SALMON, LEWIS & WELDON, P.L.C.

Attorneys at Law

Riney B. Salmon II, P.C.
John B. Weldon, Jr.
Lisa M. McKnight
James R. Huntwork
Richard N. Morrison
Kristin D. Magin

Writer's Direct Line
602-801-9066

2850 E. Camelback Road, Suite 200
Phoenix, Arizona 85016
Telephone 602-801-9060
Facsimile 602-801-9070

M. Byron Lewis
Stephen E. Crofton
Mark A. McGinnis
Karen S. Gaylord
Ronnie P. Hawks

Writer's Internet Address
mam@slwplc.com

April 1, 2003

Hand-delivered

Mr. George Mehnert
Arizona Navigable Stream Adjudication Commission
1700 West Washington, Room 304
Phoenix, AZ 85007

Re: In re Determination of Navigability of Lower Salt River

Dear George:

Enclosed are seven copies of the following documents submitted by the Salt River Project Agricultural Improvement and Power District and the Salt River Valley Water Users' Association (collectively, "SRP") for purposes of the April 7 hearing on the Lower Salt River:

1. "Information Regarding Navigability of Selected U.S. Watercourses" (April 2003);

2. Tammy LeRoy, "Salt River Centennial," Phoenix Magazine, at 67-73 (February 2003);

3. Excerpts from Marshall Trimble, Arizona: A Cavalcade of History, at 258-266 (1989);

4. Excerpts from Karen L. Smith, The Magnificent Experiment: Building the Salt River Reclamation Project, 1890-1917, at 70-91, 169-171 (1986); and

5. Excerpts from Earl A. Zarbin, Roosevelt Dam: A History to 1911, at 75-107, 114, 133, 146 (1984).

If you have any questions about these materials, please call me.

Very truly yours,

Salmon, Lewis & Weldon, P.L.C.

By Mark A. McGinnis
Mark A. McGinnis

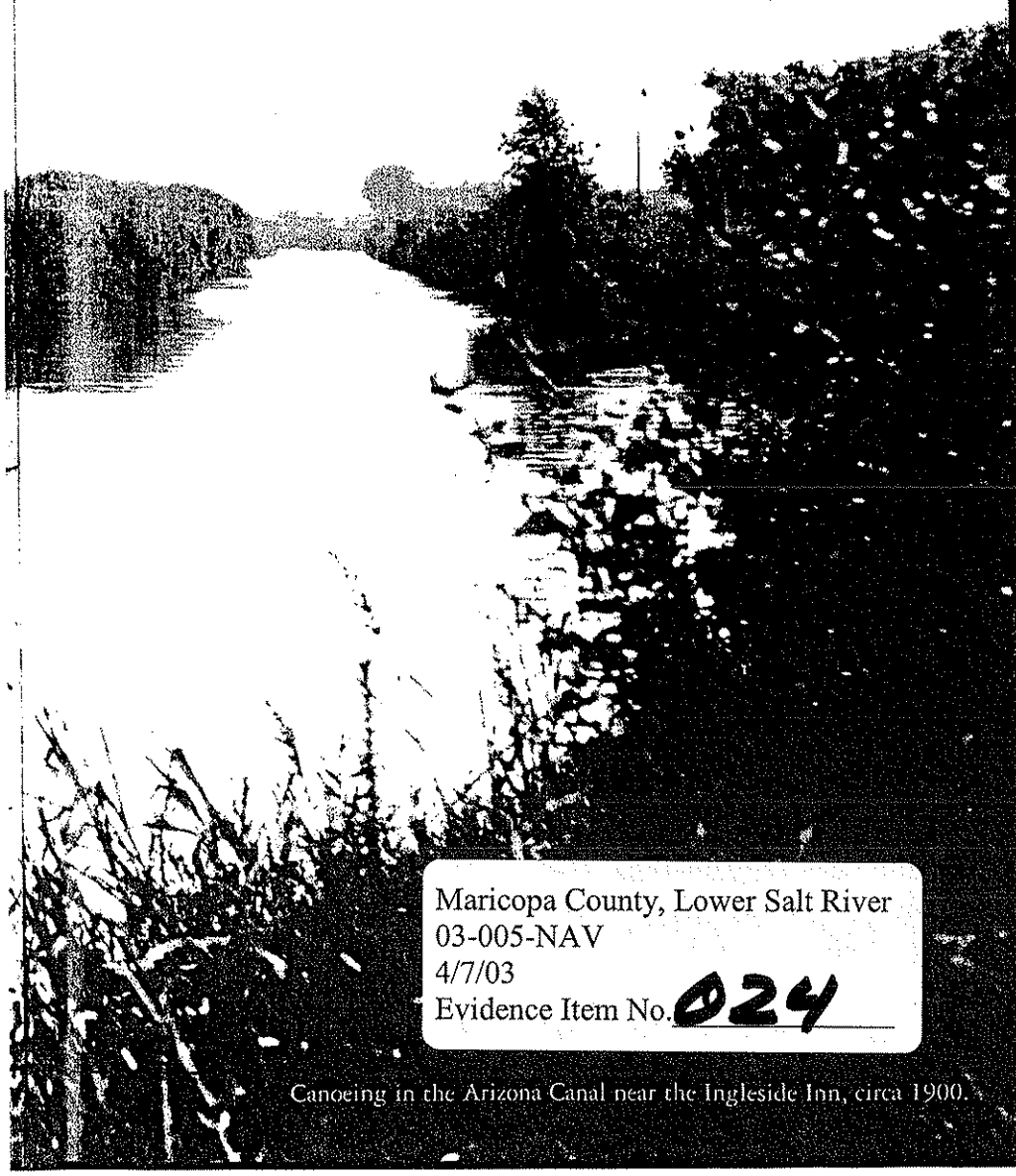
Encls.

024,25,26

Salt River Centennial

by Tammy LeRoy

The river itself has been around for thousands of years, but in February 1903, a group of local landowners took control of the unpredictable waterway, building a series of dams and canals, and creating what came to be known as the Salt River Project. This is the story of SRP.



Canoeing in the Arizona Canal near the Ingleside Inn, circa 1900.

Phoenix men survey the damage of a flood of the Salt River in 1891.

ON the afternoon of March 18, 1911, more than a thousand Arizonans gathered 60 miles east of Phoenix at the site of a newly completed dam in the Tonto Basin. They cheered wildly as a car rounded the curve and former President Theodore Roosevelt stepped out.

At the dedication ceremony that named the dam in his honor, Roosevelt thanked the people of Arizona and lauded the unprecedented engineering feat. Then, at 5:48 p.m., he pressed a button that unleashed a flow of water from the reservoir. The *Arizona Republican* eloquently described the event in the next day's paper: "A mighty roar of water rushed through the canyon, and the dedication of the greatest storage dam and reservoir on earth was an accomplished fact."

For Valley residents, the event was the culmination of years of work and planning. The temperamental Salt River had vexed farmers with alternating floods and droughts. In February 1903, a group of local landowners hoped to turn the tide by forming the Salt River Valley Water Users' Association. They pledged more than 200,000 acres of their own land as collateral for a government loan to build the massive dam, which would control the river's erratic flow, generate electric power and provide a water reserve. The plan was called the Salt River Project.

SRP, now celebrating its 100th anniversary, has grown to become the nation's third largest public power utility, providing electricity to more than 780,000 customers throughout a 2,900-square-mile service territory in Central Arizona. It also administers water rights in a 240,000-acre area, and operates a system of dams and canals. Employing nearly 4,700 people, the utility generates annual revenues of $1.2 billion.

It's hard to overstate the importance of the Salt River Project on the growth of the Valley. As the primary source of surface water, civilization in the Valley has depended on the Salt River for thousands of years.

The first people to manage its flow were the ancient Hohokam. The Hohokam were skilled farmers and engineers who settled in Arizona around 300 B.C., and over the years they engineered a complex, gravity-based canal system that stretched from the Tucson Basin to present-day Flagstaff.

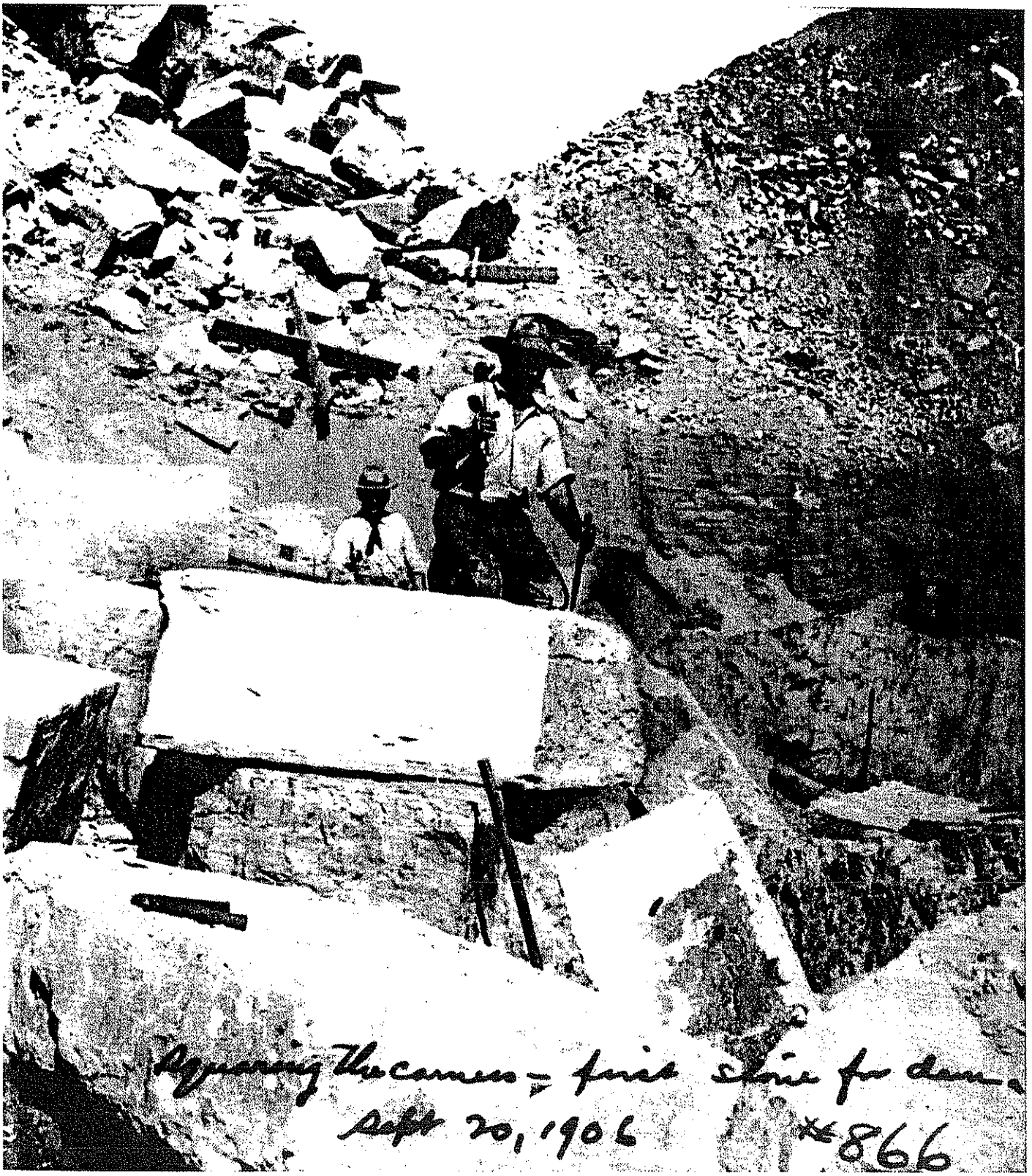
While our European ancestors were slaving under a feudal system and enduring attacks from marauding Huns, indigenous Arizonans were living in orderly towns and enjoying a remarkable degree of democratic freedom.

The Hohokam mysteriously abandoned their fields and villages around 1450 A.D. But their descendants, Arizona's Piman-speaking tribes, extended the impressive water delivery system with reservoirs, dams and more than 200 miles of irrigation ditches.

Fifteen hundred years later, a scandalous drifter named Jack Swilling resurrected the ancient Hohokam canals, and persuaded a few others to join him in an agricultural venture called the Swilling Irrigation Canal Company. This first canal, built in 1868 and eventually known as Swilling's Ditch, was located near 40th Street and Van Buren.

By the late-1870s, Swilling had left Phoenix — he eventually died in a Yuma jail — but in the Valley, a growing agricultural community added miles of irrigation canals and planted thousands of additional acres.

The 42-mile-long Arizona Canal was constructed between 1883 and 1885 to irrigate the northern portion of the Valley, and five more miles were added in 1894. Properties that once had occupied



September 20, 1906. Laborers square the corners on the first stone laid at Roosevelt Dam.

parched desert could then plant lush gardens, making it possible for resorts like the Arizona Biltmore and the Ingleside Inn to locate near the canal and prosper.

Even so, residents were subject to the vagaries of the river. An 1884 flood wreaked havoc during the construction of the Arizona Canal. Another flood wiped out a part of the canal the following year, and in 1891, another disastrous flood hit the Valley. In contrast, the years from 1897 to 1904 brought devastating drought. To the Valley's residents, the Salt's irascibility posed an economic threat.

The Salt's flow varied more than any other river in the country, according to SRP historian Ken Evans: "It could be a rushing river the size of the Colorado, and in the same year, it could literally disappear, leaving only a dry river bed."

Taming the river would be a major undertaking. As a territory, Arizona could not assume the debt necessary to build an effective dam, and not enough local capital was available. Ultimately, the search for funding led prominent Phoenix residents Dwight B. Heard and Benjamin Fowler to Washington. They and other Westerners successfully lobbied Congress for federally funded water reclamation projects that would allow local organizations to repay the government over time.

President Roosevelt signed the National Reclamation Act in 1902, and Valley citizens organized to take advantage of the new legislation. To obtain the loan to build a huge dam in the Tonto Basin, which surveys had favored as the best site, settlers used their own land as collateral. Local landowners formed the Salt River Valley Water Users' Association, with ownership of shares tied to the amount of acreage contributed, using a "one acre, one vote" model.

As many local boosters had hoped, Arizona was the first state to benefit from the legislation. The result was the construction of the Theodore Roosevelt Dam, a superb technological feat that formed a lake 30 miles long and four miles wide. Construction of the dam began in 1904 and was completed in 1911, at a final cost of $10.3 million. The engineers of the U.S. Reclamation Service had no precedent for such a large-scale irrigation project, so each aspect was somewhat experimental.

The original 280-foot-tall structure was built from block and cement, hewn from nearby hillsides. Hundreds of laborers and their families arrived in the area, and the laborers' camp became a boomtown overnight. Representing several ethnic groups, the workers formed a unique, multicultural settlement. Apaches built roads, Hispanics maintained supply routes and African-Americans worked in the quarries. Italian stonemasons, Chinese cooks, and laborers of German and Irish descent joined the ranks as well. A small hospital was

U.S. Reclamation Service crews enlarge the Arizona Canal in June 190

built, and a jail was erected, mainly to lock up those who violated the anti-liquor laws of the Reclamation Service.

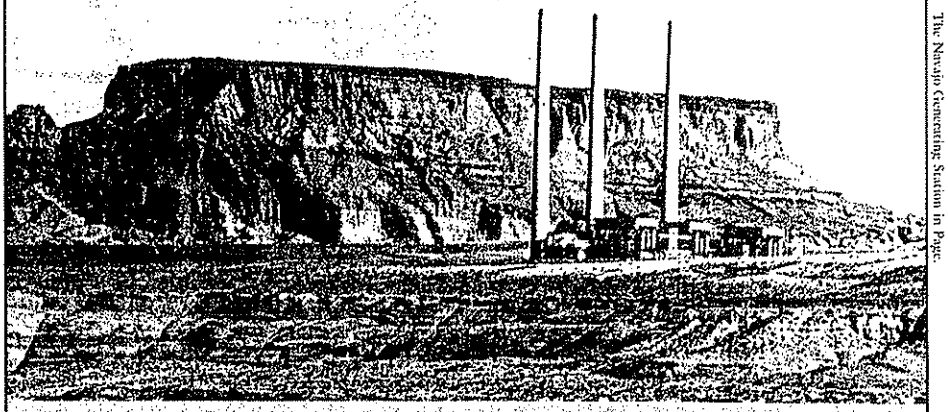
The Roosevelt settlement was strictly segregated along ethnic lines. Many of the families resided in tents, while Apache laborers lived in wickiups. Laborers worked under hazardous conditions — at least a dozen men died in the construction of the dam, and others, including women and children, perished from the harsh conditions. In July 1904, typhoid swept the camp, and in March 1905, a worker fell 300 feet to his death. The next day, a cable on a suspension bridge snapped, dropping four men into the swift current below. Three were rescued, but the fourth man was drowned.

When the dam was completed in 1911, most of the workers left as quickly as they'd appeared. In 1917, the Association took over operation of the dam and canal structures, although the federal government retained ownership. Rights to the water stored and delivered by the system, as well as full responsibility for the Salt River Project, belonged to the landowner-shareholders of the Association.

In the 1920s the Association constructed three more hydropower dams below the Roosevelt — Mormon Flat, Horse Mesa and Stewart Mountain. Together, the dams allowed for 53,000 kilowatts of additional generating capacity. As a result, the rural areas of the Salt River Valley had electricity nearly 10 years before New Deal legislation brought electric power to most of rural America. In the 1930s, SRP generated more hydroelectric power than all other government reclamation projects combined.

When the Association had difficulty making its federal debt payments during the Depression, the Arizona Legislature allowed the formation of an agricultural improvement district as a unit of government that could be financed with tax-free bonds.

The Salt River Project Agricultural Improvement and Power District, a second entity of SRP, was formed in 1936 as a means of refinancing the Association's debt at a lower cost. Today, the Association continues to manage water, while the District sells power. Power sales have always subsidized water delivery, and have allowed the company to keep water costs low, says SRP spokesperson Scott Harelson.



The Navajo Generating Station in Page.

Water Fights & Power Struggles

SRP hasn't become the nation's third largest utility without stepping on some toes, and the sore feet most often have belonged to Indian communities and environmental groups. SRP spent nearly 30 years and millions of dollars in legal fees battling the water rights settlements for Arizona Indian tribes. In September, Senator Jon Kyl introduced an agreement that would end decades of litigation between some 35 interested parties, of which SRP has been a major player. The bill, expected to pass this year, would settle water rights claims on nearly 500 billion gallons of Arizona water, dividing it among Indian communities, farmers and municipalities in Central Arizona.

SRP also has long been enmeshed in environmental issues in the Four Corners region. The company operates the Navajo Generating Station, a coal-fired plant on Navajo and Hopi lands near Black Mesa. The generation of power using coal combustion, which emits sulfur dioxide, nitrogen oxides and particulates, has had a significant effect on air quality in the Grand Canyon region. Over the years, environmental groups have won lawsuits that have forced SRP to install anti-pollution devices to clean up the plant.

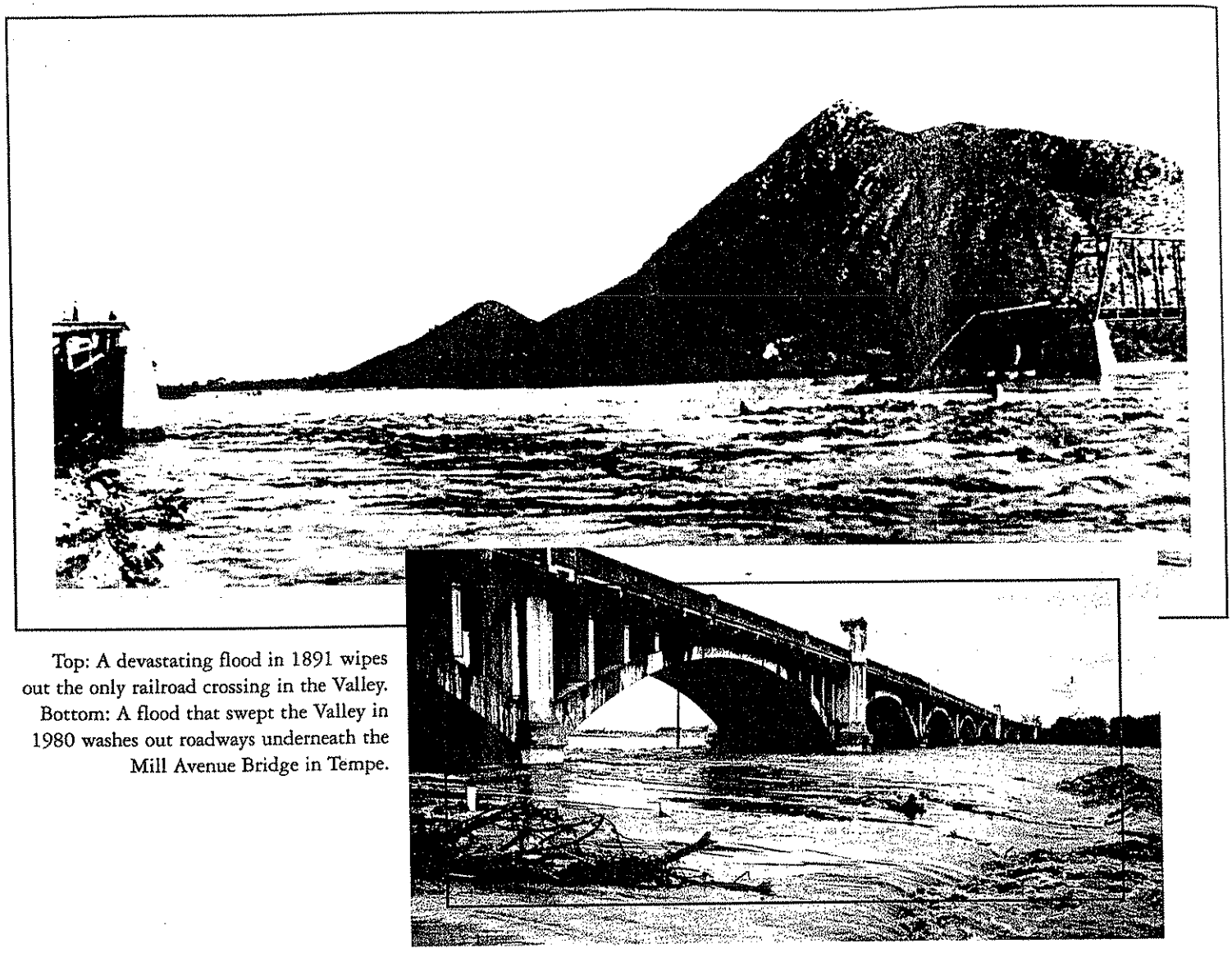
The Navajo Scrubber Project was part of a negotiated settlement between SRP, the state of Arizona, the Grand Canyon Trust and the U.S. Environmental Protection Agency. Under the settlement, SRP agreed to remove approximately 90 percent of the sulfur dioxide produced by coal combustion at the Navajo plant.

In an unprecedented coalition, Indian tribes in Northern Arizona and New Mexico have joined with the Sierra Club and other environmental groups to halt SRP's plan to build another coal-fired station in northwestern New Mexico near Fence Lake. According to coalition spokespersons, operating the coal mine that would fuel the plant would destroy sacred Native American sites like Zuni Salt Lake. The lake is critical to the ceremonial practices of the Navajo, Hopi, Laguna, Acoma, Apache and Zuni tribes. The concern is that groundwater pumped from the mine would destroy the delicate balance of water and salt found in this rare, high-desert lake.

The coalition has launched an offensive against SRP with a billboard campaign asserting that SRP targets sacred sites. Andrew Besser, who heads the Sierra Club's Environmental Justice Program based in Flagstaff, says that although SRP has experienced some sporty resistance in the past, it has never faced a multicultural coalition of this scope. The group wants SRP to abandon the Fence Lake project and use its resources to develop environmentally friendly methods of producing power. "SRP's legacy can improve by committing to wind and solar power, rather than sacrificing places like Zuni Lake for dirty coal," Besser says.

SRP spokesperson Scott Harelson says the company is taking steps to create more environmentally friendly methods of power generation, specifically a $29 million investment in renewable energy, including a groundbreaking landfill facility that captures methane gas from decomposing trash and converts it into energy.

— *T.L.*



Top: A devastating flood in 1891 wipes out the only railroad crossing in the Valley. Bottom: A flood that swept the Valley in 1980 washes out roadways underneath the Mill Avenue Bridge in Tempe.

In addition, SRP lobbied aggressively for the Central Arizona Project — a 336-mile canal system designed to carry Arizona's share of Colorado River water from the California border to Phoenix and Tucson. The canal was completed in the mid-'80s, and provides Arizona with water won in a heated battle that began in 1922 and continues today.

CAP water is stored through an innovative percolation process at the Granite Reef Underground Storage Project. SRP operates the project, located on the Salt River Pima-Maricopa Indian Community near the Gilbert Road crossing of the Salt River. It includes a system of delivery channels and four large, earthen basins where surface water is recharged.

As the Valley's need for water continued to grow, so did its power needs. By the 1970s, SRP was a leading partner in several regional coal-fired power plants. It built and operated the Navajo Generating Station in Page, and built another coal-fired plant in St. Johns. The company also secured a 17 percent share of the Palo Verde Nuclear Generating Station, which is operated by Arizona Public Service (APS). SRP also holds interests in a number of other coal-fired stations, as well as operating several power plants of its own, including hydroelectric, coal-fired and natural gas facilities.

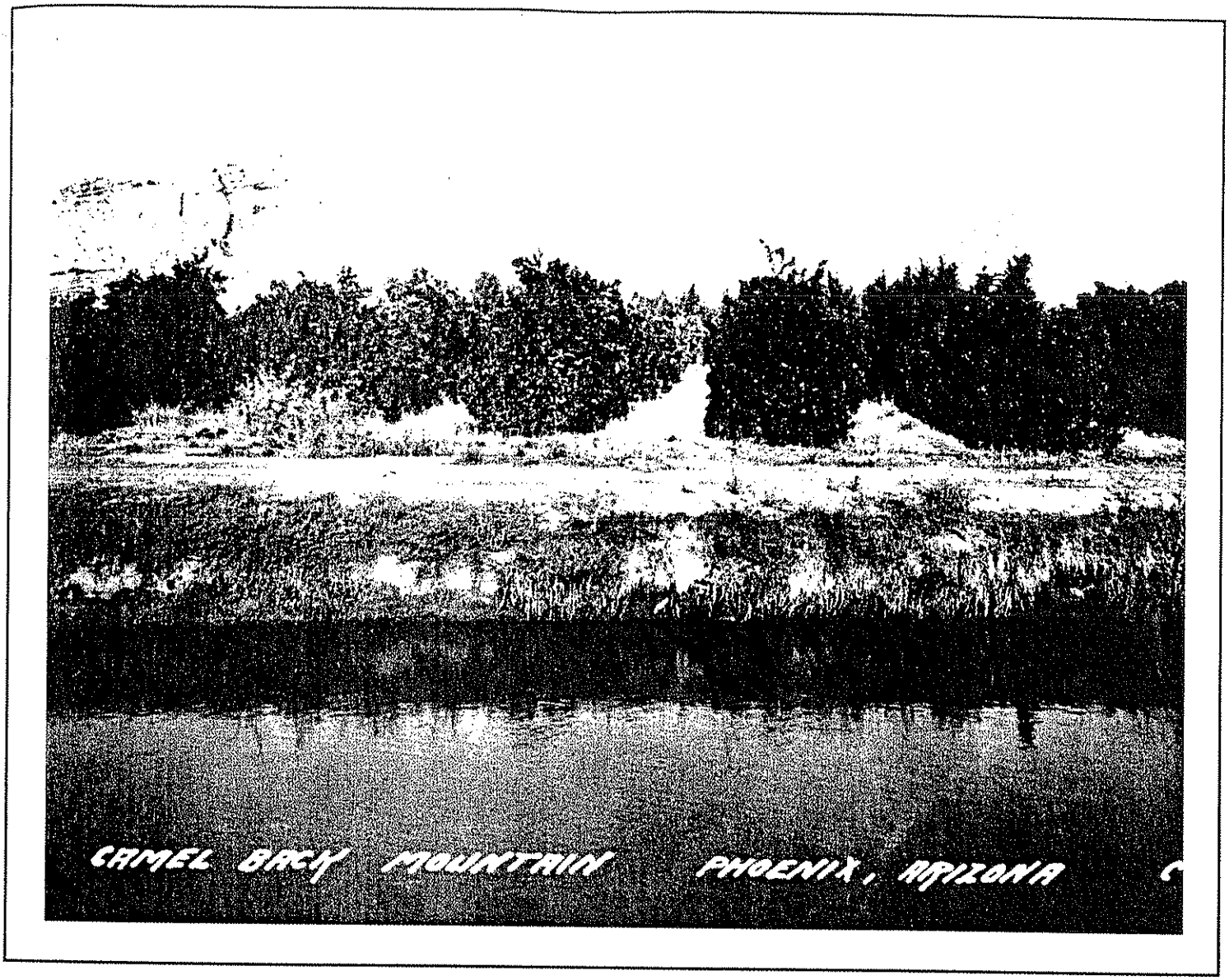
Although sophisticated solutions for controlling the Salt River had been in place for decades, in the late-1970s, the unruly stream challenged Valley residents once again.

Authorities grew concerned when unprecedented amounts of snow and rain gorged the Central Arizona watershed — studies showed that if the state were hit in rapid succession by a series of three, progressively heavier storms, catastrophe could follow. After SRP worked for two years to establish a joint emergency response team with the city of Phoenix, it looked as though the unthinkable would become reality.

On Valentine's Day 1980, a Thursday, a storm hit Central Arizona, dumping nearly 10 inches of rain on the mountain watersheds of the Salt and Verde rivers. A second storm was expected the following Saturday morning, and a third was expected as early as the next Wednesday. Previous rains had already filled the reservoirs behind the Salt River to capacity.

The threat of flooding forced crews at Roosevelt to move out of the powerhouse and into an emergency post at the top of the dam. Workers spent the night inside the shaking structure, listening to the roar of the water as it was released through the spillways at about 180,000 cubic feet per second, the largest controlled flow ever to course the river.

The dam was only inches from overflowing. If it had, it would have created a



Camelback Mountain, circa 1925

waterfall of 284 feet — more than two times that of Niagara Falls — and within hours, the river would have flooded everything in the Valley a mile north and south of the usually dry Salt River bed. It was to the point where Arizona Governor Bruce Babbitt prepared to order the evacuation of thousands of residents and businesses.

As it turned out, the second and third storms didn't have the expected impact. The Roosevelt dam didn't breach, but the Phoenix metropolitan area suffered more than $70 million in damages to roads, bridges and other structures, and SRP facilities sustained $6 million in damage. "It cut the Valley in half," Ken Evans says. "The Mill Avenue Bridge was the only way to get from one side of the Valley to the other."

The brush with disaster convinced SRP that Roosevelt and other dams on the Salt and Verde rivers needed upgrading. Once again, SRP turned to Washington for federal aid. After lobbying for the passage of the National Safety of Dams Act, the government funded more than $400 million in improvements to Central Arizona dams. In 1996, modifications raised Roosevelt Dam by 70 feet, and expanded the lake's capacity by 20 percent.

The Salt River Project was born when one of Central Arizona's worst droughts called for bold action. Today, SRP is still facing the challenges of supplying water to an arid environment — for the past seven years, Arizona has faced the worst drought on record.

SRP's Scott Harelson says the drought is serious, but adds that Valley residents probably won't feel the impact because of SRP's planning. "That's why we were created," he says. "It's why we exist. That's what we've been doing for the last 100 years."

Centennial Celebrations

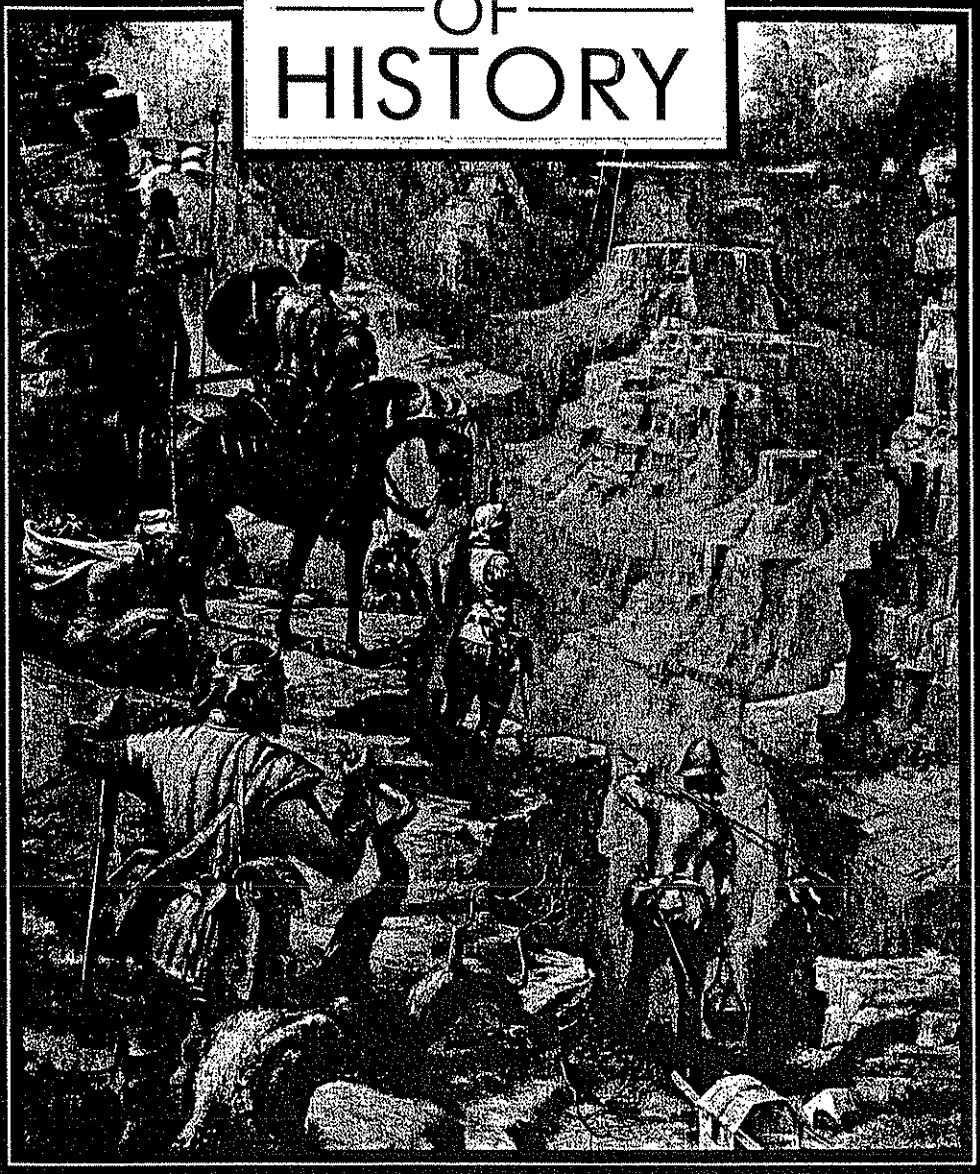
Events celebrating SRP's centennial include "SRP: The Power of Water" at the Phoenix Museum of History, which runs through December. This month, SRP will dedicate the Arizona Falls Project at 56th Street and Indian School Road, the centerpiece of a new multi-use park area. SRP will culminate its centennial with a luncheon on February 5 at the Arizona Biltmore, and a ceremony in mid-February at the Library of Congress. For more information, visit www.srpnet.com/centennial/.

PM

Tammy LeRoy is a monthly contributor to PHOENIX Magazine. She can be reached at phxmag@citieswestpub.com.

ARIZONA

A CAVALCADE OF HISTORY



MARSHALL TRIMBLE

ARIZONA

A CAVALCADE OF HISTORY

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HARNESSING THE GREAT RIVERS

During the latter part of the Nineteenth Century, James Addison Reavis, the self-styled "Baron of Arizona," almost pulled off one of the grandest real estate scams in Arizona history. Reavis learned to forge documents as a young soldier during the Civil War. He wrote his own furlough papers and, when he tired of soldiering, wrote himself a discharge. Later he improved his forgery skills while selling real estate in Missouri.

During this time he became aware of Spanish land grants in the Southwest and saw a chance to make millions of dollars. This fertile-minded, ex-streetcar conductor from St. Louis created a phony land grant that stretched from today's Sun City on the west, all the way to Silver City, New Mexico on the east — nearly 12 million acres. The vast expanse included the fertile Salt River Valley. The fraud was eventually exposed and Reavis was sent off to prison for a couple of years.

After his internment, the "Baron" returned to the Phoenix area. A few years earlier he'd been one of the most hated and feared men in the territory, despised by those who stood to lose their hard-earned land. Now he was just a pitiful, broken, and penniless old man. He walked the streets of downtown Phoenix telling anyone who'd listen of the wondrous potential for irrigating and farming the Salt River Valley.

