

Preliminary Report

...of..

Special Irrigation Committee

.. on the ..

Rillito Irrigation Project

Tucson, Arizona, March 30, 1909.

Chamber of Commerce Board of Directors,
Tucson, Arizona.

Gentlemen: After an extended and careful consideration of the Rillito Irrigation Project, your Committee respectfully submits the following preliminary report:

We believe the irrigation of the proposed district highly important to the business welfare of Tucson, and that the project is feasible under the co-operative plan as herein set forth. In fact we believe the success of the undertaking depends entirely upon the co-operation of the land owners and the acceptance of the plan of organization by a large majority of them.

ONLY LAND OWNERS TO BENEFIT.

We suggest that the land owners form an Association for the purpose of establishing a central pumping plant with sub-stations for the irrigation of their lands FOR THEIR OWN AND SOLE BENEFIT on a strictly co-operative plan. NOT A SHARE OF PROMOTION STOCK IS TO BE ISSUED to anybody, nor will any person other than an actual land owner in the "Pumping District" be permitted to subscribe for or to purchase corporate stock, nor will any land owner be allowed to hold more than one share of stock for each acre owned. The stock to be appurtenant to the land.

RILLITO VALLEY ADAPTED TO THE PROJECT.

The Santa Cruz River is a strictly desert stream. It drains a very large watershed, yet at no point is its total annual flow very great, and in normal

Q9791
PAM. 49

years it discharges no water through its outlet into the Gila River. It is rather a loosely connected series of tributaries, each of which "runs backward" in the sense that the amount of water diminishes downstream. Under such conditions it happens that the best water supplies are likely to be found on the tributaries, for there the surface flows are larger and more frequent, and the ground-water resources are more ample. This is especially true of the Rillito Valley, in which the proposed Rillito Irrigation Project is located. The value of this district is greatly increased by reason of its proximity to Tucson, assuring ready markets, and affording social, educational and other advantages.

AREA OF PROPOSED DISTRICT.

The proposed district extends from Fort Lowell to the junction of the Rillito with the Santa Cruz. It embraces an area twelve miles in length and from one to two and a half miles in width. It contains twelve thousand acres of irrigable land, of which it is proposed to irrigate eight thousand acres, principally with pumped water.

OTHER SECTIONS IRRIGATED SUCCESSFULLY IN SAME MANNER.

Large pumping projects for irrigation are by no means untried. They are being successfully accomplished in Kansas, North Dakota, Washington, California and elsewhere. The first cost is no greater than on large reservoir storage projects, and the assurance of water when needed is at least equally as good. During a series of drouth years a reservoir may be drained dry. Meanwhile pumping plants continue to yield water for the land, and, though at increased cost, crops can be carried through such years and harvested. The cost of operation is greater in the case of pumping projects, but local conditions may be so favorable that the cost is easily borne.

CO-OPERATION ESSENTIAL TO SUCCESS.

As civilization advances it becomes more imperative that men shall work together in harmony as a unit rather than as individuals. In union there is economy as well as strength. Farmers as well as other classes realize and profit by this principle. Excellent illustrations are afforded by canal companies in irrigated districts and by the Orange Growers' and other associations for marketing crops.

ECONOMY IN LARGE PLANTS. Local irrigation conditions are such as to offer a magnificent opportunity for deriving the benefits of co-operation. Power and pumping plants are increasingly economical as they increase in size, and the reasons are very plain. Large plants use the cheapest fuel—crude oil. Large engines and pumps are far more efficient than small units, that is, they

save more of the fuel energy, and waste less. For instance, an ordinary small pump often wastes two-thirds of the power supplied to it by the belt; a large pump will lose less than one-third. A small engine uses three times as much steam per horsepower as a large modern engine. The result is SIX times as much fuel burned in the small plant as in the large plant to get the same amount of water. Then, too, the cost of attendance per unit of output is much smaller in large plants. Again large plants have experienced mechanics in charge, and the machinery is well cared for and does not depreciate rapidly; in small plants the reverse condition is usually true.

Co-operative pumping in the Rillito Valley will provide irrigating water at one-third the cost with individual pumping plants. Let the farmers delegate the power and pumping business to a corps of men especially fitted for it, and the water will be delivered to each farmer at his headgate with all the convenience of more favored communities blessed with living streams.

WATER SUPPLY SUFFICIENT.

The Rillito is favored in that it includes the largest drainage streams from the Catalina and Rincon mountains. Both of these ranges reach altitudes of about nine thousand feet. Rainfall and snowfall increase very rapidly with altitude. Rainfall records obtained by the Desert Botanical Laboratory and by the forest rangers prove that the summer rainfall is three times as great on the high mountains as at Tucson. Other records indicate that the total average rainfall for the year is about four times as great on the high mountains as at Tucson. Large volumes of water pour out of the mountain canons during the summer rains and still larger ones during the winter. Many of these floods have been measured and the exact quantity of water ascertained.

Unlike the familiar floods on the mesa these mountain waters are held back and obstructed by forest and brush cover and by rock detritus so that instead of running off in a sudden short-lived flood, the flow extends over many days or even months after the rainfall has ceased. It will be an unfortunate day for this valley when the Catalina and Rincon mountains are denuded of their forest cover.

INVESTIGATIONS OF UNDERFLOW IN RILLITO VALLEY.

