HIGHLINE

BOOK

Summary With Maps and Illustrations of Arizona's Rights
On Colorado River, Arizona's Only Water

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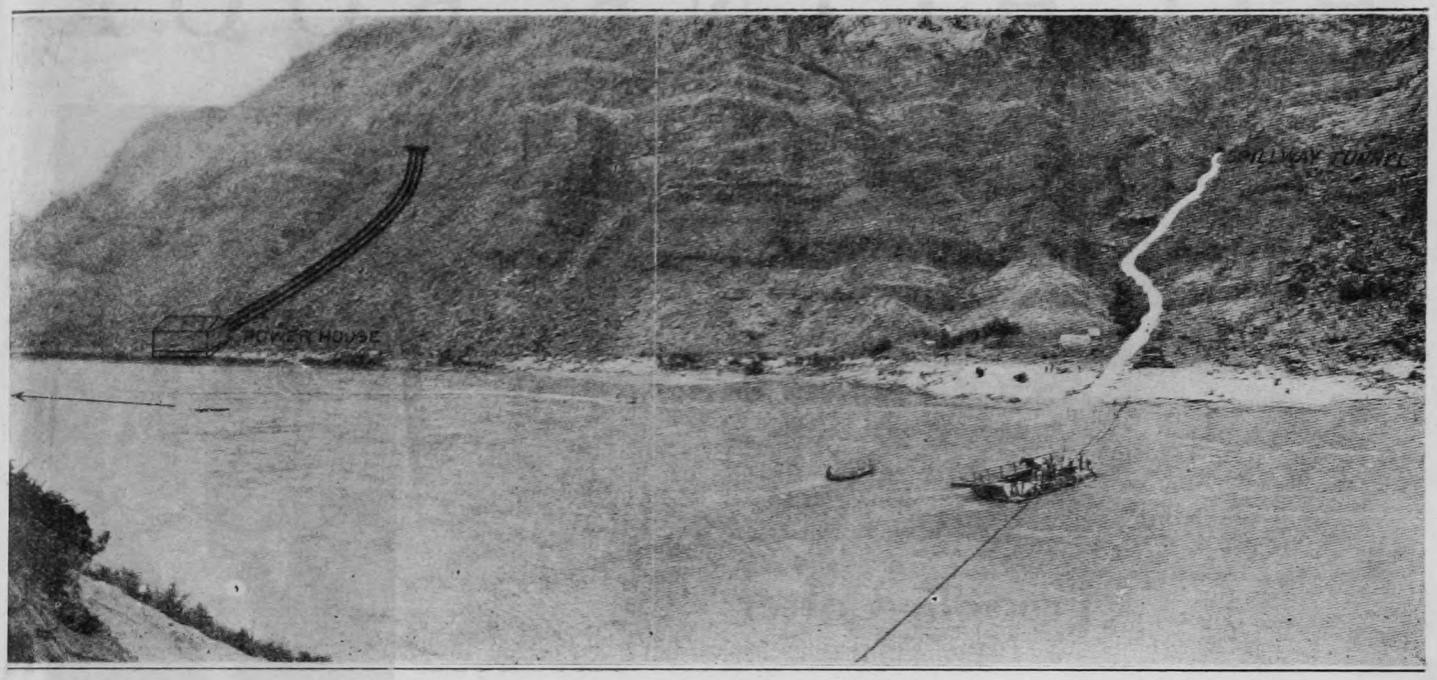
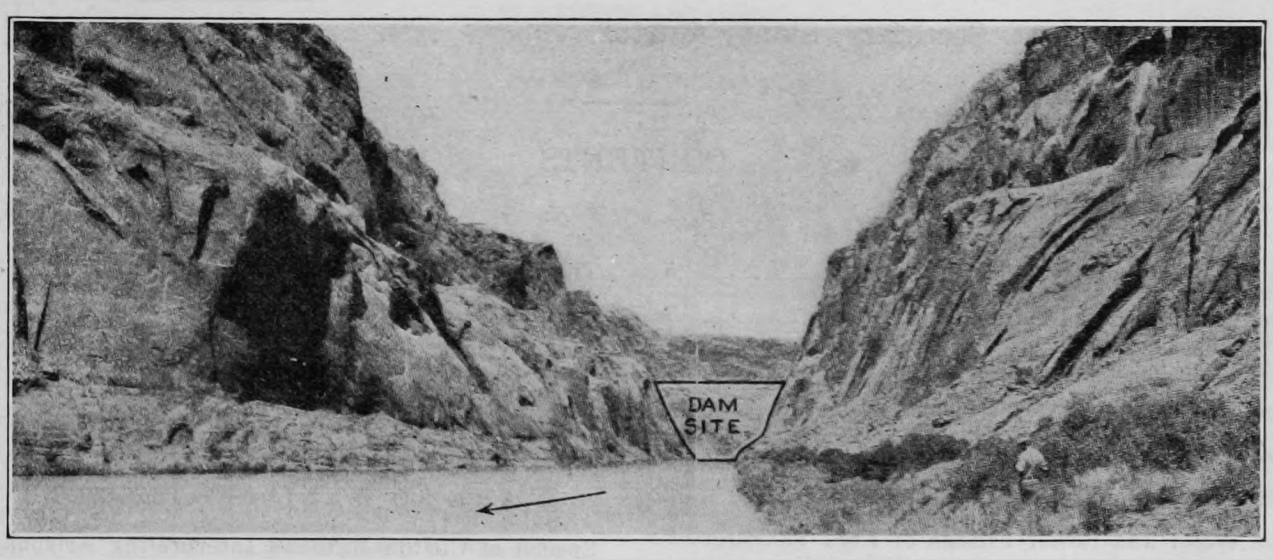
FRED T. COLTER, Publisher





Glen Canyon Dam Site, 4 miles above Lee's Ferry, Colorado River. Above the Grand Canyon, this is the chief storage dam site of the Glen-Bridge-Verde-Highline filings and projects. Water released here will be diverted into the Arizona Highline Canal either (1) by a diversion dam at Bridge Canyon, 256 miles below on the river, or (2) by tunnel from the Glen site to the head of the Verde River above Clarkdale. While the Bridge Canyon route is preferable, either route is feasible and will irrigate the same area, 4,455,000 acres in central and southern Arizona and 6,000,000 acres with use of reflow waters. 5,000,000 electric horsepower will be made on these projects and associate dams. This power was and is combined with and made subsidiary to the irrigation development for financing it in Senator Colter's filings on these projects as trustee for Airzona, and will far overpay all costs of construction, amortization, operation and maintenance.

HIGHLINE BOOK

Published by - - - - - Fred T. Colter
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1934

ARIZONA HIGHLINE RECLAMATION ASSOCIATION

Founded 1923

PATRIOTIC — NON-PARTISAN — NON-PROFIT

Fred T. Colter
President

Headquarters . . . . . Phoenix

Asst. Secretary, Sidney Kartus

FRED T. COLTER

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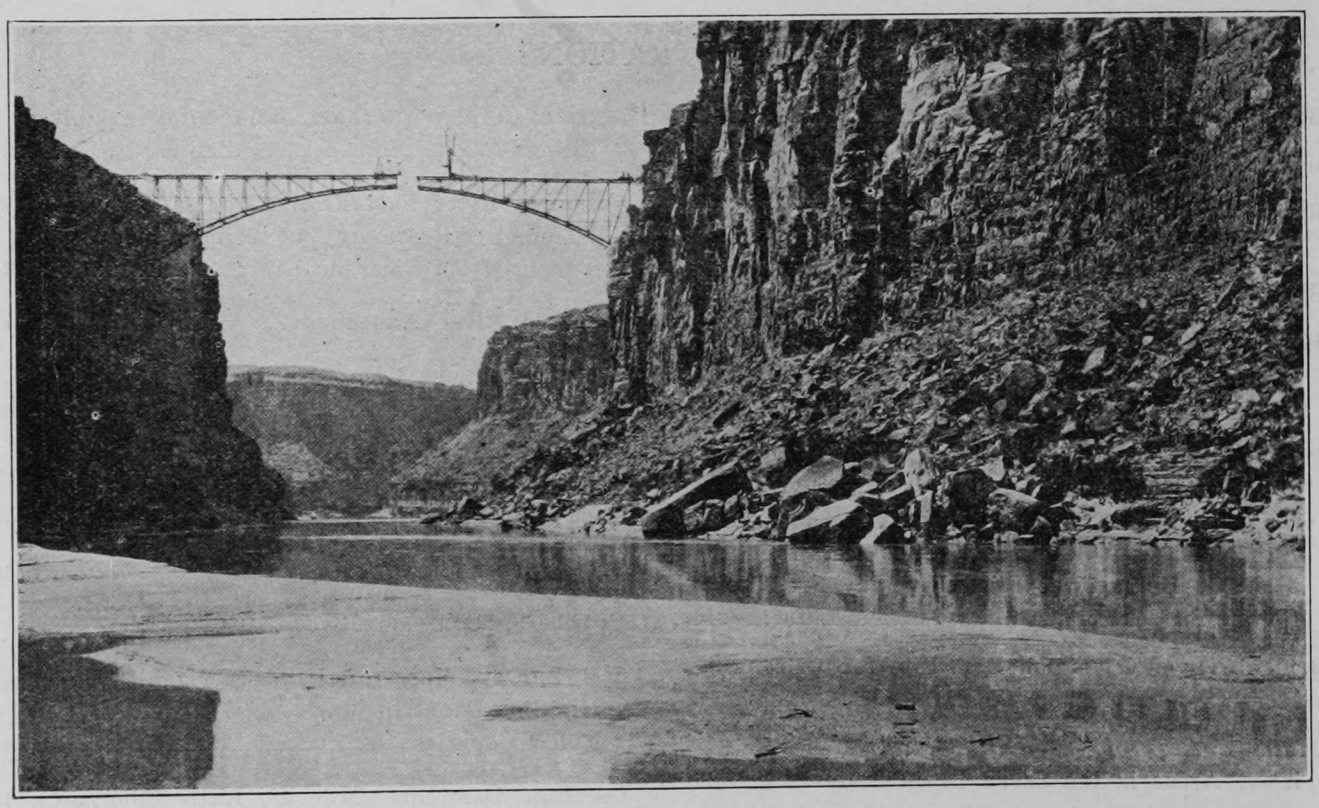


Lee's Ferry Bridge, Grand Canyon, Glen Canyon Dam Site is 4 Miles Up-River From This Point

FOREWORD

This Highline book is needed now and in the future for information and as a guide and is a summary of outstanding facts and events pertaining to the moral, physical, constitutional, legal, engineering aspects and political economics of water resources, with special regard to the Colorado River system and Arizona, and the twelve years unparalleled struggle of the people of Arizona and the trustee to protect and develop Arizona's only water resources, the Colorado River system, of which Arizona contains the body and the backbone in the Grand Canyon.

The objects of this publication, and of the trustee and the associations he represents have been and are:

(1) To protect and properly develop all the water resources of Arizona, most of which are included in the water filings the trustee has made for the people of Arizona, of which water rights, filings and sites the Glen-Bridge-Verde-Highline Reclamation project, which will develop 5,000,000 horsepower and irrigate 6,000,000 acres with reflow water use, is the major project and key upon which entirely hinges the present and future water supply and prosperity of Arizona and the beneficial, economical, maximum development of the Colorado River, and

(2) To further the $350,000,000 P W A Loan application made by the trustee for the people for construction of the project and to perfect irrigation and power water districts thereunder, and

(3) To continue due and legal diligence in keeping up the Colter water and power filings for and on behalf of the people of Arizona which were initiated in 1919 and the water filings made by Fred T. Colter beginning in 1923, which water filings therein combine the power to highest altitude canal diversion for maximum irrigation in Arizona, making irrigation superior to power, on which filings due and legal diligence has been continued by the trustee, and the publication of this Highline Book by the trustee and those assisting is further such diligence.

Arizona's rights were safeguarded in the United States Supreme Court, but to keep up these safeguards these water filings and due diligence must be continued to the end that the power must be kept combined to the maximum irrigation, and that Arizona must continue to refuse to compact away these rights to Mexico and the power monopolies through the Arizona Colorado River Commission, legislators or initiated petitions of the people, or by allowing the building of solely power dams in or near the Grand Canyon section of the river uncombined with highest elevation canal diversion for maximum irrigation in Arizona.

All these vital points in maintaining Arizona's water filings, rights and sites and lands thereunder must be alleged in and out of court. This the trustee has done since 1922, besides giving his entire fortune and time aided by thousands of patriots, and we extend our profound gratitude to those who so loyally gave their time and finances for this their great cause in the past and to those who will in the future.

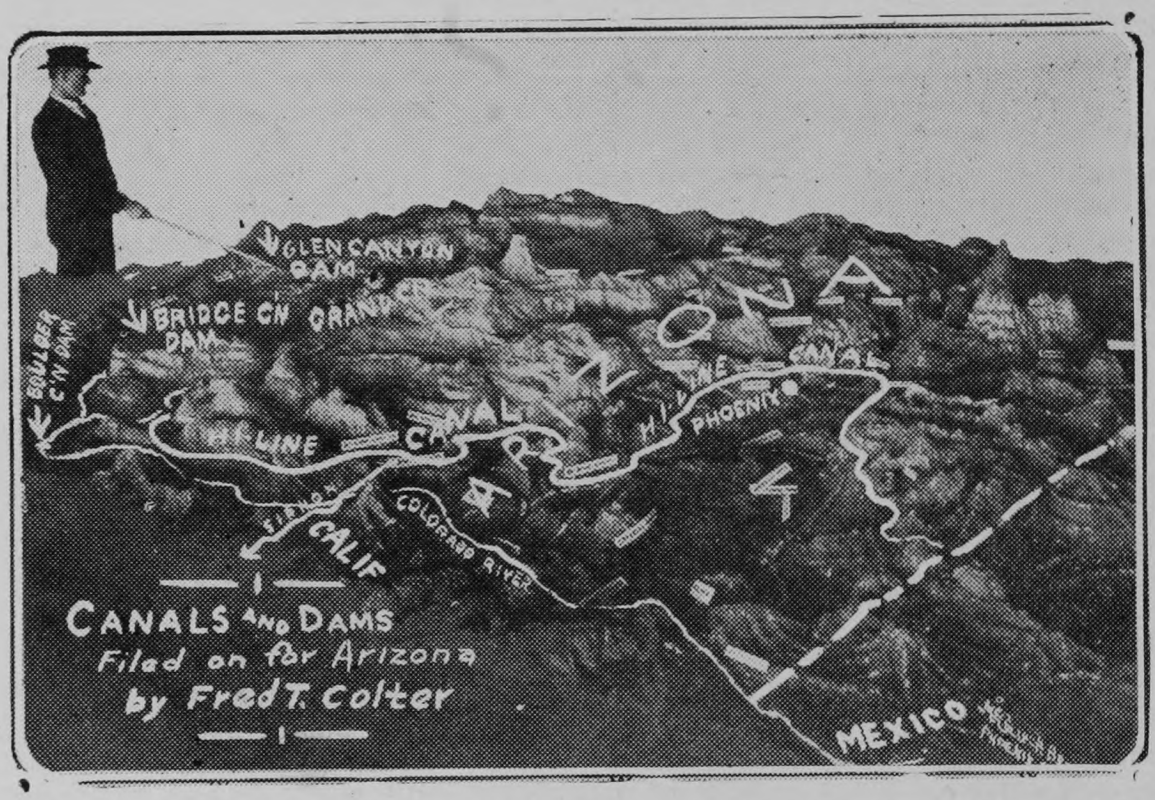
Relying on divinity in this most crucial time we plead solemnly, that with fixed faith and courage, and with concern for originality in govern-

ment and politics, we continue to safeguard and develop Arizona's great rights which we have won against the most outstanding odds and against the unpatriotic and ruinous Santa Fe Compact and its equivalents which attempted to deed seven-eighths of Arizona's only water to Mexico, separating and leaving alone the power in Arizona to be monopolized, which compacts would have subverted our federal constitution and water laws, menaced our national defense, and ruined the development of Arizona and the Colorado River. To counteract such odds in the future as in the past, Arizona holds the most perfect fundamental position ever known, morally and physically, from a constitutional, water law, and engineering standpoint, to protect and develop herself, the Colorado River, and the water resources upon which all human, animal, vegetable and mineral life subsist.

Fred T. Colter

Publisher and Trustee for State of Arizona and Water Users under said Projects.

President, Arizona Highline Reclamation Association and Glen-Bridge-Verde - Highline Pre-organization Irrigation and Power District.



Relief map of Arizona at State Fair Grounds, showing Glen-Bridge-Verde-Highline Projects for irrigating 6,000,000 acres in Arizona and manufacturing 5,000,000 electric horse power combined with this irrigation development for financing it. Standing is Senator Colter, trustee for the highline water filings and projects, president of the Arizona Highline Reclamation Association and of the pre-organization Glen-Bridge-Verde-Highline Irrigation and Power District of 3,000,000 acres founded in 1925.

FRED T. COLTER

By SIDNEY KARTUS

Fred T. Colter made the water filings as trustee for the people of Arizona on the Glen-Bridge-Verde-Highline Projects and some thirty others throughout Arizona, establishing thereby Arizona's water rights in the Colorado River, for municipal use and for irrigating 6,000,000 acres and generating 5,000,000 electric horsepower combined with this irrigation development for financing it.

On November 10, 1933 he made as trustee a $350,000,000 PWA loan application for the construction of these projects and has led in maintaining legal due diligence to and keeping up these filings and water rights.

Fred T. Colter, trustee for the Highline, was born in frontier Arizona in 1879, at Nutrioso in the White Mountains on the heads of the Little Colorado, Salt and Gila Rivers. His father, James H. G. Colter, in 1871 left Eau Claire, Wisconsin, and brought the first reaper into Arizona, trailing it from rails-end at Topeka, Kansas. His intentions were to raise grain for supplying the mounts of the United States cavalry then stationed in forts thoughout Arizona to protect the pioneer settlers against recurrent Apache outbreaks which did not end until Geronimo's surrender in 1886. In Round Valley near the present site of Springerville James H. G. Colter put land under irrigation with water diverted from the Little Colorado River.

Near Round Valley on Rudd Creek he married Rosa Rudd who had crossed the plains from Arkansas, in a covered wagon with her father, Dr. Rudd, physician, lawyer and first probate judge of Apache County. After developing and selling his first irrigated ranch, James H. G. Colter moved to, founded and reclaimed nearby Nutrioso at the mouth of Colter Creek where Frederick Tuttle Colter was born February 2, 1879. The Tuttle family, from which Fred Colter's paternal grandmother was directly descended, first came to America in 1628 on the ship Planter from the ancestral home in Tuttlefield near London. A member of the Tuttle family donated the original homestead as a site for Yale University, and fifteen presidents of that institution have been members of the Tuttle family. Fred T. Colter's ancestry is also traced to Jonathan Edwards and other distinguished early American stock, and to the royal Stuarts of Scotland.

James H. G. Colter utilized the waters of the Nutrioso Creek and Colter Creek at the head of the Little Colorado River to develop another irrigated settlement. Bishop Flake, of the Mormon Church, for whom the town of Snowflake is in part named, purchased Nutrioso from James H. G. Colter, who vacated at once although the purchase price, which was to be paid in cattle, was not delivered until the following year when the stock were driven overland to Arizona from Utah, swimming the main Colorado at Lee's Ferry, a chief point of entry for the considerable early-day Mormon migration into this state. It was in this bold and hardy atmosphere of the pioneer West that Fred T. Colter was born and reared.

James H. G. Colter then moved just across the mountain divide on the head of the Gila River and settled Alma, around which occurred many depredations by Apache Indians and outlaws. At this place Fred T. Colter as a child was under Indian fire when his father's ranch was besieged by a band of Apache warriors under Vittorio and Geronimo. James H. G. Colter accumulated a fortune by selling his Alma and adjoining ranches, but due to Indian depredations and bank failures, the father became so reduced in circumstances that at the age of ten Fred T. Colter had to help in the support of the family.

At twelve he became a cowpuncher, and soon a top-hand and broncho rider. After may years of hard work he became a wealthy businessman, cattleman and reclamationist, having earned his start through working for others, eventually becoming patron or cow wagon boss for W. H. Phelps who gave Colter his start, and years of lonely riding for himself in the White Mountains on the heads of the Little Colorado, Gila and Salt Rivers in the open range days when there were no corrals or pastures, when cattle and horses were wild as deer. In his work Colter became a champion rider and roper.

In 1900, Fred T. Colter, after spending one year feeding and pasturing 1200 head of cattle, trailed them from Arizona on account of drouth to Amarillo, Texas, in the Pan Handle. The trip through the Pan Handle demonstrated to him the advance of the homesteaders and success in farming in the former cattle ranges, and the advantages of agriculture and irrigation. After disposing of the cattle, he returned to Round Valley and commenced a large-scale land and irrigation development centering in Apache County, in connection with his livestock business.

He eventually constructed six irrigation reservoirs on the heads of the Little Colorado River, with many canals, and acquiring large tracts of land and many watering places developed the most extensive private irrigated farming and live-stock domain in the state with home ranch, post office and central offices at Colter, Arizona, adjoining Springerville and Eager. He owned 43,482 acres of agricultural and grazing land, and 1760 irrigated acres under the Lyman Dam near St. Johns, being the largest individual land owner under the

dam and the main contractor in its original construction. He controlled some 500,000 acres of grazing land, largely fenced and cross-fenced, and had at one time over 10,000 head of cattle and numerous other live-stock. Based on a report of Price, Waterhouse and Company, appraisers for Hunter, Dulin and Company of Los Angeles, the assets of Colter in 1921 were $1,472,010. During the panic of 1921 Colter re-financed by organizing most of his holdings into the Northern Arizona Land Company with himself as president, and selling Hunter, Dulin and Company $450,000 in bonds on the land and water assets of the company. When failure seemed to confront the stockmen and farmers of Arizona in the panic Colter had opened offices in Los Angeles and successfully refinanced after much effort. His interests also extended to the Salt River Valley where he acquired lands under the Roosevelt Project when first constructed, sending men, teams and equipment from the home ranch at Colter to prepare these lands for irrigation and cultivation.

During this period Colter served his neighbors both privately and publicly, having a long and distinguished record first as a county and later as a state official. He sat for two years as secretary of the committee which ascertained by sworn evidence the priority of water rights on the Little Colorado River, the findings of the committee being made the substance of a court decree issued by the late Judge Sloan. Colter was a member of the state constitutional convention in 1912 and one of the authors and signers of the constitution, member of the livestock sanitary board, state fair commission and for six terms was elected to the state senate from Apache County. He is now a member of the house of representatives. Senator Colter, as democratic national committeeman, had charge of both of Woodrow Wilson's campaigns in this state, and was a delegate to the Baltimore and San Francisco democratic national conventions, and member of the platform committee at the latter. In 1918, he won the democratic nomination for governor of Arizona, but lost the general election by 200 votes to Tom Campbell in the republican national landslide of that year. Colter has served as president of the Arizona Cattle Growers Association and director of the National Live Stock Association, as well as official of various other national organizations.

Colter's birth and life-long experience in the watershed of the Colorado with irrigation, conservation, erosion control, forestation in the White Mountains which contains the largest yellow pine forest in the United States, and his grazing and lumber interests, familiarized him with the water resources of the state and the Colorado River system and their development and conservation under the western water law of prior appropriation and beneficial use, while his long public experience had shown him the inter-relation between government and the proper utilization of natural resources, especially land and water, upon which the people must subsist.

When the unprecedented Colorado River Compact was drawn at Santa Fe in 1922 he at once perceived the ruin it would fasten upon Arizona, proper development of the Colorado River and the structure of the universal water law transmitted through thousands of years from the beginnings of civilization with the practice of irrigation in the valleys of the Nile and the Euphrates.

The cardinal doctrine of this ancient water law is that water cannot be owned and is subject only to beneficial use. As codified in the Roman Institutes of Justinian running water like the sea and the air is among the "**res communes**—things the property of which belongs to no person."

The rule in western United States, including Arizona, is that water cannot be owned and the only right in water is the right to its beneficial use, the prior appropriator to have the better right.

The Santa Fe Compact, however, purported to deed perpetually to Mexico in ownership Arizona's only water, the Colorado River, for irrigation of 2,000,000 acres owned directly beneath our border in Mexico by California land syndicates, and at the same time would have resulted in the monopoly of our power in the river by California power syndicates. For every acre thus irrigated under the compact in Mexico, four to five would have remained desert forever in Arizona. The utter subversion of water law and beneficial use under the compact would have been accompanied by mal-development and loss to a foreign nation of the rich land and water resources in the basin of the second largest American River, sacrificing national welfare and menacing our national defense. These grave issues Senator Colter alone grasped and taught.

He realized both the nature and threat of the Santa Fe Compact and the steps necessary both to defeat it and properly to develop Arizona and the Colorado River, and he had the courage to undertake what he understood.

Following his successful but strenuous refinancing in 1921, Senator Colter on the advice of physicians had obtained steamship tickets and passport for a recreational trip around the world, but when the Santa Fe Compact came over the wires, he cancelled his trip and ran for the state senate, was elected and led the opposition to its ratification by the Arizona legislature.

Throwing his entire time and fortune into the fight, Colter with a few loyal helpers defeated ratification of the compact by the 1923 legislature and subsequent legislatures. He introduced in the 1923 legislature Senate Concurrent Resolutions 5, 7, and 8, calling for appropriation of funds for obtaining necessary engineering data through surveys and for the making of filings in accordance therewith for using "the unappropriated water of the Colorado River for irrigation and for power within the state."

These resolutions failing of passage, Senator Colter and the Arizona Highline Reclamation Association then requested the chief executive, waiting upon him in a body, to authorize an official survey for obtaining the needed data. Governor Hunt complied and authorized the Sturtevant-Stam Survey, half of the expenses of which was paid from the governor's contingent fund and with funds of the Arizona Water Commissioner; the other half was furnished and raised by Senator Colter personally and the association. Senator Colter directed the assembling of and started this Colorado River Highline Survey. After delays and obstacles placed in the way had been removed the survey party under Sturtevant got under way. The party returned September 18, 1923 and on that day submitted to the governor and Senator Colter a report (see engineering section below) which found entirely feasible and practicable the Spencer-Bridge Canyon Diversion Dam and the Arizona Highline Canal.

On the basis of the new Sturtevant-Stam Survey data and maps and all other available engineering information, Senator Colter two days later, on Sept. 20, 1923, acting with the knowledge, consent and approval of the governor of Arizona made the first of his filings as trustee for and on behalf of Arizona and water users on dam and canal sites in the Colorado River System, of which the Glen-Bridge-Verde-Highline Projects are the key and basic features, by which the waters and power of the Colorado River and its tributaries were appropriated for irrigation of 6,000,000 acres in Arizona, and manufacture of 5,000,000 electric horse power combined with this irrigation development for financing it and which will far overpay all cost of these projects. After 1923 Senator Colter instituted several water suits which protected and established his water filings and rights for Arizona, and has successfully maintained due diligence to them as legally required during the past twelve years, and is now continuing this legal diligence.

Senator Colter's foresight and practical statesmanship in his struggle for conserving and developing the land and water resources of Arizona and the United States in the Colorado River system have been verified by the policies of President Franklin D. Roosevelt. In his message to Congress on June 8, 1934, President Roosevelt declared that millions of acres in the Northwest and Southwest on which wheat has been raised by dry farming must be returned to grass and trees or the action of the wind in removing the highly cultivated topsoil and the absence of grass-roots and consequent lowered water table would render this part of our country a man-made desert.

The appalling dust-storm, a forerunner under the conditions of similar storms, which devastated dry-farming sections of the Northwest and Southwest this spring, was a fulfillment of the long warning of agriculturists that these lands must be taken from cultivation and, as the President stated, replaced with other millions of acres.

Drouth, the worst in our history, also is now ravaging fifteen states in the middle west, killing crops and cattle, threatening a national shortage of bread and impoverishing millions of people. The replacement program, the President declared, must be undertaken together with planned utilization, mastery and development of our land and water resources and a redirection of the flow of population to replacement areas.

The most valuable, economical and feasible development in this country for utilization of our land and water resources and for carrying out President Roosevelt's water conservation program, is in the Glen-Bridge-Verde-Highline filings and projects, filed upon by Senator Colter for Arizona. These projects will irrigate in Arizona 6,000,000 acres of fertile desert land in a subtropical climate with an all-year growing season.

The fallacious thesis of agricultural overproduction has been cast aside by the current drouth. Crop failure or depletion may occur at any time due to plant disease, insect infestation, drought, wind or other natural causes. To discourage agriculture is to court famine and disaster. If drouth this year threatens our nation with famine in time of peace, what would be our fate were we at war? Every arable acre adds to the population, prosperity and power of the nation. Agriculture has always been the foundation stone of American economic prosperity.

"Unlike most of the leading nations of the world," the President stated in his message, "we have so far failed to create a national policy for the development of our land and water resources and for their better use. The extent of the usefulness of our great natural inheritance of land and water depends upon our mastery of it. . . . . When the next congress convenes I hope to be able to present to it a carefully considered national plan, covering development and human use of our natural resources of land and water over a long period of years."

In connection with this announcement, President Roosevelt sent to congress the report of his National Planning Commission, which recommended expenditure of $533,000,000 for development of the lower Colorado River, including $100,000,000 for Bridge Canyon Dam, which is the diversion dam site for the Arizona Highline Canal.

Each nation is limited in land and water, upon which depend its existence and prosperity. It was his grasp of this elemental human truth, many years before it became a national policy, conjoined with his extensive practical experience and knowledge of irrigation and devotion to the young state of his birth and its people, that enabled Senator Colter to evolve the Highline projects and supplied him the strength to defend them at all costs.

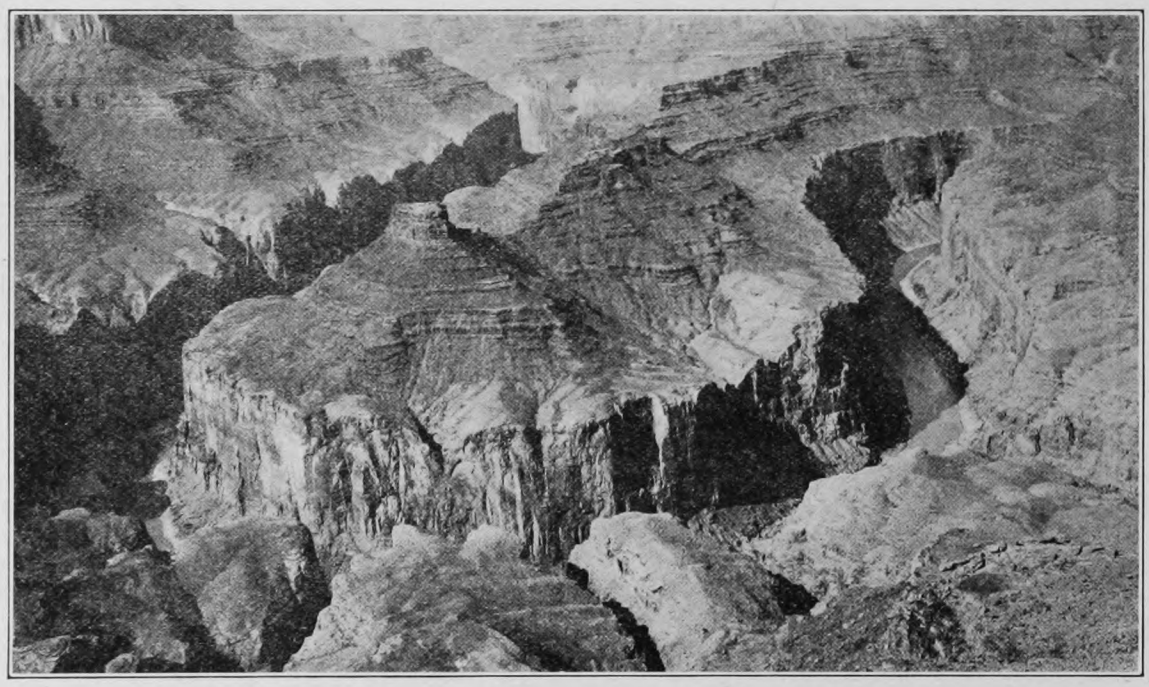
The career of Fred T. Colter may be divided into two periods. The first extends from his birth to

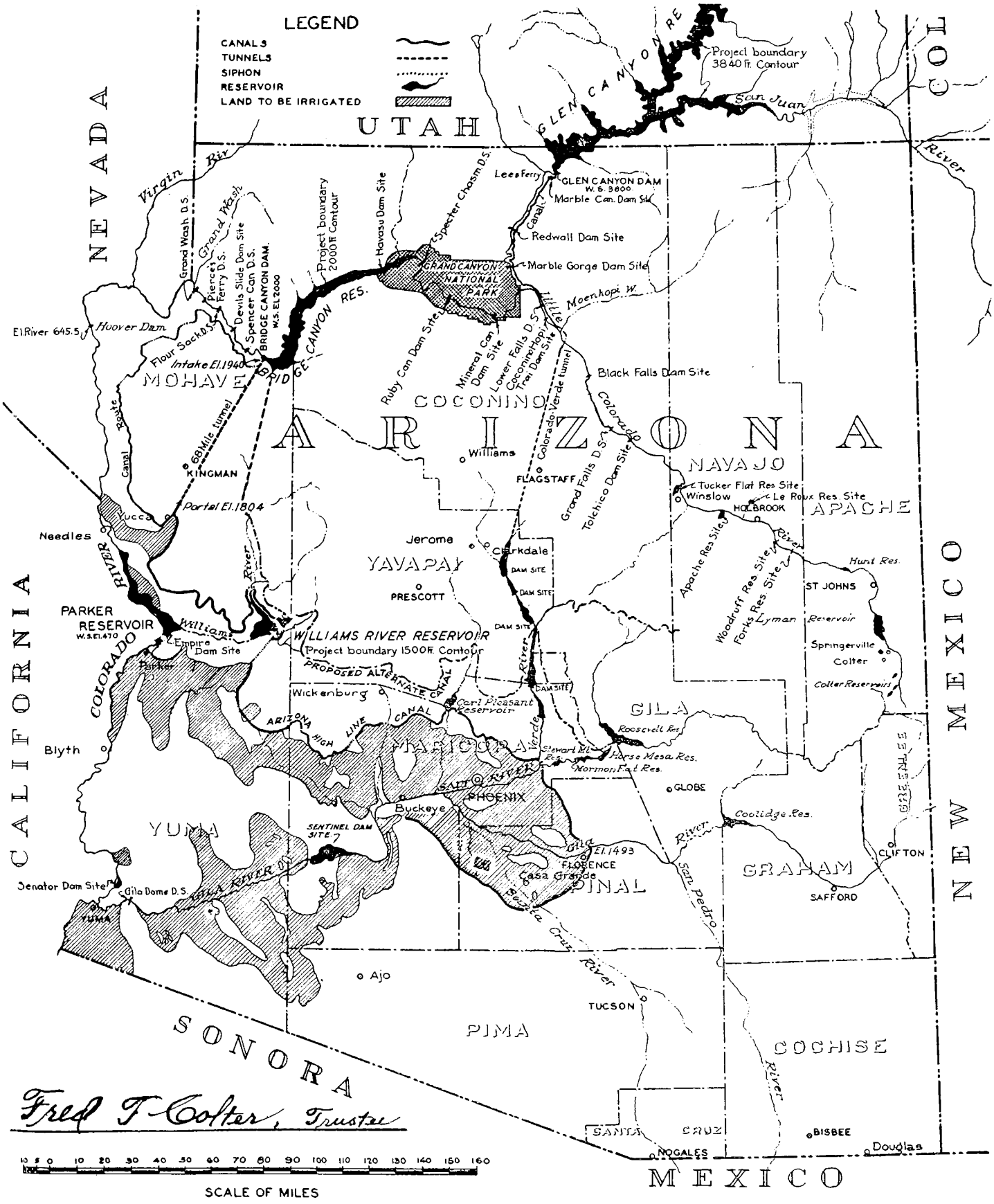
1922; the latter, from 1922 to and including the present. The early period is that of his rise through the adversities of the frontier to a position of wealth and state and national prominence as a cattleman, businessman, statesman and reclamationist. The second period, including the present, is that during which he has become an institution in this state as trustee for the Colter water and power filings and Highline projects of Arizona, which he has maintained with due diligence for twelve years, creating established and vested rights in them for Arizona, at the expense of his entire strength and all his hard-earned fortune, and against the greatest odds. Whether standing frequently alone in the legislature or earnestly addressing some private citizen, he has fearlessly and with acute perspicacity exposed, often before they were even mature, the schemes of the Colorado River enemies of Arizona within the state and without, and has denounced and thwarted them often unaided and always as leader. At the same time he has pressed steadily forward with such constructive work as surveys of the Highline projects, organization of irrigation and power districts thereunder, reports to proper officials, due legal notices and protests to adverse contenders in Mexico and California, and his $350,000,000 PWA application for construction of the projects, etc.

His qualities of courage and intellect, the long and earnest experience and study which have made him an outstanding authority on water and constitutional law and problems, his successful and practical experience as a reclamationist, his understanding of the importance and proper method of using our land and water inheritance, his untiring trusteeship of the Highline filings for the maximum development of Arizona and her chief natural resource and only water supply, the Colorado River, his fellow feeling and belief that the highest morality is that which benefits mankind, all mark Senator Colter as the leader to whom Arizona must now turn if her waters and present and future existence and prosperity are to be preserved,

> "whom neither riches nor honor can lure, whom neither poverty nor shame can affright, whom neither might nor threats can bend—he is a man."