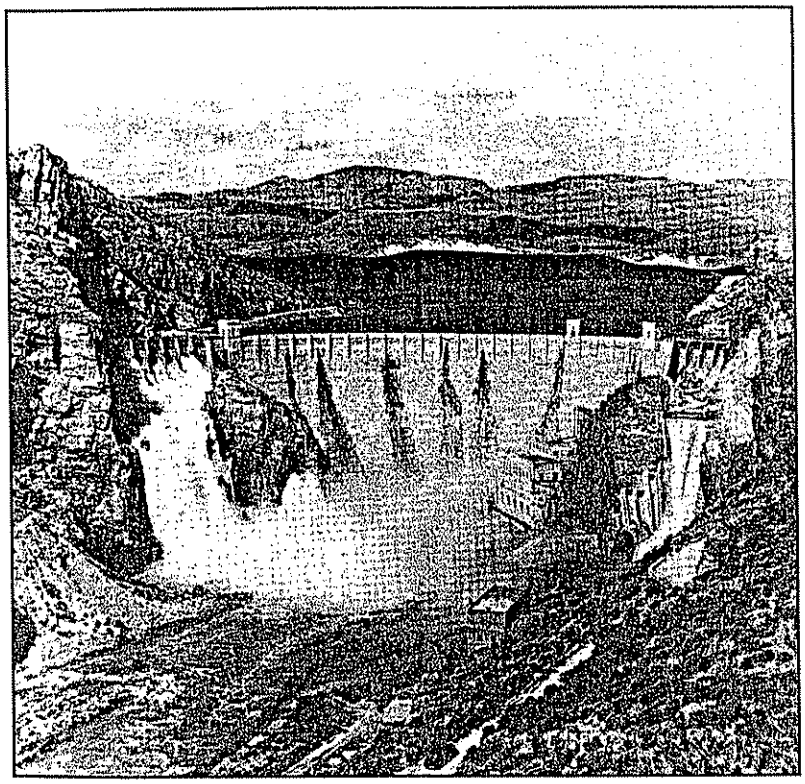
His tired eyes sparkled as he described a new and grander scheme: the expansion of canals and ditches to water the thirsty land. But no one cared to listen and Reavis soon went away. In retrospect, had Reavis turned his visionary schemes and talent to honest endeavors, he might be an honored figure today.

The old "Baron" was right. The Salt River Valley was an agricultural paradise. It was nestled at the heart of some 13,000 square miles of watershed. However, the Salt River, which meandered through the valley, was as fickle as a stud at a snortin' post. One year it'd run over its banks and flood all the way into the center of Phoenix; the next year would be so dry the cows were giving powdered milk.

In 1891, a flood spread the banks of the Salt River eight miles wide, washing out the railroad bridge at Tempe. Later in the decade, water was so scarce that folks were loading up their belongings and moving on to California. It was said a cactus wren wouldn't attempt to fly across the Salt River Valley without packin' a sack lunch. Those who stayed to await better days patroled their irrigation ditches on horseback, armed with Winchesters. During the drought, brief but furious flash floods washed out dirt diversion dams, and farmers watched the precious water escape into the Gulf of California.

As early as 1889 a dam site at the junction of Tonto Creek and the Salt River had been chosen, but nothing came of the venture. Two years earlier, the Arizona Canal began carrying water, opening up new lands for farming and leading to the founding of new communities such as Scottsdale. Still, citizens were at the mercy of the temperamental Salt River. Events in the 1890s dramatized the need for a dam to store water and control flooding, but nothing much was done until 1902 when Congress passed the Newlands, or National Reclamation, Act. The act provided the federal monies to build irrigation projects in the West. The Salt River Valley was a natural choice because a community with canals and ditches was already in existence and was fed by a vast watershed.

Before the dam could be built, the federal government wanted a guaranteed repayment plan. Valley movers and shakers — among them Benjamin Fowler, Dwight Heard, John Orme, and William J. Murphy — persuaded some 4,000 landowners to put up their lands as security. Since the federal government refused to deal with individual landowners, it was necessary for local citizens to unite and form an association. Thus was born the Salt River Valley Water Users Association, later shortened to Salt River Project, whose duties would include management of the massive operation.



Theodore Roosevelt Dam, completed in 1911 at a cost of $10 million. Salt River Project paid the debt in full to the federal government by 1955. Two hundred eighty feet high, it is the world's highest masonry dam. Photo: Salt River Project.

Italian stonemasons were imported to construct what was to become the world's highest masonry dam. A 500-foot tunnel was dug to divert water, and a town named Roosevelt was established which allowed no gambling halls or saloons — a rarity in the West. Other businesses located there with the understanding that their tenure would be brief, since the town would eventually be buried beneath the waters of a huge lake. Apache road builders, under the supervision of famed scout Al Sieber, hacked out a road up to the dam site. Sieber was killed in a construction accident. He'd fought in the Civil War and survived many a shooting scrape during the Apache Wars, only to die when a loose rock came tumbling down and

crushed him. Roosevelt Road was later renamed the Apache Trail. In 1987 it was formally dedicated as the first State Historic Road.

Tonto Dam became Theodore Roosevelt Dam, completed in 1911 at a cost of $10 million. The old Rough Rider, who'd led the Arizonans on the famous charge up San Juan Hill more than a decade earlier, traveled out to make the dedication address. With the completion of Roosevelt Dam, the future of the Salt River Valley was assured. Incidentally, the federal debt was repaid in full in 1955.

Over the next few years Horse Mesa, Mormon Flat, Stewart Mountain, and Granite Reef dams would be built on the Salt River, and Bartlett and Horseshoe dams on the Verde River to provide water storage and electricity. They combined to turn this arid land into a desert oasis.

Although the harnessing of the Salt River relieved much of the water problem in central Arizona, most folks looked to the mighty Colorado River, "The West's last great waterhole," as the future source of water. Ninety-five percent of the state's area drained into the river, and it was felt that the river should return at least a part of it. The state made up about 45 percent of the river's drainage basin and contributed about a third of the river's water. Arizona wasn't the only state interested in taking a share of the mighty Colorado. Our gluttonous neighbor to the west, California, wanted a lion's share, although it contributed not a drop. Also, Colorado, New Mexico, Nevada, Utah, Wyoming, and the Republic of Mexico all made claims to the river's annual 17.5 million acre feet of water.

In 1921 a commission was established to draw up a plan for harnessing the river. It met in Santa Fe and, by the end of 1922, completed its work, which became known as the Santa Fe Compact. All the states' legislatures, except Arizona's, ratified the agreement. Governor George W.P. Hunt opposed the bill because it didn't specify how California, Nevada, and Arizona would divide the 7.5 million acre feet allotment. Hunt had other reasons, purely partisan, for opposing the Santa Fe Compact. It had been conceived during the previous Republican administration under Governor Tom Campbell and Hunt didn't want to be upstaged. Also, his friend Fred Colter had a far-fetched plan called the Highline Canal, which proposed building a series of dams along the Colorado River in northern

Arizona and pumping the water through huge tunnels across the Colorado Plateau, over the Mogollon Rim and into the upper Verde River. Colter spent a personal fortune on the project that, although visionary, didn't come to pass. Colter's Highline Canal had a sound concept and did serve as a model for the modern Central Arizona Project.

During political campaigns, Hunt used the emotional issue of the Colorado River controversy so often as a method of rallying the voters to his cause that critics claimed, "although Jesus walked on water, Hunt *ran* on the Colorado."

In 1928 Congress passed the Boulder Dam Reclamation Act over the protests of Arizonans. The act called for the building of Hoover Dam on the Colorado River. What rankled Arizonans was that the plan also called for the building of the All-American Canal to deliver water into California's Imperial and Coachella valleys, but made no provision to deliver water into Arizona. Arizona appealed the case to the U.S. Supreme Court and lost. President Herbert Hoover put the plan in motion in 1930.

Hoover Dam was located in 800-foot-deep Black Canyon, between Arizona and Nevada, prompting critics to claim that although California profited from the project, "she didn't give a dam site for it."

Chief engineer on the job was Frank Crowe, whose goal in life was to build the largest dam in the world. In 1931 he put 3,000 men on the job. The temperature in that canyon exceeded 120 degrees and the rocks were hot enough to fry eggs. Daring workers hung by cables hundreds of feet above the canyon floor drilling holes with jackhammers and clearing debris before concrete could be poured.

For the next two years, workers dumped 16-ton buckets filled with concrete into forms every 60 seconds. Crowe, nicknamed "Hurry Up" by his hired hands, designed a complex lighting system so they could work around the clock. At its peak, 5,000 men were employed. A total of 96 died on the hazardous job. Crowe, living up to his nickname, completed the job in 1935, two years ahead of schedule, and for a time his dam was the largest in the world. Today it ranks 52nd. Lake Mead, which formed behind the dam, is still the largest man-made reservoir in the Western Hemisphere.

The construction of Parker Dam on the Colorado River in the early 1930s gave birth to one of Arizona's most embarrassing episodes in its long rivalry with California. Governor Ben Moeur became infuriated with California's power-play politics. Because Parker Dam was specifically designed to deliver water to California, Governor Moeur sent the Arizona National Guard to the east bank of the river and prohibited the construction workers from "touching the sacred soil of old Arizona." The guardsmen eagerly set up machine gun emplacements aimed at California. The gesture got the attention of the wary workers and Secretary of Interior Harold Ickes called a temporary halt to the project.

One night a party of guardsmen borrowed a couple of relic steamboats from a colorful river pilot named Nellie Bush and, under cover of darkness, headed towards the "enemy" shores of California. Unfortunately, the "Arizona Navy" got tangled in some cables and had to be rescued by the "enemy." The incident made the nation's newspapers and caused a few red faces among some sabre-rattling Arizonans. Shortly thereafter, the U.S. Supreme Court got into the act and ordered Governor Moeur to bring his troops home.

The thirsty farmers along the Gila River thought their water problems were over in 1930 with the completion of Coolidge Dam. But it seems the surveyors had explored the site during an unusually wet year. The dam was built, but a lake failed to materialize behind it. A verdant field of weeds, however, did manage to subsist rather comfortably. At the dedication ceremonies, cowboy humorist Will Rogers looked it over and quipped, "If that was my lake, I'd mow it." Incidentally, San Carlos Lake did not fill to capacity until the late 1970s.

The scarcity of water in the Southwest was cause for occasional violence and much litigation during territorial years. Men protected their precious water and flimsy brush dams with shotguns and rifles. Eastern sections of the United States never had to contend with such an unreliable water supply. American settlers to this region were accustomed to the riparian doctrine of water law, which held that a landowner was entitled to do as he pleased with water running through his property. He could allow others to divert water from his land or he could deny them. Obviously, such practices were

unrealistic in these arid lands. When Gen. Stephen Watts Kearny occupied New Mexico in 1846, he proclaimed a code of water law based on Spanish law. The code allowed for the irrigation of lands not adjacent to the streams and recognized public use of lakes, ponds, streams, and rivers. This principle proclaimed: "first in time, first in right" and protected early settlers from some upstream newcomer diverting their water. It also decreed that the exclusive private use of water was forbidden, and that the water must be used in a beneficial way. This principle evolved into the Doctrine of Prior Appropriation and Beneficial Use and is the basis for Arizona water law today.

When the Territory of Arizona was established one of the first orders of business was the creation of a code of laws. The Howell Code of 1864, named for Justice William T. Howell, used Spanish water laws for a model. During the next few years the code was refined, because many interpretations were vague and it allowed water users to use the law as they saw fit.

During the 1890s the foremost authority on irrigation law was Judge Joseph H. Kibbey, who would later become governor of the territory. In 1892 he ruled that water rights were permanently attached to the land. This meant that the sale of water rights was forbidden except in regard to a specific piece of ground. Up to then, canal companies had considered water rights separate from the land. Kibbey's decision stopped rich farmers from buying up land in order to obtain the water rights. The landmark decision was a major victory for farmers.

In 1903, in another landmark decision, Kibbey ruled that domestic water had dominance over agriculture. During times of water shortage the needs of the public must prevail over farming.

In 1910, another significant decision, the Kent Decree, named for Judge Edward Kent, clarified water rights on every parcel of land in the Salt River Valley. Generally, the decree states that the land where the water was first used has the first right to water flowing in the river or stream. When water was low, only the lands with the earliest water rights could make use of the normal flow. Even if it necessitates drying up of a stream, the water can be consumed as long as it is not wasted. "Arizona streams are public, but the right to use of water is valid only when the rights of prior claimants are not violated.

Latecomers must defer to earlier appropriators," it declared. Even today those who hold the older lands are entitled to the normal flow water ahead of the latecomers.

The grand plan to bring water into central Arizona began back in the 1920s. The Santa Fe Compact allotted the state 2.8 million acre feet. (An acre foot would cover one acre a foot deep.) However, canals such as the 390-mile All-American channeled water, including Arizona's share, to California. During the years following construction of the canal, Californians found many devious ways to obstruct the Central Arizona Project (C.A.P.). It was hinted that the project would create a huge financial and industrial complex that would compete with eastern interests. Also, it was said that large utility companies resented the cheaper hydroelectric power that would be generated. Despite these tactics, severe droughts during the 1940s and the great increase in population after World War II dramatized the need to bring the plan to fruition.

In 1963, the U.S. Supreme Court divided the water allotments among California, Nevada, and Arizona. California lawyers and politicians were defeated in their attempts to have the million-acre-foot flow from the Gila River count as part of Arizona's allotment. At last, the Supreme Court had approved the state's right to the water and the U.S. Senate approved the C.A.P. bill. Construction of the massive project began in 1968 above Parker Dam. Through a series of pumping stations, water was to be lifted and passed through a tunnel in the Buckskin Mountains, then carried through an aqueduct 190 miles to the Phoenix area, then another 143 miles to Tucson. The expected date of arrival at the Old Pueblo is 1991. The stretch to Phoenix was dedicated on November 15, 1986. During an average year, 1.5 million acre feet of water will be channeled into the interior of the state. The C.A.P., estimated to cost $3.6 billion, is the most expensive water project ever built. About three-fourths of the money must be repaid by Arizonans by such means as higher property taxes and increased water fees.

Today, Arizonans are consuming water at about twice the replenishment rate. This is being done by overdrafting or mining the underground water reserves. For example, Tucson citizens are drinking water that fell to the earth 10,000 years ago. How extensive these reserves are is anybody's guess.

Currently Arizona relies on groundwater for 60 percent of its consumption. The state's renewable water supply (rainfall, snow etc.) is 2.8 million acre feet. The C.A.P. should provide another 1.5 million acre feet per year. That totals 4.3 million acre feet. Presently, residents are consuming more than 5 million acre feet annually for a net loss of nearly a million acre feet a year. A family of four uses about one acre foot annually. (Incidentally, the Columbia River in the Pacific Northwest dumps 280 million acre feet of water into the Pacific Ocean annually.)

To offset Arizona's gap, agricultural land is being gradually retired. Some critics would like to see it gone completely. They tend to forget that agriculture developed and paid for the water in the first place. And agriculture employs, directly or indirectly, more than 80,000 people in Arizona. Currently, on a statewide basis, agriculture uses 85 percent of the water supply. Municipalities and industry use 8 percent. Mining uses 4 percent, and the other 3 percent is for so-called "other" uses. Effluent (treated waste water) will be used more in the future for irrigation. As agricultural lands are retired and urban lands are developed, the amount of agricultural water will decrease.

It'll take about 50 years at $57 a year for a typical Phoenix area homeowner to pay for the Central Arizona Project. Along with the increased amount of water, the project carries with it provisions that require strict water conservation measures, encouraging citizens and businesses to use less water rather than more.

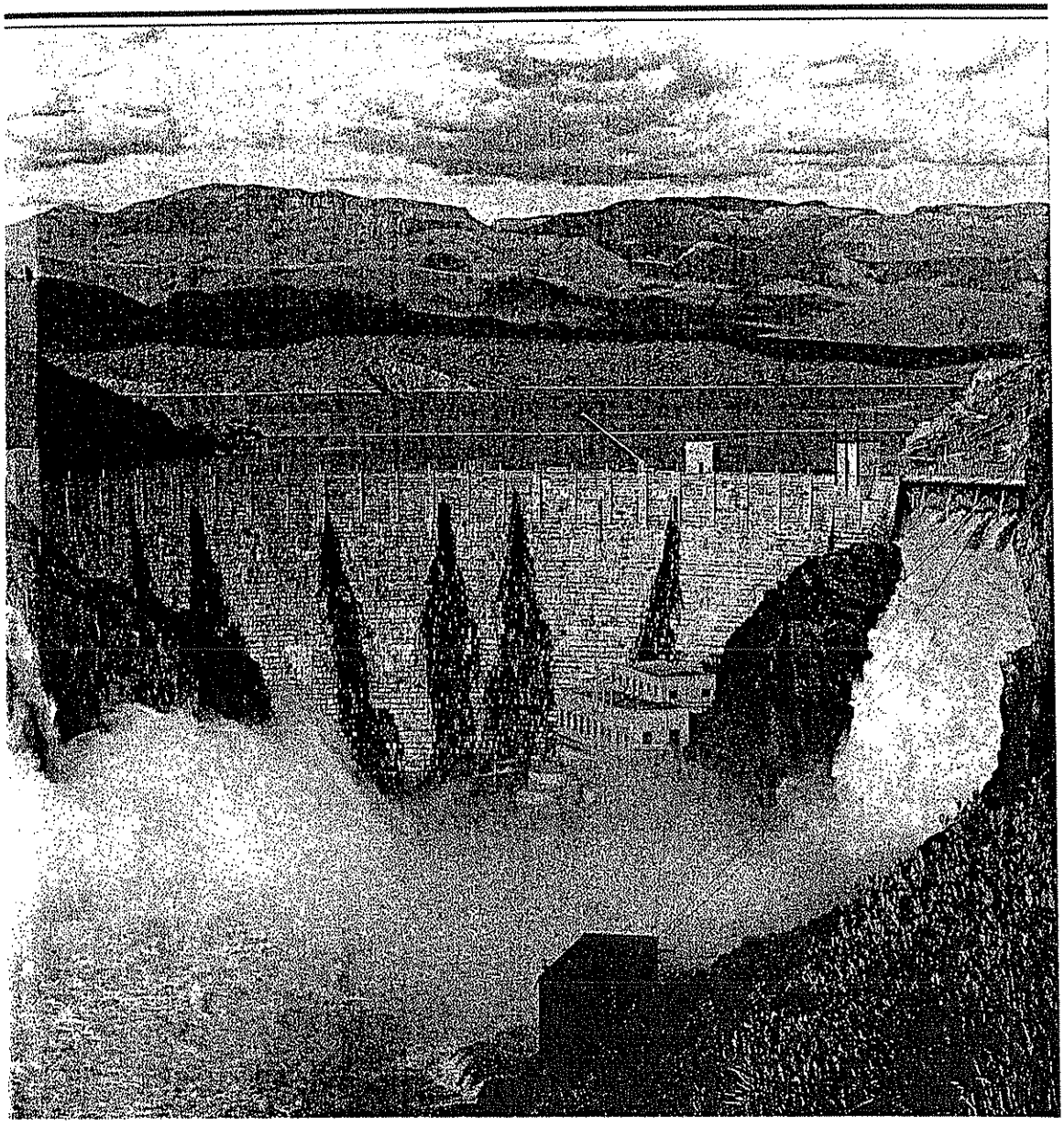
Because of eastern opposition, this could be the last major water project in the West. Regarding the artificial watering of this land, the old argument remains: "No price is too high." Or should we live within the limits of our environment?

It is an article of faith that Arizonans have long regarded water as their most precious commodity. A few years ago President Jimmy Carter was cutting back on funds for water development projects in Arizona. He was confronted by straight-talking Senator Barry Goldwater who said, "Mr. President, there are three things a westerner will fight over: Water, gold, and women — in that order."

THE MAGNIFICENT EXPERIMENT

Building the Salt River Reclamation Project, 1890–1917

KAREN L. SMITH



The Magnificent Experiment

Building the Salt River Reclamation Project 1890-1917

KAREN L. SMITH

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About the Author

KAREN L. SMITH, senior planning analyst in the Department of Strategic Planning of the Salt River Project, earned a Ph.D. in history from the University of California at Santa Barbara in 1982. She has served on the boards of directors for the National Council of Public History and the Coordinating Council for History in Arizona. In the early 1980s, as director of a research consulting firm, she was a consultant on water rights and related issues.

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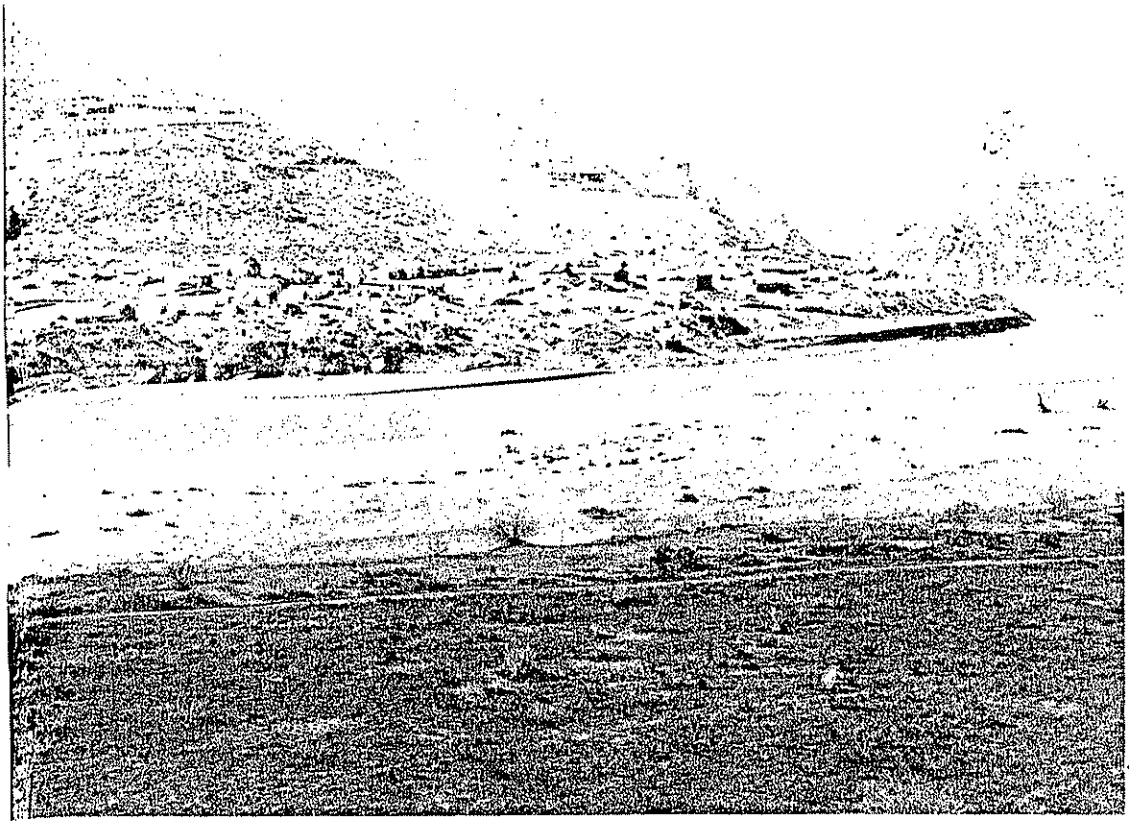
Building the Roosevelt Dam

Just as no precedent existed for the farmers' organizing the Salt River Valley Water Users' Association under the Reclamation Act of 1902, no large-scale irrigation works precedent existed for the engineers of the United States Reclamation Service. Instead, they had to develop original plans for each large system. Frederick Newell placed dam stability and economy at the top of the Service's list of engineering criteria, and the consulting board of engineers planning the Salt River Project under Newell's general supervision attempted to follow his standards carefully.[1]

Plans for the project included several components in addition to the dam. Preliminary construction work consisted of building roads and a base camp for the engineers and workers. A cement mill and sawmill were added to exploit natural resources. A power canal and permanent power-producing facility were designed to take advantage of the abundant possibilities for inexpensive hydroelectricity. The dam itself required a sluicing tunnel, an outlet tunnel, and a coffer dam before the foundation could be excavated. Stone had to be quarried in large pieces before the masonry could be laid.

The water-storage dam, named the Roosevelt Dam in honor of President Theodore Roosevelt, was planned as a simple gravity structure composed of uncoursed rubble masonry. The total height of the dam above the lowest foundation was to be 245 feet; since the damsite favored a curved form, the proposed structure was to be built on a circular curve, convex upstream, with a backside radius of 400 feet. This simple gravity structure, with its curved form, would greatly



The west end of the town of Roosevelt, Arizona, as it was in March 1906, during construction of the dam. Located on the south side of Salt River approximately one-half mile upstream from the damsite, the town had a population of about 500 during the peak of construction. After the dam was completed and the reservoir began to fill, the town was abandoned and eventually inundated.

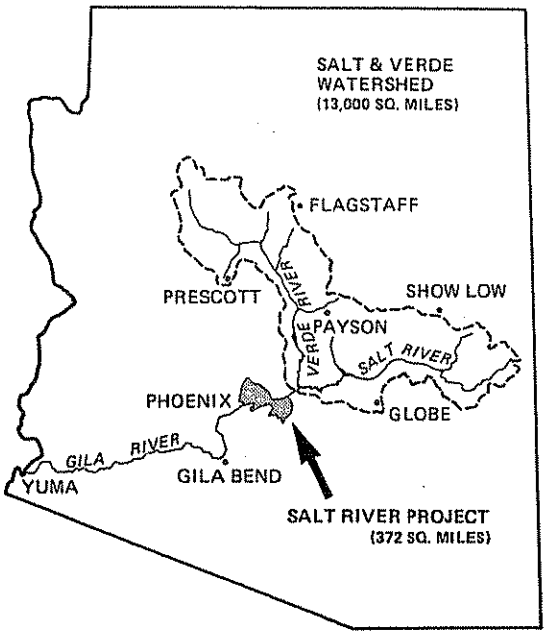
increase the stability of the dam; the masonry dam was the most conservative and permanent design yet devised.[2]

Louis C. Hill, supervising engineer on the Salt River Project, Arthur Powell Davis, chief engineer of the Reclamation Service, and Fred Teichman, design engineer on the Salt River Project consulting board, calculated this engineering design with an eye toward economy. The solid, fine-grained, sandstone cliffs, which the dam would abut, provided the stone necessary for constructing the dam and, thus, eliminated freight and other quarrying charges. Initially, the estimated cost of cement purchased in the open market, shipped by rail to the point nearest the dam, and then hauled to the damsite by wagon was a prohibitive $9 per barrel. Before deciding on a less

expensive dam, the Service investigated the possibility of manufacturing its own cement at the damsite. Good limestone and clay deposits at the site produced a quality Portland cement at an estimated $3.14 per barrel, and despite protests from the "cement trust" about government interference in the marketplace, the Service proceeded to build a cement mill at the damsite. Similarly, freight charges for hauling oil to the town of Roosevelt to produce electricity to power construction machinery were too high (usually more than 30 percent of the cost), so the consulting board of engineers designed a power canal to produce cheap hydroelectricity at the construction site. Plans for a government sawmill to cut construction timber in the Sierra Ancha Mountains (about thirty miles northeast of Roosevelt), for a permanent construction headquarters with modern conveniences to attract long-term labor, and for its own shorter and better freight road to minimize the most expensive hauling were other signs of government concern for economy.[3]

PREPARING FOR DAM CONSTRUCTION

Between 1902 and 1904, the Service completed a series of cadastral maps of the Salt River Valley, which showed not only land contours, but canal and road systems in great detail. Working through the hot summer months in the most rugged and desolate of canyons, the engineers and workers on the project glimpsed the problems that climate and terrain would make for construction: temperatures ranged from 20 degrees to 120 degrees Fahrenheit, and the reservoir site was virtually inaccessible by wagon. Sixty miles separated the reservoir site from the town of Mesa, and it was forty miles from Globe, a mining town southeast of Roosevelt. Both towns had railroad connections, but no freight road existed from the construction site to Mesa (which had the advantage over Globe of two railroad connections), and the road to Globe was treacherous, winding through several mountain ranges. Frederick Newell wrote in his Third Annual Report that few reservoirs had been constructed in locations where the natural conditions were so favorable and the transportation facilities so meager. The Reclamation Service needed to build good connective roads to these transportation centers. In addition, roads were needed to link those natural resources available near the damsite: a lumber road to the Sierra Ancha Mountains and a road to the clay flats that were three miles away from the proposed cement mill. The first construction on Salt River was, thus, rather mundane: road-building and permanent camp construction.[4]



The 372-square-mile area of the Salt River Project (shaded) receives its water from the 13,000-square-mile watershed of the Salt and Verde rivers. Located in the central part of Arizona, the Salt River Project was designed to provide irrigation to its member lands within the greater Phoenix metropolitan area. Map drawn by Cartographics Department, Salt River Project.

The road to the sawmill was quickly carved out in early 1903 and was completed by December of that year. With the sawmill plant in place, upon completion of the road, contracts for cutting and sawing lumber were let in early 1904. The Reclamation Service, unhappy with the performance of the two private contractors at work in the sawmill during the first half of 1904, took over management of the mill itself in July; average monthly output increased from 119,500 to 214,000 board feet. By mid-September 1905 all the timber which could be conveniently reached had been cut, and the excess lumber was hauled in to the damsite in November. The lumber road was, by necessity, the first piece of construction on the project; wood was needed for construction of the permanent camp, culverts and bridges for the roads, tunnel timbering, and building forms for concrete structures.[5]

On the north side of Salt River were the clay hills necessary for the production of cement. The cement mill was located on the south side of the river, and a three-mile-long road was built across the river connecting the two in 1903. Usually the ford across the river was inconsequential, but, when the river was high due to rain or snow on the 13,000-square-mile watershed, getting the clay to the cement mill

was more difficult. After an excellent-quality clay was discovered on the south side of the river, during excavation for the power canal, little use was made of the clay hills across the river or of the road to these deposits, although the lower one and one-half miles of it formed the lower part of the regular freight road to Globe. This road was simple to construct, probably requiring only dredges to even out the land.[6]

The high-line freight road to Globe, located on the upper side of the power canal, ran twenty miles from the cement mill to the old road from Globe to Livingstone. Construction was difficult, since much of the road was cut out of the hill; it required heavy sidehill work and strongly cemented gravel. Initially the road crossed the power canal about a mile from Roosevelt, but rising water and convenience of delivery caused the engineers to reroute the road higher on the side of the hill. The direction of the heaviest loads was toward the damsite, and the greatest adverse grade built into the road in this direction was about 6 percent; grades as great as 10 percent were permitted in the opposite direction. Since the road to Globe was the only freight road in existence when preliminary work began, all machinery (for the cement mill, the temporary power plant, and the sawmill), oil (for early operation of the cement mill), lumber, feed, and supplies came over this forty-mile road by wagon to the reservoir site. The high-line road to Globe, begun in December 1903 and completed in May 1904, allowed for easier delivery of these supplies from the Globe and Northern Railroad terminus.[7]

Mesa had the advantage of two competing railroad lines—the Santa Fe, Prescott and Phoenix, and the Maricopa and Phoenix; freight rates were also competitive. Since freight charges accounted for so much of the final cost of supplies, and since twenty-two miles of the sixty miles from Mesa to Roosevelt were desert and comparatively level, the Reclamation Service wondered whether a new road from Mesa might not be worth the expense. Calculation of the difference in freight rates was $15 a ton in favor of Mesa, and so work began in October 1903, near Goldfield, Arizona, located on that part of the proposed mountain road nearest the valley; in December road construction began at Roosevelt, on the upper end of the road in the canyon below the dam.[8]

To avoid the spillway on the south side of the river, the new freight road was located in the mountain, high above the dam itself. It descended to the river around the walls of a rocky side canyon with nearly vertical cliffs. Following the river for about seven miles, the road was deep inside the canyon; because some parts of it in this section were built along steep cliffs, solid-rock cuts twenty to sixty feet deep were necessary. A classic understatement described this area as

one of the most difficult parts of the road; lifelines were essential to protect the workmen and, even with them, there were fatalities. Another problem-filled part of the road was that at Fish Creek Hill, where the road climbed the hill toward Mesa at a 10 percent grade, primarily along the foot of a vertical cliff several hundred feet high. The sheer cliff in this section required rock fills seventy-five feet high to achieve the recommended width of the road and rock cuts sixty to seventy feet deep.[9]

Only three miles of the road near Goldfield had been completed when work was temporarily discontinued, pending the outcome of a bonding plan by the valley to contribute toward the cost of the road. Because the cities and towns would benefit more from the new freight road than the landowners of the association, many town boosters, who wanted the road built as soon as possible, believed they should help shoulder the cost. Congress passed enabling legislation in early 1904 so that Phoenix, Mesa, and Tempe could bond themselves, at $65,000, $3,500, and $4,000 respectively; Mesa passed the bonds unanimously, Phoenix by 94 percent, and—to no one's surprise—the bonds barely carried in Tempe. Local banks agreed to secure the money and Phoenix and Mesa sold most of their bonds; as a result, the work force on the Mesa-Roosevelt Road increased to four hundred by the middle of June 1904. Tempe had not yet "taken the trouble to sell her bonds," and most believed the project would realize nothing from that subscription.[10]

The Mesa-Roosevelt Road was first used in early 1905, but it was heavily damaged by flooding that spring and fall. It seemed that "flood followed flood, each succeeding one greater than that before it, with hardly enough time intervening to permit repairs to be made before work was again swept away;"[11] these conditions delayed the road's completion until 1909.

