MONDAY, DECEMBER 27, 2010

Roosevelt Survived the Flood

The town of Roosevelt is a service point for recreation on Roosevelt Lake, but it started before there was a lake, to provide goods and services to the workers building Roosevelt Dam. Back then it was located on the riverbank below the planned reservoir level. And as water rose behind the dam, the town had to move to higher ground to survive the flood. In fact, the lake rose behind the dam so rapidly during the spring of 1908 that many of the buildings were submerged before they could be moved, only to reappear during low water levels in the 1930s.

When construction workers first came in 1903, the project was called Tonto Dam or Tonto Basin Dam, after the valley that holds the lake. The dam would be built where the river was squeezed to 200 feet as it entered a rugged canyon just below a point called "The Crossing." Exactly when the town came to be named Roosevelt is not clear. There is evidence that it was first called Newtown. But the Post Office was established January 22, 1904 as "Roosevelt," and probably by then everyone knew it would be called Theodore Roosevelt Dam, after the president who supported its construction.

Arizona100 - An Arizona history blog

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1912-2012 Recalling the past hundred years and before—the renown, the forgotten and the secret.

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This blog has migrated to Arizona100.WordPress.com

It has been fun. Thanks for all the great comments.

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Looking west across a lazy Salt River about 1905, the dam site is in the canyon at right, with the town of Roosevelt spread across the only flat ground above the river. In another three years it would be inundated by the reservoir. Above the lake level, on Government Hill at left, are Reclamation Service buildings and tents for unmarried engineers. The largest building in front is the dining hall. The power canal is winding around the hills toward the damsite. On the hill at center is the cement plant. On the hill across the river is dam contractor O'Rourke's camp. (I have added color to black & white photos for this post)

Looking NE over the town of Roosevelt in 1905, toward the frosted Sierra Ancha range, the main street business district is visible at the right edge. (click on picture for full size) Most of the houses are canvas tents with wooden walls and floors. In the lower left foreground is the electric plant, with a glimpse of the Salt River behind. East of town a road crossed the Salt and went 30 miles into the Sierra Anchas where the government built a sawmill to supply the project with at least three million board feet of lumber.

After 20 years of agricultural development beginning in 1867, many fortunes had been made in the Salt River Valley. But just as the ancient indigenous people who eventually abandoned their canals had learned, life in the irrigated oasis was always threatened by flood or drought. The spring freshet of 1886 washed out Arizona Dam at the head of the Arizona canal. Then the great flood of 1891 that put knee-deep water in the streets of Phoenix washed out all the dams on the Salt River. And as soon as the water drained away a period of severe drought set in until the end of the century.

Far-sighted individuals had already concluded there was need of a storage reservoir in the canyons of the Salt River, and the ideal site had been located in 1889, just below the confluence of the Salt with Tonto Creek. Despite agricultural bounty in the Valley, however, funding for such an ambitious project fell short. Private efforts failed twice. Meanwhile, flooding returned in 1900, only to be followed in 1901 by an all-time low level of water in the Salt River. Mass meetings were held in Phoenix's Dorris Opera House and appeals were made to friends in Washington D.C. After Congress rejected the sale of

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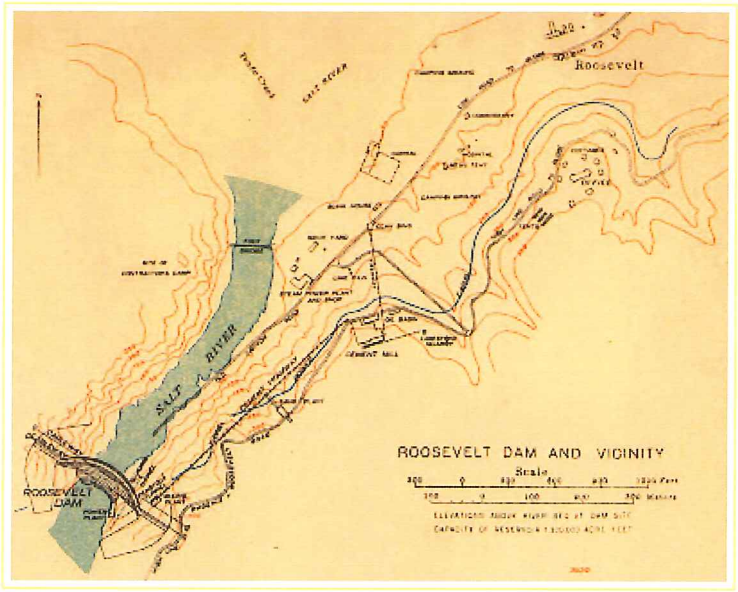
Maricopa County bonds it provided a solution to the funding problem in the form of the National Reclamation Act, signed by Republican President Teddy Roosevelt June 17, 1902. It came at a time when the federal government was expanding its involvement in the states and the United States had become an imperial power to rival the empires of Europe.