In May, 1931, Arizona won her case in the United States Supreme Court decision in **Arizona v. California.** The court ruled that Arizona is not bound by the Santa Fe Compact, Boulder Act, or Boulder Dam, which the court allowed to be built for navigation alone and subject to Arizona's present and future water rights, and ruled that Arizona can divert water above Boulder Dam. The decision of the court that Arizona is not bound by the compact would have aided her none if the Highline filings had not been made and vested rights for Arizona created thereby. With Arizona's Colorado River rights established by the Colter water filings, it is now necessary to maintain, develop, finance and construct the Highline Projects thereunder and quickly put our waters to use thereby in Arizona. To accomplish this Senator Colter must be at the helm, to engineer and lead this development to its completion, especially in such a crisis as now exists in the state and nation. Arizona is fortunate that there is such a one to whom she can turn.





Map showing dam and canal sites filed on by Fred T. Colter with the Arizona Water Commission and the Federal Power Commission for Arizona and Water Users under said projects. First filings made in 1923. Projects to develope 5,000,000 electrical horse power and irrigate 4,455,000 Acres of land.

HIGHLINE BOOK

THE $350,000,000 PWA HIGHLINE LOAN

On November 10, 1933, Senator Fred T. Colter as trustee for Arizona and water users made the $350,000,000 PWA loan application, now pending in Washington, for construction of the Glen-Bridge-Verde-Highline Projects filed upon by him beginning in 1923 for and on behalf of Arizona and water users under these projects. Shortly thereafter he opened and is now maintaining headquarters at 113 North Second Avenue, Phoenix, for pressing the loan application, perfecting organization of irrigation and power districts under the projects, maintaining and protecting these filings and projects with due diligence and expediting their construction, which, if necessary, can be financed through ordinary municipal-irrigation district bonds.

President Roosevelt on June 4 sent to congress the report of the National Planning Commission. The report recommended expenditure of $533,000,000 for the development of the lower Colorado River Basin, including $100,000,000 for Bridge Canyon Dam.

STATEWIDE ORGANIZATIONS AIDING

Aiding Senator Colter as trustee in this work are his assistants and three large patriotic and non-partisan state-wide organizations of which he is president now as he has been since their incipience.

These are (1) the Arizona Highline Reclamation Association, founded in 1923, the history and public purposes of which are familiar to all Arizonans; (2) the Glen-Bridge-Verde-Highline Preorganization Irrigation and Power District established in 1925 to reclaim the lands under the Highline, consisting of some 4,455,000 acres under the projects, these lands having been homesteaded and patented mainly by ex-service men; and (3) the Arizona Colorado River Reclamation Club for perpetuating the Colter filings and providing monetary support to that end. The central office of these three organizations is also located at the Phoenix office.

THE PUBLICATION

The **Highline** book is published from the central office by Fred T. Colter. **Senator Colter** is also preparing to issue a regular publication, also entitled **Highline,** which will serve the same purposes outlined above and others more general, particularly the reclamation of our natural resources and our people who must subsist upon them. These purposes will entail a broad concern and vigorous expression in all political, social and industrial matters. The name **Highline** does not refer alone to the great canal upon which Arizona's present and future depends, but to the highest in government, education and the benefit of man. Printing of the **Highline** book is by **The Messenger** which has been unequaled among state newspapers for its consistent support of the Highline filings and projects during the past twelve years.

This present **Highline** book contains invaluable maps, analyses, comparisons, tables, and cost estimates of the Colter water filings and Highline Projects, summarization of authoritative state and federal engineering reports thereon, and other essential data on the water resources of Arizona and their protection and proper development. This book should be preserved by its readers for its great reference value.

THE WATER AND POWER FILINGS OF FRED T. COLTER, AS TRUSTEE FOR ARIZONA AND WATER USERS ON THE GLEN-BRIDGE-VERDE-HIGHLINE PROJECTS, WITH DESCRIPTION OF ARIZONA HIGHLINE CANAL IRRIGATION SYSTEM AND PRINCIPLES

Beginning September 20, 1923, **Senator Colter** as trustee made the combined water and power filings before the Arizona Water Commissioner and Federal Power Commission, and subsequent filings additional, supplementary and amendatory thereto, on some thirty dam and canal sites throughout Arizona by which all unappropriated waters and power of the Colorado River and its tributaries were appropriated for and on behalf of Arizona and water users under these projects for irrigating 6,000,000 acres in Arizona and manufacturing 5,000,000 electric horse power combined with and subsidiary to this irrigation-municipal development for financing it. This combination of irrigation and power, which **Senator** Colter expressly stipulated in each filing, is and will continue to be a most important asset and indispensable safeguard in the consummation and protection of Arizona's water filings and water rights, as the revenue from sale of the vast power of the Colorado River will far overpay the cost of constructing, operating and maintaining the projects. The value of the 5,000,000 electric horse power of these projects, including that made in the Grand Canyon and on the Highline Canal, is eighteen billion dollars.

An idea of the wealth and enormity of the Highline's 5,000,000 electrical horse power may be gained by a comparison with the Salt River Valley Project, the four combined dams of which manufacture only 113,000 horse power.

Highline the Key to Present and Future Arizona Prosperity

The key and basic features of the Colter water filings for Arizona are the Glen - Bridge - Verde-Highline Projects, upon which hinge present supplemental water supply for completed Arizona reclamation projects and municipalities, all now short of water, and preservation and development of Arizona's future and only water supply, the Colorado River. The title of the projects indicates the Glen Canyon Storage and Power dam, located at the head of the Grand Canyon, four miles above Lee's Ferry, and the Bridge Canyon Diversion Dam, 236 miles below on the river in lower Grand Canyon, for diverting the stored water into the Arizona Highline Canal; and the Colorado River-Verde Tunnel Route also filed on by Senator Colter as an alternate. Both routes lead into the Arizona Highline Canal, and will irrigate the same area thereunder.

Below Glen Canyon Dam, the storage dam for either route, small supplemental power dams will completely take up the fall of the Colorado or the Verde, whichever river is used. On the Highline Canal itself, 600,000 electric horse power will be manufactured at several power drops in the valley area to be irrigated by water "first used for power development at the Glen Canyon Dam, a dual use and efficiency heretofore unsurpassed in the history of water economy for irrigation and power." The power made at these drops will be virtually at the consumer's door, saving transmission costs and loss. If necessary, all dams, reservoirs, canals and other reclamation sites and works for these projects can be located entirely within the borders of Arizona. Forty-two per cent of the drainage basin, ninety-two per cent of the power and practically all the dam and reservoir sites of the Colorado River are in Arizona.

Highline Solution of All Water Disputes and Shortage in Arizona and Entire Basin

The principle of the Highline Projects is highest diversion canal irrigation of maximum acreage in Arizona, with the power of the Colorado River combined with this irrigation-municipal development for financing it. From such proper application of waters at high elevations in the upper reaches of the Colorado River System in Arizona the resulting multiplicity of re-use of reflow waters will serve all dams and land below, reclaiming thus all available land in Arizona and eventually in California and Mexico as well.

Under the Highline existing water disputes and water shortage such as that between the Salt River Valley and Paradise-Verde Projects and between upper and lower users on the same streams within Arizona will be ended. The vast arid but fertile desert valleys of central and southern Arizona will be irrigated, while the low-cost power of the projects will inexpensively pump reflow water and reclaim by pumping large areas of upland and mountain valleys. As every re-use of water is recounted at law, the Colorado River that now measures 24,000,000 acre feet inclusive of present used waters, will come to measure 100,000,000 acre feet in use and increasingly more through the Highline Projects in Arizona, which with plenitude of irrigation and municipal water and power will become the most prosperous state in the union, while at the same time maximum beneficial use of the Colorado River will result not only for Arizona but also for California and Mexico and all other political entities concerned.

The Arizona Colorado River Highline Projects are the largest, richest and most feasible and economical reclamation and power projects in the world. Nowhere else is there another Grand Canyon through which a great river falls steeply between narrow walls which afford numerous dam and reservoir sites in solid rock where the rushing water can be stored, harnessed for producing 5,000,000 electric horse power and released to irrigate by gravity 6,000,000 acres of flat fertile desert land lying 1,000 feet below the primary sites in a subtropical climate with an all-year growing season.

The fall of the water to the land, as it is released for irrigation, manufactures the power which will overpay all costs of the Highline irrigation and power development.

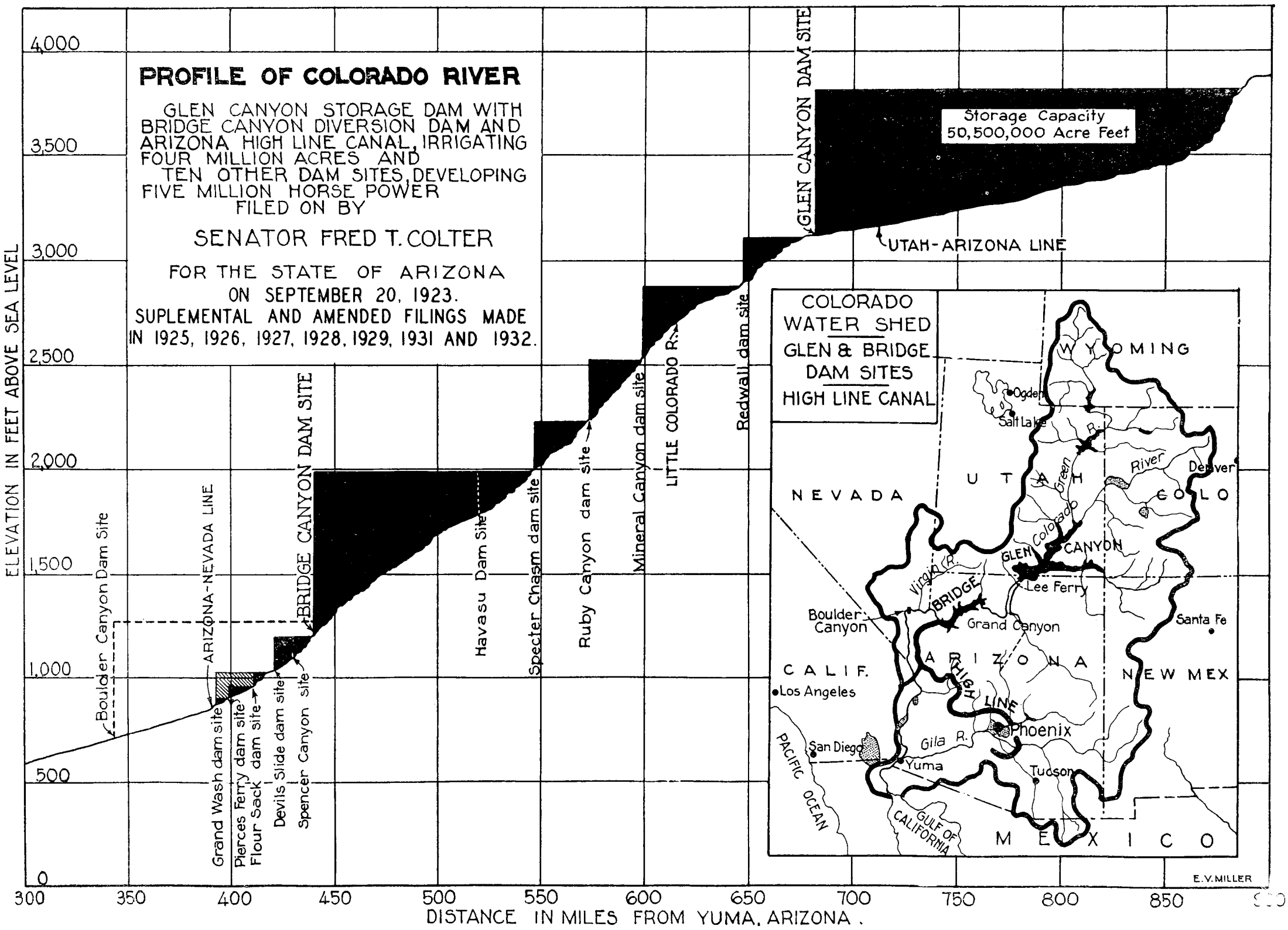
Vast Indirect Benefits to Arizona

No river on the North American continent offers such enormous opportunities for this double use of its waters as does the Colorado. The indirect benefits in Arizona will rival the worth of the billions of dollars in crops which 6,000,000 acres under the Highline will produce annually. With low-cost power, transportation, industry and mining, milling and smelting of low and high-grade ores, together with all business in Arizona, will extend immensely. Population will increase twenty-fold, all present property advance in value proportionately, while taxes decrease 75 per cent. At the same time the state unemployment situation will be solved, and a great home market created for all state agricultural and industrial products and services, benefiting professional and business men, labor and all our people alike. Every city and business in Arizona will prosper when construction of the Highline begins, as present urban centers will be the sources from which construction of the projects and development of the great land area and many homes thereunder will be supplied.

Chart of the Colter water and power filings which have created these vested rights for Arizona follows:

CHART OF COLTER WATER AND POWER FILINGS IN COLORADO RIVER SYSTEM FOR ARIZONA, BEFORE ARIZONA WATER COMMISSIONER AND FEDERAL POWER COMMISSION, INCLUDING FILINGS AMENDATORY AND SUPPLEMENTAL THERETO

A-413 T. 28 N. R. 13 W R-132	20,000 sec. ft. 22,500,000 acre ft.	Irrig-Power-Mng-Municipal-Mfg-Domestic	Fred T. Colter on behalf of State of Arizona and water users under projects.	9/20/23
R-133 T. 40 N. R. 8 E	52,000,000 acre ft.	Irrig-Power-Domestic-Municipal	Fred T. Colter on behalf of State of Arizona and water users under projects.	9/20/23
R-188 T. 27 & 28 N. R. 12 W.	10,000,000 acre ft.	Irrig-Domestic Power	Fred T. Colter on behalf of State of Arizona and water users under projects.	5/11/25
R-228 T. 40 N. R. 8 E	50,501,260 acre ft.	Irrig-Domestic Power-Flood Control	Fred T. Colter on behalf of State of Arizona and water users under projects.	3/17/26
R-229 Redwall Canyon dam site	304,000 acre ft.	Irrig-Domestic Power-Flood Control	Fred T. Colter on behalf of State of Arizona and water users under projects.	3/17/26
R-230 Mineral Canyon Reservoir	649,220 acre ft.	Irrig-Domestic Power	Fred T. Colter on behalf of State of Arizona and water users under projects.	3/17/26
R-231 Ruby Canyon Reservoir	202,480 acre ft.	Irrig-Domestic Power	Fred T. Colter on behalf of State of Arizona and water users under projects.	3/17/26
R-311 Bill Williams	1,600,000 acre ft.	Irrig-Domestic Power	Fred T. Colter on behalf of State of Arizona and water users under projects.	9/25/26
R-232 Specter Chasm Reservoir	129,990 acre ft.	Irrig-Domestic Power	Fred T. Colter on behalf of State of Arizona and water users under projects.	3/17/26
R-233 Havasu Reservoir	363,000 acre ft.	Irrig-Domestic Power	Fred T. Colter on behalf of State of Arizona and water users under projects.	3/17/26
R-234 Bridge Canyon Reservoir	10,804,000 acre ft.	Irrig-Domestic Power Flood Control	Fred T. Colter on behalf of State of Arizona and water users under projects.	3/17/26
R-235 Devil's Slide Reservoir	70,840 acre ft.	Irrig-Domestic Power	Fred T. Colter on behalf of State of Arizona and water users under projects.	3/17/26
R-236 Flour Sacks Reservoir	226,920 acre ft.	Irrig-Domestic Power-	Fred T. Colter on behalf of State of Arizona and water users under projects.	3/17/26
R-237 Pierces Ferry Reservoir	566,000 acre ft.	Irrig-Domestic Power	Fred T. Colter on behalf of State of Arizona and water users under projects.	3/17/26
R-238 Grand Wash Reservoir	169,060 acre ft.	Irrig-Domestic Power	Fred T. Colter on behalf of State of Arizona and water users under projects.	3/17/26
A-647 Bridge and Glen Canyon	23,000 sec. ft.	Irrig-Domestic Power-Mining	Fred T. Colter on behalf of State of Arizona and water users under projects.	3/17/26
A-726 Marble Gorge Reservoir	23,000 sec. ft.	Mining-Domestic	Fred T. Colter on behalf of State of Arizona and water users under projects.	6/10/27
R-272 Marble Gorge Reservoir	50,000,000 acre ft.	Power-Irrig-Domestic	Fred T. Colter on behalf of State of Arizona and water users under projects.	6/10/27
R-344 T. 10 N. R. 19 W. A-1004 Empire Dam	19,830,000 acre ft. All flow	Irrig-Power-Mining-Manufacturing	Fred T. Colter on behalf of State of Arizona and water users under projects.	7/29/29
R-346 T. 10 N. R. 19 W. Parker Dam	1,500,000 acre ft.	Power-Irrigation	Fred T. Colter on behalf of State of Arizona and water users under projects.	7/29/29



As depicted in the above map, the small supplementary power dams of the highline filings and projects completely take up the fall of the river in the Grand Canyon between and below the Glen Canyon Storage Dam and Bridge Canyon Diversion Dam for the Arizona Highline Canal. The heavy outer black line on the inset cut is the boundry of the Colorado's drainage basin. By consulting the distance in miles from Yuma at the foot of the map, the elevation on the left side and the names of the dam sites in the Grand Canyon, in connection with the inset map of the drainage basin, the location, basic features and principles of the highline filings and projects can be more readily determined.

R-348 T. 6 S. R. 21 W. Senator Dam	3,440,000 acre ft.	Industrial-Irrig-Power-Domestic	Fred T. Colter on behalf of State of Arizona and water users under projects.	7/29/31
A-1262 T. 10 N. R. 19 W. Glen-Bridge-Marble Gorge Highline and Verde Tunnel	55,000,000 acre ft.	Irrig-Domestic-Municipal-Power Mfg	Fred T. Colter on behalf of State of Arizona and water users under projects.	7/29/31
FILINGS ON COLORADO RIVER AND GILA RIVER				
R-347 T. 5 S. R. 9 W. Sentinel Dam	3,200,000 acre ft.	Irrig-Domestic Power	Fred T. Colter on behalf of State of Arizona and water users under projects.	7/29/29
A-345 Gila Dome Dam	5,600,000 acre ft.	Irrig-Domestic Power	Fred T. Colter on behalf of State of Arizona and water users under projects.	7/29/29
A-346 Parker Dam	1,500,000 acre ft.	Power	Fred T. Colter on behalf of State of Arizona and water users under projects.	10/2/29
A-1022 Underground Water	80,000 sec. ft.	Irrig-Domestic Mng-Manf-Power	Fred T. Colter on behalf of State of Arizona and water users under projects.	10/2/29
A-862 Sec. 7 T. 10 N. R. 13 W. Williams Dam, Glen-Bridge Dam and Highline Canal	All flow	Irrig-Domestic Power	Fred T. Colter on behalf of State of Arizona and water users under projects.	9/25/28
FILINGS ON LITTLE COLORADO RIVER				
A-1003 Forks A-1022 Woodruff	300,000 acre ft. 200,000 acre ft.	To irrigate 400,000 acres	Fred T. Colter on behalf of State of Arizona and water users under projects.	7/26/29
R-343 Tolchico-Grand Falls, Black Falls, Coconino Hopi Trail, Lower Falls	400,000 acre ft.	To irrigate 100,000 acres	Fred T. Colter on behalf of State of Arizona and water users under projects.	7/26/29

THE DROUTH AND PRESENT WATER SITUATION IN ARIZONA

What has the Highline to do with the present serious water situation and drouth throughout Arizona? It is no secret that all projects and municipalities throughout Arizona are now seriously short of water and would be in years of normal rainfall, none more so than the Salt River Valley Projject. With only a total of some 300,000 acre feet stored in the four dams of the Salt River Valley Project and nearly 3,000 acre feet of this being used daily, a dearth of water faces the valley in the summer, the season of heaviest water draft. Calamity and loss of millions of crops threatens unless the drouth is broken by hard rains. The life-savings, home and family life of the great majority of persons in the Salt River Valley are equally in danger with that of the farmers on whose prosperity, purchasing power and water supply they in turn depend.

Salt River Valley Water Users' Suits

A bitter water battle is being waged in the courts and out between the Salt River Valley and the Paradise-Verde Projects. The Paradise-Verde Project has maintained with due diligence its superior filings on the flood waters of the Verde River, and has received a $19,000,000 PWA loan for construction of the project which has already commenced. The Salt River Valley Project alleges **that there is not enough water in both rivers, for all land included within the Salt River Project alone** much less for 85,000 acres additional which will be brought in under the Paradise-Verde Project. In further confirmation of this shortage, the Salt River Valley Water Users" Association in June instituted suit against the adjacent Roosevelt pumping project to enjoin "excessive" pumping of water by the latter under a thirteen-year-old contract from wells located on lands included within the association. Such a suit looks to but one end. Because of lack of water a certain proportion of present irrigated lands either in the Salt River Project or the pumping district must revert to the desert. A similar suit of identical purpose against the Buckeye Project is now being prosecuted by the Salt River Project.

It is plain that water shortage has already seized Arizona like a blight although it is an infant state with a population of less than half a million. This situation exists not only in the Salt River Valley Project and municipalities around Phoenix but also throughout Arizona on all tributaries of the Colorado River, our ony water, in

the San Carlos, Gillespie, Carl Pleasant Dam Projects, and all other projects and towns. Is Arizona's growth to end and its present fall into ruin? If there is not water enough for present irrigation, and none for the future, Arizona is doomed to stagnation and decline.

Highline Essential for Tucson, Safford, Nogales, Entire State

The answer and solution to this acute danger is the Highline which will eliminate present water disputes and shortage in Arizona. With the water diverted either via the Glen Canyon-Bridge Canyon route or the alternate Colorado River-Verde Tunnel route, the Highline Canal will cross all tributaries of the main Colorado in central and southern Arizona, the Bill Williams, Hassayampa, New River, Agua Fria, Verde, Salt, San Pedro, Santa Cruz and Gila rivers and lesser tributary streams. In addition to irrigating millions of acres of desert land direct from the Highline canal, supplemental water from the main Colorado River can be released from the Highline Canal into these tributary streams for supplying established projects deriving water from them, allowing water users and landholders in the upper reaches of the streams to take all the water they can use, which will eventually come back to the lower land as reflow.

Crossing the Salt River a short distance above Granite Reef Dam, for instance, the Highline will pour any water deficiency into the canals of the Salt River Project and the present water shortage of the Salt River Valley will never recur. All lands under the Paradise-Verde project which will be unable to obtain water can be supplied direct from the Highline Canal. Crossing the Gila River above the San Carlos Project, the Highline Canal will supply that project and release Gila waters now used by it for irrigation of 100,000 acres in the Safford country that otherwise will remain desert, and from which when irrigated, reflow waters will find their way for re-use on lower lands; in the same manner, water from the Coolidge Dam can be diverted to Tucson for reclaiming thousands of fertile acres surrounding that city, which can never be irrigated in any other way, and for municipal supply. Such exchange in water is permissible under Arizona law.

The comprehensive Colter Highline filings and projects of Arizona, as above outlined, represent maximum beneficial development of the land and only water resources of Arizona in one great system of which the Glen-Bridge-Verde-Highline Project is the hub.

The millions of acres irrigated under the Highline Canal will stretch roughly west from Wickenburg to the Colorado River, southeast to Casa Grande, Florence, and Tucson, north of Ajo and west to the Mexican border and Yuma, and will afford Arizona a huge contiguous irrigated area with an immense subserving wealth of electric power, large enough to finance itself, to support its own packing, canning, and classifying plants, to secure favorable freight rates and similar advantages open to a rich and populous state. Under the Highline, Arizona with its matchless climate, will advance to a high civilization through maximum beneficial use of its land and water resources, which are the base of existence and prosperity in every state. Without the Highline, both this and what Arizona now has is lost.

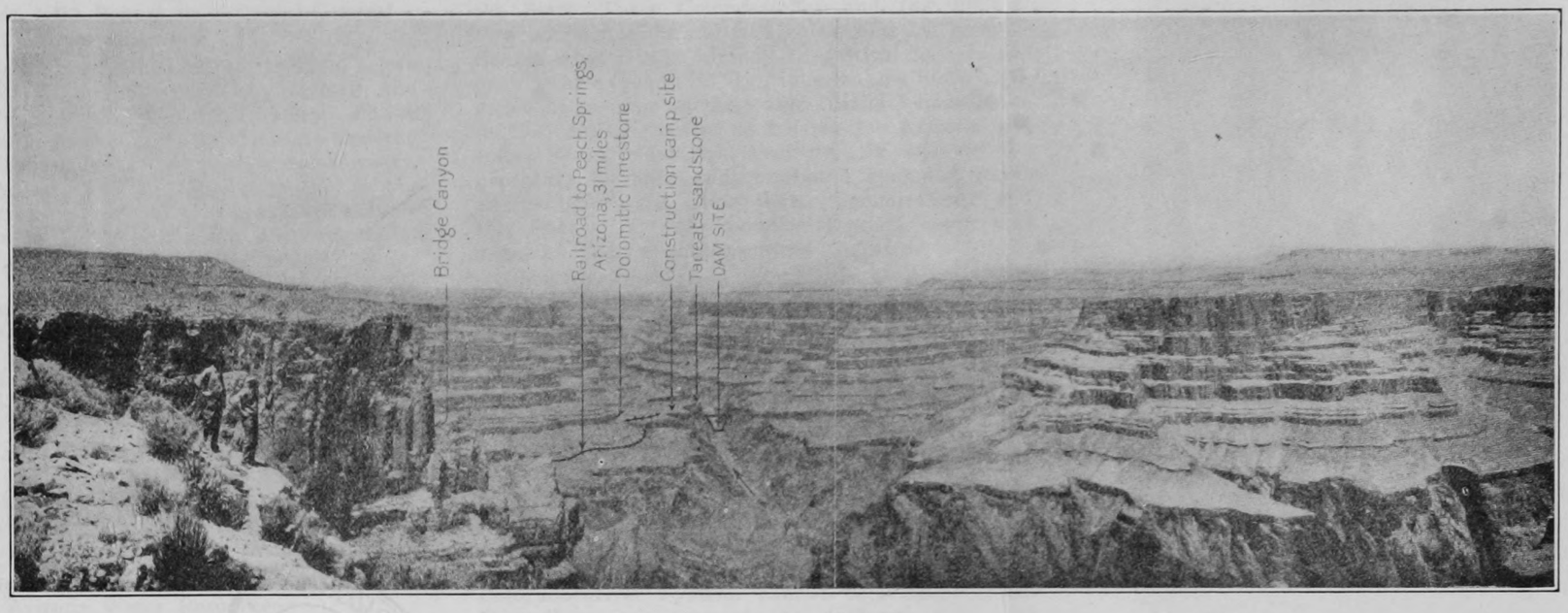
DUE DILIGENCE TOWARD THE HIGHLINE WATER FILINGS AND PROJECTS

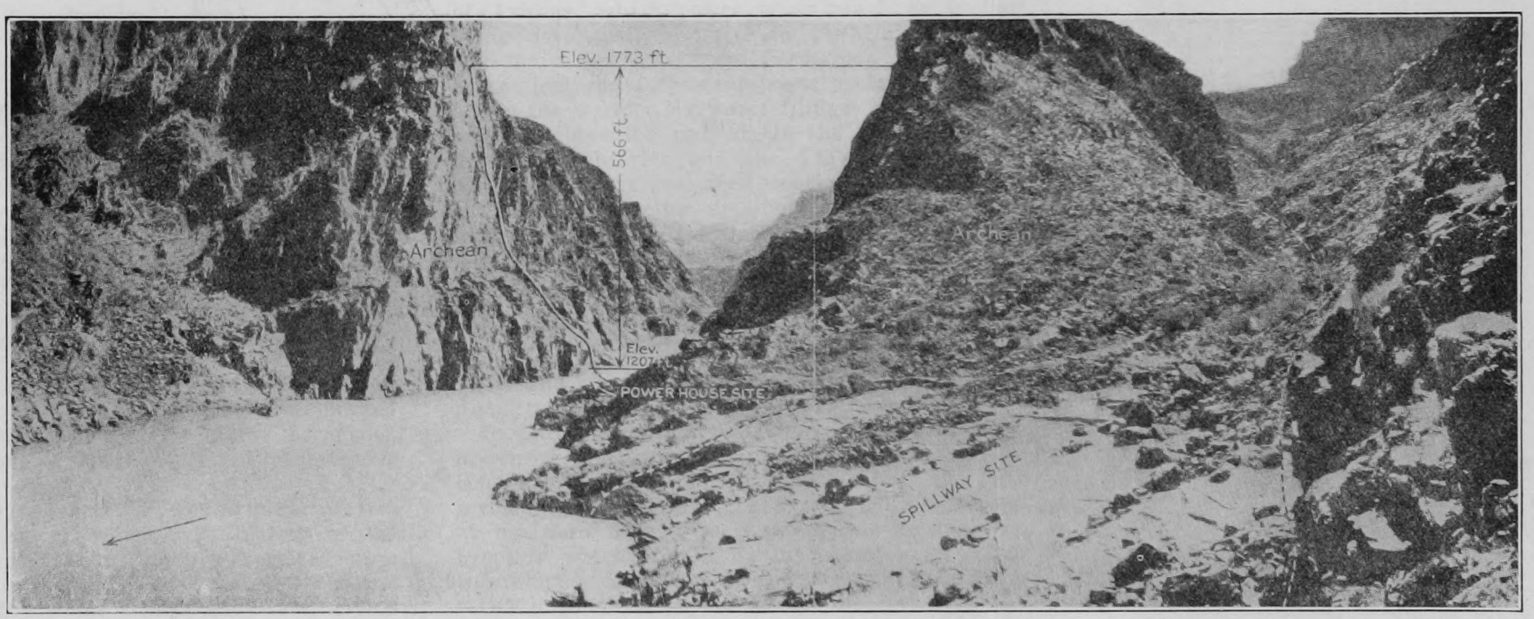
The legal term which signifies the successful maintenance of water filings and water rights is due or reasonable diligence.

For the past twelve years Senator Colter as trustee and leader, with the aid of patriotic citizens and the three organizations named, has maintained with due diligence the Colter water filings and water rights on the Highline and other projects of Arizona in accordance with legal requirements. As in the case of the Paradise-Verde Project, the thirty-year old water filings and rights of which to the storage waters of the Verde River are valid although the Paradise-Verde district has never completed a ditch or a dam, the prior and superior Colter water filings have segregated and appropriated the storage waters and power of the Colorado River and its tributaries for Arizona and its people and will do so as long as they continue to be maintained with due diligence.

Diligence Chiefly Maintained by Trustee

The burden and financial responsibility of maintaining this diligence has for twelve years been borne chiefly by the trustee. To this sole purpose he has during this period devoted all his time and effort, and all the large private fortune he accumulated by hard work from his boyhood in frontier Arizona. Most Arizonans are familiar in general with his unremitting activity in maintaining diligence to his filings for Arizona as trustee and as state official. During 1927-1928 he on several occasions went to Washington where he represented Arizona, and its water rights filed upon by him, as official commissioner to oppose the Swing-Johnson Bill (Boulder Canyon Project Act) appointed by the governor and legislature, and appeared before congressional committees and the President. Space is too brief here to record his efforts and expenditures, bills, resolutions and memorials in the legislature, surveys, speeches, reports, organizing of irrigation and power districts under the Highline canal, educational and publicity campaigns and other tireless diligence which has successfully maintained his filings for Arizona, and defeated the Santa Fe compact and its equivalents.





Bridge Canyon Dam site for storage, power, and diversion into Arizona Highline Canal, on Colorado River in lower Grand Canyon section, 236 miles below Lee's Ferry. If necessary a dam of great height here and its reservoir will be located entirely within Arizona to serve the alternate highline canal which will reclaim maximum acreage n Arizona. (See alternate highline canal, Scott Report, engineering section, supra.)

Sen. Colter's 1932 Report to Attorney-General on Diligence

In addition to his several previous reports, briefs and documents of due diligence on file with the Arizona Water Commissioner and Federal Power Commission and those printed by congress and the state of Arizona during the past twelve years, Senator Colter, on April 14, 1933, submitted to the attorney-general, by authorization, a three-volume report written by Colter on the due diligence maintained to the Glen-Bridge-Verde-Highline filings and projects by the state of Arizona and its people and Colter as trustee since statehood and more particularly during the past twelve years. This report, entitled **Diligence in Protection and Development of Arizona Water Resources,** is on file in the office of the attorney-general and the Arizona Water Commissioner. The report contains 1200 pages and 50 maps, and includes the Scott Engineering Report on the Highline Projects which also was authorized by the attorney-general.

The following is the text of the trustee's letter of transmittal of his report to the attorney-general:

Diligence in Protecting and Developing Arizona Water Resources

ARIZONA RECLAMATION ASSOCIATION

State Legislator — Fred T. Colter, President

Phoenix, Arizona, April 14, 1933.

Hon. K. Berry Peterson, Attorney Gen. Office.
State Capitol, Phoenix, Arizona.
Dear Sir:

By your authority of April, 1932, I have written and prepared a report entitled **Diligence in Protection and Development of Arizona Water Resources,** comprising approximately 1200 pages and 50 maps and illustrations, bound in three separate books: Volume I, Part I, **Introductory Report**; and Volume I, Part II (in two books), **Acts of Due or Reasonable Diligence to the Water Filings in the Colorado River System Made by the Trustee for and on Behalf of Arizona and Water Users.** In addition, there are still being prepared indexed volumes of exhibits and a newspaper scrapbook of clippings from newspapers for the past twelve years.

I am handing you herewith the original of five copies of this report, which is a history of the legal due and reasonable diligence exercised since Statehood, and especially in the past twelve years, in keeping up the water filings and water rights made for the State of Arizona and those claiming thereunder. The report and data are indispensable for the quieting of title to and the adjudication of our water rights in the Colorado River System and for the settling of any other matters relative to the water rights of Arizona and those claiming thereunder.

Copies of this report, the original tracings of the maps, and other data required to be filed with the State Water Commissioner and the Federal Power Commission and with other sources, in addition to what I have already filed with them in the past twelve years, to continue to maintain diligence in keeping up the water filings I have made in 1923 and thereafter as trustee for Arizona and water users under said projects. It will also be necessary to make additional and amended water filings before the State Water Commissioner and the Federal Power Commission with additional maps and other data required therefor.

Since you authorized this report in April, 1932, my wife and I have been working constantly in compilation of this summary report from a great deal of data which had accrued during our past twelve years' firing line fight, besides collecting much vital court, legislative, and congressional and engineering data for this report, which incurred much tedious research. A major portion of the time we had to work nights with the help of others.

The magnitude and extreme importance of this subject, the most important ever to come before any state, as it embraces Arizona's only water, the Colorado River System, cannot be overestimated. Forty-three per cent of the drainage area and ninety-two per cent of the electric power of the entire system are within the borders of the State of Arizona, which power is as much as is now being developed by water in the United States. The major project I have filed upon is the most economical and largest proposed reclamation project in the world. My water filings on some thirty major reclamation projects in the Colorado River and its tributaries and the due and reasonable diligence I have exercised continuously in taking the lead in keeping up these filings thereafter have been and will continue to be the fundamental and primary safeguard in Arizona's protection and development. Even since this fight began there have been around three million acres of land homesteaded and patented, with organized and pre-organization irrigation districts formed thereunder and many American Legion Posts and school districts thereon.

Of course you know that I have given practically my entire time during the past twelve years, which time was mostly spent on the firing line, and have given and sacrificed much over a million dollars of my hard earned reclamation and agricultural property which I built up in this state, in order to protect and keep up these water rights and water filings, with the assistance of my wife and thousands of patriotic people, including subscriptions from hundreds of citizens in Phoenix and in the State.

After building up my reclamation and agricultural outfit my time in the later years just before coming into this water fight was worth $50,000 a year, and with my age at that time the most valuable and opportune part of my whole life was the twelve years immediately ahead which were

given in service to the State. Notwithstanding this and the tortures I have gone through, I am glad that I did so because it was through this and my life's experience, the making of the water filings, my necessary legislative career and giving away all my fortune and the many other vital steps which I took that made it possible for us to win this long and bitter struggle, including the favorable United States Supreme Court decision in your Boulder Canyon Project Act suit which practically validated all my water filings and water rights for Arizona.

With the Attorney General's office and myself now carrying practically the entire official responsibility of this serious question, my cooperation and services which I desire to give you are most vital to you and to the State, especially in the next few years, because of my life's hard knocks and successful experience in reclamation development in all its phases in the many projjects of my own and in the past and present struggle for the protection of the State's water resources.

On account of my wife's intimate work in assisting me during the past twelve years in this fight, her assistance in this report has been indispensable. Our cooperation and assistance which we desire to give you will be just as important in the future as it has been in the past.

Faithfully yours,

FTC:GP FRED T. COLTER.

Aid of Arizona People Essential

It is now essential that the people of Arizona come to the direct aid of the trustee in maintaining diligence to the Highline filings and projects as the present and future water supply and prosperity of Arizona and its people depend upon them. Without water, life cannot exist, business thrive, or property increase in value. Present value of property depends upon future expectation, and future is impossible without water. No arid state or its citizens can possess a future if it fails to protect and develop with due diligence its only future water rights and filings. The Highline is the immediate, personal, vital concern of every resident, home-owner and property holder in Arizona, whether business or professional man, farmer, worker or industrialist.

