Outline History of Washington County Water
and Dixie Water Timetable

1854 **Fort Clara on Santa Clara Creek**

when the first missionaries arrived the Indians were irrigating five fields of corn and squash with a ditch more than a half mile long

the missionaries showed the Indians how to farm with a iron plow pulled by a horse and enlarged the Indians fields

the Mormons and the Indians built a dam to hold (impound) water on Santa Clara Creek... upstream from Fort Clara... (the Indians had only diverted the water when it was plentiful... the idea of storing water was new to them.).

1856 **Tonaquint** (at the junction of the Virgin River and Santa Clara Creek)

Mormons and Indians grow cotton, take water from Santa Clara Creek.

1857 **Washington City**

Mormon settlers establish the town and grow cotton... irrigation water is diverted from the Virgin River...

Utah War and Mountain Meadows Massacre happen...

1858 **Heberville** (downstream 1 1/2 miles from the junction on the southeast bank)

an experimental farm is established under the direction of Joseph Horne to grow cotton... Jacob Peart, a young cotton farmer, makes an inscription high up on the cliffs overlooking the cotton farm... 1 photo of karl larson pointing to inscription

1859 **Heberville, Washington and Harmony**

are listed in the US Postal register as having post offices... George Pectol is post master at Heberville...

1861 **St. George and Santa Clara**

Brigham Young and other church leaders visit Dixie in May... many of those previously sent had not stayed, but cotton, grapes, sugar cane are being grown... the townsite for St. George is reconnoitered, East and West Springs are known... in October conference in Salt Lake City, 309 more families are called to Dixie, they arrive in late November and early December... some these families settled in Washington, Toquerville, Grafton, Rockville, Virgin City, Springdale and Shunesburg led by Orson Pratt...

another 57 recent Swiss converts are called to Santa Clara to grow grapes and make wine under the direction of Bonelli, many travel in wagons and with teams provided by the Church...

the St. George settlers camp east of the town site... a ditch is cut (thru wiregrass) conducting water from East Springs to the encampment... tents and wagon boxes line the ditch...

the Swiss arrive at Fort Clara during December (some say 1862)... the Swiss begin cultivating farms not being used by Indians... sometimes called old Indian farms... it

is unclear how many Indians live in Santa Clara at this time, but it is a mixed Mormon and Indian settlement... Mormons inside the stone fort which is on the north bank, Indians outside and probably across the creek, in their traditional camping grounds... a ditch conducts water from the dam to Fort Clara...

it begins to rain before Christmas and continues for 40 days and nights...

1862 **All settlements flood damage**

the long duration of the rain brings floods and high water everywhere...

in Santa Clara the flood waters rise rapidly, during a few hours,... settlers begin removing possessions and stored grain but can't finish... Jacob Hamblin while directing the settlers evacuation, maybe at night, maybe when the pioneer and indian built dam breaks,... checks on the rising creek's water level, the earthen bank he is standing on is undercut by the rushing water and falls into the river with him on it... the settlers exclaim that Jacob is drowned... in a moment he calls out that he is not drowned and that someone should throw him a rope... they do and he scrambles up out of the river... then... the waters have risen so that they are higher than the ground the fort sits on... water is passing by the fort walls but can come in the main gate and inundates the fort interior to a depth of a man's chest (or waist) at its highest... a woman and her children have not left, (they were waiting for her husband)... Jacob gets the children to safety and then the woman... when he does this there are flood waters on both the Creek side and the uphill side of the fort... the men have fastened a rope across the uphill stream, the water isn't deep but it is swift and maybe 10 feet wide... Jacob carries the woman on his back... she hangs on too tight out of fear and nearly chokes him as he crosses while hanging on to the rope which he dares not let go of... the dam is gone, a grist mill just across the river is washed away, the crops are ruined, the ditch is ruined, Fort Clara has caved in on one corner at least... Jacob Hamblin's family uses stone from the fort's remains to build his house... quite a way up hill from the fort's original location...

at Santa Clara half of an Indian mound is washed away by flood waters... this mound was very old...

in Harmony, the New Fort, the one built in 1854 not 1852 falls apart because of the unending rain... the adobes were made without straw (or the right kind of mud)... one wall of the fort falls over and kills a woman, one of John D. Lee's wives, and her child...

in St. George, the settlers haven't been able to accomplish much in the way of improving the newly platted town... a meeting is called to vote on building a town hall, they commit to this project, and pledge over $2000 even though none have a roof over their heads...

in Heberville, the post office (a log cabin) is washed away and all the ditches, the crops and the soil is washed "downstream to California"...

in Grafton, the original townsite is washed away with all the cultivated soil, crops and mature cottonwood trees...

