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DEPARTMENT OF THE INTERIOR

UNITED STATES INDIAN IRRIGATION SERVICE

~~SUPERINTENDENT OF IRRIGATION~~

SUPERVISING ENGINEER
ALBUQUERQUE, N. M. ~~October 9, 1918.~~

Mr. Malcolm McDowell,
Secretary, Board of Indian Commissioners,
Washington, D. C.

My dear Mr. McDowell:

In our conversation yesterday you desired me to give you some details of the Wepo Wash Project in the Hopi country, and also to give you some statements and general approximate figures regarding the possibility of developing artesian water in the south end of the Hopi Reservation for the purpose of irrigatinn, and the approximate cost of putting down a test well for this purpose.

~~I am pleased~~ to give you the following information on the Wepo Project. As you know, all of the agricultural lands of the Hopi Indians consist of the sandy bottom lands along the three main washes that run between their mesa.

The best single area they have is what is known as the Wepo or Second Mesa Wash. This wash heretofore has had no defined channel for a number of miles and in this flat, watered by the occasional floods, are extensive corn fields.

Several years ago the valley commenced to cut up with narrow deep channels commencing at its junction with the First Mesa Wash, these channels are gradually cutting back through the fields, and some of their best fields have already

RG 75, BIA. Gen. Corres., E. 1387
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been destroyed, and if something is not done soon the rest of this area will be rendered valueless. A study has been made of the situation and a method of controlling the flood waters coming down and preventing further erosion has been worked out. The original suggestions for this work came from Foreman Womack and while some of the details have been modified considerably any credit for the successful working out of the plan is due to him.

After going over the situation with him pretty thoroughly Superintendent of Construction Post was directed to make an independent investigation, and his findings corroborated what we had already decided was necessary, and a copy of a report made by Mr. Post is hereto attached. The plan in brief is to spread out the flood waters coming down this valley and prevent their flowing in any defined channel, and to try and build up by silting the channels that have already been formed. This will be done by first a rock and brush dam in the channel at a point where it is very shallow, throwing the water out onto the floor of the valley where it will first be guided away from the stream channel by means of earthen dikes, and its distribution and control by means of what we may term a porous dam. This system works on a theory that the water when it comes down the stream will carry with it not only boulders and sand but floating debris. As the latter strikes the porous dam it clogs to a certain

degree the wire netting of which this dam is constructed, this of course retarding the water to a certain extent. The water naturally backs up and within a few minutes there is quite a pond behind the dam. As the water continues to carry debris down the stream the blocking becomes more complete and the nonflowing material, as it is being carried down the stream, naturally comes to a stop when it strikes the comparatively still water and sinks to the bottom of the upper end of the pond. This operation shows that the floating debris is checked by the dam itself, while the heavier material has filled practically all of the basin before it comes in contact with the dam, or rather the floating material behind the dam.

These dams will be placed at intervals depending upon the slope of the land, and will be so built that the top of one dam is at the elevation of the bottom of the one above it. The accumulation of the material between these points will form level steps upon which the crops can be grown, and the water of the stream will be spread over such a wide area that it will not run with any depth across this land, hence will not wash or injure growing crops. In addition to these light dams, gates will be placed in the dikes that are constructed to assist in the distribution of the water and the irrigation of lands lying between the dikes and the stream itself.

The original plan ~~submitted to the Chief Engineer~~ was

to reclaim something over a thousand acres of land at an estimated cost of $7700., but the last report submitted (which has been approved) will cover about one-third of the area, it being thought that it might be wise to see this part completed and tested that any errors in construction might be remedied before further work is done. To complete the part covered in this last report ~~Mr. Post~~ estimates $2125., but ~~I have~~ asked that $3000. or so much as may be necessary be authorized owing to constant changing costs of material and increased cost of labor.

~~I have bids on the material but cannot place order until~~ I get the authority, and the only question now is ~~whether~~ the appropriation for miscellaneous Navajo work made by the last Congress can be utilized for work on this reservation, and if not, whether the Office has any other funds that they can use for the purpose. I believe that the work should be done this fall and winter so that the spring floods may be controlled and the land put in shape so that crops may be raised next year.

POSSIBILITY OF DEVELOPING ARTESIAN WATER ON SOUTH PART OF HOPI RESERVATION. As you are familiar with the needs of the Indians and the proposed exploration for artesian water for the purpose of irrigation on this part of the reservation, it is not necessary to go into any details of this part of the subject.

The point you wished me to cover is, in my opinion, the possibility of securing artesian water and then, following that, an estimate of the cost of putting down one test well.

It is possible that at any place south of the Hopi villages artesian water may be found. The geological formation is such that water that falls throughout the Blackmountain country may be carried under impervious strata to the south, and by piercing a hole through this material may rise sufficiently high to make a flowing well. This is the opinion of Prof. Herbert E. Gregory after a careful reconnaissance of the entire country. In his report entitled "The Navajo Country", published as Water Supply Paper 380, on page 182 he gives the geologic formation of this section in which he thinks that artesian water is likely to be struck, and that the well sunk at Keams Canon while it gave negative ~~reports~~ results and demonstrates the unreliability of the Dakota sandstone as a water carrier of prominence in this area, he does not think that it means water may not be found in other parts of this area; for he says on page 175 "because of the variable nature of the Dakota the Keams Canon well does not furnish conclusive evidence that similar wells

at First Mesa, Second Mesa, Oraibi,and intervening points will be unsuccessful."

Of course, the sinking of such a well would be entirely experimental, and if such a well is put down it should not be less than 2000 feet in depth, unless artesian water is secured at a lesser depth. To do this we would have to purchase a drilling rig with a capacity of at least 2000 to 2500 feet. We could put in a portable rig which would be available for work at other points, or we could build a wooden tower and put in an engine and boiler with a bull wheel and walking beam, but such an outfit could not be moved to another point without being entirely rebuilt.

The price of all machinery has increased so greatly that I am unable to give you any accurate figures without first securing them from the makers of these rigs, but from data secured lately I believe a portable rig such as I mention would cost, complete with all tools, cable, etc., not less than $5500. and perhaps $7000. Such a rig would have about a 25 H. P. boiler locomotive type, and engine about the same rated H. P. with approximately 10 x 10 cylinders and equipped with tools for drilling a hole of 12, 10, 8¼, 6½, and 5 inches in diameter, for it would be necessary to begin with a 12 inch hole at the surface and put down that size hole as far as the formation would allow, then of course to the next smaller size, and it is probable that at the depth of 2000 feet we would get down to 5 inch casing.

The outfit complete would weigh about 40,000 lbs.

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All well casing has increased in price at least 100 per cent., and it may be difficult to get it at any price. It is estimated that a well 2000 feet deep would cost not less than $15000.

With a new rig and everything working in the best manner we should be able to do rapid work at a minimum cost, considering the market. We have an old well rig putting down deep wells, and it cost us, owing to difficult drilling and the fact that the rig would not work anywhere nearly as efficient as a new one, $12000. to put down well No. 1013 which is 1050 feet deep. This well is located about forty miles north of Callup.

In the estimated cost of the rig it is probable that the wooden tower rig with the equipment could be put in for $1000. to $1500. less than the portable rig.

I am not sure that I have covered this subject as completely as you desire, but if I have not let me know and I will go into it with greater detail as to the points where I have been rather sketchy.

Very truly
A. J. Robinson
SUPERVISING ENGINEER