

Yakima project cost figures as provided by Bureau of Reclamation auditor
in Yakima office, April 29, 1947

Kittitas \$ 11,977,396

Sunnyside \$4,213,811.

Tieton \$3,462,565 (repaid)

Roza \$19,379,900 (estimated)

Kennewick \$646,000 for Prosser power plant. Anticipated cost to be
\$5,000,000.

Roza has spent \$12,391,180 plus \$3,088,000 contracts for storage,
approximately \$3,903,000 left in contracts.

Repayment figures, (general or approximate)

Kittitas \$763,000

Tieton \$3,462,565.

Sunnyside ~~\$0~~ \$3,430,039.

Roza \$28,000.

Storage repayments \$2,681,000.

Major construction features:

Storage:

Clear Creek, capital cost \$140,497 begun 1914, completed 1918.

Tieton, capital cost \$4,376,538, construction begun by govt. 1917, completed 1925.

Bumping, capital cost \$550,837, govt. construction begun 1909, completed 1910.

Cle Elum, capital, \$2,435,306, govt. begun 1931, completed 1933.

¶ Keechelus, capital, \$2,004,198, govt. const. begun 1912, construction completed 1917.

Kachess, capital \$752,254, govt. construction begun 1910, completed 1912.

Kittitas: Canal system \$7,539,354, construction begun 1926, completed 1933. Lateral system ~~\$1,687,775~~ \$1,68,775.

Tieton: Canal system, capital cost \$1,353,271, begun 1906, completed 1912. Lateral system \$190,635.

Sunnyside: canal system, capital cost \$1,662,387; lateral system \$289,493. Begun 1906. Finished 1923.

Kennewick Prosser Power system. Capital cost \$404,844, construction begun 1932, completed 1932.

In June, 1952, construction costs of Sunnyside Valley Irrigation Project paid off by check paid for \$21,128,64 paid to Bureau of Reclamation.

District embraced 67,000 ~~acres~~ irrigated acres, second and largest federal reclamation in nation to repay.

The project cost 42,270,050 . Project valued at 45 million. Farmers paid almost 200 million in federal taxes during the years.

Total gross crop value of entire division from 1907 amounted to \$301,077,304 for entire Yakima project, Sunnyside Valley

Irrigation District total was \$250,000,000 or 110 times the cost of the irrigation facilities.

In 1907 40,000 acres cropped, value 2 million, \$50 per acre crop value.

Increased to 80,984 in 1951, total of \$13,403,749 crops, \$165.51 per acre return.

Bureau of Reclamation Figures:

The entire Yakima federal reclamation project has an excellent repayment record. Approximately \$10,219,308 of the total value of repayment contracts--\$24,869,813--has been returned to the federal treasury. The percentage uncollected is 1.6--and even that small percentage is to be paid within the next month or two (from February 1947 release). The figures used here do not include the Roza division which is not yet completed. However the water users in this area have given the bureau of reclamation their first check for \$7,050. The total construction cost of the Roza division to date is \$15,078,100.

Since 1919 the Yakima project, embracing 350,000 acres of irrigated land, provided a full or supplemental supply of water by the bureau of reclamation, has produced \$819,100,087 in crops. This is more than 20 times the construction cost of the project including the Roza division, which is not yet in full production. The costs to date total approximately \$40,000,000. The 1946 returns for the project was \$76,056,840, nearly twice the federal expenditure.

The 81,500 acre Snaryside division of the Yakima project, in the years 1907 to 1946 inclusive, have produced crops valued at \$234,665,503, approximately 48 times the total construction cost, which is \$4,885,442. The average annual production for these years is 1.4 times the total construction cost of the irrigation works for the division.

Crops produced on the partially developed 72,000 acre Roza division from 1941 to 1946 inclusive, total approximately \$15,366,208. This is approximately equivalent to the cost of the project to date.

General facts about the Yakima project.

The Yakima project is situated on the eastern slope of the Cascade Mountains in Yakima, Kittitas and Benton counties of south central Washington. It occupies a comparatively narrow strip of fertile land on both sides of the Yakima river extending from

Easton to Kennewick, a distance of about 175 miles.