1862-1866 **St. George**

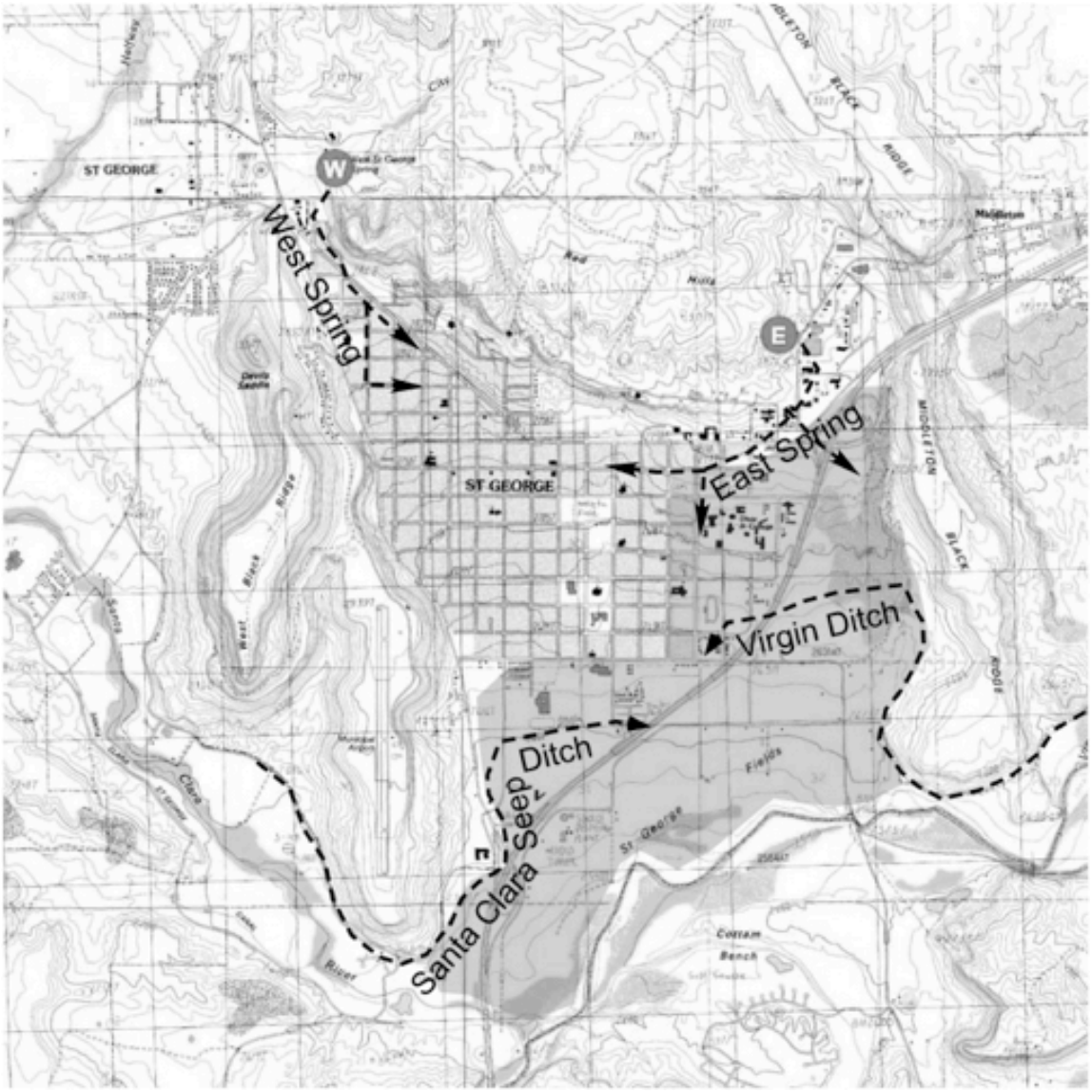
From Hubert Howe Bancroft
pg. 600
History of Utah: 1540 - 1886

... *"Before its settlement, the valley of St. George presented a barren appearance, its surface being strongly impregnated with mineral salts, even bottom-lands of the Virgin and Santa Clara showing large strips of alkaline soil. Its climate was mild, and, with irrigation, crops of many kinds could be raised; but water was scarce, an artesian well sunk in 1862, at a cost of $5,000, being abandoned as a failure, after attaining a depth of more than two hundred feet.*

The people farmed on the joint enclosure system, the first enclosed field, named the St. George, being irrigated by the 'Virgin Ditch', the cost of which between Dec. 1861 and Aug. 1866 was $26,611.59". James G. Bleak, in Utah Sketches, MS. Mead calculates the cost of water to be $12 per acre per year during the first five years in St. George... when a good house was worth $500... and farmland $40 to $50 per acre...