Thirty to fifty Apache Indians built the last major road; the 1907 Tonto Road replaced the old Tonto Road, which had been submerged by the rising reservoir. It, too, was expensive and difficult to build, requiring a 3,700-foot-long crossing over Tonto Creek and the removal of rock and other material eighteen to twenty miles, primarily by hand; over 500 feet of 30-inch concrete pipe culverts were laid, and 4,000 cubic yards of dry wall were put in. The Indians were separated from the rest of the large labor force at work on the Salt River Project, and available evidence does not indicate whether they were also accorded the eight-hour-day and pay equal to the others. They were, however, a consistently productive labor group, responsible for many aspects of the construction and greatly depended upon by the Reclamation Service for much of the heavy work.[12]

Of all the roads built by the Reclamation Service on the Salt River

Project, the Mesa-Roosevelt Road was by far the most difficult and expensive. The Service told the Congress in its Third Annual Report that:

> The construction is as expensive as heavy railroad work, the cost of some short portions reaching $25,000 per mile; in others it fell as low as $500 per mile . . . . [However,] the reduction of rates on oil for burning cement, on food, on machinery, supplies, hay, grain, etc., will nearly pay the full cost of the road.[13]

The U. S. Reclamation Service constructed a total of 112 miles of permanent roads at a cost of over half a million dollars, or about $5,000 per mile on the average. Temporary construction roads, such as those to the cement mill and the clay beds, cost another $44,000, charged entirely to the cost of the project.[14]

Since most of the preliminary work on the project consisted of road-building and surveying, there was little need for a permanent headquarters camp at the damsite throughout 1903. The town of Livingstone, a short distance away, provided temporary quarters for Reclamation Service personnel and the labor force until 1904, when construction on the reservoir site itself necessitated a permanent camp. Preparations, which had been made during the previous year, included a small water system, built for the Roosevelt community, and, in anticipation of the summer heat, a refrigerator plant of two-ton capacity to produce ice. Situated on a high bluff overlooking the reservoir were the office building and reading room, cottages for the engineers, tents for the workers, and a corral.[15]

Because the camp was located so far from any other settled community, the Reclamation Service built a small hospital and hired a Phoenix doctor as camp physician. Sanitation was provided by a septic-tank sewage system, and electric and telephone lines were strung throughout the burgeoning village. A small vegetable garden provided fresh food for the laborers and engineers on the project, and bathhouses were built for their comfort. Completing the picture of civilization at Roosevelt was the jail, used mostly to confine those who had violated the strict anti-liquor rules imposed by the Reclamation Service.[16]

Supervising the work on the Roosevelt Dam was Louis C. Hill, a former railroad engineer and professor of hydraulic and electrical engineering at the Colorado School of Mines. Hill was thirty-eight years old when he took charge of the Salt River Project in 1903, and, although he had been a divisional manager of the Great Northern Railroad, he had never before directed an irrigation project. Perhaps

because few engineers had extensive irrigation experience on large-scale projects, Frederick Newell assigned the design for the Roosevelt Dam and the Salt River Project to Hill, Davis, and Teichman, retaining final approval, however, as director of the Reclamation Service. Hill's education in civil and electrical engineering at the University of Michigan made him a good choice for engineer-in-chief. He assembled a team of engineers to direct, under his supervision, the various construction aspects of the project. J. D. Stannard was administrator of the Phoenix office, Howard S. Reed of the canal system, W. A. Farish of the roads, and A. M. Demrich of the electric plant. When Hill was appointed supervising engineer of all Reclamation Service work in Arizona, southern California, New Mexico, Texas, and Utah in late 1904, Chester W. Smith was chosen as the new engineer-in-charge for project construction. Smith was the engineer responsible for implementation of the project design, and for improvisation when things did not work out as they should.[17]

Chester Smith arrived at Roosevelt late in the afternoon of December 22, 1904, and over the few days remaining in the year learned generally the direction of the work and plans. The pace of work on the project increased under Smith, as he took little time from his duties for anything else; unlike Hill, who lived in Phoenix with his wife and children, Smith was alone at Roosevelt. He was an engineer totally involved in his work, who believed in conservation and viewed engineers as key elements in it. Publishing extensively in technical journals, Smith enjoyed solving engineering problems and sharing solutions with his fraternity of fellow engineers. His workday began at sunrise and lasted well into the evening, and this routine stopped only when illness forced him to his bed. While some men might have hesitated to take the challenge of supervising construction of the Salt River Project, given the difficulties of location, economy, and the completion goals, Smith never seemed to waver. He was completely devoted to making the Salt River Project a success, and he expected the same from every other worker there; he seemed to have little regard for those less committed.[18]

During January 1905 Smith reviewed the proposed power-canal lines and the sawmill site and road; he also showed various representatives of national construction companies the reservoir site. Through February and March, he started construction of the temporary bridges and auxiliary cables necessary for hauling material across Salt River (the rock quarry was located on the north side of the river, and almost everything else was on the south side), had two Italian stonemasons at work on stone samples to determine the specific gravity of

the rock, and designed and worked out the lumber fill for the temporary dams necessary to divert the normal flow of the river from the various construction sites.[19]

Bids for construction of the dam opened on February 23, 1905. Twenty firms from all sections of the country submitted detailed estimates. Included within these estimates were prices for three classes of excavation, for construction of the masonry dam, coping, wing walls, bridges, bridge piers, and overhaul, and for the time necessary for completing the work. John M. O'Rourke's firm from Denver, Colorado, builders of the Galveston seawall, submitted the winning bid of $1,147,600 for construction of the Roosevelt Dam in two years. Smith, however, preferred the bid of a St. Louis Company, Broderick and Ward ($1,187,200 for a completed dam in seventeen months), and he listed them first in his notes and O'Rourke second; whether economy was the only deciding factor is unknown.[20]

O'Rourke needed cement before he could begin foundation work or the necessary construction of the coffer dam, which would divert the river from the foundation site, and Smith prodded the crews that were completing the problem-riddled cement mill. Although excavation for the foundation of the cement mill began in November 1903, delays—due to slow delivery of equipment and to the floods of early 1905—left the cement mill unfinished until the water receded in February 1905. The rain-soaked road from Globe caused one shipment of cement to take eleven days in January 1905, before reaching the damsite; workers were able to deliver only two loads of oil in February. Smith discovered that no oil-storage tanks had been constructed near the mill; this oversight further decreased productivity, and design of a 2,000-barrel tank began late in 1904. Output increased by 50 percent when he built a second tube mill for grinding cement in November 1905. With an adequate amount of oil stored to fuel the temporary steam plant (prior to completion of the power canal), the cement mill began to run with only minor interruptions. Although the government price of $3.14 per barrel of cement was less than all the others, the use of oil for fuel in the mill accounted for more than 50 percent of that cost.[21]

PLANNING FOR HYDROELECTRIC POWER

The high cost of using oil as a fuel source during construction was but one of the reasons that the Reclamation Service designed Salt River as the first multi-purpose reclamation project in the nation. Other arguments supporting the added hydroelectric capacity were

chiefly of local interest. Farmers in the valley who were not located under one of the project canals depended upon the pumping of groundwater to irrigate their crops; the power canal and power plant located at Roosevelt would provide inexpensive hydroelectricity for pumping. Several copper mines, located within the Globe-Superior-Miami triangle, about fifty miles from the damsite, also needed cheap power for rock-digging equipment. Still another potential customer of the hydroelectricity produced at the Roosevelt Dam was the City of Phoenix. George Maxwell wanted to develop "every atom of electric power" for the irrigation of the Salt River Valley; Frederick Newell agreed with him. For these reasons, the original plans for the project included a 19-mile-long power canal, which would produce 4,400 horsepower (3,282 kilowatts) in a temporary unit to be used in constructing the dam and in pumping water for irrigation, and a permanent power plant of 4,400 kilowatt capacity.[22]

The power canal, with its head at the upper end of the reservoir, skirted the reservoir basin along the water level when the basin was full, passed around one end of the dam in a channel cut in the rock wasteway, dropped several feet through a hole in the rock, and then went out and over the precipice to the temporary powerhouse. Contracts for excavation were let in March 1904, but the difficulties of digging out 600,000 cubic yards of rock and dirt and of driving 9,000 feet of tunnel were sufficient for Smith to bet a new suit of clothes that excavation would not be finished within the estimated time. He won; excavation was completed in November, three months late.[23] The work was heavy, but the complications of the canal project centered mostly on the construction of the reinforced concrete pressure pipes that carried a capacity water flow of 250 cubic feet per second underneath Pinto Creek, a tributary of Salt River located upstream from the damsite.[24]

The use of pressure pipes to carry water underneath water was not new; municipal waterworks in Europe and in the eastern United States had included them for several years. What was new about the work at Roosevelt, and considered quite timely by other engineers at work in developing water systems, was the use of reinforced concrete pipe, (which could carry water at high pressure) instead of the wood and cast-iron pipes which dominated water-system technology at that time.[25]

Work on the Pinto pressure pipes for the power canal involved a labor gang of about thirty men continuously laying concrete around steel reinforcement rings. The primary reason for continuously laying the concrete was to avoid irregular transverse joints; if the joints

were not smooth, the pipe would leak, pressure would devolve upon the concrete rather than the steel, and the pipe would crack. A specially designed movable form facilitated continuous work. Problems arose, however, with cement peeling off its steel plates. Soft soap and oil were used as remedies, but even so the government-produced Portland cement was slow to set, requiring more time and labor than originally anticipated. For this reason, labor was the highest cost in construction of the pipes.[26]

Temperature also adversely affected the pipe's construction. On the first of the two Pinto lines there were few interruptions to continuous work, and most of the pipe was built in comparatively cool weather, so transverse joint problems were minimal. But the second Pinto line was built entirely during the hot, summer months with several interruptions to continuous work, and, when it was first filled during cold weather, at least forty perceptible cracks developed in the transverse joints; the result was severe leakage.[27]

Smith seemed to enjoy diagnosing the problem on the Pinto lines. In his words, he believed the pipes cracked because "the concrete shrank in the process of setting; this was resisted by the steel rings, thus producing a condition in which the steel was in compression and the concrete in tension, therefore on filling the pipe, the concrete took the entire load."[28] He worked on this problem after dinners, until one evening, after dining with Hill and some other engineers, he realized the problem and the solution. Repairs were made by cutting the cracks out, inserting oakum caulking, and then putting stiff mortar over the joints; grout was run into the crack from the outside.[29]

The Reclamation Service constructed the 2,600-foot-long Pinto pipes at a cost of nearly $106,000; similar pipes at Cottonwood Creek cost less than half that amount. Smith acknowledged labor as the principal cost of the Pinto pipes, calling the labor employed in Arizona, "inefficient and high-priced."[30] Yet even with the construction problems and the labor costs, the reinforced concrete conduit pipes for the Salt River Project's power canal received accolades from Thomas Wiggins, an engineer on the New York Board of Water Supply: "The engineers of the Reclamation Service deserve great credit for the way the pipe was built and its cheapness under rather adverse conditions . . . it illustrates what can be done by ingenious engineers who are also practical."[31]

Water was diverted into the power canal intake by a boulder and concrete overflow dam, and the entrance to the intake was governed by gates designed to exclude sand and other material from the canal. Although the intake gates kept much of the heavier debris from flowing down the canal, Teichman designed a novel rotating screen, located at the penstock (where the water flowed into the guide buck-

ets of the powerhouse turbine), to keep grass and sticks from lodging in the buckets and breaking the turbine runner. Settling basins above the entrance to the Pinto pipes and in front of the penstock also removed silt from the water in the canal. The power canal was first put into operation April 1, 1906, but it was plagued with breaks in the banks in September, so that water was kept out of the canal and no power was available. These breaks were quickly repaired, however, and the operation of the canal proved quite satisfactory to the Service. Final cost of the power canal, including all excavation, tunnels, pipes, gates, settling basins, and repairs, was approximately $1.5 million. The Reclamation Service had initially estimated its construction costs at $91,000, but even the engineers did not attempt to justify the expensive overruns; the high labor costs and quirks of nature, as well as the untried character of the work itself, contributed to the inflation.[32]

The permanent power plant was, in a sense, an extension of the temporary plant designed by the project's engineering consulting board. Although the temporary unit was needed immediately, the engineers (George Y. Wisner, W. H. Sanders, O. H. Ensign, and Louis C. Hill) decided to install it in a recess cut out of the canyon wall about thirty-five feet above the low-water mark, which would also house the permanent plant. The temporary unit was enlarged in 1907 to include a second penstock which would connect to the dam (the first connected with the power canal), and the installation of additional turbines (there would eventually be three units producing power). Upon construction of the permanent stone powerhouse, Smith discovered that the waterwheel had been badly cut due to cavitation (the hydraulic erosion of steel due to high velocity flows); he immediately ordered a new one, since that was about the only solution to the problem at the time.[33]

High velocity flows posed other problems in construction as well. At the same time that excavation on the power canal began, the government was at work blasting out the approaches to the sluicing tunnel on the south side of the river, which would carry the water around the damsite during construction. The tunnel, driven by a private contractor beginning in May 1904, was 13 feet wide, 11 feet high, and 480 feet long, and passed through a solid mountain wall of quartzite and sandstone before exiting above the dam spillway. Construction was difficult and uncomfortable; a small rise in the river flooded both portals with mud and debris, and several hot springs were struck, forcing temperatures inside the tunnel to 130 degrees Fahrenheit. Apache Indian and Mexican laborers poured concrete on portions of the tunnel floor, from the entrance to the hydraulic gates, and on the sides and top of the section below the gates, as the engineers had

instructed, although the design called for a steel and concrete floor. After completion in September 1906, when water was turned through the tunnel under high pressure, the deep cuts produced required complete reconcreting of the tunnel floor; this was finally finished in 1909.[34]

The hydraulic gates in the sluicing tunnel were unique in that "no other instance [was] known where gates of this size [were] operated under so high a head."[35] A combination of steel and bronze, of the stony type, the six gates moved on rollers and were operated by hydraulic cylinders electrically controlled. Set in two groups of three, the gates were used for both service and emergency purposes. The service gates were designed to regulate the amount of outflow from the reservoir, and the emergency gates were to control water in case of accident or repair to the service gates. Although designed to handle a head of water of one hundred feet, an increase in the head imposed operation limitations on the hydraulic cylinders. When the high flow in September 1906 caused a large amount of damage to the tunnel, it also attacked and damaged the upper battery of gates and carried away a portion of the bronze roller trains. Although repaired with the tunnel, the gates never functioned as they should have.[36]

CONSTRUCTING THE DAM

All of this construction—the roads, permanent headquarters, cement mill, power canal and powerhouse, and sluicing tunnel—was simply a prelude to the main act at Roosevelt—building the dam itself. John O'Rourke's construction company signed a contract with Secretary of Interior Ethan A. Hitchcock in April 1905, agreeing to finish the dam in two years; the company immediately began preliminary work. During the remainder of 1905 O'Rourke's crew established camp on the north side of the river, secured equipment, installed the machine plant, and began stripping the quarries for stone and driving piles for a coffer dam and flume. They were the builders, putting together the pieces designed by the engineers.

The contractor's work was closely monitored by Chester Smith. Although the two men seemed amiable toward each other in the early days of construction, by the end of the first year their relationship was strained; O'Rourke must have wondered what he had involved himself in, and Smith quite candidly believed the government could do all the work better and faster than O'Rourke's group. The central problem between the two was quality of construction. Smith was quite concerned with dam stability, as were the other engineers, and

insisted on performing the work methodically to insure its safety; no step was to be eliminated and no unauthorized shortcuts would be allowed. O'Rourke, on the other hand, saw before him a contract with a two-year deadline; his goal was to push the work as rapidly as possible. In attempting to meet their respective goals, a certain amount of tension developed between the engineer and the builder.

That the strain between Smith and O'Rourke did not automatically transfer to the men working under their authority was due primarily to the very clear delineation of the work to be performed on the dam by the Reclamation Service and by the contractor. O'Rourke and his men were responsible for building the coffer dam, the flume, and the cableways (from the quarry to the damsite and from the damsite to a spot upstream where waste was hauled), for cutting the stone and spalls (small fragments of stone) from the cliffs for the dam, for excavating the foundation, and for laying the masonry. The Service was to provide power, cement, and sand and to build the toolhouse, gatehouse, reinforced bridge on top of the dam, outlet tunnel, and sluice gates. Accountability for the tasks of building was clear.[37]

In addition to working on separate jobs, the men on O'Rourke's crew worked out of a different construction area from those in the Service, although they all ate together in the mess hall and presumably were housed in the same bunkhouses. There is little evidence to suggest that workers were concerned with the differing philosophies of the contractor or the Service.

It was the vagueness of Smith's instructions—to supervise O'Rourke's construction—which left the contractor somewhat unsettled about his own function. Their relationship was not one that each had embraced, but rather one mandated by the Department of Interior. Latent difficulties between the two men were perhaps unfairly accentuated during the 1905 floods. Rain began to fall at noon on November 26, 1905, and between 6:00 P.M. of that day and 11:00 A.M. of the 27th, the river rose thirty feet at the damsite; the discharge increased from 2,000 second-feet to nearly 130,000 second-feet. All the work done on the coffer dam and flume was washed away, as well as some of the necessary machinery for continuing construction.[38]

Minor flooding occurred throughout the remainder of 1905 and into 1906, preventing renewal of construction until March. When the river receded to a point at which O'Rourke's crew could begin anew on the coffer dam, the contractor requested that the flume be dispensed with and the sluicing tunnel alone carry the river. While Smith and Louis Hill agreed to this change in construction plans—probably in an attempt to hurry the work along—Smith was not entirely pleased with the prospect of the tunnel's carrying the entire flow of

the Salt River; the river had already shown its erratic nature, and the tunnel carried a maximum of only 1,300 second-feet. Concern over the sluicing tunnel as the only source of water carriage around the damsite proved well founded, as very minor floods washed over the coffer dam delaying construction several times throughout 1906 and 1907.[39]

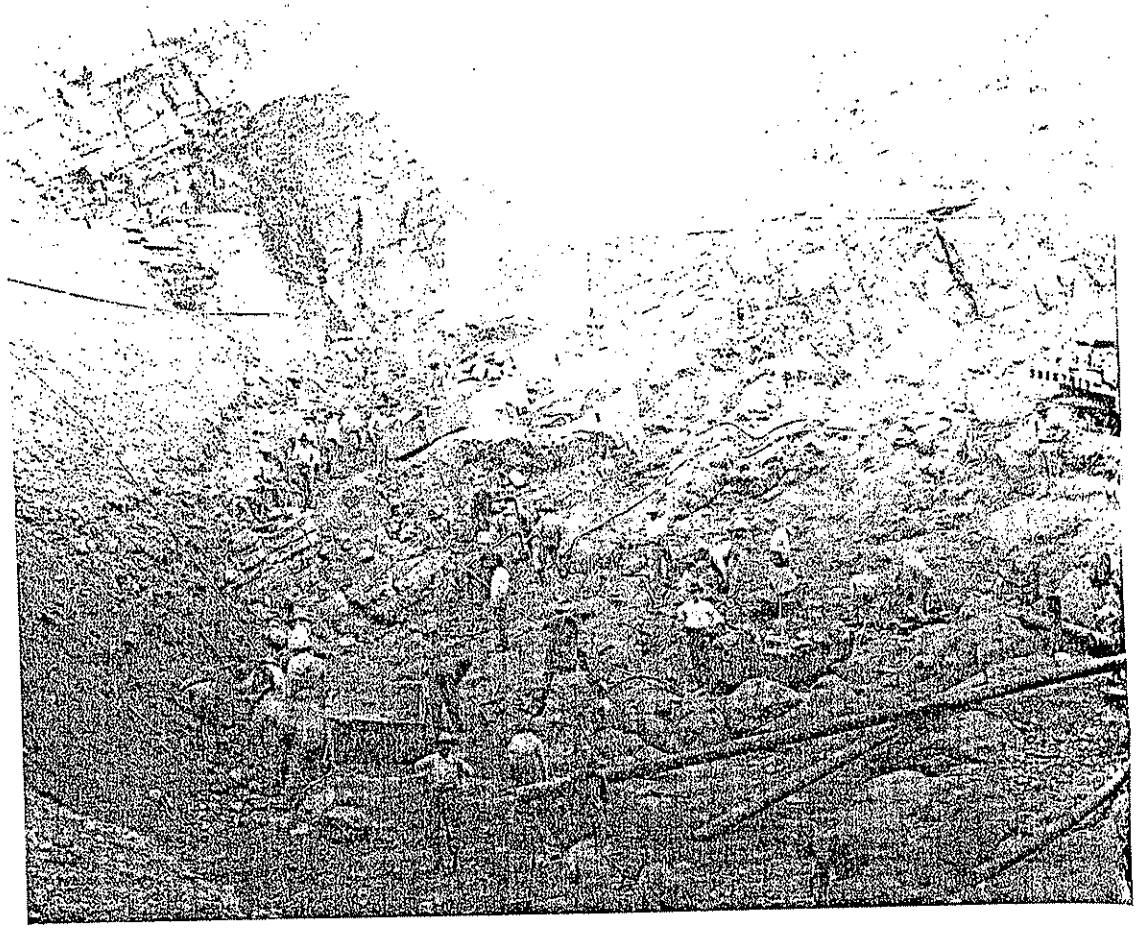
While O'Rourke's initial construction delays resulted mainly from flooding during 1905, he was slow to respond to the flood emergency. His company left machinery on the riverbanks and did not quickly rebuild the coffer dam with flume, nor did it employ an adequate number of workers to pump the water from the foundation site. This lack of preventive activity led Smith to believe the contractor from Denver was inexperienced in large construction, despite O'Rourke's Galveston seawall. Construction problems on the dam throughout 1906 gave further credence to his earlier impression. For example, in February 1906, the man scheduled to do the pile driving was ready to start, but the hammer was not available. In addition, O'Rourke had not hired a sufficient number of skilled quarrymen, probably because he underestimated the inaccessibility of skilled labor in Arizona and because he did not pay very well. Although O'Rourke insisted that recently recruited quarrymen from California would arrive by June 14, 1906, Smith was forced, by the end of September, to ask two stonemasons he knew in Pennsylvania to come to work on the dam and to bring masons and laborers with them; Smith even offered to pay railroad fare for the two men.[40] The coffer dam O'Rourke was rebuilding throughout the spring of 1906 remained incomplete by June, and Smith thought the construction crew was "not making any energetic attempt to back up the gap or to make the dam tight by depositing fine material on the upper side."[41]

The gap in the coffer dam allowed as much as 20 percent of the river to flow through, flooding the excavation pit for the foundation of the permanent dam and preventing the use of the hydraulic excavator. The "entire progress [of the dam] is depending on the closing of the upper [coffer] dam," Smith wrote on June 18, 1906, disturbed by the slowness of O'Rourke and his crew. He outlined a plan for the contractor in which the construction workers would work nights, use fine material and rock to fill the gaps in the upper dam, and then concrete the lower one. Even with these instructions, O'Rourke continued to place scarce labor on work projects that could wait; this practice delayed the cutting of stone and the completion of the coffer dam, and generally set back the date at which laying masonry could begin.[42]

In all fairness to O'Rourke, no contractor had experience in building large irrigation works such as those envisioned at Roosevelt; just as the landowners and engineers experimented with new ideas and forms, so the contractor relied on his ingenuity to solve unanticipated problems. Because the coffer dam did not hold all the water expected, more of the river flowed into the damsite than the hydraulic excavator could handle, so the construction crew built a sump just below the upper coffer dam to cut off the water which would normally fill the pit. Although Smith did not believe that the work of lowering the hydraulic excavators was pursued as energetically as it should be, O'Rourke did manage to begin laying the foundation masonry for the permanent dam on September 20, 1906—more than ten days ahead of the schedule Smith pessimistically thought possible.[43]

By the fall of 1906 the coffer dam held a sufficient amount of the river (there were fortunately few rains) so that work of building the dam progressed nicely. Excavation along the dam line to the solid bedrock was completed with little use of explosives, so that the rock would not be weakened. The foundation was thoroughly cleaned of all gravel, sand, and earth, and all fissured or disintegrated rock was removed; the dam would rest on solid rock throughout. Once the foundation was cleaned, the stone could be laid. The aim of the Reclamation Service was to use the largest proportion of stone and the smallest proportion of mortar and concrete in the dam that could be practically secured. For this goal to be accomplished, the Service provided facilities for handling stone weighing as much as ten tons, and large stones were used almost exclusively. To facilitate the drying of concrete during the hot season without cracking, all masonry was kept wet during the time of construction and until the work was at least six days old by piping water by gravity from the power canal to cover the face of the dam with a thin wet film. The temperature of the masonry was, thus, kept as much as 75 degrees below that which it would otherwise have reached.[44]

Chester Smith, other engineers of the Service, and John O'Rourke's crew also developed a faster and better method of laying masonry. In the classic method used on other masonry dams, a dam's vertical joints were filled with comparatively stiff mortar and then spalls were "laboriously laid up by a mason with a trowel." The new method involved filling the vertical joints with quite wet concrete (largely placed by dumping it), churning and spading when necessary, and throwing spalls in the joints. Not only did the new method increase the amount of masonry which could be laid (from an average



Excavation for the foundation of Roosevelt Dam went down to solid bedrock and was accomplished with little use of explosives, so that the rock would not be weakened. This photo, taken in September 1906, shows excavation at the base of the abutment wall. Excavated materials were removed from the pit by large metal buckets, which were transported by cableways; a bucket hook is visible at upper left. Materials were excavated by manual labor, using pick axes, sledge hammers, and shovels.

of six cubic yards per derrick-hour to an average of sixteen cubic yards), but it also resulted in masonry that was more watertight than that produced by the classic method.[45]

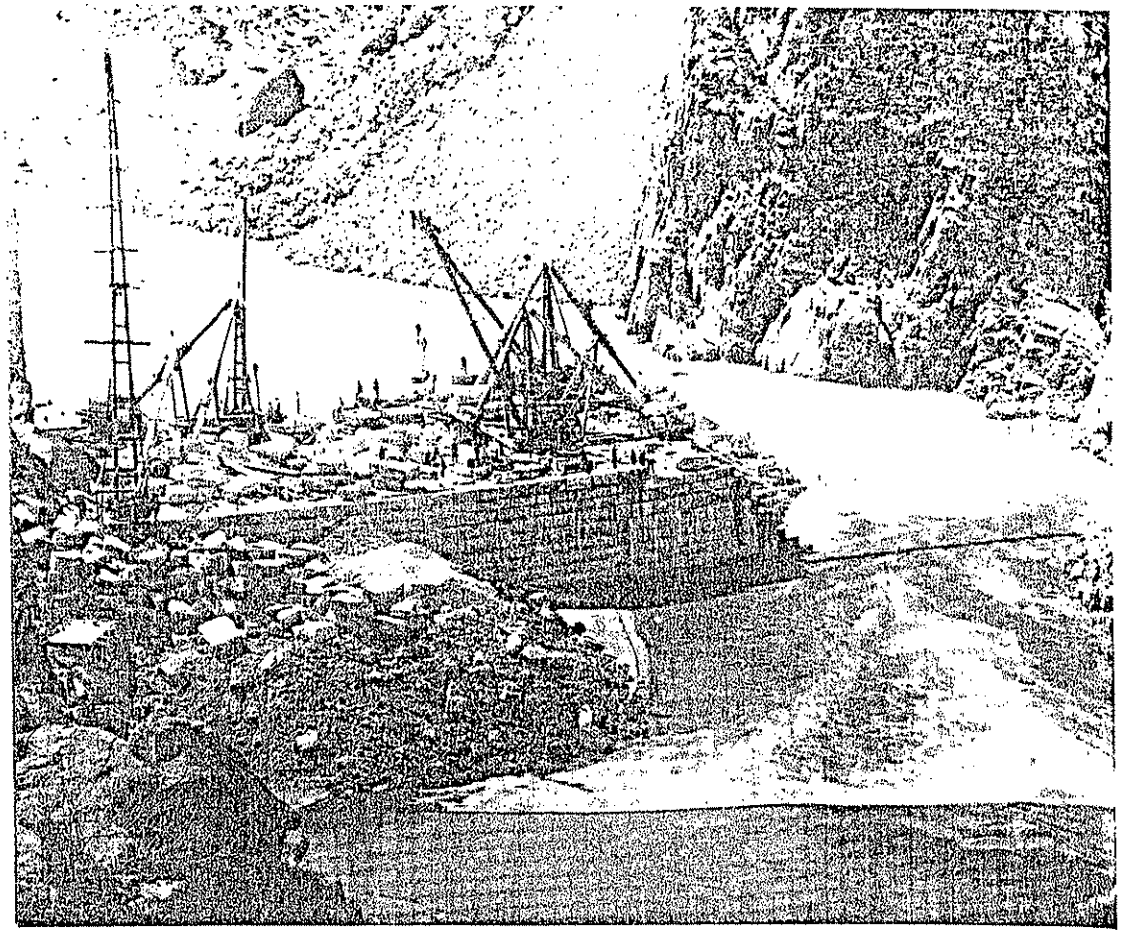
Despite these new, faster methods of laying masonry and O'Rourke's readiness to begin setting the stone for the dam, Smith remained dissatisfied with the work's progress. He considered the contractor's crew to be unorganized and, as he had done for the construction of the coffer dam, Smith outlined a plan for the builder to follow. All the power drills were to be placed in the excavation pit

and work was to begin immediately on the cut-off trench; all the trimming and cleaning of the stone must be performed in the quarry, not at the damsite; no more stone was to be stored in the excavation pit, where it would be in the way of excavation; night work would begin October 1, 1906; the stone would be crushed finer; and more men must be trained to perform the skilled masonry work. Smith's evident displeasure with the contractor's work generated rumors around Roosevelt that the government wanted to finish the job, rather than extend another contract deadline to O'Rourke.[46]

Although Smith denied that the government would finish the dam itself, it is probable that he would have muttered something concerning the wisdom of replacing O'Rourke with a more competent Reclamation Service crew. O'Rourke tried to hurry the work along not by hiring more workers or by paying a wage that would entice skilled labor to remain at the isolated construction site but by trying to evade the eight-hour work day mandated by law. When Smith refused to allow the contractor to ignore this legal provision, O'Rourke, in October 1906, appealed to Louis Hill. The contractor insisted that Hill should declare a state of emergency, a situation that would suspend enforcement of the labor provision. Hill refused; the eight-hour law was to remain in effect.[47]

In November seven skilled workers left the contractor's camp right in the middle of important excavation work because, as Smith noted, "O'Rourke would only pay $3.50 per day instead of $4." On another occasion (November 18, 1906), water was low in the power canal, and the power and lights were shut off from 9:00 P.M. until 12:30 A.M., so O'Rourke's watchman shut down the hydraulic lifts and went home. When water then came in, there was no one there to start the pumps, the bottom of the pit filled with water, and no masonry could be completed for several days until it was pumped out. As Smith remarked, "this need not have been the case."[48]

The problem of diverting the river had not been solved by the coffer dam and sluicing tunnel. High water throughout the winter of 1906 and spring of 1907 continued to flood the excavation of the foundation, so, in 1907, O'Rourke's crew began building a rock-fill dam to supplement the concrete coffer dam in driving the river into the tunnels. By May 6, 1907, more than two years after the signing of the government contract, the rock-fill dam extended completely across the river, and O'Rourke's men were at work making both the rock-fill and concrete coffer dams tighter, so that laying the main body of masonry for the permanent dam could proceed uninterrupted. Even with this bit of progress in taming the river, Smith



When high water came in the spring of 1908, the southern part of the dam (left) was high enough to cause the river to flow over the north end only. About two months after this photograph was taken in April 1908, construction crews began laying masonry at the north end. The wooden, stiff-arm derricks on top of the dam were used to move the quarried stone into position. A temporary walkway stretches across the floodwaters to the north end of the damsite.

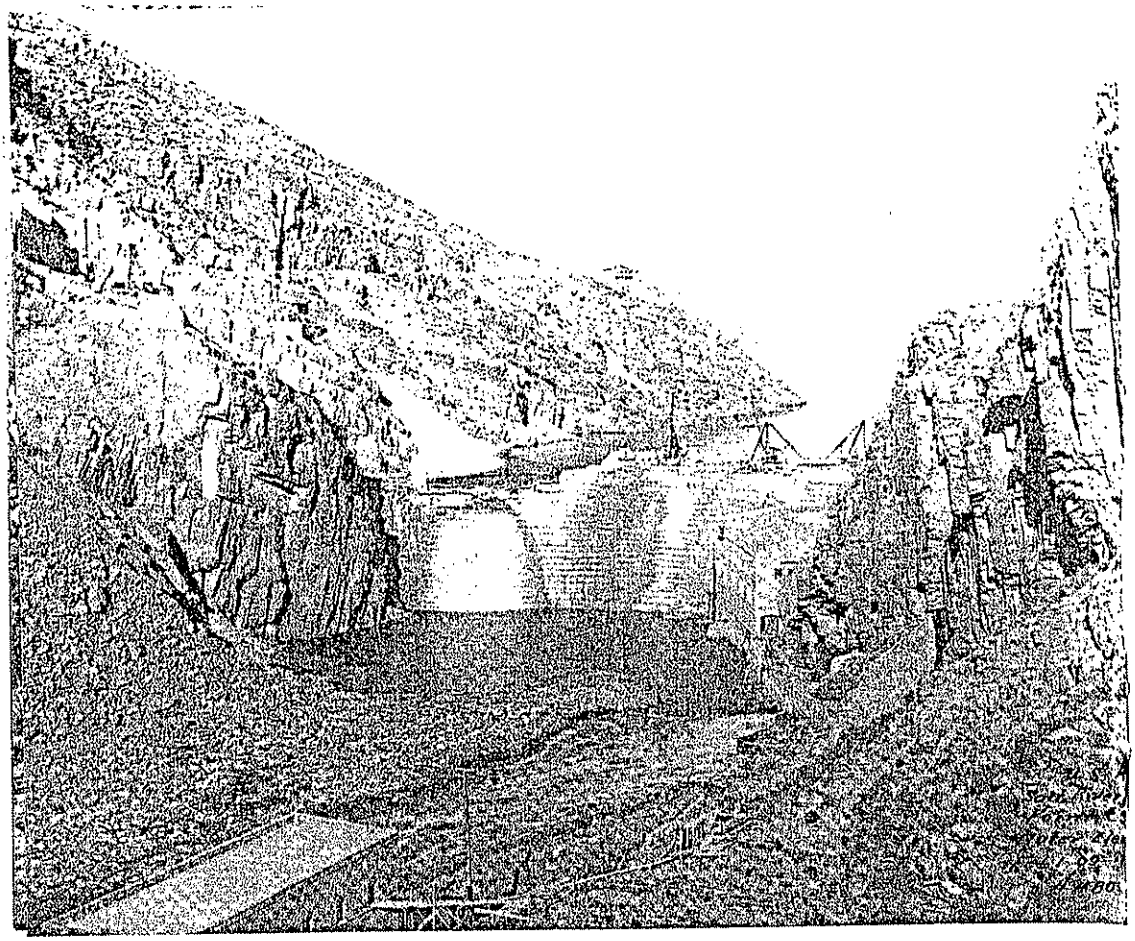
continued to find the contractor and his men inept. On May 8, 1907, Smith went down to the coffer dam and found O'Rourke's crew "fiddling around, doing nothing but [getting] their mixing plant in shape to run."[49] Continual mistakes by O'Rourke's crew in dumping concrete into water that was not still led Smith to report the next day that "the job is not being conducted with energy or brains."[50] Breakdowns in the hydraulic pipes, inadequate provision for steam pumps to power the contractor's centrifugal pumps, and the persistent problem of maintaining an adequate labor force produced postponement after postponement for setting the stone for the main dam.[51]

Although George M. Steinmetz, manager of O'Rourke's crew, promised Smith that setting the stone for the main dam would begin June 1, 1907, water in the pit prevented this. When the contractor wanted to lay new masonry on top of the masonry laid in the fall of 1906, rather than at the low point, as Smith required, O'Rourke angrily declared that he would appeal to Washington. Because he was many months behind schedule in building the dam, O'Rourke was in a hurry to get several layers of stone laid as an indication of his progress. Smith knew, however, that stone laid at the low point of the excavated foundation would prevent movement, particularly in the event of flooding, which had plagued the construction of the dam since 1905. Louis Hill supported Smith, of course, and O'Rourke fussed and fumed throughout the summer at what he considered persecution by the two engineers.[52]

In August 1907 Smith and O'Rourke had a long talk about "things generally." The contractor did not feel that he was getting "a square deal"; Smith tried to explain government regulations concerning waste, dumping, and payment for goods produced. The results of this talk were not entirely satisfactory, and O'Rourke continued to go over Smith's head to Louis Hill for permission to do things differently; Hill continued to side with his engineer in charge of construction. This problem continued until the final stone was laid February 5, 1911.[53]

Once the foundation had been cleared, water pumped out, and the masonry set down, dam construction went quickly. There were no floods throughout the winter of 1907 and early 1908 to impede the construction progress. When high water did come in the spring of 1908, the southern two-thirds of the dam were at a sufficient elevation that the excess water passed over the north end of the dam only, without delays to the contractor. In June, O'Rourke's men began laying masonry at the north end of the dam, and from this month forward, the south end of the dam was kept from eighteen to fifty feet higher than the other. On November 29, 1909, the contractor brought the elevation of the lowest part of the dam to 150 feet, the elevation which was supposed to have been reached by April 1907.[54]

Construction of the Roosevelt Dam and its ancillary structures, completed in February 1911, was marked both by new technological features and by inefficient and inexperienced contractors. While the introduction of reinforced concrete pressure pipes, advanced methods of laying masonry, and innovative hydraulic sluice gates helped to spur the pace of building the dam, as well as to characterize it as a modern piece of construction, the problems between John O'Rourke and the U.S. Reclamation Service hindered its progress. The more



The downstream face of Roosevelt Dam, February 1909. Water elevation behind the dam is 73 feet. The completed power house is located just below the dam (center right), and part of the transformer house is visible at the lower left of the photo. The building on the hill in the background is Apache Lodge; built by contractor John M. O'Rourke, it served as the residence for his engineers, foremen, and inspectors. White water at the lower center of photo is discharge from the sluice tunnel. Cableways, which were used to transport material from one side of the river to the other, are visible at top right.

time and men it took O'Rourke's company to build the dam, the more costly it was to become to the landowners of the Salt River Valley Water Users' Association, both in irrigation water lost and in project dollars to repay; the same was true, of course, for the Reclamation Service's expensive overruns on the power canal.

Yet throughout the period 1904–1908, when construction problems peaked, visitors to Roosevelt did nothing but praise the work and its creators. Benjamin Fowler, Dwight Heard, A. J. Chandler, and

W. J. Murphy were just a few of the prominent members of the Association who ventured up the winding road from the valley to check on the dam's progress. More often than not, Chester Smith would personally lead them through the labyrinth of tunnels, canals, and proposed dams, so that these men felt they were informed about the project they would eventually call their own. From across the nation came important politicians, such as William G. McAdoo (a power in the Democratic party who would become Secretary of the Treasury in 1913) and Secretary of Interior James Garfield, to check on the nation's reclamation program at Salt River. Often led by Frederick Newell, Louis Hill, Joseph Kibbey, or Benjamin Fowler, these men also followed Smith over the Roosevelt project, seeing for themselves the conditions which they had previously known only through Reclamation Service reports.

Few, if any, of the visitors to Roosevelt were aware of problems, other than the 1905 floods, which were pushing back the date of completion of the dam. Newell, Hill, and Smith considered these problems to be engineering concerns which could be solved by the practical, rational men of the Service. They knew that compared to other reclamation projects, the problems at Salt River were minor ones with predictable solutions. If the private contractors on the sawmill could not produce, the government would take over; if the concreted portion of the sluicing tunnel broke away during high flows, it could be replaced; if the hydraulic gates malfunctioned, they could be fixed. O'Rourke's construction company made mistakes which delayed the final date of the dam's completion but did not mar its ultimate success.

Officials of the Reclamation Service considered the Roosevelt Dam a magnificent achievement, and a "monumental triumph of the skill and genius of [its] scientist creators."[55] Residents of the Salt River Valley and the nation joined them in their praise. The magnitude of engineering and construction accomplishments—and this still cannot be lost on the visitor rounding the final turn up Roosevelt Road to see a dam of solid rock looming between the Mazatzal and Sierra Ancha Mountains—dominated other issues.