HIGHLINE—THE POLITICAL TEST

Any person aspiring to public office in Arizona should pledge himself to maintain the Highline filings and projects and other filings made for Arizona. To this both democratic and republican state party platforms in the last election pledged their candidates.

There is no substitute for water in the life of a state and its people. The Highline filings and projects are at this moment the test of every Arizona political candidate in the coming election. If for the Highline, he is for Arizona; if against the Highline, he is against Arizona. If he is right on the Highline Projects and wrong on other matters, it is possible to rectify him. If wrong or noncommittal on the Highline and right on other matters, he is a menace to the state which he would destroy by alienating its only water to Mexico, will end up wrong on all scores and must be defeated at the polls.

SANTA FE COMPACT DANGERS AND EQUIVALENTS

At the present time the Santa Fe compact is threatening Arizona in the form of one of its disguised equivalents proposed through certain of our own state officials, press and people, as has so often occurred in the past. Such has long been the strategy of Arizona's enemies, well aware that nothing can be done to kill her water filings and rights on the river unless she is deceived into ratifying in some disguise the compact which for twelve years she has rejected. Arizona's water rights and existence have been protected by the United States Supreme Court, but they could at any time be deeded away by such ratification.

Parker-Gila Compact Scheme

The equivalent of the Santa Fe Compact currently endangering Arizona is the Parker-Gila-Project-California Tri-State Compact scheme. This is merely the original Albert B. Fall-Senate Document No. 142 proposal, upon which the Santa Fe Compact is based, of some 187,000 acres as the perpetual limit of irrigation in Arizona from the Colorado River, with no water for the land. The scheme proposes to comply with the Santa Fe Compact, to allow the Parker Diversion Dam for the Los Angeles Aqqueduct to be built by the Metropolitan Water District of Southern California and to use this dam in common with the district. As is stated in the Parker-Gila PWA application, this scheme was worked out in co-operation with the Bureau of Reclamation in Washington which under Elwood Mead as commissioner for a decade has sponsored the compact and continually opposed Arizona's water filings, water rights, and projects.

The 187,000 acres in question consist largely of salt bottom lands along the Colorado River, nearly half of which is Indian reservation land and can be irrigated directly from the river by gravity. The 187,000 acres, however, is not even a mess of pottage, for under the Santa Fe Compact and its supplemental Tri-State Compact there would be no water for even this paltry acreage in Arizona. The Santa Fe Compact and supplemental Tri-State Compact, had they not been rejected by Arizona, would have allocated her from the Colorado River and its tributaries 2,800,000 acre feet in perpetuity, inclusive of present perfected rights. Arizona, on July 25, 1929, was already using 3,500,000 acre feet, an excess of 700,000 acre feet. As Lewis W. Douglas, now director of the national budget, said in 1931 (while Arizona Congressman), in a statement published in the **Phoenix Gazette** condemning

the Parker-Gila compact scheme and refusing to meet and discuss it with Elwood Mead, who had come to Arizona for that purpose:

"Under the terms of the Colorado River Compact and Boulder Canyon Project Act, construction of a dam at Parker cannot possibly and never will be a benefit to the State of Arizona.

"The Colorado River Compact allocates 7,500,000 acre feet of water to the lower basin. Six-and-a-half million acre feet already have been used and to that amount rights have been perfected. The remaining 1,000,000 acre feet has been contracted by Ray Lyman Wilbur, secretary of the interior, to the Metropolitan Water District of California.

"There is therefore under the terms of the compact and the Boulder Act, no water not now being used in Arizona available for future use.

"A dam at Parker, which of necessity must be a relatively small dam, cannot be of any advantage or benefit to my state."

Arizona Can Make No Agreement with California

If 187,000 acres could be irrigated in Arizona under the Parker-Gila Compact scheme, it would be disastrous for Arizona and the nation to accept this and allow 6,000,000 acres in Arizona under the Highline to remain desert forever while our Colorado River water necessary for irrigating them went to Mexico.

As disclosed by press reports and official published letters, the present administration and Colorado River Commission of Arizona in connection with its Parker-Gila Compact scheme has sought a compact between Arizona and California on the Colorado River.

For the avowed purpose of forcing California into such a compact, Governor Moeur called out the national guard, a contingent of which is now camped in observation at the Parker dam site. While placing the troops on the river is in itself commendable and should have been done years ago, the avowed purpose would destroy the state instead of protecting it, for California ratified the Santa Fe Compact and is bound by it in respect to the river, and Arizona can make no agreement with her which would not be in accordance therewith and bind us also to the ruinous compact. The same is true of Nevada and the other five basin states. Nor can Arizona or its political subdivisions make any agreement or contract with the secretary of the interior, who under the terms of the Boulder Act is also bound to observe the compact.

California, further, has no dam or reservoir sites in the Colorado River, contributes no water to it and has nothing to agree with. Arizona contains 42 per cent of the entire drainage basin and 92 per cent of the power of the Colorado River and practically all its dam and reservoir sites. Ninety-three per cent or 104,000 square miles of Arizona's area, is drained by the Colorado River, and but 6,000 squqare miles of California's area. All rivers in Arizona run into the Colorado River; in California, none. Arizona has no water supply other than the Colorado. All the waters and power of the Colorado River and its tributaries will be utilized in Arizona on lands under the Highline filings and projects, if necessary by dam, reservoir, tunnel and canal sites located entirely within the borders of Arizona.

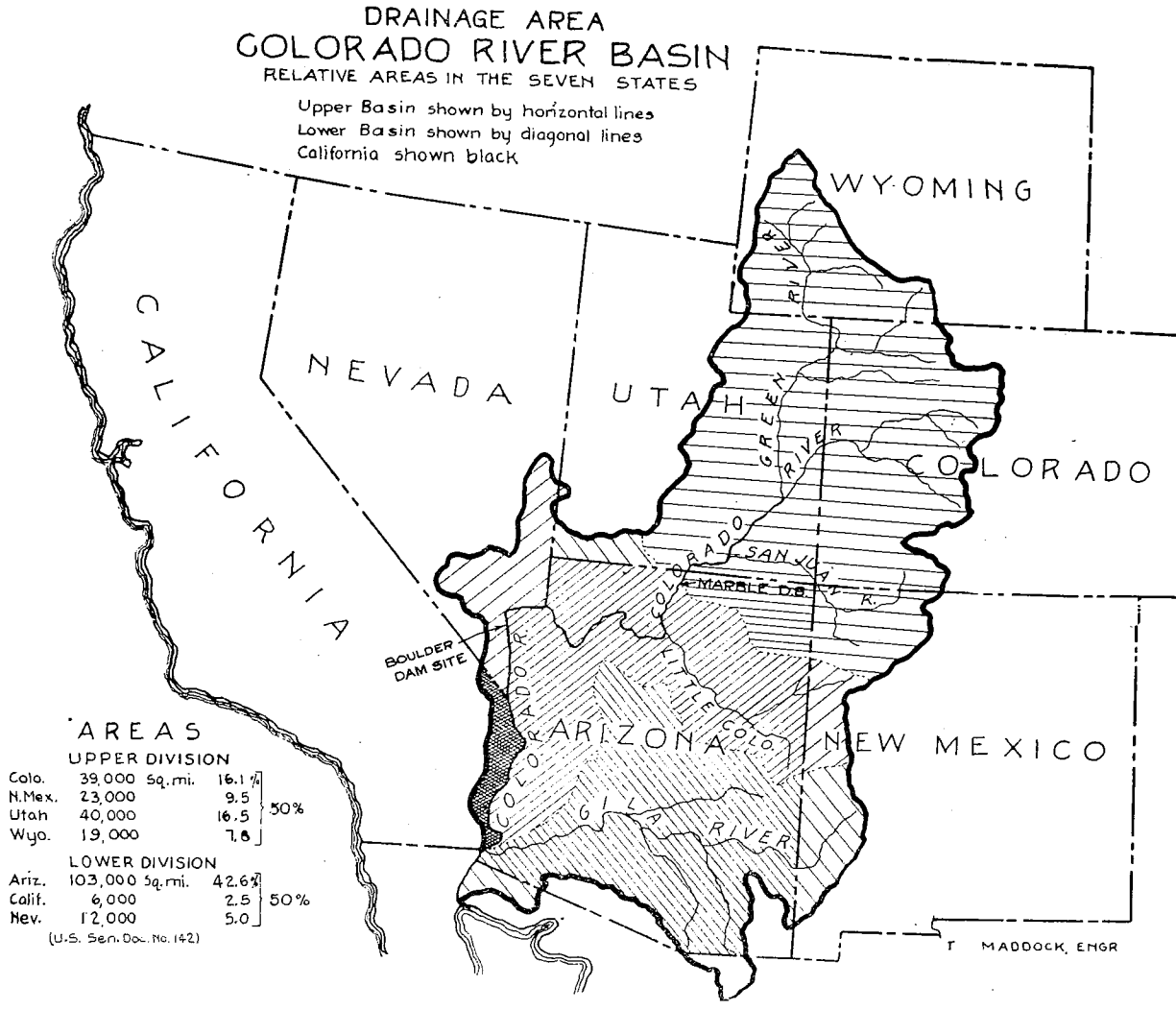
Arizona Highline Filings and Projects Key to Proper Development of Colorado for All Concerned, Including California and Mexico

The Arizona Highline Projects will also eventually satisfy in full Colorado River water needs of California and Mexico, due to first application of water on lands at higher elevations in the upper reaches of the stream in Arizona and subsequent multiple re-use of reflow water as it reappears at descending altitudes in the stream system and its land areas through seepage, raised water table and re-precipitation, serving all dams and lands below and affording a perfect natural storage superior to forestation and of inestimable value to the arid southwest and the nation. The mass of underground reservoirs thus formed will be greater beyond comparison than overground storage behind dams on the river. Correct development of streams for both reclamation and power always begins on the heads, as under the Highline Projects. The altitude at Glen Canyon, chief storage dam site of the Highline Projects, is 3127 feet. By building the first storage dam at Glen Canyon, the horsepower made at dams lower on the river will be nearly tripled and these lower dams can be built at greatly reduced expense as the floods will be controlled above.

Compact If Ever Ratified by Arizona Would Deed Our Water to Mexico and Leave 10,000,000 Acres Desert Forever in Arizona

On the other hand, both the Highline and the use of reflow waters therefrom would be forever lost to Arizona and the stream's drainage basin under the Santa Fe Compact or any agreement necessarily subject to it between Arizona and California or the secretary of the interior. The compact, if ever ratified by Arizona, would allocate our Colorado River waters (1) chiefly to Mexico in the river's delta at sea-level whence reflow water would go to the Gulf of California; (2) to the below sea-level Imperial and Coachella Valleys of California outside of the river's drainage basin from which reflow waters would run to the dead Salton Sea 250 feet below sea-level; and (3) to Los Angeles and the Metropolitan Water District of Southern California also outside the river's drainage basin from which reflow waters would reach the Pacific.

Boulder Dam, which would carry out these com-



The drainage basin of the Colorado River includes practically all Arizona, which contains more of it than any other state, and very little of California. Arizona has 104,000 square miles in the drainage basin, California only 4000 square miles. Arizona contains 42% of the entire drainage basin and 92% of the power and practically all the dam and reservoir sites of the Colorado River. Many Arizona rivers run into the Colorado; California contributes no water to and has no dam sites in the river. Note that Imperial and Coachella Valleys, Los Angeles, and the Metropolitan Water District of Southern California are all completely outside the drainage basin of the Colorado River.

pact provisions, is at an altitude of 600 feet, and Parker Dam at 450 feet, at the lower or wrong end of the river for proper stream development and too low for any appreciable gravity irrigation in Arizona.

Under the compact Arizona's water would have been deeded to Mexico for irrigation of 2,000,000 acres owned there by California land syndicates, which would compete with our present agriculture, industry and labor, subvert our water laws and federal constitution and menace our national defence. For every acre thus irrigated in Mexico four to five would remain desert forever in Arizona. The water and power would have been separated, the water going to Mexico and the power in Arizona left to be monopolized by California power syndicates, destroying the natural and legal combination of the water and power in the trustee's filings for Arizona.

THE PARKER-GILA-COMPACT SCHEME

A brief recital of recent events connected with the Parker-Gila-Tri-State Compact scheme will bring the Colorado River situation up to date in its true aspects. Its future course will be presented to Arizona people in the forthcoming regular publication, **Highline.**

It has been noted above that this scheme is merely the original Albert B. Fall Santa Fe Compact proposal, frequently renewed in various disguises, and that Dr. Elwood Mead in 1931 attempted to discuss it with Lewis W. Douglas, then Arizona congressman, who denounced the scheme and refused to confer with Mead concerning it.

Wilbur Offer

On February 10, 1933, in the last few days of Hoover's administration, his secretary of the interior and fellow-Californian, Ray Lyman Wilbur, renewed the Parker-Gila-Tri-State Compact scheme in the form of a contract offered by him to Governor Moeur and the Colorado River Commission for ratification by the Arizona legislature, then in session. This contract, which is on file in the governor's office, in sections 19 and 20 thereof provided that it was subject to the Santa Fe Compact and had to be ratified by the Arizona legislature. Wilbur had already signed for the United States, and the dotted line was offered to Arizona.

This amazing effrontry to Arizona, in the dying days of the administrations which under Harding, Coolidge and Hoover had persistently tried to force the compact on the state of Arizona, came when a new national administration and a "new deal" were only a few days away. Nevertheless, Governor Moeur and the commission in answer requested Wilbur to send representatives to negotiate, and when these came, met with them at closed secret conferences in the Westward Ho Hotel.

These star-chamber sessions were denounced by the trustee in several speeches on the floor of the legislature, and by an indignation mass-meeting of citizens on March 2 at the capitol. The house of representatives passed unanimously House Resolution No. 5 introduced by Colter and entitled, **"Protesting against Secretary of Interior Wilbur's offer of contract to Arizona, which offer proposed to destroy Arizona by forcing upon Arizona the old Santa Fe Compact and Tri-State Compact, and protesting against any agreement with California."** This exposure was more than the secret conferences could endure, and they ended without accomplishing their aim of obtaining Arizona's signature to the compact by ratification of the 1933 legislature.

The Carson Opinion Against Arizona

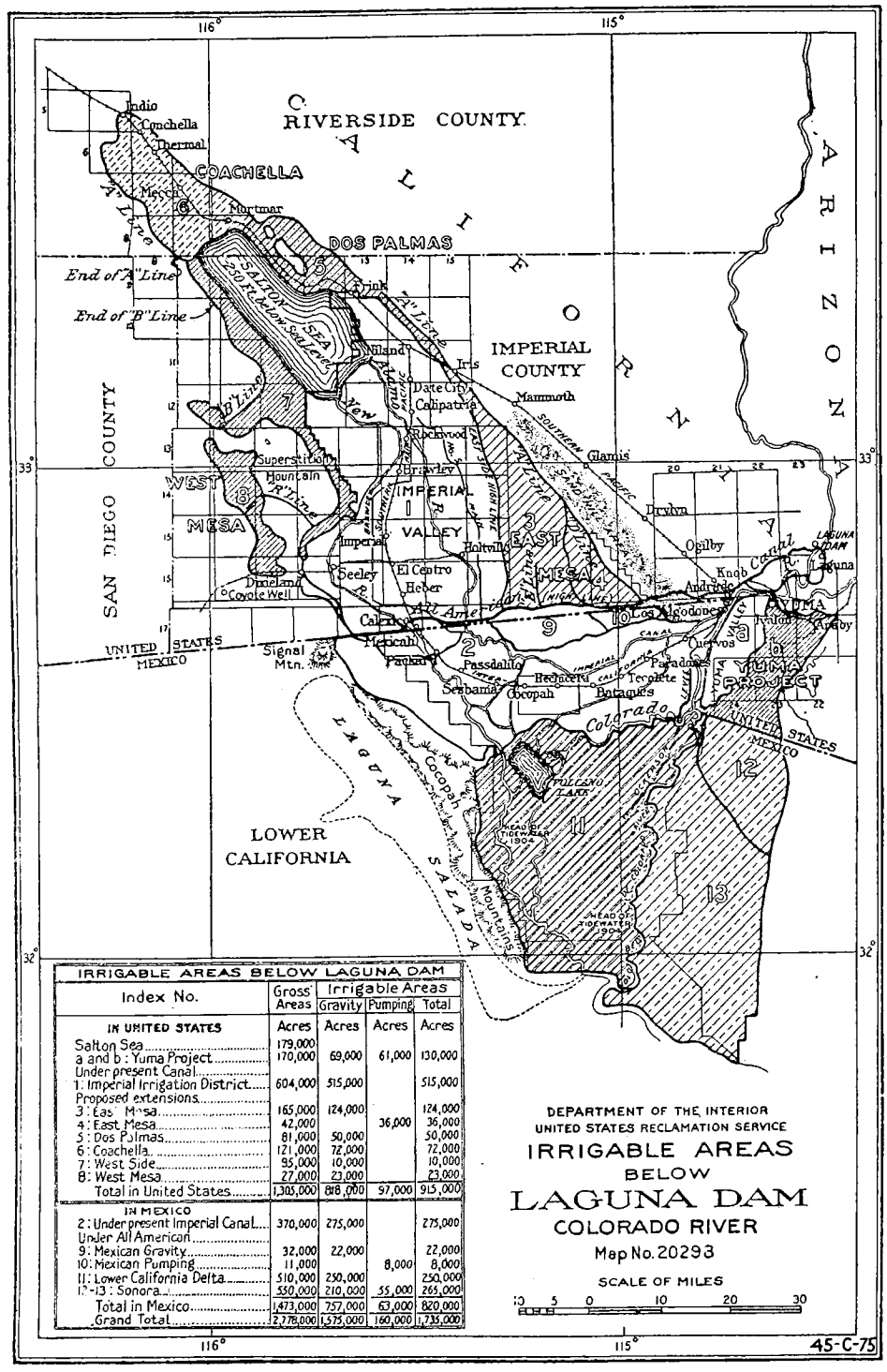
The plan, however, was not dropped by the Commission and Attorney-General La Prade who all along has been equally guilty in fomenting it. After preparation during the succeeding three months, Attorney-General La Prade on July 12, 1933 concurred in and submitted to the Arizona Colorado River Commission the notorious opinion by Assistant Attorney-General Charles C. Carson, jr., that Arizona is bound by the Santa Fe Compact although she did not ratify it, whereas the United States Supreme Court ruled exactly the opposite. Carson is special assistant to La Prade and counsel for the commission.

The following month, in August, citing the spurious Carson opinion against Arizona as legal countenance, the commission submitted its Parker-Gila Compact scheme and $20,000,000 PWA application, with the approval and support of Governor Moeur and La Prade. On August 23, Senator Colter submitted a detailed brief condemning and demolishing the Carson opinion to the commission, governor and attorney-general. This he followed, on August 25, with a brief exposing the Parker-Gila Project as a compact equivalent. Both briefs were mimeographed and extensively circulated throughout Arizona and the nation.

Mass-Meetings Condemn Parker-Gila Compact Scheme

Meanwhile indignation mass meetings were being held, culminating on September 12 in a joint mass meeting of organizations and citizens in the house chambers of the capitol. This meeting, which was addressed by Senator Colter and George H. Maxwell, father of Roosevelt Dam and the national reclamation act, adopted a joint resolution condemning the Parker-Gila Compact scheme and Arizona officials sponsoring it as unfit for office. A committee of seventy-five served copies of the resolution on Governor Moeur and Attorney-General La Prade in person in the governor's office.

Meanwhile, the Colorado River Commission of A. H. Favour, chairman, John Mason Ross, secretary, and C. C. Cragin, during this period was conferring on August 7 at the California Club, Los Angeles, as is stated in the official minutes of the commission, "with certain members of the board of directors of the Metropolitan Water District



IRRIGABLE AREAS BELOW LAGUNA DAM

Index No.	Gross Areas	Irrigable Areas Gravity	Pumping	Total
IN UNITED STATES	Acres	Acres	Acres	Acres
Salton Sea	179,000			
a and b: Yuma Project	170,000	69,000	61,000	130,000
Under present Canal				
1: Imperial Irrigation District	604,000	515,000		515,000
Proposed extensions				
3: East Mesa	165,000	124,000		124,000
4: East Mesa	42,000		36,000	36,000
5: Dos Palmas	81,000	50,000		50,000
6: Coachella	121,000	72,000		72,000
7: West Side	95,000	10,000		10,000
8: West Mesa	27,000	23,000		23,000
Total in United States	1,305,000	818,000	97,000	915,000
IN MEXICO				
2: Under present Imperial Canal	370,000	275,000		275,000
Under All American				
9: Mexican Gravity	32,000	22,000		22,000
10: Mexican Pumping	11,000		8,000	8,000
11: Lower California Delta	510,000	250,000		250,000
12-13: Sonora	550,000	210,000	55,000	265,000
Total in Mexico	1,473,000	757,000	63,000	820,000
Grand Total	2,778,000	1,575,000	160,000	1,735,000

Map of the United States Department of Interior, showing area irrigable in Mexico from Colorado River. The Mexican government has officially claimed this area to be 1,961,000 acres, through the Mexican treaty commissioner in the report of the International (United States-Mexico) Water Commission, House Document 359, 71st Congress.

and certain representatives of the Imperial Valley as to the possibility of working out an arrangement under which the first unit of the proposed Parker-Gila project might be initiated through the use of available federal funds, as a part of and in connection with the proposed Parker and Imperial dams, the construction of which by or for certain California interests is now in contemplation. As a result of said conference, it appeared to the commission that it was highly desirable to take such steps." As explained above, a Parker-Gila-Compact Parker Dam scheme in connection with California would necessarily bind Arizona to the ruinous Santa Fe Compact as California ratified and is bound to observe the compact.

Favour, Ross and Cragin Charged in Suit with Conspiracy to Destroy Arizona's Colorado River Water Filings and Water Rights

C. C. Cragin, having resigned from the commission, was then employed on August 12 at $100 per day and expenses by A. H. Favour and John Mason Ross of the commission to proceed to Washington to lobby for this compact scheme.

Mrs. Ana Frohmiller, state auditor, refused to honor Cragin's claim of $6,658 for seventy-six days, August 14 to October 29, of such "professional service" to Arizona. When Cragin brought a mandamus action in the state supreme court to force payment, a petition of intervention in the case upholding Mrs. Frohmiller's action was filed by taxpayers, residents, and landholders under the Glen-Bridge-Verde-Highline water filings and projects. The petition set forth that the Parker-Gila scheme is a disguised equivalent of the Santa Fe Compact, and stated the complete material and financial disaster which would result to the intervenors and all others in Arizona and the state itself if this compact scheme were foisted on Arizona and aided by the payment of wages to Cragin by the state for work destructive of its existence and which "is within itself and the result of collusion and conspiracy on the part of the commissioners to defraud the state of Arizona and destroy its Colorado River water rights." (**Messenger**, December 9, 1933.)

La Prade Compact Suit Thrown Out

The commission as part of its Parker-Gila-Compact scheme on February 14, 1934 filed through Attorney-General La Prade its recent absurd, culpable suit in the United States Supreme Court for perpetuation of testimony interpreting a minor point in the Santa Fe Compact. Why perpetuate testimony regarding a compact to which we are not bound and which would destroy us if we were, especially when the same high court had ruled in Arizona's previous victorious suit that she is not bound by the compact? The compact suit was thrown out by the court on the following May 21. The supreme court further protected Arizona by ruling that the dismissal was without prejudice to Arizona's rights if and when they are invaded, by the compact or otherwise. What are these rights? They are solely and alone the Fred T. Colter water filings, water rights, and projects of Arizona and its people in the Colorado River system, and all others of Arizona and those claiming under it, which must be pleaded as the basis of any successful and genuine Colorado River suit, whether brought by the state of Arizona or Senator Colter as trustee. Such filings and data are the basis of all water suits adjudicated by the courts.

During the first part of April, 1934, La Prade, Carson, and other Arizona officials presented their compact schemes in several days appearance before the President's Special Colorado River Board of four cabinet members, for which Elwood Mead was technical adviser. This board acted as a special subcommittee of the national planning commission. The following telegram and letter of protest was immediately dispatched on April 7 to the board by Arizona organizations, and are quoted as published by the Phoenix **Messenger**, April 14, 1934:

April 7, 1934
Phoenix, Arizona

President Roosevelt's Special Cabinet
Elwood Mead, Colorado River Board, for National Planning Commission, Washington, D. C.
Organizations request disregard La Prade Arizona Colorado River Commission Parker-Gila Project Colorado River Compacts or other betrayal schemes which people will never ratify. Suit being instituted charging La Prade, Carson, Cragin, Commissioners Favour, Ross with conspiracy to destroy Arizona's only water and power rights for monopolization by California Mexican land and power syndicates. Letter follows.

T. S. Stevens, Director, Colorado River Reclamation Club
S. Kartus, Secretary,
Dr. H. E. Gerdes, Director, Land Holders Ass'n.,
Ilet Williams, Secretary.

Phoenix, Arizona
April 7, 1934

President Roosevelt's Special Cabinet,
Elwood Mead Board,
National Planning Commission on Colorado River,
Washington, D. C.
Gentlemen:

The organizations below named meeting here today unanimously authorized sending of the enclosed telegram (copy) and this letter:

The Parker-Gila Project-Tri-State Compact-Colorado River Compact scheme or any other being presented at your hearing this week on Arizona Colorado River Development by Arthur T. La Prade, Arizona Attorney-General, his assistant Charles A. Carson, jr., and others is contrary to the expressed will of Arizona's people who for

twelve years have rejected these ruinous compacts which would destroy Arizona and proper development of the entire river. Indignation mass meetings and resolutions throughout Arizona have condemned these schemes and La Prade, C. C. Cragin, A. H. Favour and John Mason Ross of Arizona Colorado River Commission and Carson, its counsel, who instigated them in the face of the United States Supreme Court decision that protected Arizona by ruling that she is not bound by the compact, that neither her present nor future water rights could be impaired by the Boulder Act or Dam, which the court allowed to be built for navigation alone, subject to Arizona's water rights, and that Arizona can divert water above Boulder Dam. Suit is being instituted here against La Prade, Carson, Cragin, Favour and Ross for malfeasance and conspiracy to destroy Arizona's Colorado River water filings, water rights and projects which both party platforms in the last State election pledged them to protect. These compact betrayal schemes do not represent Arizona nor does La Prade's fake supreme court motion quibbling over 1,000,000 acre feet while letting 12,000,000 go to Mexico as a ground for fatal compromise or division of water by a Colorado River Authority. Neither you nor your commission nor any river authority can divide water or put it in ownership. Courts alone can quiet water titles and they only in beneficial use. How can you even intelligently discuss subject by considering only one phase of it presented by Arizona's enemies and repudiated by Arizona which will never ratify these compacts? A $350,000,000 PWA application is on file and pending in Washington for the Glen-Bridge-Verde Highline Projects which will irrigate 6,000,000 acres in Arizona and manufacture 5,000,000 electric horsepower combined with this irrigation-municipal development for financing it, which projects represent maximum beneficial use of Colorado Rver for all concerned and must be constructed to preserve our waters from Mexico where under the Parker-Gila Compact scheme 2,000,000 acres directly below our border would be irrigated with Arizona's only water to compete immediately with our present agriculture, industry, and labor and menace our national defense. For every acre thus irrigated in Mexico four would remain desert forever in Arizona and the United States. We request this be read at your hearing, and an early reply. Copies to President Roosevelt, all members of the planning commission, and Secretary Ickes.

Very truly yours,

T. S. Stevens, Director,

S. Kartus, Secretary, Colorado River Reclamation Club,

Dr. H. E. Gerdes, Director,

Ilet Williams, Secretary, Land Holders Ass'n,

The final report of the national planning commission, submitted to Congress June 4, by President Roosevelt, as noted, recommended expenditure of $533,000,000 for lower Colorado River development, including $100,000,000 for the Bridge Canyon Dam, which is the diversion dam for the Arizona Highline Canal.

Upper Basin States Warn of Mexico

A striking verification of Senator Colter's long and frequent warning of the Mexican threat was sounded at the meeting of the four upper basin states at Denver, June 30, 1934, attended also by Dr. Elwood Mead, U. S. Reclamation Commissioner. The representatives of Colorado, Utah, Wyoming, and New Mexico passed and handed to Dr. Mead a resolution which stated in part that when the construction of the Boulder Dam is finished in 1935:

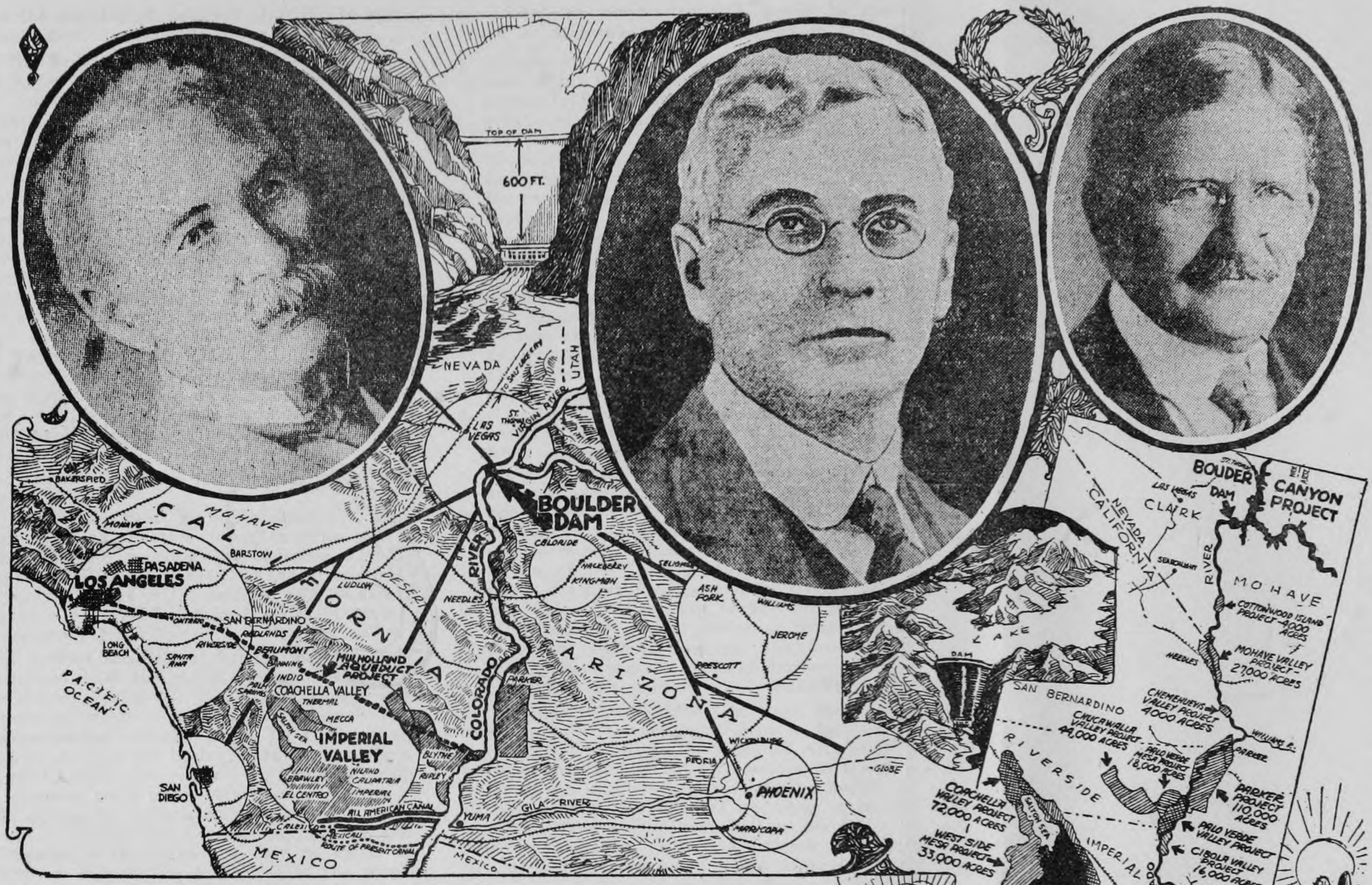
> "The river flow below the dam will be equalized, thus making it physically possible for the Republic of Mexico to put to beneficial use these waters which will have been conserved entirely at the expense of the United States and which therefore belong to the United States." (**Arizona Republic**, July 1, 1934.)

For Arizona and the United States this means that if the waters of the Colorado had not been already appropriated for Arizona by the Highline filings, they would have gone to Mexico under the compact, when Boulder Dam is completed in 1935 and equalizes the floods of the Colorado. There is no other physical or legal alternative. As long, however, as the prior and superior Colter water filings and Highline Projects continue to be maintained with due diligence, developed and ultimately constructed for irrigating 6,000,000 acres in Arizona, any invasion of them through the compact or otherwise by adverse contenders will be at their risk and hazard, and will be enjoined and prevented at law. Warning protests and notices to this effect have been duly dispatched by Senator Colter as trustee during the past twelve years to all who are or may be adverse contenders in this country or Mexico, and they are hereby again so warned.

Parker-Gila-Compact Scheme Renewed in Phoenix at Secret Conferences Between Commission and Mead

From the meeting of the upper basin states in Denver, Dr. Mead proceeded to Los Angeles. After consultation there he arrived in Phoenix July 6, for a two-day conference with Governor Moeur and the Arizona Colorado River Commission.

The conference was held in secret behind closed doors, not at the capitol but in the Westward Ho Hotel, and could not be reached by telephone. As due diligence a set of resolutions was passed by the three organizations and sent to the conference, while Senator Colter as trustee himself presented a copy of the resolutions to Elwood Mead during a discussion with him in Mead's room at the Adams Hotel. As published in the **Arizona Repub-**



Top, left to right, William Mulholland, chief engineer Los Angeles Water Department; Arthur Powell Davis, former director and chief engineer, U. S. Reclamation Service, and now consulting engineer of the Boulder Dam project, and E. F. Scattergood, chief Los Angeles electrical engineer.

Map below: Circle represents major power consumption centers within economic reach of Boulder Dam. Shaded area indicates lands in Arizona, Nevada and California that will be made immediately irrigable by water from Boulder Dam storage reservoir and the All-American canal.

This map shows a "close-up" of the Boulder Dam area, the shaded portion illustrating the huge acreage of available irrigable land and the black that portion now under irrigation.

Everything on this page outside of this border is a photo representation from the Los Angeles Examiner of November 18, 1923. Here is presented the full picture of ex-secretary Albert B. Fall's plan for dividing the water of the Colorado River from the Boulder Canyon Dam, under the Colorado River Compact. "Sixty per cent to the United States of America and 40 per cent to Mexico", in accordance with the engineering report of Arthur P. Davis, the deposed head of the United States Reclamation Service. Can anyone doubt, after seeing this map, that if the Fall-Davis-Boulder Canyon Dam-Colorado River Compact Scheme is put over, Arizona will lose her greatest source of future taxable wealth, leaving Arizona a cripple forever. See the shaded portions in Mexico, which, with Arizona's water, would become a foreign irrigated empire that would compete with our present agriculture, industry and labor and menace our national defense as a most strategic food production and supply, military, airplane and naval base against our border.

lic on the morning of Saturday, July 7, the resolutions stated:

"That only by maintaining the Fred T. Colter water filings on the Colorado River and by construction of the Glen-Bridge-Verde-Highline Projects thereunder could the waters of the river be utilized in Arizona and prevented from going to Mexico.

"The resolution pointed out the secretary of the interior is bound to observe the Santa Fe Compact under the Boulder Canyon Act and that Dr. Mead consequently cannot propose any agreement between the secretary of the interior and Arizona which would not bind this state to the compact. Arizona, likewise, the resolution said, cannot make any compact with California which has ratified the Santa Fe Compact.

"The resolution asserted the courts alone may divide the waters of the Colorado River and establish title (to their use). No compact, conference, agreement, board or authority, may make such division, it declared."

The **Phoenix Gazette** of Saturday afternoon, July 7, stated:

"Dr. Elwood Mead, U. S. Reclamation Commissioner, left Phoenix today carrying with him Arizona's proposal and agreement for complete settlement of the Colorado River controversy. Nature of the proposal and its substance was a closely guarded secret in State government circles."

The **Arizona Republic** of Sunday morning, July 8, disclosed that the secret proposal is merely again for the Parker-Gila Compact agreement with the secretary of the interior, the old Albert B. Fall 187,000-acres-and-no-water Santa Fe Compact rejected by Arizona for twelve years. As the secretary must observe the compact, an agreement with him of course could not be otherwise.

The citizens of Arizona must be on their guard against this Parker-Gila-Compact scheme. A special session of the legislature may be called to ratify it, or to pass the scheme on to the people by referendum vote. Either in the legislature or by vote of the people, the Parker-Gila Compact scheme must be defeated.

SAFEGUARDS

As future guidance to Arizona and its people, certain fundamental Colorado River safeguards can be set forth which must be observed.

It should always be remembered that the dangers to be avoided will almost always arise from defeatist attempts within our own camp and by divers of our own state officials, press and people who are the tools of the California-Mexican land syndicates and the power trusts which seek to exploit Arizona's wealth in Colorado River electric horse power.