Project lands range in elevation from 400 feet above sea level to 2,200 feet. The climate is mild and free from extreme weather conditions. The abundance of sunshine makes the country healthful. The average temperature range is from a maximum of 100 degrees Fh to a minimum of zero fh with only occasional extremes beyond this range. At Yakima, centrally located, on the project, the average annual rainfall is 8.15 inches, the annual mean temperature is 50.5 f and the frost-free period is 187 days. Extreme s on the project vary from those given for Yakima, depending on the altitude. The irrigation season extends from about April 1 to October 31.

An adequate and dependable water supply is obtained from the natural flow of the Yakima river and its tributaries, supplemented by storage provided in six reservoirs having a combined capacity of 1,039,330 acre feet. These reservoirs and their respective capacities, in the order of construction, are as follows:

Bumping, 34,000 acre feet; Kachess 239,000; Keechelus 153,000; Clear Creek 5,300; Tieton 197,000 and Cle Elum 435,700.

Storage is released from the six reservoirs into the river system and delivered in the river channels to the various channel headgates. Project irrigation works, constructed or acquired by the bureau, include the Tieton, Sunnyside, Kittitas and Kennewick divisions and consist of more than 1,250 miles of canals and laterals and all other necessary structures such as diversion dams, tunnels, flumes, pipe lines, bridges and culverts.

Upon completion of the project the total area under irrigation in the Yakima valley will approximate 590,000 acres of which about 430,000 acres are now irrigated. Of this total 350,000 acres are supplied with water from irrigation works and storage reservoirs constructed by the bureau of reclamation.

The predominate soil is volcanic ash of a fine, silty texture and considerable depth, usually underlaid with gravel or decomposed basalt. Other soil types are alluvial loams, silt and sandy loams underlaid with gravel. The character of the topography is rolling, affording for the most part good natural drainage.

Lands of the project are especially adapted to all the principal field crops. Certain sections are particularly suitable for growing fruits. The principal crops are fruit, especially apples and alfalfa hay, potatoes, grains. An average of three cuttings of alfalfa is produced. Yields vary from 3 to 6 tons per acre. Apples produce an average of 300 boxes of graded and packed fruit per acre and yields of 1,000 boxes of packed fruit are not uncommon. A large variety of vegetable and truck crops are raised commercially and produce profitable yields. Potatoes produce 200 to 700 bushels per acre. The mild winters are favorable for the breeding of all classes of livestock.

The irrigated land in the Yakima valley supports about 30 cities.

Fact sheet: On Tieton division, Yakima project:

On February 14, 1947, directors of the Yakima-Tieton Irrigation district, representing 1,300 farmers on 20,000 acres of the Tieton division of the Yakima project in eastern Washington, made the final payment, amounting to \$19,630.98 on the district's construction cost obligation. Thereby it became the first federal reclamation project in the west completely to repay the national investment in its irrigation works.

This highly productive orchard area since 1910 has produced crops valued at approximately \$157,000,000, about 45 times the cost of the project. In 1946 alone, the crop value--\$18,326,008, was more than five times the federal expenditure.

Many other federal reclamation projects are well on their way to completing their repayment, which generally cover a 40-year period. All expenditures in irrigation works constructed by the bureau of reclamation under the reclamation act of 1902, the basic law under which the program is being carried on, and acts supplementary thereto, are reimbursable.

The city of North Yakima (now Yakima) was established in the year 1885 and it became apparent at an early date that any body of land tributary to the city that could be irrigated would probably lie on the bench lands to the west. These were watered to a minor extent by Cowlitz and Ahtanum Creeks, both small streams yielding water for a comparatively small acreage.

In 1890 D.W. ~~Stainer~~ Staier, now dead, proposed that glaciers at the head of the Tieton river be diverted by some means into Cowlitz creek to assure a larger and more uniform supply. This probably was the original thought of the Tieton project. It was looked into during the fall of 1890 by W.H. Redman, who pronounced it infeasible.

About this time an irrigation district law was enacted by the state legislature and the Wide Hollow and Cowlitz irrigation district was formed. In the spring of 1891 Winchester and Strobach of the board of directors engaged Guy Sterling to make an examination of the Tieton Canyon as a source of water supply for the district. He submitted his report on May 4, 1891, after spending \$4,000 in investigations.