36. Ibid.
37. B. A. Fowler to Joseph Kibbey, October 23, 1905, Copies of Letters between Salt River Valley Water Users' Association and U.S. Reclamation Service, 1902 – 1909, Corporate Secretary's Office, Salt River Project; Fowler circular to the Association, March 31, 1906.
38. Joseph Kibbey to B. A. Fowler, October 28, 1905, Copies of Letters between Salt River Valley Water Users' Association and U.S. Reclamation Service, 1902 – 1909, Corporate Secretary's Office, Salt River Project.
39. C. J. Hall to the Board of Governors, November 6, 1905; B. A. Fowler to Frank Parker, November 10, 1905, Copies of Letters between Salt River Valley Water Users' Association and U.S. Reclamation Service, 1902 – 1909, Corporate Secretary's Office, Salt River Project.
40. Commission of Engineers to Charles Walcott, December 8, 1905, Copies of Letters between Salt River Valley Water Users' Association and U.S. Reclamation Service, 1902 – 1909, Corporate Secretary's Office, Salt River Project.
41. B. A. Fowler to the Board of Governors, December 16, 1905, Copies of Letters between Salt River Valley Water Users' Association and U.S. Reclamation Service, 1902 – 1909, Corporate Secretary's Office, Salt River Project.
42. Ibid.
43. B. A. Fowler to the Board of Governors, January 6, 1906, and January 20, 1906, Copies of Letters between Salt River Valley Water Users' Association and U.S. Reclamation Service, 1902 – 1909, Corporate Secretary's Office, Salt River Project; Fowler circular to the Association, March 31, 1906.
44. B. A. Fowler to the Board of Governors, February 19, 1906, Copies of Letters between Salt River Valley Water Users' Association and U.S. Reclamation Service, 1902 – 1909, Corporate Secretary's Office, Salt River Project; *Minutes* of the Board, March 20, 1906.
45. Ibid.
46. B. A. Fowler to the Board of Governors, January 9, 1906, March 8, 1906, Copies of Letters between Salt River Valley Water Users' Association and U.S. Reclamation Service, 1902 – 1909, Corporate Secretary's Office, Salt River Project; *Minutes* of the Board, March 20, 1906.
47. Dwight B. Heard to the members of the Salt River Valley Water Users' Association, April 2, 1906, pamphlet in S.R.P. 1906 Newsclip file, Corporate Secretary's Office, Salt River Project.
48. Dwight B. Heard to Charles Walcott, March 28, 1906, Records of the Bureau of Reclamation, Record Group 115, Salt River 1902 – 1919, series 261, National Archives, Washington, D.C.
49. B. A. Fowler to Morris Bien, March 27, 1906, Records of the Bureau of Reclamation, Record Group 115, Salt River 1902 – 1919, series 261, National Archives, Washington D.C.
50. Ibid.
51. "An Earlier Water Users' Election," *Republican*, 3 April 1926, clipping in the Arizona Collection, Arizona State University.
52. F. H. Newell to Dr. E. W. Wilbur, March 29, 1906, Records of the Bureau of Reclamation, Record Group 115, Salt River 1902 – 1919, series 261, National Archives, Washington, D.C.

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1. U.S., Department of Interior, Reclamation Service, *Third Annual Report of the United States Reclamation Service, 1903 – 1904* (Washington, D.C.: Government Printing Office, 1905), p. 44.
2. U.S., Department of Interior, Reclamation Service, *First Annual Report of the United States Reclamation Service, June 17 to December 1, 1902* (Washington, D.C.: Government Printing Office, 1903), pp. 95 – 99. In 1986 the dam stood at 280 feet.

3. Chester Smith, "The Construction of the Roosevelt Dam," *Engineering Record* 62 (December 31, 1910): 756–762; "History of the Salt River Project," author unknown, no date (probably the U.S. Reclamation Service, c. 1911), pp. 65–66, 80–82, unpublished typescript, Salt River Project Archives; Chester Smith, "Progress on the Roosevelt Dam, Salt River Project," *Engineering News* 60 (September 10, 1908): 265–268; *Third Annual Report of the U.S. Reclamation Service*, p. 140. The "History of the Salt River Project" is primarily a technical report which describes the construction plans and specifications.
4. "History of the Salt River Project," pp. 59–74; *Third Annual Report of the U.S. Reclamation Service*, p. 140.
5. "History of the Salt River Project," pp. 65–67.
6. Ibid., p. 68.
7. Ibid., pp. 68–69.
8. Ibid., pp. 69–70.
9. Ibid., pp. 70–71.
10. Ibid., p. 71.
11. Ibid., p. 72; Salt River Valley Water Users' Association, "Data for the Committee of Special Advisers on Reclamation of the Department of Interior," December 24, 1923, pp. 3–4, Central Records Box S-7-21, Salt River Project.
12. "History of the Salt River Project," p. 73. Chester W. Smith, Diary No. 1, December 22, 1904, Salt River Project History Center, illustrates the use of Apache Indians on the Salt River Project. See also Clarence J. Blanchard, "A Great Work of Irrigation in the West," *Travel* 12 (August, 1907): 483.
13. *Third Annual Report of the U.S. Reclamation Service*, p. 141.
14. "History of the Salt River Project," p. 74.
15. Ibid., pp. 60–61. Chester W. Smith continually refers to engineers moving into new cottages throughout his diaries, and occasionally notes the workers in the tents.
16. Ibid.
17. *Who's Who in America, 1897–1942* (Chicago: The Marquis Company, 1943), p. 564; William E. Curtis, "Roosevelt Dam Gigantic Piece of Engineering," clipping April 19, 1911, McClintock Scraps: Arizona–Reclamation–Salt River Valley, Arizona Room, Phoenix Public Library, Phoenix, Arizona.
18. Chester W. Smith left four diaries of his work on the Salt River Project with the project upon its completion, and my general impressions of Smith are formed from these as well as his published pieces.
19. Chester Smith Diary No. 1, January–March, 1905.
20. Ibid.
21. "History of the Salt River Project," pp. 76–82.
22. Oscar C. S. Carter, "The Government Irrigation Project at Roosevelt Dam, Salt River, Arizona," *Journal of the Franklin Institute* 163 (April, 1907): 297–298; George H. Maxwell to Frederick H. Newell, April 23, 1903, and F. H. Newell to George Maxwell, May 1, 1903, Records of the Bureau of Reclamation, Record Group 115, Salt River, 1902–1919, series 305, National Archives, Washington, D.C.; Arthur P. Davis, *Irrigation Works Constructed by the United States Government*, (New York: John Wiley & Sons, Inc., 1917), pp. 17–18. A horsepower unit equals 746 watts.
23. Chester Smith Diary No. 1, June 7, 1905.
24. *Third Annual Report of the U.S. Reclamation Service*, p. 137; F. Teichman, "Rotating Screen of Power Canal, Salt River Project," *Transactions of the A.S.C.E.* 60 (1908): 337–338; "History of the Salt River Project," p. 118.
25. Chester Smith, "Reinforced Concrete Pipe for Carrying Water Under Pressure," *Transactions of the A.S.C.E.* 60 (1908), pp. 142–159.
26. Chester Smith, "Reinforced Concrete Pipe," pp. 124–141; "History of the Salt River Project," pp. 126–127.
27. Smith, "Reinforced Concrete Pipe," pp. 132–133.
28. Ibid., p. 133.

29. Ibid.
30. Ibid., p. 159.
31. Ibid., p. 156.
32. "History of the Salt River Project," pp. 88 – 89, 107 – 112; Chester W. Smith, "Progress on the Roosevelt Dam," pp. 265 – 268; Chester Smith Diary No. 2, March 15, 1906, and Diary No. 3, September 25, 26, and 28, 1906, Corporate Secretary's Office, Salt River Project; Teichman, "Rotating Screen," p. 337; Salt River Valley Water Users' Association to Secretary of Interior Franklin K. Lane, no date, (c. 1916), Central Records Box S-7-20, *Board of Review*, Salt River Project.
33. Davis, *Irrigation Works*, pp. 17 – 18; Chester Smith Diary No. 4, May 16, 20, and 25 – 27, and June 1, 1907, Corporate Secretary's Office, Salt River Project; Interview with A. E. McQueen, Manager of Civil Engineering, Salt River Project, November 17, 1981; "History of the Salt River Project," pp. 132 – 142.
34. "History of the Salt River Project," pp. 85 – 86.
35. Arthur P. Davis, "The Salt River Project," *Engineering Record* 57 (June 20, 1908): 769.
36. Ibid.
37. "History of the Salt River Project," pp. 132 – 165.
38. Ibid., pp. 167 – 168; Smith, "Progress on the Roosevelt Dam," p. 266; Davis, *Irrigation Works*, pp. 9 – 10.
39. Ibid.; Chester Smith Diary No. 2, February 27, 1906.
40. Chester Smith Diary No. 2, February 27 and June 4, 1906, and Diary No. 3, September 22 and November 11, 1906.
41. Chester Smith Diary No. 2, June 14 – 15, 1906.
42. Ibid., June 14 and 18, August 21, 1906.
43. Ibid., July 26 and August 3, 1906; Chester Smith Diary No. 3, September 20, 1906.
44. "The Salt River Project, U.S.R.S.," *Engineering Record* 52 (October 14, 1905): 422 – 423; Smith, "The Construction of Roosevelt Dam," pp. 756 – 762.
45. Smith, "The Construction of Roosevelt Dam," p. 761.
46. Chester Smith Diary No. 3, September 21 and October 10, 1906.
47. Ibid., October 13 and 15, November 11 and 18, 1906.
48. Ibid.
49. Chester Smith Diary No. 4, May 8, 1907, Corporate Secretary's Office, Salt River Project (see also entries for April 21 and 25, May 1, 4, and 6, 1907; interview with A. E. McQueen, November 17, 1981.
50. Chester Smith Diary No. 4, May 9, 1907.
51. Ibid., May 20 and 30 – 31, June 1, 3, and 13, 1907.
52. Ibid., May 12, June 17 and 19 – 20, 1907; interview with A. E. McQueen, November 17, 1981.
53. Chester Smith Diary No. 4, August 9 and 12, 1907; C. R. Weitze, U.S. Reclamation Service, Diary No. 2, February 5, 1911, Salt River Project History Center.
54. "History of the Salt River Project," pp. 168 – 171.
55. Dorothy Lampen, "Economic and Social Aspects of Federal Reclamation," *Johns Hopkins University Studies in Historical and Political Science*, 48 (1930): 54 – 55.

THE BUSINESS OF IRRIGATION

1. Arthur P. Davis, *Irrigation Works Constructed by the United States Government*, (New York: John Wiley & Sons, Inc., 1917), p. 7; *Arizona Republican*, 26 March 1912; U. S. Congress, House, Board of Army Engineers on Reclamation Projects, *Fund for Reclamation of Arid Lands*, House of Representatives Document No. 1262, 61st Congress, 3d session, (Washington, D.C., 1911), p. 27.

ROOSEVELT DAM:

A History to 1911

Earl A. Zarbin

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For information address:

The Central Arizona Museum
1242 North Central
Phoenix, Arizona 85003

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Earl A. Zarbin

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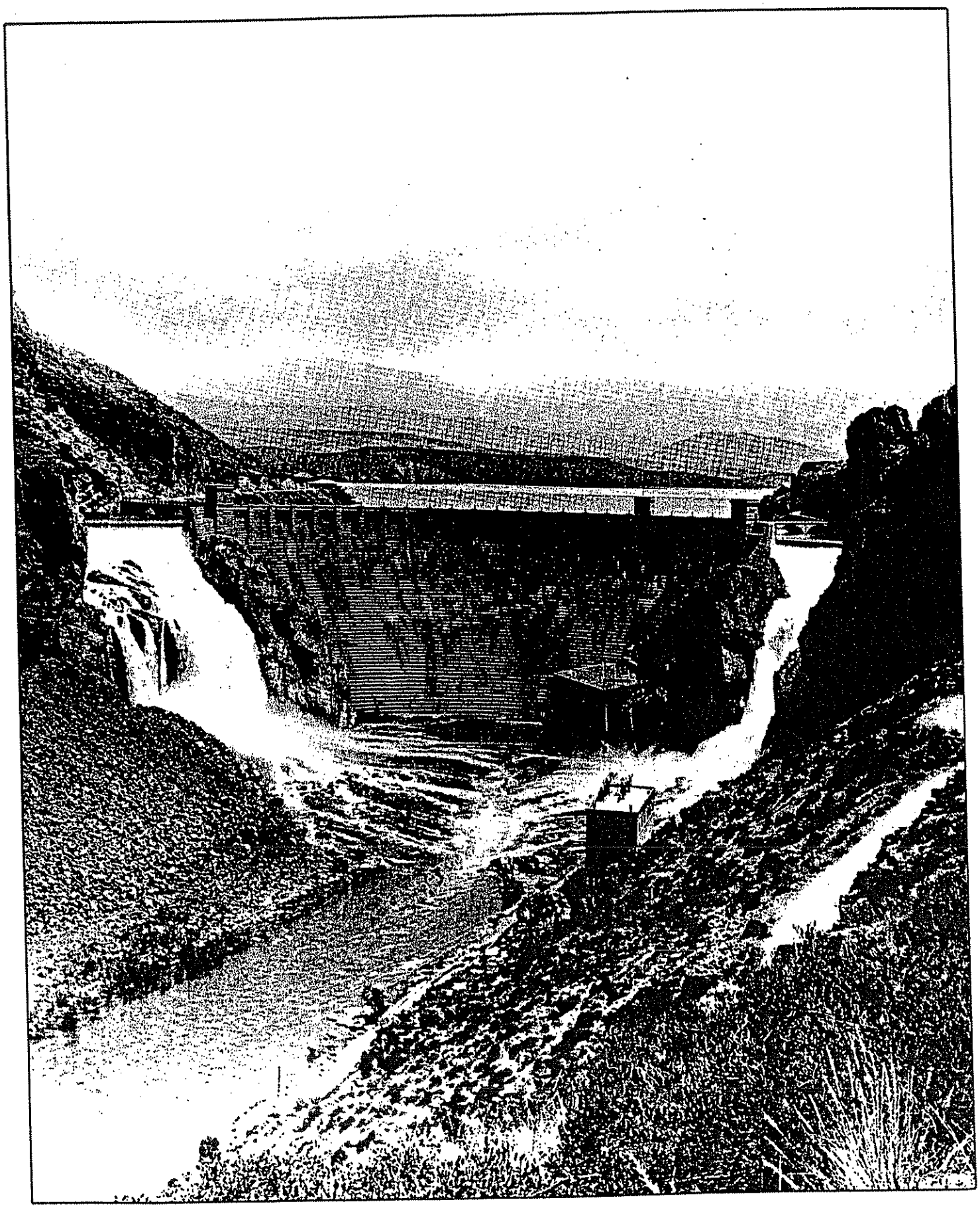

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August 1903 - March 1904

On August 3, 1903, the Board of Governors of the Salt River Valley Water Users' Association got some good but not unexpected news: The U.S. Geological Survey had approved the association's application for construction of a dam and reservoir at the Tonto Basin site on the Salt River. The governors received the news in a letter from Benjamin A. Fowler, association president, who had gone to Denver, Colorado, to meet with Frederick H. Newell, chief of the Reclamation Service, and Arthur Davis, engineer in charge of the preliminary work for the Tonto reservoir. Fowler wrote the application was being forwarded to Secretary of the Interior Ethan A. Hitchcock for his approval. In addition, Fowler said, orders were being issued by the Reclamation Service, which meant moving ahead with the project. [1]

Soon after, there was tangible evidence the Reclamation Service was doing something more than making surveys. Charles P. Mullen, in charge of keeping the engineers in supplies, came to Phoenix and purchased eight mules, two wagons, six scrapers, shovels, a stove, and groceries. [2] The ***Arizona Republican*** reported the supplies were for use in construction of a 23-mile-long road from Livingston to timberland in the Sierra Anchas, a line of mountains to the north and northeast where the Reclamation Service intended to operate a portable sawmill to supply lumber for building the cement mill and other structures at the reservoir site. [3] The sawmill was to have several locations, [4] the first of them near the falls of Wild Rose Creek, about 35 miles from the dam site. [5]

Mullen said the entire route for a road between the dam and Phoenix had not been selected, [6] while the ***Arizona Silver Belt,*** in Globe, reported,

The proposed wagon road to Phoenix is not seriously talked of for the reason that it is impracticable. It would cost probably $150,000, an amount out of all proportion to the benefit that would be derived from it, and the farmers would have to pay for it. Besides, a wagon road from the mouth of Tonto to Phoenix available for freighting is impossible. Globe will handle all the freight. [7]

The ***Silver Belt*** had reported earlier the Gila Valley, Globe and Northern Railway, which served Globe, already had received inquiries concerning the movement of large quantities of cement, fuel oil, and steel. [8]

Mullen also had the job of buying the land of settlers in the Tonto Basin, [9] at up to $30 an acre. [10] Some believed that once it became known the government intended to go ahead with the reservoir, owners of land in the basin to be flooded would ask exorbitant prices for their acreage. Because of this, it was decided in advance to have private parties take options on as much ground as they could get. In this way, some of the property was "secured at nominal prices," [11] but publication of what was happening caused problems, and some owners refused to sell. [12] A few of the owners and the govenment could not agree on price, so the U.S. Department of Justice took them to court. At least one of these cases did not end until 1918 when the governors agreed to pay $5,000 to Marion Braddock for the submerging of his ground; in addition, he retained title to the land. [13] Some of the options were paid for with property tax funds collected for use by the Maricopa County Board of Water Storage Commissioners. [14] In 1916, the value of the submerged land, including the price paid for the dam site, was put at $152,415.79. [15]

On August 19, the ***Arizona Gazette*** printed a story from Denver saying the government had advertised for bids for construction of the cement mill near the site of the proposed reservoir and for erection of a telephone line. [16] The advertisement said the steel and timber cement mill building would be built "on the Salt River, opposite the mouth of Tonto Creek, requiring about eight tons of structural steel and iron." [17] The telephone line was to run from Phoenix to Livingston via Mesa, Goldfield, and Fish Creek. [18]

The advertisement for bids had been made without Secretary Hitchcock's formal approval for construction of the reservoir. Davis was questioned about this by a Phoenix newspaperman, and the engineer explained this was the same way the Reclamation Service had begun work on its first project, the Truckee River diversion dam in Nevada. Davis said:

The official act of the government in its decision to build the Nevada project consisted of the request for bids to construct the dam, made by myself, and the acceptance of the lowest bid by authority of the secretary. Work began on that project at once, and I presume the same will be true in the case of the Tonto Basin project. [19]

Davis said the bids, which would be received until September 21, included machinery for the manufacture of cement and for a temporary power plant to provide electricity for use in the construction work. [20]

Before August ended, Louis C. Hill, a former professor of physics and electrical engineering who had joined the Reclamation Service, arrived in Phoenix, [21] and on August 24, 1903, he took charge of all field operations in connection with the Tonto reservoir. [22] In addition, letters from Fowler warned political pressures were still being brought on Hitchcock to reverse himself on the Tonto dam. [23] Fowler said there were persistent rumors an effort would be made at the National Irrigation Congress at Ogden, Utah, September 15-18, to pass a resolution condemning the Tonto Basin project as a speculative scheme for the benefit of lands in private ownership. He expressed concern over the effect this might have on Hitchcock. [24] This prompted Vernon Clark, Phoenix businessman and irrigator, and several others to announce they would attend the congress to assist Fowler and George H. Maxwell, executive director of the National Irrigation Association. [25]

On September 1, Davis appeared before the Maricopa County Board of Trade to bring the members up-to-date on what was happening. He discussed the cement mill, saying it would be nearly a year before cement could be manufactured. He said all the contracts to be let would be

awarded before Christmas. Davis spent most of the time discussing the desirability and the cost of a wagon road between Mesa and the dam site. He said the road from Globe would be shorter than from Mesa,

but to offset the differences, the advantages are with Mesa, as we would be forced to come here for our forage and labor, which would be a great deal cheaper than at Globe, which is only a mining camp and sparsely settled. Another possible advantage would be railroad rates, which may be a very important factor, but there must be a large difference in the Globe railroad rates and the rates here to make up for the difference in wagon rates. . .

All things considered, we would prefer that the freight came this way. If we could have a road whereby we could make the distance in one day with a buggy and two days with a wagon, it would be a great improvement over the inconveniences we have to endure by going by way of Globe. [26]

Davis said, however, that because the road from Globe was shorter and better, the Reclamation Service had about concluded the road to Mesa would be too expensive to undertake under the irrigation act. For $5,000 or $6,000, he said, the road from Globe could be shortened from 43 miles to about 38 or 39 miles, while the road from Mesa might cost between $150,000 and $200,000. He said it was over this route the power transmission line as well as the telephone line would have to be constructed. Eleven miles of the route through the Salt River Canyon was in very rough country known as Fish Creek Hill, but should the people of the Valley agree to pay for that portion of the road at a cost of about $100,000, Davis said he believed the government "would be justified in building the balance out of the reclamation fund." [27] He also had heard the rumor a trolley line was going to be built from Mesa to the Tonto Basin: if true, he said, "the matter of freight would be settled, for wagons could not compete with electricity." [28] The rumor proved untrue.

Davis said two roads were then under construction, the lumber road, and a three-mile road from the site of the cement works to the clay hills. Davis said about 12,000 tons of clay would be needed. [29] The clay deposits were about one- and one-half miles north of the river while the cement works were to be constructed south of the river.

During excavation for the power canal, clay was found south of the river and closer to the mill building, so the clay road north of the Salt was little used. The one- and one-half miles of the road south of the river formed part of the regular freight road to Globe until water backed up by the reservoir flooded it. [30]

Some work had been done on a road from the dam site toward the head of the power canal, and work was to begin on the telephone road, Davis said. [31] The latter road was to become the freight road between the dam and Mesa.

After hearing Davis, Board of Trade members discussed raising money for the Fish Creek Hill portion of the road. Some suggested bonding the county, while others thought Phoenix, Tempe, and Mesa should supply the funds. [32]

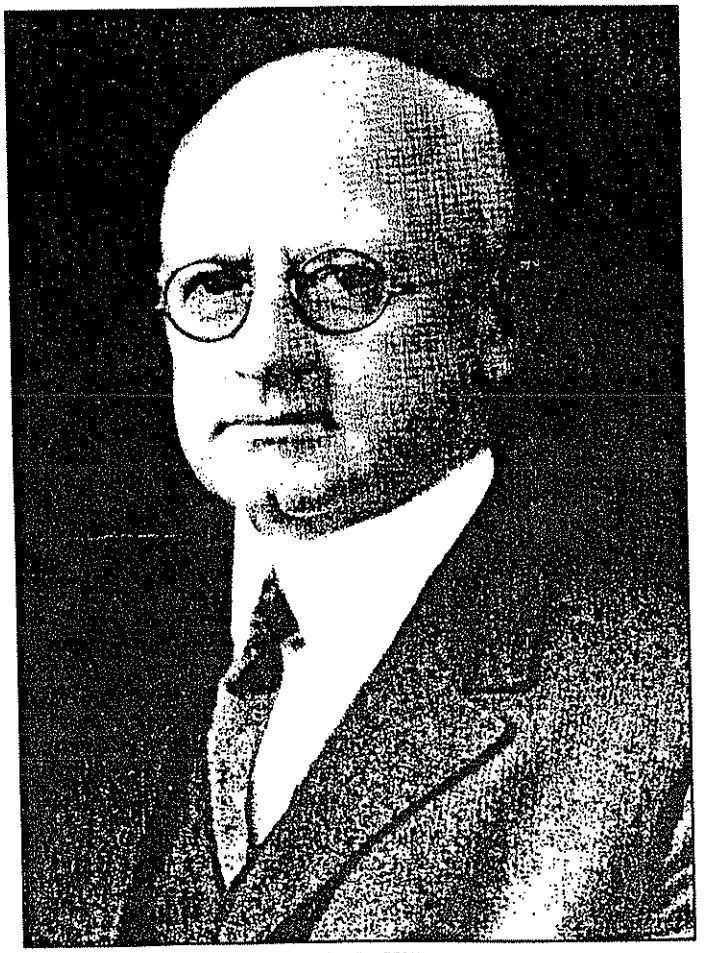
The Board of Trade also named Davis as one of its representatives to the National Irrigation Congress, [33] but Davis later said he would have been there anyway under orders from Newell. Davis said he spent most of his time at the congress discussing engineering problems confronting the Reclamation Service in the various projects. [34]

At the congress, Charles C. Reppy of Florence, Pinal County, Arizona, wanted a resolution adopted demanding Congress enact a law prohibiting the spending of any reclamation fund money where any land was owned by private persons. Maricopa County Supervisor John P. Orme, returning to Phoenix from the Utah meeting, said Davis killed the Reppy proposal by saying there was not a single feasible irrigation project in the nation that did not involve some privately owned land; that the Tonto Basin project was the most feasible in the West, and that the San Carlos dam was not recommended because the depth to bedrock made it impractical and because it would have benefited no one but the Indians, something not contemplated by the reclamation act. [35]

Orme said Reppy "printed and circulated the bare-faced statement that Newell, Davis and Maxwell had been bribed, and he showed a picture of Mr. Maxwell's residence east of town, probably with a view of making it appear that this house was the bribe that was given to Mr. Maxwell. All of his accusations fell flat and were unheeded." [36]

Bids for the Reclamation Service work in the Tonto Basin were opened September 23 in Denver but the bidders and the amounts were not disclosed. [37]

The governors met October 5 and passed a resolution authorizing Fowler to appoint a committee of three,



Louis C. Hill

including himself, to discuss the advisability of building a road from the Valley to the dam site. The resolution invited the Board of Trade and the Phoenix, Tempe, and Mesa councils to appoint similar committees. [38]

In the days that followed, each of the towns and the Board of Trade complied, with Davis telling the Phoenix council the government could construct a trail sufficient for erecting the transmission line for $25,000. If the Valley residents were willing to raise $100,000, he was sure the government would increase its spending by another $50,000 to provide a good freight road. [39]

Davis also made arrangements for office space in the rooms of the Water Users' Association, Nicholson Building, 34 North Center Street, thereby making Phoenix his headquarters. [40]

On October 14, [41] Hitchock issued an order to Charles D. Walcott, director of the U. S. Geological Survey, to make contracts for the preliminary work on the Tonto reservoir. [42] In addition, the Reclamation Service was authorized to exercise the options it had taken on land in the Tonto Basin. Those were due to expire October 20. [43]

In reporting these matters, Charles C. Randolph, Washington correspondent of the ***Republican,*** wrote,

A source of annoyance to the [Interior] department is the attitude of several holders of land in the reservoir site who appear determined to hold up the government for excessive sums for their holdings. It is the policy of the department to avoid litigation and it will be liberal with land owners but it will not submit to extortions of the kind mentioned. . . There is no doubt that contracts would have been let some time ago but for obstacles created by land owners. [44]

Accounts of Hitchcock's actions were published the morning of October 15. Former Phoenix Mayor Walter Talbot and Clark, along with many others, viewed the announcement about the contracts as the culmination of the long struggle to get a reservoir. Talbot and Clark decided the time had come to celebrate. They took up a collection and then got some posters out announcing a meeting at 3 p.m. at the Board of Trade. They arranged for the Pioneer Band to play that night, and they bought all the fireworks they could find in the city. [45]

At the meeting, it was quickly agreed "a jollification meeting" [46] was in order that night, the details to be looked after by a committee of five that included Talbot and Clark. Another committee of three was assigned to send telegrams of appreciation to President Theodore Roosevelt, Hitchcock, Walcott, Newell, Davis, and Maxwell. [47] A vote of thanks was given to Fowler and a request he speak. Fowler thanked the group for its vote. He said that much remained to be done, but he was certain with cooperation, loyal support of each other, and patience, success was assured. [48]

Shortly after 7 p.m., the Pioneer Band marched up and down Washington Street, First Avenue, and Adams Street, with the crowd stopping in front of the Adams Hotel at Center and Adams. All the while, cannon crackers, little torpedoes, and other fireworks were set off so that "the Fourth of July was as nothing in comparison." [49]

The men chosen to speak at the jollification were on the balcony of the Adams Hotel. The four stories of the hotel were a blaze of electric lights. Among the speakers were Governor Alexander O. Brodie, attorney Joseph L. B. Alexander, hotelman John C. Adams, and Fowler. Various of the speakers made mention of Fowler and Maxwell. Credit also was given to Joseph H. Kibbey, legal counsel. [50]

Alexander recalled there was a time when he, as many others, had been in doubt as to whether the reservoir would be built. But those doubts had been allayed after Brodie had returned from Washington and told Alexander the president had expressed a desire the dam be built. Alexander closed by saying the people should support the construction of the Tonto Basin road. [51]

When the speeches were over, the Pioneer Band marched to the newspaper offices and gave serenades, the merrymaking continuing until late. [52]

Davis returned to Phoenix October 18. In an interview, he said preparatory work for construction of the power canal would go on while the cement works were being built. He said some cement would be required for the power canal. [53]

Another visitor was Edward T. Duryea of Colton, California, a government specialist in the manufacture of Portland cement. Duryea explained how the cement would be produced. He said the plant would be as small as any made but still would cost $100,000. Its capacity would be 300 barrels a day. The plant would be within 2,000 feet of the dam site. Just behind the plant location was a hill from which limestone would be taken. The limestone overlaid the mountain, so it would be necessary to quarry. The clay with which the limestone would be mixed was three miles distant. The heat for the kilns through which the mixture would pass would be furnished by burning oil. It would take 11 gallons of oil for each barrel of cement. The oil, purchased in California, would cost one cent a gallon. Delivered to Phoenix, it would cost two cents a gallon, or to Globe, three cents. It would take another five cents to deliver to the cement plant. Adding the cost of labor and electric power, the expense of producing 200,000 barrels was put at $2 a barrel. Duryea estimated that if the cement was bought in the marketplace, by the time it was delivered to the dam site it would cost $8 per barrel. [54]

Duryea also said the conditions for the manufacture of cement were as favorable at the site of the San Carlos dam as they were at the Tonto Basin. [55]

On October 22, the committee to build the road to Tonto Basin, under the chairmanship of Kibbey, issued a report in the form of a proposed federal law that would allow Phoenix, Tempe, and Mesa to sell bonds to raise money for construction of the road. [56] Congressional approval was needed because of an 1886 law known as the Harrison Act. The act limited territories and their political subdivisions from issuing bonds without first receiving permission from Congress.

In late October, about 200 men were working on the various works at the Tonto Basin. One-half of them were Apache Indians from the San Carlos Reservation. They were paid $1.50 per day plus board. The white men received $2 per day, rations, and lodging. [57]

Hitchcock announced on October 31 bids for building the power canal would be received by the Interior Department until December 8. The bids would be,

for the construction of about eighteen miles of canal, pressure pipes and tunnels, together with headworks, spill-ways and gates, for the diversion and conduction of about 200 cubic feet of water per second, from Salt River, about 25 miles north of Globe, Arizona, for power purposes. Proposals must be submitted in three bids, one for tunnels, one for pressure pipes, and one for other structures. [58]

Fowler and Kibbey presented the governors the results of the road committee's work on November 3, 1903. The governors authorized Fowler to go to Washington to work for passage of the proposed law to allow the cities of Phoenix, Tempe, and Mesa to bond themselves for building the Tonto Basin road. The governors also authorized Fowler and Kibbey to negotiate a lease for office space on the second floor of the new post office building, on the southeast corner of Monroe and Center. [59]

The next week, Louis Hill, Henry A. Storrs, a government electrical engineer, and two others arrived in Phoenix from the Tonto Basin over the route of the proposed wagon and telephone road. [60] Hill said excavation for the cement mill foundation was progressing and preparations for making brick necessary for erection of the building almost was finished. [61] Soon after, it was announced the Interior Department was asking bids for a thousand barrels of cement for use in the cement mill foundation, the temporary powerhouse, and other structures. [62]

Davis also had worked up the specifications for bids on driving a 500-foot tunnel through a solid rock formation on the north side of the river, at the dam site. The tunnel was to be used to divert the river around the dam site while the dam foundation was built. It was thought that diversion, plus water diverted into the power canal, would leave the dam site comparatively dry. After the dam was built, irrigation water would flow through the tunnel, which would have two headgates, one at the upper end for use only if there was some need to repair the one which would be farther down. The material for the headgates had not been selected, but both steel and bronze were being considered. [63]

Storrs said the telephone line would be about 75-miles long, but only about 50 miles would have to be constructed because the government contemplated acquiring the poles of the Arizona Water Co. between Phoenix and the Arizona Dam. He said most of the poles would be iron, but about 25 miles would be wood. Delivering the poles to where they would be raised would be difficult because of their weight and the terrain. [64] The contractor for the telephone line, James R. Thorpe of Denver, had gone to San Francisco, California, to purchase poles. [65]

Meantime, the Gila Valley and Globe Telephone Co. arranged to extend its line 24 miles from Globe to Livingston, receiving a contribution of $800 from Globe merchants for construction. The money was to be repaid by free use of the line until the debt was paid and by reduced tolls thereafter. [66]

Globe businessmen, as well as some in the Salt River Valley, talked about opening small stores and other commercial enterprises at the government town site on a high bluff three-quarters of a mile upstream of the dam. [67] The government welcomed all enterprise without limitation, except that the sale of liquor would be prohibited there and at construction camps. [68]

The new town lacked a name. The Globe people discussed it, coming up with the name Olberg after Charles R. Olberg, a Geological Survey engineer involved in much of the preliminary work. [69] Olberg, however, protested the town being named after him, [70] and it wasn't long before the place was called Roosevelt. [71]

Norman H. Livingston, who operated a store at Livingston about 11 miles upstream at the mouth of Pinto Creek, may have been the first shopkeeper at Roosevelt. He also planned to operate a restaurant and a hay and grain business. E. F. Kellner & Co. of Globe planned to open a store within a few weeks. [72]

In late November, a letter from Fowler arrived. He said the bonding bill could not be passed in the "present extra session" of Congress, but it would be introduced early in December and no opposition was expected. [73]

Fowler also found himself in the midst of a controversy involving the cement industry. A couple of the cement manufacturers, one of them George Stone of San Francisco, president of the Pacific Portland Cement Co., visited Hitchcock and told him that the government had no business making cement, and it would be illegal for it to do so. [74]

According to a dispatch from Randolph, the ***Republican's*** correspondent, Stone informed Hitchcock that permitting the Geological Survey to make the cement at the Tonto Basin would be detrimental to the Republican Party. Stone argued the product the government intended to make would be inferior. However, should it be manufactured successfully, this might encourage other persons to enter the business and cheapen the cost, thereby destroying the industry. Stone threatened to try to get a bill through Congress to prevent the government from making cement. He also intimated cement could be delivered to the reservoir site for under $5 per barrel. Randolph said this compared with the $2.50 per barrel it would cost if made at the dam site and the $9.50 per barrel being asked by the "cement trust." [75]

Stone denied there was a cement trust, but acknowledged there was an association of Portland cement manufacturers. He said he could supply the government with cement at $1.75 per barrel f.o.b. Adding the cost of railroad shipping, the cement could be delivered in Phoenix at $3.25 per barrel, or Globe at $3.55, provided he got the contract for the entire estimated 200,000 barrels. Added to the price would be the wagon haul to the dam from Globe, which would mean another $1.90 for a total of $5.45 per barrel. [76]

As soon as Fowler learned about the cement makers' insistence on supplying the cement, he began lining up support from senators and representatives to protect the Water Users' Association's interests. [77]

In Phoenix, Davis said that, even if the cement price came

down to $5.50 per barrel, that would still be more than double what it would cost to produce at the site. [78]

Davis also said that contracts for the cement machinery and buildings already had been received as well as proposals for hauling the materials to the Tonto Basin. Based on these expenses, he said the cement plant would cost less to build than estimated. If a reduction in the cost of transporting the oil could be secured, the price per barrel of cement would be even lower. [79]

"The cost would not be more than $2 per barrel after the mill has been completed," Davis said. [80] He suggested the government invite bids from manufacturers to produce cement at the dam site, which would eliminate the cost of freight. It also would force the successful bidder to do the work as decided by the Reclamation Service, but this was a matter for Hitchcock to decide, Davis said. [81]

The cement makers met with Interior Department officials November 25. After the meeting, department officials announced they would ask for bids on 200,000 barrels of cement, letting it also be known the government had given up, at least temporarily, the idea of making its own cement. The bids were expected to take one of two forms: the government to furnish at the site a 250-barrel per day mill and power to operate it, or the cement to be manufactured elsewhere, shipped to Globe or Phoenix by rail, and hauled to the Tonto Basin. The manufacturers and Interior Department agreed to ask the railroads for reduced rates; if the railroads agreed, the lowest bids would be sought from the makers and the government's plant abandoned. [82]

Davis said that, if the cement mill at the Tonto site was given up, it was certain the dam and reservoir "can never be built for the original estimate." [83]

The ***Republican*** suggested a cement company be organized in the Valley should there be a call for bids. [84] The ***Gazette*** proposed the ranchers of the Water Users' Association take control of the cement plant, [85] while the ***Enterprise*** said protests to the Interior Department's decision should be sent through Fowler. [86]

On December 2, work was shut down on the Tonto road above Goldfield about 22 miles northeast of Mesa. [87] Although newspapers described the halt in work as temporary, [88] apparently to allow for a more complete survey of the road, [89] "rumors respecting it had grown from a mole hill into a mountain." [90] One rumor was work had been suspended at the Tonto Basin, and another was Davis had been replaced. [91] Davis had left for the reservoir site soon after the road work had stopped. [92] When he returned December 23, Davis said the rumors were wrong. Everything was proceeding nicely, and there was nothing to worry about, he said. [93] This included demonstrating for prospective bidders the character of the work connected with the power canal and preparing the cement mill foundation. Material for the telephone line was being distributed, [94] and the road to the sawmill site was completed. [95] In addition, J. E. Sturgeon of Tempe signed an agreement to farm the land in the Tonto Basin acquired by the government from settlers. [96]

On December 18, the road bonding bill was approved by the U.S. House of Representatives, [97] and on December 19 Newell testified about the cement question at a special joint meeting of the Senate and House Committees on Irrigation. Newell said the government would manufacture cement at the dam site if that was the cheapest way to get it. He said it was doubtful the cement makers could deliver it cheaper. If there was any possibility that could happen, it would be because of the high price of shipping oil from California to the Tonto Basin. But even then, Newell said he did not think the private cement makers could produce it for less. [98]

First supplies to Roosevelt were freighted from Globe. A typical teamster, February 6, 1904.

