre for one year. The annual assessments for keeping canals in repair have been paid as in the first, or building expense, by making labor the chief means of payment.”



Unidentified People Digging a Ditch, Washington County, 1920's
Historic Innovation:

Rockville residents have used other methods to irrigate their land besides the historic canals and ditches. This 1898 photograph shows two men working on a water wheel which raised water from a short feeder canal along side the river up to a wooden flume (about twenty feet higher than the river) which provided water for crops.



Huber's Water Wheel in Rockville 1898

Modern Innovation:

Only a small portion of the stone-lined ditches continue to do their original work. The Rockville Ditch Company has buried PVC pipe in the right of way alongside the historic ditches that delivers irrigation water to ditch users. This non-pressurized system works in much the same way the ditches did with gravity and screw-type valves regulating the water flow.



PVC pipe feeding original stone irrigation box from buried PVC ditch replacement pipe in 2010



Stone-lined ditch along Main Street filled with debris in 2010

It took considerable surveying ability to layout the ditches in an economical manner since the only force that delivered water was gravity. Local surveyor Chapman Duncan had some difficulty in accomplishing this task in the town of Virgin during the 1860's. An irrigation canal was surveyed and built but the water wouldn't run uphill. After this surveying error he settled in "Duncan's Retreat" to retreat from Virgin and its residents. (footnote 10) Duncan's Retreat was located between Virgin and Grafton.



Ditch along the south side of Main Street in 2010

- (footnote 1) A Gentile Account of Life in Utah's Dixie 1872-73: Elizabeth Kane's St. George Journal
 (footnote 2) Irrigation Investigations in Utah, Elwood Mead, 1903, USDA, pg. 225.
 (footnote 3) The Latter-Day Saints' Millennial Star, Volume 53, Liverpool, 1891
 (footnote 4) Historic American Building Survey, Public Works Administration, 1940
 (footnote 5). Larry Ballard, Rockville Town Ditch Former Inspector interviewed by Richard Kohler in 2010.
 (footnote 6) Survey of Rockville Town Ditch, Mark Schraut, Surveyor, 2007.
 (footnote 7) Leon Lewis, Rockville Town Ditch Watermaster, Interviewed by Richard Kohler in 2010.
 (footnote 8) Larry Ballard, Rockville Resident interviewed by Richard Kohler in 2010.
 (footnote 9) Irrigation in Utah, Utah Irrigation Commission, Joel Shoemaker, 1895.
 (footnote 10) Leon Lewis, Rockville Town Ditch Watermaster, Interviewed by Richard Kohler in 2010.

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Bibliography (in chronological order)

- George Stephens, *The Practical Irrigator and Drainer*, William Blackwood, Edinburgh, 1834
 John C. Fremont, *Narrative of the Exploring Expedition to the Rocky Mountains*, Henry Polkinhorn, Washington, 1845
 J. Weidemann, *Beautifying Country Homes: A Handbook of Landscape Gardening*, Orange Judd and Company, New York, 1870
 J. H. Beadle, *The Undeveloped West*, National Publishing Company, Philadelphia, 1873
 Hubert Howe Bancroft, *History of Utah, 1540-1886*, The History Company, San Francisco, 1889
 Andrew Jensen, *The Historical Record*, Volume Nine, Salt Lake City, 1890
 Utah Irrigation Commission, *Irrigation in Utah*, Salt Lake City, 1895
 Elwood Meade, *Irrigation Investigations in Utah*, 1903, United States Department of Agriculture, 1903
 Charles Hillman Brough, *Irrigation in Utah*, Johns Hopkins Press, Baltimore, 1898
 John Goodell, *Water Works for Small Cities and Towns*, The Engineering Record, 1899
 Orson r. Whitney, *History of Utah in Four Volumes*, George Q. Cannon and Sons Company, Salt Lake City, 1904
 Willaim E. Smythe, *The Conquest of Arid America*, The Macmillan Company, London, 1905
 Frederick S. Dellenbaugh, *Breaking the Wilderness*, The Knickerbocker Press, 1908
 Utah Conservation Commission, *First Biennial Report*, 1913
 John Andreas Widtsoe, *Dry Farming*, The Macmillan Company, New York, 1920
 George Wharton James, *Utah: Land of Blossoming Valleys*, The Page Company, Boston, 1922
 Annual Report of the Director of the National Park Service, 1922 through 1926
 Wayne D. Stout, *Our Pioneer Ancestors*, Salt Lake City, 1944
 Virgin River Stream Depletion Chart, Utah Water and Power Board, Utah State Engineers Office, 1958
 Richard H. Jackson, *The Mormon Village: Genesis and Antecedants of the City of Zion Plan*, BYU Studies 17, 1977
 Richard V. Francaviglia, *The Mormon Landscape*, AMS Press, New York, 1978
 Eugene E. Campbell, *Establishing Zion: The Mormon Church in the American West, 1847-1869*, Signature Books, 1988
 Becky Bartholomew, *What Made the Mormon Landscape Unique?*, History Blazer, 1995
 Town of Rockville, Utah, *General Plan*, 1997