Sterling estimated the necessary length of the canal at 11 miles. The length of the canal finally constructed is about 12 miles. Sterling estimated that there would be a sufficient water supply to irrigate fully about 35,000 acres. The distribution system now in use covers about 34,000.

Because of the failure to collect assessments for the survey work and subsequent financial panic in 1893, the Sterling scheme fell through.

Other investigations followed and attempts to organize. The bureau of reclamation sent a crew to the area to make a report and the Tieton was one of the first projects in the west to be investigated and constructed under the Reclamation act of 1902. A project report was completed on March 13, 1903 by T. . Noble. It was again investigated in 1904 and 1905. The Tieton Water Users association was organized on March 10, 1906. On April 12, 1906 the water users authorized the trustees to enter into a contract with the secretary of the interior for the construction of the necessary irrigation works.

In order to provide ready access to the Tieton canyon, which had heretofore been reached only by pack train, work had been started

August 20, 1906, by government forces on construction of a wagon road. The work during the summer of 1906 also included actual tests of various methods of lining the main canal.

The date of opening of the proposals for the main canal was set at November 15, 1906, but owing to the serious floods and washouts which occurred that time, the actual opening was deferred until November 19. Only one bid was received, being that of Theodore Weisberger for the driving of the Tieton Ditch and North Fork tunnels and the manufacturing and placing of shapes for lining the entire main canal. The bid on the tunnels was rejected but a contract covering the concrete work was made. There being no indication that immediate readvertising would secure additional bids, it was decided to build the main tunnels by government forces.

The construction of the diversion dam, main canal, lateral system and other distribution facilities had been completed in 1912.

Construction of the Bumping Lake reservoir was begun in the fall of 1908. Located high in the Cascades, near the northeast corner of Rainier National Park, the dam, an earth-fill structure, is 3,425 feet long at the crest, 45 feet high above the streambed and has a volume of 233,850 cubic yards. The reservoir has a capacity of 34,000 acre feet, covers 1,350 acres and taps a drainage area of 68 square miles.

During the season of 1912 the irrigation works operated included the storage reservoir and outlet works at Bumping lake, 12 miles of concrete main canal with diversion weir and headworks, five automatic spillways, four and one-half miles of the channel of the North Fork of Cowlitz Creek, five diversion dams, 90 miles of main laterals, having a capacity of 12 second feet or more and 238 miles of sub laterals having a capacity of less than 10 second feet.

The work of constructing the Tieton was spread out over three years for the reason that funds were not available for a shorter construction period.

Water was furnished to owners of land who desired it as fast as laterals and structures were ready. The first delivery was made to the Naches Ridge in May, 1910.

Prior to 1904 only 500 to 600 acres of land were under irrigation. Most of the land was privately owned. The percentage of public land open to homesteading under the project was only about 2,000 acres or less than 6 per cent. The state owned about 2,300 acres and the Northern Pacific Railway about 300 acres.

When water first became available, land sold at sky-high prices. A number of land companies were engaged in land promotion on the strength of the coming supply of water. They sold land for as much as \$500 an acre for which they agreed to remove sagebrush, plant the trees and take care of the orchard for five years.

Originally the project was to embrace 24,000 acres. The additional acreage was mostly poorer land. By 1918 the acreage had been reduced to 32,000. In 1927, a year of water scarcity, the bureau of reclamation issued a regulation at the request of the association, permitting the farmers to transfer water rights from the poorer land in order to increase the water supply for the better land. This reduced the total area to about 27,000 irrigable acres where it stands today. In 1946 about 24,470 acres were irrigated.

The average size of farms on the Tieton, when water was first delivered, was approximately 20 acres. This is still roughly the average.

The new settlers came from every state in the union, particularly Wisconsin and other Middle Western states.

During the first year of operation 7,180 acres were under irrigation, netting the settlers an average of \$28.75 an acre.

In 1946 the total value of crops amounted to \$18,326,004 from 24,396 acres of land, giving an average value per acre of \$751.19. For the past two years, Tieton has led all projects in average per acre return.