Using the pooled resources of taxpayers across the country, the US Reclamation Service would provide millions of dollars to build the tallest dam in the country and the largest reservoir in the world, to block floods yet keep Salt River Valley canals full. It would be called the "Salt River Project," the first of many reclamation projects in Arizona and among the first five in the country. Eleven private canal companies in the Valley were united in February 1903 to form the Salt River Valley Water Users Association, a non-profit irrigation company. Farmers and ranchers pledged to pay back the federal government loan, putting up their land as collateral. Hydropower generated by water releases at the dam would subsidize water delivery, with enough excess power to pump ground water beyond the end of canals. None of this came without opposition, but the majority prevailed.



This map prepared in 1910 by the Reclamation Service shows the site about 1907, but with a completed dam as it would appear in 1910. The main street of Roosevelt is at upper right, with the USRS office on Government Hill just below. Dam contractor O'Rourke's camp is across the river by way of a suspension footbridge that washed away in 1908. The steam power plant, cement mill, sand crushing and concrete mixing plants are located. The power canal brought water to a temporary hydroelectric turbine located inside the penstock tunnel, putting the more costly steam plant on standby.

Roosevelt Dam was located in a very remote canyon 40 miles from the railroad at Globe and about 60 miles from Phoenix, inflating the cost of freighting supplies and adding to the difficulty of construction. Contractors reached the site from Globe in 1903, while construction of

a road from Mesa, to be called the Apache Trail, continued for another three years. Houses for workers and a few stores were built on a hillside within walking distance of the dam site. The town and O'Rourke's camp were provided with water and sewer lines, an ice plant, telephones and electricity. Roosevelt had utilities other towns in Arizona wished for. It also went without something every other boomtown had. The government forbade the sale of alcohol. Brick and lime kilns were completed in 1904, the same year a telephone line was strung to Phoenix and the road from Globe was completed. Work had begun on a cement plant. John M. O'Rourke & Co. of Galveston, Texas won the low bid to construct just the dam in March 1905 for a cost reported in the press of $1.1 million.

Though small and primitive motor trucks were available after 1905, large teams of draft horses or mules were still the best way to transport heavy loads beyond the railroad until well into the 1920s. All supplies for the work camp and construction were hauled over the shorter and relatively easier grades from Globe or the long and steep road from Mesa. The last two miles of the Mesa road were not completed until 1905. Freight made up 30% of the cost of supplies. Here, an empty oil tanker has stopped on the Apache Trail at J. Fraser's Road House, a lodge at the bottom of Fish Creek Hill, before starting the difficult climb on the way to Mesa. (The postcard was published by the Berryhill Company of Phoenix and printed in Germany about 1907. Within a year or two American printers would install German presses and offer color postcards at a competitive price.)