The safeguards which have been continually enunciated by the trustee and should be memorized by Arizona's people are briefly as follows:

1. Arizona must never accept the Santa Fe Compact or any of its equivalents, such as the California-Tri-State Compact or Parker-Gila Project-Compact scheme, or any contract between the secretary of the interior and Arizona or its political subdivisions which embodies these compacts.
2. No treaty must ever be ratified between this country and Mexico which embodies any of these compacts or fails to protect fully all vested and inchoate water filings, water rights, and projects of Arizona and those claiming under it, including the Highline.
3. Any Colorado River board or authority can be no more than a fact-finding body, and must not and cannot divide water or establish title to its use, which latter can be determined by the courts alone.
4. No solely power dam must ever be built in or near the Grand Canyon section of the Colorado River uncombined with, and not subsidiary to, highest diversion canal irrigation of maximum acreage in Arizona.
5. The Glen-Bridge-Verde-Highline filings must be maintained with legal due diligence and projects thereunder ultimately constructed and the waters of the Colorado River system thereby put to use first in Arizona in the United States.
6. Any Colorado River suit brought by the State of Arizona, or Senator Colter as trustee, must plead the Glen-Bridge-Verde Highline filings and projects and all others of Arizona.

Concerning safeguard No. 1, in addition to the Parker-Gila-Tri-State-Compact schemes, there is at present another compact equivalent on foot. This is an attempt to deceive the people of Arizona into believing that through an agreement with the secretary of the interior they can irrigate 300,000 or 400,000 acres in this state by pumping water 300 feet from the proposed Imperial Dam for the All-American Canal of California. Under the compact of course there would be no water for this.

Regarding safeguard No. 2, the trustee introduced in the 1933 Arizona legislature House Resolution No. 4, which was passed unanimously, entitled **"Informing the United States Treaty Making Powers that Waters of the Colorado River System have already been appropriated in Arizona and in the United States of America by the Colter water filings for Arizona and in said appropriation the reflow waters therefrom will more than take care of all the lands in the delta of the Colorado River in Mexico.**

In connection with safeguard No. 4, the Diamond Creek Permit Application of 1923 was for such a solely power dam in the Grand Canyon uncombined with any irrigation whatsoever in Arizona. This dam would have equalized the floods of the Colorado River for power manufacture alone and

the equated waters would have gone to Mexico as under the Santa Fe Compact.

The Diamond Creek Permit, which was backed by out-of-state power-copper interests, was quashed in 1925 in the courts of Maricopa County under Senator Colter's leadership. A revival of the Diamond Creek application, which may be tried, must be guarded against.

Power Trusts and International Bankers Fight Irrigation

As pointed out by Senator Colter in a letter of February 2, 1934, to President Franklin D. Roosevelt on the Highline filings and projects, it has long been the policy of the power trusts, and the international bankers who own them, with their powerful weapons of influence and publicity, to kill irrigation in the west in order to monopolize waters of western streams for power manufacture alone. Such is the scheme on the Colorado. If the Colter Highline filings with their combination of irrigation and power could be killed, the power in the Grand Canyon would be monopolized by the trusts, while the water would go to Mexico. The Southern California Edison Company and other power interests have filings for power alone throughout the Grand Canyon. These power filings are legally inferior to the Colter combined irrigation and power filings for Arizona, as irrigation under both state and federal law is superior to power as a use of water.

In his letter to President Roosevelt, Senator Colter also pointed out that the international bankers, discouraging irrigation in the West, loaned immense sums to foreign nations to develop their natural resources, which as imports and on the world market then compete with our own labor, industry and agriculture.

Concerning Safeguards No. 3 and 6 the late Judge Sloan of Phoenix, an eminent water right attorney and judge, made an invaluable statement a few days before his recent death. The statement, published in the daily press of Phoenix, was issued in connection with the water dispute between the Paradise-Verde and Salt River Valley Project, Judge Sloan being attorney for the latter. In the statement Judge Sloan rejected a settlement of the dispute by a compact or agreement between the two projects. He stated that the directors of water associations could not divide the waters the use of which belongs to the water and landholders of the associations, but that titles to the use of water can be ascertained by the courts alone. This statement will be a lasting tribute to the man who made it. If officers of an association cannot divide the waters of their own land holders, how ridiculous and impossible it would be for any foreign compact, authority or board to attempt to do so! Upon this principle Arizona must take its stand, and avoid the Santa Fe and other compacts as well as any Colorado River authority or board. Our water filings, water right titles and projects can be protected, defended and established only by the pleading thereof in court.

LANDHOLDERS UNDER THE HIGHLINE

More than 3,000,000 acres under the Glen-Bridge-Verde-Highline projects have been homesteaded and patented, and their value and that of the homes upon them depends entirely upon the Highline filings and projects for they can obtain water from no other source. Hundreds of homestead entrymen and owners of land under the projects have already signed petitions to the boards of supervisors of the various counties for perfected organization of the great Glen-Bridge-Verde-Highline Irrigation and Power District. Those who have not already done so are urged to take such action at once. Petitions are available at the central office, 113 N. Second Avenue, Phoenix.

The moment the district is organized, lands within it will rise far in value beyond their present desert worth, like lands in the Paradise-Verde district which for years in the past have sold as high as $100 an acre without a dam or ditch completed but with the district organized. Assessments will not begin until the Highline district is legally organized and perfected. Assessments then will be negligible owing to the immense area, 6,000,000 acres, over which they will be prorated. Where the little Paradise-Verde project of only 80,000 acres has had assessment of dollars per acre, the Highline district will require cents. No one needs to fear the financial result of having his desert land worth $3.00 an acre converted into green irrigated farming land worth vastly more.

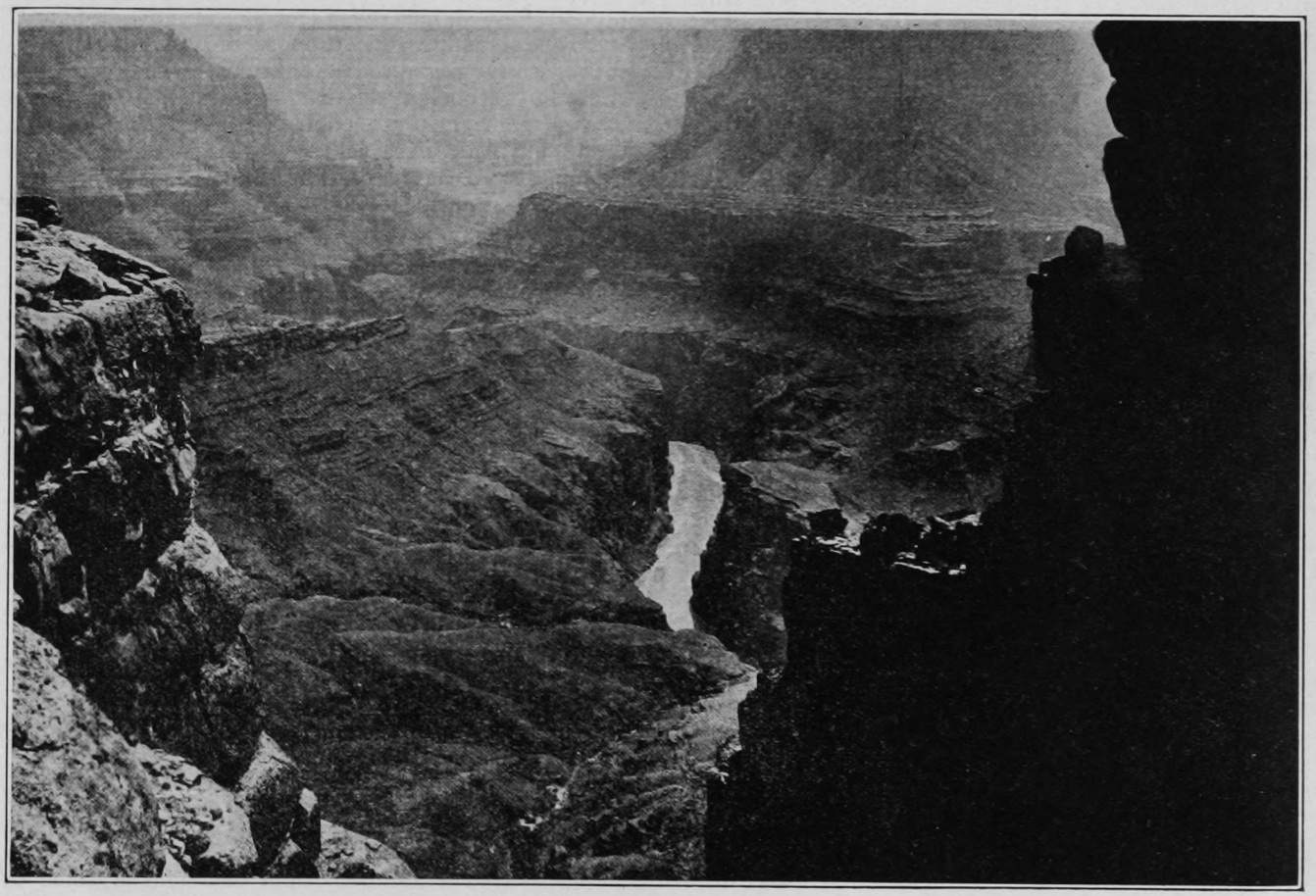
The landholders under these projects are direct beneficiaries of the work led by Senator Colter. The forthcoming publication, **Highline**, will be their organ, and they especially should subscribe to it and read it for their own information, protection and economic advantage.

Subscriptions will be encouraged from all others as well as memberships in the organization, for funds are essential to the maintaining of diligence to the Colter water filings and Highline Projects. Volunteer members and workers will be gladly enrolled without charge, for the moral support of Arizona people is even more necessary than financial support. Business and professional men, workers, farmers and all residents of Arizona are urged to join and aid, for the prosperity of all will be in the degree that water can be guaranteed for Arizona now and in the future. Out-of-state subscriptions and memberships from those wishing to share in proper development of the second American river and conservation of our state and national land and water resources will be welcomed.

To All Landholders and Residents

To the farmers of already established reclama-

tion projects of the state, as to all of its residents, the Highline means the end of the present acute water shortage and high charges, and of the excessive taxation and unemployment now burdening Arizona. The trustee during his long public career has sponsored the farmers' cause in their water problems and others, being himself a practical farmer and stockman. In the 1933 legislature he introduced and led in the passage of Senate Joint Resolution Number 2 endorsing the Frazier-Lempke Bill and recommending that livestockmen and ranchers be included with farmers for refinancing of their mortgages at low interest rates. The bill was subsequently passed by Congress and approved by President Roosevelt.



Mile 38 Colorado River. Top Red Wall 3600′ Top Canon 6000′

Marble Gorge, one of the alternate dam sites filed upon by Senator Colter as trustee for Arizona. The filings on these alternate sites will permit final location of dams and canals of the Glen-Bridge-Verde-Highline Projects at preferable points in accordance with more complete engineering data.

WHY ARIZONA'S LEGAL RIGHTS IN THE COLORADO RIVER ARE SO WELL PROTECTED

SPEECH OF CLIFTON MATHEWS INTERPRETING ARIZONA v. CALIFORNIA DECISION OF THE U. S. SUPREME COURT

Following Arizona's victory in the Arizona v. California suit in the United States Supreme Court, Clifton Mathews delivered an address at Globe, August 6, 1931, interpreting this favorable decision which held that Arizona is not bound either by the Santa Fe Compact, the Boulder Act, or Boulder Dam. Mr. Mathews, now United States district attorney for Arizona, was special assistant attorney-general of Arizona for handling this suit. Mr. Mathews said in part:

"The ruling of the Supreme Court in declaring the Colorado River a navigable stream even strengthens Arizona's position in the protection of her river rights. It gives Arizona the right to demand government protection against any act which might impair the navigation of the stream.

"In the decision rendered by the Supreme Court, Arizona was only refused its effort to halt construction of Boulder Dam. It was not forced to sign the Colorado River Compact, the most inequitable document a sovereign state was ever asked to put its pen to and one which congress in the Boulder Canyon Project Act sought to ram down our throats.

"But Congress didn't succeed. We went into court and in our suit we raised the question whether, under the constitution of the United States, Congress could force the compact on Arizona. That was the one, all-important question in the case, and the court decided it in our favor.

"The decision says we are not under the compact, that we are not bound by it, that we cannot be bound by it, without our consent, that our State water laws are still in force, that we are still free to appropriate any unappropriated water in the river, just as if the Boulder Canyon Project Act had not been passed.

"And so this compact clause—the clause that attempted to force the compact on Arizona—has gone by the board. It is dead. It was the very heart of the act, but we tore it out, tore it up and made waste paper of it.

"Declaring that several years must elapse before the dam would be completed, the court did not pass upon the question we raised relative to use of the dam as a power project, the Los Angeles water project, and the All-American Canal project. It held it was unnecessary to act on these questions now, and that if after completing the dam, the secretary of the interior should attempt to make unlawful use of it, Arizona could complain then and the court would hear her complaint. So the court dismissed our bill, without prejudice, thereby reserving to Arizona the right to renew it later, if necessary.

"Consider now the position this puts California in. All she has got is the decision saying Boulder Dam may be built. Her three projects, power, Los Angeles water, and the All-American Canal, are still under fire. Instead of validating and approving these projects the decision casts the gravest doubt upon their legality.

"In order to get the court's approval of the Boulder Dam, California claimed, and the court upheld her claim, the Colorado is navigable. If the river is navigable, the bed of it from the center of the stream to the highwater mark on the Arizona side belongs to and is owned by the State of Arizona. The government can use the Arizona land (her half of the river bed) for the purpose of building a navigable dam or otherwise regulating navigation. But California has no right to use Arizona's half of the river bed for any purpose without Arizona's consent.

"One-half of the proposed power plant, one-half of the proposed diversion dam for Los Angeles, and one-half of the proposed diversion dam for the Imperial Valley, are to be constructed in and on Arizona's half of the river bed. It cannot truthfully be said these projects are for the improvement of navigation. How then can they be constructed without Arizona's consent?

"And that isn't all. We didn't know until recently, but now we know, that we have a great navigable river flowing between us and California. That being so, the State of Arizona has the legal right to insist that its navigability be protected and preserved. We can go into court, if necessary, to enjoin obstructions of it, or diversions of water from it, such as would seriously impair its navigability. That is what New York, Michigan, and Wisconsin did in the Chicago Drainage District case. That is what New Jersey and Pennsylvania did in their recent suit against New York. What these states did Arizona can do, and intelligent Californians know it. That is why they aren't as happy over the Boulder Dam decision as some of us have imagined here, who have misunderstood the support given Arizona in the court's dismissal without prejudice."

AS WASHINGTON POST VIEWS RIVER RIGHTS

(Published in **Messenger**, June 6, 1931)

The Washington Post published an editorial on

the dismissal of Arizona's suit against Secretary Wilbur and six western states that analyzes the situation understandingly. The only point of disagreement is the statement that there are 9,000,000 acre feet of the water of the Colorado River still unappropriated and that assertion is based on the mention of "unappropriated water" in Arizona's complaint. The Colter filings covered that water years ago. Otherwise the editorial will strike a responsive chord in the hearts of Arizonans:

"By dismissing the suit of Arizona against Secretary Wilbur and six Western states, the supreme court permits construction of Hoover dam to go ahead, leaving the states free to fight over the water afterward. The court refuses to halt work on the project, on the ground that Arizona's rights have not yet been infringed. But the court takes note of the fact that Arizona has not agreed to the division of waters called for by the six-state compact and states that if operation of the dam, after it is constructed. shall in any way interfere with the rights of Arizona, an appropriate legal remedy will be available.

"The court refuses to inquire into the motives of Congress in passing the Hoover dam act. Congress pretended to authorize this $165,000,000 project for the purpose of controlling floods and improving navigation. As a matter of fact, the compact, to which the act is subject, declares that 'inasmuch as the Colorado River has ceased to be navigable for commerce . . . . the use of its waters for navigation shall be subservient to the uses of such waters for domestic, agricultural and power purposes.'

"It is logical to suppose that the diversion of water for agricultural purposes will destroy whatever navigability the river has now, and that instead of improving navigation the Hoover dam will render it impossible. But the court was willing to take the word of congress that improvement of navigation is one of the primary purposes of the act. Thus the fiction of spending $165,000,000 of the taxpayers' money for flood control and navigation is sustained by the highest tribunal.

"Unfortunately, the supreme court's decision does not settle this protracted controversy. All legal obsacles in the way of construction of Hoover dam are now removed, but the squabble over water rights in the Colorado will doubtless go on for many years. The court has merely decided that congress has authority to build this dam under the pretense of improving navigation, and not that congress and six states may ride rough-shod over Arizona's water rights. The court did not permit an injunction to issue, because Arizona's suit was based on 'potential invasions,' and not on actual impairment of her rights. Nevertheless, 9,000,000 acre feet of water of the Colorado remain unappropriated, and Arizona has the same right to appropriate it as she had before the Hoover dam was authorized. Since Arizona is not bound by the compact, that state can presumably take so much water from the Colorado as it wishes, and once it has done so, the other states will be powerless to interfere.

"In effect, this situation seems to vitiate the whole compact. It was not because Utah, Colorado and Wyoming wanted a dam built in Black Canyon that they agreed to the compact. That project will be no advantage to them. They entered into the compact to protect their rights for future development in the Colorado, and they agreed to the construction of Hoover dam in order to bring California into the compact and thus limit its rights of appropriation. Now their rights in the river cannot be protected, because Arizona has the privilege of establishing claim to as much of the water as its people desire. The upper basin states are left without any guarantee that their share of the water will remain unappropriated when they are ready to use it. The supreme court's decision leaves the basic controversy open, awaiting the time when actual diversion of a state's waters by other states will warrant an injunction.

"Oddly enough, Arizona is the only state concerned which has not bargained away some of its rights."

ANALYSIS BY MAJOR J. LEE TURLEY, WESTERN WATER ATTORNEY AND ENGINEER, OF ARIZONA'S WATER RIGHTS AND FILINGS

"Arizona was safeguarded by the United States Supreme Court decision notwithstanding Arizona's case was dismissed by a non-presentation of all the facts. I will be brief now, but plain, upon one principal point—that of an 'appropriation.' A bill or case must present the facts as they are, and have been, in Arizona. To deny facts does not change them. I bring to your attention that ALL THE WATERS OF THE COLORADO RIVER HAVE BEEN 'APPROPRIATED' IN ARIZONA BEFORE ANY MOVE WAS MADE BY CALIFORNIA AND MEXICO. This gives a PRIORITY AND SUPERIORITY in Arizona ahead of them, in addition to the fact that California has no right to take water out of Arizona and the Colorado River System into another river system.

"Have you ever . . . heard of the 'doctrine of relation' in the appropriation of water? Well let me tell you. In the growth of the 'appropriation' idea as distinct from that of 'riparian rights' of the common law it was the small diversions of the miners and the pioneers which initiated the change. Then the old doctrine of relation was that the right to the appropriation dated from the actual placing of the water to beneficial uses after the works were completed. But, because of the unfairness to a larger project, this was changed by statutes, as also by decisions of the courts, so that all such priorities do actually re-

late back to when the project was initiated under the statutes of the State. In other words, when a project is properly filed upon, notices given, or work started in the field, as provided by the State Statutes, the waters therefor are segregated from the public waters and dedicated to the uses of such project till it is completed or till it is judicially determined to be forfeited according to law. There are three periods in the life of any such project; a period of formulation and initiation; one of construction, and the period of use after completion. Any project—no matter by whom initiated—which has been properly initiated and filed upon under the laws of Arizona has an actual 'appropriation' therefor to the extent of all the waters so segregated from the public waters; and by all means should be so pleaded in any water suit Arizona has brought or will bring. Filings made for the State and those claiming under it and completed and proposed reclamation sites therefor and the maximum acreage to be irrigated and power manufactured thereunder should be enumerated and pleaded.

"The laws of Arizona recognize the doctrine of 'relation' of priorities relating back to when the projects were initiated or filed on. This fact should be set forth in any bill and brief—that ALL THE WATERS HAVE BEEN HERETOFORE 'APPROPRIATED' UNDER THE LAWS OF ARIZONA, as they actually have been. Who, that knows anything about financing, would put any funds whatsoever into such projects in Arizona if he had to wait till the waters were diverted, after the loss of time in constructing the works, then out onto the lands or to other uses? To so plead such would kill off all development in Arizona in the interest of the so-called 'corporations.'

"There are times in the affairs of men when an individual may become an institution. So it is here with Fred T. Colter. The man who, because of perspicacity and foresight, actually initiated 'appropriations' under which ALL the waters of the Colorado River CAN be held by Arizona, as against California and Mexico and the power trusts, by such priorities, has thereby become an 'institution' for the State of Arizona. And no matter what you may all think of the individual peculiarities of such a man you MUST stand behind the INSTITUTION (the prior filings of appropriations) represented by that man—if you expect to maintain Arizona's rights and to enforce the laws of the State contemplated by the oaths of office sworn by public officials."

ARIZONA SAFEGUARDED

Major Turley Says Colter Water Filings, Which Are Prior and Superior, and Arizona Are Protected by United States Supreme Court Decision

(From the Messenger)

Major J. Turley, water expert and attorney, admitted to practice before the U. S. Supreme Court, with a life of actual engagement in water and land problems, recites cases and facts to verify extremely favorable position and justification of Arizona in claiming water rights in the Colorado River. He reviews the recent decision of the U. S. Supreme Court in the Wisconsin v. Illinois case, against Chicago diverting waters out of Lake Michigan into the Mississippi River, not in conformity with the law, and therefor ordered to cut down diversion after it had actually been made for over forty years. Also the Connecticut v. Massachusetts and New Jersey v. New York cases were decided on the basis of protecting state's rights, as also the U. S. v. Utah case, which held that the Upper Colorado is navigable in the state of Utah, and the Arizona v. California, Wilbur, et al., U. S. Supreme Court case, which held the lower Colorado River is navigable and that the rights of Arizona are unimpaired by the Boulder Dam Act.

Major Turley insists any Arizona pleading MUST set forth ALL of the waters of the Colorado River HAVE been "APPROPRIATED" in Arizona, as technically they have, and when California or any source starts to take any water belonging to Arizona out of the Colorado River they MUST and CAN be STOPPED, for there would then be an actual invasion or vested property rights, decidedly an unconstitutional act. He refers to the "doctrine of relation" in the laws of Arizona under which, when a project is properly initiated and filed on in this state, the waters called for under such filings are segregated from the public waters and are dedicated to the use of such project until same is abandoned or is judicially determined to be extinguished. Therefore when Fred T. Colter made the filings on all waters of the Colorado River for the superior consumptive use on some 6,000,000 acres in Arizona and 5,000,000 horsepower, these waters were segregated for the Colter projects and there are NO waters LEGALLY LEFT in the Colorado River. Therefore it must be that these facts be set out in any Arizona pleadings before the U. S. Supreme Court, or in any court.

The Hoover or Boulder Dam is permitted to go ahead. However, the decision specifically sets out that **Arizona's State's Rights** are not impaired and Arizona CAN divert ALL of those waters either above or below the Hoover Dam. The problem on the Colorado River must be settled on the basis of titles and property rights in the use of these waters. The court has merely decided that congress has authority to build this dam for navigation ONLY and not that the secretary of the interior and a state or states can ride ROUGH-SHOD over ARIZONA'S WATER RIGHTS.

Since Arizona is not bound by the Santa Fe Compact or Tri-State Compact (as held by the Supreme Court), Arizona is the ONLY state in the Colorado River Basin which has **NOT BARGAINED**

AWAY HER WATER RIGHTS. Now what Arizona must do is to declare her water rights, get behind these water rights, **exert due diligence in their development** and co-operate in the best plan for all concerned with respect to the Colorado River problem. Colter made these filings, commencing in 1923, which are PRIOR and SUPERIOR and in good standing and has led the fight for Arizona's protection and gives a fortune of his own to preserve the priorities of these waters for the people of Arizona. NOW because of past events the best course left for the state's interest is for Senator Colter to form a corporation to hold these filings, rights and priorities and to give certificates to those who have and those who shall contribute anything of value towards such water rights, so that they as well as the records may have some evidence of what has been done to perfect and develop said water filings.

ANALYSIS OF RUINOUS SANTA FE COMPACT AND SUPPLEMENTAL TRI-STATE COMPACT REJECTED By ARIZONA

(Statement of Senator Colter, published by press of Arizona.)

The provisions of the Colorado River Compact by which Arizona's waters would have been deeded to Mexico had Arizona signed it are set forth below. Paragraphs (a) and (b) of Article III provide for definite allocations of the waters of the Colorado River and its tributaries "in perpetuity" to the upper and lower basins, and that such allocations shall include present used waters. Paragraph (c) of the same article provides that surplus waters of the Colorado River System over and above the total amount allocated to the upper and lower basins in the United States should go to Mexico, and that if this surplus is not sufficient the deficiency should be supplied mainly by Arizona. Article VIII of the compact further strengthens the deeding of such "surplus" waters to Mexico by declaring that water rights in the upper and lower basins "shall be satisfied solely from the water apportioned to the basin in which they are situate." Paragraph (f) of Article III after referring to the three allocations of the Compact in Paragraphs (a), (b), and (c) (the upper basin, the lower basin and Mexico), provides that if there should be a surplus after Oct. 1, 1963, it may be apportioned after that date. There would be no surplus by that time because Mexico would have already put to use the surplus waters as allocated that nation by paragraphs (c) and (f) of Article III, but in any event the Tri-State Compact would allocate California half of any surplus existing in 1963.

Now there are in the Colorado River System, inclusive of present used waters as the compact stipulates, 25,000,000 acre feet of water calculated as follows:

		Acre Feet
Annual flow of Colorado River at Yuma		17,500,000
Present used water in Arizona (figure as of June 25, 1929, subsequent increase not added)		3,500,000
Present used Colorado River waters in California		2,500,000
Present used water, Upper Basin States		1,500,000
Total waters of Colorado Riv. Sys.		25,000,000
Apportioned to Upper Basin by Colorado River Compact	Acre Feet 7,500,000	
Apportioned to Lower Basin by Colorado River Compact and supplemental Tri-State Compact		
California	5,400,000	
Arizona	2,800,000	
Nevada	300,000	
Total Lower Basin	8,500,000	
Total Upper and Lower Basins		16,000,000
Surplus to Mexico from above allocations		9,000,000

The mountainous upper basin with its limited irrigable area and small requirement of water per acre would never use more than 4,500,000 acre feet of its allocation under the Colorado River Compact:

Apportioned to upper basin by Colorado River Compact	7,500,000	
Amount Upper basin would use	4,500,000	
Surplus to Mexico from Upper basin		3,000,000
Total allocation to Mexico by Colrado River Compact, with any deficiency guaranteed by Arizona		12,000,000

The mountainous upper basin with its limited irrigable area and greater rainfall due to higher altitudes will require far less water in the aggregate and only half as much water per acre as the lower basin. The above table conservatively estimates that 3,000,000 acre feet of the compact's upper basin allocation will not be used in that area but will be added to the surplus waters deeded by the compact to Mexico. Actually, the entire 7,500,000 acre feet upper basin allocation or any waters used in the upper basin will by reflow eventually come back into the river, the flow of which will not be depleted as it crosses the Utah-Arizona line, but Arizona if it signed the compacts would not be able to use these waters.

What Arizona Is Entitled To From Colorado River, Its Only Water

A state is entitled only to the use of such waters that rise and fall on its river system areas as it puts to use or initiates to put eventually to beneficial use.

The proportion of land area any state has in the drainage basin of a stream system, together with the amount of water per acre required for irrigation determines the amount of a stream system waters to which that state is inherently entitled. Irrigation in Arizona at lower altitudes requires more than twice as much water as in the high altitudes of the upper basin. The proportionate land areas of the "lower basin" states are shown in this table:

	Entire Basin	Lower Basin
Arizona	42%	85.5%
California	2%	10. %
Nevada	5%	4.5%

Arizona has 92% of the power of the Colorado River.

By virtue of its great area and millions of acres of irrigable land in the Colorado River drainage basin and its high water duty per acre for irrigating its lands, Arizona is entitled to 15,000,000 acre feet of Colorado River System waters, which it may use if not bound by signing any water division compact. This 15,000,000 acre feet will progressively increase as time goes on through reflow and re-use of water until it becomes 30,000,000 acre feet, and this increase will continue until all available land in Arizona is irrigated. Reflow from such irrigation development in this State will supply all Mexican Colorado River needs, and, as will be the case at the Utah-Arizona line, the Colorado River will never deplete its flow at the Mexican border.

Arizona's prior and superior legal right to the irrigation of millions of acres of land throughout the State was established when Fred T. Colter beginning in 1923 filed on all the unappropriated waters of the Colorado River for the people of Arizona, and by keeping up these water filings and water rights, which must continue, and, on the other hand, Arizona must as in the past continue to refuse to sign any water division compacts and limitations, as they would destroy these natural and legal water rights.

The representatives of Arizona in Congress and the treaty-making power of the United States should base any negotiations with Mexico concerning use by that nation of Colorado River waters on the fact that reflow waters from irrigation near the heads of this stream will eventually supply all water needs of Mexican lands in the Colorado River delta. The waters of the Colorado River System which today measure 25,000,000 acre feet when fully and properly developed from the heads down by re-use of water will in the future measure 60,000,000 acre feet and will increase more each year with the counting of reflow use as required by the tested water law of maximum, economical, beneficial use of water. Because of this multiple reflow and re-use of water, Arizona cannot afford to adopt any water division compacts limiting its present and future use of water and growth; it would be suicidal for Arizona or any municipality thereof to adopt this Parker-Gila Project - Colorado River Compact - Tri - State Compact scheme or its equivalent by any compact with another state or states or by contract with the Secretary of the Interior, since these compact schemes would allocate Arizona forever less water than it now uses and in addition obligate this State in dry years to supply the Mexican water deficiency.

"NEVER WAS BIGGER HOAX IN U. S." SAYS SMITH ON TRI-STATE PACT

(Arizona Gazette, October 20, 1926.)

Charging that there never was a bigger hoax in the country Professor G. E. P. Smith, irrigation engineer of the University of Arizona, last night attacked the proposed tri-state compact which has been proposed as a supplement to the Colorado River Compact. He charged that Arizona had three battlefronts — on the south, west and northeast, and that the one on the northeast was the one which should be watched most carefully. His address was made at a meeting of the Tucson Civic club.

Speaking of the Santa Fe Compact, he declared that it gave the upper basin states thirty per cent more water than they could ever use, and that the lower states had 35 per cent less water than there is known use for now.

He sounded a warning for Arizona to take steps immediately to compile information about the river which could be used in the presentation of what he termed Arizona's case, referring to such programs already under way in other states.

The speaker also warned against a possible treaty made with Mexico, whereby he said the rights of the United States to waters of the Colorado river would be sacrificed to secure a larger share of waters from the Rio Grande, where farmers have already utilized all of the available water.

Referring to the "battlefront" on the west, he stated that the upper basin did not leave California enough water for either state, so that one state would have to suffer for the loss of the water. With California further progressed in statehood and better equipped financially to make improvements, Arizona is at a disadvantage in competing with California for this water.

The composite picture of the five recent aspirants for the office of governor showed to Professor Smith, a man voicing a violent favor for the development of the Colorado river for the benefit of Arizona, but lacking specific information on the manner in which to proceed.

PHOENIX EVENING GAZETTE

ARIZONA'S CAPITAL NEWSPAPER + AGGRESSIVE AND INDEPENDENT

VOL. LII. PHOENIX, ARIZONA, Monday Evening, January 25, 1932 NO. 73.

Huge Washington Dam Project Urged To Give 100,000 Jobs

BY HAROLD TURNBLAD

WENATCHEE, Wash., Jan. 26.—(AP)—Construction of the gigantic Grand Coulee dam and development of the vast Columbia river basin again are being urged upon congress.

Senators Jones and Dill of Washington have introduced a bill in the senate, while a similar measure also has been introduced in the house, calling for construction of this project, comparable only to the huge Hoover dam and Boulder canyon development, which it exceeds in size and cost.

The bill does not specify the amount to be required, but Jones says the board of engineers for rivers and harbors estimates the cost at about $400,000,000.

Advocates of the project point out that the starting of construction would directly or indirectly give employment to thousands of now idle workers.

POWER TO PAY COST

Power from the mighty torrents of the Columbia would be relied upon to pay for the dam within 50 years, although congress is asked to underwrite the expense because of the magnitude of the project. Worked in with the power and reclamation agies of the development plans is flood control along the river.

Four times more electricity would be developed at the Grand Coulee dam than at the huge Hoover dam project under construction on the Colorado river. Approximately 1,500,000 acres of bleak desert would be transformed into some of the nation's finest agricultural land.

Only a small portion of the land would be opened to settlement at one time in order to avoid overproduction of agricultural products. Diversification of crops would be insisted upon.

INDORSED BY MANY

The Washington State Grange, which formerly opposed the development of the Columbia basin, as the area to be benefited by the Grand Coulee project is known, recently added its endorsement to those of many civic and state organizations.

The first farmers to benefit by the reclamation development which is part of the project would be a hardy group of "dry farmers" who have fought a losing battle with the elements.

Formerly enough rain fell to enable them to wrest a crop from the soil every two years, but a cycle of dry years has left hundreds of abandoned farm houses and thousands of dead fruit trees in its wake.

In citing how the project would be a boon to unemployed Willis T. Ratchellor, Seattle consulting engineer, estimates that erection of the dam alone would provide work for 5,000 men.

A similar number could be employed in building the reclamation canals and several thousands in building railroads spurs and handling freight.

Approval of congress for construction of the giant Grand Coulee dam project on the Columbia river in Washington is being sought by senators, representatives and organizations of the state. Map above shows location of the $400,000,000 project, and the 1,500,000 acres of desert land it would irrigate. Below is the Grand Coulee reservoir which was the ice channel of the Columbia river.

Ratchellor believes 100,000 men would be given jobs directly or indirectly if congress orders work to proceed. This includes men in industries which would provide materials and machinery.

Although not so high as Hoover dam, Coulee dam would be the largest of its kind in the world.

LARGEST IN WORLD

Preliminary plans call for it to be 500 feet high where it would bite deepest into bedrock. It would tower 350 feet above the present level of the Columbia river.

The dam would be about 4,300 feet long and require 10,000,000 yards of concrete.

Seven times as much water would be handled as at Hoover dam, and a 150-mile lake would be formed above the dam.

The lake would form an important link in the inland waterways along the Columbia river, planned by the war department and would store 5,000,0000 acre feet of water for irrigation.

Engineers estimate electricity totaling 4,000,000 horsepower could be developed at the Grand Coulee site. Of this amount 2,000,000 horsepower will be sold to western slope power companies.

The remaining secondary power would be used for raising water impounded by the dam 285 feet into a natural reservoir formed by the Grand Coulee—the ice age channel of the Columbia river—for irrigating the Columbia basin and for pumping water to other irrigation projects.

Low earthen dams at either end of Grand Coulee would form a narrow lage 28 miles long. A short tunnel would carry the water through a ridge into Bacon lake, from which the main irrigation canals would carry the water by gravity over the project.

Columbia River Basin - Grand Coulee Project costing $400,000,000, authorized and financed by the Federal Government and now under construction.

ENGINEERING COMPARISONS

The Superior Feasibility of the Arizona Highline Projects as Compared with Other Large Water and Power Projects

The three other huge water projects which will now be compared with the Glen-Bridge-Verde-Highline Projects, are the Columbia River Basin-Grand Coulee Project, the All-Gravity Los Angeles Tunnel, and the Colorado River Aqueduct to Los Angeles. These comparisons amply prove that the Arizona Highline Projects are more far feasible than either of the three with which it is compared.

1. **Columbia River Basin-Grand Coulee Project** (see photostat and article in **Phoenix Gazette**). This project, which will cost $400,000,000, has already been approved and authorized by the PWA and extended an initial loan of $60,000,000. This Columbia River Basin Project, now in course of construction, will irrigate 1,200,000 acres, not by gravity but by a 285-foot pump lift, and manufacture 4,000,000 electric horse power, 2,000,000 of which must always be used for pumping the irrigation water.

The Arizona Highline Projects will irrigate 4,455,000 acres by gravity and 6,000,000 acres with reflow use, and will manufacture 5,000,000 electric horse power which will far overpay the $350,000,000 cost of the Highline, which thus greatly surpasses in feasibility the Columbia River Basin-Grand Coulee Project.

2. **All-Tunnel, All-Gravity Aqueduct to Los Angeles From Black Canyon** (see photostat). This 300-mile tunnel from the Colorado River was proposed by the late famous General Goethals, engineer of the Panama Canal, with Louis C. Hill and Walter Gordon Clark, engineers. The 300-mile tunnel, at an estimated cost of $242,000,000, was planned to convey 1,000,000 acre feet of water to Los Angeles from the Colorado River. The Arizona Highline Projects with only 68 miles of tunnel will bring 12,000,000 to 16,000,000 acre feet for irrigation-municipal use to central and southern Arizona at a cost of only $350,000,000 which the power incidentally produced will far overpay.

3. **The Colorado River Aqueduct** (see photostat). This aqueduct is now being built by the Metropolitan Water District of Southern California. Cost of aqueduct is $220,000,000, with $25,000,000 additional for terminal works, a total of $245,000,000. The aqueduct calls for a 1700 foot pump lift, 97 miles of tunnel, and 265 miles passage across desert and mountain ranges to the Pacific Coast. Annual electric power charges for pumping would be capitalized at some $400,000,000, rendering a total charge of $645,000,000 for the aqueduct.