Principal crops: Apples, 13,450 acres, gross returns \$13,099,750, average per acre \$973.96.

Peaches: 1,722 acres, gross returns \$668,398, average per acre \$388.15.
Pears, 4,508 acres, gross returns \$3,006,353, average per acre \$666.89.

Prunes 193 acres, gross returns \$80,756, average per acre \$418.42.

Small fruit, apricots, berries, cherries, grapes, plums, 1,645 acres, gross returns \$1,092,688.

Total 21,518 acres, gross returns \$17,947,945, average per acre \$843.09.

When the farmers made the final payment, the entire \$3,597,479 which the federal government invested was repaid. The construction costs broken down:

Original construction cost: \$3,312,479; supplemental construction, \$150,000 and supplemental water supply \$135,000.

The construction cost on the Tieton varied from \$93 to \$110 per acre. The annual payments were between \$5.58 and \$6.60 per acre. In addition water users were required to pay a supplemental construction charge of \$11.63 per acre in eight semi-annual installments, beginning with 1940. The system has been operated by the bureau, until it was turned back by the government to the water users, at an annual charge averaging about \$3 an acre.

Yakima valley crops, during the years of 1943, 1944 and 1945 were valued at \$320,193,500, an amount in excess of the Klondike gold production in its entire lifetime.

Yakima project:

Settlement, 1922.

Population 59,221 cities; 20,237 farms.

Number of irrigated farms 5,413.

Number of churches 91.

Numbers of schools 51.

Amount bank deposits \$28,037,094.

Construction cost to June 30, 1926. Yakima \$26,346,977.

Roza division \$15,231,960.

Estimated cost to complete: Yakima \$26,346,977. Roza division

\$19,600,000.

Funds available for construction prior to June 30, 1926, Yakima

\$26,346,977; Roza \$17,000,149. Necessary funds after FY 1926:

Roza \$2,599,851.

Plan for repayment: Yakima. Various contracts under reclamation act.

Roza division: Roza irrigation district has contracted to

repay construction cost under 40 year plan.

Payments begun: Yakima 1907; Roza division, begun in 1926.

Total amount of repayment contracts, including all items repayable in the

same manner construction: Yakima \$24,874,987; Roza division

\$15,078,100.

Total amount due as of June 30, 1926 under repayment contracts:

Yakima \$10,234,017; Roza \$6,345.

Total amount paid of amounts due: Yakima \$9,865,870; Roza

\$6,345.

Amount delinquent of amounts due: Yakima \$368,140.

Balance of repayment contract not (Not) due and repayable

\$14,640,969; Roza \$15,071,755.

Additional amounts applied to repayment of construction cost such as

contributed funds, power, etc: Yakima \$860,408; Roza \$227,437.

Total collected and applied to repayment of construction: Yakima \$10,726,278. Roza \$233,782.

1945

Irrigation: Tieton ~~xxxxx~~ Division of Yakima Project

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As an example of the divisions making up the Yakima Project (From records of the Tieton Division, Tieton Water Users Association, Tieton and U.S. Bureau of Reclamation, Yakima Project, ~~Yakima~~ Federal Building~~xx~~, Yakima).

Origin of Tieton irrigation development traced back to 1890 with plans for diverting glacial waters at head of Tieton River into Cowiche Creek.

Financial panic of 1893 interrupted project plans of individuals. U.S. Bureau of Reclamation interested, sent in crew of surveyors, Tieton was one of first western projects investigated under Reclamation Act of 1902. On The Tieton Water Users Association was organized on March 10, 1906. On APRIL 1st, 1906 THE Water users authorized trustees to enter into contract with secretary of the interior for construction of irrigation works. Project envisioned 12 mile main canal for irrigation of 34,000 acres. Construction work of Bump Lake reservoir, canal, two tunnels and smaller ditches spread out over three years and first delivery of water to Naches Ridge was made in May, 1910. During first year of operation 7,180 acres under irrigation

Original construction cost was \$3,312,479; supplementary construction and supplemental water supply added to cost \$150,000 and \$135,000. This made construction costs per acre run from \$93 to \$110 per acre.