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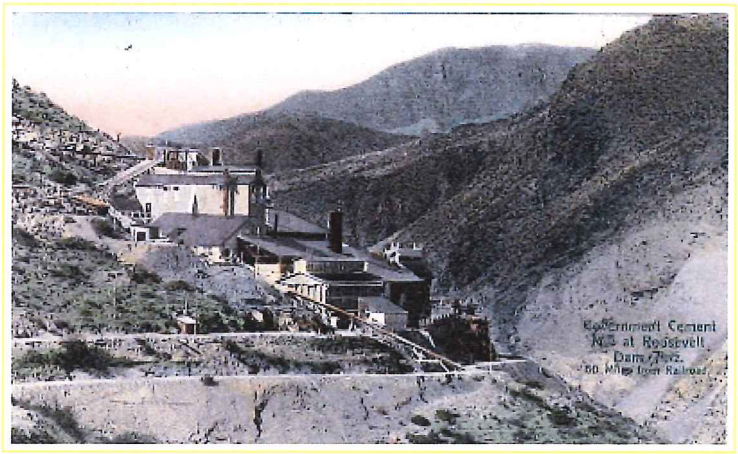
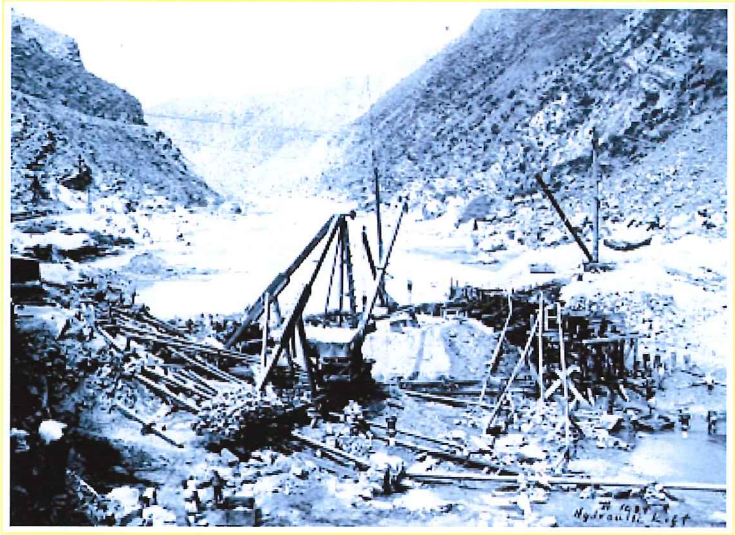


So cement would not have to be freighted from Globe or Mesa, the Reclamation Service built (Nov. 1903-Mar.1905) a cement mill overlooking the damsite. Using limestone quarried right at the mill and clay from a mile away, the plant produced 338,452 barrels of cement from April 1905 to July 1910, for a savings of about $600,000. The mill used electricity and fuel oil, a barrel of oil for each four barrels of cement produced. The cost saving allowed the government to also ship barrels of cement from Roosevelt to the construction site of Granite Reef Dam in the Valley. A fire in the cement mill on December 7, 1908 caused a lot of damage and stopped work on the dam for two weeks.

To provide electricity, first a small wood-fired plant was built. It required 25 cords of wood a day and all scrub trees were soon stripped from the hills for ten miles around. An oil-fueled electric plant started up when oil delivery became available by mule wagons over the road from Mesa. Ultimately the plan was to use hydropower, and work began on a 19-mile power canal with 21 tunnels and two inverted siphons from a diversion dam on the Salt River. But it soon became apparent that the project would cost much more than first estimated. The power canal originally allotted $188,360 for construction gobbled up $1.4 million, plus another $127,000 for the diversion dam.

A 480-foot diversion tunnel, that could be used later to sluice silt from the lake, was bored through the south wall of the canyon in 1904. Cofferdams were built to isolate the worksite and the riverbed was excavated to bedrock over the winter of 1905-1906. In November 1905 came a flood of Biblical proportions. The river rose nearly 30 feet in 15 hours and overtopped the cofferdams. It became apparent that the diversion tunnel was too small and nothing could be done to prevent water from inundating the work every time the Salt River rose to flood stage. After years of drought, construction had unfortunately begun at the start of a period of record stream flows. Finally, the first stone was placed on clean bedrock September 20, 1906. Two months later work halted as the foundation stones disappeared beneath the raging river. Laying stones resumed in June 1907, interrupted by floods in summer and fall. While two years had originally been allotted for construction, four years, seven months and 21 days would pass before stones reached 150 feet on only the south side. It would require six years to complete 280 feet of masonry running 723 feet between

spillways.



Here, on July 16, 1906, workers are rebuilding the downstream cofferdam, using a "hydraulic lift" much like a canal lock, to lift excavated material. Digging reached bedrock 30 feet below the river surface where foundation stones were laid in cement mortar on the thoroughly washed bedrock. In December, the Salt River flooded, overtopping the cofferdams and washing away everything seen here. But the cemented stones didn't budge.