The Rillito Valley filling is composed largely of coarse quartz sand from these same mountains. No other mountains in Southern Arizona are composed of rock which breaks up into such porous water-bearing sand as does the coarse-grained granite and gneiss of the Catalina and Rincon mountains. The result is that the Rillito Valley has a wonderful sponge-like power of absorbing the flood waters. Measurements of the flow at Fort Lowell and again at the Oracle road crossing

have shown that from 25% to 100% of the water soaks in, the percentage depending on the size of the flow and the clearness of the water. During January and February of this year the seepage of the mountain water into the Rillito Valley has been at the rate of over 3,500 acre-feet per month. During this time the rainfall at the University has been only a half inch per month, which is much below the normal amount.

A test well was drilled in 1908 at the Oracle road crossing. This is directly in the center of the proposed "Pumping District." The formation was found to be an ideal porous water bearing sand to the full depth of the well, 130 feet. Another well on the Kimball homestead shows water bearing sand to a depth of 210 feet.

From an extended study of the physical conditions and of all available data it can be stated with confidence that the underflow and the groundwater storage in the Rillito Valley are sufficient for the contemplated 8,000-acre project. The investigational work has reached such a stage that the entire project can be fully detailed. The next step should be the drilling of the contemplated wells. At least six of them should be drilled and tested in different parts of the district before any other investment is made, but each well should be of full size and a part of the main project. The wells can be drilled, cased and perforated at a cost of \$900.00 each.

DESCRIPTION OF IRRIGATION PLAN.

The proposed plan for the Rillito project is one of CO-OPERATIVE PUMPING. All the power required for pumping throughout the "Pumping District" will be generated at one central power house. This power house will be situated close to the railroad northwest of the city at a point where the crude fuel oil can be unloaded by gravity into tanks. The power house will be fire proof. The equipment will consist of water-tube boilers with superheaters, and fuel economizers; compound condensing engines; engine-type generators; feed-water heaters and other auxiliaries of demonstrated value.

SUB-STATIONS. The electric power will be transmitted from the central station to a series of sub-station pumping plants situated in the Rillito Valley. At each sub-station there will be deep drilled wells and a centrifugal pump direct-connected to an induction motor. A centrifugal pump and motor constitute the simplest pumping equipment ever devised and can be operated by a six-year-old boy. Both pump and motor will be carefully designed for minimum, maximum and average lift of water so as to give high efficiencies at all times. Each sub-station will be housed in a very small concrete building.

The water will be pumped into canals leading out into the irrigated district. Each canal will also be able to draw flood water from the river,

and during floods the entire district can be thus cheaply irrigated, cutting down the expense for pumping, and conserving the ground water supply. The land owners under each canal may build and operate their canal independently of the central association whose functions would end with the delivery of the water into the canal; or the ownership and administration of the canals may rest in the central association.

COST.

The first cost of the central station completely equipped, the electrical transmission line, telephone line, and sub-stations will not exceed \$180,000.00, making a unit charge of \$22.50 per acre. This does not provide for the distributing canals which may be estimated at \$2.00 per acre additional.

Since not all land owners can prepare their land so as to take water at the outset, it is probable that only one of the two engine-units at the central station need be purchased at first. Similarly not all of the sub-stations need be installed the first year. The initial investment will be about \$125,000.00.

The annual cost for operation including taxes will be about \$5.50 per acre when the district is thoroughly organized. Assuming that the plant is built on borrowed capital at 6% interest and that it is to be paid for in sixteen equal annual payments, then \$2.25 additional will be required per acre for such installments.

The cost compares not unfavorably with the cost in other localities. Where co-operative pumping is practiced such cost is usually from \$5.00 to \$12.00 per acre per year, depending on the lift, the cost of fuel, and the amount of water required per acre. Ranchers under the Salt River Project are expecting to pay \$30.00 per acre to cover the first cost, and the Yuma Project will cost \$40.00 per acre.

CORPORATION TO RAISE FUNDS.

Corporation or association stock will be issued to land owners in the proposed district who convey to the corporation a part, not to exceed one-half of their respective holdings. With such corporate assets it is believed that sufficient funds can be raised to carry out and finance the entire project, first for the proposed test wells and subsequently for the final installation of the complete plant.

MEANS MUCH FOR TUCSON.

A peculiarly favorable condition exists in the already developed and waiting market. Tucson and nearby mining cities, and camps are paying abnormally high prices due to our isolation from agricultural areas. Hundreds of thousands of dollars are sent away annually for agricultural

products. That money should be kept at home. An era of great growth and progress will inevitably follow the creation of an agricultural district in the Rillito Valley.

Your committee suggests that this preliminary report be printed and distributed among the land owners who are to be benefited by the project. We also ask for further instructions in the premises.

Respectfully submitted,

LEO GOLDSCHMIDT,
Chairman.

C. H. BAYLESS.
F. RONSTADT.
F. O. BENEDICT.
W. H. SAWTELLE.
G. E. P. SMITH.

Tucson, Arizona, April 1, 1909.

The Chamber of Commerce Board of Directors at a special meeting called this day accepts and approves the above preliminary report of the Special Irrigation Committee, and heartily endorses the irrigation project and the plan of organization as set forth in said report.

The committee is continued with authority to proceed in the matter as it deems advisable.

BOARD OF DIRECTORS.

By GEO. F. KITT, President.