THE BOULDER DAM ALL AMERICAN CANAL PROJECT

FACTS

Issued by
IMPERIAL IRRIGATION DISTRICT
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—HISTORY OF THE PROPOSED LEGISLATION—

"The Colorado River Basin has been under observation, survey and study and the subject of reports to Congress since the close of the Civil War. More than $350,000 have been expended by the Bureau of Reclamation since the Kinkaid Act of May 18, 1920. More than $2,000,000 have been expended by other agencies of the government.

"The time has arrived when the government should decide whether it will proceed to convert this natural menace into a National resource." (1).

Definite study, with a view to the early solution of these problems, however, was begun in 1918. On February 16, 1918, a contract was entered into between the United States and Imperial Irrigation District (2) ; by the terms of which the United States appropriated the sum of $15,000 and the District appropriated the sum of $30,000 to make a complete investigation, survey and cost estimate of an All American Canal from Laguna Dam into Imperial Valley.

The investigations and report were made by a Board, consisting of W. W. Schlecht, project manager of the Yuma project, who represented the United States and is an engineer of very wide experience in connection with reclamation matters; Dr. Elwood Mead, represented the State of California. Dr. Mead is an irrigation engineer of international reputation. He was sent to Australia by the British Government to assist in the inauguration of an irrigation system and has been referred to "as one of the most distinguished irrrigation authorities in the world." (3). Mr. C. E. Grunsky represented the District. He was a member of the Panama Canal Commission. He is also an engineer of international reputation, and is now president of the American Society of Civil Engineers.

On July 22, 1919, the All American Canal Board submitted its report to the Secretary of the Interior and to the Imperial Irrigation District. (4).

Following a preliminary report of the All American Canal

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(1) Letter from Secretary of Interior to Committee on Reclamation and Irrigation, Hearings, page 1379. (2) Original contract on file in the office of Imperial Irrigation District. (3) Hearings before Committee on Reclamation of Arid Lands, January 29, 1920, H. R. 6044, page 438. (4) Report of All American Canal Board on file at Imperial Irrigation District Office, El Centro, California.

Board, on June 17, 1919, Congressman Kettner introduced the first All American Canal bill (1), commonly referred to as the "First Kettner Bill."

On January 7, 1920, the second Kettner Bill (2) was introduced by Congressman Kettner. This bill provided for the building of an All American Canal, and in addition thereto such storage reservoirs and other works as the Secretary of the Interior might find necessary to provide an adequate water supply.

During the progress of the hearings before the Committee on Irrigation of Arid Lands, the question of water supply became an important issue and the chairman of the Committee introduced a bill (3) known as the "Kinkaid Act," which Act was approved May 18, 1920, and authorized the Secretary of the Interior to "have an examination made of the Imperial Valley in the State of California, with a view of determining the area, location and general character of the public and privately owned unirrigated lands in said Valley which can be irrigated at a reasonable cost, and the character, extent and cost of an irrigation system or of the modification, enlargement, improvement and extension of the present system, adequate and dependable for the irrigation of the present area in the said Valley and of the public and privately owned lands in said Valley and adjacent thereto not now under irrigation which can be irrigated at a reasonable cost from known sources of water supply from diversion of water from the Colorado River at Laguna Dam."

Pursuant to the terms of the "Kinkaid Act" the United States appropriated the sum of $20,000; the Imperial Irrigation District appropriated the sum of $100,000 and other agencies including Coachella Valley appropriated still additional sums; all of these funds were made available to the Secretary of the Interior and were used by him in making the investigations required under the Act.

On February 28, 1922, the Secretary of the Interior, pursuant to the "Kinkaid Act," made his report to the Congress which report was printed as Senate Document 142, entitled "Problems of Imperial Valley and Vicinity." In this report the Secretary made the following recommendations:

"1. It is recommended that through suitable legislation the United States undertake the construction with Government funds of a highline canal from Laguna Dam to the Imperial Valley, to be reimbursed by the lands benefited.

"2. It is recommended that the public lands that can be reclaimed by such works be reserved for settlement by ex-service men under conditions securing actual settlement and cultivation.

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(1) H. R. 6044, 66th Congress 1st Session. (2) H. R. 11553, 66th Congress, Second Session. (3) H. R. 12537, 66th Congress, 2nd Session. (4) 41 Stat. 600.

"3. It is recommended that through suitable legislation the United States undertake the construction with Government funds of a reservoir at or near Boulder Canyon on the lower Colorado River to be reimbursed by the revenues from leasing the power privileges incident thereto.

"4. It is recommended that any State interested in this development shall have the right at its election to contribute an equitable part of the cost of the construction of the reservoir and receive for its contribution a proportionate share of power at cost to be determined by the Secretary of the Interior.

"5. It is recommended that the Secretary of the Interior be empowered after full hearing of all concerned to allot the various applicants their due proportion of the power privileges and to allocate the cost and benefits of a highline canal.

"6. It is recommended that every development hereafter authorized to be undertaken on the Colorado River by Federal Government or otherwise be required in both construction and operation to give priority of right and use:

"First. To river regulation and flood control.

"Second. To use of storage water for irrigation.

"Third. To development of power." (1).

Following this report Congressman Phil. D. Swing, on April 25, 1922, introduced in the Congress a Bill (2) "for the purpose of regulating the lower Colorado River and controlling the floods therein, providing storage of water for irrigation, securing the development of electrical power and providing homes for honorably discharged men and women of the United States Army, Navy and Marine Corps. . . . " The Secretary of the Interior was "authorized and empowered to construct a dam and incidental works for the purpose of providing a reservoir at or near Boulder Canyon on said river, adequate for the purposes aforesaid . . . ; also to construct a main canal and appurtenant structures located entirely within the United States connecting Laguna Dam on said river with the Imperial and Coachella Valleys in California, together with such other canals and structures as may be required for the distribution and delivery of water from said reservoir and said river to lands in the United States, which said Secretary may find practicable of irrigation and reclamation therefrom. . . . "

The Sixty-seventh Congress adjourned without action on this Bill and on the 10th day of December, 1923, Congressman Swing introduced H. R. 2903, 68th. Congress, 1st Session, which is the bill now pending in the Congress and commonly referred to as the "Swing-Johnson Bill."