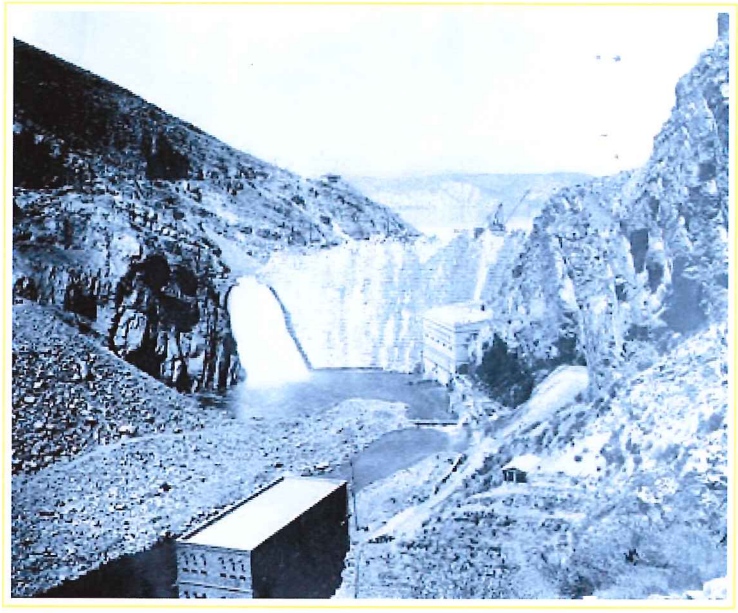
A close-up of construction late in 1907 shows how the dam was engineered. The masonry technique was termed "broken range cyclopean rubble," placing large irregular blocks of sandstone weighing up to 10-tons each with the joints breaking rather than aligned. Each block was completely surrounded with at least two inches of concrete, with spalls (splinters of rock) added to fill wide gaps. Workers are adding another block at lower right with a tub of concrete at ready, as an engineer in white shirt and tie observes. Pipes deliver water to drench the stones and keep the concrete from drying before it sets. Blocks at the vertical upstream face were finished with a chisel to produce a uniform wall with random projections. Blocks were finished where they made the sloping downstream face to present an aesthetic stair-step surface. (This

picture is a detail from a postcard made by German printers who colorized a black & white photograph sent to them by publisher M. Rieder of Los Angeles. Each card coming from a two-color press had additional colors laboriously added by hand with a brush and bottles of dye.)

After two years of frustrating work between floods the project was way behind schedule. Here, on April 29, 1908, sandstone blocks are about 50 feet above bedrock on the south side. But the river is running over the north side while the sluicing tunnel is closed off (bottom left) to install gates from January 31 to July 2. Behind the masonry rubble the hydropower house can be seen. High on the canyon wall at right stones are quarried, then moved by overhead cable and derricks to their place on the dam. The quarry will become the north spillway. An overhead cableway (two black squares are pulleys) delivered stones each night, tubs of concrete mortar all day. The concrete mixing facility is on the side of the canyon at left. The High Line road to Mesa (later called Apache Trail) is precariously cut into the cliffs above the river.

A view of the dam from downstream in late summer 1908 shows the south side rising above 70 feet and work restarted on the lower north side after the sluicing tunnel reopened. The powerhouse is enclosed and water can be seen

exiting the tunnel below the building. December 16, 1908, water again overtopped the dam, a stream 125 feet wide and 13 feet deep, not receding until the end of the month. Again, the deluge came so suddenly workers could not save derricks and winches from being swept away.



The sluicing tunnel was closed off again May 8, 1909 so concrete and steel lining could be added to repair cavitation damage. Shutting off irrigation in the valley during the growing season was unacceptable, so workers had to cut a notch in the dam to pass enough water for the crops. Masonry has passed the 130-foot level on the south side and an electric substation building has been added in the foreground. The cableway at upper right is delivering a tub of concrete. The boardinghouse at O'Rourke's camp can be seen on the hill behind the dam.

By November 1, 1909 the dam was almost 200 feet high on the south side. A week later the sluicing gates would reopen, diverting the river from flowing

through the notch on the north side so work could resume there. Stonemasons were working on an ever-narrowing summit. The dam was 167 feet thick at bedrock but only 16 feet at top, enough weight of rock to easily hold back the weight of water 270 or more feet deep. In this photo you can clearly see the vertical upstream face with random projections and the stair-step downstream face. Workers living at O'Rourke's camp reached the town of Roosevelt by boat after a footbridge suspended across the canyon washed away. They went to work by crossing the notch on the smaller footbridge at lower right.