The Highline Projects will cost one-half of this amount, are all-gravity and the revenue from power sales will much more than pay completely all cost of construction, amortization, operation, and maintenance.

COMPARISON TABLE

President Roosevelt has said that he intended to use the Tennessee Valley Authority and Columbia River Basin Projects, both of which have been authorized and financed by the federal government, as "yardsticks." The table below shows by these measurements how much more beneficial and economical are the Arizona Highline Projects than either the TVA or the Columbia River-Grand Coulee Project, both of which are now under construction.

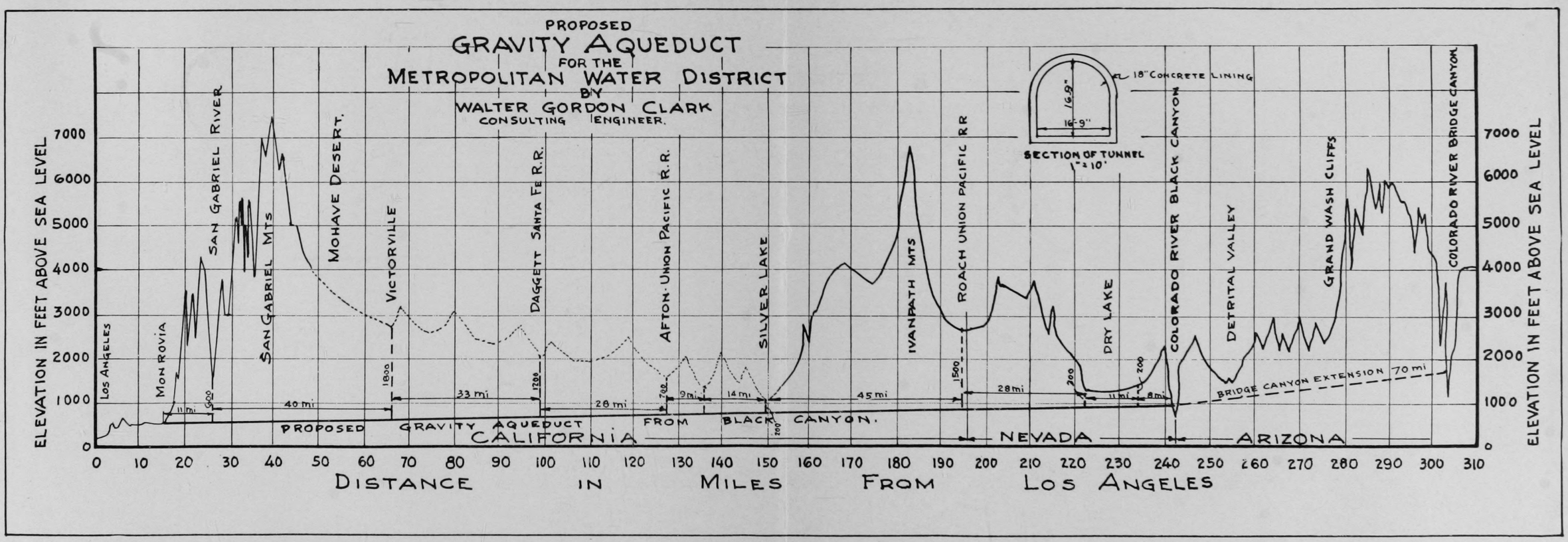
Name	Location	Electrical H.P. to be developed	Acres Subject to Irrigation	Cost
TVA	Tennessee	4,000,000	None	$952,000,000
Columbia River Grand Coulee Project	Washington	4,000,000	1,200,000 by 285 foot pump lift	$400,000,000
Highline	Arizona	5,000,000	4,445,000 by gravity, 6,000,000 with reflow use	$350,000,000

NOTE: One-half of the power developed on the Columbia River Project will be required to pump water for irrigation. On the Highline Projects in Arizona every step is a "drop" and manufactures power instead of consuming any of it for pumping for irrigation and revenue from sale of this power will far overpay all cost of the highline projects.

ENGINEERING GROUP ON COLORADO RIVER PROJECT
LOUIS C. HILL, WALTER GORDON CLARK AND THE
LATE GEN. GOETHALS

Proposed 300-Mile All-Gravity, All-Tunnel Aqueduct to Los Angeles from Colorado River

(HYDRAULIC ENGINEERING, SEPTEMBER, 1929)

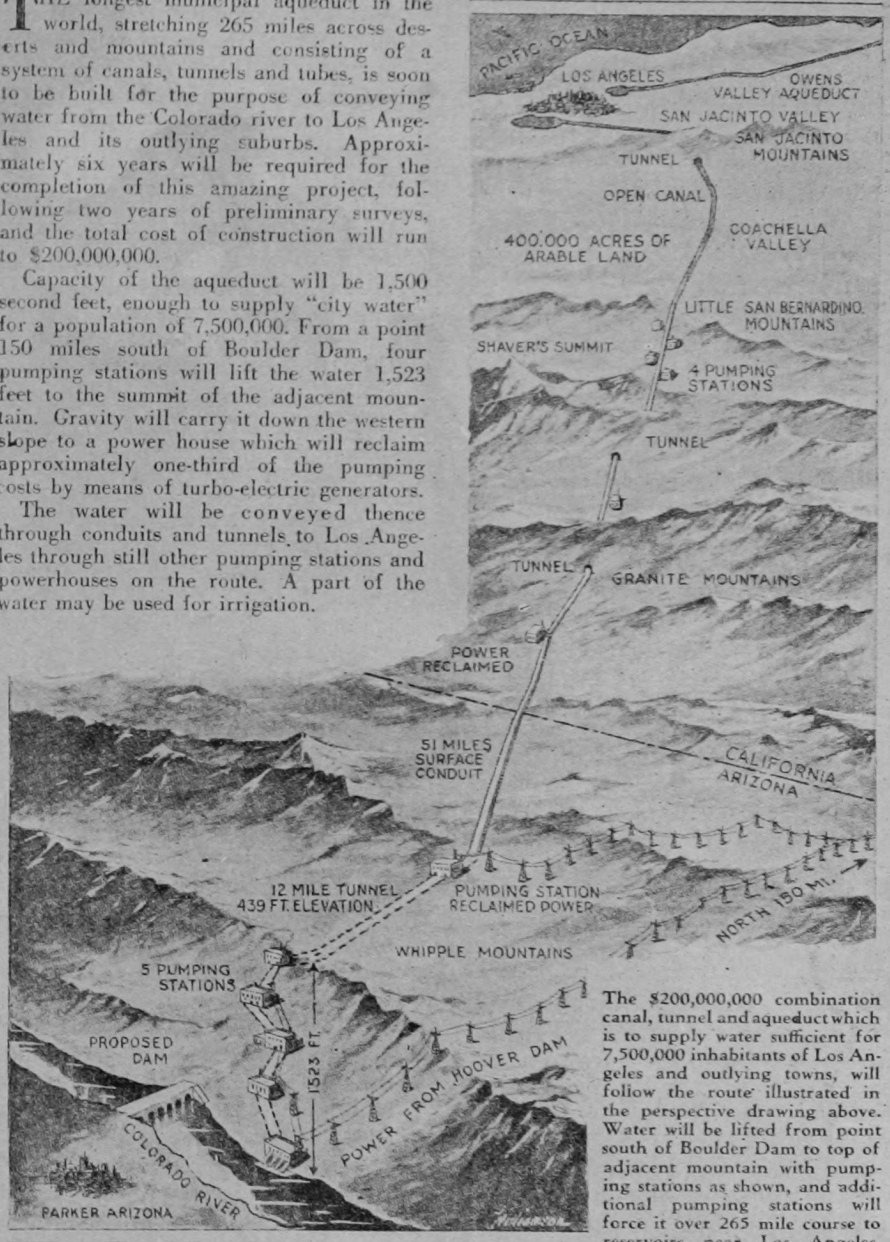


Water Pumped 265 Miles Across Desert

THE longest municipal aqueduct in the world, stretching 265 miles across deserts and mountains and consisting of a system of canals, tunnels and tubes, is soon to be built for the purpose of conveying water from the Colorado river to Los Angeles and its outlying suburbs. Approximately six years will be required for the completion of this amazing project, following two years of preliminary surveys, and the total cost of construction will run to $200,000,000.

Capacity of the aqueduct will be 1,500 second feet, enough to supply "city water" for a population of 7,500,000. From a point 150 miles south of Boulder Dam, four pumping stations will lift the water 1,523 feet to the summit of the adjacent mountain. Gravity will carry it down the western slope to a power house which will reclaim approximately one-third of the pumping costs by means of turbo-electric generators.

The water will be conveyed thence through conduits and tunnels to Los Angeles through still other pumping stations and powerhouses on the route. A part of the water may be used for irrigation.



The $200,000,000 combination canal, tunnel and aqueduct which is to supply water sufficient for 7,500,000 inhabitants of Los Angeles and outlying towns, will follow the route illustrated in the perspective drawing above. Water will be lifted from point south of Boulder Dam to top of adjacent mountain with pumping stations as shown, and additional pumping stations will force it over 265 mile course to reservoirs near Los Angeles.

Los Angeles Municipal Water and Irrigation Plan which involves 94 miles of tunnels and approximately 2000 foot pump lifts with a first cost of 225 million dollars with an annual pumping cost and other costs which would be capitalized at 400 million dollars. (Modern Mechanics and Inventions, August, 1930.)

ENGINEERING SECTION

Official State and Federal Survey — Reports of Highline Projects

I. EARLY ENGINEERING

Early maps, engineering reports, and initiation of the Arizona Highline Projects date from 1919 and earlier. Among those active early in this work were Professor G. E. P. Smith of the University of Arizona, J. Dobbins, R. M. Stine, Robert H. Williams, H. E. Turner, Howard S. Reed, and Sheldon K. Baker.

II. ARIZONA ENGINEERING COMMISSION SURVEY, 1922-23, WITH U. S. CO-OPERATION

In 1922-1923, the State of Arizona and the United States cooperated in an official survey by the Arizona Engineering Commission, of which the chairman was E. C. La Rue, noted Colorado River authority and at that time hydraulic engineer of the U. S. Geological Survey. The commission rendered its report to the Governor (Hunt) of Arizona July 3, 1923. Although based on admittedly insufficient data and using a contour level not high enough to reach additional millions of acres which can be feasibly irrigated and by inclusion will greatly reduce the pro rata cost of development per acre, the commission report found feasible the irrigation of great areas in Arizona from the Colorado River. La Rue in a special minority report favored the Arizona Highline Canal from the Spencer Canyon-Bridge Canyon vicinity. The report recommended that $25,000 be appropriated for further investigation. (Arizona Engineering Commission Report, p. 135, Colorado River Basin Hearings, House of Representatives, 68th Congress, 1st session, on H. R. 2903 by Swing.)

III. STURTEVANT-STAM SURVEY AND REPORT TO GOVERNOR AND SENATOR COLTER AS TRUSTEE, 1923, ET SEQ.

When the report had been filed with Governor Hunt the Arizona Highline Reclamation Association under Senator Colter's direction as president requested of Governor Hunt, waiting upon him in a body in his office for the purpose, another official survey for the needed additional data. Governor Hunt complied, and authorized the Sturtevant-Stam Survey, half of the expenses of which was paid from the governor's contingent fund and by the State Water Commissioner; the other half was raised and furnished by Senator Colter personally and the association. George W. Sturtevant, consulting engineer in charge, a graduate of the University of Maine, had been instructor in field engineering and hydraulics at the University of Minnesota, and held a high record as an international consulting, construction and hydraulic engineer. He previously had conducted, in 1893, surveys of the Colorado River and its tributaries for the land department of the Atchison, Topeka & Santa Fe R. R., with a view to irrigation of lands in Arizona from the river and had been consulting engineer to the group of bankers who had financed the second Niagara Falls Power Development for machinery installation, and for seven other major dams and hydro-electric installations. Mr. Sturtevant had served as consulting engineer for 212 water and power projects in the United States, Canada, Mexico and South America. By training and experience he was well qualified for surveying and reporting upon the Arizona Highline Canal and the great combined irrigation and power projects thereunder.

On Sept. 18, 1923, the Sturtevant-Stam Survey Report was submitted in the form of a letter to the governor and Senator Colter, president of the Arizona Highline Reclamation Association. After a detailed statement of the route followed and data accumulated, the report concluded:

"We find the proposed Arizona Highline Canal Irrigation and Power Project entirely feasible and practical.

"The construction of a Colorado River Dam below Spencer Canyon to divert water at the 2000 foot elevation, including over 500 miles of highline canal and 155 miles of lateral canals reaching to centers of distribution to 3,500,000 acres of desert lands in Arizona will be $290,000,000.

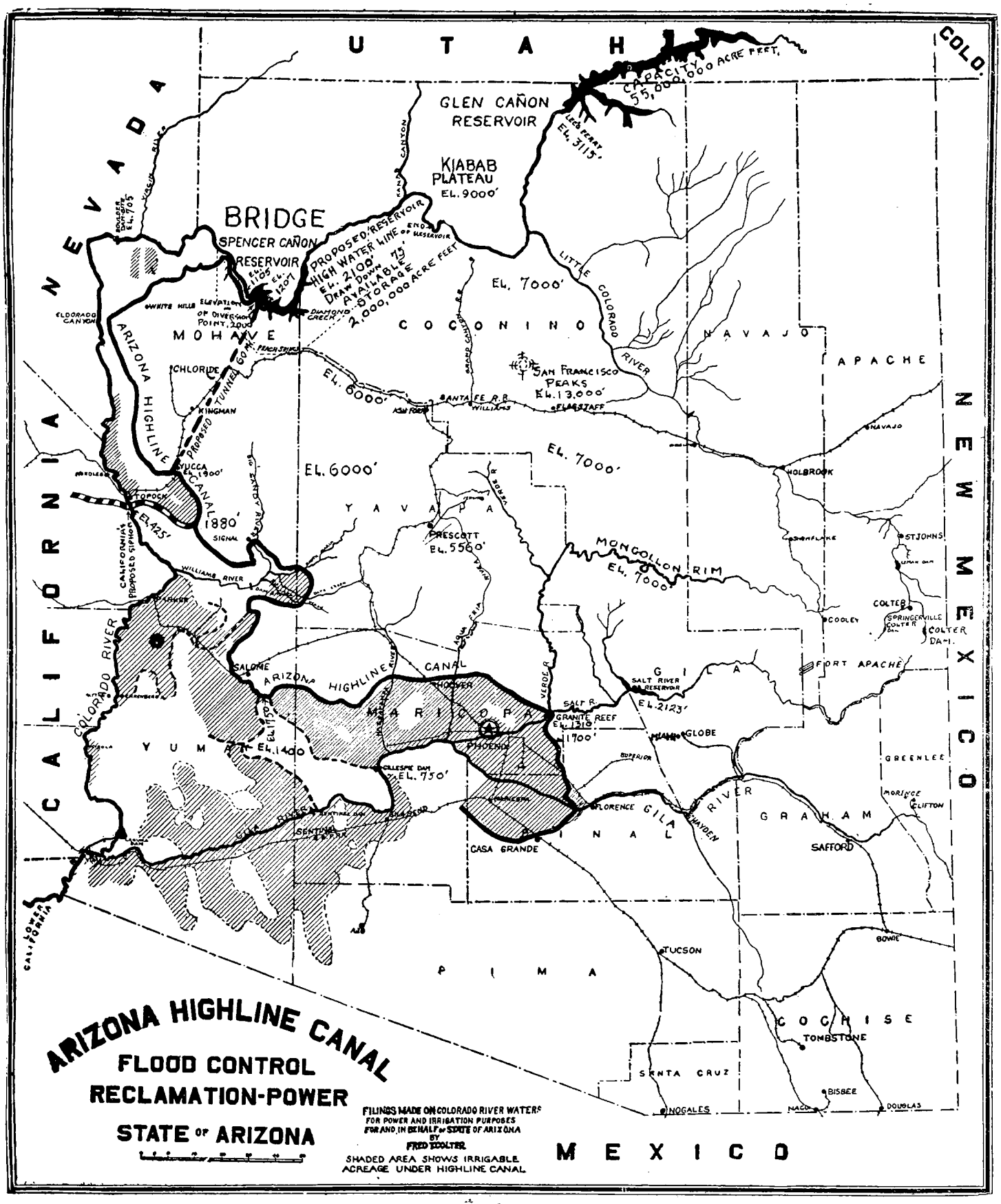
"A diversion dam located in the lower canyon of the Colorado River, five miles below Spencer Canyon, constructed to divert water at the 2000 foot level as a gravity type monolithic concrete dam, and including electrically operated headgate system, 30 miles of railroad with equipment, cement plant, all necessary housing, cables, hoists, machinery, tools, equipment and labor, will cost $46,340,000.

"A Highline Canal, all concrete lined, 548 miles total length, with a capacity of 15,000 cubic feet per second for over 250 miles, and reduced in capacity for the remainder of its mileage, including 27 miles of cement-lined tunnels (all short in length) including power operated headgates at all lateral canal systems, will cost $206,116,000.

"One hundred fifty-five miles of main lateral canals, all concrete-lined and leading to distribution centers for water supply to 3,500,000 acres, will cost $37,544,000.

"TOTAL COST, $290,000,000.

"This does not include credit from government



Map of Glen Canyon Dam and Storage Reservoir, Bridge Canyon Diversion Dam and Arizona Highland Canal

The waters of the Colorado River required for the reclamation of 4,500,000 acres of land in Arizona under the Arizona Highline Canal system have been appropriated and the necessary filings made for the State of Arizona, and as Trustee therefor by Fred T. Colter, President of the Arizona Highline Reclamation Association.

The lands to be reclaimed under this State Appropriation are indicated by the shaded areas on the above map.

for flood control nor the power developed on the Arizona Highline Canal that will eventually pay for cost of the entire project.

"(Signed) GEO. W. STURTEVANT,
Engineer in Charge of the
Arizona State Survey Party."

On March 8, March 10, and Dec. 10, 1928, further reports were submitted by George W. Sturtevant, all to Senator Colter as trustee for the state of Arizona and water users under the Highline projects. Dated March 8, 1928, the following is a summarized statement by Mr. Sturtevant of mileage, classification of materials, and estimated cost of construction made from the preliminary survey and inspection of the 185 miles of transmission canal leading from the Bridge Canyon Dam on the Colorado River to the Needles Mountain-Topock Forebay of the all-gravity Arizona Highline transmission canal:

Length of Canal, Bridge Canyon Head Gates to the Needles Mountain Forebay		185 miles
Total tunnel mileage along this canal	33 miles	
Mileage in rock side cutting	18 miles	
Mileage in mixed earth and rock excavation	42 miles	
Mileage in all-rock excavation (no side cutting)	24 miles	
Mileage in all-earth excavation, normal work	68 miles	
		185 miles

All tunnels and bridges will have 12 foot barge or boatway clearance. Canal to be all concrete lined.

Estimated Cost

For 33 miles concrete lined canal tunnel in rock	$25,160,000
For 18 miles concrete lined canal side cuts in rock	14,150,000
For 68 miles concrete lined canal in earth excavation	19,720,000
For 48 miles concrete lined canal in mixed earth and rock	17,472,000
For 18 miles concrete lined canal, all rock excavation	5,256,000
For roads, bridges, drainage, telephone line, fencing and station houses	375,000
For miscellaneous equipment	1,150,000
For legal, engineering, superintendence, insurance, and miscellaneous expenses	2,250,000
Total cost 185 miles transmission canal	$85,533,000

Glen Canyon and Bridge Canyon Dams

Estimated cost of Glen Canyon Dam complete	$ 33,000,000
Estimated cost Bridge Canyon Dam and Head Gates	39,000,000
Total cost Glen and Bridge Canyon Dams and 185 miles transmission canal to Topock Forebay	$157,533,000

On March 10, 1928, Mr. Sturtevant submitted the following report to Fred T. Colter, trustee, on the Arizona All-Gravity Highline Canal, with an assumed water surface at Bridge Canyon head gates of 1900 feet.

Arizona All-Gravity Highline Canal

	Tunnel	Open Cut	Miles	Elevation
At Bridge Canyon Diversion Dam				1900.0
Side cut inlet portal to Meriwitica Tunnel		1.2	1.2	1899.0
Tunnel to Meriwitica Spencer Canyon	6.2		7.4	1886.6
Along Spencer Canyon		0.3	7.7	1886.4
Along Spencer Canyon to W. side Meriwitica Canyon	0.5	2.2	10.4	1884.1
Along N. Side Canyon (A) on map	2.0	0.4	20.5	1873.5
Along Colo. River to N. Side Canyon (C)	1.2	7.3	29.0	1866.7
To near end Grand Wash Cliffs along Colo. River to W. Portal Tunnel to Grapevine Wash	5.5	11.0	45.5	1849.1
To W. Portal Hualpai Hills Tunnel	3.0	2.0	50.8	1841.9
To W. Portal of White Hills or Squaw Peak Tunnel	6.5	14.5	71.8	1820.2
To W. Portal of Pilot Knob Tunnel	3.0	17.3	92.1	1803.8
To W. Portal of Yucca	3.1	56.8	152.0	1769.2
To Needles Mts-Topock Forebay (Canal Forks)	4.3	28.8	185.1	1746.2
Total	36.5	148.3	185.1	1746.2
Arizona All-Gravity Canal from Needles Mts. Forebay				
To W. Portal Sandy River flume or siphon	13.0	38.0	51.0	1746.0
To S. Portal Santa Maria flume or siphon	2.5	19.5	71.5	1686.7
To E. Portal Little Harqua Hala Tunnel	3.5	47.5	122.5	1651.2
To E. Portal Hassayampa flume	3.0	64.0	189.5	1609.2
To E. Portal Agua Fria River flume	1.5	29.0	220.0	1578.0
To R. Portal Salt River (Granite Reef) siphon	1.5	47.0	268.5	1546.8
To S. Portal Gila River flume, 3 miles West of Price		39.0	307.5	1523.0
To Near Head of Waterman Wash, 7 miles S. of Maricopa		70.0	377.5	1450.0
Total	25.0	344.0		

"At points of take off of lateral canals leading from the Arizona Highline Canal to 3,500,000 acres of valley lands throughout southwestern Arizona, and at 12 or more major drops along

the larger canals there may be developed 600,000 hydroelectric horse power entirely within the valley area to be irrigated by waters first used for power development at the Glen Canyon Dam, thus showing a dual use and efficiency heretofore unsurpassed in the history of water economy for irrigation and power.

"Water and power and site filings have been made by Fred T. Colter for Arizona and its water users."

On Dec. 10, 1928, Mr. Sturtevant submitted the following brief summary of power which will be made on the "Glen Canyon-Bridge Canyon All-Gravity Arizona Highline Canal system and dam sites between Glen and Bridge Dams."

At Glen Canyon Dam—Average yearly ..... 700,000 H. P.

At Needles Mountains — Water to Lower Colorado River District. 4,700,000 acre feet returned to Parker Reservoir from Needles Forebay through steel reinforced, concrete lined bed-rock tunnel penstocks, to 3 or 4 power stations—tail discharge into Parker Reservoir with net effective head of 1300 feet—Stabilized power output 750,000 H. P.

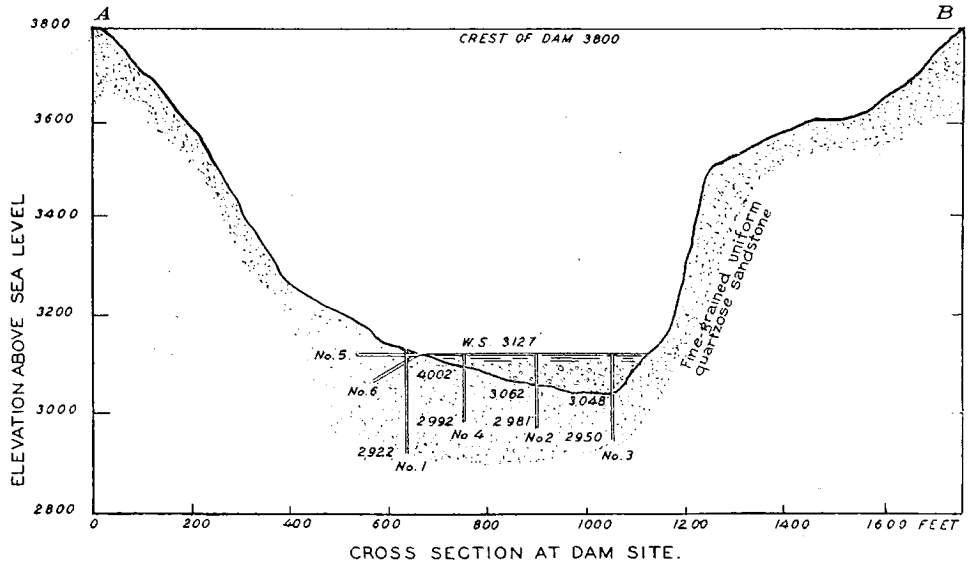
Along Arizona Distribution Canal System—Power available at 20 or more canal drops along the transmission canal system conveying water to 3,000,000 acres or more of land in Arizona ..... 600,000 H. P.

Total Available Power from the Arizona Glen-Bridge Highline Plan on Colorado River will exceed.....2,000,000 H. P.

"There is between Glen Canyon storage dam site and Bridge Canyon diversion dam site, 1350 foot fall, which can produce an additional 2,000,000 H. P., produced by building four additional dams at Redwall or Marble, Mineral Canyon, Ruby Canyon, Specter Canyon.

"Dam sites, power and water filed on by Fred T. Colter for Arizona and its power, water, and land users; filings made supplemental, additional, and subsidiary to the Glen Canyon storage dam site, Bridge Canyon storage and diversion dam site for Arizona Highline Canal. Filings on the same made by Fred T. Colter in 1923 and diligence kept up by him and people for Arizona to irrigate 4,000,000 acres in Arizona and produce additional 2,000,000 horse power of electricity. Grand total available power from the Arizona Glen-Bridge-Highline Plan of Colorado River Development, including dam sites between Glen and Bridge dam sites, 4,000,000 horse power."

As explained, it was on the basis of the new data and maps furnished by the official Sturtevant-Stam Survey, and all other available information that the trustee, Fred T. Colter, made the first of his water filings on the Highline Projects for and on behalf of Arizona and water users under the projects. This survey-report was largely obtained and financed by Senator Colter.



CROSS SECTION AT DAM SITE.

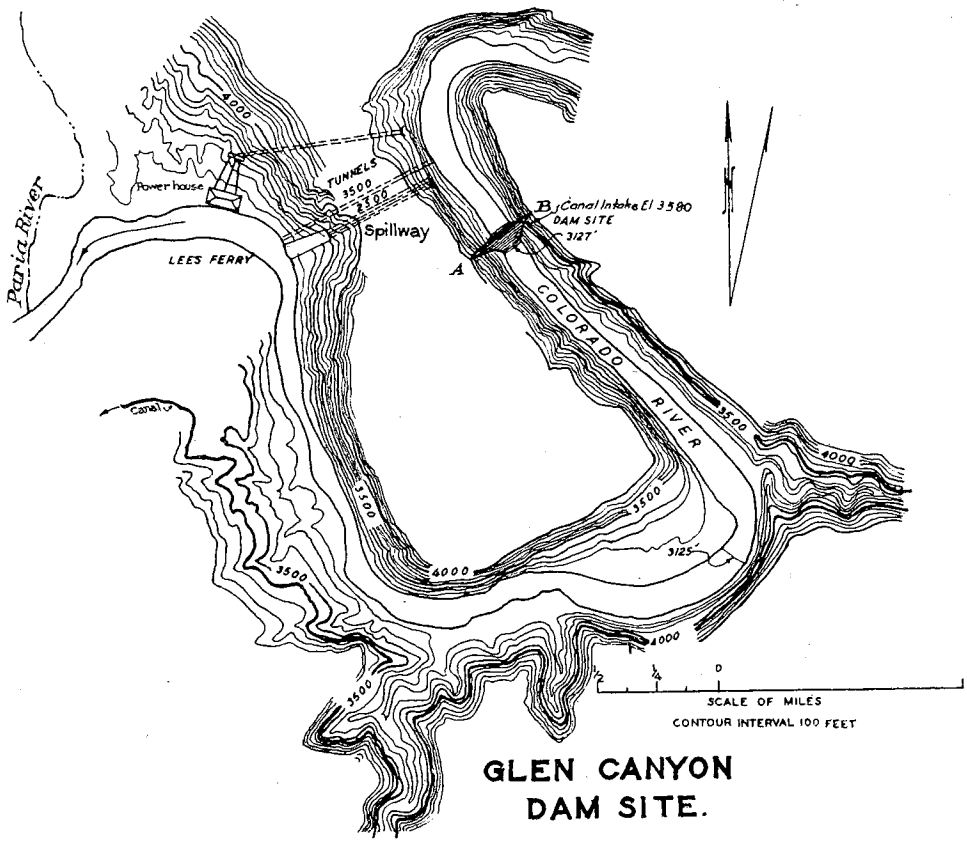
Glen Canyon Dam Site

IV. TROTT-PARKER SURVEY, 1925

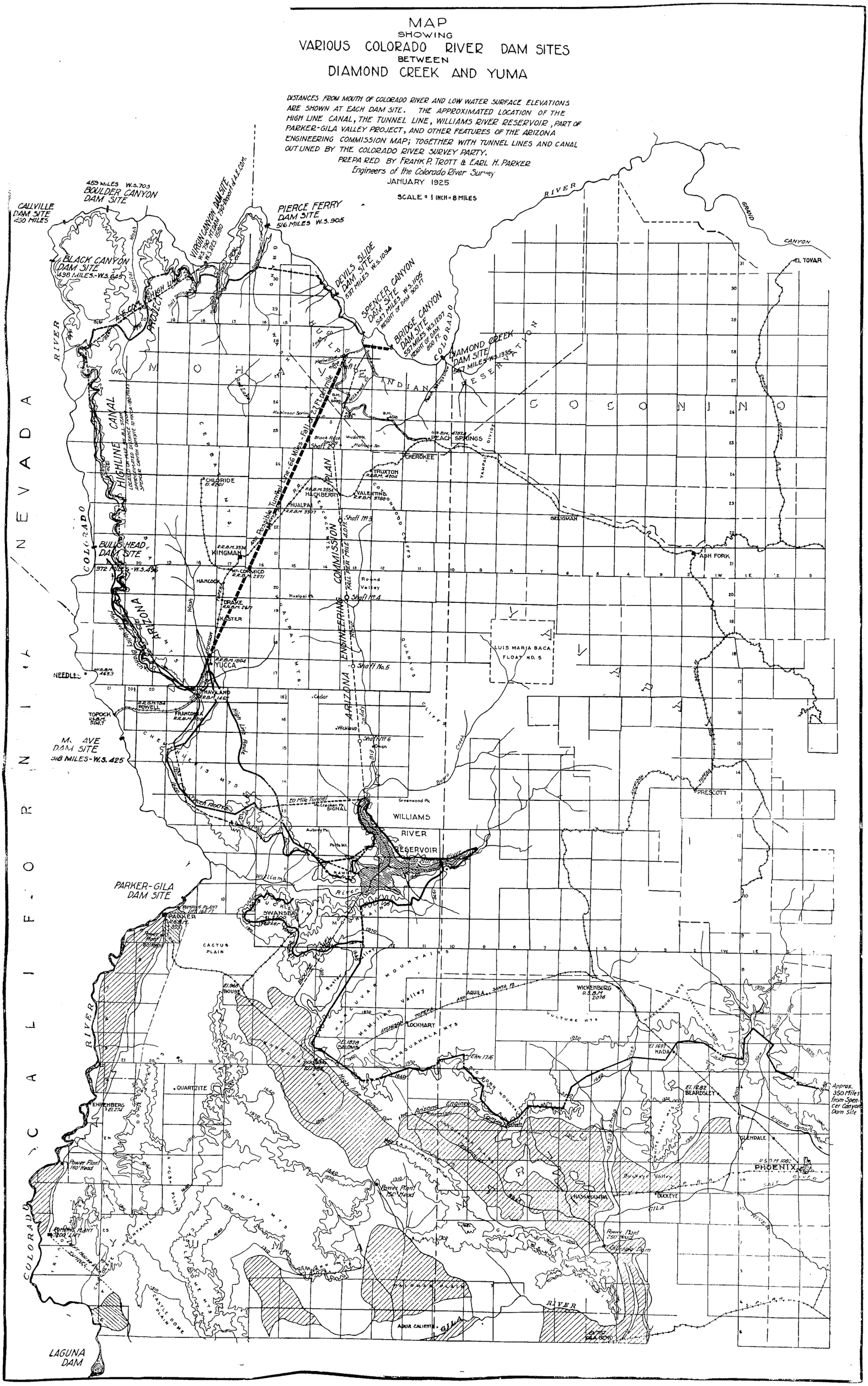
On Feb. 5, 1925, Governor Hunt submitted to the state senate the report of Col. Frank B. Trott on the Spencer-Bridge Canyon Diversion Dam and the Arizona Highline Canal, the survey and report having been authorized by the governor some weeks earlier, again at the request of Senator Colter and his associates. Colonel Trott was formerly United States Surveyor-General of Arizona and is now and for years has been Arizona Water Commissioner. Associated with Colonel Trott in this survey as engineer was Carl H. Parker. Included in their report was a map of the Spencer-Bridge Canyon sites and the Arizona Highline Canal showing location by township and range. This map was used in the founding in 1925 by Senator Colter of the first unit of the Pre-organization Glen-Bridge-Verde-Highline Irrigation and Power District of some 3,000,000 acres of which he is president.

Like all previous reports the Trott Survey complained of the lack of complete data. But the concluding paragraph stated:

"However, we are firmly of the opinion that the Bridge Canyon Dam site is the highest site available for irrigation in Arizona, and should the Boulder Canyon Dam be built to an elevation above 600 feet, (it is being built to 700 feet) it would flood this site and all intervening sites and might forever reduce the limit of productive lands in Arizona to a possible area of about 800,000 acres, and having this belief, with the information obtained on this survey and from other reliable sources, we feel it to be our duty to recommend that further investigations for a canal to be diverted from Spencer or Bridge Canyon be made, for if a canal can be feasibly constructed from either dam it will add two or more million acres of productive land to Arizona."



GLEN CANYON DAM SITE.



TROTT-PARKER SURVEY MAP—Land comprises approximately first unit of Glen-Bridge-Verde-Highline Preorganization Irrigation and Power District of 3,000,000 acres organized in 1925 by Fred T. Colter, president.

V. U. S. GEOLOGICAL SURVEY WATER SUPPLY PAPER NO. 556

By E. C. La Rue, 1925

In 1925 appeared the final Colorado River recommendation of E. C. La Rue in the form of Water Supply Paper No. 556 of the U. S. Geological Survey, entitled **Water Power and Flood Control of Colorado River below Green River, Utah.**

Ten years previously La Rue had written the first comprehensive report on utilization of the Colorado River, published by the U. S. Geological Survey as its Water Supply Paper No. 315. La Rue gave twenty years of his life to study of the river, and was the leading authority on the subject in the government hydraulic and geologic service. His data and dam site surveys in the Grand Canyon and elsewhere on the river and its tributaries were obtained in person. La Rue is one of the few men who have gone through the Grand Canyon by boat and survived the passage. He voyaged 2000 miles by open boat along the Colorado River and its remote tributaries in the upper basin states, through the Grand Canyon and below it in the river's open valley near the gulf.

In his final paper No. 556 La Rue disapproved the Compact-Boulder Dam scheme of Colorado River development, and favored the Glen Canyon storage dam and Bridge Canyon diversion dam for gravity irrigation of great areas in Arizona. In appearances before the U. S. Senate and house committees on reclamation he went further and denounced the Boulder Dam-Compact scheme as impossible to fit into any scheme of proper Colorado River development.

La Rue's reports and data have been utilized by Senator Colter in making, extending, and completing his filings for Arizona. Following are brief extracts from Water Supply Paper No. 556:

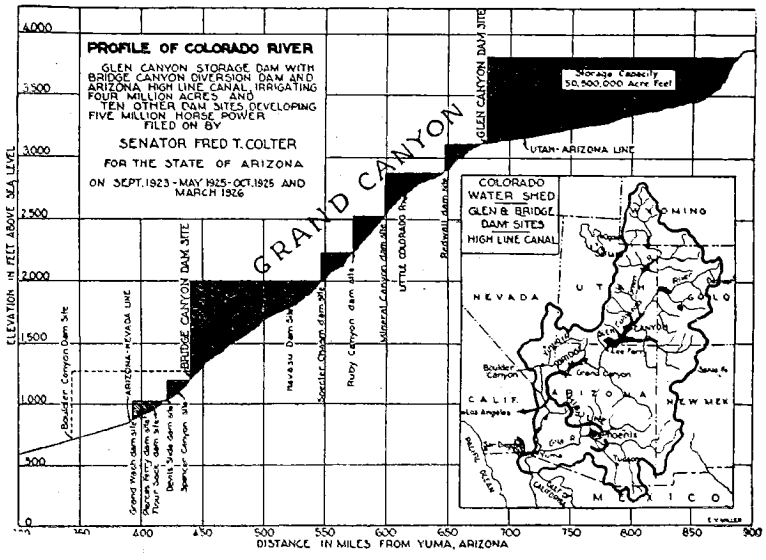
"The irrigation of lands from which the waste water and return flow would become available for use lower on the stream would be desirable." (Page 42.)