To summarize: There have been four bills introduced for the purpose of authorizing this development. The first was purely an All American Canal bill; the second was for the building of an All American Canal and such storage as the Sec-

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(1) Page 21, Senate Document 142. (2) H. R. 11449, 67th Congress, 2nd Session.

retary of the Interior might find necessary and the third and fourth were for the Boulder Canyon Dam and the All American Canal.

WHAT THE BILL CONTAINS

The bill first provides for the construction by the United States of a dam at or near Boulder Canyon.

WHY BOULDER CANYON IS SELECTED

Boulder Canyon is selected by name in the Bill for the reason that after thorough investigation that site was recommended by the United States. (1).

This recommendation has been concurred in by many eminent engineers, including Secretary Herbert Hoover (2) F. E. Weymouth, Chief Engineer of the Reclamation Service (3) and General George Goethals, builder of the Panama Canal (4).

TOPOC SITE

Within recent months there has been considerable discussion of a flood control dam near Needles in the Mojave Canyon, commonly referred to as the Topoc Dam. Since this has been offered as a substitute for the Boulder Canyon Dam the subject should be discussed in this booklet.

Mr. Arthur P. Davis is probably as fully informed on matters pertaining to the Colorado River as anyone. He commenced his investigations of the river in 1883. At the time the Reclamation Act of 1902 was passed he was the engineer in charge of stream measurements in the United States. After the passage of that Act he was transferred to the Reclamation Service with the title of "Principal Engineer." In 1907 he was made chief engineer of the Reclamation Service and in 1914 was appointed Director of the Reclamation Service, which position he held until 1923, during all of which time he made intensive study of the Colorado River and the investigations reported in Senate Document 142 were all made under his personal direction and supervision. He is an engineer of international reputation. He is past President of American Society of Civil Engineers and his opinion, particularly touching the Colorado River, is entitled to great weight.

Concerning this matter Mr. Davis testified before the committee on Irrigation and Reclamation on April 18, 1924, where he said (5): "If such a reservoir is provided at Mojave Canyon (the point below Needles), it will lose a large and unnecessary quantity of water by evaporation and will permanently submerge a large area of irrigable land and destroy much other

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(1) Senate Document 142, Page 27. (2) Hearings before Committee on Irrigation of Arid Lands, June 21, 1922, H. R. 11449, page 53. (3) Hearings before Committee on Irrigation and Reclamation, March 20, 1924, H. R. 2903, page 715. (4) Hearings before Committee on Irrigation and Reclamation, March 20, 1924, H. R. 2903, page 747. (5) Page 1380 Hearings before the Committee on Irrigation and Reclamation.

property, and for lack of head will produce very little power. None of these objections applies to Boulder Canyon, which is the only place that will solve all the problems presented, and furnish power enough to pay its cost, without unnecessary evaporation." (1).

"The small reservoir for flood control only will be partially or wholly filled each flood season and thereafter quickly emptied. During the time it contains water, that water being flood water heavily laden with silt will deposit the same over the entire submerged area, and when the reservoir is emptied the stream flowing through will cut a channel through the sediment deposit and carry that part of the silt to the headworks of the canals below. The major portion of the deposited silt will remain where deposited and diminish the storage capacity by that amount. It is clear, then, that the detention reservoir will hold back a large part of the silt that now passes to the sea in the flood and add a portion to the medium and low stages that are mostly or entirely used for irrigation, and that the silt nuisance will be nearly as bad as it is now. This condition will forbid the use of the Colorado for domestic purposes as desired by the cities of Southern California. At the same time, the small detention reservoir will be annually depleted in capacity." (2).

"It has been said that flood control can be obtained more quickly by a dam in Mojave Canyon than by one in Boulder Canyon. This is not a reasonable assumption. The investigations of Boulder Canyon have occupied nearly three years, and the same critic says they are not sufficient. No investigations of Mojave Canyon have been made, and after these are completed it would be necessary to take up negotiations with the railroad and hotel companies and hundreds of property owners for the removal of the railroad and city of Needles.

"Such measures afford endless opportunity for delay whether carried out under private negotiation or by condemnation proceedings.

"No such difficulties are found at Boulder Canyon, and it is believed a reservoir of any given capacity can be built there more quickly than anywhere else, if all reasonable precautions are observed. . . .

"The development at Mojave Canyon for flood control only will cost about the same as at Boulder Canyon, and will destroy 34,000 acres of irrigable land, directly in the river bottom, mostly in Arizona. Inasmuch as the available land easily reached is the limit on development, this should not be tolerated if it can be avoided. . ." (3).

"It has been stated here that a flood-control dam can be provided at Mojave Canyon for $10,000,000—that, I believe is in the testimony—whereas the facts are that this amount will be expended upon damages, exclusive of the dam. The removal

(1) Id. page 1382. (2) Id. page 1384. (3) Id. page 1385.

of the double track railroad and its auxiliaries of roundhouse, machine shop, icing plant, eating house, etc., is estimated to cost $8,500,000, and the town submerged and other damages bring this up to $10,000,000, without counting the 40,000 acres of irrigable land. The dam itself and appurtenances bring the cost up to $26,000,000, nearly as much as the same capacity would cost at Boulder Canyon. (1).

"The construction of a reservior of small capacity at either point would be very unwise, as it would not desilt the river, and there would be no effective means of repaying the cost to the government, while by building a higher dam at Boulder Canyon enough power can be developed to repay its cost and incidentally promote the development of the Southwest.

"And this dam, in proportion to capacity, would be much cheaper than one at Mojave Canyon. . ." (2).