Virgin Ditch, Santa Clara Seep Ditch, East and West Springs

the Virgin Ditch was 6 feet wide and 3 feet deep about six miles long and had a timbered tunnel 900 feet long as it passed by the lower end of the black ridge on the east of town... water from this ditch irrigated St. George fields on the north bank of the Virgin... water from East Spring irrigated fields farther uphill on the east side of town... water from the West Spring was conducted to the town site for culinary purposes but was also used to water small fields and orchards at the edge of the plat... at the lower end of the Santa Clara above Tonaquint water was taken from the Santa Clara Seep Ditch... Seep (meaning returned water already used for irrigation)... this ditch came around the south end of the black ridge on the west side to town and water fields south of town... 1 photo of west spring.



Since a large portion of St. George's water came from Springs which provided reliable quantities and didn't flood or dry up, St. George had an advantage over neighboring settlements...

West (or Watercress) Springs, *DSC Library*

1863 **St. George and Santa Clara Creek water rights**

When St. George was made the county seat of Washington County, in 1863, Brigham Young gave it all the rights in the Santa Clara Creek (that weren't already being used by Santa Clara, Gunlock, and Pine Valley all of which had been settled before Saint George). Originally this wasn't significant but by the 1870's there were issues that needed to be resolved.

1864 The **Upper Virgin communities become Kane County** with Grafton as their county seat... the county seat moves to Rockville from 1866 to 1867... in 1867 it moves to Toquerville... in 1882 these towns are brought back into Washington County and Kanab becomes Kane county seat... this move causes some official water records to be "lost" later because they don't look for them in Kanab.

1865 **St. George City Council gives Pine Valley more water rights** but doesn't consult Santa Clara or Gunlock.

Diversion dams were built (and rebuilt) along Santa Clara Creek and the Virgin River with brush, earth, rocks and labor. Even a modest flood would destroy large portions of these dams. Irrigation companies continued to rely on these impermanent construction methods until the 1960's.

Construction of Brush Diversion Dam on Virgin River, 1950's, *Virgin Valley Historical Museum*

The Beginning of a Virgin River Diversion Dam, 1921, *Virgin Valley Historical Museum*

1876 34 miles of community canals and ditches had been built at a cost of $56,000.... and 74 miles of private ditches valued at $6,000 were operating... the cost of repairing the dams and ditches since settlement had been $18,000.

Virgin River Brush Diversion Dam, *Virgin River Historical Museum*

1877 the year the temple was completed... another attempt at dam building is made 2 miles above the tunnel, at a cost of $4000... only short lived success...

1881 at tax of $8 per acre was levied to repair canals serving 448 acres...

1882 $1100 was spent repairing the Virgin, Jarvis, and Seep ditches...
common labor was $3 per day, sugar was $1 per pound, molasses $4 per gallon, cotton fabric $1 per yard, and flour 20 cents a pound...

from Frederick Newell, Report on Agriculture, 1890

The area of good land, however, is comparatively limited, and the unregulated water supply barely sufficient for the present area under cultivation. On account of the erratic character of the streams the expense of maintaining ditches and diverting water into them has been very great. The head works are frequently washed away, and several ditch owners state that they scarcely ever take water into their ditches at the same place two years in succession. As in the case of other counties in the Colorado basin, the steams occasionally wash out their channels to a depth of many feet, necessitating the construction of long lines of canal to bring the water upon the land again.