Davis had been criticized for not calling for bids, but Newell said Davis had obtained figures "from California manufacturers nearest to the dam site, showing the lowest price of cement, delivered at the site, would be $9 per barrel." Newell said if bids had been solicited, it would have spared him criticism too, but he thought Davis was justified in considering the $9 per barrel figure was made in good faith. Newell said Davis had not considered the quotation to be a starting point for future negotiations. He said Davis was a frank person, and he expected the cement makers would be the same. Davis should not be censured because he overlooked the finagling that went on in negotiating prices. [99]

Bids were opened December 23 at the Interior Department for construction of the 500-foot tunnel on the north side of the river. [100] On January 6, 1904, bids were opened for the power canal, [101] and two days later the department received bids for the delivery of 1,000 barrels of cement at Globe, the low bid being $4.80 per barrel. The same news dispatch reporting the cement bid said the government engineers, in calculating the cost of cement delivered at the dam, learned a mining company at Globe was paying $6.80 per barrel. Adding the cost of carrying the cement 40 miles over the mountain trail, they had come up with the $9 per barrel estimate. [102]

Cement at $9 per barrel would have made the building of a masonary dam prohibitive. This had led to the search for materials to determine whether cement could be produced there. Eight rock and clay samples were sent to the cement works at Colton for analysis. Test results showed a good quality material could be made. [103]

The same day the bids for the cement were opened, the Senate passed the bonding bill. It was expected it would reach the president for his signature on January 12. [104] However, Roosevelt did not sign it until January 21. [105] Fowler wrote the delay in signing "was caused by the fact of it being a bill affecting the territory and hence necessitating several references and no little red tape." [106]

Meantime, the consulting and construction engineers involved with building the various Reclamation Service projects were called to Washington to discuss the cement situation. The principle involved in manufacturing cement for the Tonto Basin project was identical to that which would apply to the other projects. The cement manufacturers maintained the government had no,

duty to enter into the manufacture of any class of commodities. If the government can erect cement plants to avoid the cost of railroad transportation, middlemen's profits and manufacturer's profits, it is its duty to erect mills for the manufacture of blankets, clothing, shoes, etc., worn by its soldiers and sailors, to manufacture iron for its building construction, to operate mines for its gold and silver currency, etc. . . in no case should the government enter into any competition with the general public. [107]

The cement industry argued if the dam should be built and collapse because of poor quality cement made by the Reclamation Service, millions of dollars invested by the government and private land holders would be lost. The government would be without any security, which the private makers would provide if given the contract to make the cement, and the only punishment to the government men might be the firing of an incompetent superintendent. The manufacturers said they would be willing to produce cement at the dam site provided the material found there met the qualities of Portland cement of known character, but they wanted the option of supplying it from their own mills. If the cement was produced at the site, the government would own the mill, but it would provide the bidder electrical power free for its operation. In outlining these conditions in a letter to Hitchcock, the Portland cement industry said,

We, however, do not recognize that the government in the construction of a dam, should, without requesting bids from cement manufacturers for the cement to be supplied, proceed to construct and operate a cement works as part of the construction of the dam—such cement works and operations of the same being no part of that which would be called for in bids for the construction of the dam, or materials entering therein. [108]

The letter added it was a source of gratification to the industry to find "that the high price at which it was claimed cement would cost at this time, arose from the excessive cost of transportation, and not from excessive factory price of the material." [109]

A government engineer associated with the Tonto Basin project, probably Davis, had told the ***Enterprise*** it "would not be very comfortable to have outside contractors there." He said the contractors probably would not be satisfied with the mill, nor would they want to work for six months and stop for six months, if that were necessary. [110] Another problem was government laborers were restricted to working eight hours per day, which was two hours less than private companies. This was a 20 percent advantage in favor of the cement makers. [111]

Another time, Davis said he did not want to be handicapped by the presence of a private cement maker, and he expressed confidence that would not happen. [112]

Nonetheless, in accordance with its November commitment, the Interior Department called for bids on January 25. It specified the quantity at between 150,000 and 250,000 barrels. [113] Correspondent Randolph of the ***Republican*** said this amounted "to a practical abandonment of the project for a cement factory at the site," but he said the Geological Survey had received assurances the bid would be about $4 per barrel, delivered at the site. He said the Globe, Gila Valley and Northern Railroad had made material concessions. The bids were to be opened February 29. [114]

While this was going on, progress continued on all phases of the work, including road building—except for the section above Goldfield. Engineer W. A. Farish of the Reclamation Service reported that much of the work was in rock, [115] which was one reason why the ***Silver Belt*** had written if "some of the Phoenix enthusiasts would visit the box canyon and see the character of the work being done to make it possible to construct the transmission line, we think their hearts would fail them on the wagon road proposition. The excavating is nearly all in solid rock and very slow and expensive." [116] Despite this, by mid-January eight miles of the road from the dam site west toward Fish Creek Hill had been constructed. [117] In addition, work on a high line road to shorten the distance to Globe was progressing. [118]

Five miles of telephone poles had been put up from the

Arizona Dam in the direction of the Tonto Basin. [119] The men putting up the telephone line expected to reach Mormon Flat by February 1. [120] In all, about 400 men were employed, including 30 on the telephone line and 75 on the cement plant. Hill, the engineer supervising the work, said the mill foundation was in and the building was going up. Fifteen men were cutting trees and sawing lumber in the mountains, furnishing 5,000 to 6,000 feet of lumber a day. Thirty were at a cadastral survey camp south of Mesa. Ten were surveying. The remainder were building roads and freighting supplies from Globe. [121]

The power canal contracts had been let for the excavation of about 600,000 yards of material, the drilling of 7,000 feet of tunnel in connection with building the power canal and the manufacture of pressure pipe. [122]

The tiny community of Roosevelt had a barber shop, a drugstore, a meat market, a shoe shop, a livery stable, two restaurants, two lodging houses, and three general stores. Two doctors were present. One of them was in private practice, and the other worked for the government. A private party had put up a town hall where dances were held on Saturday night. [123] A 40,000-gallon water reservoir was built above the cement mill site. Plans were made to pipe water in three miles from Cottonwood Canyon through one- and one-half and 2-inch pipes, eliminating the camp's dependence on river water. [124]

In mid-January, Kibbey was summoned to Washington to confer with Reclamation Service officials about legal matters in connection with the water storage project. [125] While the nature of the legal matters was not disclosed, one of them involved writing a contract between the Water Users' Association and the Interior Department, providing for repayment of the money advanced for building the reservoir and associated works. As it turned out, Kibbey also was involved in government negotiations to acquire the rights of the Hudson Reservoir and Canal Co. at the Tonto Basin.

The day before leaving for Washington, Kibbey met with land owners under the Salt River Valley, Maricopa, and Grand canals to discuss formation of canal districts in accordance with article 9 of the Water Users' Association articles of incorporation. The landowners approved the form of a petition to be submitted to the Council calling for the creation of the districts. The owners under each canal then met separately to sign the petition for their canal. The petition was the work of a 21-member committee of landowners from the three canals headed by John R. Norton. [126] The landowners also discussed how their relative rights to water would be determined. If there always was enough water, this would not be a problem. But should there be a miscalculation in the number of acres that could be served or should drought occur, the priority of rights had to be known, and the Reclamation Service insisted this question be settled in the beginning. Just how this would be done was not decided, but the filing of a friendly lawsuit or finding another means were discussed. [127]

Rumors had circulated in the Valley the Hudson Reservoir and Canal Co. was demanding $100,000 for its claims in the Tonto Basin. According to the February 11 *Gazette*, the demand had been put to the Interior Department by former Governor Nathan O. Murphy and Sims Ely, who was secretary of the Hudson company as well as editor of the *Republican*. ". . . owing to the demands for $100,000, the construction work on the Tonto reservoir has been delayed," the *Gazette* said. It said local attorneys and those in Washington denied the Hudson company had any claim to the reservoir site, and, if it did, its claims were not worth a third of the price demanded. The newspaper gave two reasons why there had been no public discussion: first, those with knowledge of the situation did not want "to create any unnecessary agitation in the valley," and, second, there was confidence that Fowler and Kibbey would take care of the people's interest. If claims of the Hudson company were established, the Water Users' Association would pay a just sum, the paper said. [128]

The following day, the *Gazette* reported the Mann family of New York, owners of the Hudson company, claimed their right to the Tonto dam site did not expire until October 1905, "and if they hold out, operations on the government reservoir cannot begin until then, and probably not until after the case has been carried to the court. This might delay the dam for several years." [129]

On February 13, the *Enterprise* reported a compromise price of $40,000 was to be paid to the Hudson Reservoir and Canal Co. The newspaper commented:

> ***This means that the farmers of Salt River Valley will have to pay forty thousand dollars for something which neither by them nor by the government, prior to the institution of the Murphy and Ely claim, was ever taken into consideration. . . If nothing else arises. . . active work will be begun at Tonto in a short time. But for the institution of this claim work might have been under way nearly if not quite three months ago.*** [130]

The next morning, Sunday, February 14, the *Gazette* editorially accused Ely, Murphy and the *Republican* of trying to hold-up their neighbors. The *Gazette* said when the Water Users' Association was formed, the people,

> ***did not for a moment believe that any citizen, resident or property owner, who would be benefited by the construction of the Tonto reservoir, would ever be guilty of attempting a hold-up and virtually rob his friends and neighbors of $100,000, every dollar of which is equal to a drop of blood. . .***
>
> ***Had the graft been attempted in the open and by outsiders, the people would have known how to meet them on the field but to have those who owe their present and future to the people, turn traitor and strike in the dark, is more than the limit. . .*** [131]

The *Republican* chose the same Sunday morning to comment, asserting that accusations against it and charges that the work on the reservoir might be delayed were inspired by the newspaper's desire for an uninstructed delegation to the Republican National Convention of 1904. The *Republican* maintained if it could be shown it "is connected with any object in opposition to the welfare of the people of the valley," its influence in the delegation matter would be weakened. It said, "the newspapers. . . being served by the Washington grapevine service" were urging an instructed delegation to the GOP convention. [132]

The *Republican* said it was uncertain about the claims of the Hudson company. The newspaper said a member of the

Water Users' Association reported he had been informed by the Interior Department the Hudson company's right was valid. The paper said it also had learned the agreement to pay $40,000 had been reached with the consent of Fowler and Kibbey. Regarding the charge the dam had been threatened, the ***Republican*** said:

> ***There has been at no time a cessation of operations at the dam, as the grapevine papers well know. There was last fall a discontinuance of work on the cement mill in consequences of the appeal made to the Interior Department by a representative of the cement manufacturers. Even that work is now resumed in part. All the time a small army of men has been employed in the various operations possible before the actual work of dam building is commenced. . .***
>
> ***The*** **Republican** ***seldom wastes so many words on misrepresentation so utterly silly as this is. We are not sure now that we have not been recklessly extravagant.*** [133]

The ***Republican's*** words fueled the flames of journalistic self-righteousness. For readers not privy to the behind-the-scenes maneuvering, it helped produce only a bit more understanding of what allegedly happened.

The ***Enterprise*** said it was a Democratic newspaper and it was indifferent to what Republicans did. It charged the so-called legality of the Hudson Reservoir and Canal Co. claim had been fixed "not by exhaustive investigation before an unbiased tribunal," but by Murphy's "intimate acquaintance with Secretary Hitchcock" and by Murphy's representations as a lobbyist for the Santa Fe Railroad. The newspaper said the Hudson company people had "performed no work since 1891, except to relocate the site and amend their plans from time to time." It said by the time Kibbey and Fowler became involved, they confronted "a condition, and not a theory," and their fight was "for as small a hold-up as possible." As to the ***Republican,*** the ***Enterprise*** said:

> ***Certain it is that the negotiations have been carried on in the dark, consummated in the dark, and much uneasiness is being caused the*** **Republican** ***by the present expose.*** [134]

The ***Gazette's*** response was to accuse the ***Republican*** of knowing "nothing of honest motives" and of never advocating "any cause except when its managers saw a chance for a rake-off. Honest men consider a denunciation by the ***Republican*** as a high compliment. . . " The ***Gazette*** reached a crescendo in vituperativeness:

> ***The history of the*** **Republican** ***is a continued story of graft, grab, pilfer and steal, and it has become so thoroughly saturated with evil designs that the common ordinary foot pad, outlaw and moral degenerate are angels in comparison.*** [135]

Meanwhile, the owner of the ***Republican,*** George W. Vickers, sent a telegram to Kibbey recounting the statements appearing in the ***Enterprise*** and ***Gazette.*** He asked Kibbey to respond. Kibbey sent a wire, which was published in the ***Republican*** the morning of February 16:

> ***Work was not held up on the Tonto dam site by threats of litigation by the Hudson Reservoir company. There is no conclusive action yet by the Interior Department, but the situation is satisfactory to Mr. Fowler and myself. Governor Murphy had nothing to do with the matter that I know of. Mr. Ely, secretary of the company, was present at the hearing, but not as principal in presenting it. Mr. Ely's connection with the matter has been entirely fair.*** [136]

The hearing to which Kibbey referrred apparently was one conducted by an advisory board of five engineers appointed in January by the Geological Survey. Kibbey and Fowler represented the Water Users' Association at the hearing, while Henry R. Mann, president, and Ely appeared for the Hudson Reservoir and Canal Co. The advisory board decided $40,000 should be paid to the company, an action the ***Gazette*** said was taken February 16. The ***Gazette*** correspondent in Washington reported Kibbey had told him:

> ***If the company had held out in the demand for $100,000, it might have caused delay in the work on the Tonto dam indefinitely, by litigation, especially, as it was contended that the franchise was self-forfeiting by the mere lapse of time, but might require a judicial declaration of forfeiture.*** [137]

Concerning the Kibbey telegram printed in the ***Republican,*** the ***Gazette*** said:

> ***The alleged telegram from Judge Kibbey might have been secured through misrepresentation. . .*** [138]

Ely returned to Phoenix February 19. Upon learning about what he said were "a lot of falsehoods concerning the settlement between the government and the Hudson Reservoir and Canal," Ely wrote an article to set the record straight. He said it was lies that the company either delayed or threatened to delay the Tonto reservoir, that there had been graft, that the negotiations were secret, that political influence was involved, and that Murphy was involved in any manner. [139]

Ely said he several times had stated in public before water committees of Valley citizens the company would ask at least $100,000 and probably $200,000 for its claims. He said the owners could have delayed construction indefinitely and might have recovered as much as $200,000, but, "They did not wish to be obstructionists on the eve of success—although it was a success in which everybody but themselves would share." [140]

That ended the controversy over purchase of the dam site. The last step in the transaction was the filing by the government of a deed to the property with the county recorder on July 25, 1904. [141]

Three members of the Board of Governors, Alexander J. Chandler, Frank Alkire, and Ethelbert W. Wilbur, met with Hill February 19. Hill informed them the wagon road to the reservoir site had been named the Phoenix-Roosevelt road, with the length between Mesa and Roosevelt about 60 miles. He also presented a list of the estimated construction costs of the road between certain points, the most expensive being two miles at Fish Creek Hill at $6,000 per mile. Hill's estimate was $78,100. He also said the grade at no place would exceed six percent. Based on Hill's figures, the three governors decided to recommend a bond issue of $80,000 for the three cities. [142]

At a meeting March 1, the joint road committee met with Hill and Davis. After an extended discussion, it was decided the cities should provide $75,000 for construction of the freight road. The committee adopted a resolution asking the cities to hold bond elections in the following amounts: Phoenix $67,500, Tempe $4,000, and Mesa $3,500. [143]

Even as the committee acted, work on the road continued.

U.S. Reclamation Service engineers, laborers and Roosevelt townspeople, February 2, 1904.

Thorpe said it was a road worth seeing and was being constructed regardless of expense. He said it was 10 miles from Roosevelt to the mouth of Fish Creek, and the road was being blasted out of solid rock by blowing off the ends of the mountains which run down the canyon. Thorpe said the terrain reminded him of European highways, but the primal virginity of the Tonto country had been destroyed by the vigorous road building. [144]

Hill and Duryea came in over the road, reporting travel was not now so serious an undertaking. From their camp, they traveled by wagon to the end of the road, then 27 miles by horseback, then by carriage to Mesa, and then by rail to Phoenix. [145]

The telephone poles had been set to the top of Fish Creek Hill and wire men were not far behind. [146] The telephone from the dam site to Globe was finished and the first message was spoken February 12. [147] A temporary electric plant was operating at Roosevelt, furnishing power for lights. [148]

In late February, some of the government officials moved their operations to the north side of the river opposite Roosevelt. A suspension bridge was to be constructed over the river. A number of men were laid off pending the start of work on the power canal. [149]

On February 27, the Council divided the land signed into the Water Users' Association into 10 districts from which one governor and three council members would be elected April 5. [150]

Davis and Kibbey returned to the Valley, and Davis said the cement bids would be opened February 29, and it was unlikely there would be any bids to manufacture the cement at the dam site. He said if the low bid was near estimates made by government engineers, a contract would be awarded. [151]

Kibbey reported he expected the government had by now signed the contract with the association, and he expected a copy at any time. He said it had to be ratified by members of the association. He also said Davis had informed him that by March 1, the government would have spent or would have under contract $1 million on the Tonto Basin project. [152]

Kibbey said the government would build the cement works regardless of the bids. The cement mill would be built as a precautionary measure. The reason was that the government was not going to award the entire cement contract at once. And on subsequent bids, if too high for the dam's construction, the government could produce the cement itself. Kibbey said he expected the low bid to be less than $2.75 per barrel. This would earn the manufacturer no money, but he said the makers figured they would make money by keeping the government out of the business. [153]

On March 1, Kibbey received a telegram from Fowler saying he had the approved contract, and he would have it with him when he arrived in Phoenix on Saturday, March 5. [154] A community reception was planned to honor Fowler and Kibbey for securing the contract. [155]

News of the cement bids was received March 2 in a telegram to Davis from Newell. There were three bids for delivery of cement at the dam site: $4,89, $5.40 and $5.70. [156] There also was an informal bid to deliver cement at $3 per barrel to Globe. Davis wired Newell to reject all bids. Davis said the government could make the cement at $3 per barrel. He said this was an uncontroverted fact. He said no manufacturer had investigated producing the cement at the dam site. A reporter for the ***Republican*** asked if the government would call for new bids or proceed to make the cement. Davis said he could not answer that question, [157] but the Interior Department the next day announced all cement bids had been rejected. [158] On March 4, the department said

the government would make its own cement. [159]

The reception for Fowler was postponed until Monday, March 7, because he did not arrive in Phoenix until Saturday night. [160] Sunday night, with Davis present, Fowler gave a long interview on his affairs in Washington. He said Kibbey and Davis arrived as the contract negotiations began and their services were indispensable in explaining conditions to clerks in the Interior Department who knew nothing about the Valley and its conditions. Fowler said he did not believe anyone could have taken the place of Kibbey in this work. Fowler said what actually was signed was a memorandum of agreement between the government and the Water Users' Association. Once it was ratified by the association and the shareholders, it would be returned to Washington and serve as the contract. [161]

In the meantime, there would be no delay in the actual work, Fowler said. He added the work would go on because of the government's strong faith in the honest purpose of the people. He said Davis would have stopped the work six months ago were it not for that faith. Davis concurred, saying,"The government felt justified in keeping on, by the great interest of the valley in the enterprise." Davis said a delay of a year would have been of incalculable damage to the farmers, perhaps by as much as $2 million. [162]

Fowler said the work in the Valley was being watched with great interest. He said the government's approval of what had been done was so high the articles of incorporation and other documents prepared for the Water Users' Association had been copied by other associations. Davis said there was something about which Fowler would not speak, and this was the offer of a position in the Reclamation Service to assist in organizing other water users' associations. Davis said the salary offered was almost twice the amount Fowler received from the association, but he turned down the job because his services were needed in the Valley. [163] Fowler was paid $2,000 per year. [164]

The reception for Fowler and Kibbey outside the courthouse began at 2:30 p.m. with music by the Pioneer and Indian School bands. The ***Republican*** said the turnout of people was greater than the one 18 months earlier when George Maxwell pointed the way to get the reservoir, and the previous June when the gathering of enough acres signed into the association was celebrated. [165]

Fowler and Kibbey were compared to returning war heros. County attorney Albert C. Baker said the Rough Riders had not done as much for the country as had Kibbey and Fowler. Davis said they had accomplished more than people realized because they had induced the government to commit itself to a definite plan, when the most that could reasonably have been expected was a tentative and conditional agreement. But in this instance, the government was proceeding on the faith of the people represented by them, Davis said. [166]

Kibbey and Fowler spoke, Kibbey reviewing events leading to the proposed contract, and Fowler stressing the responsibility placed on the people and the confidence expressed in them by the government in the memorandum of agreement.

"This agreement with the government means that we will get the dam, and get the water," Kibbey said. "It will not, after the dam is built, be a question of whether or not to plant crops, or whether or not the season may be dry, for the water will be here, and we will know just what we have to depend upon." [167]

Fowler urged the passage of the road bonding bill and read a letter from Newell recommending the road as a matter of convenience and economy. Fowler also read a letter from Hitchcock, which had accompanied the memorandum. Hitchcock said the proposed agreement,

> ***will secure the most economical distribution of the water upon the lands that can profitably be benefited thereby, will avoid conflicts that might otherwise arise in the distribution of the water, will be most effective in preventing any interference with vested rights that have heretofore been acquired, will equitably distribute the cost of construction, maintenance, and operation of the works, and will assure the government reimbursement of all money expended in and upon the project.*** [168]

Fowler also said the contract for the power canal had been let at a price of about $500,000, and within 90 days 1,000 men would be at work in the Tonto Basin. [169]

At the conclusion of his remarks, the assembly adopted a resolution giving the "warmest kind of thanks and gratitude of the people" to Fowler, Kibbey, Davis, and Maxwell. [170]

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1. ***Arizona Republican*** (Phoenix), August 4, 1903.
2. ***Arizona Gazette*** (Phoenix), August 14, 1903.
3. ***Republican,*** August 15, 22, 1904; ***Salt River Project, Final History to 1916,*** Vol. I. p. 67, 72, unpublished manuscript, Salt River Project Archives (herafter SRPA).
4. ***Final History to 1916.*** Vol. I, P. 67.
5. ***Gazette,*** August 16, 1903.
6. ***Ibid.,*** August 14, 1903.
7. ***Arizona Silver Belt*** (Globe), August 22, 1903, reprinted in the ***Gazette,*** August 25, 1903.
8. ***Silver Belt,*** reprinted in the ***Gazette,*** August 11, 1903.
9. ***Gazette,*** August 19, 1903.
10. ***Ibid.,*** September 2, 1903.
11. ***Ibid,*** September 2, 1903.
12. ***Ibid.***
13. ***Republican,*** January 8, 1918.
14. ***Ibid,*** September 2, 1903; ***Gazette,*** September 2, 1903.
15. ***Final History to 1916,*** Vol. I, p. 120.
16. ***Gazette,*** August 19, 1903.
17. ***Ibid.; Republican,*** August 23, 1903.
18. ***Gazette,*** August 21, 1903.
19. ***Enterprise,*** September 1, 1903.
20. ***Republican,*** September 2, 1903.
21. ***Ibid.,*** August 27, 1903.
22. Arthur P. Davis, ***Second Annual Report of the Reclamation Service, 1902-1903*** (Washington: Government Printing Office, 1904) p. 72.
23. ***Enterprise,*** August 28, 1903.
24. ***Ibid.,*** August 31, 1903.
25. ***Ibid.,*** August 28, 1903.
26. ***Gazette,*** September 2, 1903.
27. ***Ibid.; Republican,*** September 2, 1903.
28. ***Republican,*** September 2, 1903; ***Gazette,*** September 4, 1903.
29. ***Ibid.***

30. *Final History to 1916,* Vol I., p. 73.
31. *Republican,* September 2, 1903.
32. *Gazette,* September 2, 1903.
33. *Republican,* September 2, 1903.
34. *Ibid.,* October 1, 1903.
35. *Enterprise,* September 25, 1903.
36. *Ibid.*
37. *Republican,* September 24, 1903.
38. *Ibid.,* October 6, 1903.
39. *Ibid.*
40. *Ibid.,* October 8, 1903.
41. Davis, ***Second Annual Report of the Reclamation Service,*** p. 72, said Secretary Hitchcock on October 12, 1903, approved the award of contracts for various work associated with the Tonto Basin project.
42. *Ibid.* The contractors and the work they were to do: Wilcox & Rose, Riverside, Calif., erect building for manufacture of cement; Hendrie & Bolthoff, Denver, Colo., electric motors for cement mill; Babcock Electric Manufacturing Co., generators for temporary power plant; Stillwell-Bierce and Smith-Vaile Co., water wheels for temporary power plant; Allis-Chalmers Co., machinery for manufacturing cement: James R. Thorpe, telephone line from Arizona Dam to Livingston; *Republican,* October 15, 1903.
43. *Republican,* October 15, 1903.
44. *Ibid.*
45. *Republican,* October 16, 1903; *Gazette,* October 16, 1903.
46. *Republican,* October 16, 1903.
47. *Ibid.; Gazette,* October 16, 1903.
48. *Republican,* October 16, 1903.
49. *Gazette,* October 16, 1903.
50. *Ibid.; Republican,* October 16, 1903.
51. *Ibid.*
52. *Ibid.*
53. *Republican,* October 19, 1903.
54. *Ibid.,* October 22, 1903.
55. *Ibid.*
56. *Ibid.*
57. *Gazette,* October 20, 1903; *Enterprise,* October 28, 1903.
58. *Republican,* November 6, 1903.
59. *Ibid.,* November 3, 1903.
60. *Ibid.,* November 11, 1903; *Gazette,* November 10, 1903.
61. *Republican,* November 11, 1903.
62. *Ibid.,* November 18, 1903.
63. *Ibid.,* November 14, 1903; *Gazette,* November 19, December 24, 1903; Louis C. Hill, ***Third Annual Report of the Reclamation Service, 1903-1904,*** (Washington: Government Printing Office, 1905) p. 146.
64. *Gazette,* November 10, 1093; ***Final History to 1916,*** Vol. 1, p. 62.
65. *Republican,* November 8, 1903.
66. *Ibid.,* November 30, 1903.
67. *Ibid.,* November 11, 1903; ***Final History to 1916,*** Vol. I., p. 60.
68. *Republican,* November 11, 1903.
69. *Silver Belt,* undated, reprinted *Enterprise,* November 17, 1903.
70. *Enterprise,* November 25, 1903.
71. *Republican,* January 31, 1904; Omar A. Turney, who was with the U. S. Geological Survey in the Tonto Basin and later was an engineer in the Salt River Valley, took credit for giving the name Roosevelt to the town; *Republican,* October 11, 1914; another story about how the name Roosevelt came in to use was told in the *Republican,* April 13, 1908, crediting unnamed censors in Washington who decided the name Tonto, which "in the Apache language means 'fool,'" was inappropriate for the dam. They thereupon decided to name the dam after President Theodore Roosevelt.
72. *Silver Belt,* undated, reprinted *Enterprise,* November 17, 1903.
73. *Republican,* November 22, 1903.
74. *Ibid.*
75. *Ibid.,* The cement manufacturers interpreted the Republican Party platform of 1900, which promised protection of home industries, to include the cement business. Instead of doing that, the administation proposed going into competition with it, they argued. Moreover, the industry had contributed liberally to the campaign of William McKinley and his running mate, Theodore Roosevelt, *Republican,* March 7, 1904.
76. *Republican,* November 24, 1903.
77. *Gazette,* November 22, 1903.
78. *Ibid.,* November 24, 1903.
79. *Republican,* November 24, 1903.
80. *Gazette,* November 24, 1903.
81. *Ibid.*
82. *Ibid.,* November 26, 1903.
83. *Enterprise,* November 26, 1903.
84. *Republican,* November 28, 1903.
85. *Gazette,* November 29, 1903.
86. *Enterprise,* November 26, 1903.
87. *Republican,* December 4, 1903.
88. *Ibid.; Gazette,* December 3, 1903.
89. *Republican,* December 16, 1903.
90. *Ibid.,* December 4, 1903.
91. *Ibid.,* December 15, 24, 1903.
92. *Ibid.,* December 15, 1903.
93. *Ibid.,* December 24, 1903.
94. *Ibid.,* December 23, 1903.
95. *Enterprise,* November 30, 1903.
96. *Republican,* December 16, 17, 1903.
97. *Ibid.,* December 19, 1903.
98. *Ibid.,* December 22, 1903.
99. *Ibid.*
100. *Gazette,* December 24, 1903.
101. *Republican,* January 8, 1904.
102. *Enterprise,* January 8, 1904.
103. ***Final History to 1916,*** Vol. I. p. 80.
104. *Republican,* January 9, 1904.
105. *Gazette,* January 22, 1904.
106. *Republican,* February 2, 1904.
107. *Gazette,* January 2, 1904.
108. *Ibid.*
109. *Ibid.*
110. *Enterprise,* November 26, 1903.
111. *Republican,* December 22, 1903.
112. *Enterprise,* December 18, 1903.
113. *Republican,* January 26, 1904, March 4, 1904.
114. *Ibid.,* January 27, 1904.
115. *Gazette,* January 8, 1904.
116. *Silver Belt,* undated, reprinted *Enterprise,* November 25, 1903.
117. *Gazette,* January 13, 1904.
118. *Ibid.*
119. *Ibid.*
120. *Republican,* January 26, 1904.
121. *Ibid.; Enterprise,* February 1, 1904.
122. *Republican,* February 2, 29, 1904.
123. *Ibid.*
124. *Enterprise,* February 1, 1904; *Republican,* February 13, 1904.
125. *Republican,* January 16, 1904.
126. *Ibid.,* January 17, 1904.
127. *Ibid.*
128. *Gazette,* February 11, 1904.
129. *Ibid.,* February 12, 1904.
130. *Enterprise,* February 13, 1904.
131. *Gazette,* February 14, 1904.
132. *Republican,* February 14, 1904.
133. *Ibid.*
134. *Enterprise,* February 15, 1904.
135. *Gazette,* February 16, 1904.
136. *Republican,* February 16, 1904.
137. *Gazette,* February 17, 1904.
138. *Ibid.*
139. *Republican,* February 20, 1904.

140. *Ibid.*
141. *Ibid.*, July 6, 1904.
142. *Ibid.*, February 20, 1904.
143. *Ibid.*, March 2, 1904.
144. *Ibid.*, February 11, 1904.
145. *Ibid.*, February 19, 1904.
146. *Ibid.*, February 14, 1904.
147. *Ibid.*, February 18, 1904.
148. *Ibid.*, February 14, 1904.
149. *Gazette,* March 1, 1904.
150. *Republican,* February 28, 1904.
151. *Ibid.*, February 29, 1904.
152. *Ibid.*, March 1, 1904.
153. *Ibid.*
154. *Ibid.*, March 2, 1904.
155. *Ibid.*, March 4, 5, 6, 8, 1904.
156. *Republican,* March 3, 1904, gives the low bid at $4.81 per barrel, but *Final History to 1916,* Vol. I, p. 82, puts the price at $4.89 per barrel delivered at Roosevelt. "This was probably based upon cash f.o.b. factory of but little more than $1 per barrel and nearly $3.89 for freight by rail and wagon."
157. *Republican,* March 3, 1904; *Gazette,* March 3, 1904.
158. *Republican,* March 4, 1904.
159. *Ibid.*, March 5, 1904.
160. *Ibid.*, March 6, 1904.
161. *Ibid.*, March 7, 1904.
162. *Ibid.*
163. *Ibid.* According to the *Republican,* June 10, 1903, Fowler was hired by the U. S. Geological Survey in 1902 to do "a cadastral survey" of the Valley, but quit when he was made president of the Water Users' Association. The *Enterprise,* June 9, 1903, said Fowler's salary from the Geological Survey was more than what the association paid him.
164. *The Taming of the Salt* (Salt River Project: Phoenix, 1970), p. 76.
165. *Republican,* March 8, 1904; *Gazette,* March 8, 1904.
166. *Republican,* March 8, 1904.
167. *Gazette,* March 8, 1904.
168. E. A. Hitchcock to C. D. Walcott, February 25, 1904, reprinted in *Republican,* March 8, 1904, and *Gazette,* March 8, 1904.
169. *Gazette,* March 8, 1904.
170. *Ibid.; Republican,* March 8, 1904.

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The evening of March 9, 1904, the Phoenix City Council met and voted to call a bond election April 11 to provide money to help the Reclamation Service build the Roosevelt road between Mesa and the Tonto Basin. Mayor Walter Bennett, in answer to a question about who would own the road when it was finished, said it would be a public thoroughfare under control of and maintained by the federal government. This would continue until the time for the farmers to take control of the reservoir and pay for it. [1]

At a meeting March 15 with the Maricopa County Board of Trade, Benjamin A. Fowler said the government would maintain the road until the Water Users' Association had finished paying for the dam. Fowler, president of the association, said that would be about 15 years from then. He said the question of ultimate ownership had not been decided, nor had the possibility of the sale of a franchise for use of the road by a railroad or electric trolley. Deciding those matters right then was less important than getting the road, he said. [2]

Louis C. Hill, Reclamation Service engineer in charge of the work at the Tonto Basin, said March 21 the government would keep the road in good repair as long as it retained possession of the dam. If building the road cost more than the $75,000 to be put up by Phoenix, Tempe, and Mesa, the government would pay the deficiency, he said. [3]

Opposition to the road seemed minimal. In answer to one argument there was no hurry in completing the road, so there was no real hurry in voting on the bonds, Arthur P. Davis said there was the greatest urgency. Davis, in overall charge of operations on the Tonto Basin project for the government, said that if the bonds were approved, the road would be built in four months but in three months machinery needed at the dam site would be carried over it. In addition, there would be a savings to the farmers in the cost of transportation. [4] It was acknowledged that because the road from Mesa would be longer than from Globe, the wagon haul would cost more, but this was partly offset by the higher railroad rates to Globe. [5] More than that, getting to Globe was inconvenient. [6]

Frederick H. Newell, chief engineer of the Reclamation Service, had written to Fowler concerning the road the previous December. Newell said,

It is essential in order to secure supplies and labor at reasonable cost to have quick communication with the center of population and of business in the Salt River Valley, and avoid the long round-about railroad route and wagon transportation. . .