"It is now urged that the Mojave site is the place for the reservoir because it is 100 miles nearer the land to be protected and irrigated, although there is no tributary worth mentioning between.

"They were perfectly willing to ignore 300 miles before" (referring to the Glen Canyon site) "but now 100 miles is very important."

"The Mojave site has no place in the economical and full development of the power and irrigation resources of the river." (3).

"The Mojave would waste so much water by evaporation that it should not be considered for this purpose when another reservoir in Boulder Canyon of the same capacity can be built which would evaporate only about half as much water . . . " (4)

"With all these facts staring us in the face, to build a dam in Mojave Canyon would be inexcusable. This is the reason this site has not been drilled or otherwise investigated. Like hundreds of other sites on the river, a general knowledge of its conditions show so plainly that it is inadvisable that money spent on investigation would be wasted. Its one 'virtue' is that it produces no power, or so little that none of the power companies have applied for it, although anxious to possess all the desirable sites." (5).

NEED OF BOULDER DAM

Storage

While the Colorado River has an average annual run-off of 17,500,000 acre feet (6) a very large portion of the water is discharged in flood, reaching a maximum of more than 200,000 cubic feet per second, at Yuma, and during a period of only a few weeks duration. It has been known to reach a maximum of

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(1) See statement of F. E. Weymouth, March 20, 1924, Hearings before Committee on Irrigation and Reclamation, H. R. 2903, page 746. (2) Id. page 1385. (3) Id. page 1387. (4) Id. page 1391. (5) See statement of F. E. Weymouth, March 20, 1924, Hearings before Committee on Irrigation and Reclamation, H. R. 2903, page 746. (6) Senate document 142, page 4.

BOULDER DAM SITE

300,000 feet at Needles. (1). This flood reaches its peak in June and a minimum flow of the river is usually in December. It is not uncommon for the river to have a discharge as small as 3,000 cubic feet per second, and in years prior to 1924 it has been known to be as low as 2200 feet at Yuma. 1924 has established a new low record and at the time this booklet is being written (September 12, 1924) the discharge at Yuma is only 1,251 feet. Of this amount of water, Mexico under present arrangements takes one-half. It is perfectly apparent that after the losses in 2,000 miles or more of canals are accounted for there is merely water enough for domestic and stock purposes. There is no water left for irrigation of the more than 400,000 acres of land under cultivation on the American side of the international line, and as a result the farmers are taking a great loss. The normal diversion at this time of year into the canals of Imperial Irrigation District below Yuma is four thousand second feet.

Imperial Valley by nature is a barren desert, with no value at all for any purpose, and yet by the practice of irrigation from the waters of the Colorado River the Imperial Valley produces annually more agricultural products in value than any one of several states of the Union. It will be borne in mind that a very large proportion of the crops produced are in competition with no other place in the United States. Imperial Valley is essentially a winter garden—its fruits and vegetables ripen at a time when very little of such products is produced in the United States outside of green houses. To illustrate, this year (1924) Imperial Valley shipped to the markets of the United States and Canada from January to March, more than 9,000 carloads of lettuce. During this season it shipped more than 16,000 carloads of cantaloupes. In addition to these products water melons, peas, spinach, strawberries, dates, and many other fruits and vegetables were supplied to the markets at a time when they could be produced at few other places in the United States in the open. This production running into many millions of dollars in value is wholly dependent upon irrigation from the Colorado River and for a stable supply storage must be provided.

In addition to the lands under the present canal system there are 432,000 acres in Imperial Valley on the American side of the international line (2) susceptible of irrigation from an All American Canal, and for which there is no water until storage is provided.

PROTECTION FROM FLOODS

The Salton Sea is the lowest point in the Colorado River Basin and lies between Imperial and Coachella Valleys. This

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(1) Statement of Arthur P. Davis, April 18, 1924, before Committee on Irrigation and Reclamation, page 1382. (2) Senate document 142, page 11.

point is approximately 250 feet lower than the Gulf of California into which the Colorado River flows. (1). If uninterrupted by artificial barriers the river would turn northward into and completely inundate this entire basin, eventually filling it to above the level of the sea. In 1905 the river actually turned into the Imperial Valley where it flowed for more than a year forming a lake of more than 300 square miles in area. In February 1907 the river was returned to its channel and held by means of protective levees until 1908 when it again left its channel and followed the Bee River to Volcano Lake. (2). In Volcano Lake the river immediately started its process of depositings silt and the protective levees of the Imperial Irrigation District were extended southwesterly to prevent overflow from that point. In 1920 Imperial Irrigation District constructed at a cost of approximately $700,000 what is known as Pescadero Cut, which had the effect of turning the river channel from Bee River southward to the Pescadero River, which is at a lower elevation. There the river again started its work of depositing silt, which will in time fill up this depression and again menace the lands of Imperial and Coachella Valleys. In protecting these valleys, including Mexico, from this ever present menace the Imperial Irrigation District has expended the sum of $2.377.348 and the levee work must be continually carried on until the floods are held back by a large capacity storage dam. **In addition to a dam that will simply control the flood waters it must be of sufficient capacity to act as a desilting reservoir, otherwise the silt deposited by the river in the delta will in a short time build up its bed above the surrounding country and again turn the river into a menace even though the flow be regulated, but if such a dam is constructed at once advantage is taken of the low areas into which the river is now flowing, and with the silting up process checked, the river channel will remain relatively permanent on low ground with no tendency to leave it. With that condition the menace of the river regulated in flow will be removed to a distant date. (3).**

The effect of this flood menace is apparent to everyone. Capital does not seek investments where such a menace exists. Interest rates are high because of the risk, or supposed risk, involved. Federal Farm Land Banks have refused to make loans on Imperial Valley lands until water conditions are made stable. While Imperial Valley lands are highly productive the market values thereof are extremely low. It therefore becomes apparent that flood protection must be had at once, for which reason the government recommended river regulation and flood control as the first use of any dam to be constructed. (4).