from Elwood Mead, *Irrigation in Utah*, 1903

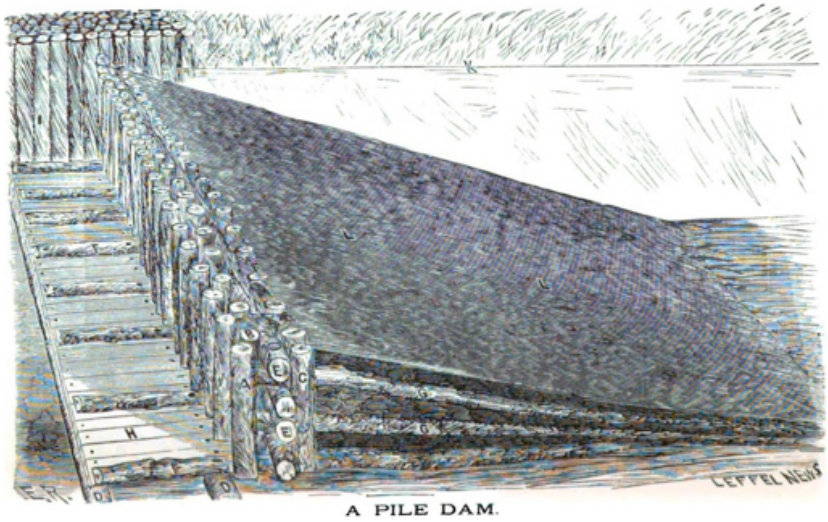
It was found practically impossible to build a dam in the river that would withstand even the more moderate floods. Rocks and piles sank in the quicksand of the river until hope of building a permanent dam was almost given up.

1885 - 1886 Henry Eyring, Journal, 1885

"The pile-dam contemplated for a long time is being driven in a good locality near the Middleton crossing. (after seven weeks)... The pile dam is nearly finished.
(after nine weeks)... Heavy rains fell on the 23d and 24th washing out Dams on the Rio Virgen and carrying 1/4 of the County bridge down stream. The river got around the north end of the pile dam making a gap 8 rods (132 feet) wide to be spanned."

Deseret News, November 1886

"... The stockholders sustained the board in their views, and were decidedly in favor of a pile dam. Steps were immediately taken to procure the necessary timbers, and most of them got out from Pine Valley mountains the same fall. Much delay was occasioned in driving the piles, the result of which has been very disastrous to the farming community of Washington. The piles are driven, but the filling of rock, a great portion of it, remains to be done, consequently we have had no water to our fields this year, and therefor no crops, with the exception of a little lucern hay. Many of our lucern patches appear to be literally burnt up. At this season many are without provender for the work teams and cows. A great many are going north in quest of a little breadstuff to tide them through the winter."



Elwood Mead, Irrigation in Utah, 1903

"Experiment after experiment demonstrated the construction of a permanent dam across the sand bottom of the Virgin River to be practically impossible. What was expected to be a successful effort was made some years ago 4 miles below the present dam. At a large expense heavy piles were sunk into the river bed to hold the rock and brush work of the dam, but they proved unable to withstand the summer floods, with the result that when water was most needed and plentiful in the river there was no dam to divert it to the fields. The farmers became satisfied that unless a solid foundation could be found the fields would have to be abandoned."

Pile Dam Remnants

1889 In 1889, the LaVerkin Fruit and Nursery Company was incorporated with Thomas Judd as president. He planned and built a five-mile long canal, which took water out of the Virgin River and through an 900 foot tunnel cut through solid rock and onto the LaVerkin bench irrigating over 500 acres of fertile land. Canal complete in 1891, but impossible to repair until concrete lined after 1902.

La Verkin Ranch, *DSC Library*

Outlet of LaVerkin Canal Tunnel with Workmen, 1890, *DSC Library*

1891 Washington Fields Dam completed irrigates at least 2,000 new acres with some early estimates saying 3,500 acres... a large amount of acreage is damaged permanently because it is irrigated without proper drainage causing alkali to be leached from soils...