It is for the advantage of the people of Salt River valley to have this wagon road built as speedily as possible as it will reduce the ultimate cost of the works, which they must pay for and will facilitate every step of the proceedings. . . Trade and commerce between the cities of the valley and the construction and mining camps in the mountains will be vastly increased. [7]

Another plus, Newell said, was it would help reduce the cost of building the power transmission line. [8]

Another point of opposition in Phoenix was the road would provide greater benefits to Mesa and Tempe, which were closer to the Tonto Basin. To this, the ***Arizona Republican*** said in an editorial: "A more narrow, shortsighted view could not be entertained, and, happily, such a view is not held by many." [9]

The Water Users' Association issued a pamphlet, "Facts to Be Considered by the Voters of Phoenix, Tempe and Mesa Concerning the Tonto Road, and Voting Bonds for Aiding in its Construction." [10] The pamphlet, written by Joseph H. Kibbey, [11] the association's counsel, explained the economic advantages to the Valley:

For the next four years the money expended at Tonto for labor and food supplies, both of which can be obtained in the Salt River valley, if not barred by the difficulty and cost of transportation, will exceed $1,500 per day for every business day in the year; $1,000 for labor and $500 for food supply. In other words, if the food supply is obtained from this valley there will be expended here, on that account alone, more than $500 per day; and by locating the employment office here there will be a continual stream of laborers, numbering well up into the thousands, going and coming through the city for several years, each one of whom would leave here more or less cash, and to whom the total wages would exceed $1000 per day. The greater part of wages paid to men engaged in any work is expended where paid or at the city nearest and most convenient to the place of payment. Can we afford to lose this additional capital which would inevitably be put in circulation here. [12]

Another argument was the Valley demand for cement for irrigation ditches, sidewalks, and construction could be supplied at one-half the present market cost by the government plant at the Tonto Basin. The pamphlet said the cement could be hauled very cheaply by teamsters who otherwise would return to the Valley with empty wagons. [13]

Finally, the pamphlet said that, if the people failed to support the bonds, the government would "hereafter deal at arms' length and take nothing of the good faith and promise of co-operation for granted." [14]

On March 21, the governors of the Water Users' Association approved the form of contract between the association and the Interior Department for building the Tonto dam. [15] The document was sent to the Council, which gave its approval, and, on March 28, the governors set May 10 as the date the association shareholders would vote on it. [16]

The governors also adopted a resolution instructing that the names of settlers upon school lands not be included among those eligible to vote. This was done because although the lands had been signed into the association, the settlers did not hold title. [17] The school lands consisted of sections 16 and 36 of each township and were reserved by the national government for use by the Arizona Territory to benefit the public schools. The persons farming those sections obtained leases from the territory with the proceeds from the leases placed in a trust fund to benefit the schools.

There were a number of other persons signed into the association who were ineligible to vote. These included farmers who leased lands but did not hold clear title (the holders of title could vote). Others who could not vote were corporations, estate administrators, executors, trustees,

guardians, minors and residents of town sites, such as Phoenix, unless they owned land subscribed into the reservoir district which was outside the municipal boundaries. [18]

Nonresidents of Arizona could vote if they owned land and they happened to be in the Valley when the election was held. But they could not vote by proxy. Women holding title to land were eligible to vote. [19]

The governors' decision to deny the vote to school land farmers applied to the election of association officers April 5 as well as to the contract election. The decision drew a protest from T. P. Coughlin, who wrote:

Settlers upon (school) land are either entitled to all the rights and privileges of any other member of the association or they are not members of the association at all. If said settlers have no voice in the affairs of the association, every acre of school land is illegally subscribed upon the books of the association and every dollar paid by the aforesaid settlers to the association should be returned. If, upon the other hand, should it be decided by the secretary of the Interior that these settlers have rights in the association then the coming election will be illegal. These settlers were asked to subscribe their land and done so in good faith. They were only asked for their lease upon the land and the 10 cents per acre. Their rights of franchise as American citizens was not questioned. And the mere fact that they lease land from the territory should not in itself be such a heinous crime that they should lose their right of suffrage. [20]

The school lands problem was not resolved until 1915 when the Arizona Legislature passed a law allowing lands in sections 16 and 36 to be sold. In 1917, the governors agreed to include on the association voting list occupants of school lands who had secured purchase contracts from the State of Arizona and had recorded them with the county recorder. [21]

A mass rally to discuss the Roosevelt road bonds was held the evening of March 29 at the Dorris theater. Carl Hayden, a member of the Tempe City Council, said he was against the bonds at first because he did not see how they could help Tempe. He changed his mind, he said, because the road would be built sometime, and there was no other time when it could be built so cheaply. In addition, the road would have the benefit of government engineering skills and government construction, which meant there would be no graft.

"We would not be sure of that if we were building the road ourselves," Hayden said. [22]

Hill answered questions and described the road, saying in two places the up grade would be six percent, and, in one place, Fish Creek Hill, 10 percent, but the latter would not be in the direction of the dam. He said other routes had been examined and found unsuitable. [23]

By the end of March, 140 men were working on the Roosevelt road between Fish Creek Hill and the dam. [24] Construction also continued on the High Line road, [25] which branched off the road from Globe to Livingston about six miles above the latter place. The High Line road ran for 20 miles to the dam site. Originally, it crossed south of the power canal line about a mile above Roosevelt, then continued into the town. This lower road would later be flooded by the reservoir. The High Line road also went to the cement mill and eventually was to link with the Roosevelt road. Like the Roosevelt road, the grade of the High Line road toward the dam did not exceed six percent, while 10 percent was the steepest grade toward Globe. [26]

The telephone line was completed from the Arizona Dam to Fish Creek Hill and from Roosevelt east to the point on the Salt River where the cement diversion dam was to be constructed to divert water into the power canal. [27] The survey for the power canal line was completed, and two contracts were signed for its construction, one for excavation and the other for tunnel work. [28] Davis went to Los Angeles to be present at some tests of steel-reinforced concrete pipe, which would be used to convey the power canal water across canyons and washes. There was a possibility the pipe would be used in the canal penstock, but a decision on the material had not been made. Wood stave and iron were among other materials suggested. [29]

A 300-foot-long suspension bridge, suspended from two wire cables attached to the canyon walls, was in place over the river. [30] One hundred men worked at quarrying and installing slabs of limestone for the foundation at the cement mill, which was half completed. [31] Contracts were signed for the cement mill machinery and for the mill building. [32]

At Roosevelt, about 60 tents provided living quarters for many of the men. The town had a dozen frame buildings. There were now four general merchandise stores, four restaurants, and a post office. Roosevelt was described as "a live, up-to-date little town with electric lights and paved streets." [33]

On April 2, by a vote of 68 to 2, property owners in Mesa approved selling $3,500 in bonds for building the Roosevelt road. [34] Three days later, Fowler was reelected president of the Water Users' Association in the organization's first election for which 986 persons were eligible to vote. [35] Neither Fowler nor Dr. Ethelbert W. Wilbur, vice president, was opposed in the election. [36]

At the same time, an unsigned circular was distributed through Phoenix urging property taxpayers to vote against the wagon road bonds. The circular said Phoenix should do nothing to build up Mesa and Tempe. It argued the cost of hauling oil from Mesa would be 20 cents per hundredweight higher than from Globe, and all freight "will go that way." [37]

The circular went into italics over a statement by Fowler in Washington, D.C., that the road was not "vitally" necessary. [38] The evening of April 9, at the final meeting on behalf of the bonds, Fowler charged the circular misrepresented his views. He acknowledged telling a congressional committee that while the road did not have to be built, it was very important and a proper business move, and the people strongly supported it. He said he was sure the people would demonstrate this at the election. [39]

Other speakers, including Kibbey and hotelman John C. Adams, said building the road was a business proposition, which would increase prosperity. Davis also spoke, repeating some of the business arguments for the road, adding the dam's electric power plant and transmission line would be a constantly growing enterprise whose initial cost would be less with the road. He said the dam would attract tourists and the lake behind it would provide fishing, boating, and other vacation opportunities. He said the road

would be a good one, permanent in nature, and would be built for the money asked. [40]

On April 11, while Phoenix voters were approving the bonds 686 to 38, [41] Davis met with the governors and told them the extended drought in the country was an unlooked for condition and if it continued could affect the number of acres for which association shares could be issued. He said the policy of limiting the number of shares within the number of acres that could be safely irrigated would be adhered to rigidly. The Interior Department now estimated 200,000 acres could be irrigated, 160,000 acres from the natural flow of the river and impounded water, and 35,000 to 40,000 acres from the underground supply. The estimated cost of the project was $3,600,000, or a cost of $18 per acre if 200,000 acres were included in the reservoir district. If the drought continued and the estimated acreage was reduced to 180,000, the cost would be $20 per acre, and if, 150,000, it would be $24 per acre. [42]

Davis said, however, it was doubtful any such reduction would be necessary. "It is only mentioned to show the most extreme conditions possible," he said. [43]

The governors ordered a letter to be sent to shareholders urging them to vote in the election to ratify the contract with the government. The governors said a large vote would "show the government our appreciation of what they are doing for us." Shareholders were warned they could not vote if they had failed to pay the previously levied assessment of 10 cents per acre. [44]

In addition, a pamphlet containing a draft of the proposed contract and a copy of Hitchcock's letter of February 25, 1904, to the director of the U.S. Geological Survey, was distributed to shareholders. [45]

On April 30, property tax payers in Tempe approved their portion of the Roosevelt road bonds 54 to 10, [46] but it also was learned the government would be unable to continue building the road until the bonds were sold and the money became available. Hill and Davis at first had said approval of the bonds would be sufficient to continue building, but they now said they needed the money. Fearing the red tape involved in selling the bonds could take up to two months, delaying construction of the road by that much, the ***Phoenix Enterprise*** said "some method must be devised to raise some money prior to that time." [47]

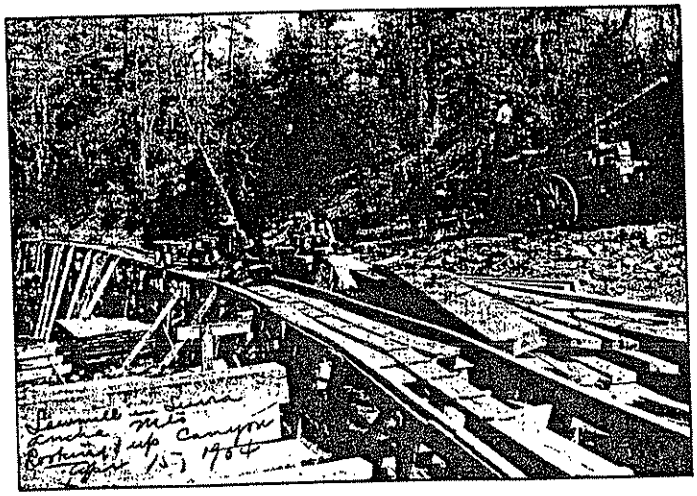
Hill, discussing the work in the Tonto Basin, said it had been decided to construct the dam's sluicing tunnel on the south side instead of the north side of the river, and the work of excavating the tunnel's approaches was in progress. He said there would be 8,700 feet of tunnels along the route of the power canal, and this work was in progress, too. [48]

The telephone line, constructed on high ground so it would not be flooded when the reservoir filled, was completed from the site of the power canal diversion dam about six miles upstream from Livingston, to the Arizona Dam where it connected to Phoenix over the line of the Arizona Water Co. Hill spoke over the line from Livingston to Phoenix April 17. [49]

However, the telephone service was unsatisfactory for two reasons. First, the end of the line in Phoenix was in the office of the Arizona Water Co., [50] and second, the line between the Arizona Dam and the water company office ran along the ground. [51] As a result, the Reclamation Service in late December 1904, began construction of its own line from the Arizona Dam. This line, with poles set 35 to the mile, was 27 miles long and connected with the Reclamation Service office and the Consolidated Telephone, Telegraph and Electric Co. in Phoenix. Wooden poles were used inside the city and iron poles outside. The Arizona Water Co. was allowed to place its own new line on the poles. The government line was completed in February 1905. Later that year, a branch line was run to Mesa off the Phoenix-Arizona Dam connection. [52]

In the last week of April, a measles epidemic broke out in Livingston. [53] At Roosevelt, construction of new buildings continued, [54] while at the cement mill the building began going up. Contractors for the power canal also got underway with the excavation and tunneling. [55] Also, construction was soon to begin on a second and larger temporary steam power plant, which was to be a few hundred feet from the site. [56]

The High Line road to Globe was completed, [57] and W. B. Lewis, operator of the stagecoach line from Globe to Roosevelt, increased service from three times a week to daily. [58]



Two views of government sawmill in the Sierra Ancha Mountains.

Meantime, government employees began traveling over the route of the uncompleted Roosevelt road to reach the dam site. The Bowen & Grover stage line carried the first government passengers in wagons from Mesa to Mormon Flat, where the travelers switched to mules for the remainder of the journey. [59] Other men seeking employment walked or rode horseback to the Tonto Basin. [60]

Bowen & Grover began construction of a road house at Mormon Flat. [61] Other stage stations were being established along the road at Goldfield, at Weekes Ranch a mile east of Goldfield, [62] and at Fish Creek. [63]

Freighting outfits also began departing from Phoenix for the dam site. [64]

On May 6, Fowler left for Denver where he met with Davis and Hill to ask if there was some way the government could advance the money for the Roosevelt road. They told him no. Before Fowler began the return trip, he sent a telegram to Vernon L. Clark, putting in motion a previously agreed upon alternative plan to raise between $20,000 and $25,000, the amount Davis and Hill indicated would be needed to keep the road work going until the bonds were sold. The local banks agreed to put up the money by accepting the personal notes of financially solid men, up to a maximum of $300 apiece. Mayor Bennett of Phoenix assured the banks the City Council would repay the funds as soon as the cash for the bonds was received. A meeting was called the night of May 17 at the Board of Trade [65] where the plan was explained. Dr. Alexander J. Chandler of Mesa said the same proposal had worked in his city. Chandler said 10 men were asked to sign notes but 20 responded. The Board of Trade agreed to the plan, assigning Fowler, Frank Alkire, and Walter Talbot to carry it out. By the time the meeting ended, they had 52 names. [66] Five days later, the committee had 148 notes. [67]

The night of May 23, the Phoenix city council sold its bonds to a Denver company for a total of $69,750. [68] A week later, Hill was notified $20,000 secured by notes was in the bank at Phoenix, and checks drawn against the city of Phoenix for the road construction would be approved. Hill reported 150 men were at work at the Roosevelt end of the road and 150 would be put to work at Fish Creek Canyon. [69] By mid-June, almost 400 men were at work on the road. [70]

On May 10, shareholders in the Water Users' Association gave their approval of the contract for the dam. The vote was 24,602 to 240. It was said the 240 votes were cast by two men in the lower end of the Valley who may not have fully understood how to mark the ballot. Based on the vote, the governors adopted a resolution authorizing the association president and secretary to enter into a contract with the government. [71]

On May 28, the Council acted upon the petitions from the landowners under the Salt River Valley, Maricopa, and Grand canals and approved the formation of three canal districts. [72]

The Water Users' Association office was moved to the post office building on May 31. [73]

Frederick Newell arrived at Globe June 4. He met Fowler there, and they traveled together to the Reclamation Service headquarters camp at Livingston. With Hill, they spent the next few days visiting the sawmill in the Sierra Anchas and touring the other work. On Wednesday afternoon, June 8, they started for Phoenix, camping at Fish Creek overnight. They arrived in Mesa Thursday night. They reached Phoenix about noon June 10, and that afternoon Newell met with the Maricopa County Board of Supervisors to encourage it to put the road between Mesa and Goldfield into good shape for heavy hauling. [74] The supervisors had been warned that if the road was not readied for heavy hauling, machinery might have to be sent via Globe. Davis had suggested $5,000 for the work, but the supervisors said they did not have the money. [75] They later agreed to fix the eight miles between Mesa and the point where the road entered Pinal County. They said they had no jurisdiction beyond that point. [76]

The greatest obstacle to all of the road work at that time was the drought. The problem was getting water to the workers. Hill said the white men could not work far distances from water. He said Indians would work in those locales. He said the Indians, who also worked for cheaper wages, would walk four miles for water. He said it would require about 12 barrels of water each day at the camps, which was too costly and would wear out the horses needed to pack it in. [77]

At the Tonto Basin, a force of men drilled holes in the riverbed searching for bedrock on the line of the dam. When finished there, they intended to drill for bedrock in the Salt River upstream at the site of the power canal diversion dam. [78]

In Roosevelt, two large boilers and the engine for the new steam power plant were in place and a brick building to house them was going up. This was the first brick building, and it was made with bricks produced at Roosevelt. [79] Construction also was in progress for an ice plant and for an office building for the Reclamation Service. [80]

Dust was held down on the streets of Roosevelt by means of a large sprinkling wagon. [81] Druggist Warren Barnett served ice cream sodas from his soda fountain for 25 cents, [82] and Saturday night dances were held at a new dance hall erected by restaurant owner Richard Baker. [83] The tents in which the workers lived were moved higher up the hill. [84]

Signs of oil were found in the Tonto Basin, and the smell of it was detected in the sluicing tunnel. Hill said the indications of oil were not sufficient to justify the expense of bringing in a heavy drilling rig to explore for it. [85]

Construction of the sluicing tunnel was progressing from both ends, and by the end of June, 230 feet had been tunneled. About 4,000 feet of tunnel work on the power canal was completed and ready for concrete lining, but excavation work was hampered by a shortage of men. [86]

Hot springs near Roosevelt were being used by some persons to bathe, and some used the warm water to do their laundry. [87]

On June 19, the governors, acting upon the recommendation of landowners under the three canal divisions that had been created, named three commissioners for each. Maricopa Canal landowners split on who they

Indian teamsters making fill on the High Line road, circa March 1904.

wanted for commissioners, and petitions nominating two groups were offered. The governors selected the men with the greatest number of signatures, Dwight B. Heard, C. C. Hurley, and Henry Ware. [88]

The governors also granted a month's leave of absence to Fowler, who had been asked by Newell to join him in inspecting irrigation projects in Colorado and Idaho. Fowler was instructed to deliver the signed contract to Newell. Fowler also was authorized to go to Washington if necessary to explain details and make an early plea for signing by the government. [89]

Late in June, commissioners from the three canal divisions urged water users under the Arizona Canal to create another division and to select commissioners. One purpose in asking the Arizona Canal landowners to do this was so water users under the four canals could unite their efforts to acquire the canals from the Arizona Water Co. [90]

On July 5, the governors passed a resolution authorizing Kibbey to file the lawsuit that would determine the priority of water rights in the Valley. The governors did this in the following language:

That the attorney of the association, Judge Kibbey, be authorized and instructed to institute a comprehensive suit to determine the relative rights of all persons using or diverting water from the flow of the Salt and Verde rivers for the purposes of irrigation, mining and manufacturing, to use and to divert water for the purposes aforesaid, at such time and in such manner as to him may seem wise and expedient, and to that end to take any and all steps which may to him seem expedient or necessary to speedily settle and determine the present vested rights to the use of water for said purposes, from the flow of the Salt and Verde rivers and their tributaries. [91]

The *Arizona Gazette* reported Kibbey would select one of the water users with the oldest claims to become the plaintiff in the suit, and all others would be defendants. These defendants were to include users upstream on the Verde and Salt rivers who diverted water claimed by Valley farmers. [92]

A few days later, the U.S. Department of Justice filed suit to close a saloon operated by Charles W. Williams near the mouth of Pinto Creek and the Salt River. The suit alleged the saloon was greatly interfering with construction operations. [93] Hill said that while the saloon and gambling house were three or four miles from the nearest contractor's camp and a dozen miles from the dam site, teamsters and others from the camps patronized the business. He said the camps were usually quiet, except when the men returned drunk from the saloon. A man had been sent to ask Williams to close, but he refused, saying he had been there before the land was withdrawn for the Tonto Basin reservoir. [94] But the saloon was on government land and an injunction closing it was granted. [95]

Rain, the first in nine months, fell in the Valley and over some of the watershed July 21. At midday, 750 cubic feet per second was measured at the Arizona Dam, which was 10 times more than the water flowing in the river the day before. However, the flow fell to 500 cubic feet per second by evening. [96]

The night of July 22, heavy showers fell over parts of the Tonto Basin, and the government camp at Livingston was flooded by two feet of water coming from Pinto Creek. The creek itself ran five-feet deep and a quarter-mile wide. [97]

The morning of July 23, water ran two-feet deep over the Arizona Dam. The Arizona Canal was supposed to carry a maximum of 750 cubic feet per second diverted by the dam. This left about 7,000 cubic feet per second going over the dam. Before dark, the water made the Salt River unfordable at Tempe. [98]

However, very little of the water reached the parched land, and the north side farmers met July 26 to talk about it. Before the meeting, County Supervisor John P. Orme and

others went to the office of the Arizona Water Co. to ask about what happened to the water. The conversation between Orme and William B. Cleary, general manager of the company, became heated, and Cleary punched Orme in the face. The *Republican* reported,

The blow was not a heavy one and was not intended to do any bodily damage, but it did no moral good. It aroused a great deal of inflammation and was the principal topic of conversation on the street during the forenoon. Later in the day a party of water users again visited the canal office and the subject was further talked over. Mr. Cleary expressed regret at the occurrence and offered to apologize to Mr. Orme for his hasty and violent action. The apology was readily accepted and the gentlemen shook hands. [99]

The farmers met again July 27. This time they drew up petitions that were presented to Cleary. The petitions, which were signed by the commissioners appointed for the Maricopa, Grand, and Salt River Valley canals and by a committee appointed for the Arizona Canal, said the canals were "largely filled with sand, silt, debris, weeds and brush" and could not carry the water for which the farmers had paid. The petition concerning the Grand Canal pointed out that it was "without any head or diversion dam." The farmers demanded the conditions,

be remedied at once and that you inform us immediately whether you will comply with this demand. [100]

Cleary accepted the petitions and said they would be referred to the directors of each canal company. He said he would let the farmers know as expeditiously as possible what would be done. [101]

That morning, water again began going over the Arizona Dam. It reached a depth of two and one-half feet before dropping to two feet and continued at that depth until late afternoon. This put a good head of water in the canals. [102]

Word came from Livingston that Charles R. Olberg, one of the government engineers, and Dr. Ralph F. Palmer, the government physician, had come down with typhoid. [103]

Palmer, in an autobiography, ***Doctor on Horseback,*** said Dr. Richard D. Kennedy of the Old Dominion Mine Hospital at Globe was called to the camp and gave Palmer the same treatment the latter had devised for other patients:

This was to put the patient in a canvas tarp with several inches of water in it and a cake of ice at the head and foot. Then four to six men would hold the sides and ends up and swish the cold water around by rolling the patient in the canvas. It was a very effective treatment from a fever standpoint but as my 105 degree temperature began to respond I sure wanted to beg off. Anyway, there is an end to all things and all the typhoid cases recovered. [104]

Another heavy rain fell in the Tonto Basin July 26. Pinto Creek rose three feet while a rise of eight and one-half feet was measured that night at the Tonto dam site. The high water swamped part of the road between there and Fish Creek Hill and swept away supplies at one of the road camps. [105]

Hill reported the specifications for the dam were nearing completion, but it would take some time yet for the detailed drawings to be finished. [106] He said drawings and specifications for the regulating gates in the sluicing tunnel were almost ready. [107]

A daily mail service was started August 1 between Globe, Livingston, and Roosevelt. [108]

In Phoenix, the farmers representing the various north side canals met. Besides talking about canal conditions, they named Heard as chairman. Heard, in turn, appointed Orme to act in his place while Heard spent a month vacationing in California. [109]

Another result of the farmers' meetings was the incorporation, August 6, of the Appropriators' Canal Co. The purpose of the incorporators, Orme, Patrick T. Hurley, Thomas Armstrong Jr., W. H. Wilkey, and Lincoln Fowler, was to reestablish the head of the Grand Canal to capture the water that came over the Arizona Dam and to use it to irrigate lands under the Grand, Maricopa, and Salt River Valley canals. Part of the contention was that the Arizona Canal was big enough only to keep itself and one other of the canals filled at the same time. Reopening the head of the Grand Canal was expected to make it possible to keep all four north side canals full. Men and horses were sent to begin the work. [110]

The Grand Canal at that time received its water through the Crosscut Canal that dropped south from the Arizona Canal along the line of today's 48th Street in Phoenix. The farmers said the Grand Canal could carry more water than was being delivered through the Crosscut. Cleary, when questioned about what was happening, said so far as he knew there was no objection to the Appropriators' Canal. [111]

The capital stock of the company was $50,000, and landowners under the three canals the Appropriators' intended to serve were asked to buy stock. Each share of stock represented an acre of ground and a proportionate amount of the additional water that was to be brought through the canal. [112]

At 8 p.m. Sunday, August 7, Munc Price of Reedsville, North Carolina, a rodman on one of the Reclamation Service survey crews, died of typhoid fever in the hospital at Roosevelt. [113] Price's death was the first among the men associated with the Tonto Basin project.

The same day Price died, the Salt River at Roosevelt rose about two feet higher than it had from the storms two weeks earlier. The high water was caused by rains that fell in the Sierra Anchas. The water carried a couple of inches of mud into the sluicing tunnel. [114]

By then, the larger steam power plant was operating day and night supplying electricity for a steam hoist at the cement mill and for other machinery plus the ice plant, the machine shop, and carpenter shop. [115] The ice plant was soon producing two tons of ice each day. [116]

On August 11, Secretary of the Interior Ethan A. Hitchcock signed the contract with the Water Users' Association for construction of the dam. [117]

A few days later, lawsuits were brought against the Grand, Maricopa, and the Salt River Valley canal companies by about 50 farmers. The suits complained the companies had failed to perform their duties as common carriers with the result the plaintiffs' "trees and vines are already destroyed and their fields of alfalfa reduced in extent and productiveness." The suits asked that if the companies failed to make adequate repairs or did not stop allowing other companies from appropriating water that was

rightfully theirs, that the companies be placed in receivership. One of the attorneys for the farmers was Thomas Armstrong Jr., one of the incorporators of the Appropriators' canal. [118]

Rains fell all night in the Tonto Basin August 15 filling the intake tunnel for the power canal with five feet of water and mud. Water got into several of the other tunnels, but they were drained and damage was light. [119]

By the end of August, six camps had been established for men working on the Roosevelt road. [120]

The digging of the sluicing tunnel was completed. The tunnel excavations from both ends were within a quarter-inch of the engineers' lines when they met. [121] The tunnel was 13-feet wide, 11-feet high, and 480-feet long. Besides sluicing the reservoir, the tunnel was intended to divert the river around the dam while it was being built. When the reservoir was full, it was expected that 10,000 cubic feet of water per second could be discharged through the tunnel. [122]

Construction of the sluicing tunnel,

presented many great difficulties; a rise in the river of two feet would flood both portals, together with their long approaches, with mud and river debris, which could only be removed by men tramming it out in practically water tight cars. This occurred not less than three times during the progress of the work. Another bad feature was the intense heat. Several hot springs were encountered and the temperature rose to 130 degrees Fahrenheit. This water emitted a steam-like vapor which was almost suffocating. The men worked stripped to the waist, coming out at short intervals for a breath of air.

Machine drills driven by compressed air were used in the construction. . . On account of the isolated situation of the work, it was difficult to get experienced drillers. The common laborers were largely Mexicans and Apache Indians. [123]

Excavation of the power canal tunnels was nearly done, and the work of lining them with concrete continued. [124] The Reclamation Service employed a new contractor to operate the sawmill, and about 8,000 feet of lumber were cut daily. About 5,000 feet of lumber were used in the power canal tunnels, and the remainder were used in the work at Roosevelt and at the dam site. [125]

Hill passed through Phoenix on September 16 on his way to Denver for the opening of the bids for the sluicing tunnel gates. He reported the cement mill building was completed, and the foundations were in for the manufacturing machinery. By October 1, he expected it would be possible to drive a team of horses from one end of the Roosevelt road to the other. The road was almost finished except to the top of Fish Creek Hill and bridges over Lewis and Pranty, Fish, and Ash creeks. [126] The Fish Creek Hill work was some of the most difficult and expensive to be done.

The road climbs the hill going towards Mesa on a 10 percent grade, for the most part along the foot of a vertical cliff several hundred feet high, the cliff being so steep as to necessitate rock fills 75 feet in height in order to get the required width of roadway. In other places, rock cuts 60 to 70 feet in depth were necessary. Some short sections of this road were very expensive to construct, the cost probably reaching $25,000 or more per mile. [127]

On September 17, Republicans held their territorial convention in Prescott, and Fowler was selected as the party's nominee for delegate to Congress. Fowler's name was placed in nomination by Kibbey, who also introduced a successful resolution pledging the support of Fowler and the GOP to the construction of the San Carlos dam and other favorable irrigation projects. [128] The Democrats, two days earlier, approved a plank urging the building of the San Carlos dam. They nominated Marcus A. Smith for delegate. [129]

The Post Office Department advertised for bids for a mail route between Mesa and Roosevelt, [130] and Sheldon S. Baker, a chemist for the Geological Survey, reported that 90 percent of the salt found in the Salt River was caused by the flow of water over large salt deposits in Carrizo Creek. Cibecue Creek contributed about 5 percent of the salt found in the river. [131]

A court hearing was held September 28 by Judge Edward Kent on the request that the Salt River Valley, Maricopa, and Grand canal companies be placed in receivership. Kent indicated the farmers were asking for too much, but he said he would consider their plea that the companies be required to repair and improve the canals, dam, and headgates. [132]

October opened with Kent's denying all of the farmers' pleas by dismissing the cases. [133]

George H. Maxwell, executive director of the National Irrigation Association, came to Phoenix to campaign on behalf of Fowler's candidacy. Before a filled Dorris theater the night of October 14, Maxwell extolled Fowler and defended the national irrigation movement's financial backing by the railroads. He also denied he had gained financially. Before becoming involved in the irrigation movement, his income as a lawyer had ranged between $10,000 and $26,000 per year, he said. Moreover, he had contributed $10,000 to the movement, getting the money by mortgaging property. Maxwell said he had repaid $1,000 of that and was paying 8 percent interest on the balance. [134] While in Phoenix, he arranged the sale of his ranch for $15,000. [135]

About 11 a.m. Tuesday, October 18, Robert Schell was fatally injured while doing some blasting on the Roosevelt road about 15 miles from the dam site. He put in a dynamite charge and either made the fuse too short or miscalculated the time needed to get away. Schell caught the full effect of the blast. His right arm was almost entirely blown away, and the concussion threw him at least 30 feet. He landed on his back on a rock. Schell, described as "rather an old man," died about 9 o'clock that night before a doctor summoned from Mesa could reach him. [136]

The general election was held November 8, and Fowler lost to Smith by 872 votes—9,522 to 10,394. [137]

On November 14, the contract for three pair of gates to be installed in the sluicing tunnel was let to the Llewellyn Iron Works of Los Angeles for $102,000. [138] The government took over operation of the sawmill, while work had fallen a little behind on the power canal because of the inability to get enough workers during the hot weather. The power canal contractors were urged to hire additional men so there would be no delay in its completion. [139]

In Washington, the Interior Department on November 23 announced bids would be received at the Reclamation Service office in Phoenix until 9 a.m. February 8, 1905,

for the construction of a masonry dam and two bridges on Salt River, about 70 miles east of Phoenix, Ariz. The dam will contain about 300,000 cubic yards of masonry. Specifications, form of proposal, and plans may be inspected at the office of the chief engineer of the Reclamation Service, Washington, D.C., or at the office of the district engineer of the Reclamation Service, Roosevelt, Ariz. . . Proposals must be marked: "Proposal for the construction of the Roosevelt dam, Salt River, Arizona." [140]

The last of the machinery for use in the cement mill was delivered in November. The machinery had been expected earlier, but delays occurred because the contractors were slow in making shipment and because freighters to haul it from Globe to Roosevelt were scarce. [141]

By the end of November, the Roosevelt road was in good enough shape to warrant the beginning of a movement in Mesa for its use as a bicycle trail. The Mesa people were especially concerned with the condition of the road from Mesa to Goldfield. This was the old road. It was soft and they were afraid it would soon be cut up by heavy traffic. They wanted the road made smooth so that each time a wheel passed over the road it would be packed down and hardened. [142]

John Holdren, who won the contract to deliver mail between Mesa and Roosevelt, bought a couple of heavy carriages to carry the mail. [143] The mail service began December 5. [144]

It was announced from Livingston that the Reclamation Service would soon open bids for delivering 50,000 barrels of oil from Mesa to the cement mill at Roosevelt. Tanks with capacities of 1,000 barrels were to be built at Mesa for handling the oil. [145] A tank with a 2,000 barrel capacity was built near the cement mill. [146] The government hoped to begin the manufacture of cement by February 1, 1905. [147]

In early December, only the bridge across Ash Creek was not in place on the Roosevelt road. Hill reported people were managing to get around the creek, but it would take a couple of weeks to take care of some of the rough spots along the road. Thereafter, he said, a crew would be kept busy repairing the road where it settled and where rocks fell on it. The stage carrying the mail and passengers made the trip from Mesa to Roosevelt in one day with three changes of horses. [148]

The governors met December 5 and adopted a resolution that the contracts of landowners who applied for stock in the association and failed to pay the preliminary assessment of 10 cents per acre by January 15, 1905, be returned to such persons as having been rejected. The resolution did "not apply to school lands or lands on the waiting list" hoping to get into the association. Frank H. Parker, association secretary, said payment had been made on 150,000 acres and about 45,000 acres were delinquent. The association needed the money to operate. [149]

Early the morning of December 9, two Indian children burned to death at an Indian camp near the work on the power canal. The children made a fire of dried brush and fell asleep nearby. Somehow, their clothing caught fire. The children were about 7 years old. [150]

Orville H. Ensign, electrical engineer for the Reclamation Service, was aboard the stage Friday, December 16, when it made the trip from Roosevelt to Mesa in eleven and one-half hours. Ensign said the only break in the ride was at Ash Creek, which the passengers had to walk over. He said the bridge was expected to be completed by the next Tuesday. The worst part of the road was from Goldfield to Mesa, but workmen had started to change some of the grades and to harden it. Ensign said the horses trotted most of the way, upgrade as well as downhill. [151]

Christmas was celebrated at Roosevelt with a Christmas tree and Christmas eve dancing plus a children's program held in the school house. [152]

Because a portion of the Roosevelt road ran along the river past the dam site and was subject to flooding, construction started in January 1905 on a new road at a higher elevation from the cement mill to pass over a hill and connect with the Roosevelt road. [153] The part of the road immediately downstream from the dam was built high on the mountain to avoid the south side spillway. There, and farther down the canyon, rock cuts of from 20 feet to 60 feet were made. To protect the workers, life lines were used in many instances. [154]

Workmen also began blasting away the mountain to prepare a shelf for the temporary and permanent power plants. Originally, the engineers had planned to put the temporary hydroelectric power plant inside the reservoir at a point 80 feet above the low flow of the river. Various objections to this led to a new plan to locate the temporary plant on the site of the permanent powerhouse, immediately below the dam. Hence, much of the work for the temporary plant was later used in the permanent powerhouse. [155]

The shelf on which the permanent powerhouse was to rise was 25 feet above the river channel, but the temporary plant went into a recess 10 feet higher up, hollowed out of the mountainside. This was done to protect the temporary installation from possible flooding and from damage by falling rocks during future blasting. [156]

The temporary power plant was to be connected with the power canal by means of a tunnel 500-feet long. The tunnel was to be lined with a 7-foot diameter steel pipe set in concrete. [157]

Another work in progress was the excavation inside the sluicing tunnel of the chamber in which two sets of three identical gates were to be installed, the first set of service gates to control the release of water and the other set to serve as emergency gates should repairs be necessary. The excavation was about 120 feet inside the tunnel from the upstream portal. The service gates would be set in the downstream end of the chamber and the emergency gates 10 feet farther upstream. [158]

On Thursday, January 5, 1905, the Reclamation Service opened bids in Phoenix for the purchase and delivery of 50,000 barrels of oil to Roosevelt and for the hauling of freight. The oil bids took into consideration the railroad freight rates from the California oil fields to Mesa and Globe and the hauling of oil from those two points to Roosevelt. Three bids were entered that included the cost of the oil and its delivery, the lowest being $3.48 per barrel by C. R. Eager & Co. of Los Angeles, and the highest $4.49. Seven bids were

made for hauling freight, the lowest being $13.60 per ton by Wolf Sachs of Tempe, and the highest $18.50. [159] The contracts were later awarded to Eager Co. [160] and Sachs. [161]

The *Gazette* reported January 6 the Reclamation Service had "under consideration the designing of an ideal distributing canal system for the entire Salt River valley" based upon the cadastral survey of the Valley made by government engineers. The newspaper called this,

a piece of good news to the people of the valley. For while we have always been looking forward to the big dam as something that would put new life and vigor into our section, yet we had not considered anything with reference to the method which would be used by the government in distributing the water from the dam... This ideal canal system is something that few had thought of before. [162]

Apparently it was unknown to the *Gazette* editors that Charles D. Walcott, director of the U.S. Geological Survey, had described the "ideal irrigation system for the Salt River valley" in a report April 10, 1903, to the Interior secretary. This system called for a permanent diversion dam and one large main canal on each side of the river by which to convey water to laterals for distribution to the land. This system contemplated the selection of a water commissioner by the settlers for each canal, subject to approval by the government engineer in charge. Once the majority of payments had been made to the government for the cost of building the reservoir, the water users were expected to take control of the distribution system, subject to rules and regulations established by the Interior secretary. [163]

The *Republican,* on January 7, echoed the *Gazette* report of the previous day, the *Republican* adding "an ideal distributing canal system. . .is a part of the work of reclamation in the valley which was not generally contemplated in the beginning." [164]

In later years, the things "not generally contemplated in the beginning" became a sore point with many of the shareholders in the Water Users' Association because they had to pay for the work. As the cost of the project rose from the initial projection of about $15 per acre toward $50, $55 and $60 per acre, some of the farmers became bitter and resentful.