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(1) Senate document 142, page 7. (2) Statement of Arthur P. Davis before Committee on Irrigation and Reclamation, April 18, 1924, page 1379. (3) Statement of Arthur P. Davis before Committee on Irrigation and Reclamation, April 18, 1924, page 1380. (4) Senate document 142, page 21.

SILT

The Colorado River water carries a very large amount of silt which is deposited as the velocity is retarded. This silt at Yuma is estimated at 113,000 acre feet per annum. (1). In other words, a sufficient amount of silt to cover 1000 acres of land 113 feet deep each year.

The silt is largely responsible for the flood menace, and in addition it costs Imperial Irrigation District a very large sum of money each year to simply dredge and remove it from its canals. Besides this, it is estimated that it costs the individual farmers $1,000,000 per year in the cleaning and operation of their farm ditches and for the re-levelling made necessary by the constant deposit of silt on the upper ends of their respective lands.

Through the years of dredging the main and lateral canals the sides or banks have been raised to such height that in numerous places it is hazardous to operate the dredges and the silt taken from the canals is actually being moved a second time. Canal rights of way are being widened to make room for the deposit of more silt, and the high ditch banks, in addition to being extremely unsightly, are becoming troublesome in matters of transportation.

In the consideration of any reservoir, therefore, the desilting of water is of great importance from the standpoint of economic operation as well as for removing the flood menace.

The dam at Boulder Canyon as recommended by the government would store the silt for over 300 years if all were caught and held and nearly a century would pass before its water storage function would be seriously impaired. (2).

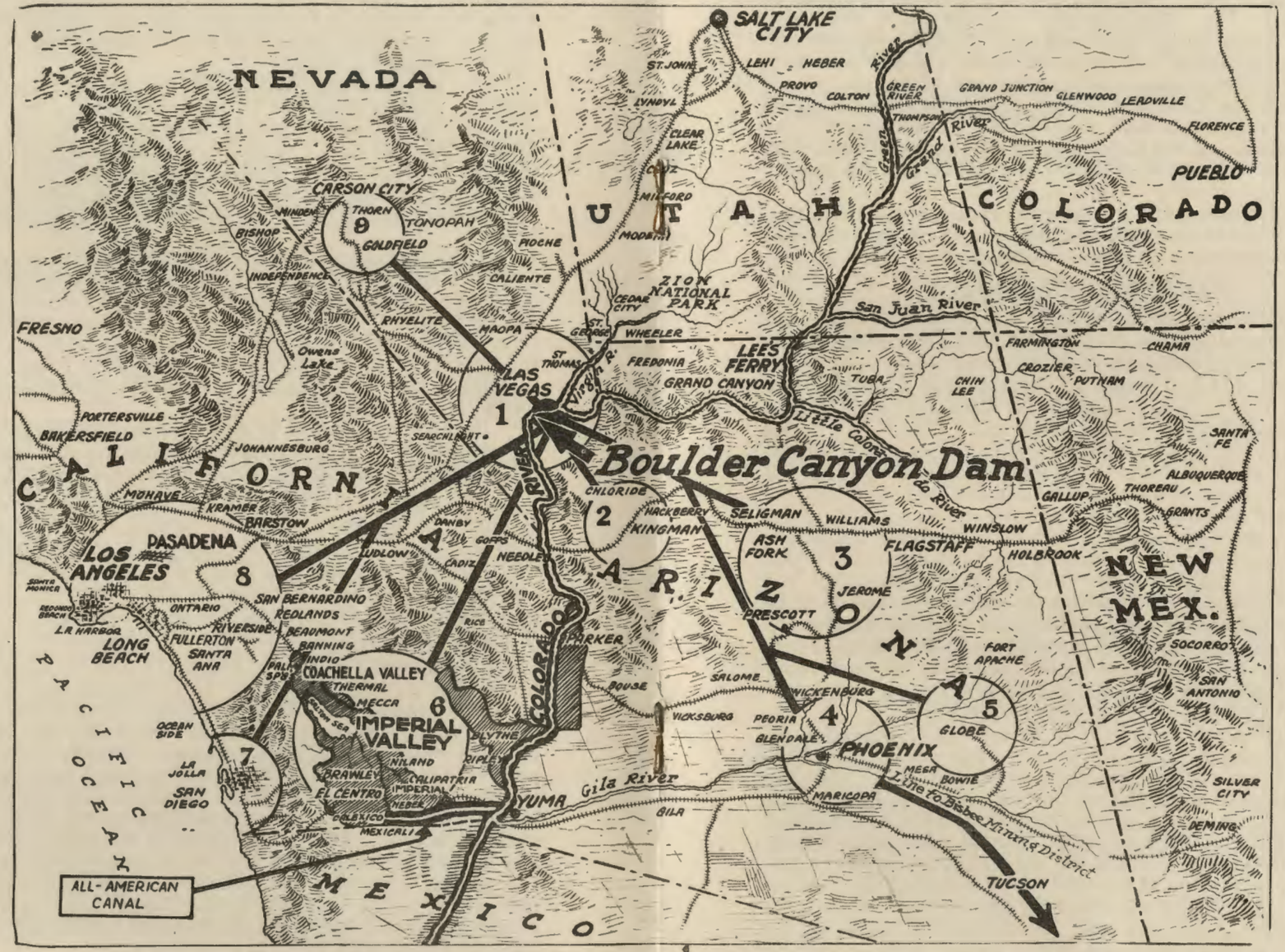
POWER AT BOULDER CANYON

The dam at Boulder Canyon will serve a three fold purpose. First, river regulation and flood control; second, storage of water for irrigation; and third, development of power. (3). The government recommends that the dam be built at Boulder Canyon by government funds "to be reimbursed by the revenues from leasing the power privileges incident thereto." (4). It is possible with a storage reservoir at Boulder Canyon of a capacity of 31,400,000 acre feet to develop 700,000 firm horse power. (5). The present insistent demand for this power and the ever growing market for it, indicates that the power privileges at Boulder Dam can be counted on to repay the entire cost of the dam. (6). "The markets for power are numerous and various in this part of the country, consisting in general of the mining interests in Arizona and Nevada, the pumping requirements in the Colorado River Valley, and the needs of the municipalities of Arizona and Southern California, for municipal and commercial use." (7).