Washington Fields Dam, 1891, *DSC Library*

Washington Fields Dam Workmen, 1891, *DSC Library*

Washington Fields Dam Spillway Flood Water, *DSC Library*

Washington and St. George Fields Canal emerging from Tunnel, 1891, *DSC Library*

Washington Fields Canal and Dam, 1957, *DSC Library*

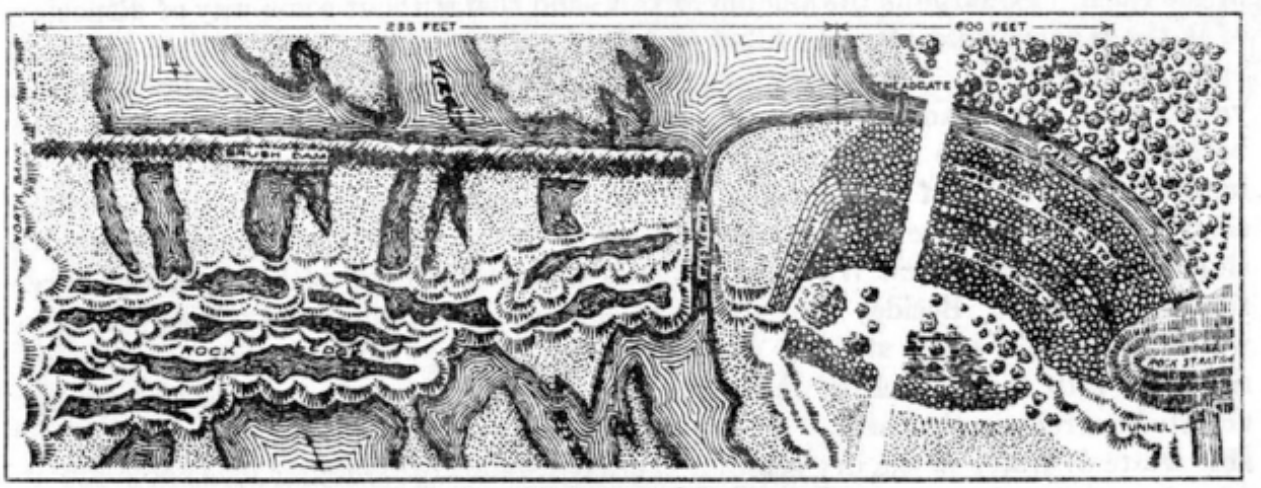


FIG. 1.—Plan of St. George and Washington Dam.

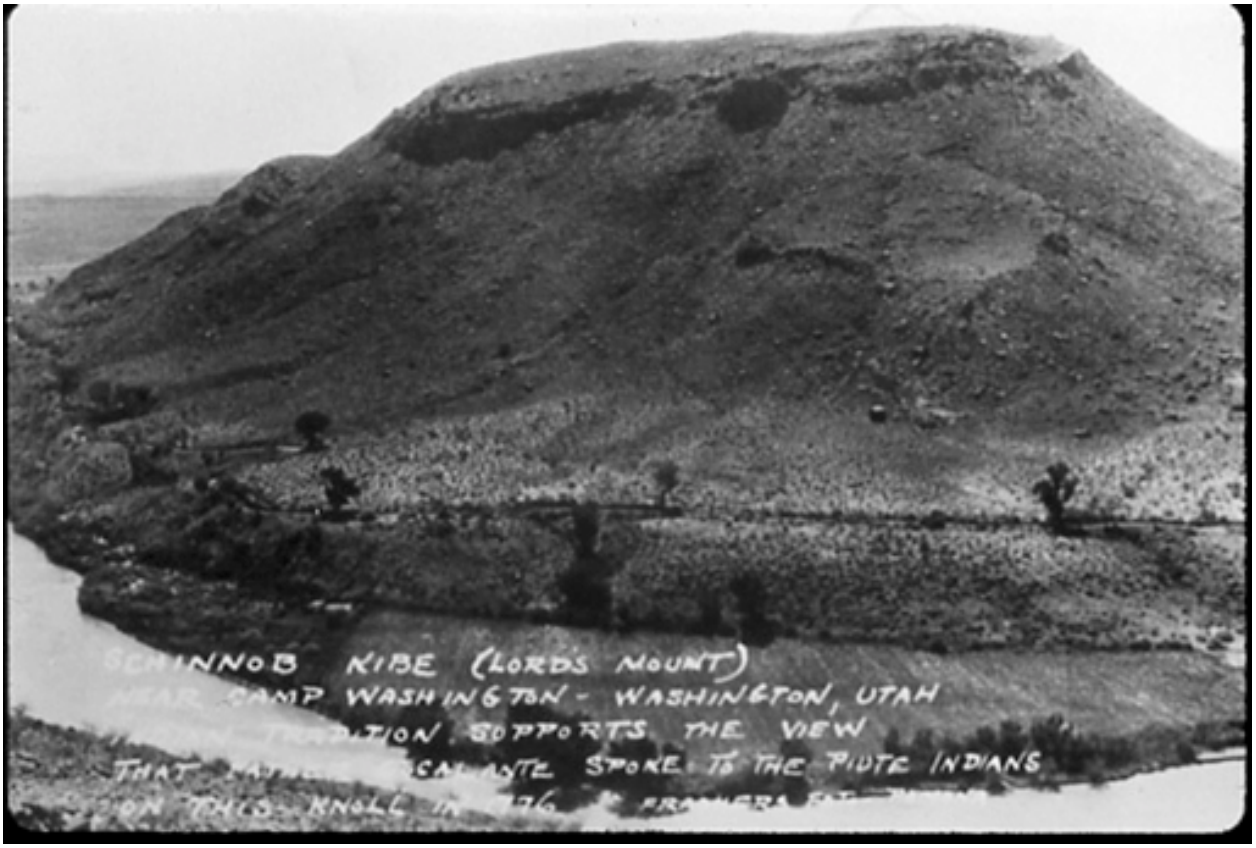
from Irrigation in Utah, Elwood Mead, 1902