Heavy rains and snow began falling over the watershed of the Salt and Verde rivers the night of January 7. Within a few days, the area of the Tonto Basin, from the power canal diversion dam to the Roosevelt dam site, was covered with water. The washes and creeks ran with torrents, and most of the roads became impassable. The river at Roosevelt rose 16 feet above its usual level. Before the storm passed, almost 6 inches of rain fell, and the Sierra Anchas were covered with snow. [165]

Rain started falling over the Salt River Valley the morning of January 9. [166] The morning of January 10, a report came in from the Arizona Dam that two feet of water was flowing over. By that night it was three feet, and the water continued to rise so that by the night of January 11 it was more than four-feet deep. [167]

The high water in the river gave the operators of the Appropriators' Canal a chance to try out the newly installed headgates. A flow estimated at more than 125 cubic feet of water per second ran into the canal for a distance of six or seven miles before being diverted back into the river through a waste way. [168]

At a session of the Arizona Supreme Court January 13, it was announced the U.S. Supreme Court had upheld the lower courts in the case of ***Henry E. Slosser v. the Salt River Canal Co.*** brought in 1895. The lower courts held that Slosser had a right to water for his land even though he was not a shareholder in the canal company and had not rented a water right from a stockholder. [169]

A reporter for the *Republican* wrote an account of a trip over the Roosevelt road, saying "It is the wagon road of America" with nothing like it elsewhere in the U.S. He reported it had been opened for freight a few days earlier, and the teamsters were disturbed by rumors automobiles were going to use it. The freighters said there were hundreds of sharp curves from which a driver could not see 30 feet ahead, and, if automobiles were met at such points, the horses would scare and plunge over the bluffs. Their own lives would be endangered, and they predicted problems if automobiles tried to use the road. [170]

The writer said the roadbed, beyond Goldfield, was made of disintegrated granite and tuff, a volcanic rock. The wooden bridges, constructed from lumber cut in the Sierra Anchas, were substantial, and there were few heavy grades. He said "the road is as smooth as Washington street" and would be ideal for bicycles except for the grades. However, the road needed widening at the curves so freight teams could pass. [171]

Teams were encounted on every mile, and stations for tourists had been established and were being improved. The scenery was "indescribably beautiful and grand," with the "stupendous canyon of Fish Creek. . .a repetition of the Grand Canyon on a minor scale." For miles, the road followed a "shelf in the cliffs, from which a stone can be tossed hundreds of feet below. It skirts palisades which are more magnificient than the famed palisades of the Hudson." [172]

On January 16, Kibbey filed in the U.S. District Court the lawsuit of ***Patrick T. Hurley v. Charles F. Abbott and others.*** This was the suit to determine the order in which land in the Valley was to receive water from the river. In reporting the filing of the suit, the *Republican* said in the "complaint there are sixty folios of names containing altogether more than 5,000." All the water users in the Valley and along the upper Verde River were made defendants. [173]

The complaint said Hurley owned the southeast quarter of section 14, township 1 north, range 2 east (Lower Buckeye road to Durango, between 27th and 31st avenues), and his right to appropriate 120 miners' inches of water annually to irrigate the 160 acres dated from as early as 1870. The water claim of 120 inches was for more than 2,100 acre-feet per year. Hurley asked his water appropriation be secured to him against encroachments from all other water users. [174]

Among the new arrivals at Roosevelt was Chester W. Smith of Connecticut, who was to take charge of the dam construction when it started. A dance was held in the new government dining room, [175] which was located on the

mountainside above the High Line road near a group of permanent houses for Reclamation Service officials. These houses were occupied by, among others, Hill, Palmer, Duryea, and their families. [176] Storekeepers in Roosevelt were pleased by business, and the town with its "good many restaurants and lodging houses. . .springing up. . .is taking on quite a metropolitan air." [177] The town lots were leased "for business purposes at no rental but under restriction as to conduct, especially in regard to liquor, which was prohibited within a three-mile limit over the entire project." [178]

The new building at Roosevelt to house the Reclamation Service offices was nearing completion, with part of the government staff there and the rest at Livingston. [179] About 20 families were camped at Livingston or nearby. [180] Tents were pitched on three sides of the ranch house, which once was headquarters for the H. Z. ranch. The building was whitewashed, as were all the trees and fence poles. The entire office force assisted in the raising of a 50-foot flagpole, brought in from the Sierra Anchas January 31. A flag was run up and lowered at sunset, with Frank Nash, a one-time government scout in the Apache wars, sounding retreat. [181]

A number of water users under the Grand, Maricopa, and Salt River Valley canals met and decided to have a single law firm represent them in ***Hurley v. Abbott,*** in order to reduce the expense of answering and being represented. They drafted a letter to be sent to others similarly situated, inviting them to join. [182]

Water users served by the Arizona Canal met under the auspices of the Arizona Canal Water Users' Protective Association. Kibbey explained the purpose of the ***Hurley*** suit. While the water users agreed with the object of the suit, many of them thought there might be a simpler and less expensive way to achieve the same thing. Some suggested a cooperative agreement using the Kibbey Decree of 1892 as the basis for a settlement. The association appointed a committee of 10 men to study the effect of the lawsuit. [183]

Heavy rain fell again in early February, and by Saturday, February 4, the country was awash in water. The floodplain of Cave Creek, which entered the Valley northwest of Phoenix, was filled with water, and the ***Republican*** reported:

There had never been so much water within the limits of Phoenix since the flood of 1891. All of the city west of the east line of the capitol grounds was submerged or surrounded. Nothing could be seen of the grounds but the trees and shrubbery, and the water at its highest point was beginning to creep under the doors of the capitol building. . . A great section of the Maricopa canal went out and the water poured through without obstruction. [184]

The Salt River at Tempe reached a point higher than at any time since 1891, which meant water was pouring over the Arizona Dam. [185] ***On February 6, the water coming over the dam ranged between six- and seven-feet deep.*** [186]

Hill arrived in Phoenix from the dam site on Tuesday, February 7. He said the worst problem at Roosevelt was the road at the dam site, which had been covered by water 15-feet deep but was at a depth of six or eight feet when he had left. [187] He had come to Phoenix for the opening of the bids for the dam, but this was postponed until February 23 because the arrival of some of the Reclamation Service consulting engineers had been delayed by the weather. [188] The bidders, about 20 in number, met with Hill at the appointed hour. They handed over their bids, then he read to them the official notice of postponement, and returned the bids unopened. The contractors protested the length of the delay and sent a telegram to Secretary Hitchcock contending that the engineers would arrive in two or three days. They asked for an earlier date for the bid opening. They wanted to avoid the expense of remaining in Phoenix or of going home and returning, [189] but Hitchcock, the next day, replied the new day having been announced, it would be impracticable to order an earlier opening. [190]

Hill, on February 8, did open bids for the delivery of wood to the dam site. The wood was to be burned at the cement mill. J. E. Sturgeon of Tempe offered the lower of two bids, $4.35 per cord for 100 cords of cottonwood and $5.60 per cord for 500 cords of mesquite wood. Sturgeon already was furnishing the government camps with a large part of their meat supply, and he had other interests in the Tonto Basin. [191]

On February 10, President Theodore Roosevelt sent the name of Joseph H. Kibbey, attorney general of Arizona, to the U.S. Senate to succeed Alexander O. Brodie as governor. [192] Roosevelt earlier had named Brodie assistant chief of the Records and Pension Bureau of the U.S. Army, an appointment that had been confirmed in January by the U.S. Senate. [193]

Arizona Canal water users met February 11 to consider the findings of the committee appointed to recommend how to react to ***Hurley v. Abbott.*** The committee majority advised joining with the water users under the other canals in encouraging the suit and making an early answer to it, but a motion to adopt the recommendation failed by a 3 to 1 margin. Among those opposed to the majority was William J. Murphy, the owner of more land under the canal than probably anyone else. The majority of the water users favored taking no action except to urge the withdrawal of the suit and to accept whatever summons was made upon them. [194]

Thomas Armstrong Jr. filed an answer to ***Hurley*** on February 13. He asked that Hurley be required to prove his claim. Armstrong also said he was the owner of two tracts of land the water appropriations for which were made in 1869. He said he was entitled to a constant flow of 33/80 of an inch or one-half inch of water for each acre. He asked the court to establish his right to that volume of water and to restrain Hurley or anyone else from taking it. [195]

Long-time residents of the Tonto Basin said it had been many years since they had seen so much water in the Salt River. Stages and freight were delayed, and teams could not get across the river to bring in lumber from the Sierra Anchas. An effort to start a ferry at Griffin's Ford, over which all the wood was carried, failed because the cable used was too weak. [196] Stronger cable was procured, and in another week a ferry was running to carry provisions across the river for the men at the sawmill. [197]

Teamsters continued to have difficulty getting freight from Globe to Roosevelt and Livingston. In some places, the

road was described as having no bottom. The Roosevelt road continued to be covered by water in the vicinity of the dam. [198]

Hill came in from the Tonto Basin for the opening of the dam bids. He reported everything was going smoothly except for the freighting. He said the final touches were being put on the upper 10 miles of the power canal and the lower part, about nine miles long, would require another four months of work. The uncompleted sections required the heaviest work. [199]

The penstock for the power canal was under construction. Hill said the power canal would develop 5,000 horsepower, and another 2,500 horsepower would be developed through penstocks placed in the dam. He said seven miles downstream there was a place to develop another 2,500 horsepower and just above the mouth of the Verde River, 4,500 horsepower. [200]

Hill said the cement plant was ready to begin grinding raw materials, with the only thing holding up the grinding the inability to bring in oil over the road from Globe. Four carloads of an order of 1,500 barrels were in Globe awaiting delivery. [201]

Twenty-two bids were opened February 23 for construction of the dam. The low bid of $1,147,600 was made by John M. O'Rourke & Co. of Galveston, Texas. O'Rourke proposed to build the dam in 24 months, while the second lowest bidder, Roderick & Wood of St. Louis, proposed to take 17 months at a cost of $1,187,200. The high bid was $2,685,900 and called for a 30-month construction period. [202] The height of the dam above the low water mark was to be 230 feet, and the reservoir when full was to contain 1,100,000 acre-feet of water. [203]

The following day, the ***Republican*** said, "The people generally are feeling quite jubilant over the figures presented. . . The cost is materially less than had been predicted by many who were disposed to take a pessimistic view of things." [204]

The newspaper also pointed out the government specifications called for the dam to come into use when 150 feet above the level of the riverbed. By that time four-fifths of the masonry work would be completed, but the reservoir would hold only about a third of its capacity compared to when it was completed. The newspaper said,

> ***The reasons are obvious why the last one-fifth of the work will be the fifth that will provide for the holding of two-thirds of the water when the basin is full.*** [205]

Kibbey was confirmed as governor by the U.S. Senate on February 27. [206] He took office the afternoon of Tuesday, March 7, 1905. [207]

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1. ***Arizona Republican*** (Phoenix), March 9, 1904.
2. ***Ibid.,*** March 16, 1904.
3. ***Ibid.,*** March 22, 1904.
4. ***Ibid.,*** March 16, 1904.
5. ***Ibid.,*** April 7, 1904.
6. F. H. Newell to B. A. Fowler, December 18, 1903, Salt River Project Archives (hereafter SRPA).
7. ***Ibid.***
8. ***Ibid.***
9. ***Republican,*** March 13, 1904.
10. ***Ibid.,*** March 23, 1904.
11. ***Ibid.,*** March 16, 1904.
12. ***Ibid.,*** March 23, 1904.
13. ***Ibid.***
14. ***Ibid.***
15. ***Ibid.,*** March 22, 1904.
16. ***Ibid.,*** March 29, 1904.
17. ***Ibid.,*** March 29 and 30, 1904.
18. ***Ibid.,*** March 30, 1904.
19. ***Ibid.***
20. ***Ibid.,*** April 1, 1904.
21. ***Ibid.,*** February 7, 1917.
22. ***Ibid.,*** March 30, 1904.
23. ***Ibid.***
24. ***Phoenix Enterprise,*** March 31, 1904.
25. ***Ibid.***
26. ***Salt River Project, Final History to 1916,*** unpublished manuscript, Vol. I, p. 73, SRPA.
27. ***Enterprise,*** March 31, 1904; ***Republican,*** March 17, 1904.
28. ***Republican,*** March 17, 1904; ***Final History to 1916,*** Vol. I, p. 157. Robert Sherer & Co. received the contract for power canal excavation. John Tuttle won the contract for tunnel construction for the power canal.
29. ***Republican,*** March 12, 1904.
30. ***Ibid.,*** March 25, 1904.
31. ***Enterprise,*** March 31, 1904.
32. ***Ibid.,*** March 16, 1904.
33. ***Ibid.,*** March 31, 1904.
34. ***Republican,*** April 2, 1904.
35. ***Ibid.,*** April 2, 6 and 7, 1904.
36. ***Ibid.,*** April 6 and 7, 1904.
37. ***Ibid.,*** April 7, 1904.
38. ***Ibid.***
39. ***Ibid.,*** April 10, 1904.
40. ***Ibid.***
41. ***Ibid.,*** April 12, 1904.
42. ***Ibid.***
43. ***Ibid.***
44. ***Arizona Gazette*** (Phoenix), April 13, 1904.
45. Morris Bien to B.A. Fowler, February 24, 1905, reprinted ***Republican,*** November 19, 1905.
46. ***Republican,*** May 1, 1904; ***Enterprise,*** May 3, 1904, reported the vote was 56 to 10.
47. ***Enterprise,*** April 30, 1904.
48. ***Republican,*** April 21, 1904; ***Final History to 1916,*** Vol. I, p. 157.
49. ***Republican,*** April 16 and 21, 1904.
50. ***Ibid.,*** May 13, 1904.
51. ***Final History to 1916,*** Vol. I., p. 64.
52. ***Ibid.; Republican,*** Dec. 1, 1904.
53. ***Republican,*** May 1, 1904.
54. ***Ibid.,*** April 16, 1904.
55. ***Ibid.,*** May 1, 1904.
56. ***Ibid.,*** April 21 and 23, 1904.
57. ***Ibid.,*** May 1, 1904.
58. ***Ibid.,*** April 25, 1904.
59. ***Ibid.,*** April 14, 1904.
60. ***Ibid.,*** April 21, 1904.
61. ***Ibid.,*** April 16, 1904.
62. ***Ibid.,*** April 28, 1904.
63. ***Ibid.,*** April 18 and 21, May 1, 1904.
64. ***Ibid.,*** May 4, 1904.
65. ***Ibid.,*** May 17, 1904.
66. ***Ibid.,*** May 18, 1904.
67. ***Ibid.,*** May 23, 1904.

68. *Ibid.*, May 24, 1904.
69. *Ibid.*, May 31, 1904.
70. ***Final History to 1916***, Vol. I, pps. 76-77.
71. ***Republican***, March 17, 1904.
72. *Ibid.*, May 29, 1904.
73. *Ibid.*, June 1, 1904.
74. *Ibid.*, June 11, 1904.
75. *Ibid.*, May 24, 1904.
76. *Ibid.*, June 11, 1904.
77. *Ibid.*, June 12, 1904; ***Gazette***, June 14, 1904.
78. ***Republican***, June 8, 1904.
79. *Ibid.*, June 8, July 10, August 24, 1904.
80. *Ibid.*, June 19, 1904.
81. *Ibid.*, June 26, 1904.
82. *Ibid.*, April 26, June 26, 1904.
83. *Ibid.*, April 10, June 26, 1904.
84. *Ibid.*, June 26, 1904.
85. *Ibid.*, June 28, July 10, 1904.
86. *Ibid.*, July 10, 1904.
87. *Ibid.*, June 28, 1904.
88. ***Arizona Republican Weekly*** (Phoenix), June 9, 1904; ***Republican***, June 19, 1904.
89. ***Republican***, June 19, 1904.
90. *Ibid.*, June 9, and 26, 1904.
91. *Ibid.*, July 6, 1904.
92. ***Gazette***, July 6, 1904.
93. *Ibid.*, July 9, 1904; ***Republican***, July 9, 1904.
94. ***Gazette***, July 10, 1904; ***Republican***, July 10, 1904.
95. ***Republican***, August 13, 1904.
96. *Ibid.*, July 22, 1904.
97. *Ibid.*, July 26 and 28, 1904.
98. *Ibid.*, July 24, 1904.
99. *Ibid.*, July 27, 1904.
100. *Ibid.*, July 28, 1904; ***Gazette***, July 28, 1904.
101. *Ibid.*
102. ***Republican***, July 28, 1904.
103. *Ibid.*
104. Ralph F. Palmer, ***Doctor on Horseback***, (Mesa: Mesa Historical and Archaeological Society, 1979) p. 106.
105. ***Republican***, July 30, 1904.
106. *Ibid.*
107. ***Gazette***, July 30, 1904.
108. ***Republican***, August 5, 1904.
109. *Ibid.*, August 1, 1904.
110. *Ibid.*, August 7, 1904; ***Gazette***, August 7, 1904.
111. ***Republican***, August 7, 1904.
112. *Ibid.*
113. *Ibid.*, August 12, 1904.
114. *Ibid.*
115. *Ibid.*
116. *Ibid.*, August 24, 1904.
117. *Ibid.*, August 12, 1904.
118. *Ibid.*, August 17, 1904.
119. *Ibid.*, August 24, 1904.
120. *Ibid.*
121. *Ibid.*, September 2, 1904.
122. ***Final History to 1916***, Vol. I., p. 93; Louis C. Hill, ***Fourth Annual Report of the Reclamation Service, 1904-05.***, (Washington: Government Printing Office, 1906), p. 74.
123. ***Final History to 1916***, Vol. I., pp. 93-94.
124. ***Republican***, September 2, 1904.
125. *Ibid.*, August 24, 1904.
126. *Ibid.*, September 17 and November 3, 1904.
127. ***Final History to 1916***, Vol. I., pp. 75-76.
128. ***Republican***, September 18, 1904.
129. *Ibid.*, September 16, 1904.
130. *Ibid.*, September 20, 1904.
131. *Ibid.*, September 27, 1904.
132. *Ibid.*, September 29, 1904.
133. *Ibid.*, October 2, 1904.
134. *Ibid.*, October 15, 1904.
135. *Ibid.*, November 12, 1904.
136. *Ibid.*, October 19, 1904.
137. *Ibid.*, November 10, 1904.
138. ***Final History to 1916***, Vol. I, p. 105.
139. ***Republican***, December 17, 1904.
140. *Ibid.*, December 6, 1904.
141. ***Final History to 1916***, Vol. I, p. 83.
142. ***Republican***, November 29, 1904.
143. *Ibid.*, December 3, 1904.
144. *Ibid.*, December 9 and 27, 1904.
145. *Ibid.*, December 6, 1904.
146. ***Final History to 1916***, Vol. I, p. 83.
147. ***Republican***, December 6, 1904.
148. *Ibid.*
149. *Ibid.*
150. *Ibid.*, December 14, 1904.
151. *Ibid.*, December 17, 1904.
152. *Ibid.*, December 27, 1904.
153. *Ibid.*, January 4 and February 8, 1904.
154. ***Final History to 1916***, Vol. I, p. 75.
155. *Ibid.*, p. 113.
156. *Ibid.*, p. 114; ***Republican***, January 4, 1905.
157. ***Final History to 1916***, Vol. I, p. 113.
158. *Ibid.*, pp. 104-105; ***Republican***, January 4, 1905.
159. ***Republican***, January 6, 1905.
160. ***Final History to 1916***, Vol. I, pp. 84-85.
161. ***Republican***, February 3, 1905.
162. ***Gazette***, January 6, 1905.
163. C. D. Walcott to E. A. Hitchcock, April 10, 1903, Report on Irrigation in the Salt River Valley, National Archives, Record Group 48, Lands & Railroad, Reclamation, SRPA.
164. ***Republican***, January 7, 1905.
165. *Ibid.*, January 21, 1905.
166. *Ibid.*, January 10, 1905.
167. *Ibid.*, January 12, 1905.
168. *Ibid.*, January 13, 1905; ***Gazette***, January 12, 1905.
169. ***Gazette***, February 12, 1899, and January 13, 1905; ***Republican***, January 14, 1905.
170. ***Republican***, January 10, 1905.
171. *Ibid.*
172. *Ibid.*
173. *Ibid.*, January 17, 1905.
174. *Ibid.*
175. *Ibid.*, January 21, 1905.
176. *Ibid.*, December 6, 1904.
177. *Ibid.*, January 21, 1905.
178. Palmer, ***op.cit.***, p. 86.
179. ***Republican***, January 23, 1904.
180. *Ibid.*, January 11, 1905.
181. *Ibid.*, February 16, 1905.
182. *Ibid.*, January 24, 1905.
183. *Ibid.*, January 29, 1905.
184. *Ibid.*, February 5, 1905.
185. *Ibid.*
186. *Ibid.*, February 7, 1905.
187. *Ibid.*, February 8, 1905.
188. *Ibid.*
189. *Ibid.*, February 9, 1905.
190. *Ibid.*, February 10, 1905.
191. *Ibid.*, February 9, 1905.
192. *Ibid.*, February 11, 1905.
193. *Ibid.*, January 27, 1905.
194. *Ibid.*, February 12, 1905.
195. *Ibid.*, February 14, 1905.
196. *Ibid.*, February 22, 1905.
197. *Ibid.*, February 27, 1905.
198. *Ibid.*, February 28, 1905.
199. *Ibid.*, February 23, 1905.

200. *Ibid.*
201. *Ibid.*
202. *Ibid.*, February 24, 1905.
203. *Gazette*, February 15, 1905.
204. *Republican*, February 24, 1905.
205. *Ibid.*, February 25, 1905.
206. *Ibid.*, February 28, 1905.
207. *Ibid.*, March 8, 1905.

March - August 1905

Two men died in the first two days of March 1905, at the Tonto Basin. The first was Alex McGalvey, one of the men working on the extension of the Roosevelt road above the dam site. McGalvey fell from a 300-foot-high cliff to the rocks below. Though several men were working near him, no one saw him fall. One of his companions missed him. They looked over the edge of the cliff and saw him on the rocks. This happened March 1. [1]

The next day, Mills Van Wagenen, 20, of Globe, was with three other men on the suspension bridge over the Salt River watching Osborne Richins take flow measurements. A heavy rock broke free from the side of the mountain and crushed one of the cables holding the bridge between the canyon walls. The bridge tipped as it dropped about 20 feet to the water, spilling all of the men but Richins into the swift-running river. Richins, stream gauger for the Reclamation Service, grabbed one of the wires along the side of the bridge. Van Wagenen, an inexperienced swimmer, was swept away. [2] His body was found 16 days later caught in some branches at the head of the Utah Canal, about eight miles below the junction of the Salt and Verde rivers. [3] He had been employed by the government. [4]

Two of the men who had been on the bridge, Will Galpin and Ellis Palmer, swam to safety, while the fourth man, an unidentified stranger, was pulled to safety by Richins. [5]

Ah Soo, a Chinese employed as a cook at the Reclamation Service's headquarters camp, almost drowned when he attempted to swim the river following a hunt for game. He was saved by several Indians camped on the north side of the river. [6]

A different kind of event, a wedding, the first at Roosevelt, took place at 4:30 p.m., March 5. John D. Houston, a Roosevelt businessman, married Rose E. Velasco. The bride had been born at old Fort McDowell and had been reared in Phoenix. [7]

The Tonto Basin had several days of clear weather, then rain fell again. The deluges of water, besides bringing freighting to a virtual standstill, washed out the railroad in the vicinity of Globe. The Salt River Valley too had a few days of respite from the rain, but it began falling again, and the flow in the river continued high. Water poured over the Arizona Dam. [8]

By March 16, 10.42 inches of rain had fallen in Phoenix, which was nearly twice the 5.57 inches that fell in all of 1904. [9] One old-timer, Henry Morgan, said he had not seen a rainy season equal to this one except in the spring of 1864 or 1865. Twice in March, the water flow at the Roosevelt dam site reached between 50,000 and 60,000 cubic feet per second. [10]

On March 17, seven feet of water was measured coming over the Arizona Dam at 4 o'clock in the afternoon. [11] Two spans of the Phoenix & Eastern Railroad bridge dropped into the Salt River at Tempe, but a second railroad bridge, the Maricopa & Phoenix, withstood the burrowing water. The river carved acreage away from bordering farms, and at the Center Street crossing south of Phoenix, it was said to be the highest in 14 years. [12]

Despite the miserable conditions and the boggy road between Mesa and Goldfield, [13] Wolf Sachs on March 21 sent out his first freight wagon on the Roosevelt road. [14] The *Arizona Republican* reported,

> ***Wednesday two more of Wolf Sachs' six-mule teams came up to Mesa and loaded with grain and hay and supplies for the Tonto Dam. This makes five outfits on the road... Mesa, with the starting of the oil teams and the teams for handling the merchandise and supplies, takes on the air of a hustling mining camp in the early days, less the drunkenness and noise.*** [15]

There was no way to get the supplies directly to Roosevelt because the over-the-hill road had not been completed, and the road along the river past the dam site remained under water. [16] There were two ways to get the supplies to the camp: one choice was to send it via pack trains and the other was to haul the goods upriver in a boat. Neither method was appealing, but until the river went down or the Roosevelt road was completed, those were the options. [17]

Word came from Washington, D.C., that the contract for construction of the Roosevelt Dam had been awarded to John M. O'Rourke & Co. of Galveston, Texas. [18]

Benjamin A. Fowler, president of the Water Users' Association, called the governors and attorneys in the city into conference March 27 to discuss the water priority lawsuit of ***Hurley v. Abbott.*** [19] Fowler, who had returned from Washington the previous week, revealed to them letters written to him February 23, 1905, by Arthur P. Davis, assistant chief engineer of the Reclamation Service, and February 24, 1905, by Morris Bien, supervising engineer, expressing concern over opposition to the lawsuit. Davis wrote,

> ***It was distinctly understood from the first that such an adjudication would be made at the earliest possible date, and it is a great surprise and disappointment that this policy does not meet with universal favor. . . . It is (a) necessary preliminary to any intelligent determination on the part of the association or on the part of the government as to how much water will be available for distribution to the lands that have been pledged for the payment of the cost of the reservoir.***
>
> ***A large proportion of the lands that have been thus pledged are in tracts greater than 160 acres, and under the terms of the reclamation act, must be sold to persons who are eligible to perfect a water right under that act. No intelligent purchase or sale of such lands can be made until it is known whether or not they will be irrigated by the proposed project, and this uncertainty attaches to a very large proportion of the lands in the reclamation district. Their sale depends upon their status with regard to water rights, which cannot be settled until after a judicial decree and a determination as to whether they will be included in the area served by the reservoir. . . .***
>
> ***If this adjudication is not made as soon as practicable, it will be necessary for the government to determine in some other way the lands to be served by the reservoir which will lead to dissatisfaction and litigation, and will necessitate an eventual adjudication such as is now proposed with the delay and loss that such a delay will occasion.*** [20]

Bien said opposition to ***Hurley*** came as a surprise to him,

because one of the fundamental ideas urged upon the consideration of the secretary of the interior in February 1904, for immediate action on the draft of contract then submitted was that this was a necessary preliminary to adjudication of these claims to the use of water. [21]

Bien reminded Fowler the secretary had stated this in his letter of February 25, 1904, to the director of the U.S. Geological Survey, and the letter had been printed as part of the draft of the contract circulated in a pamphlet to shareholders in the Water Users' Association before the association's election ratifying the contract. The secretary had said,

Unless some agreement or understanding as to the distribution of all the waters made available by means of the reservoir can be arrived at, so that its use can be made uniform by one system, a conflict between the users of the increased supply and the owners of the vested rights in the natural flow of the stream would seem to be inevitable. [22]

Bien said failure to carry out the adjudication would be regarded by the secretary as a "direct violation of [the terms of the contract], leaving him free of any obligation specified in it." He warned if the adjudication was not accomplished "there is grave doubt whether any storage would be possible by the Reclamation Service for the benefit of the members of the association." He concluded:

Unless adjudication of these individual water rights is carried through by the association, the main purpose of its existence is not realized. It is doubtful, therefore, whether the department would undertake to operate the storage system in the face of the serious conflicts of rights that must necessarily arise if no adjudication of these rights has been made. [23]

There was no apparent disagreement among either the governors or the attorneys as to the need for the adjudication, but no definite action was taken. [24]

The Council of the Water Users' Association met April 1 at the Board of Trade to discuss the situation. About 100 persons were present, including Governor Joseph H. Kibbey, association attorney, who argued the lawsuit was absolutely necessary. He said he had heard talk of a settlement by agreement, but nothing had come of it. He said the suit would go on, and the expense would be much greater if the water users waited to receive summons before replying. [25]

William J. Murphy, though not a Council member, was allowed to speak. He expressed strong opposition to ***Hurley,*** contending the suit would continue for years and would be expensive to every landowner. Murphy said he believed the letters from Davis and Bien had been solicited. [26]

Fowler followed Murphy, and said he had asked for the letters while he was in Washington. Fowler said the opposition to the suit was discussed with Reclamation officials, and all of them said it was necessary. He said he did not want to return to Arizona as the bearer of messages but thought it would be better if letters were addressed to him. Fowler said he doubted an agreement could be reached to which all water users would subscribe. He said he had been informed by the court that, unless an agreement was unanimous, it was worthless. The suit was the only option. [27]

Again, nothing definite was done. [28]

The election of association governors took place April 4. A week later, Fowler wrote to Davis, telling him, "in several of the districts the election turned on 'suit or no suit' to establish prior rights." Fowler said Dr. Alexander J. Chandler had engineered the election of W. J. Kingsbury, who, like Chandler, opposed ***Hurley.*** Fowler said that, as the board then stood, it was split for and against the lawsuit, with Fowler providing the necessary sixth vote in favor. Among the farmers elected to the Board of Governors was Maricopa County Supervisor John P. Orme. [29]

Fowler reported that there had been,

so many determined threats of vigorous litigation and determination to carry the suit on demurrer and other technicalities to the United States Supreme Court, and thus delay action, that it has seemed to me best to find some other way, if it is possible, by which these rights can be adjudicated. [30]

If some other way could not be found, Fowler said the suit would have to be pushed, even if it took years to settle, which "causes apprehension throughout the business community." In addition to such large landholders as Chandler and Murphy, the real estate men opposed the suit. [31] The suit was a threat to land sales under the larger canals [Chandler's Consolidated, Murphy's Arizona] where the appropriations of water were the youngest. Although Chandler and Murphy were shareholders in the Water Users' Association and they knew the government insisted upon determining the priority of rights before distribution of water from the reservoir began, they apparently preferred maintaining the status quo for as long as they could. They were comfortable with the situation as it was, and they could not know, as no one could, what the court might do.

The weather improved in the Tonto Basin so freighting between there and Globe began to return to normal. The Reclamation Service office in Phoenix reported oil was beginning to arrive in Roosevelt from Globe, and the cement mill would soon start up. [32]

The Council met April 8 to discuss ***Hurley.*** At length, the Council adopted two resolutions. The first, appointed the Council chairman, C. T. Hirst, and a councilman from each district to prepare a report for the Council outlining "the best means of promptly adjusting the rights to the use of irrigating water." The second, invited any person having a plan to adjust the rights to present it in writing and to explain it in person at a meeting scheduled April 22. [33]

Heavy rains again descended on the Tonto Basin country April 8, [34] and word came April 12 from Roosevelt that the water in the river was higher than at any other time that year. The water was reported to be 25-feet deep. [35]

At 4 o'clock on the afternoon of April 12, the water coming over the Arizona Dam was 7.7-feet deep. [36] In the forenoon the following day, with nearly eight feet of water topping the dam, timbers began to slough away.

By 3 p.m., it was estimated the hole in the dam was 200-feet wide. [37] The ***Republican*** said,

The importance of this misfortune is not alone in the property loss to the canal company. . .it very seriously affects nearly all the north side ranchers, for the reason that it may mean an entire lack of irrigation water for their crops later on, when the dry season comes and the rain stops. And it could not occur at a more critical

time, for the crops now are all growing, and if there is a shortage it will be during the season when they are maturing. [38]

The dam was 1,100-feet long and about ten feet high, with aprons slanting into the river bed on both the upstream and downstream sides. Six inches to seven feet of water had come over the dam since January 10. [39] The last time the dam had broken was in 1891 when almost 18 feet of water topped it. [40]

A general meeting of water users April 13 resulted in the unanimous adoption of a resolution urging the governors and Council of the Water Users' Association to do everything possible to expedite ***Hurley v. Abbott*** and for all shareholders to file their answers. The resolution also urged all water users agree that the evidence adduced in ***M. Wormser, et al, v. the Salt River Valley Canal Co., et al,*** which resulted in the Kibbey Decree,

as to the cultivation and right to the use of water on particular lands under the several canals, be admitted as competent evidence in the suit of Hurley v. Abbott, et al, and be considered determinative of the rights to the use of water upon said several tracts of lands therein tabulated as of date of the decision. . . [41]

The Kibbey Decree set forth the number of quarter sections of land entitled to water under the canals between the years 1868 and 1889. A table included with the decision showed 946 quarter sections irrigated under eight canals. The decree did not deal with the rights of individual lands receiving water through the canals. [42]

On April 14, the break in the Arizona Dam was said to be about 300 feet. [43] A report from Tempe said the greater part of the timbers had lodged in the river between there and Mesa, and in one place a man could almost cross on them without getting wet. [44] William B. Cleary, general manager of the Arizona Water Co., which operated the dam, said April 15 the management already was planning to begin repairs when the water went down. The break in the dam was said to have grown larger, [45] and by April 17, it was estimated to be 400-feet wide. [46]

The break in the dam also caused two hydroelectric power plants, which depended upon the Arizona Canal for water, to cease operations. The Evergreen power station was on a crosscut canal on the Salt River Indian Reservation, and the Arizona Falls plant was at today's 56th Street and Indian School Road in Phoenix. The two stations supplied electricity to the Phoenix Light & Fuel Co. for distribution in Phoenix. The company maintained a steam power plant for backup. [47]

The cement mill at Roosevelt began operating April 17, [48] but it was not to run at full capacity until 1906. There were two reasons. First, the electric generating capacity of the temporary steam power plant was insufficient. It was not until April 2, 1906, that the cement mill received electricity from the temporary hydroelectric power plant so it could run at capacity. Second, the grinding of the cement was slower than anticipated. This problem was resolved by the purchase of a second tube mill for grinding cement. It was installed in November 1905, increasing the capacity of the cement mill by about 50 percent. [49]

Once the mill was operating at capacity, it took two months to fill the storage space set aside for cement. The mill was closed from June through September 1906. Until August 1909, when all the cement required had been manufactured, the mill shut down three more times, May and November 1907, and August 1909. The capacity of the mill was about 10,000 barrels per month, but its highest single month's production was 14,000 barrels. The total output was 338,452 barrels. The cost of manufacturing, including depreciation of the plant, was $1,063,542.36, or $3.14 per barrel, which was $1.75 per barrel less than the low bid of $4.89 for delivering the product at Roosevelt. The Reclamation Service figured the savings to the farmers was $591,487. [50]

The dam contractor, John M. O'Rourke, and his business partner, George N. Steinmetz, after visiting the dam site, came to Phoenix April 21 and met with local businessmen and Reclamation Service officials. O'Rourke told a newspaper reporter it would take about four months before active work would begin. He said the temporary power plant had to be in operation and machinery purchased. In the interim, quarries would be opened and cables, trams, derricks and other equipment readied. O'Rourke said one advantage was the quarries would be on the hills overlooking the dam site, which eliminated the need for building railroads. He estimated 300 to 500 men would be employed, depending upon the stage of the work. The part of the work on which he hoped to employ the most men was the laying of the foundation. He said the work would be pushed as fast as possible, regardless of the season. The first work would be the excavation of the dam site. If water came along and filled the hole, it would be taken out at the earliest opportunity and the work continued until the dam was built. [51]

Stockholders of the Appropriators' Canal Co. met April 22. Because of the damage to the Arizona Dam, they now envisioned the role of the Appropriators' as supplying water at all times for land under the Grand Canal. The Appropriators' stockholders voted to raise and spend $7,500 for construction, including building three bridges, and to meet with directors of the Grand Canal to ask permission to connect the Appropriators' Canal to the Grand Canal. [52]

The Council also met April 22 and discussed two plans proposed to the subcommittee appointed April 8 for facilitating settlement of the priority suit. Both plans involved dividing the land into classes according to the priority of appropriation and establishing 40 miners' inches as the amount of water to which each quarter section of land should be entitled. A plan offered by C. B. Wood proposed continuing the distribution of water to the Tempe and San Francisco canals as provided by the Kibbey Decree. The plan proposed designating lands irrigated between 1868 and 1875, as described in the Kibbey Decree, as Class A. Other classes proposed were land irrigated between 1875 and 1880 Class B, 1880 to 1885 Class C, and 1885 to 1890 Class D. Lands no longer irrigated were to be excluded. Since the plan "would protect every ***legitimate right***" of the lands to be irrigated, estimated at between 100,000 and 110,000 acres, Wood believed "the suit to all intents and purposes would be settled." Kibbey condemned Wood's plan as

impracticable,[53] undoubtedly because it contained no provision for determining the priority rights of individual lands. It also smacked of Dwight B. Heard's rejected proposal for a reservoir regulating right by which the reservoir would provide water for already existing rights.