Immigrants were welcomed as cheap labor in the United States in those days and many different nationalities, including native-born Blacks, worked at Roosevelt. Italians were adept stonecutters. Apache men did much of the work on the road that would later be named after them, proving particularly skillful at laying dry masonry to support the roadbed on the side of cliffs. Still, a strict segregation of labor was maintained, with Anglos in supervisory positions and people of color assigned manual labor.

The temporary hydropower plant provided electricity from April 1906 until August 1909. At that time the permanent hydropower plant constructed (1906-1908) of stone on the south side of the river started up three turbines. In October 1909 electricity was supplied to Valley cities over a 75-mile, 45,000-volt transmission line constructed 1907-1909. Water was supplied to Valley canals at Granite Reef diversion dam (constructed by the Reclamation Service Oct.1906-Aug.1908).

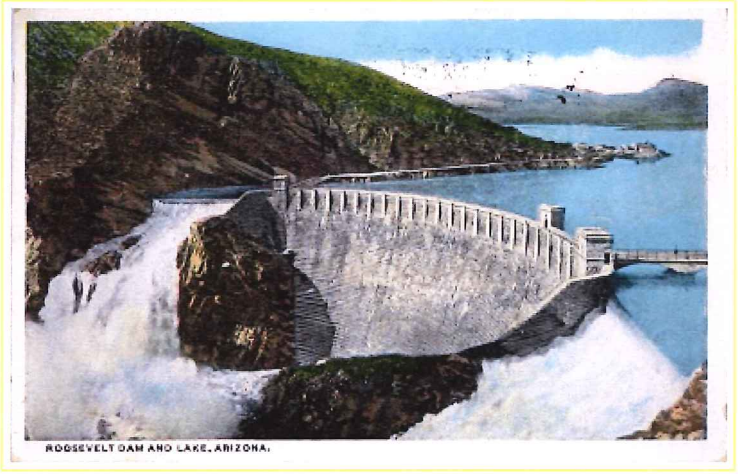
Cost of the dam had ballooned past $3 million, far above the original estimate of $1.9 million. Add to that the expensive power canal, at least a million dollars spent acquiring land and another $2.3 million for the electric power system. "Because of heavy flooding that wreaked havoc with the construction site, it may have been impossible for any company or organization to have built Roosevelt Dam in a timely, cost effective manner," concluded an official history (Billington, et al., 2005). Flooding showed the need, but residents in the Salt River Valley became impatient for completion and unhappy with Reclamation Service performance and looked for ways to reduce the cost they would have to repay. The last stone on the dam was finally laid February 5, 1911, but O'Rourke's workers had already begun leaving during the previous year.

After signing the Reclamation Act, President Theodore Roosevelt was reelected in 1904. He declined to run again in 1908 but remained a popular and influential public figure. Here, he arrives from Phoenix by car March 18, 1911 with Territorial Governor Richard Sloan to dedicate the government dam named in his honor.

When the United States entered World War I in 1917, army guards were assigned to prevent sabotage of important infrastructure, including the nation's largest hydroelectric dam in the remote mountains of the newest state. This detail from a Keystone View Company stereoscopic card shows a contingent of "Sammies" near the south end valve house.

Another two generators were added at Roosevelt Dam in 1912, and spillways were raised five feet in 1913. A sixth generator was added in November 1915. After five years only half full, rain in the mountains filled the lake to 225 feet at the dam and water first began to flow through the spillways on the evening of April 15, 1915. Repairs to the

spillways were made from October 1915 to January 1916, and completed just four days before the next spillover. Roosevelt Lake reached a maximum storage of 1.5 million acre-feet, and 2.1 million acre feet were measured over the spillways from January 18 through May 30, 1916. The water level almost touched the underside of the automobile bridges on each side and the dam shook for weeks as if by an earthquake under the weight of water eleven and a half feet deep rushing through the spillways.