Note that the headgate to the canal and the canal were originally on the upstream side of the 600 foot long rock embankment. A tunnel was cut through the solid rock formation on the south bank for the canal. Before 1957, the canal was relocated to the downstream side of the embankment bypassing the tunnel.

Workmen and Horse Teams Digging Washington Fields Canal, 1892, *DSC LibraryW*ork on

Washington Fields Canal, 1892, *DSC Library*

The Washington Fields Canal was completed in 1893, two years after the Dam.



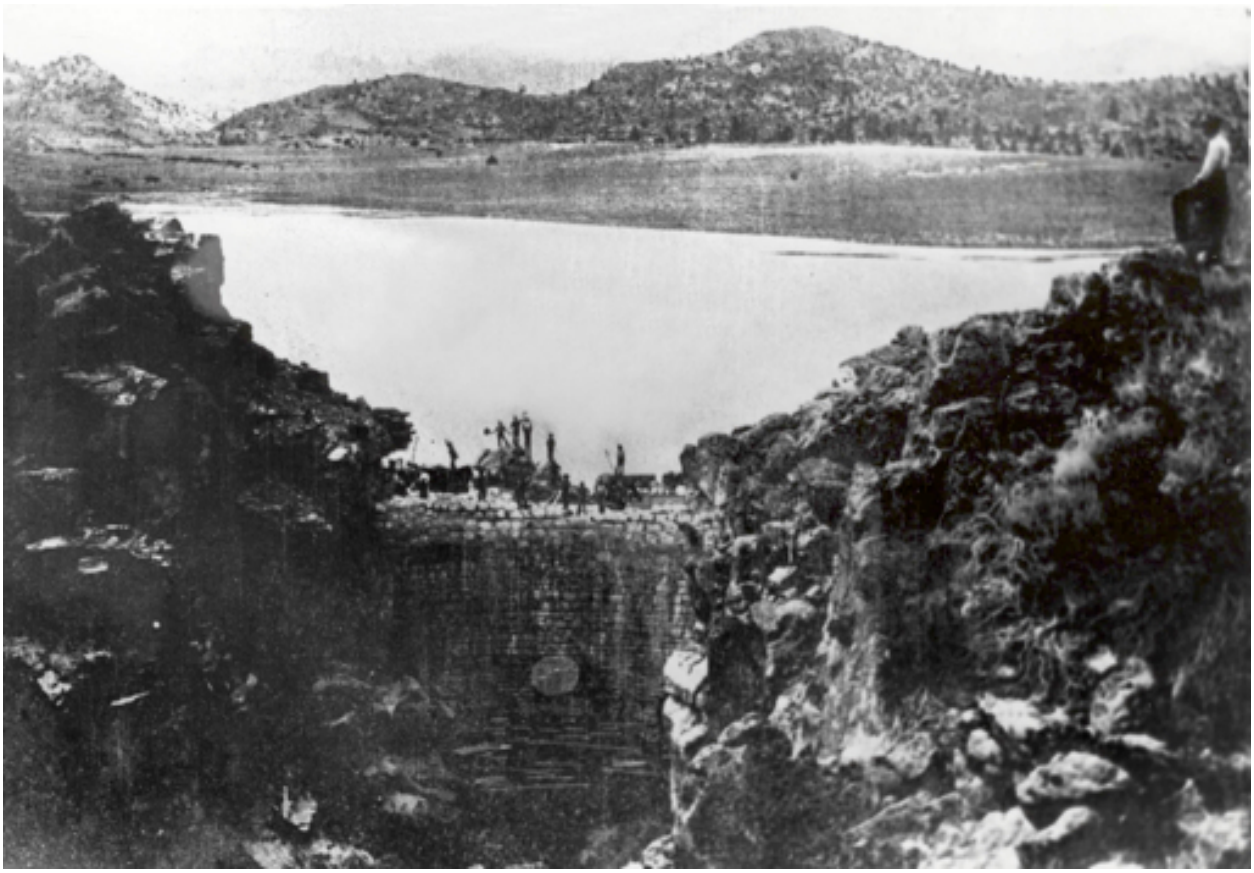
Washington Fields Canal above the Virgin River at the foot of Lord's Mount, *DSC Library*