On February 14, 1947, directors of the Yakima-Tieton Irrigation District, representing 1,300 farmers on 20,000 acres made the final payment to government on construction, \$19,630.98 and thereby the Tieton became the first federal reclamation project in the west to completely repay the cost to the government. In 1946 alone the Tieton Crop value, \$18,326,008 was more than five times the federal expenditure.

(lowest along river)

United States Department of Interior, Kennewick Division,
Yakima Project. Project planning report No 1-5.35.1. Boise, Idaho,
1947.

irrigable area of 27,682 acres. Includes Chandler power plant for
pumping to higher lands and for electrical production fed into Columbia
River power system.

Diversion, at Prosser.

includes 16,693 acres of dry land
cash crops important, livestock unimportant
small grain, asparagus, sweet corn, potatoes, grapes, cherries, peaches,
alfalfa, pasture. Dairy cows, swine

Expansion of the Roza division, Construction on Roza Division was begun
in 1936, when completed 72,000 acres of irrigable land to be served.

Gravity unit of division consists of 45,000 acres, remaining 27,000
by pumping. Of total acreage 85 per cent lies south of Union Gap.

These return flows will drain to Yakima River below Sunnyside Dam.

For Kennewick Division--Diversity of local markets there: Yakima
Fruit Growers, Pasco Growers Inc. Church Grape Juice Co. Oregon Dairy
and Poultry Products, Twin City Creamery, Royal Canning Co. Walla Walla
Canning Co.

key:

The Yakima Federal Reclamation Project, the outgrowth of the development of irrigation, occupies a strip of fertile land on both sides of the Yakima River extending from Easton to Kennewick, a distance of ~~174~~ 175 miles.

This is the area developed by irrigation, first, from small stream flow, and then by ~~irrigated~~ storage reservoirs and irrigation works to bring land higher than river elevation under irrigation.

The irrigation season extends from April 1 to October 31. During the winter snow and rains replenish the storage in the drained reservoirs.

Comprehensive development was possible by passage of the Reclamation Act in 1902. Even then some 120,000 acres were partially irrigated by private canals on the Yakima River and its tributaries.

As result of a petition dated January 28, 1903 from citizens of Yakima County to the Secretary of the Interior, ~~condemned~~ surveys, construction etc. carried out by the Bureau of Reclamation.

Irrigation water is obtained from the natural flow of the Yakima River and its tributaries supplemented by storage provided in six reservoirs having a combined capacity of 1,039,330 acre-feet. The reservoirs, and capacities, in order of construction:

Bumping 34,000 acre feet; ~~Elk Creek~~

Kachess 210,000

Keechelus 152,000

Clear Creek 5,830

Tieton 202,500 (Rimrock)

Cle Elum 435,000

Project works constructed or acquired by Bureau of Reclamation, consist of 1,250 miles of canals and laterals.

The Wapato division is separate. It is operated by the U.S. Indian Service. Uses reservoirs.

Synopsis of Lectures in the Short Course on Soils and Irrigation,
State College of Washington, Institute of Agricultural Sciences and Community
College Service

Lecture II

By 1860 the census reported 752 irrigation enterprises supplying water to 402,237 acres. By 1900 some 8,000,000 acres of western land were irrigated. Most simple, generally diversion of water from nearby rivers or creeks without need for storage reservoirs and expensive conveyance facilities.

Irrigation development in Washington parallels that of entire west. In 1940 approximately 615,000 acres were supplied with water. Irrigated acreage will reach some 2,000,000 acres as potential.

Lecture II

The Yakima River has within the boundaries of its watershed about 432,000 acres of irrigated and nearly 650,000 acres of irrigable lands. The minimum flow recorded at Union Gap over a 23 year period was slightly over 1,500,000 acre feet. This points out need for regulation and wise utilization of available supplies.

All irrigation states have laws which regulate and protect water rights. In state of Washington a Water Code was passed in 1917. At that time only surface waters were included under its jurisdiction. In 1945 a supplementary act was passed, whereby surface water code was extended to include control and regulation of ground waters. All waters within the boundaries of the state, except those that have already been legally appropriated are now considered to be public waters, and the state through the supervisor of water hydraulics has the power to regulate and control utilization of these waters.