Though mailed in 1921, this postcard probably shows the 1915 spill when water first overflowed the dam. The former O'Rourke camp, now Roosevelt Lodge, is at Hotel Point. After overflowing in 1915 and 1916, Roosevelt Lake overflowed again in 1920 before entering a long period of drought. Following the installation of three penstock valves before 1920 in the north canyon wall, water could be released through the south wall sluicing tunnel, hydropower turbines, the spillways, two north wall tunnels and the penstock valves. But the appearance of the dam had been designed to suggest strength under all that weight of water.

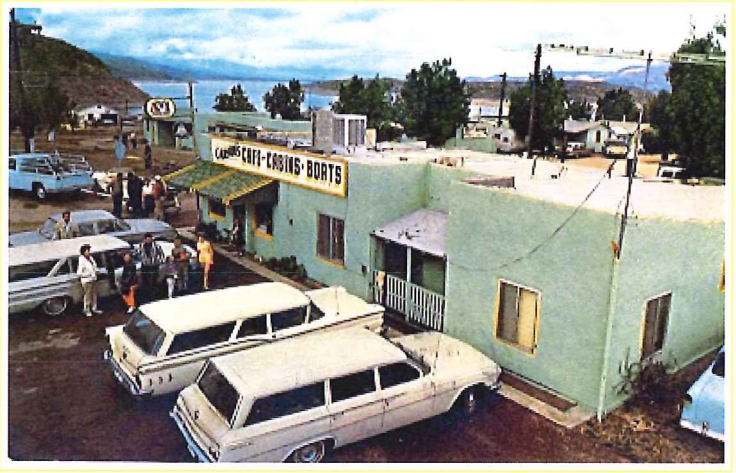
Upon completion of the dam, buildings at O'Rourke's camp were sold to local merchants M. C. Webb and his son. The boarding house became Roosevelt Lodge to accommodate tourists as the sights along the Apache Trail were publicized far and wide. Visitors could ride a bus over the Trail and eat or stay at Tortilla Flat, Fish Creek Lodge or Roosevelt Lodge. Apache Indian families

were put on display and Anglo traders sold Native American crafts. In addition to the dam, tourists could visit nearby Tonto National Monument ruins or take a boat out on the lake.

In 1917, the Southern Pacific railroad purchased the hotel and renamed it Apache Lodge. While the Union Pacific railroad bused tourists to the north rim of the Grand Canyon and Santa Fe railroad trains went directly to the south rim, the Southern Pacific promoted Apache Trail and Roosevelt Lake. Railroads also connected with bus and car transportation to a number of Arizona dude ranches and hot springs.

The final cost of the project came to more than $10 million and the ten-year repayment schedule had to be extended to twenty by an act of Congress in 1914. In 1917, the Reclamation Service turned over operation of Roosevelt Dam to the Water Users Association, retaining mortgage holder interests. But the Association could not make loan payments during the recession years of 1920 and 1921. As soon as the economy improved, the Association sold bonds to build five additional dams on the Salt and Verde Rivers beginning in 1923. That same year, spillway gates were added to Roosevelt Dam, raising the lake another 15 feet, and in 1936 spillway floors were improved to minimize damage during overflow. By 1925 irrigation and power infrastructure represented an investment of more than $23 million. In 1937, the Association created the Salt River Project Agricultural Improvement and Power District, an autonomous government entity, so the state legislature could grant it favorable municipal bonding powers. Drought nearly emptied Roosevelt Lake by June 1940. Then it quickly filled and spilled over in 1941. After World War Two, the Association had trouble paying taxes, so it transferred the electric utility to the tax-exempt District, creating today's SRP. In 1955, water users paid off the federal loan thirty-five years late.

Thaddeus T. Frazier opened a store at Roosevelt in 1908. It hosted the Post Office for many years, with Stella Frazier as postmaster 1916-1958. (The postcard was published around 1952 for the Fraziers by Norton Louis Avery & Son of Lowell, Michigan and printed in "Genuine Natural Color" by Dexter Press of West Nyack, New York.)



Carson's Café, cabins and boats was located on the west side of Cottonwood Creek or wash, where the marina is now. This postcard shows the resort about 1962, with Rock Island behind the trees and the highway cut going around to Government Hill visible at upper left. In 1988, work began to reroute Highway 88 and relocate recreational facilities in anticipation of higher reservoir levels after the dam was raised. As a result, only traces of older facilities can be seen today. But again, Roosevelt survived the flood.