(1) Senate document 142, page 4. (2) Senate document 142, page 20.
(3) Senate document 142, page 21. (4) Senate document 142, page 21.
(5) Senate document 142, page 14 (6) Senate document 142, page 14.
(7) Senate document 142, page 14.

MAP OF SOUTHWEST

Showing the Colorado River with the Boulder Canyon Dam and the All American Canal.
As provided for in Senate Bill 727 and House Bill 2903.



Shaded area indicates lands in Arizona, Nevada and California, that will be made immediately irrigable by water from the Boulder Canyon storage reservoir and the All American Canal, including lands already irrigated.

Circles represent major power consumption centers within reach of Boulder Canyon Dam.

In other words, a dam at Boulder Canyon can be constructed without any ultimate cost to the government.

"There is no other reservoir site in the basin as cheap as Boulder Canyon for large capacity. It will desilt the river, which those in the upper basin will not. It will intercept and regulate a large water supply from lower tributaries which they will not. It will store and render valuable the flood waters of the Little Colorado, Virgin, and other streams which are worthless without storage, and above all, it will correct the great flood menace of the Colorado, which the upper reservoirs will not, and it will produce power enough to pay for itself." (1).

For these reasons, the government recommended the construction at Boulder Canyon, and not elsewhere, and the bill now pending carries out those recommendations.

ALL AMERICAN CANAL

The Government recommended, and the bill provides for the construction of an All American Canal from the Laguna Dam to the Imperial and Coachella Valleys. (2).

There are 419,900 acres of land in the Imperial and Coachella Valleys outside of Imperial Irrigation District, which can be irrigated through an All American Canal. (3). This excludes 12,100 acres now under irrigation in Coachella Valley. All of this land is entirely worthless without irrigation. It being a barren desert is a liability which can be converted into a valuable asset for the American people.

The bill does not require the Imperial Irrigation District, or any other area of land to assume the obligation of the All American Canal. It provides "that no expenditures for the construction of canals or appurtenant structures authorized hereunder shall be made until the lands to be irrigated thereby shall have first been legally obligated to pay their proper proportions as may be determined by the Secretary of the Interior of the total cost thereof to the United States. . . . " pursuant to the terms of the Reclamation Act of 1902.

The 12,000 acres in Coachella Valley under irrigation receives its water from wells. During the early years of development in Coachella Valley the wells were artesian. As the acreage developed most of them ceased to flow, and pumps were installed. In recent years the water table has lowered in many instances to such an extent that it was necessary for pumps to be lowered in order to lift the water, and today irrigation is being practiced at great expense by pumping and further extension of the cultivated areas is almost impossible. To Coachella Valley, therefore, the All American Canal is imperative.

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(1) Statement of Arthur P. Davis, April 18, 1924, before Committee on Irrigation and Reclamation, page 1395. (2) Senate document 142, page 21. (3) Senate document 142, page 11.

The new lands in Imperial Valley when water is applied, will be highly valuable. (1). It, therefore, seems that even if the Imperial Irrigation District does not care to share in the benefits and burdens of an All American Canal the new lands, including Coachella Valley, can well afford to build it.

The Congress or the people of Imperial Valley ought not to deny them that opportunity.

SOLDIERS' PREFERENCE RIGHTS

The Act provides that all lands practicable of irrigation and reclamation by the irrigation works authorized shall be withdrawn from entry, and when the works are sufficiently constructed to permit the delivery of water the same shall be open to entry in tracts not exceeding 160 acres, with preferential right to persons who have served in the United States Army, Navy and Marine Corps. **There are 166,900 acres (2) known to be irrigable from the All American Canal which will be subject to such entry, or 4172 farms of 40 acres each.**

To this may be added many thousand acres of land that are classed as doubtful. When location, fertility, climatic conditions, and water supply are considered, it is doubtful if there is another area in the United States that offers such opportunities.

In Mexico at the present time there are 200,000 acres of land under irrigation from the Colorado River, with 600 000 additional susceptible of irrigation (3), and estimates have been made as high as 2,000,000 acres that would eventually be irrigated in Mexico from the Colorado River. (4). In any event, it is known that there is a very large area of land in Mexico not yet under cultivation which can successfully be irrigated from this river.

Below Needles, including Mexico, there are more lands that can eventually be irrigated than there will be water to serve. (5). This statement was made by Col. Kelly, who is the Chief Engineer of the Federal Power Commission, and at the same time he stated: "although it is impossible to predict the rate at which either irrigation or power will develop, it is certain that there are more than enough irrigable lands to use all the water available and that all the power that can be developed in the main section of the river will be needed."

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(1) Senate document 142, page 93. (2) Senate document 142, page 13. (3) Senate document 142, page 32. (4) Statement of George H. Maxwell before the Committee on Irrigation and Reclamation, April 23, 1924, page 1523. (5) Paper of Col. William Kelly read before the American Society of Civil Engineers at Pasadena, California, June 19, 1924, reported in proceedings of American Society of Civil Engineers, Aug. 1924, page 796; Statement of A. P. Davis, before Committee on Irrigation and Reclamation, April 19, 1924, page 1438.

Then it simply becomes a question as to which land will remain dry.