1893 Washington and St. George Fields Canal Complete

2009 Aerial Photo of Washington Fields Dam

The key to the success of this dam is its location. Here the Virgin River crosses a rock ridge which gives the dam a solid foundation. This northeast to southwest trending stone base was not eroded like the sand bottom in prior attempts were.

1891 Orson Hunstman of Hebron surveys 320 acre new settlement Enterprise below the site of Enterprise Reservoir. 1893 Enterprise Reservoir and Canal Company incorporated... construction starts... 1909 reservoir completed... later 1922 upper reservoir built...



Enterprise Dam during Construction, ca. 1900, *DSC Library*

Panorama of Enterprise, ca. 1910, *DSC Library*

The Enterprise Dam and Canal provided water to over 4,000 acres of land after 1909.

1893 Hurricane Canal work begun by settlers of Virgin City, Rockville, Grafton, Springdale, Duncan's Retreat because they were out of land even though they had water... left over dynamite from Silver Reef used by Mormon ex-miners... log floats downstream... finished in 1908

Hurricane Canal, 1908, *DSC Library*

Hurricane Canal, 1908, *DSC Library*

Hurricane Canal Cement Dam, *DSC Library*

Hurricane Canal Tunnel and Bridge Construction, 1906, *DSC Library*

Hurricane Bench Panorama from Hurricane Cliff, after 1910, *DSC Library*

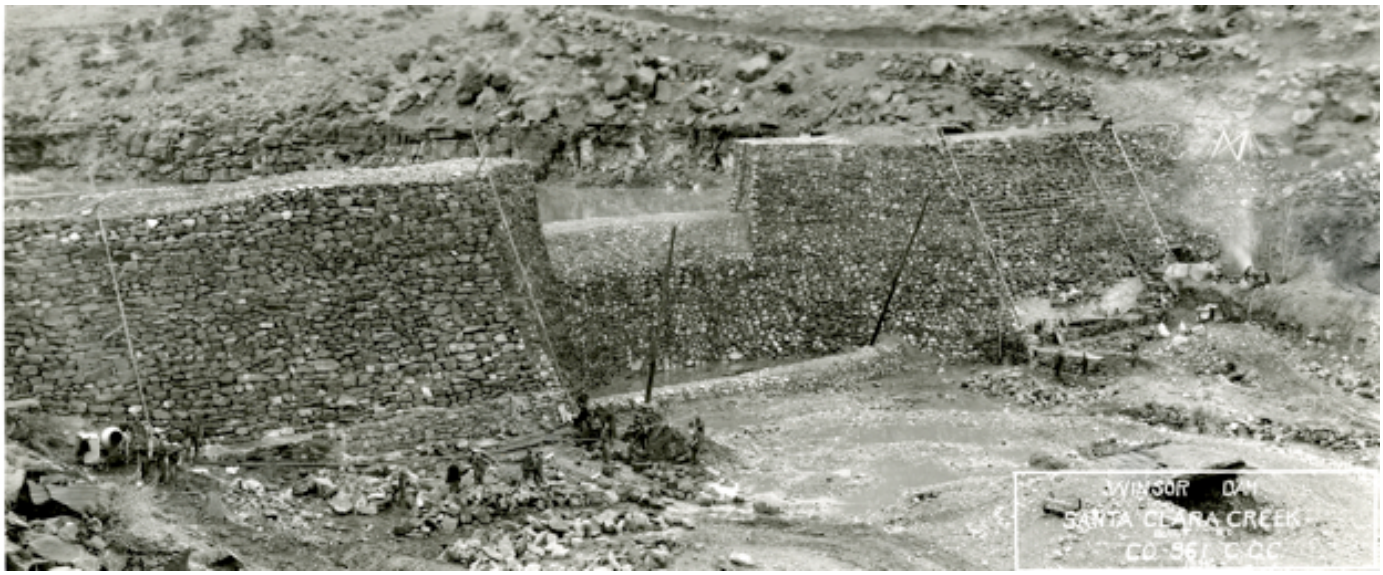
The Hurricane Canal brought water to over 2,000 acres of fertile farm land. The canal project was organized by residents of Virgin City, Grafton, Rockville, Springdale, Shunesburg because while they usually had sufficient water there was only a small amount of irrigated land in these communities and the younger generation needed more farm land.