The need for more water, earthquake protection and a calculated increase in the volume of "hundred-year floods" caused the federal government in 1984 to authorize raising the height of Roosevelt Dam. Work started in 1989 but had to be delayed when the Salt River again produced a torrent. Storms in the watershed brought the lake to its highest level ever on January 19, 1993. The south spillway could not channel all the flow and water overtopped the sidewall and began pouring onto the roof of the hydropower house, causing a million

dollars damage. By then a new 1,080-foot long suspension arch highway bridge had opened behind the dam. When work resumed on the dam, the front was covered over with concrete to thicken it and raise it. At a cost of $424 million the top of the dam was raised 77 feet. Now, only at low water levels can the original sandstone blocks be seen on the upstream wall. Since the original structure had disappeared, the dam's National Historic Landmark status designated in 1963 was withdrawn in 1999.

See:

Donald N. Bentz, "The Doomed City" *Frontier Times* May 1968.
David P. Billington, et al., *The History of Large Federal Dams. . .* (US Bureau of Reclamation, 2005)
Kathleen Garcia, *Roosevelt Dam* (2009)
Athia L. Hardt, ed., *Arizona Waterline* [1989]
L. L. Lombardi, *Tortilla Flat Then & Now* (1996)
Salt River Project, *The Taming of the Salt* (1970)
Stephen C. Shadegg, *Century One* (1969)
Chester W. Smith, "The Building of the Roosevelt Dam" *The Earth* August 1909
Karen L. Smith, *The Magnificent Experiment, Building the Salt River Reclamation Project, 1890-1917* (1986)
US Dept. of Interior, USGS, US Reclamation Service, annual reports: 1903-04, 1915-16.
Earl A. Zarbin, *Roosevelt Dam: A History to 1911* (1984)

Posted by Robert Lucas at 6:48 PM

Labels: Roosevelt Dam and town

Reactions: scary (0) interesting (1) cool (0)

4 comments:

Anonymous January 26, 2012 at 2:09 PM

Does anyone know anything about graveyards in the area. There is one at Schoolhouse and there is one directly across the street from the Marina next to Lakeside Mobile Home Park.

Reply

Robert Lucas February 6, 2012 at 6:48 PM

Thanks for the interesting comment, Anon. A quick Google search returned info on Bacon Family Cemetery and Tonto NF Cemetery Trail 255. Must be a number of sites used over the years.

Reply

Anonymous December 9, 2013 at 9:37 PM

Does anyone have more info on the Frazier's store? Any pictures, etc? I'm trying to gather info for an elderly family member of the Frazier's. Thank you very much! My email is: CordesStation@msn.com

Reply

Mrs Sharon Sim October 16, 2015 at 5:23 AM

Hello Everybody,
My name is Mrs Sharon Sim. I live in singapore and i am a happy woman today? and i told my self that any lender that rescue my family from our poor situation, i will refer any person that is looking for loan to him, he gave me happiness to me and my family, i was in need of a loan of S$250,000.00 to start my life all over as i am a single mother with 3 kids I met this honest and GOD fearing man loan lender that help me with a loan of S$250,000.00 SG. Dollar, he is a GOD fearing man, if you are in need of loan and you will pay back the loan please contact him tell him that is Mrs Sharon, that refer you to him. contact Dr Purva Pius,via email:(urgentloan22@gmail.com)Thank you.