The question as to the rights of Mexico to the waters of an international stream was presented to the United States Attorney General on a demand from Mexico growing out of the diversion and use of the waters of the Rio Grande in the United States to the injury of inhabitants of Mexico who had used the water for a great many years. They claimed that the water of this international stream could not be diverted in the United States where it had the effect to deprive Mexico of its use. The Attorney General deals at length with the subject and concludes with the following statement:

"The case presented is a novel one. Whether the circumstances make it possible or proper to take any action from consideration of comity is a question which does not pertain to this department; but that question should be decided as one of policy only, because, in my opinion, the rules, principles and precedents of international law impose no liability or obligation upon the United States." (1).

Land, however, is constantly being developed in Mexico and water applied which at least establishes a color of right which will no doubt be insisted upon and will doubtless to a certain extent be recognized. If Col. Kelly is correct in his conclusion then when these hundreds of thousands of acres are irrigated in Mexico, and which do not require an All American Canal for that purpose, then like hundreds of thousands of acres in the United States will remain a desert.

IMPERIAL IRRIGATION DISTRICT WILL NEED THE ALL AMERICAN CANAL

The Imperial Irrigation District at the present time receives all of its water for irrigation and domestic use by sufferance of a foreign country. There are no treaties between the United States and Mexico effecting the use of these waters for irrigation or domestic purposes. (2). Therefore, when the water which is diverted in California crosses the International line into Mexico all jurisdiction thereof is completely lost. To make possible the irrigation of Imperial Valley a Mexican corporation was formed which, in 1904, obtained a concession from Mexico, giving it the right to receive the water at the International line and reconvey the same back into the United States, provided that "enough shall be used to irrigate the lands susceptible of irrigation in Lower California with the water carried through the canal or canals without in any case the amount of water used exceeding one-half of the volume of water passing through said canals." (3).

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(1) Opinion of United States Attorney General Judson Harmon, 21 Opinions of Atorneys General, page 274. (2) Opinion of Judson Harmon, United States Attorney General, 21 Opinions of Attorneys General, page 274. (3) Original concession on file in office of Imperial Irrigation District, El Centro, California.

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BOULDER DAM AND RESERVOIR SITE

Aerial Photo of the Site of the Boulder Dam. This Photo was made from an Army Air Service Plane from Rockwell Field, San Diego, Calif.

While this instrument is commonly referred to as a concession, and which it may properly be, in effect, it is nothing more than a contract, for a violation of which the Mexican Corporation, the stock of which is held by the directors of the Imperial Irrigation District, would have a claim against the Mexican government for damages. The corporation is chartered under the Mexican laws and is prohibited from complaining to the government of the United States against any treatment or wrong done it by the Mexican government. In other words, here is a community of 55,000 people and property values of $100,000,000 wholly dependent upon the good faith of Mexico for its existence.

The construction of the heading or intake and the annual construction of the weir for the diversion of water in the United States is for the benefit of Mexico as well as Imperial Valley. Yet the cost has fallen wholly upon the American farmers. The Imperial Irrigation District has expended $2,377,348.00 in the construction and maintenance of a protective levy system 76 miles in length with more than fifty miles of standard gauge railroad. In addition to this sum the original company and other agencies expended several million dollars. This is for the benefit of Mexican land as well as our own, and yet the Imperial Irrigation District has paid more than $200,000 in Mexican duties, brokerage and counsel fees in the construction and maintenance of its works in Mexico. In addition to that the Mexican corporation, controlled by the Imperial Irrigation District has been required to and has paid taxes and fines to the Mexican government to the amount of more than $30,000. The only part of this expense borne by Mexican land has been fifty cents per acre foot for water service up to and including 1916, and eighty-five cents per acre foot since that time.

In a letter from Mr. Cronholm, Chief Engineer of the District to the Secretary of Agriculture at Mexico City, dated December 28, 1920, and covering the period from August 1, 1920, to December 31, 1921, the expense of flood protection in Mexico and for operation and up-keep of diversion works and irrigation structures and facilities of the Mexican corporation is placed at $3,646,888.96. Based on water sales in Mexico, the Mexican lands paid $677,390.93, less than their just proportion. (1).

A petition by Mr. C. N. Perry, Chief Engineer of the District to the Secretary of Agriculture and Fomento, dated June 12, 1919, states that from February 21, 1916, the Mexican corporation had spent more than $1,000,000 in protective work along the Colorado River and before this the original company had spent more than $1,800,000; that the duties of importation paid until January 1, 1918, amounted to more than $50,000 and that the amount from January 1, 1918, to the date of the peti-

(1) Copy of original letter on file in office of Imperial Irrigation District, El Centro, California.

tion was close to $15,000; that the Mexican corporation had been charging eighty cents national gold for each 1,000 cubic meter of water delivered when the actual cost to the Mexican corporation during the year of 1918 was more than $1.75 national gold. (1).

On January 20, 1921, Mr. F. N. Cronholm, General Manager, submitted to the Board of Directors of the District the following statement:

STATEMENT SHOWING COMPARISON OF COSTS AND REVENUES FROM OUR OPERATIONS IN MEXICO DURING PERIOD MAY 1, 1916, TO DECEMBER 31, 1920.

COSTS, HANLON HEADING AND VALLEY DIVISION IN MEXICO

(Amounts shown are to nearest dollar)

	1916 (May to December)	1917 (entire calendar year)	1918 (entire calendar year)	1919 (entire calendar year)	1920 (entire calendar year)	Grand Total
Operating expenses	$389,779	$730,284	$786,652	$943,592	$861,190	$3,711,497
Protective work	219,281	170,655	395,488	545,958	633,020	1,964,402
Additions and betterments	272,080	517,544	522,213	611,714	333,140	2,556,691
Equipment purchased	3,995	186,882	362,571	65,349	287,024	925,821
Interest and discount on district bond	139,563	356,264	523,527	349,316	336,638	1,705,308
Miscellaneous interest, etc.	8,430	26,029	19,648	20,874	60,449	135,930
Total	1,033,128	1,987,658	2,930,099	2,536,803	2,511,461	10,999,649
Perc'tage chargeable to Mexican lands, based upon water sales each year	18.08	20.80	27.23	29.17	31.95	26.78
Amount chargeable to Mexican lands at above percentages	$186,880	$413,432	$797,865	$739,985	$802,412	$2,940,574
Amounts realized by water sales in Mexico	83,612	152,160	274,159	340,711	499,248	1,349,890
Deficit	$103,268	$261,272	$523,706	$399,274	$303,164	$1,590,684

(2)

On the same basis in the year 1921 the Mexican lands were short of their just proportion, the sum of $255,493.00 and for the year 1922 of $340,723.