1896 The need to bring water from the Pine Valley Mountains to St. George was discussed by the settlers in 1862, but the project was not commenced until a 1896. Cottonwood Canal began to convey water from Cottonwood Spring at the base of Pine Valley Mountain to Saint George, a distance of 18 miles, in 1903.

Cottonwood Canal Water Storage Tanks above St. George (1940's)

Map of Irrigated Areas within the Virgin River Basin, 1903,
from Irrigation in Utah, *United States Department of Agriculture Publication*

1909 Santa Clara Bench Canal begun. Water is diverted from Santa Clara Creek near the (old Shem Smelter) to the Santa Clara Bench (later Ivins) a distance of 8 miles. This dam was later named the Winsor Dam. More than 4,000 acres are brought under ditch by the project.



Work by Civilian Conservation Corps on Winsor Dam on Santa Clara Creek, 1935, *USHS*

The canal is completed to the bench in 1914, additional work continues on the bench until 1916. Ivins reservoir is built in 1918, west of today's Kayenta development. The reservoir stores water diverted from Santa Clara Creek before it is distributed to the Upper Santa Clara Bench Canal and the lower Santa Clara Bench Canal to water users. This is the first successful water storage project built within the Virgin River basin (the 1909 Enterprise Dam lies within the Great Basin).

from Frederick Newell, Report on Agriculture, 1890

The irrigators, however, believe that water storage in side canyons and depressions not on the line of the streams can be successfully accomplished and larger areas thus brought under cultivation.

In 1911, St. George City had attempted to build a storage reservoir at the end of the Cottonwood Canal. A 600 foot wide rock dam was built about two miles north of the city, but it never held water.

1912 St. George City voted to construct a wooden pipeline system to conduct water to every home and business in 1907. This system was finally completed in 1912. St. George repealed the "drinking hour" ordinance that required livestock to be kept away from all ditches for one hour each early morning so that "culinary" water could be taken out of the ditch network for each day's domestic needs. This ordinance had been in force since 1864.

As piped water became available, parents and teachers encouraged children not to drink from the ditch, but it was a hard habit to break.

Culinary water systems with pure water piped from natural springs or deeper wells came to some Dixie communities after 1945, and most by the late 1960's.

School Teachers Drinking from the Ditch, Mesquite, late 1890's, *Virgin Valley Historical Museum*

Water Wheel, Mesquite, *Virgin Valley Historical Museum*

from
Annual Report of the Commissioner and the Board of Agriculture
Virginia Department of Agriculture and Immigration 1881

It is easily constructed, and is cheap where the supply of water is sufficient. It consists of a wheel having broad floats hung upon an axle, so that the lower floats are submerged in the water. By offering a little obstruction to the stream to increase the rapidity of the current, where the natural velocity is not sufficient, the wheel is revolved. Water-buckets are fixed to the circumference of the wheel in such a position that the direction of their longitudinal is 45 degrees from that of the axle of the wheel. The buckets are partly filled as they pass through the water, and are discharged as the wheel brings them around in an inverted position into a wooden trough placed along side of the wheel. From this trough the water is conveyed to the distributing channels. Water may be raised in this rough and ready process in the cheapest manner to a height of ten or twelve feet, requiring no attention, and working by day and night so long as the stream flows.

Huber's Water Wheel, Rockville, 1900, *SUU Library*

The pressure to irrigate more land led to the use of water-powered water wheels which could lift water out of streams and canals. Although these devices required frequent maintenance, they were in use in many parts of the Virgin basin until the advent of inexpensive electric pumps in the 1950's. Articles describing the origin, construction and operation of water wheels appeared in many publications including the Juvenile Instructor, a youth-oriented Latter-Day Saint church magazine. One of the issues that was not addressed in these prototypical designs was the need to keep livestock, children and pets away from the rotating mechanism. The solution seen here of some fences with formidable barrier of spiky logs was not uncommon.