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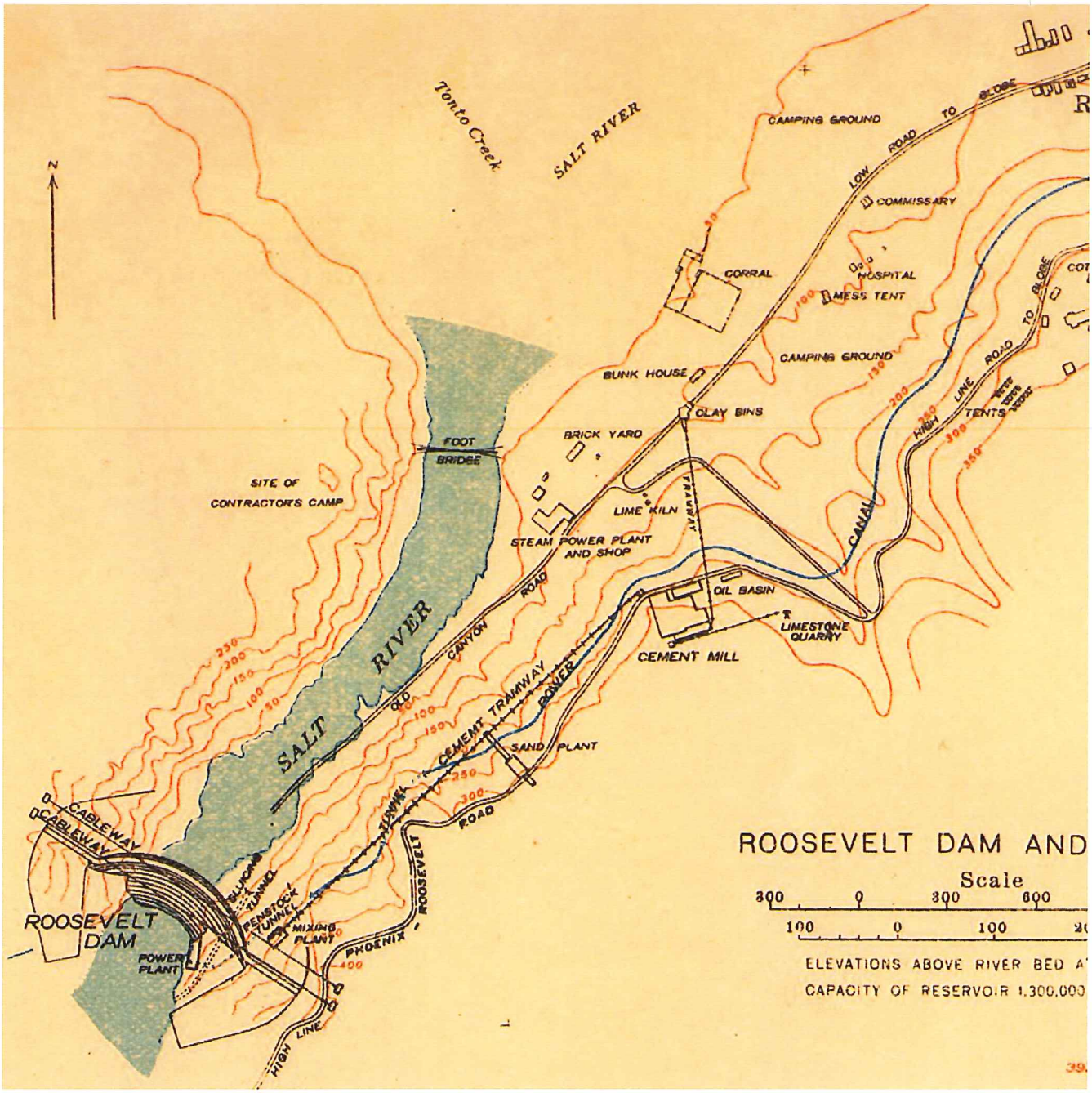
Tonto Creek
SALT RIVER
CAMPING GROUND
LOW ROAD TO GLOBE
COMMISSARY
CORRAL
HOSPITAL
MESS TENT
CAMPING GROUND
BUNK HOUSE
CLAY BINS
BRICK YARD
FOOT BRIDGE
SITE OF CONTRACTOR'S CAMP
LIME KILN
TRAMWAY
STEAM POWER PLANT AND SHOP
CANAL
OIL BASIN
LIMESTONE QUARRY
CEMENT MILL
SALT RIVER
OLD CANYON ROAD
CEMENT TRAMWAY
POWER
SAND PLANT
TUNNEL
ROOSEVELT ROAD
CABLEWAY
CABLEWAY
ROOSEVELT DAM
POWER PLANT
PENSTOCK TUNNEL
MIXING PLANT
PHOENIX
HIGH LINE
ROOSEVELT DAM AND
Scale
300 0 300 600
100 0 100
ELEVATIONS ABOVE RIVER BED
CAPACITY OF RESERVOIR 1,300,000