No amount is allowed in the foregoing statements for depreciation, which would add materially to the totals. The year 1923 is not shown for the reason that no similar compilation can be made with any reasonable degree of accuracy, since the District has been distributing water.

These state ments are based on percentage of water delivered, which is eminently fair to Mexico and perhaps unfair to the United States. The concession which the district is operating under grants to Mexico one-half of the water carried through the canals. The District, therefore, is obliged to main-

(1) Copy of original petition on file in office of Imperial Irrigation District, El Centro, California. (2) Letter and statement on file in office of Imperial Irrigation District, El Centro, California.

tain its diversions and canals so as to at all times be in position to make that delivery and it would not be unfair to charge Mexico with half the cost instead of 26.78 per cent as given in Mr. Cronholm's statement. In other words, on that basis Mexico would have a deficit over the five year period considered, by Mr. Cronholm of $3,909,140.50 instead of $1,590,684, as given in the statement. At times the Mexican lands actually take one half of the water.

Whatever may be argued as to revenue derived from the sale of water in Mexico it must be recognized that Mexico never has paid its just proportion of the cost.

CONTRACT OF 1918 CHANGING DIVERSION TO LAGUNA DAM

The present diversion system is not satisfactory, and during the low flow of the river each year diversion is accomplished only by means of a temporary weir below the intake.

The Colorado River, being a navigable stream, is under the jurisdiction of the War Department, and before this weir can be constructed the District must annually obtain from the Secretary of War permission for its construction. In 1916 an action was commenced in the Superior Court of the State of Arizona, in and for the County of Yuma, to enjoin the construction of the weir and a temporary injunction was obtained which is still in effect. (1). The weir was necessary in order to prevent destruction in Imperial Valley, and in order to operate under the injunction a contract was made with the Yuma County Water User's Association, which contract has been renewed from year to year and under which the district is operating today. By the terms of this contract the district assumes full responsibility and agrees to protect the people of the Yuma Valley against damages occasioned by the construction and maintenance of the weir and to secure these damages annually causes a surety company bond to be executed in the sum of $500,000. (2).

It was, therefore, obvious and is still obvious that the District must sooner or later abandon its present headings and diversion works. To that end, on October 23, 1918, a contract was entered into between Imperial Irrigation District and the United States, and ratified by a vote of the people of Imperial Irrigation District, at an election held for that purpose, resulting in a vote of 2535 for the contract and 922 against it. (3). By the terms of this contract the District agreed to immediately obtain data for the purpose and upon the approval of which to begin and carry to completion with due diligence the construc-

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(1) Records of the Superior Court, Yuma County. (2) Original contract on file in office of Imperial Irrigation District, El Centro, California. (3) Original contract on file in the office of Imperial Irrigation District, El Centro, California.

tion of an All American Canal connecting its irrigation system with Laguna Dam, and for the rights at Laguna Dam the District agreed to pay to the United States the sum of $1,600,000 of which sum $192,000 have been paid. The terms of the contract have been complied with to date and it is now in full force and effect.

FEASIBILITY OF ALL AMERICAN CANAL

No report of any reputable engineer who has made a study of the All American Canal has been called to the attention of the Imperial Irrigation District in which the All American Canal was pronounced infeasible. The engineers of the United States Reclamation Service, including Mr. Porter J. Preston, and former Director Mr. Arthur P. Davis, have pronounced it feasible; also F. E. Weymouth, Chief Engineer of the Reclamation Service, has said it is feasible. (1). The All American Canal Board, under the Contract of February 16, 1918, and consisting of Mr. W. W. Schlecht, Dr. Elwood Mead, and Mr. C. E. Grunsky, all engineers of very wide experience and unquestioned reputation, pronounced it feasible, and recommended the construction. (2). Secretary Fall, after a thorough investigation by competent engineers pursuant to the "Kinkaid Act" pronounced it feasible and recommended the construction. (3). The Secretary in his letter of transmittal said: "The findings and recommendations (page 21) included in the report have my hearty concurrence and approval. I earnestly hope that the report will be favorably received and acted upon by Congress."

THE SAND HILLS

Much has been said regarding the problem of constructing the canal through the sand hills lying between the river and Imperial Valley. This subject has been fully investigated and is covered by the report of the All American Canal Board on pages 32-33.

Several solutions of the problem are available for controlling the possible drift of sand. The heavy material from the Mesa can be spread over the spoil banks to cover a strip as wide as construction methods will permit; temporary barriers will be erected during period of construction; when canal is in operation a strip of land adjacent thereto may be irrigated by pumps and vegetation grown thereon; suction dredges may be installed to remove the sand as it finds its way into the canal. (5). A tube under the sand hills has been suggested. (6). This would entirely eliminate the menace, but is expensive and does not seem necessary. A cement lined canal of relatively high

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(1) Statement before Committee, March 20, 1924, page 733. (2) Report of All American Canal Board, page 63. (3) Senate document 142, page 21; also letter of transmittal. (5) Report of All American Canal Board, pages 32 and 80. (6) Report of P. M. Nunn to Imperial Irrigation District, July 16, 1913.

velocity (1) will carry the sand that finds its way into the canal to a point where the same can be removed either by sluicing or by dredges.

A study of the sand movement indicates that the sand does not move as much as it is popularly supposed.