"The Glen Canyon Dam would relieve the flood menace, provide water for future irrigation, more than double the power that would be developed on the lower river, and greatly reduce the cost of all dams subsequently built on the river below Glen Canyon." (Page 36.)

"There are ten dam sites below Glen Canyon where a total head of 2523 feet may be utilized for the development of power. At the present time, without storage the total capacity of these sites is 1,758,000 horsepower. With storage in the Glen Canyon reservoir the power capacity of these ten sites would be increased to 4,345,000 horsepower." (Page 35.)

"Owing to its position on the river, large storage capacity, and other favorable features, Glen Canyon with a dam near Lee's Ferry has been selected as the site best adopted for the storage of water in the interest of power development in the Grand Canyon and below." (Page 43.)

"The writer believes that any comprehensive plan of development that provides for the full utilization of the water resources of the river must include the Glen Canyon reservoir site." (Page 36.)



VI. ARIZONA COLORADO RIVER COMMISSION REPORT, 1931 - 1932, ON COLORADO RIVER-VERDE PROJECT

Senator Colter as trustee several times appeared before the governor and Colorado River Commission, once accompanied by Major J. Lee Turley, western water attorney and engineer, and requested that the $100,000 appropriation which Colter largely had obtained from the legislature for the commission should be expended mainly for a complete highline survey, including all canals, laterals and lands thereunder, either of the Bridge Canyon Diversion Route or the Colorado River-Verde Tunnel, as practically the same lands will be irrigated under either route.

The Colorado River Commission of Arizona in 1931-1932 undertook and completed a detailed state survey and printed report of the Verde Tunnel route of the Highline Projects, a most valuable accomplishment. This commission was composed of George W. P. Hunt, then governor; Homer Wood, prominent engineer, member of the constitution convention and first state senate; Judge Samuel Pattee, who was the chief author of the 1913 Code of Arizona; and Thomas Maddock, Arizona State Engineer in 1922. The commission expended $80,000 in thoroughly investigating and found entirely feasible the Colorado River-Verde Tunnel Project, which is among the thirty dam and canal sites filed upon for Arizona by Senator Colter.

On page 2 of the commission's Colorado River-Verde report it is stated: "In addition, we allege that this report is an act of due diligence in an endeavor to maintain the filings, appropriations, and all the legal rights of the State of Arizona and its citizens to the waters of the Colorado River."

The commission survey mapped routes of the Highline Canal by section and township. Soil surveys were made of lands irrigable under the canal, arability being shown in the report by colored soil survey maps which are reproduced in this **Highline** Book. Selection of the Verde River dam sites and canal sites and their cost estimates were made with the assistance of expert hydraulic engineers, including E. C. La Rue, now in private practice in California. The state market for electric power is analyzed in a paper included in the report, prepared by Benj. F. Webber, M.S., geologist.

The commission report estimated cost of the Colorado River-Verde Highline Project at $407,444,000, and found that power revenue would pay all cost of construction and amortization and earn a profit. While this figure is $57,444,000 higher than the $350,000,000 required by the Glen-Bridge route, the Colorado River-Verde Project as shown by the cost estimates and summaries of the report, is entirely feasible within itself. As political or other conditions may render it necessary to adopt the Verde Tunnel-Highline route, Senator Colter filed upon it also as an alternate to the Glen-Bridge route.

It will be noted that a minimum set-up of 2,314,000 acres is used in the commission's cost summary with project expense estimated at $407,444,000. As stated on page 4 of this official state report, **"the figures given as to arable areas are minimum."** 1,066,439 acres in Yuma County are omitted because, while soil surveys of this area had been completed by Preston J. Porter, engineer for the United States Reclamation Service, the maps were not yet available when the report went to press. Other irrigable land was omitted for the same reason. By including the entire 6,000,000 acres, together with irrigation of upland and mountain valleys by low pump lift with the inexpensive electricity made on the project near points of use, the cost per acre will be greatly lessened. Even on a calculation of 2,314,000 acres the cost estimates of the report show that the power produced will pay all costs of construction and amortization and a profit besides of $1.76 per acre foot.

Below are extracts, tables, maps and summary of cost estimates from the 1931-1932 printed report of the Arizona Colorado River Commission:

Extracts From Colorado River-Verde Report of Colorado River Commission

We (the commission) believe that the various resolutions, acts, and appropriations of the Arizona legislature*, the opposition of our congressional delegation to the passage of the Boulder Dam Act, the suit by the attorney general in the Supreme Court and the public declaration of the chief executive are notices to the world that this State does not acquiesce in the acts of the Secretary of the Interior and other federal officials pertaining to the water and power resources of the Colorado River, and that it may never be justly said that Arizona has slept on her rights.

In addition, we allege that this report is an act of due diligence, in an endeavor to maintain the filings, appropriations and all the legal rights of the State of Arizona and its citizens to the waters of the Colorado River.

Scope of the Work

Field work performed in order to obtain information for this report includes a geological investigation from Glen Canyon to the mouth of Oak Creek.

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*Among the acts, resolutions and memorials introduced into the Arizona Legislature by Senator Colter for surveys, filings, appropriations, legal defense, development and protection of the Colorado River water filings and water rights of Arizona and against the Santa Fe Compact and Tri-State Compact are the following: S.C.R. 5, 7 and 8, 1923; S. B. 127, S. J. R. 6, S. J. R. 10, S. J. R. 12, S. C. R. 4, S. C. R. 6, 1925; S. B. 3, Minority Report of Senator Colter as official commissioner appointed by governor and legislature to oppose Swing-Johnson Bill in Washington, S. B. 88, S. J. R. 1, S. J. M. 2, S. J. M. 5, S J. M. 9, S. J. M. 10, S. M. 1, regular session of 1927; S. M. 1, fourth special session, 1927; S. J. R. 1, S. B. 102, fifth special session, 1928; S. B. 1. S. C. R. 3, Sixth special session, 1928, etc.

A reconnaissance survey was made of 120 miles of the Verde River and ravine cross sections taken at ten dam sites.

Topographic surveys for 752 miles of canal lines were run to determine the limiting lines of the lands that could be reached by gravity flow.

On 362 additional miles of canals located beyond control points the costs were estimated.

Section line extensions were run in unsurveyed areas for a total of 170 miles.

Approximately 8000 miles of section lines were traversed. Holes were drilled to a depth of five feet to obtain soil samples, and 15,300 laboratory tests for salt content and soil texture were made in the soil classifications of 3,500,000 acres.

Omissions

We had hoped to include in our map of Yuma County the soil survey made by the Reclamation Bureau below the 600 foot contour sea level datum. The survey of this section of the State was made at the request of our commission, and done under authority of Paragraph 15 of the Boulder Dam Act. The field work was completed in June, and the maps should be available shortly. One sheet received, covering the government soil examination in Maricopa County has been added to our map. Advance information furnished by Mr. Porter J. Preston is that out of 1,066,439 gross acres examined some 622,252 or 60 per cent are arable.

There are approximately 100,000 additional acres between the 600 and 700 foot levels that fringe the area surveyed by the government on which soil surveys have not been made. This work can be done better after the government maps are obtained. Probably from 50,000 to 60,000 acres of this area will be found arable.

Presumably the Reclamation Bureau will investigate soil conditions and irrigation possibilities on the Colorado Rver Indian Reservation, and the valleys of Cottonwood, Mohave, Blankenship, Bouse, Posa, Cibola, Chemehuevis, etc., adjacent to the river. These, with the Yuma Valley and lower Mesa, total about 280,000 acres of arable land.

During the past summer United States Reclamation forces examined some 210,000 acres in the valleys of the Virgin, Kanab, and Paria. Of this, 150,000 acres are in Arizona.

Soil Surveys

While it has long been known that it is possible to irrigate millions of acres in Arizona, the arability of this land has been a matter of dispute. Our survey covered some 3,500,000 acres. Township plats have been prepared on a scale of two inches to the mile. These are colored to show the various classifications. The texture of the soil at various depths, and the soluble and insoluble salt contents, are noted as well as topographic features. The Reclamation Department has examined 1,200,000 additional acres, so that information has been obtained in the last two years, covering some 4,700,000 acres, of which some 2,800,000 acres are arable. Much additional arable land is available for irrigation by low pumping lifts if water can be obtained.

Soil classification may be made according to many standards. We adopted that of the Bureau of Reclamation, in order that the areas that can be successfully tilled in Arizona may be compared with those of the other western states. Various crops prefer acid, neutral or alkaline soil. Leaching of land containing excess soluble salts or chemical reaction on insoluble salts will reclaim lands we have classified as non irrigable. Enhanced value may justify the leveling of lands rejected because of rough topography. **For these reasons the figures given as to arable areas are minimum.** Some soils have been excluded, regardless of the fact that they support heavy desert growth, because they are shallow and are underlain with impermeable clay or caliche strata, or have other disadvantages as to drainage and would water-log if subject to irrigation.

We have been extremely conservative in our soil classification and held to the standards of the Reclamation Service, even where crops are now being successfully cultivated on soils that would be subject to rejection. The yellow areas on the index maps that are marked "a" designate marginal areas that should not yield as great a return as the lands designated class 1 and 2, because of salt contents, or will require larger outlays for leveling than are now considered economical.

The first indication of soil fertility is the present desert growth. Subsurface investigations disclose the possibility of the cultivation of domesticated plants with deeper root systems and are mostly necessary to check surface indications. They usually result in rejection of land appearing good rather than in proving the land better than indicated by surface conditions. In order to keep field examiners quickly advised of salt content in the soil samples taken, the necessary laboratory work was done in camps, and sometimes at night, so that classification could be made while on the areas in question, and check holes could be put down where necessary.

No attempt was made to secure the exact soil condition on each forty acre tract as the information we desired was the approximate percentage of the various classes of land in each township, and the cost of detailed soil surveys on millions of acres of land would have been too great. Originally we endeavored to obtain soil field experts from the University of Arizona, but as none was available, through the courtesy of Mr. P. J. Preston of the United States Bureau of Reclamation, former manager of the Yuma project, we placed men with his forces. They studied the methods of soil classification used by the Reclamation Service until permitted to make classification for the government. They were then transferred to our work, and by gradually breaking in additional men a competent field force was organized.

Soil classification prior to reclamation construction is a comparatively recent practice. The areas of some existing projects have had to be reduced from 50 to 70 per cent, because of poor soils. Soils that do not require treatment can obviously stand higher costs for water. At present the selling prices of land bears little relation to the soil classification. Where a single year's leaching will change soil from No. 2 to No. 1 the difference in value is obviously the cost of the season's treatment. The same conditions exist for other classifications. Likewise, comparatively expensive leveling of land near mountains might be more than justified if citrus is to be planted.

Reasons for Colorado-Verde Plan

The plan of irrigating Arizona land with waters of the Colorado River herein submitted was chosen for the following reasons:

(1) It will insure an absolutely dependable supply of water for existing Arizona projects.

(2) It provides for a gravity flow instead of pumping; permitting the saving of hydroelectric power for industrial and commercial development.

(3) It will create abundance of cheap power in the central portion of the State at many different locations, insuring non-interruption of service without expensive standby plants, provide for short transmission lines at low altitudes, reducing cost and losses in transmission and freedom from storm damages. This power would be cheaper than that from the Hoover Dam.

(4) It will assist in the mineral development of the State, and provide existing mines with better opportunities to compete with other producers.

(5) It will permit of manufacturing development, insuring a variety of business activity and create a more self-sustaining commonwealth.

(6) It will insure several re-uses of water by the greater difference in elevation of the land to be irrigated, thus providing a **high** water duty.

(7) It will allow the use of the flow of the Salt, Gila, Verde, Agua Fria, etc., for the peak water demands of summer irrigation, reducing the size of tunnels, canals, etc., to 60 per cent of the capacity they would have to be if serving the land direct.

(8) It will reduce the number and length of canals, and also avoid seepage and evaporation losses by the use of tunnels.

(9) It will include within the canal lines such a great body of land that a limited allotment of water may be used on the most favorable soils, thus insuring greater financial return from each acre cultivated.

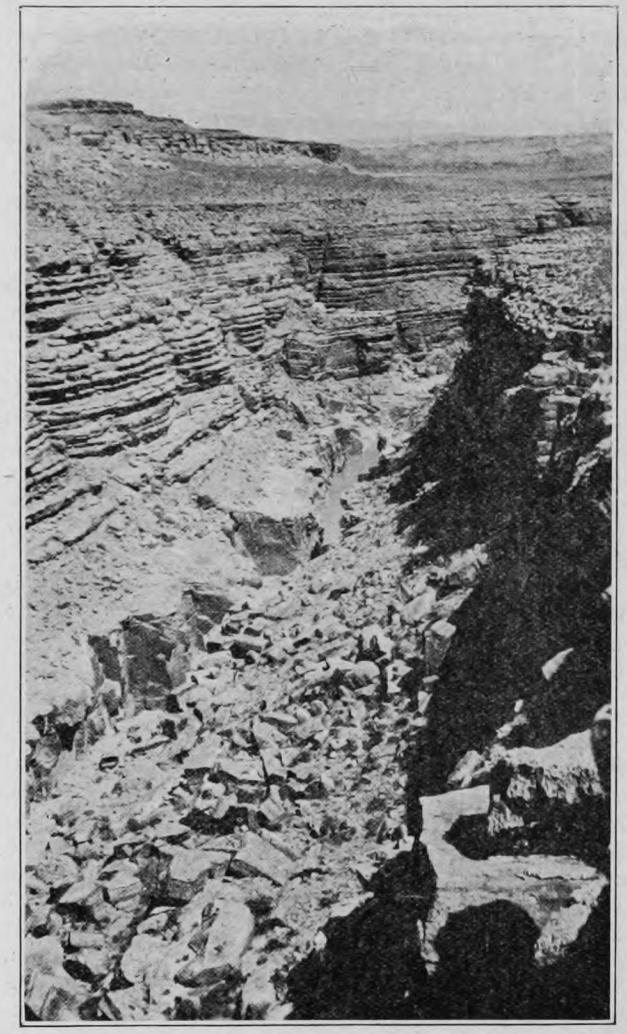
(10) It will permit the use of present urban facilities during the necessarily gradual development of areas adjoining those now in cultivation, reducing the difficulty and cost of bringing in new desert areas.

(11) It would provide ample water to release whatever amount of the Gila could be used in its upper valleys, including those in New Mexico, and supply water for approximately 100,000 acres now in projects for which no water is otherwise available.

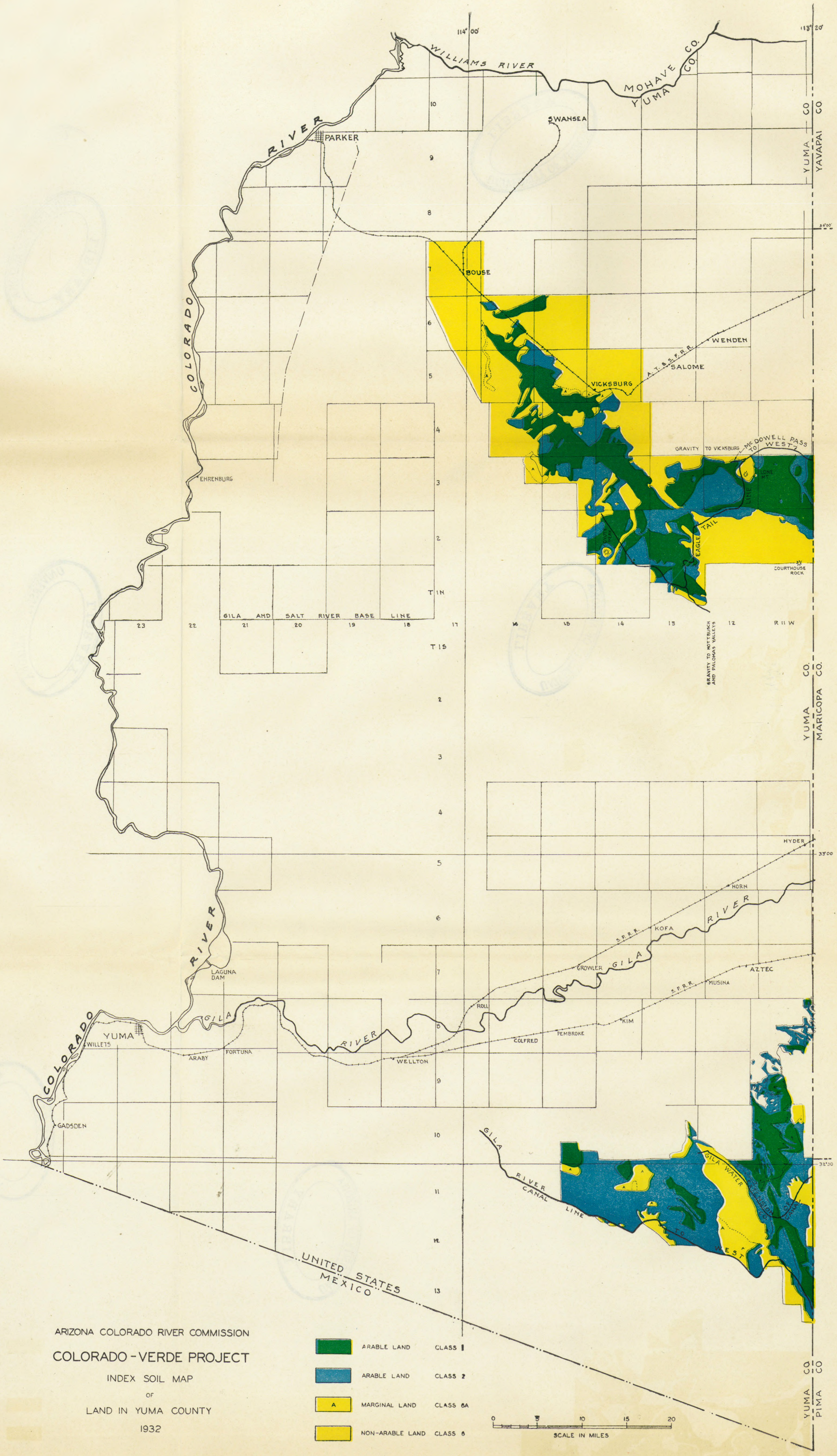
(13) It would reduce the distance of water travel in evaporating channels from Lee's Ferry to Yuma and the Imperial Valley by about 50 per cent.

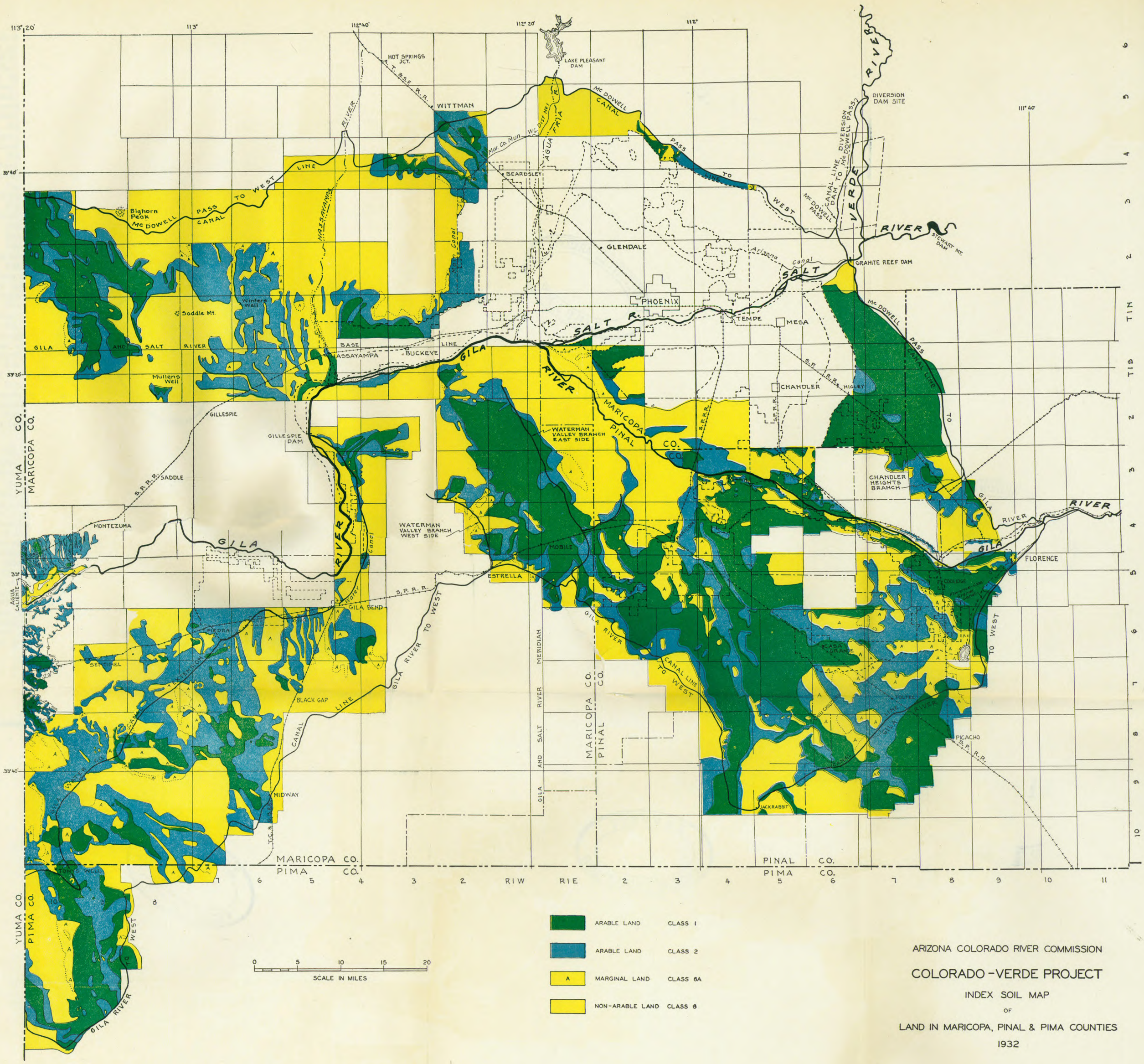
Plan

This plan of development for central and southwest Arizona provides for: A 438 foot dam at the head of Marble Gorge, just above the steel arch bridge near Lee's Ferry, to raise the water to elevation 3543 feet and later to 3600 feet above sea level, securing a storage reservoir of 16,000,000 acre feet capacity, for a pressure tunnel with a 28 foot inside diameter 46.4 miles in length to the Little Colorado River at 10 miles from its mouth, for the construction of a dam at mile 10 on the Little Colorado to the same elevation as that on the main river, for the use of the canyon



Coconino Dam Site—Mile 48, Little Colorado


ARIZONA COLORADO RIVER COMMISSION
COLORADO - VERDE PROJECT
INDEX SOIL MAP
OF
LAND IN YUMA COUNTY
1932
ARABLE LAND CLASS 1
ARABLE LAND CLASS 2
MARGINAL LAND CLASS 6A
NON-ARABLE LAND CLASS 6
SCALE IN MILES
WILLIAMS RIVER
MOHAVE CO.
YUMA CO.
YAVAPAI CO.
MARICOPA CO.
PIMA CO.
COLORADO RIVER
GILA RIVER
PARKER
SWANSEA
BOUSE
WENDEN
SALOME
VICKSBURG
A.T.&S.F.R.R.
GRAVITY TO VICKSBURG
McDOWELL PASS TO WEST
LONE MT.
EAGLE TAIL LINE
COURTHOUSE ROCK
EHRENBURG
GILA AND SALT RIVER BASE LINE
T 1 N
T 1 S
R 11 W
GRAVITY TO MOTTBUSCH AND PALOMAS VALLEYS
HYDER
HORN
KOFA
S.P.R.R.
GROWLER
AZTEC
MUSINA
ROLL
KIM
PEMBROKE
COLFRED
WELLTON
LAGUNA DAM
YUMA
WILLETS
ARABY
FORTUNA
GADSDEN
GILA RIVER CANAL LINE
GILA WATER DIVERSION CANAL
TO WEST
UNITED STATES
MEXICO


ARIZONA COLORADO RIVER COMMISSION
COLORADO-VERDE PROJECT
INDEX SOIL MAP
OF
LAND IN MARICOPA, PINAL & PIMA COUNTIES
1932
ARABLE LAND CLASS 1
ARABLE LAND CLASS 2
MARGINAL LAND CLASS 6A
NON-ARABLE LAND CLASS 6
SCALE IN MILES
0 5 10 15 20
HOT SPRINGS JCT.
LAKE PLEASANT DAM
WITTMAN
BEARDSLEY
GLENDALE
PHOENIX
TEMPE
MESA
CHANDLER
HIGLEY
GRANITE REEF DAM
DIVERSION DAM SITE
STEWART MT. DAM
BUCKEYE
HASSAYAMPA
GILLESPIE
GILLESPIE DAM
SADDLE
MONTEZUMA
GILA BEND
ESTRELLA
MOBILE
FLORENCE
COOLIDGE
CASA GRANDE
PICACHO
JACKRABBIT
BLACK GAP
MIDWAY
SENTINEL
PIEDRA
WATERMAN VALLEY BRANCH EAST SIDE
WATERMAN VALLEY BRANCH WEST SIDE
CHANDLER HEIGHTS BRANCH
Bighorn Peak
Saddle Mt.
Winters Well
Mullens Well
Tonto Well
Agua Caliente
GILA AND SALT RIVER MERIDIAN
YUMA CO.
MARICOPA CO.
PIMA CO.
PINAL CO.
RIW
RIE
T1N
T1S
T2S
T3S
113° 20'
113°
112° 40'
112° 20'
112°
111° 40'
33° 40'
33° 20'
33°
33° 40'

of the Little Colorado as a canal to mile 19, for a pressure tunnel with a 28 foot inside diameter, 97.8 miles in length from the Little Colorado to the mouth of Oak Creek on the Verde River, for a dam at Camp Verde Dam site to elevation 3145 feet, and later to elevation 3200 feet, for a diversion dam 76 feet high on the Verde River a mile north of Camp Creek to divert water at elevation 1610 feet;

For a 10,000 second-foot canal from the diversion site 16.4 miles to McDowell Pass, which can later be increased in capacity by lining;

For a canal to the westward from McDowell Pass to serve land north of the Salt and Gila Rivers;

For siphons or grade reservoirs, crossing Cave Creek, Hassayampa, and Centennial:

For a canal southward from McDowell Pass 3.8 miles to Granite Reef Dam;

For a siphon across Salt River;

For a canal from Granite Reef to the Gila River;

For a siphon across the Gila River into the Florence Canal;

For the enlarging and extending of the Florence Casa Grande Canal westward to serve land south of the Gila River in Pinal, Maricopa, Pima, and Yuma Counties;

For penstocks at Granite Reef for a 300 foot drop;

For the enlargement and extension or the construction of a new canal from Gillespie Dam south and westward to serve land south of the Gila River below the 730 foot level;

For a similar parallel canal on the north side of the Gila River;

For the installation of eight dams and power plants in the Verde River as the market for power warrants;

For the erection of power plants on the canals as later justified.

Reservoir

The elevation of the regulating reservoir on the Verde River largely controls the selection of the storage reservoir on the Colorado.

The dam site at the highway bridge below Lee's Ferry is made the basis of this report, because the canyon walls are much narrower than at Glen No. 1 or No. 2 sites, it is more accessible and construction materials are available.

A short distance up and down stream from this site the canyon is wider and the foundation materials are poorer. Competing sites are at least 9 miles up stream and 20 miles below.

This site was drilled by the Arizona Colorado River Commission in 1927. A favorable geological report was made by Dr. Ransome, of California Institute of Technology. The foundation rock has been tested and found capable of resisting the pressure at the base of a high dam. The dam was designed by B. F. Jakobsen in 1927, and then estimated to cost $19,000,000.

If the depth to bed rock can be decreased by dynamiting the rapids at Badger and Soap Creeks below the site, the costs can be reduced. As the river at this point practically parallels the line of the tunnel to the Little Colorado, the service tunnel could be used for stream diversion during construction. The construction of the Hoover Dam below will warrant the risk of cheaper temporary coffer dam construction than originally planned.

Tunnels

The tunnel from the Colorado River to the Little Colorado could be shortened by 25.4 miles by constructing a dam at mile 40 instead of at mile 5. Good dam sites apparently exist at this alternate location, but the river is about 260 feet lower. If the river fill above bed rock is similar to that at the Marble Gorge and Hoover sites, a dam at this alternate site would have to be about 800 feet in height from bottom of foundation to bring the crest to the elevation necessary to give equal flow through the main tunnel. As this height is some hundred feet higher than the Hoover Dam, which has been subject to criticism, it is considered better to base this report on a smaller dam and a longer tunnel, but dam sites in the vicinity of mile 35 to 45 on the main river should be examined prior to deciding on any particular site. As these sites are very inaccessible, the trip from the canyon brink to the top of the lower gorge being arduous, and the only practical approach to the river proper being by boat, these investigations will be expensive.

The tunnel from the Colorado River to the Little Colorado is all in stratified rock. The various strata that will be encountered are shown on the geological sections prepared by Prof. Stoyanow of the University of Arizona, most of the field work having been done by Walter Thomas. These strata are broken by few faults, and should provide the least complications possible to secure in long tunnel excavations. Shafts have been calculated at intervals that will permit of the completion of the tunnels in from 5 to 6 years.

The tunnel from the Little Colorado to the Verde will be mostly in Yavapai shist, with probable occasional intrusions of granite. The alternate location to the west of Kendrick Peak and Slate Mountain is recommended by the geologists in order to avoid laccoliths and broken formation. Water problems should be small in the tunnel, with the possible exception in the Verde formation on the southern end, and through a portion of the redwall limestone in the vicinity of mile 90. The pilot tunnel is figured to be separated from the main bore, and connected at 2000 foot intervals to permit attacking the main heading at numerous points. The pilot tunnel can later be enlarged and lined to carry additional water.

The dam in the Little Colorado at mile 10 is needed to secure the flood flow of that stream. The reservoir will have a small capacity, but ex-

cess water could be diverted northward to the Glen Reservoir and southward to the Camp Verde reservoir through the tunnels. As the hydraulic gradient would result in the surface of the water in the Little Colorado Reservoir being about 130 feet lower than the Glen Reservoir the care of flash floods would be automatic. Some thousand second feet of water would be obtained from the Little Colorado River here, including the flow from Blue Springs.

Subsequently a 6.5 mile tunnel could be constructed from mile 10 on the Little Colorado to mile 66.5 on the main Colorado River, and the upper tunnel capacity increased to Marble Gorge. This would permit the installation of 799,000 horse power at mile 66.5 at a cost of $46,447,000 or $58.00 per h.p. with a production cost of 1.18 mills per kwh.

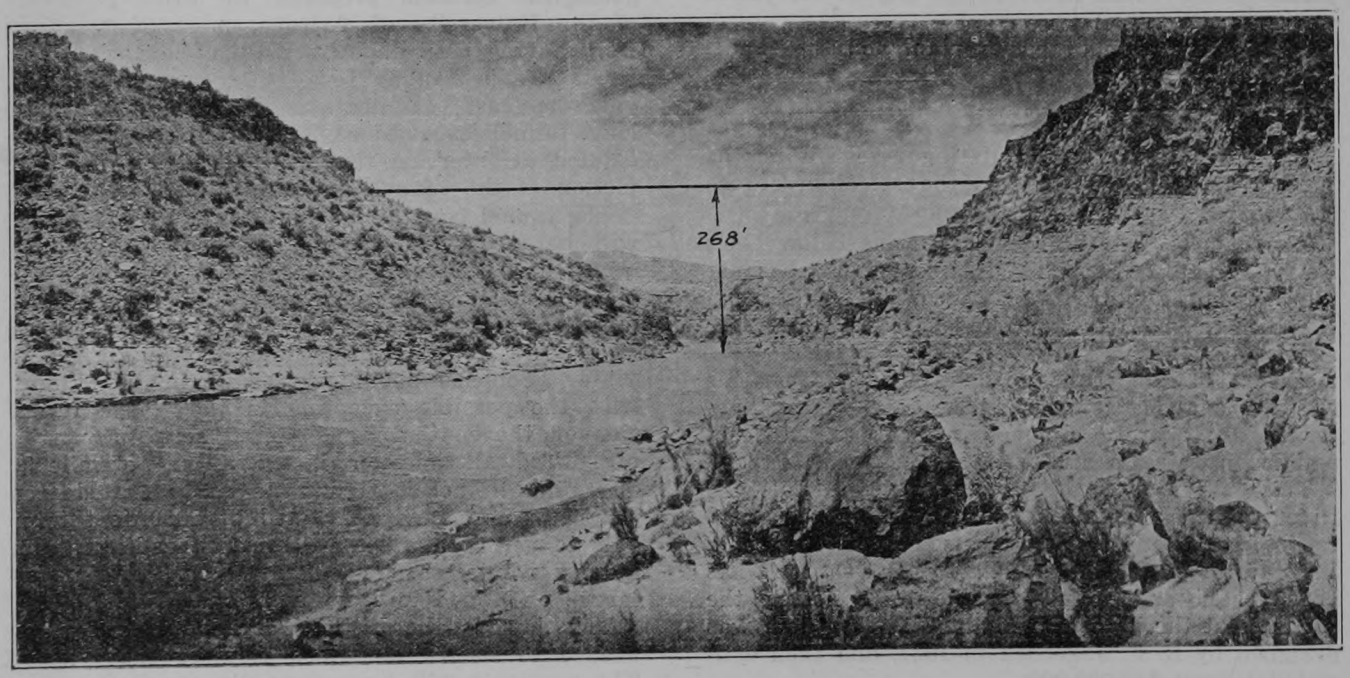
As an alternate to the dam at mile 10, a dam estimated to cost $75,000 could be installed at the Coconino site at mile 47.5 on the Little Colorado and 4800 h.p. developed for $100,000 which could be used for tunnel construction purposes.

The water from the Coconino dam could be dropped down the canyon of the Little Colorado and into the tunnel. The total length of tunnel would have to be increased by 5 miles in place of the 9 miles of river channel between mile 10 and 19 on the Little Colorado. The alternate plan would be approximately $1,500,000 cheaper, but it would preclude the capture of the water from Blue Springs, which is approximately half of the flow of the Little Colorado River.