Frank H. Parker, the association secretary, offered the second plan. Parker's plan proposed using tables prepared by the Maricopa County Board of Water Storage Commissioners, showing 120,000 acres (750 quarter sections) in actual cultivation in 1901. Until the priorities of the landowners were determined, Parker wanted them to agree the 750 quarter sections had the first right to water and the water would be divided equally. He also thought it would be an advantage if the number of quarter sections with first rights to the flow of the Salt and Verde rivers was reduced to 700 quarter sections. These were to be designated Class A lands. Lands with occasional irrigation, estimated to include 300 to 400 quarter sections, were to be Class B. Parker proposed the Kibbey Decree be used to locate the 700 quarter sections in Class A.[54]

Neither plan was acceptable to the Council, which adopted a resolution calling for a Committee of Sixteen to make a concerted effort,

> ***to unite the owners of cultivated lands both within and without the association, on some form of an agreement as to the use of the natural appropriated flow of the Salt and Verde rivers. Said agreement to be used as a stipulation in the suit of*** **Hurley vs. Abbott, et al.,** ***and to be binding upon all parties signing such agreement.*** [55]

After it was pointed out the resolution seemed to favor cultivated lands over uncultivated lands, an amendment to the resolution was added:

> ***Said committee shall be empowered to work out a compromise plan for the lands within the association, if in their study of the situation they find such a plan feasible.*** [56]

A resolution named to the Committee of Sixteen the president of the association, Fowler; vice president, Dr. Ethelbert W. Wilbur; the secretary, Parker; and the chairman of the council, Hirst. Hirst and Fowler were authorized to name seven members of the Council, three governors, and one representative each from lands under the Tempe and San Francisco canals not in the association.[57] The appointments were made April 24. Heard was named to represent the San Francisco Canal.[58]

The Roosevelt road opened for traffic April 24, and the first stage went over it that night.[59] The cost of building the 63 miles of the road was $350,644.[60] Opening the road did not mean an end to road construction. There were more roads to be built in addition to maintenance, repairs, and improvements.

Fowler left for Washington April 25. He considered the breaking of the Arizona Dam as an opportunity for the Water Users' Association to acquire the north side canal system from the Arizona Water Co. and to press the Interior Department for construction of a permanent solid masonry diversion dam.[61]

On April 26, the management of the Grand Canal announced it was willing to meet with representatives of the Appropriators' Canal to work out an agreement under which Grand Canal water users could get water while the Arizona Dam was being repaired. Lloyd B. Christy, president of the Grand Canal, and Cleary, secretary, offered to lease to the Appropriators' the portion of the Grand Canal from its headgates opposite Tempe westerly to its intersection with the Crosscut Canal, provided the Appropriators' repaired it. Christy and Cleary also said they were willing to pay for water delivery to the Crosscut until the Arizona Dam was diverting water and the Arizona Canal was supplying water into the Crosscut.[62]

The proposition proferred by Christy and Cleary was immediately rejected by Appropriators' Canal officials because it would have defeated and undone everything they had accomplished. The Appropriators' came up with a counter proposition consisting of two plans: first, the Appropriators' would complete its canal from the river to the intersection of the Grand Canal within four weeks and would supply water for six months without cost to the Grand Canal. This would be done provided the Grand Canal would obtain permission from its associated corporation, the Arizona Water Co., for the Appropriators' to extend its canal across a quarter section of land owned by the Arizona Water Co. lying between the western end of the Appropriators' and the Grand Canal. The Appropriators' offered to pay reasonable damages for permission to cross the quarter section.

Second, the Appropriators' would allow the Grand Canal to complete the Appropriators' Canal within four weeks and the Appropriators' would pay the construction costs. The Appropriators' would give the Grand Canal a lien on the Appropriators', and would allow the Grand Canal to remain in possession of it, rent free, until the cost was repaid with interest. In exchange, the Grand Canal would supply water to the landowners until such time as the Grand Canal again obtained water through the Arizona Canal.[63]

The two sides met April 29, but could not agree to a compromise. The Appropriators' officials decided to go ahead with the construction of their canal, paralleling the Grand Canal, and prepare to go to court over their digging across the quarter section owned by the Arizona Water Co.[64]

The Reclamation Service announced it would accept bids for construction of a sand crushing plant at Roosevelt until 2 p.m. May 15. The sand would be used in the cement and concrete work at the dam.[65]

Hill reported the high water in the river had filled the sluicing tunnel with sand. He said the sand could easily be flushed out with water when the tunnel was needed. He also said preliminary work for the gates was continuing. The chamber above the tunnel was completed, and workmen were about 40 feet away from having drilled through from the top downward.[66]

Hill said about 5,000 yards of rock had been removed from the south wall of the canyon to accommodate the temporary power plant. The rock had been dumped into the riverbed, and nearly all of it had been carried away by the

floods. Hill said that was the only good turn the river had done for them. [67]

About 120 feet of the power canal penstock had been excavated as an uprise, and Hill said another force would begin working downward in a few days. As soon as wood could be supplied for fuel, compressed air drills would be used in the excavation, he said. [68]

The rainy weather had seriously delayed progress, Hill said, but about 500 government employees were at work. [69] The main headquarters was now at Roosevelt, with the engineers and office workers occupying the Reclamation Service's new building at Roosevelt. [70]

On May 1, the governors adopted a resolution giving delinquent stockholders until June 1 to pay the preliminary assessment of ten cents per share without penalty. The Council adopted a bylaw imposing a penalty of two cents per share for the first 30 days of delinquency after June 1 and one cent per share for each succeeding 30-day period. The Council adopted another bylaw permitting landowners qualified to become shareholders to apply for stock. Upon payment of the ten cents per share, the land would be placed upon the "waiting list" for later decision by the secretary of the interior as to which land in the reservoir district would get water. The bylaws could not become effective until approved by the interior secretary, an action that took place October 25, 1905. The period for paying the ten cents per share was extended until June 1, 1906. [71]

A traction engine to haul oil in 34 barrel tanks on specially built wagons between Mesa and Government Well passed through Tempe en route to Mesa on May 1, 1905, on the Maricopa & Phoenix Railroad. Government Well was about two and one-half miles northeast of Goldfield on the Roosevelt road and was the point at which the road began its passage through the mountains.

The traction engine, owned by C. R. Eager & Co., weighed 23 tons and stood on three wheels, two at the rear and the third centered at the front. The wheels were 57-inches high with tires 42-inches wide and required a road 14-feet wide. To accommodate the engine, which was equipped with a gasoline fueled marine corrugated boiler, the Reclamation Service laid out a new road from Mesa to Government Well and built extra strength bridges. Pulling a full load of four wagons with filled tanks, totaling 58,432 pounds, the traction engine chugged along at about three miles per hour. At Government Well the wagons were hitched to six-horse teams for the haul to Roosevelt. A second traction engine was put in service in September. [72]

The Committee of Sixteen met May 6 to consider the Kibbey Decree and other data, including tables showing river water flows, water distribution, cultivated acreage, and contracts between the various canals. In addition, Parker announced that printed copies of the complaint in ***Hurley v. Abbott*** and printed forms to make formal answer to the suit were available at the Water Users' Association offices. Kibbey had drawn up the form to make formal answer; the water user had only to fill in appropriate blanks. [73]

On May 6, Fowler delivered a letter in Washington, D.C., to Frederick H. Newell, chief engineer of the Reclamation Service, in which Fowler said the Arizona Water Co. "would gladly unload" the injured Arizona Dam and the company's canal interests, and the Water Users' Association "would gladly purchase," provided the Interior Department would appoint a commission or board to determine the price and terms. Fowler also asked the government to replace the Arizona Dam with a,

> ***permanent masonry diversion dam for the benefit of the whole valley, with head gates, at either end to supply main distributing canals, on both the north and south sides of the river, which, in the early future, will be consolidated under the administration of the Salt River Valley Water Users' Association.*** [74]

Before writing the letter, Fowler had been in New York City getting the agreement of Hiram R. Steele, vice president of the Arizona Water Co., and his associates for the sale of the company to the Water Users' Association. None of this was known to the water users until after Fowler returned to the Valley in June.

Newell replied to Fowler's letter at once—on May 6. Newell said the government already had spent and would spend more money on the Salt River project than authorized by the reclamation act [section 9 of the act provided funds derived from the sale of public lands be spent on projects within the state or territory where the lands were sold]. For that reason, he said, "it has therefore become necessary to scrutinize with great care all propositions for additional expenditures." [75]

After reminding Fowler that, "All the dealings of the Reclamation Service with the people of the valley. . .have been based upon. . .a proper adjustment of [vested water] rights before any new expenditures are undertaken in the valley or any stored water is furnished for irrigation," Newell said the question of building the diversion dam would be investigated. He closed the letter by asking Fowler to urge upon the Water Users' Association the immediate "adjustment of the existing water rights, in order that the government may proceed without delay or uncertainty." [76]

Newell did not comment upon Fowler's request for the appointment of a board to determine the value of the Arizona Water Co. holdings, but they undoubtedly discussed this. Fowler commuted back and forth between Washington and New York, trying to bring together a satisfactory arrangement for the purchase of the water company.

The Committee of Sixteen, on May 9, appointed a three-member subcommittee, Heard, Parker, and Wilbur, to consider the substitution of a regulated flow for the fluctuating flow of water. The committee had determined the regulated flow coming from the reservoir would be less than the average amount of water actually delivered. [77] Heard unquestionably was the chief exponent of the regulated flow, which would have provided the regulation right in the reservoir for which he had fought unsuccessfully when the association's articles of incorporation were written.

The subcommittee issued its report May 13, including a recommendation that a daily regulated flow be adopted. However, the daily regulated flow was abandoned after

ensuing meetings of the full committee indicated it would be impossible to get agreement on it among all water users. [78]

Meanwhile, work on the Appropriators' Canal progressed, with a new head at the level of the river bottom built a mile and a half farther upstream. [79] Cleary reported the repair work at the Arizona Dam and the Arizona Canal would proceed faster if more animals could be obtained. The canal was filled with sand for a distance of two miles. The break in the dam measured 190 feet, and some of the cribbing still stood in the breach. [80]

Bids for the sand crushing plant were opened May 15, and the lowest of four, $5,531.86, came from the Mine and Smelter Supply Co. of El Paso, Texas, which received the contract. [81] The same day, the first two tanks of oil were sent out from Mesa by freight train. The traction engine was ready for work, but the road was not in good enough shape. Oil was arriving at Roosevelt from Globe for use at the cement mill, and some of the cement was used to line the power canal. Hill reported more than 200 feet of the power canal penstock had been excavated. [82]

The Orange Growers' Association, made up of 20 orchardists, met May 18 and decided to order four pumps from a San Francisco company for use in drawing water from the river at the head of the Arizona Canal. Since the Arizona Water Co. was not supplying the water for which they had paid, the ranchers did not see how anyone could object to their plan. The aggregate capacity of the pumps was 1,850 miners' inches (91.5 acre-feet in 24 hours). [83]

Secretary of the Interior Ethan A. Hitchcock, on May 18, agreed to appoint three "disinterested engineers or experts" to calculate the value of the Arizona Water Co., as proposed by Fowler and Steele. Charles D. Walcott, director of the U.S. Geological Survey, informed Fowler of the decision by letter May 22. Walcott said that agreement to appoint the board was done "upon the distinct understanding that the United States does not at this time assume the obligation to pay the amount appraised nor to purchase the property at any price or in any event, this question to be left for future decision when the value of the property, as determined by the Commission, shall become known." [84]

Fowler sent a letter May 23 to the Interior Department in which he enclosed a form of contract for the sale of the Arizona Water Co. to the Water Users' Association. He asked Hitchcock to approve the contract form. [85]

On May 24, 3,000 acres of the Salt River Indian Reservation on the north side of the Salt River and 900 acres on the south side were signed for stock in the Water Users' Association. The land was signed in upon the recommendation of William H. Code, irrigation engineer for the U.S. Bureau of Indian Affairs. Authority for Joseph B. Alexander, superintendent of the Indian reservation, to enroll the Indian land was given by Hitchcock on May 18. Alexander was told to,

take such steps as may be necessary to carry out the recommendations of Inspector Code with respect to signing up on the waiting list of the Water Users' Association for reservoir rights for the Indians. . . [86]

The Indians on the Salt River Reservation were never issued reservoir rights, their land being omitted when the interior secretary designated which acreage within the reservoir district would receive stored water. One reason for this was the land would have been subject to a lien for the payment of all assessments of the association. [87]

The pumps ordered by the Orange Growers' Association arrived by train May 24. They were immediately loaded on four-horse wagons for movement to the head of the Arizona Canal. Foundations for the pumps and two engines to run them, one gasoline and the other steam, already were in place. [88] Two of the pumps were in operation by May 28, but more power was needed to start the others. The two working pumps produced about 1,500 inches of water, but the water was not going far because the Arizona Canal still had not been cleaned. The pumps were started in the hope the water would wash some of the sand downstream and help open the canal. [89]

Meanwhile, some of the orange growers hauled water in to irrigate trees and installed pumps for that purpose. [90] The pumps at the head of the Arizona Canal failed to get sufficient water down the canal to do any good, so the Orange Growers' Association closed them down June 15. [91] In addition, the Arizona Water Co. expected to have water in the Arizona Canal a few days thereafter. Repairs involving the Arizona Dam included the construction of a gravel dike that circled the breach to keep water from passing through. The dike, intended as a temporary work while new cribbing was built in the river to fill in the break, ran to the head of the canal. Water was turned down the canal June 18. [92]

Hitchcock, on June 1, wrote to Fowler, saying,

I have concluded that the interests of the government will be best subserved and the situation much simplified by the purchase of the property of the Arizona Water company directly by the United States, provided that such property can be acquired, including all outstanding interests controlled by the company, for a satisfactory consideration. [93]

Despite this explicit statement, Hitchcock added "that this proposed action has no significance or effect beyond the ascertainment of the value of the property controlled by the Arizona Water company. . ." [94]

That same day, Concord stagecoaches arrived at Mesa. They were ordered from a San Francisco firm by William A. Kimball for a stage line between Mesa and Roosevelt. One seated eight passengers and the other ten. It was announced the stages would go into operation at once, making stops at Goldfield, Morman Flat, and Fish Creek to change horses. The stage office in Roosevelt was at Warren Barnett's drug store, and in Mesa, in the former post office building. The competition no doubt prompted J. Holdren & Sons, the existing stage line, to report a 14-passenger automobile had been ordered for use between Mesa and Government Well. It was promised the auto, which would have a speed of 20 miles an hour, would make a daily round trip between the two points. [95]

Fowler and Steele, on June 7, sent a letter to Hitchcock in which they described the property of the Arizona Canal Co. to be appraised. The property included the Arizona Canal

and Dam; all contracts, including one allowing the Phoenix Light & Fuel Co. to develop hydroelectric power with water flowing in the Arizona Canal; controlling interest in the Grand, Salt River Valley, Maricopa, and Water Power (Crosscut) canals, and all water rights and property owned under the canals. They said the "appraisement shall be governed by the rules that would apply if the property was being taken by condemnation proceedings." They concluded,

that this appraisement is to be made with a view of said property being taken over by the United States government as an integral part of the irrigation system for said valley if the government shall hereafter elect to do so but that the government is in no way obligated to make said purchase. [96]

In Phoenix on June 7, Cleary, on behalf of the Arizona Water Co., warned the Appropriators' Canal company to cease its operations. [97] The Appropriators' had built a flume under the Crosscut Canal, and men and teams were excavating a canal paralleling the Grand Canal. The flume was 20-feet wide and three-feet deep. The Arizona Water Co. claimed the land on which the Appropriators' Canal was being extended. [98] The Arizona Water Co. filed suit June 9, and a temporary injunction was issued to halt the canal digging. [99]

Water users under the Grand, Maricopa, and Salt River Valley canals met June 10. Landowners under the latter two adopted a resolution calling upon the Arizona Water Co. to repair the Joint Head Dam (a short distance east of today's 48th Street on the north side of the Salt River in Phoenix) and to clean the sand out of the Salt River Valley Canal so it could carry an adequate amount of water. The situation between the Arizona Water Co. and the Appropriators' Canal was discussed, and Lincoln Fowler said he had tendered the water company $250 in gold for the strip of land near the Crosscut through which the Appropriators' had run. The strip of land was 60-feet wide and a mile long. An answer to the Arizona Water Company's lawsuit had been made by the Appropriators', including the filing of a condemnation proceeding for the strip of land. [100]

Hitchcock wrote to Benjamin Fowler June 10, telling him a commission would be appointed to appraise the Arizona Water Co. Hitchcock also advised him that, while this was being done with the understanding the government was under no obligation to buy, "It must be. . .understood that if any purchase shall be made by the government it must be to the property as an entirety." [101]

On Monday, June 12, a flow of 6,000 inches of water ran through the Appropriators' Canal into the Grand Canal west of the Crosscut Canal. The farmers also decided to improve the Joint Head Dam themselves. [102]

When the case of the Arizona Water Co. against the Appropriators' Canal Co. came up in court, attorney Thomas Armstrong Jr. said the Appropriators' had ignored the temporary injunction because the farmers needed the water. Cleary asked for 30 days in which to prepare evidence, but Judge Edward Kent denied the request and set a hearing for the following day. Cleary also sent men and teams to work on the Joint Head Dam. [103]

After hearing arguments June 13, Kent took under advisement whether to dissolve the injunction. He also set June 14 to hear the Appropriators' condemnation suit. Meantime, under the direction of Heard, work continued on the Appropriators' Canal, and it was expected that within a few days water would be turned into the Salt River Valley and Maricopa canals as well as the Grand Canal. [104]

Hitchcock, on June 14, approved the appointments of George Y. Wisner, W. H. Sanders, and A. E. Chandler to serve as a commission to appraise the property of the Arizona Water Co. [105] The same day, Hitchcock wrote to Fowler and Steele telling them of the action. [106]

Also on that day, Kent ruled the Appropriators' could have the strip of land owned by the Arizona Water Co. The only testimony concerned the value of the land, put by the Appropriators' at $10 to $15 per acre for the approximately eight acres involved. The ground had never been cultivated and was covered with virgin brush. Cleary put the value of the land between $40 and $50 per acre. He testified the bush was a valuable crop cultivated by the Arizona Water Co. for use in the construction and repair of the Joint Head Dam. Kent ordered the Appropriators' to excecute a bond of $300 until the value of the land was determined. [107]

The ***Republican,*** in an editorial, pointed out the significance of Kent's ruling in the Appropriators' condemnation case:

If the Appropriators' canal can invade the territory of the Arizona Water company. . .what is to prevent it. . .from constructing a system of canals which will parallel the old system?

And if this privilege exists, what becomes of the value of the property and rights heretofore enjoyed by the Arizona Water company? That such value has been greatly lessened is the natural conclusion.

. . .the new state of affairs would seem to give the ranchers a decided advantage in negotiating with the Arizona Water company for the acquirement of its holdings. To put it bluntly, the way seems clear for the ranchers to construct a new system of canals in the event that they cannot reach satisfactory terms with the owners of the old canal system. [108]

Benjamin Fowler returned to Phoenix on June 17. He said he would report on what had been accomplished at a meeting of the governors on Monday. He added the trip east had been made advisable by the breaking of the Arizona Dam and the discussions had involved the system of water distribution. [109]

The Grand, Maricopa, and Salt River Valley canals' water users met and adopted resolutions calling for completion of the Appropriators' Canal, delivery of water from it to the Maricopa and Salt River Valley canals, purchase of stock in the Appropriators' by water users under the three older canals, and construction of a permanent dam at the Joint Head. [110]

Soon after, extension of the Appropriators' Canal began. By the end of October 1905, the canal's length was said to be 30 miles plus 20 miles of laterals. It was estimated the canal could provide water for 38,000 acres, about 15,000 acres of which could get water from no other canal. [111]

At the governors' meeting June 19, Fowler revealed the exchange of correspondence with Hitchcock. Fowler said he

total of freight would be about 2,500,000 pounds. [11] In connection with that, the oil delivery contract was sold by Eager & Co. to Shattuck and Desmond, also of Los Angeles, on September 23 at Mesa. [12]

Hill said the sawmill in the Sierra Anchas had been closed and moved to Roosevelt, but a half-million feet of lumber remained to be hauled. This undoubtedly included poles that J. M. O'Rourke & Co., the dam contractor, intended to use in the construction of cofferdams in the riverbed above and below the dam site before starting excavation for the dam foundation. O'Rourke planned to build a large flume between the cofferdams to carry the normal flow of the river over the dam site. Hill said if the flow of the river was too much for the flume, part of the water might be diverted through the sluicing tunnel. He said O'Rourke had been delayed in getting started because one piece of machinery was not shipped until four months after it was ordered. The machinery was en route then, he said. [13]

The condition of the Roosevelt road from Mesa to Government Well continued to concern Hill and the Good Roads Association of Mesa. The heavy wagons had pulverized the soil to a bed of dust four inches thick. Hill said he would see the road was graveled if the association could persuade the Maricopa County Board of Supervisors to grade the 12 miles to the county line. It was estimated grading the road would cost $1,200. However, the only bid was $5,500, and the supervisors rejected it. The supervisors asked for new bids, and Shattuck and Desmond offered to do the grading for $1,500, which was accepted. By the end of January 1906, the grading was completed and only the graveling remained to be done. [14]

Letters from Steele and the Water Users' Association president, Benjamin A. Fowler, who had gone to the East Coast, were received by Kibbey. The letters, which concerned the sale of the Arizona Water Company's property, were read by Kibbey to the governors when they met October 2. Steele thought the water company should get $700,000, but he wanted the governors to set a price and to permit Fowler to act for the association. Fowler said he was willing to do it but not without instructions. He also intimated that, while he did not think it was right the governors should say what the association would pay, if a figure was sent to him he would be better able to act. It also appeared from the letters Hill had suggested to Steele and Fowler that, if the government were assured the association would take over the water company's property, the Reclamation Service might at once build the cement diversion dam, and the expense of repairing the Arizona Dam would be saved. Fowler said he did not think the government would build the diversion dam until it had some estimate of the price of the water company's holdings. [15]

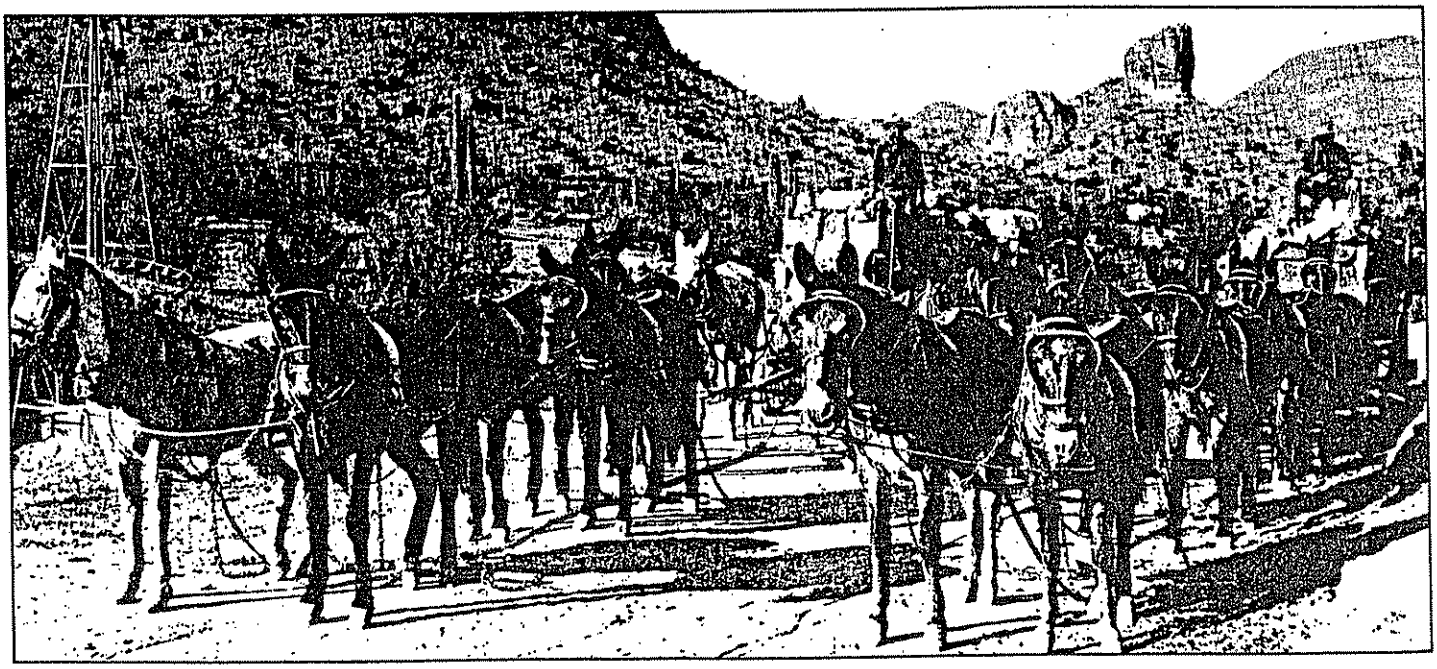
Kibbey told the governors the water company should initiate the negotiating. He believed the company was more anxious to sell than the association was to buy. The governors did not want to offer more than might be necessary to buy. They also thought it was customary for the seller to put a price on his goods before the haggling started. At the governors' instructions, Kibbey sent telegrams to Steele and Fowler:

To Steele, New York City:

The board of governors met today and directed me to say that it adheres to its position that negotiations must be initiated by a proposition from a representative of the water company interests.

To Fowler, Washington, D.C.:

The board has considered the matter. It directs me to say that it can undertake no negotiations without a proposition from the water company as a basis. Every circumstance suggesting desirability of prompt action has been considered by the board and it is deemed by it that expedition is more advantageous to the water company than to the association. If negotiations fail, it will be because the water company has not initiated them by making a proposition. It remains with the water company to expedite matters. The board thinks this should be the place of negotiations. [16]



By September 1905, teamsters hauled 1,500,000 pounds of freight per month to Roosevelt.

face of the small dam was to be rough and uneven, against which the rest of the foundation would rise. Once the small triangular dam was in, there would be no need for the upper cofferdam. If floods came, the worst that could happen would be the filling of the hole between the lower side of the small dam and the downstream cofferdam. Hill said it would be the work of but a day or two to pump out the water and clear away any debris. [61]

On June 1, the Salt River Valley Water Users' Association opened its books for registration of all land within the reservoir district not signed into the association and for the re-signing of those acres for which their owners had failed to pay the earlier assessments. The landowners who had not paid the assessments had the option of paying them and not re-signing. Shareholders who failed to pay their assessments within 30 days faced a penalty of two cents per acre and an additional one cent per acre for every 30 days delay thereafter. [62]

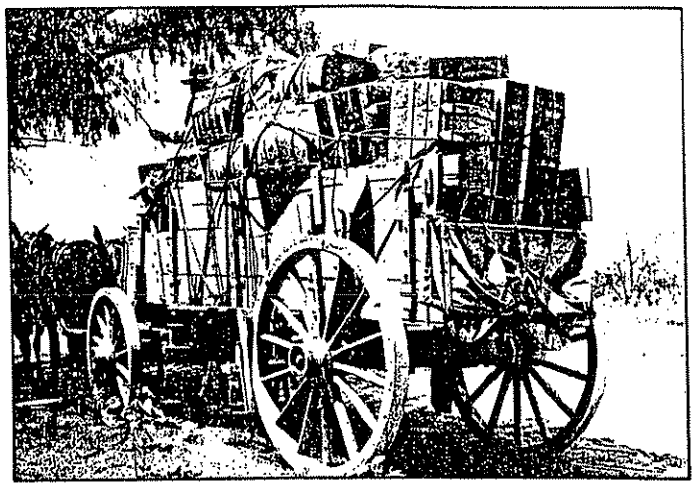
Judge Kent, on June 1, signed an ancillary decree confirming the sale of the Arizona Water Co. A decree confirming the sale already had been signed in New York City by Judge Holt. [63]

Phoenix property owners who had not done so were urged to deed their water rights to the mayor in trust so that a single answer could be made for all residents in the suit of ***Hurley v. Abbott.*** The mayor already held in trust the water rights for the original city limits, Seventh Street to Seventh Avenue, between Van Buren and Harrison, and for all or parts of five additions to the city. The ***Republican*** said the city was,

vitally interested in the case, not alone because of its indirect interests in the welfare of the whole valley but because eventually it is possible power from the Roosevelt dam may be obtained to be used in connection with the municipal water works system. [64]

The Salt River Valley Canal and Maricopa Canal companies on June 6 asked the U.S. District Court to issue injunctions against the Appropriators' Canal Co., the Grand Canal Co., and the Arizona Canal Water Users' Association to stop them from appropriating any flow of the Salt River that interfered with the plaintiffs'diverting 10,000 inches of water. The suit was aimed particularly at the Appropriators' Canal Co., which, since a lower level in the river, had been taking most of the water that had come downstream. When Frank Trott, water commissioner under the Kibbey Decree, attempted to regulate the amount of water the Appropriators' Canal was taking, company officials turned him away, saying he had no authority over the canal. The aim of the injunction suit was to bring the Appropriators' Canal under the jurisdiction of the court and the commissioner. [65]

At a hearing June 8, Judge Kent indicated he would give the Appropriators' Canal the old water delivery schedule of the Grand Canal, which had no head in the river through which to get water. Kent took that action the following day. He also ordered that the Arizona Canal Water Users' Association receive the water formerly taken by the Arizona Water Co., and the water available for distribution to the four north side canals be diverted in equal shares of one-



Baggage belonging to Italian rockmen loaded for transportation to Roosevelt, June 12, 1906.

quarter each. It had been brought out at the hearing that about 10,500 acres of land were being irrigated from each of the canals. [66]

On June 13, the ***Gazette*** reported work on the Roosevelt Dam would begin in a few days—the work was the start of the excavation of the dam site to bedrock. That day, the Reclamation Service began the diversion of the river through the sluicing tunnel. The water, when at the height of the lowest level of the upper cofferdam, flowed through the tunnel at the rate of 1,300 cubic feet per second. [67]

The site of the excavation was 2,500 feet below the junction of the Salt River and Tonto Creek. In locating the site, the government drilled three lines of holes across the stream in search of bedrock. The Reclamation Service reported the first line of holes drilled was about 1,600 feet below a line of six holes drilled by the Hudson Reservoir & Canal Co., which showed the bedrock consisted of sandstone and broken quartz and varied in depth between 23 and 64.5 feet. The first line of nine holes made by the government found bedrock in the red sandstone at depths of between 20 and 38 feet. The second line, 100 feet below the first, also contained nine holes, and the sandstone bedrock was from 21 to 24.6-feet deep. The third line, 100 feet below the middle line, had seven holes, and the bedrock, black slate, ranged in depth from 21.9 to 31 feet. The Reclamation Service said,

The final location of the dam was made so that the upper [first] and middle [second] lines came practically in the foundation. The bedrock is described as being a hard, tough, fine-grained sandstone, in well defined strata, dipping upstream at an angle of 29 degrees from the horizontal, approximately at right angles to the dam. The canyon, at the level of the river, was but little more than 200 feet wide. [68]

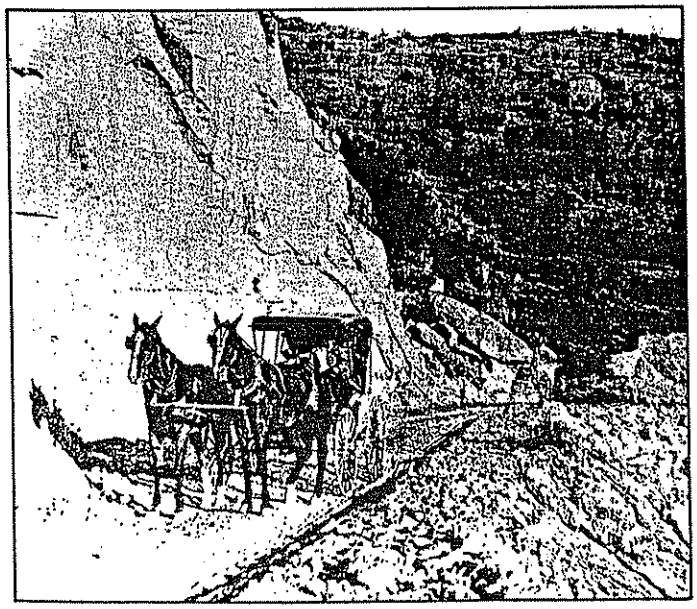
The plan was to excavate the foundation site using two hydraulic pumps; it was thought the work would be started in a few days. [69]

O'Rourke found it difficult to get all the labor he wanted for the job. The spring and summer heat was one reason; other reasons were the remoteness of the site, the difficulty of the work, and the long hours. As a result, O'Rourke worked the men day and night to accomplish as much as he could

William H. Code, irrigation engineer for the Indian Service, visited Phoenix on January 11 and informed the ***Republican*** that proposals to bring electric power to the Gila River Indian Reservation were being considered by the Interior Department. Code said there were two plans. The first was to develop hydro-power at a point between the Arizona Canal head and Roosevelt, and the second was to run a branch transmission line from Roosevelt Dam to the reservation. The power was to be used to pump water from the ground for irrigation of reservation lands. [64]

The high water in the river cut a new channel that left the head of the Appropriators' Canal many feet away from the main flow of water. The head either would have to be lowered or extended. In addition, rocks and sand filled the head for a short distance and had to be removed. The cost of doing these things was estimated at $2,000. On January 16, the board of directors called a meeting for January 22 to consider an assessment of 50 cents per share. [65]

Benjamin Fowler returned January 18 from a two-day trip to the head of the Arizona Canal and the Granite Reef camp site. Fowler reported repair work on the canal was satisfactory and nearly all the preliminary work for the diversion dam had been completed. By this time the camp included four bunk houses, an office building, a mercantile store that used coupons and was operated by the government, and a large building with concrete floor and screened sides containing chairs and tables. In this latter building, cigars, soda water, and ice cream were sold as a department of the mercantile store. A little village of 20 houses built apart for Mexican laborers was known as "Mexico." There were 200 men in camp; common laborers were paid $2 per day; other laborers $2 to $3; drillers, $2.75; carpenters, $3.50 to $5; helpers, $2.50, and sub-foremen, $3.50. The government deducted 75 cents per day for meals. The cable tower on the south side was ready to be raised, and excavation for the north side tower was done. The 2-1/2 inch cable between the towers would span 1,600 feet and would sag 80 feet. A cage with a capacity of 35 men was to be attached to the cable to transport workers across the river. The narrow gauge railroad was completed, lacking only electricity to operate. The railroad ran to two quarries, the most distant 3,200 feet. On the south side, the excavation for the dam, sluice gates, and canal head gates was down to bedrock. [66]



Traveling the Roosevelt road by buggy. First trip by auto was February 8, 1906.

The ***Republican*** reported January 22 that several holders of receivers' certificates from the Arizona Water Co. had received notification to forward them to the New York Trust Co. presumably to exchange for cash. The newspaper thought this meant the government had paid the company the purchase price of the canals, a supposition confirmed by Hill when he returned from Washington a few days later. However, R. E. Miner, secretary of the water company, said the transfer of the canals to the government was not expected until mid-May. He said the government still had to approve the abstracts of title to the Arizona, Maricopa, and Grand canals. [67]

Shareholders in the Appropriators' Canal Co. voted 9,085 to 3,247 against an assessment of 50 cents per share at their meeting January 22. By a voice vote, a levy of 15 cents per share was adopted, but there were objections the vote was illegal, and doubts were expressed that the directors would be able to collect the assessment. Before the votes were taken, the directors reported they had paid off about $14,000 of the old debt and several thousand dollars had been spent on repairs. [68]

On January 26, the ***Republican*** said engineer Hill had been furnished an automobile, a Stevens-Duryea, by the government, and a few days later he, Mrs. Hill, Fowler, Reclamation Service engineer Orville H. Ensign, and F. H. Ensign traveled in the vehicle to Granite Reef. The Ensigns were brothers. [69]

Demrick came in from Roosevelt and said O'Rourke's men for the past few days had been driving piling into the riverbed for the new cofferdams. Demerick said the dams were to be reinforced with concrete. [70]

Hill attended a meeting of the Arizona Canal Water Users' Association on January 29 and announced that because of practical ownership of the canal by the government, the Reclamation Service would widen the 900 feet of channel between the old head and the proposed new head. He said the ditch might not be widened as much as some persons had suggested, but it was part of the plan for the diversion dam construction to divert as much water as possible through the canals. This would make the handling of the remainder of the water by cofferdams much easier, Hill said. [71]

While the Reclamation Service intended to widen the canal, the responsibility for construction of the rock dam and the installation of the cable across the river remained with the association. Alkire wrote a letter to stockholders informing them of this, adding that they would be responsible for maintenance and operation expenses until October 1. He asked the shareholders to remit the assessment of $1 per share levied December 8. He said about two-fifths of the shares had paid. [72]