Touching this point the All American Canal Board said: "While the blow sand is a menace and will need constant attention to prevent its encroachment upon the canal, our observations, while not extending over a sufficient time to lead to final conclusions, have, however, led us to the opinion that it is not an obstacle to the successful and economical operation of a large canal." (2).

COST OF ALL AMERICAN CANAL

The total cost of the All American Canal to cover all lands susceptible of irrigation in Imperial and Coachella Valleys, including the connection with the Laguna Dam and the enlargement for the Yuma Project, is estimated at $29,793,000, or a cost per acre of $36.55. (3).

The actual cost is not expected to exceed these figures. The estimates were made in 1918 at a time when labor and material costs were exceedingly high and the estimates are made by thoroughly competent engineers.

The unit cost for earth excavation from Laguna Dam to Pilot Knob is estimated at 20c per cubic yard; Pilot Knob through sand hills at 30c per cubic yard; for the Mesa in cuts less than thirty-five feet at 20c per cubic yard. (4). These three items constitute a very large part of the entire cost, aggregating $16,720,220 to which is added 15 per cent for contingencies, or a total of $18,228,253. (5). It is proposed to make this excavation with drag line dredges. (6).

In 1923 the Imperial Irrigation District, under the direction of Mr. Ray S. Carberry, Chief Engineer, in the construction of drainage canals with drag line dredges excavated 2,356,695 yards of earth at a cost of .097 cents per cubic yard. (7).

POWER

Power will be developed on the All American Canal at Syphon Drop at Pilot Knob, and west of the Sand Hills. Imperial Valley has no interest in the power developed at Syphon Drop. If the first unit of the All American Canal only is constructed from Laguna Dam to Pilot Knob there can be developed at Pilot

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(1) Report of All American Canal Board, page 46. (2) Report of All American Canal Board, page 80. (3) Senate document 142, page 12. (4) Report of All American Canal Board, page 84. (5) Report of All American Canal Board, page 86, et. sec. (6) Report of All American Canal Board, page 37. (7) Annual Report of Chief Engineer 1923, page 30.

Knob 13,500 horse power (1), of which the Yuma Project will receive 8,500 horse power. (2). West of the Sand Hills on the All American Canal there will be two drops where power will be developed. (3). The first drop is twenty-four feet, the second drop is 47 feet, and the total amount of energy that can be generated at these two stations is estimated at 53,200 water horse power or 32,000 delivery horse power. (4).

Another drop of six feet is found in the canal before reaching power station No. 1, which may be combined with that drop making a drop of thirty feet and thereby adding to the power at that station. (5)

Other estimates which show a very much larger amount of power possibilities have been made, but the reports thereon are not available.

COST OF POWER

The total cost of power at the two stations above mentioned is estimated at $3,307,000. (6).

The total cost of power installation to Imperial Irrigation District will be $3.98 per acre. (7).

POWER IN SALT RIVER VALLEY

In connection with their irrigation system from the Roosevelt Dam the Salt River Valley Water Users Association installed a power system generating 24,000 horse power hydro-electric energy at a cost of approximately $3,500,000. During this year they will receive approximately $650,000 gross revenue, exclusive of 12,000 000 KWH used for pumping irrigation and drainage water. They have just completed the installation of a new 10,000 H.P. unit under the Mormon Flat development. From these two stations they expect to receive next year more than $900,000 gross revenue, exclusive of the amount used for pumping.

They have just voted and sold bonds for a new development to cost $4,400,000 which will add approximately $1,000,000 per year to their income. In other words, they will have a total of about 74,000 H.P. with a revenue of nearly $2,000,000 per year. Their operation and maintenance cost at this time is approximately $170,000 per year and they estimate that with

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(1) Report of All American Canal Board, page 97. (2) Contract of October 23, 1918. (3) Report of All American Canal Board, page 47. (4) Senate document 142, page 86. (5) Report of All American Canal Board, page 97. (6) Senate document 142, page 86. (7) Senate document 142, page 13.

the whole project completed their cost will be less than $200,000 per year. (1).

POWER OF TURLOCK IRRIGATION DISTRICT

The Turlock Irrigation District less than two years ago installed a plant at its Don Pedro Dam, with a total capacity of 15,000 KW or about 20,000 H. P. of which Turlock receives two-thirds. This power is carried over a transmission line thirty-three miles in length to a sub-station from which the District operates approximately 200 miles of distribution lines to 3000 active consumers. The rate charged is exceedingly low, being an average of .0159 cents per KWH and even though the system has been in operation less than two years, it will show a substantial profit for 1924, after deducting for all maintenance and cost of operation, bond interest, sinking fund, and depreciation. (2).

THE ALL AMERICAN CANAL AN INTREGAL PART OF THE LEGISLATION

The All American Canal and storage in the River must go hand in hand. With so large an area of valuable land in the United States susceptible of irrigation from the All American Canal and without which it must forever remain a desert, and in view of the fact that there is more land than there is water to serve it is hardly to be supposed that the Congress will authorize the expenditure of large sums of money to store the water of this river without at the same time making possible its use on American land. This seems to be the inclination of the Congress as testified to by persons in a position to know. (3). The contrary opinion has not come to the attention of the Irrigation District from anyone in a similar position to know the facts.

CONCLUSION

While the All American Canal, including power instal'ation, will represent a capital investment of something over $30,000,000 it would seem that the benefits to be gained will more than justify the cost, particularly in view of the fact that a large amount of revenue will be produced by the generation and sale of electrical energy in an amount almost if not quite sufficient to defray the annual charges. It therefore follows that both the dam at Boulder Canyon and the All American Canal should be constructed without delay and the full cooperation and support of all persons enlisted to urge upon the Congress the necessity of passing legislation to authorize the same.

IMPERIAL IRRIGATION DISTRICT.

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(1) Letter on file in office of Irrigation District, El Centro, California. (2) Letter on file in office of Irrigation District, El Centro, California. (3) Letters on file at office of Imperial Irrigation District, El Centro, California.