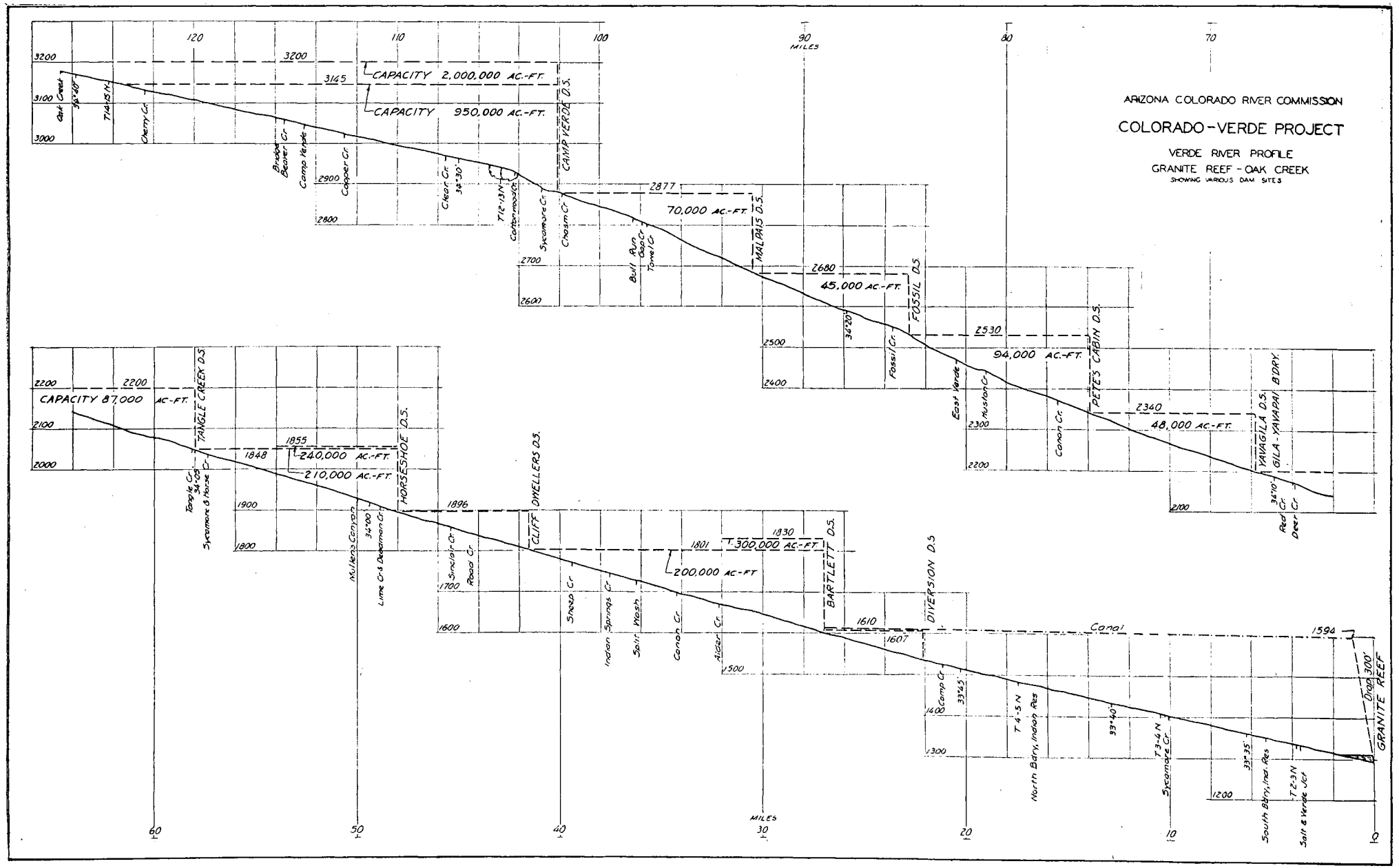
Verde Dam

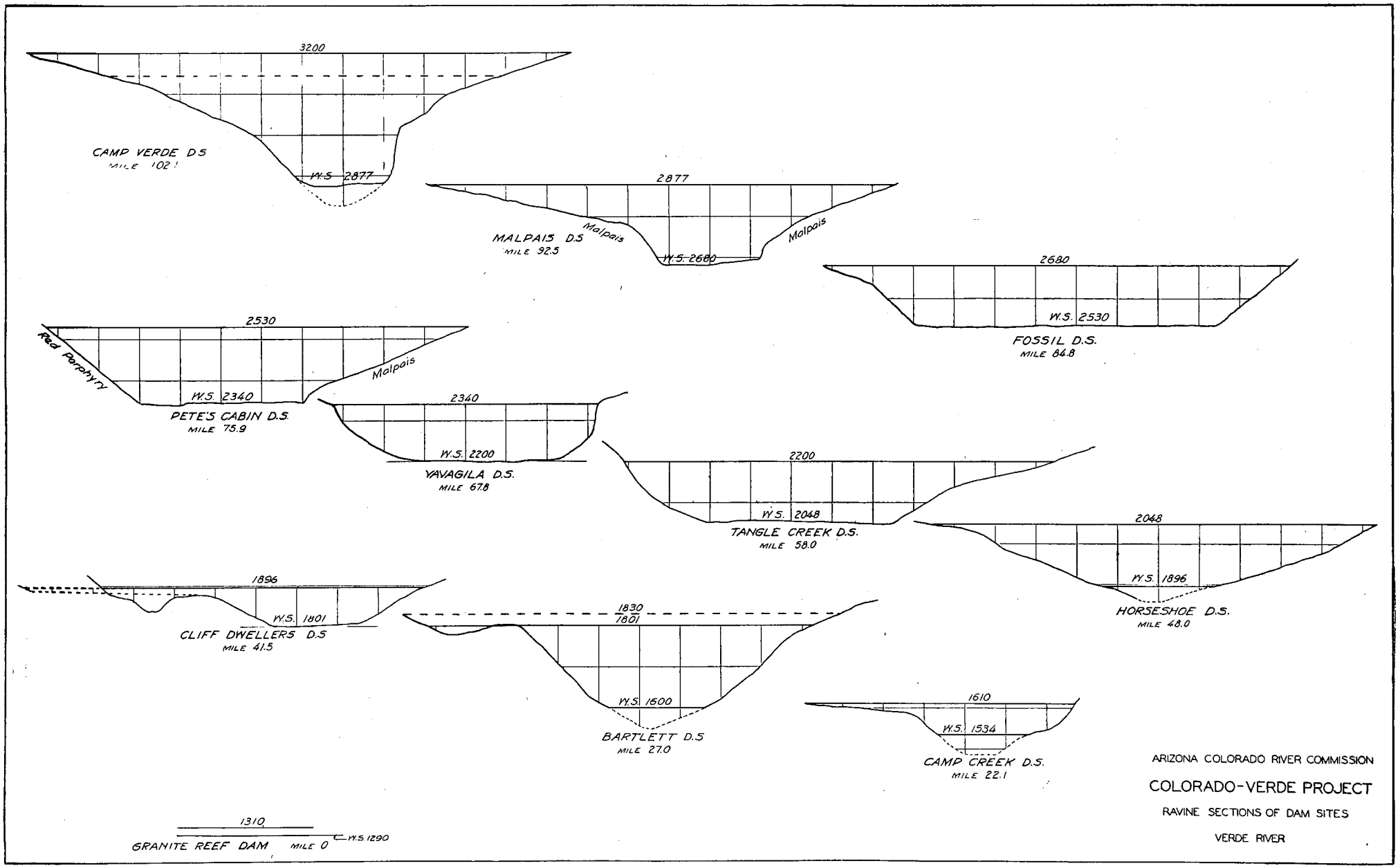
The Verde Dam in addition to acting as a storage reservoir for Verde flood waters would become a regulating reservoir permitting continuous flow through the tunnels, which can be reduced in capacity accordingly to about 60 per cent of what they otherwise would need to be. The Verde Reservoir will contain 950,000 acre feet with a dam constructed to elevation 3145, and approximately 2,000,000 acre feet when built to 3200. As the tunnel would be able to supply peak water demands in the early period of irrigation development the cost of raising the dam the last 55 feet can be postponed until it is needed.

The dams between Camp Verde and Camp Creek can be installed as rapidly as power demands warrant. None of these dams is high, and the sites drilled have had relatively shallow foundations. If the Verde Dam is constructed first their flood hazard will be small. The sites are suitable to multiple arch designs, although rock fill dam backed with finer material might be cheaper in a few instances. The estimates have been prepared for multiple arches and the foundations that are undrilled presumed to be similar to those examined.



Camp Verde Dam Site—Mile 102


ARIZONA COLORADO RIVER COMMISSION
COLORADO-VERDE PROJECT
VERDE RIVER PROFILE
GRANITE REEF - OAK CREEK
SHOWING VARIOUS DAM SITES
CAPACITY 2,000,000 AC.-FT.
CAPACITY 950,000 AC.-FT.
CAMP VERDE D.S.
70,000 AC.-FT.
MALPAIS D.S.
45,000 AC.-FT.
FOSSIL D.S.
94,000 AC.-FT.
PETES CABIN D.S.
48,000 AC.-FT.
YAVAGILA D.S.
GILA-YAVAPAI B.DPY.
CAPACITY 87,000 AC.-FT.
TANGLE CREEK D.S.
240,000 AC.-FT.
210,000 AC.-FT.
HORSESHOE D.S.
CLIFF DWELLERS D.S.
300,000 AC.-FT.
200,000 AC.-FT.
BARTLETT D.S.
DIVERSION D.S.
Canal
Drop 300'
GRANITE REEF
MILES
Oak Creek
Cherry Cr.
Beaver Cr.
Camp Verde
Copper Cr.
Clear Cr.
Cottonwood Cr.
Sycamore Cr.
Chasm Cr.
Bull Run
Oak Cr.
Tonto Cr.
Fossil Cr.
East Verde
Muston Cr.
Canon Cr.
Red Cr.
Deer Cr.
Tonto Cr.
Sycamore & Horse Cr.
Mulkens Canyon
Lime Cr. & Deadman Cr.
Sinclair Cr.
Road Cr.
Sheep Cr.
Indian Springs Cr.
Split Wash
Canon Cr.
Alder Cr.
Camp Cr.
North Bdry. Indep. Res.
Sycamore Cr.
South Bdry. Ind. Res.
Salt & Verde Jct.



ARIZONA COLORADO RIVER COMMISSION

COLORADO-VERDE PROJECT

RAVINE SECTIONS OF DAM SITES

VERDE RIVER

VERDE RIVER POWER DEVELOPMENT

Dam	Head	Installed Horsepower	Power House Cost	Type of Dam	Cost of Dam	Total Cost
Malpais	195	177,000	$ 3,260,000	Multiple Arch	$1,272,000	$ 4,532,000
Bartlett	189	171,500	3,175,000	Single Arch	1,510,000	4,685,000
Pete's Cabin	188	171,000	3,250,000	Multiple Arch	1,720,000	4,970,000
Yavagila	138	125,500	3,010,000	Multiple Arch	750,000	3,760,000
Horseshoe	150	136,400	3,000,000	Multiple Arch	1,240,000	4,240,000
Tangle Creek	150	136,000	3,000,000	Multiple Arch	1,400,000	4,400,000
Fossil Creek	148	134,500	2,960,000	Multiple Arch	1,593,000	4,553,000
Cliff Dwellers	93	84,500	2,700,000	Multiple Arch	350,000	3,050,000
		1,136,800	$24,355,000		$9,835,000	$34,190,000
Roads						500,000
						$34,690,000

Q=6,000 Sec. ft.

Installed Horsepower	1,136,800
Firm Horsepower	682,080
Kwh per annum	4,460,000,000

Annual Cost	$2,896,050
Sale Price at 2 mills	$8,920,000
Net Annual Return	$6,023,950
Net Annual Return, per kwh	1.351 mills

COST ESTIMATE COLORADO-VERDE CANALS

SET-UP NO. 1

Acreage	1,217,664
Miles Canals	574
Canal capacity at Diversion Dam	10,000 sec. ft.

Earth excavation	54,226,230 cy	at 10c	$ 5,422,623
Rock and Caliche excavation	5,477,138 cy	at 60c	3,286,283
Concrete Lining	14,125,604 sf	at 10c	1,412,560
Horseshoe Tunnels			
R....15.2	1,550 lf	at $190	294,500
R....10.4	2,000 lf	at 110	220,000
R.... 8.85	2,000 lf	at 90	180,000
R.... 7.55	550 lf	at 80	44,000
R.... 3.9	1,600 lf	at 35	56,000
R.... 6.8	1,044 lf	at 65	67,860
Agua Fria Siphon	4,900 lf		700,000
Salt River Siphon	9,590 lf		792,000
Salt River Penstocks	6,700 lf		1,380,000
Siphon South of Salt River	2,850 lf		151,000
Hassayampa Crossing	4,700 lf		375,000
R. R. and Hwy. Crossings and Turnouts			330,000
		Total	$14,711,826

SETUP NO. 2

Acreage	2,314,000
Miles Canals	881.4
Canal capacity at Diversion Dam	19,775 sec. ft.

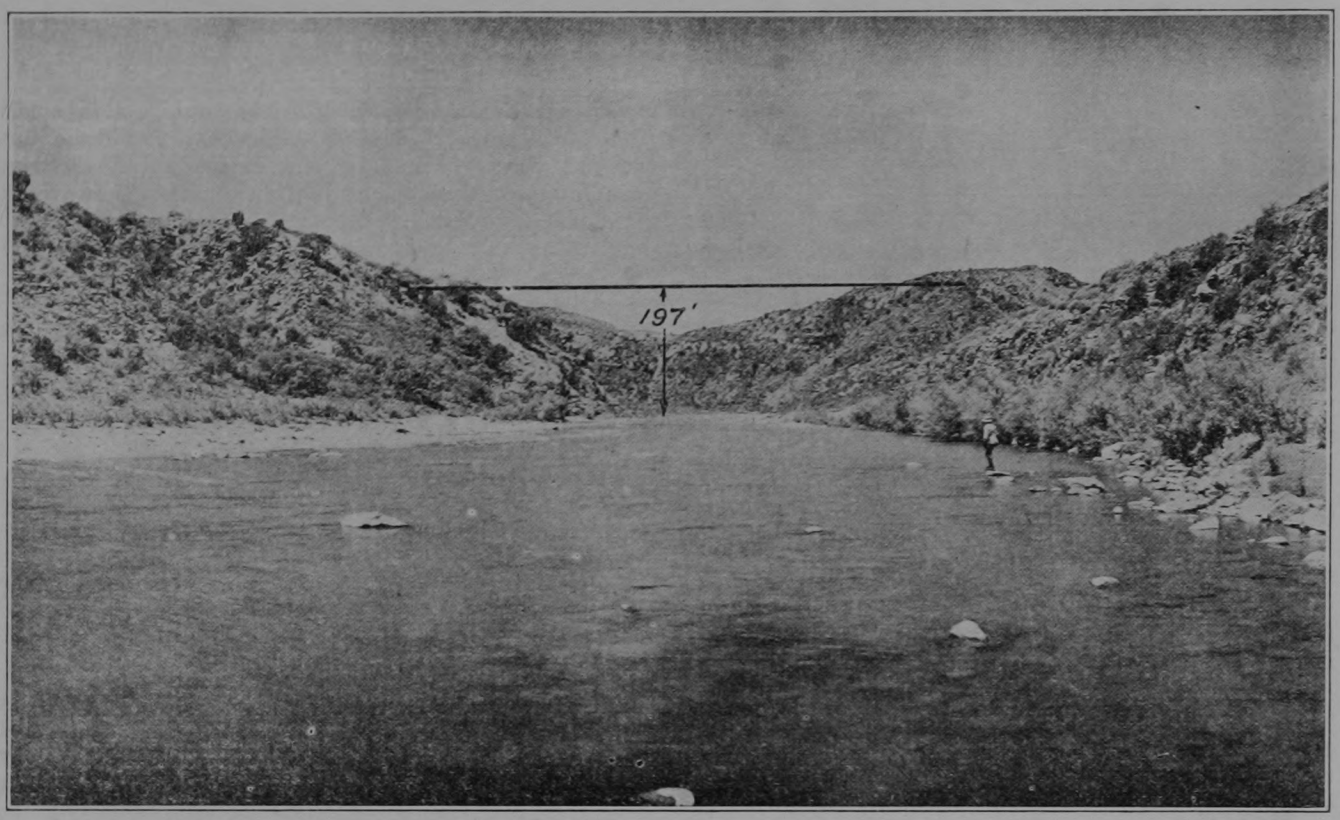
Earth excavation	120,027,324 cy	at 10c	$12,002,708
Rock and Caliche excavation	11,495,068 cy	at 60c	6,897,041
Concrete lining	23,757,589 sf	at 10c	2,375,759
Horseshoe Tunnels			
R....10.4	2,000 lf	at $110	220,000
R.... 8.85	2,000 lf	at 90	180,000
R.... 7.55	550 lf	at 80	44,000
R.... 3.9	1,600 lf	at 35	56,000
R....14.8	1,044 lf	at 175	182,700
Agua Fria Siphon	4,900 lf		700,000
Salt River Siphon	9,590 lf		4,490,700
Salt River Penstocks	6,700 lf		1,380,000
Siphon South of Salt River	2,850 lf		859,500
Hassayampa Crossing	4,700 lf		375,000
Gila River Siphon	2,872 lf		440,000
R. R. and Hwy. Crossings and Turnouts			400,000
		Total	$30,653,408

SUMMARY OF COSTS — COLORADO-VERDE PROJECT

	No. 1 Q=6000 s.f. 1,217,664 Ac. Low Dams	No. 2 Q=6000 s.f. 1,217,664 Ac. Low Dams	No. 3 Q=6000 s.f. 1,217,664 Ac. High Dams	No. 4 Q=6000 s.f. 1,217,664 Ac. High Dams	No. 5 Q=12,000 s.f. 2,314,000 Ac. High Dams
Marble Gorge Dam, Mile 5, Colorado, 438'-495'	$ 19,000,000	$ 19,000,000	$ 21,000,000	$ 21,000,000	$ 21,000,000
Marble Gorge Power, 400,000 I.H.P., 500,000 I.H.P.	.....	4,800,000	6,000,000	.....	.....
Tunnel, Mile 5, Colorado to Mile 10, Little Colorado	41,904,000	41,904,000	41,904,000	75,311,000	75,311,000
Dam, Mile 10, Little Colorado, 451'-508'	6,000,000	6,000,000	7,500,000	7,500,000	7,500,000
Tunnel, Mile 10, Little Colorado to Mile 66.5, Colorado	.....	.....	.....	5,870,000	.....
Power, Mile 66.5, Colorado, 799,000 I.H.P.	.....	.....	.....	9,590,000	.....
Tunnel, Mile 19, Little Colorado to Verde River	88,323,000	88,323,000	88,323,000	88,323,000	158,737,000
Shafts and Elevators	4,357,000	4,357,000	4,357,000	4,357,000	4,357,000
Camp Verde Dam 268'-323'	2,800,000	2,800,000	3,785,000	3,785,000	3,785,000
Camp Verde Power 209,000 I.H.P., 268,000 I.H.P.	.....	3,500,000	4,020,000	4,020,000	8,040,000
Camp Creek Diversion Dam	325,000	325,000	325,000	325,000	325,000
Power at Granite Reef 172,000 I.H.P.	.....	2,780,000	2,780,000	2,780,000	2,780,000
Main Canal System	13,000,000	14,712,000	14,712,000	14,712,000	30,654,000
Lateral System (to each 80 acres)	18,265,000	18,265,000	18,265,000	18,265,000	34,710,000
Verde River Power (see tabulation)	.....	.....	34,690,000	34,690,000	59,045,000
Highway Construction	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
TOTALS	$195,174,000	$207,966,000	$248,861,000	$291,728,000	$407,444,000
Installed Horsepower	.....	781,000	2,076,800	2,375,800	2,981,600
Firm Horsepower	.....	468,600	1,246,080	1,425,480	1,788,960
KWH per Annum	.....	3,064,644,000	8,149,363,200	9,322,639,200	11,699,798,400
Annual cost	$ 13,637,390	$ 14,838,670	$ 18,164,320	$ 21,119,340	$ 29,997,460
Sale price per Annum, at 2 mills per KWH	.....	$ 6,129,288	$ 16,298,726	$ 18,645,278	$ 23,399,597
Net cost per Annum	$ 13,637,390	$ 8,709,382	$ 1,865,894	$ 2,474,062	$ 6,597,863
Net cost per Annum per acre-foot, first 40 years	$ 3.10	$ 1.98	$0.42	$0.56	$0.75
Net cost per Annum per acre-foot, after 40 years	$ 0.67	Profit $0.61	Profit $2.65	Profit $3.06	Profit $1.76

ANNUAL COST

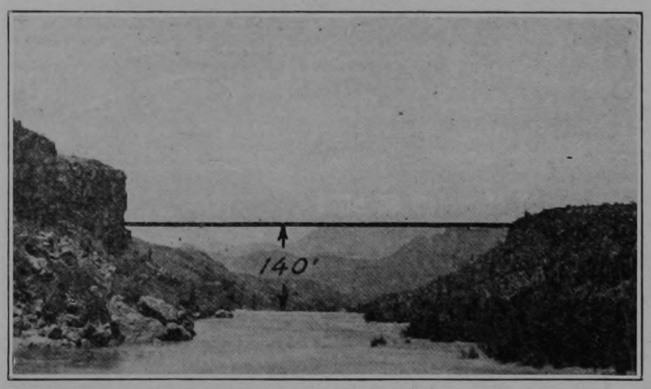
	Dams, Tunnels Shafts	Other Items	Interest during Construction
Interest	4%	4%	4%
Amort.	1%	1%	1%
Dep. O & M	1%	4%	
Totals	6%	9%	5%



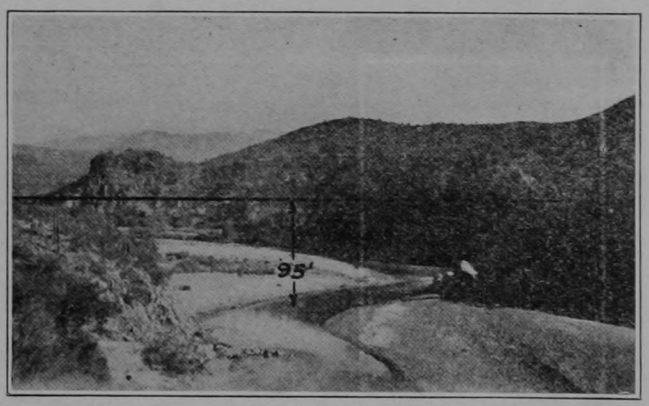
Malpais Dam Site—Verde River Mile 92

Relative

The irrigation of Arizona lands by the use of the water of the Colorado River is not a small or cheap proposition. The total costs are staggering, but so is the acreage that can be irrigated, the power that can be developed and the growth and prosperity that can be brought to the State. The unit costs are not high. They are less than those of many projects built and contemplated. The irrigation of a large acreage in Arizona is a project comparable with the Columbia, which is estimated at $376,631,000 to produce 1,400,000 commercial horse power and irrigate 1,200,000 acres by a pump lift of 370 feet, with the project estimated to cost $360,000,000 for transferring the surplus water of the Sacramento River to the Valley of the San Joaquin, with the 6,000,000 acre extension of the Aswan project on the Nile by England. . . . We believe that the development of Arizona power and irrigation is much more feasible than any of these projects. . . . A comparison of the Colorado-River project shows that, while it involves costs similar to those of the Metropolitan Water District, it would give returns many times as favorable. In this connection it should be



Yavagila Dam Site—Mile 68 Verde River



Cliff Dwellers Dam Site—Mile 42 Verde River

remembered that Los Angeles has in the Owens Valley-Mono Lake region a source of better and cheaper water than from the Colorado River, and that they will not need any of the latter for over 20 years, and probably not the whole amount for 75 or 100 years.

It will require over 8,000,000 additional population at 120 gal. per capita per day to consume in domestic use the 1500 sec. ft. of water that it is proposed to pump 1600 feet over the coast mountain range to the vicinity of Los Angeles, but it will only require 30,000 farm units of 40 acres each, or say an additional population of 120,000 to occupy 1,200,000 acres of Arizona land. If Los Angeles expects to use Colorado River water for agricultural purposes, an acre in California producing crops for shipment to New York, Chicago, Philadelphia, or Detroit can stand no higher water costs than an acre in Arizona.

Those who condemn the 144 miles of tunnel on the Colorado-Verde project should consider that there are 104 miles of tunnel on the revised plan for the 267 miles of Metropolitan Aqueduct from Parker to the reservoirs, 25 miles outside of Los Angeles, and nearly as many additional miles of concrete conduits, pipes and siphons.

A comparison of the figures given in the final report of the Metropolitan Water District Board of Review with those of the Colorado-Verde project, with interest estimated at 4¾ per cent and excluding the cost of distribution in California beyond their terminal reservoirs and in Arizona beyond the main canals, shows that without any power at all the costs for water on the Arizona project would be but 11 per cent of the cost of water to California during the amortization period, and after the amortization period but 8 per cent.

If the Colorado-Verde project could sell a small part of their power the water cost would be but 6 per cent of that of the Metropolitan District during amortization, and after amortization would become a profit.

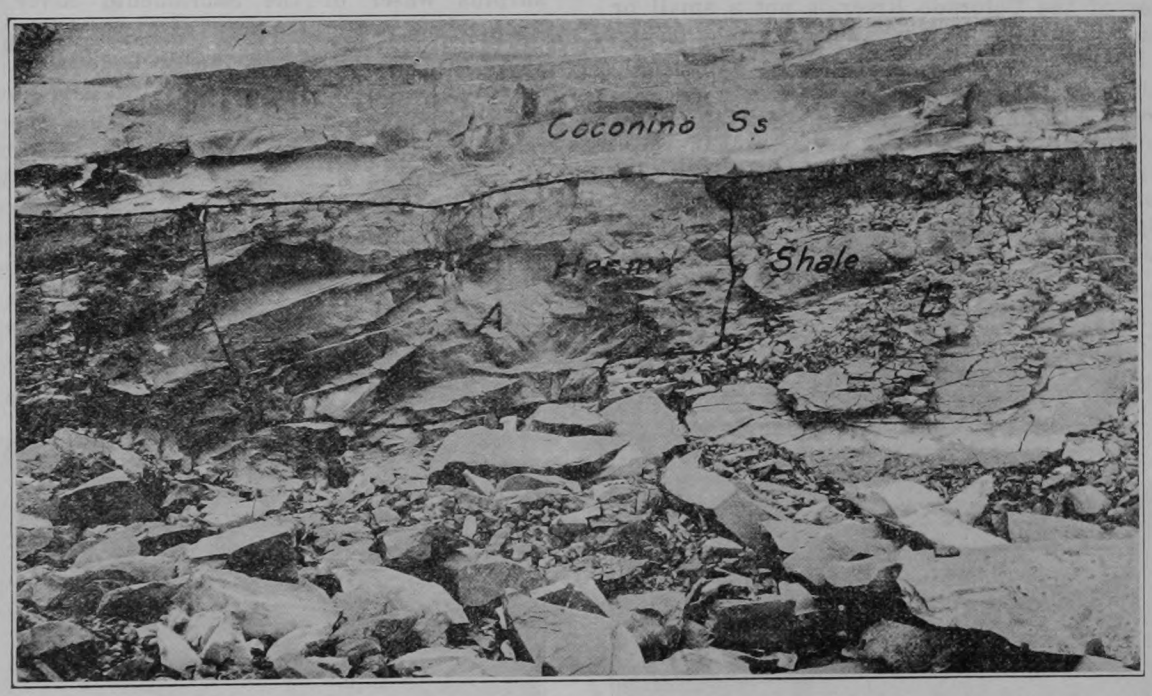
Metropolitan Water

	District	Colo-Verde	Colo-Verde
Cost of Project	$ 194,364,000	$176,909,000	$ 189,731,000
Water Obtained acre ft.	1,100,000	4,400,000	4,400,000
Kwh Produced	314,770,000	0	3,065,000,000
Kwh used in pumping	2,533,200,000	0	0
Cost per acre ft. for 40 yrs.	26.66	3.09	1.63
Cost per acre ft. after 40 yrs.	6.56	.50	Income .98

At present Los Angeles charges the San Fernando Valley lands $9.80 per acre foot for water, and it has been suggested that Colorado River water that will cost $26.66 per acre foot to take to the coastal plain be temporarily sold to irrigation projects at $10.00 per acre foot.

The population of the United States doubled in the last 41 years. Arizona's population doubled in 19 years. Our population will continue to grow if we develop the resources within our State that can sustain population.

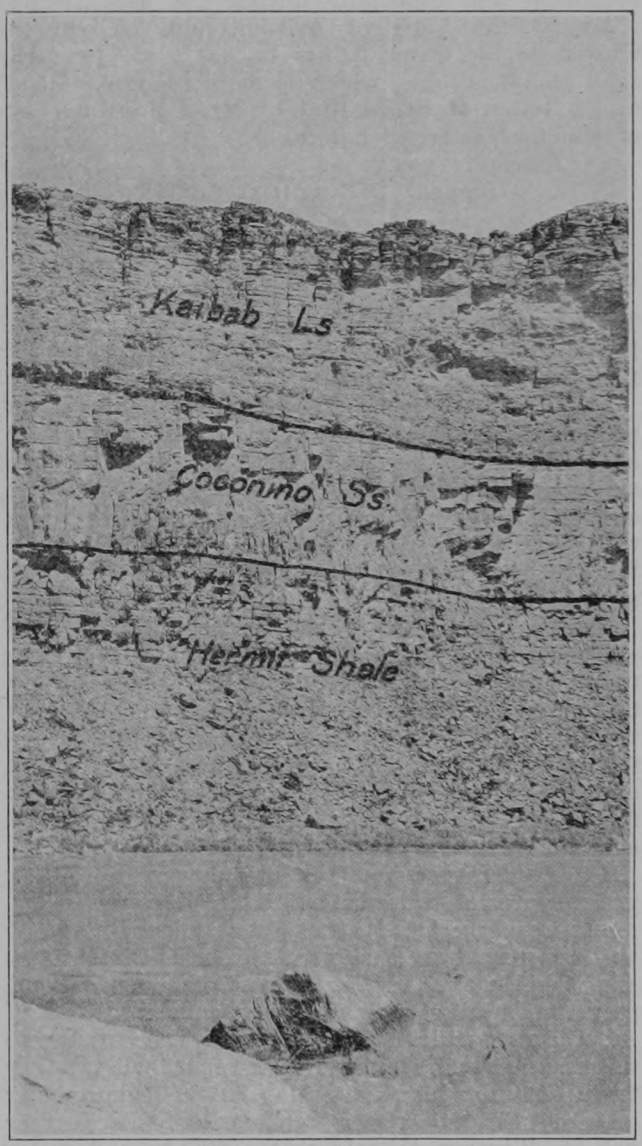
The previous generation had the foresight, courage, and ability to conquer the western deserts. If we have not lost these attributes progress will continue.



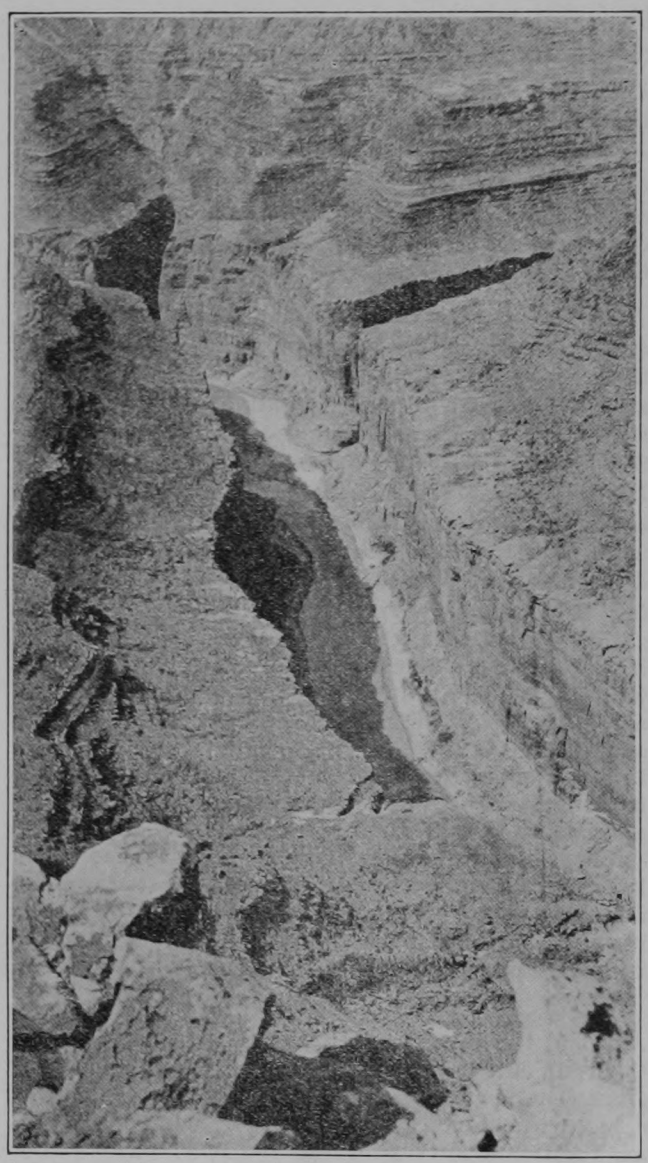
Contact between Coconino Sand Stone and Hermit Shale in Marble Gorge. "A" shows hard rock exposed by dynamite. "B" weathered rock surface. This material is similar to that of foundations at Marble Gorge Dam Site.

VII. COLTER-STEPHENS SURVEY, 1931

In the fall of 1931, Senator Colter and T. S. Stephens, as president and vice-president, respectively, of the Arizona Highline Reclamation Association, personally led a reconnaissance survey party by boat to the Glen Canyon site for a general survey of the country and study of the terrain. The party was guided by the Johnson Brothers, pioneers born in the vicinity, who assisted E. C. La Rue in his investigations of the Glen Canyon section. The survey confirmed the conclusion of La Rue and practically all other engineers that the Glen Canyon site is unexcelled for storage of the river waters. A dam in Glen Canyon of the same height as Boulder Dam will store two and one-half times as much water in its reservoir.



Rock Strata, Mile 8 Colorado River
A dam at the Lees Ferry Bridge would have its foundations in material similar to that in the vertical wall.



Mile 40, Colorado River
Inner Gorge is in Redwall Limestone

VIII. SCOTT REPORT TO ARIZONA ATTORNEY-GENERAL ON GLEN-BRIDGE-VERDE-HIGHLINE WATER FILINGS, WATER RIGHTS AND PROJECTS, 1932

In April, 1932, Arizona Attorney General K. Berry Peterson, instructed Donald C. Scott, of the Scott Engineering Company, Phoenix, to prepare and deliver to Senator Colter maps and photographs to be used in the authorized three-volume report then being prepared by Senator Colter as trustee to the attorney-general on diligence maintained to the Glen-Bridge-Verde-Highline Water Filings, water rights, and projects for and on behalf of Arizona. In accordance with these instructions, Mr. Scott, on March 28, 1933, delivered to Senator Colter maps on tracing cloth, photostat copies, etc., together with a written favorable engineering report to the attorney general on the Glen-Bridge-Verde-Highline Projects.

The Scott maps depicted all the dam, reservoir and canal sites filed upon by Senator Colter throughout Arizona for the state and its people and both the Glen-Bridge-Highline route and alternate Colorado River-Verde route. In addition the Scott report maps delineated in red the alternate Highline Canal filed upon by Senator Colter at a higher elevation than the original Highline Canal. The alternate Highline will require a higher diversion dam at Bridge Canyon but less tunneling in leaving the river. By reaching lands at greater elevations, 1,000,000 more acres can be irrigated than under the original Highline Canal, with increased resulting reflow use. The alternate Highline Canal is the more comprehensive, and will probably be the route finally chosen. It should be remembered that in all formative reclamation and power projects the dam and canal locations specified are subject to adjustment as more data become available. The so-called Boulder Dam, for example, is not located as originally planned in the Boulder Canyon for which it is named, but was changed to Black Canyon, 20 miles distant, where it is now being constructed.

The Scott report found both the Glen-Bridge-Arizona Highline Canal route and the alternate Colorado River-Verde route of the Colter water filings and projects entirely feasible and practicable, with the former preferable. It recommended an additional survey of the Arizona Highline Canal, particularly for determining the best of the several locations from which a canal or tunnel can be diverted from the Bridge Canyon site. The Scott Report with its letters of transmittal follows, including several of the accompanying maps:

SCOTT ENGINEERING COMPANY
Ellis Building
Phoenix, Arizona
March 28, 1933.

Hon. K. Berry Peterson,
Asst. Attorney General,
State Capitol,
Phoenix, Arizona,
Dear Sir:

In accordance with your instructions of April, 1932, I have prepared and delivered to Mr. Fred T. Colter maps and photostats to be used in the report which he has been making to your office on the due and reasonable diligence exerted since Statehood and especially during the past twelve years by the State of Arizona and by him as trustee, to the water filings he has made for Arizona and its people, which is more fully explained in my letter of transmittal to Mr. Colter, a copy of which is attached hereto.

Sincerely yours,
(Signed) DONALD C. SCOTT,

SCOTT ENGINEERING COMPANY,
By Donald C. Scott
March 28, 1933.

To the Hon. Fred T. Colter,
Phoenix, Arizona.
Dear Mr. Colter:

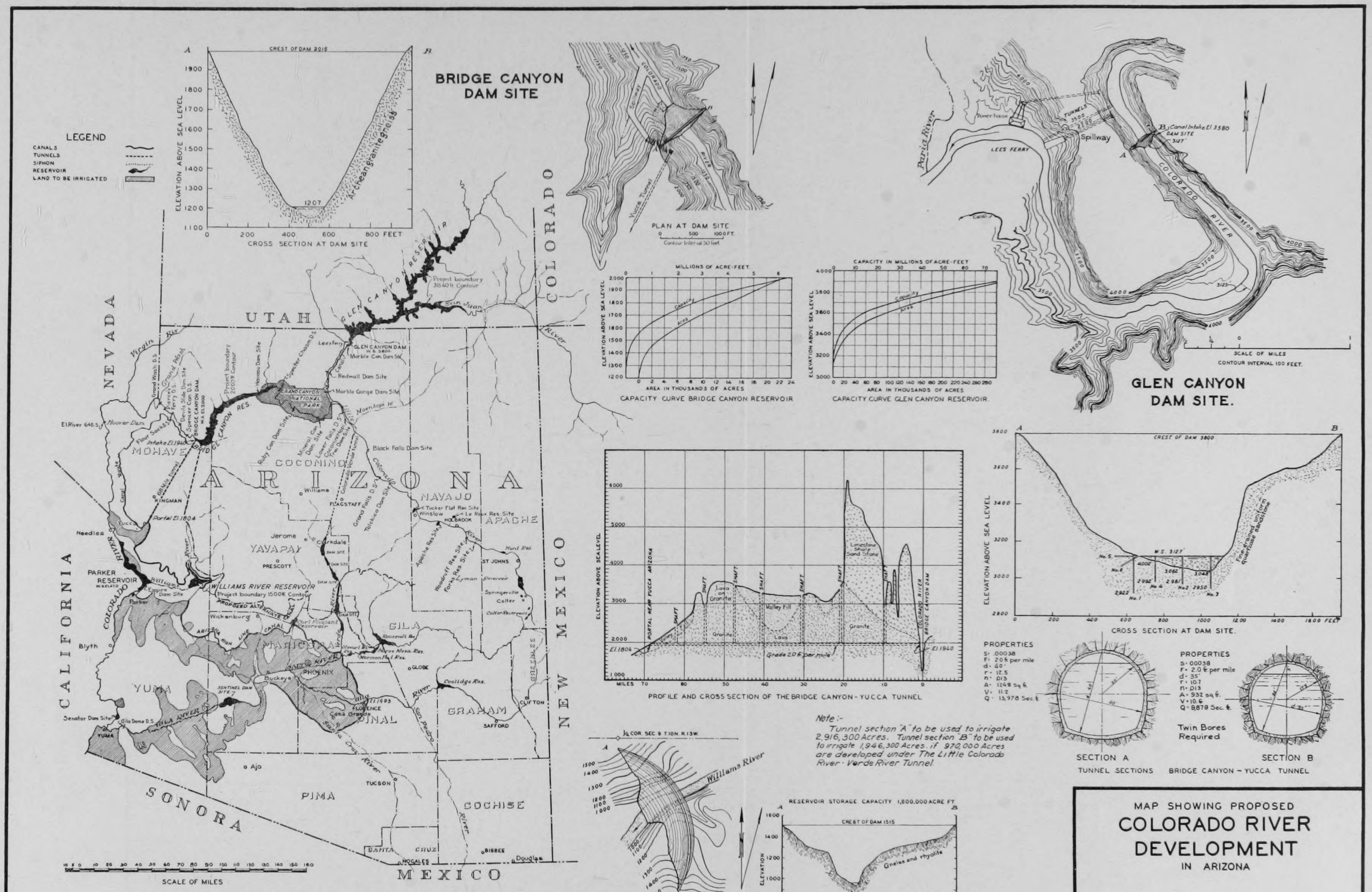
I am handing you herewith a set of maps on tracing cloth comprising twenty sheets with many copies therefrom in conformity with the requirements of the Arizona State Water Commissioner and the Federal Power Commission. These maps with some thirty others and the photostatic copies for the reports were prepared for the following purposes:

(1) For assisting in the perpetuation of the combined irrigation and power filings, with irrigaton superor to power therein, made by you on the Colorado River System beginning in 1923 and thereafter on the projects delineated in these maps for and in behalf of Arizona and water users under said projects, which water filings are on file with the Arizona State Water Commissioner and the Federal Power Commission.

