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DEPARTMENT OF THE INTERIOR

UNITED STATES INDIAN FIELD SERVICE

FIFTH IRRIGATION DISTRICT
Albuquerque, New Mexico

Aug. 23, 1929

Herbert V. Clotts
Chief Engineer

Dear Sir:

In the development of shallow wells in or near the beds of washes or streams throughout the Navajo Country, we are confronted with the following situation for which we have not worked out a satisfactory solution.

The bottom of these washes, very often, are a fill of very fine sand usually mixed with fine clays and when saturated the material runs like water. A well put down in this material must have the casing with sufficient openings to let the water through, and even the finer holes in a casing of any kind will let the fine sand material through in such quantities that the well is soon filled up, or so nearly so that it is rendered valueless.

In drilled wells we have tried pipe with small perforations, and, as said, this lets the sand through. We have tried the Cook strainer, but have found if we get the slots fine enough to keep out the sand that the clay in the material will fill up the slots until the water is shut off, and we must either take the screen out or get no water, and when we do we get the sand.

We have put down several wells in this formation, making them quite shallow - say 6 to 12 feet, where we could excavate a great hole, in the middle of which a well curb of masonry , with weep holes was built, then around on the outside we put a blanket of screened gravel, carrying up the other material on the outside of this, until we had the well curb inside of a ring of gravel two feet or more in thickness. This we found was successful in allowing the water to come in and the sand was quite effectually kept out.

The slow movement of water through such fine material makes it almost necessary to have a well of some capacity in order that water can accumulate between periods of pumping.

It is thought that in future development we should have an open well of as great a diameter as may be possible with the plan selected, and the construction designed so we can put the rock screen

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on the outside.

Several plans have been suggested and the object of this letter is to receive criticisms on the plans mentioned and to have suggestions for other plan to achieve the desired results.

Plan 1. Secure a supply of interlocking steel piling. Drive this piling in a circle, perhaps 10 ft in diameter, excavate inside, build a masonry wall with some loose joints or a concrete wall with weep holes of the diameter required - say 6 feet - and fill in between the piling and the wall with selected gravel or crushed stone, and then pull the piling for use at another point.

Objections: The lightest interlocking steel piling is the U. S. piling made by the Carnegie people, width 9", weight 16 lbs. per foot. If we used six foot lengths (excavating as deeply as possible before putting in the piling) 44 pieces, such as would be needed, would weigh 4224 lbs. We would then have to carry steam boiler, steam hammer and a rigging to pull the piling, so we would have eight to ten tons of equipment to carry over a country where there is no roads and often down sandy washes. This great equipment seems impracticable.

Plan 2. Get slotted pipe and sink an outer casing - say about six feet in diameter, by placing a weighted platform on the top of a section and excavating inside, sinking it in this manner. When down as deep as required, set another similar slotted casing of less diameter on the inside and fill between the two casings with the selected gravel. In order to get two feet of the gravel, if the outside casing was 6 feet the inside one could only be 2 feet. Possibly if we had the outer one slotted, the gravel screen might be effective if only 12 to 16 inches.

Objections: Securing a circular pipe or casing 6 feet in diameter that would be stiff enough to stand the handling and the pressure during construction without serious deformation would be difficult. If corrugated to get strength there would be a greater difficulty in sinking it because of the skin friction against the corrugations. A two foot inner pipe would scarcely give sufficient storage of water between pumpings to be of much value. The shorter life of metal casing as against masonry or concrete, (The slotted pipe contemplated is similar to that listed by Hardesty Co. in their catalog No. 12 at pages 180 and 181 where they list the casing up to 84 inches in diameter and all gages up to 10 gage).

Note: In the above construction it would probably be necessary to cement the bottom of the well to keep the sands from heaving into

the pipe.

Plan 3. We have an orange peel bucket, about one-third yard. Rig up gasoline hoist with a derrick boom which could be mounted on a truck, use this to excavate the hole, the yardage would not amount to much with such an equipment. Dig as big a hole as necessary, with as flat slopes as needed; build the masonry wall, back fill with gravel or broken stone, using no form outside, but filling with the spoil as the gravel is placed. The backfill to be made with the bucket, same as the excavation.

It is believed that all things considered, this will be the preferable one of the three suggested.

There are undoubtedly other plans which might be worked out. What is desired is a method of construction that will let the water into a well of reasonable diameter, and at the same time keep the sand out. One that needs minimum of equipment to haul from point to point, and something effective that will have a minimum of cost.

Please make any suggestions that might be of assistance. We need to commence construction soon on quite a number of these wells and ask early consideration of the problem if you can.

Very truly,

E. F. Robinson
Supervising Engineer

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