Lecture IV--Measuring irrigation, Aldert Molenaar

Definition of terms:

Units of volume Acre-inch--the volume necessary to cover one acre to a depth of one inch.

Acre foot- the volume necessary to cover one acre to a depth of one foot

Units of Flow

Gallons per minute-A continuous flow amounting to a volume of one gallon passing a point each minute of time.

Cubic foot per second-A continuous flow amounting to a volume of one cubic foot passing a point each second of time.

Miner 's inch-A continuous flow equal to one-fiftieth ($1/50$ th) Cubic foot per second. It is the amount of water that flows through an orifice one inch square under a head of four inches above the center of the orifice.

Irrigation

Sunnyside canal

irrigation folder - no number

West Shore, 1887, pp 812

Irrigation scheme in Yakima - Articles of incorporation of the Sunnyside Irrigating Canal and Land Company were filed this week with the territorial auditor and the auditor of Yakima county.

The capitalization of the company is \$500,000 divided into five thousand shares of \$100 each and the objects named in the articles filed are briefly as follows:

To build, maintain and operate an irrigating canal which shall have its head at or near the present head of the Komnewock ditch and to carry water onto the Sunnyside country; to build, maintain and operate canal or other freight boats on said stream; to do a general milling business; to locate townsites; and to transact a general real estate business.

The canal is to be twenty feet wide on the bottom and five feet in depth.

The incorporators are I.N. Muncy of Dayton; J.G. Evans of Yakima and Fred C. Pettibone of Whatcom. It is understood that the incorporators have business relations with capitalists whereby subscriptions to the stock in the sum of \$200,000 are already guaranteed.

Irrigation measurement laws.

U.S. Department of Agriculture Office of Irrigation Inquiry, Bulletin
No. 1, Government Printing Office, 1893 , pp 82

~~Measurement~~ Measurement of water

The unit of measure for water for irrigation, mining, milling, and
mechanical purposes in this State Shall be a cubic foot of water per
second of time--Chapt. 4, sec. 1862.

Irrigation:

Constitution, state

Washington. Constitutional provision

The use of the waters of this State for irrigation, mining and manufacturing purposes shall be deemed a public use. --Art. XXI, sec 1.
(p. 75 , U.S. Dept of Agriculture office of Irrigation Inquiry
Bulletin No. 1, Washington Government Printing Office, 1893.

The Reclamation Act

The title of the act, as all act titles, is explanatory.

An act appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands. (Act June 17, 1902, ch. 1093, 32 Stat. 388)

~~Text of the complete act may be found on p. 9 of Federal Reclamation~~

Text of the complete act may be found on p. 9 of Federal Reclamation Laws Annotated, United States Department of Interior, U.S. Government Printing Office, Washington; 1931. On pps 10- 55 may be found ammendatory and supplementary acts up to that date.

Smythe, William E-Conquest of Arid America, 1900, Harper bros.

irrigation older than history, it was never practiced upon any considerable scale by Anglo-Saxons until the Mormon pioneers turned the waters of City Creek upon the alkaline soil of Salt Lake Valley in the summer of 1847. 90 p.51 later

Greeley Colony in Colorado , Riverside Colony in Southern California p 98-9

in far west the irrigable district is enclosed between the Cascade and Titter Root ranges and the drainage from these high mountains furnishes more water than can ever be used to advantage..

The most important irrigation development thus far accomplished is in the Yakima Valley. Here there are nearly four hundred miles of canals, some of them very large. The towns of North Yakima, Prosser and Ellensburg are the chief points in the irrigated portions of the valley. A number of canals have been constructed along the Wenatchee river a.... p 187.

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Irrigation History: Heavy water use, need for storage

"The low water flow of the Yakima River amounting to 2,000 second feet was found to be practically all used by sixty canals at the time the Reclamation Service took up the study of Yakima irrigation....

D.C. Henny, former supervising engineer of the Reclamation Service in an address before the National Irrigation Congress at Spokane in August, ~~1900~~ 1900, p 524, Pacific Monthly, Vol 26, No. 5, article, Randall R. Hoard, Irrigation as the Homeseeker Finds It.