(2) To be used for any amended water filing you may make therewith.

(3) To be used in this present report by you to the Arizona Attorney General, of which these maps and photostats and this letter are a part, of the past twelve years diligence exerted by the State of Arizona and its people and yourself as trustee to these said water filings, which report will also be filed with the Arizona State Water Commissioner and the Federal Power Commission as a further act of diligence to said water filings and water rights, and as additional notice to any adverse water contenders.

These maps show the topography of the proposed Glen Canyon Dam and Reservoir site, the Bridge Canyon Diversion Dam and Reservoir site,



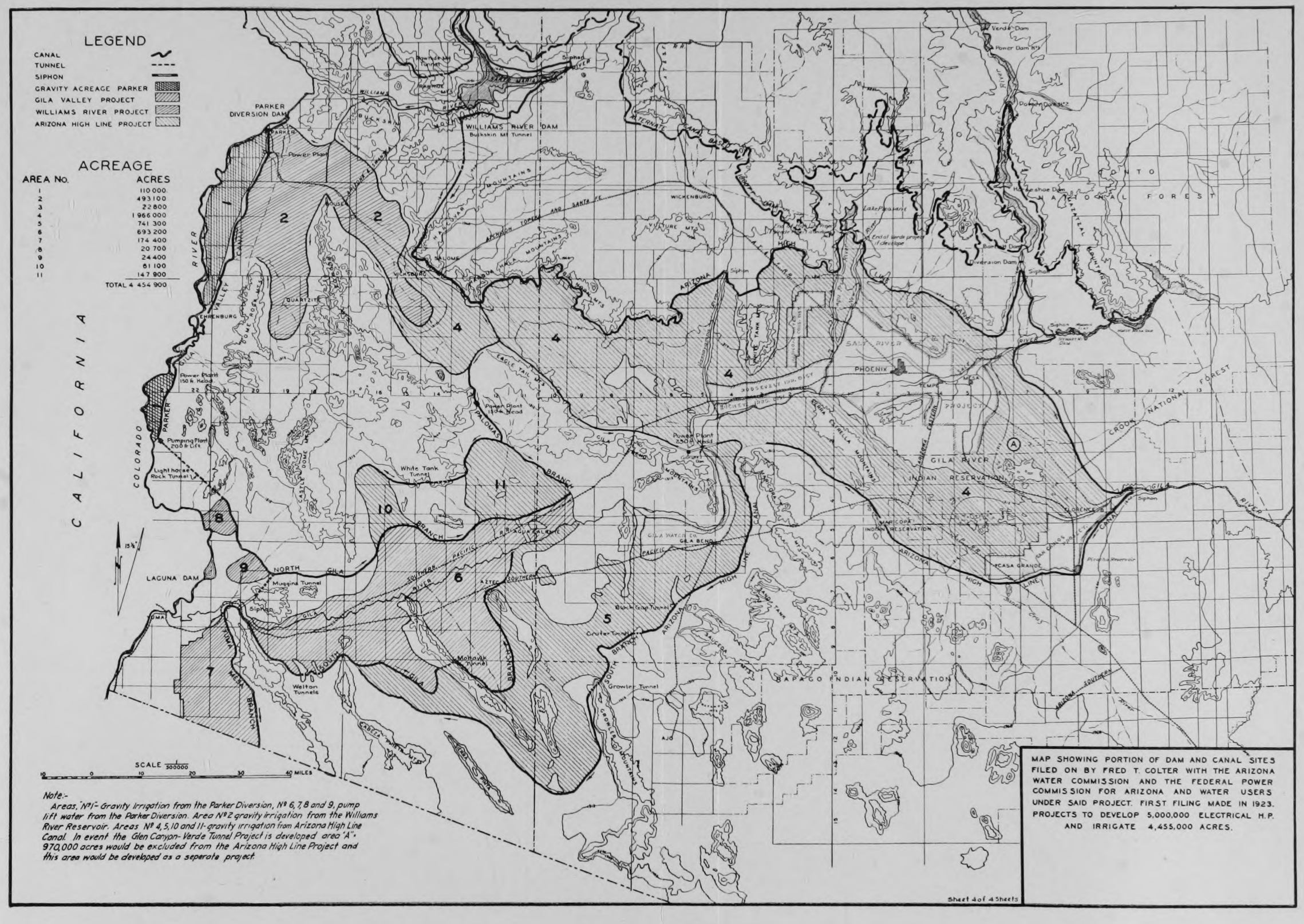
Map showing dam and canal sites filed on by Fred T. Colter with the Arizona Water Commission and the Federal Power Commission for Arizona and Water Users under said projects. First filings made in 1923. Projects to develope 5,000,000 electrical horse power and irrigate 4,455,000 Acres of land.

Sheet 1 of 4 Sheets

MAP SHOWING PROPOSED

COLORADO RIVER DEVELOPMENT

IN ARIZONA



Note:-
Areas, Nº1 - Gravity Irrigation from the Parker Diversion, Nº 6, 7, 8 and 9, pump lift water from the Parker Diversion. Area Nº 2 gravity irrigation from the Williams River Reservoir. Areas Nº 4, 5, 10 and 11 - gravity irrigation from Arizona High Line Canal. In event the Glen Canyon-Verde Tunnel Project is developed area "A" 970,000 acres would be excluded from the Arizona High Line Project and this area would be developed as a seperate project.

MAP SHOWING PORTION OF DAM AND CANAL SITES FILED ON BY FRED T. COLTER WITH THE ARIZONA WATER COMMISSION AND THE FEDERAL POWER COMMISSION FOR ARIZONA AND WATER USERS UNDER SAID PROJECT. FIRST FILING MADE IN 1923. PROJECTS TO DEVELOP 5,000,000 ELECTRICAL H.P. AND IRRIGATE 4,455,000 ACRES.

Sheet 4 of 4 Sheets

the Williams River Dam site, the approximate location of all proposed canals, tunnels, and siphons, the approximate acreage to be irrigated under each project and the total acreage to be irrigated under the combined projects set forth therein and filed upon by you as trustee as above stated. The maps show the 4,455,000 acres to be irrigated under these projects and give contours, range, and township locations of lands to be irrigated.

In the preparation of these maps in conformity with the general plan proposed by yourself and the Arizona Highline Reclamation Association, every effort has been made to collect all the available information to be had at this time, and to incorporate this information in the maps. The following sources of information have been reviewed and used in this work:

(1) **"Report Based on Reconnaissance Investigations of Arizona Lands Irrigable from the Colorado River,"** by the Arizona Engineering Commission, under the direction of E. C. La Rue, made in 1923.
(2) United States Geological Survey **Water Supply Paper No. 556**, made in 1925.
(3) **All Gravity Aqueduct Plan from Bridge Canyon Dam Site to Secure Water for Southern California**, by E. C. La Rue—**Hydraulic Engineer**, May, 1929.
(4) Summary of irrigation and power filings made by Fred T. Colter to the Federal Power Commission and the Arizona State Water Commissioner for irrigation, reservoir and power sites on the Colorado River from the years 1923-1929, most of which were published in **Hydraulic Engineer**, September, 1929.
(5) All United States Geological Survey Quadrangles available for this area.
(6) Sturtevant-Stam Highline Canal and Spencer-Bridge Canyon Diversion Dam Site survey of 1923, on the basis of which engineering data Fred T. Colter, trustee, made the first of said water filings.
(7) Topographic Map of the State of Arizona by the United States Geological Survey and the University of Arizona, in 1925.
(8) Trott-Parker Surveys in 1925.
(9) All advance sheets of the United States States Geological Survey which are available at this time.
(10) From my personal records and information I have been able to obtain in the field.

GENERAL PLAN

The general plan of development of this project is predicated on the construction of the Glen Canyon Dam, which will provide storage, flood, and silt control for the other structures which are to be built below this point. This dam will provide storage for 50,000,000 acre feet of water to be used for power and irrigation.

The water stored, in passing through the proposed power plant at the Glen Canyon Dam, will develop 700,000 electrical horse power, and this same water in passing the four other power sites between the Glen Canyon Dam and the Bridge Canyon Dam, which will be the point of diversion, will manufacture additional power as follows:

Dam Site	Electrical Horse Power to be Developed
(1) Redwall	362,000
(2) Mineral Canyon	588,000
(3) Ruby Canyon	494,000
(4) Spencer-Bridge Canyon	392,000

Under this plan the proposed point of diversion will be the Bridge Canyon Dam. At this point it is possible to develop another 1,000,000 electrical horse power. The portal of the proposed irrigation tunnels would be at an elevation of 1940 feet providing a storage of 9,000,000 acre feet in the Bridge Canyon Reservoir, and, with storage capacity at the Glen Canyon Reservoir, the total available storage would be 59,000,000 acre feet available for irrigation. The water stored in the four reservoirs of the power sites cannot be considered as available for irrigation as it will be necessary to maintain these reservoirs at their maximum elevation in order to develop the maximum power at each site.

These reservoirs could be drawn upon at any time in case of emergency at a sacrifice to the power developed.

In addition, 600,000 electrical horse power will be manufactured on the Arizona Highline Canal. These added, total 4,136,000 electric horse power to be made on the combined projects. The value of this great amount of electric power will more than pay for all the combined irrigation and power development of 4,455,000 acres under these projects.

Irrigation Projects

The irrigation plan is divided into three projects and two alternate projects as follows:

1. Arizona Glen-Bridge-Highline Canal Project to irrigate 4,455,000 acres.
2. Williams River Project, included in Glen-Bridge-Highline Project.
3. The Parker-Gila Valley Project alternate. The 912,000 acres that can be irrigated thereunder can be irrigated at less cost under the Glen-Bridge-Highline Project or Glen-Verde Project.
4. The Glen Canyon-Verde River Project and Colorado River-Verde Project (to irrigate approximately 4,455,000 acres).

The Glen-Bridge-Highline Canal Project to Irrigate 4,455,000 Acres

The water for the Glen-Bridge-Highline Canal Project would be stored at Glen Canyon Reservoir site and diverted from the Bridge Canyon Reservoir at a tentative elevation of 1940 feet, and from this point of diversion, water would be conveyed by two tunnels to a point near Yucca, Arizona.

From this point water would be conveyed in an open canal to the Williams River Reservoir where provision would be made to fill and maintain this reservoir at its maximum capacity, the filling being done at the periods when the entire capacity of the tunnels and canals is not needed to irrigate the lands served by them. From the Williams Reservoir the canal would pass through a tunnel in the Buckskin Mountains and follow the high contour around the south slope of the Harcuvar Mountains, flowing in an easterly direction and crossing the Hassayampa River by means of a siphon, thence easterly passing north of the White Tank Mountains and crossing the Santa Fe Railroad at a point south of Whitman, thence in an easterly direction crossing the Agua Fria River at a point south of the proposed Verde Diversion Dam. From this point the canal would run southward, crossing the Salt River at a point between the Granite Reef Dam and Stewart Mountain Dam, thence south and crossing the Gila River at a point near Florence. From here the canal would run south and west to a point near the Gillespie Dam. The total length of this canal would be approximately 577 miles.

South Branch

The South branch of the Arizona Highline Canal would have its junction with the Arizona Highline Canal at a point near the southwest end of the Harcuvar Mountains. From this point it would pass along a ridge to a point near the northwest end of the Eagle Tail Mountains, thence easterly to the Gila River where it would cross the river near the Gillespie Dam by means of a siphon. At this point there would be a power drop of about 250 feet which would be used to generate power by passing the water used on the lower lands through a power plant at this point. From this point the canal would run in a southwesterly direction ending at a point near the north end of the Cabeza Pricta Mountains. The approximate length would be 200 miles.

The Palomas Branch

The Palomas Branch, which would have an approximate length of 97 miles, would have its junction with the South Branch near the west end of the Eagle Tail Mountains and from this point the canal would wind in a southerly direction to a point where a drop of 150 feet could be used for the generation of electrical energy. This canal would continue on south and branch, part of the flow going east and part going west. The total acreage under the Arizona Highline Canal and its branches would amount to 4,455,000 acres. For a more detailed location of these canals reference is made to sheet 4 of the accompanying maps.

The Williams River Project

This project calls for the construction of a dam on the Williams River, the high water contour of which would be at the 1500 foot contour elevation. As stated, this reservoir could be filled from the Arizona Highline Canal and Williams River. Water could be taken out of this reservoir at approximately an elevation of 1320 feet for power and irrigation purposes. From this point water would be conveyed by means of canal and used to irrigate approximately 493,100 acres of land (see map).

The Parker-Gila Valley Project

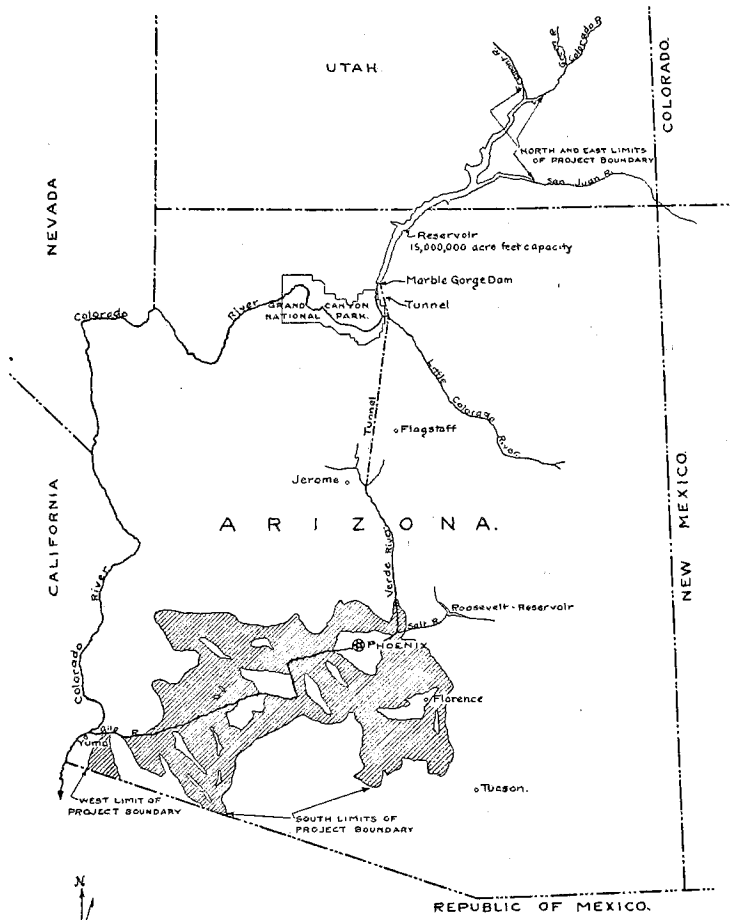
Under this project there are 912,100 acres of land which are a part of the 4,455,000 acres which can be more economically irrigated from the Arizona Highline Canal. By irrigating this area from this project the needed tunnel capacity is reduced and with silt and flood control taken care of to some extent at the above described dams and the water passed through the power house at the dam could be used for irrigation at this point if it would ever be deemed proper to include this area under the Parker-Gila Project.

The Parker-Gila Valley project calls for the construction of a diversion dam on the Colorado River at a point north of Parker, Arizona. At this point the water would be diverted and taken by a canal south and about parallel to the Colorado River. There would be about 110,000 acres of land which would receive gravity water from this canal. There are two power drops on this canal in addition to the power developed at the diversion dam. These drops are 80 and 150 feet. At the south end of the gravity district the water would be pumped to a point 200 feet above the lower canal. From this point it would be conveyed by canal and tunnel to irrigate 912,000 acres along both sides of the Gila River. For a more detailed layout of this project see sheet 5 of maps.

Alternate Glen Canyon-Verde Project Filed on to Irrigate 4,455,000 Acres

An alternate project is shown on the accompanying maps which calls for a canal and tunnel connecting the Glen Canyon Reservoir with the Verde River. Under this plan 970,000 acres could be excluded from the Highline Project, but about the same land would be irrigated as under the Highline Project. The canal locations would be very nearly the same as shown on the maps with the water flowing west from the Verde River to Agua Fria River. This project would work in conjunction with the present proposed Paradise-Verde Project with all storage reservoirs being developed on the Verde River to handle the peak irrigation demands and develop the maximum electrical energy through five power and storage dams on the Verde River below tunnel to diversion point. This project, or Glen-Bridge-Highline Project could be assisted by the construction of a dam at the Sentinel Dam Site as a large amount of the return flow could be used on the lands on the lower Gila Valley.

I also show on maps No. 3 and 4 an alternate high canal to be diverted from the 1800 foot dam



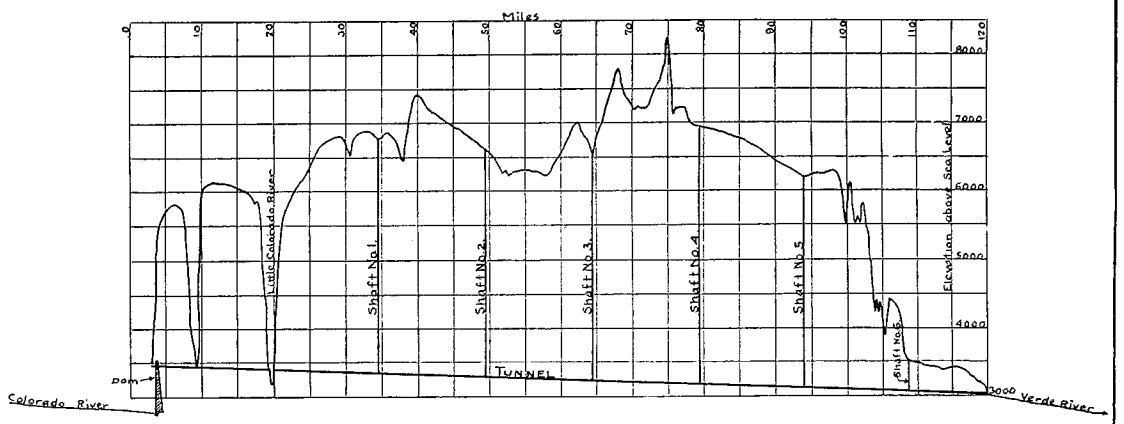
GENERAL MAP
SCALE 1 INCH = 40 MILES

MILES

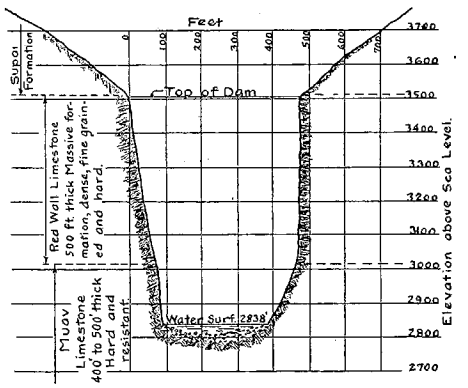
LEGEND

Lands to be Irrigated.

Map showing dam and canal sites filed on by Fred T. Colter with the Arizona Water Commission and the Federal Power Commission for Arizona and Water Users under said projects. First filings made in 1923. Projects to develope 5,000,000 electrical horse power and irrigate 4,455,000 Acres of land



PROFILE OF TUNNEL.



SECTION OF DAM SITE.

For Geology see USGS Water Supply Paper No. 556, pp 130, 136, 137.

This map is a part of the preliminary permit made by the undersigned this 10th day of June 1927

Fred T. Colter

Fred T. Colter Trustee

COLORADO - VERDE PROJECT

MAP SHOWING PROJECT BOUNDARY, PROFILE OF TUNNEL AND SECTION OF DAM SITE.

DRAWN BY C.C.T.

JUNE 8 - 1929.

in the vicinity of the Bridge Canyon Dam Site at 3000 foot elevation; said dam could be a rock fill dam to a great height and would irrigate about 1,000,000 acres more above the Highline Canal.

The Colorado River-Verde or Glen Canyon-Verde Projects are practical, also verified by Arizona Colorado River Commission Survey and Report of 1932 but the Glen-Bridge-Highline Canal Project is more economical and practical than either and to ascertain how much more economical it would be, I would recommend an additional survey of the Arizona Highline Canal, especially for determining the best and most economical of several places from which a canal or tunnel could be diverted from Bridge Canyon dam site. These surveys would also continue to constitute due and reasonable diligence and would help to keep up the water filings made by you for the people of Arizona on said projects and assist in obtaining proper rights of way.

Most of this could be done by aerial survey methods at a cost which would be very much cheaper than by present field methods. This type of survey, which I am prepared to make, would be very valuable in that it would not only show the topography, but would show the general character classification of all the land and geological formations with very little field work. It would be possible to make an estimate of cost within a more reasonable degree of accuracy.

Respectfully submitted,
(SGD) DONALD C. SCOTT,
SCOTT ENGINEERING CO.
By Donald C. Scott.

TEXT OF THE SANTA FE COMPACT

(COLORADO RIVER COMPACT)

Below is the full text of the ruinous Santa Fe-Tri-State-Parker-Gila Compact rejected by Arizona for twelve years. If Arizona should ever ratify this compact or any equivalent thereof, seven-eighths of her overground and underground water would be deeded to Mexico in perpetuity.

COLORADO RIVER COMPACT

The States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming, having resolved to enter into a compact under the Act of the Congress of the United States of America approved August 19, 1921 (42 Statutes at Large, page 171), and the Acts of the Legislatures of the said States, have through their Governors appointed as their Commissioners:

W. S. Norviel for the State of Arizona,
W. F. McClure for the State of California,
Delph E. Carpenter for the State of Colorado,
J. G. Scrugham for the State of Nevada,
Stephen B. Davis, Jr., for the State of New Mexico,
R. E. Caldwell for the State of Utah,
Frank C. Emerson for the State of Wyoming,

who, after negotiations participated in by Herbert Hoover, appointed by the President as the representative of the United States of America, have agreed upon the following articles:

ARTICLE I.

The major purposes of this compact are to provide for the equitable division and apportionment of the use of the waters of the Colorado River System; to establish the relative importance of different beneficial uses of water; to promote interstate comity; to remove causes of present and future controversies; and to secure the expeditious agricultural and industrial development of the Colorado River Basin, the storage of its waters, and the protection of life and property from floods. To these ends the Colorado River Basin is divided into two Basins, and an apportionment of the use of part of the water of the Colorado River System is made to each of them with the provision that further equitable apportionments may be made.

ARTICLE II.

As used in this compact:

(a) The term "Colorado River System" means that portion of the Colorado River and its tributaries within the United States of America.

(b) The term "Colorado River Basin" means all of the drainage area of the Colorado River System and all other territory within the United States of America to which the waters of the Colorado River System shall be beneficially applied.

(c) The term "States of the Upper Division" means the States of Colorado, New Mexico, Utah, and Wyoming.

(d) The term "States of the Lower Division" means the States of Arizona, California, and Nevada.

(e) The term "Lee Ferry" means a point in the main stream of the Colorado River one mile below the mouth of the Paria River.

(Continued on page 60)

JOHN L. SULLIVAN

DEMOCRAT

— FOR —

ATTORNEY GENERAL

The Colorado River System is our only water supply.

The responsibility for the protection of our rights in the Colorado River rests far more on the Attorney General than on any other State official.

I pledge myself to protect these rights including all filings.

I pledge unceasing opposition to the Santa Fe Compact, Tri-State Compact and their equivalents.

Upon the protection and development of our water rights depend our very existence and the future growth of the State of Arizona.

JOHN L. SULLIVAN.

(f) The term "Upper Basin" means those parts of the States of Arizona, Colorado, New Mexico, Utah, and Wyoming within and from which waters naturally drain into the Colorado River System above Lee Ferry, and also all parts of said States located without the drainage area of the Colorado River System which are now or shall hereafter be beneficially served by waters diverted from the system above Lee Ferry.

(g) The term "Lower Basin" means those parts of the States of Arizona, California, Nevada, New Mexico, and Utah within and from which waters naturally drain into the Colorado River System below Lee Ferry, and also all parts of said States located without the drainage area of the Colorado River System which are now or shall hereafter be beneficially served by waters diverted from the system below Lee Ferry.

(h) The term "domestic use" shall include the use of water for household, stock, municipal, mining, milling, industrial, and other like purposes, but shall exclude the generation of electrical power.

ARTICLE III.

(a) There is hereby apportioned from the Colorado River System in perpetuity to the Upper Basin and to the Lower Basin, respectively, the exclusive beneficial consumptive use of 7,500,000 acre-feet of water per annum, which shall include all water necessary for the supply of any rights which may now exist.

(b) In addition to the apportionment in paragraph (a), the Lower Basin is hereby given the right to increase its beneficial consumptive use of such waters by one million acre-feet per annum.

(c) If, as a matter of international comity, the United States of America shall hereafter recognize in the United States of Mexico any right to the use of any waters of the Colorado River System, such waters shall be supplied first from the waters which are surplus over and above the aggregate of the quantities specified in paragraphs (a) and (b); and if such surplus shall prove insufficient for this purpose, then the burden of such deficiency shall be equally borne by the Upper Basin and the Lower Basin, and whenever necessary the

- MARICOPA COUNTY -

States of the Upper Division shall deliver at Lee Ferry water to supply one-half of the deficiency so recognized in addition to that provided in paragraph (d).

(d) The States of the Upper Division will not cause the flow of the river at Lee Ferry to be depleted below an aggregate of 75,000,000 acre-feet for any period of ten consecutive years reckoned in continuing progressive series beginning with the first day of October next succeeding the ratification of this compact.

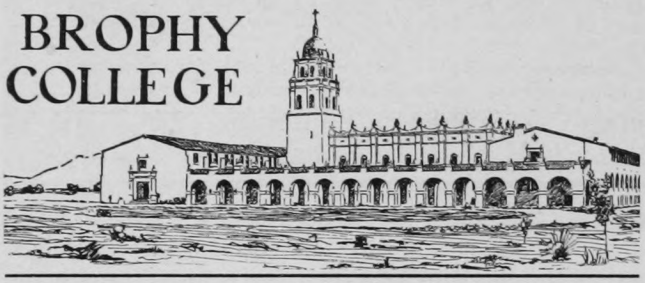
(e) The States of the Upper Division shall not withhold water, and the States of the Lower Division shall not require the delivery of water which

- MARICOPA COUNTY -

M. L.
OLLERTON
Democrat
For
COUNTY ATTORNEY
Qualified by training and experience

HARRY
JOHNSON
Democrat
For
COUNTY ATTORNEY
Arizona's present and future depends on the Highline

BROPHY COLLEGE



George W. Vaughn
For
CLERK OF SUPERIOR COURT
Subject to Democratic Primary
Qualified—Reliable
Resident Maricopa County 34 years. First time for public office

can not reasonably be applied to domestic and agricultural uses.

(f) Further equitable apportionment of the beneficial uses of the waters of the Colorado River System unapportioned by paragraphs (a), (b), and (c) may be made in the manner provided in paragraph (g) at any time after October first, 1963, if and when either Basin shall have reached its total beneficial consumptive use as set out in paragraphs (a) and (b).

W. H.
LINVILLE
Democrat for
RECORDER
(Has never spent his entire budget. Office profits $20,000 per year)

John A. Foote
FOR
Supervisor
District No. 8
20 Years in Maricopa Co.
A Taxpayer
Never Held Public Office

WALTER S.
WILSON
Appreciates your support
For
CLERK OF THE SUPERIOR COURT

E. R. (Edd) PRYOR
For County Supervisor, Dist. No. 2

Ramona Cafe — **323 E. Washington**
Travis Steak House — **1st St. and Monroe**

"FAMILY KITCHEN PIE"
215 E. Roosevelt St.
Phoenix

(g) In the event of a desire for a further apportionment, as provided in paragraph (f), any two signatory States, acting through their Governors, may give joint notice of such desire to the Governors of the other signatory States and to the President of the United States of America, and it shall be the duty of the Governors of the signatory States and of the President of the United States of America forthwith to appoint representatives, whose duty it shall be to divide and apportion equitably between the Upper Basin and Lower Basin the beneficial use of the unapportioned water of the Colorado River System, as mentioned in paragraph (f), subject to the legislative ratification of the signatory States and the Congress of the United States of America.

ARTICLE IV.

(a) Inasmuch as the Colorado River has ceased to be navigable for commerce and the reservation of its waters for navigation would seriously limit

the development of its basin, the use of its waters for purposes of navigation shall be subservient to the uses of such waters for domestic, agricultural, and power purposes. If the Congress shall not consent to this paragraph, the other provisions of this compact shall nevertheless remain binding.

(b) Subject to the provisions of this compact, water of the Colorado River System may be impounded and used for the generation of electrical power, but such impounding and use shall be subservient to the use and consumption of such water for agricultural and domestic purposes and shall not interfere with or prevent use for such dominant purposes.

(c) The provisions of this article shall not apply to or interfere with the regulation and control by any State within its boundaries of the appropriation, use, and distribution of water.

ARTICLE V.

The chief official of each signatory State charged with the administration of water rights, together with the Director of the United States Reclamation Service and the Director of the United States Geological Survey, shall cooperate, ex officio:

(a) To promote the systematic determination and coordination of the facts as to flow, appropriation, consumption and use of water in the Colorado River Basin, and the interchange of available information in such matters.

(b) To secure the ascertainment and publication of the annual flow of the Colorado River at Lee Ferry.

(c) To perform such other duties as may be assigned by mutual consent of the signatories from time to time.

ARTICLE VI.

Should any claim or controversy arise between any two or more of the signatory States (a) with respect to the waters of the Colorado River System not covered by the terms of this compact; (b) over the meaning or performance of any of the terms of this compact; (c) as to the allocation of the burdens incident to the performance of any article of this compact or the delivery of waters as herein provided; (d) as to the construction or operation of works within the Colorado River Basin to be situated in two or more States, or to be constructed in one State for the benefit of another State; or (e) as to the diversion of water in one State for the benefit of another State; the Governors of the States affected, upon the request of one of them, shall forthwith appoint Commissioners with power to consider and adjust such claim or controversy, subject to ratification by the Legislatures of the States so affected.

Nothing herein contained shall prevent the adjustment of any such claim or controversy by any present method or by direct future legislative action of the interested States.

ARTICLE VII.

Nothing in this compact shall be construed as affecting the obligations of the United States of America to Indian tribes.

ARTICLE VIII.

Present perfected rights to the beneficial use of waters of the Colorado River System are unimpaired by this compact. Whenever storage capacity of 5,000,000 acre-feet shall have been provided on the main Colorado River within or for the benefit of the Lower Basin, then claims of such rights, if any, by appropriators or users of water in the Lower Basin against appropriators or users of water in the Upper Basin shall attach to and be satisfied from water that may be stored not in conflict with Article III.

All other rights to beneficial use of waters of the Colorado River System shall be satisfied solely from the water apportioned to that basin in which they are situate.

ARTICLE IX.

Nothing in this compact shall be construed to limit or prevent any State from instituting or maintaining any action or proceeding, legal or equtable, for the protection of any right under this compact or the enforcement of any of its provisions.

ARTICLE X.

This compact may be terminated at any time by the unanimous agreement of the signatory States. In the event of such termination all rights established under it shall continue unimpaired.

ARTICLE XI.

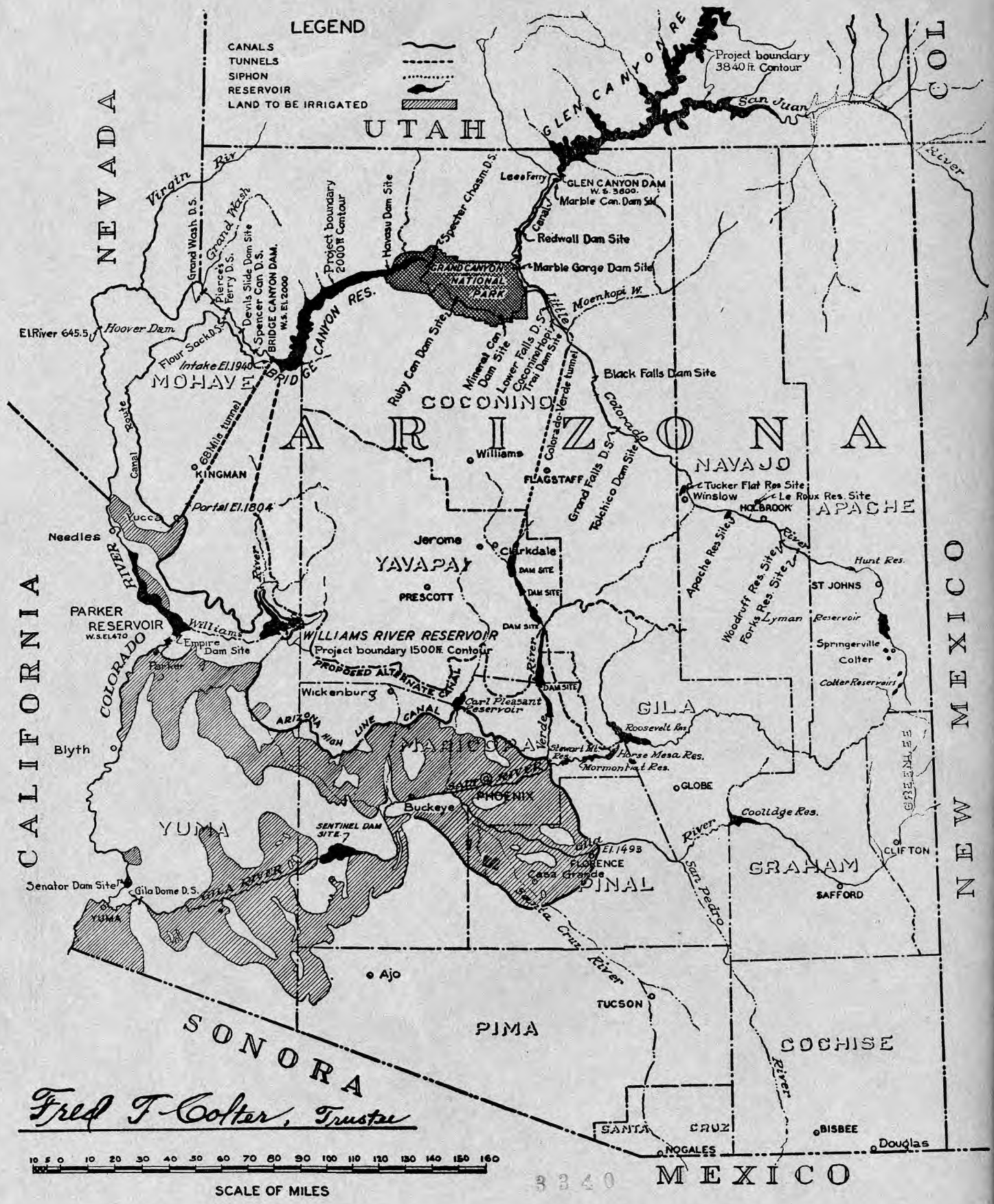
This compact shall become binding and obligatory when it shall have been approved by the Legislatures of each of the signatory States and by the Congress of the United States. Notice of approval by the Legislatures shall be given by the Governor of each signatory State to the Governors of the other signatory States and to the President of the United States, and the President of the United States is requesed to give notice to the Governors of the signatory States of approval by the Congress of the United States.

In witness whereof the Commissioners have signed this compact in a single original, which shall be deposited in the archives of the Department of State of the United States of America and of which a duly certified copy shall be forwarded to the Governor of each of the signatory States.

Done at the City of Santa Fe, New Mexico, this twenty-fourth day of November, A. D. one thousand nine hundred and twenty-two.

(Signed) W. S. Norviel.
(Signed) W. F. McClure.
(Signed) Delph E. Carpenter.
(Signed) J. G. Scrugham.
(Signed) Stephen B. Davis, Jr.
(Signed) R. E. Caldwell.
(Signed) Frank C. Emerson.

Approved: (Signed) Herbert Hoover.



Map showing dam and canal sites filed on by Fred T. Colter with the Arizona Water Commission and the Federal Power Commission for Arizona and Water Users under said projects. First filings made in 1923. Projects to develope 5,000,000 electrical horse power and irrigate 4,455,000 Acres of land.