SUPERINTENDENT OF IRRIGATION.

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Tuba, Arizona
May 4th 1908

Mr H. F. Robinson

Supt of Irrigation

Santa Fe, N. M.

Sir.

Concerning the work done here since my report of April 5th I add as follows.

Send here with two sketches showing the general features at Tuba and the storage basins in Reservoir Cañon. The topography was sketched by running on the land lines from the corners marked on plat and by traverse lines where same were necessary

In your letter of March 30th I was directed to investigate the scheme of J. B. Frey, missionary as regarding irrigation of lands in the Moenkopie wash. The correspondence regarding this scheme I return under Separate cover and will speak of this project first.

The land mentioned, see plat, is mainly in secs 2&3 and has been dry farmed for years, but at my last

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visit I could see no evidences of the Indians having started the planting for this season. While water could be put on this land I regard the same as very impracticable for several reasons.

As Mr. Janus states in his report of Jan. 28th to irrigate this land would neccessitate maintaining a dam at the point marked on plat and either flumming across the wash or carrying the water around bluffs below the dam in a pipe anchored to bluff.

The wash is from 12 to 15 ft. deep, and from 100 to 150' wide and a flume with bents in the wash would have to be replaced several times every season. The alternative of a suspended flume like piping the water around the bluffs is most expensive Construction.

The flow of the wash has decreased considerably since my arrival here, Approximate measurements about a month ago showed about 5 sec. ft. in the ditch now covering the lands situated mainly in secs. 31 & 6. (See Plat) Recently not enough water is impounded during the night to draw off, more than 3.5 sec ft. I am informed that about July 1st permanent stream flows in the wash at the village of Moencopie. Any division of the water

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seems entirely out of the question as there has not enough to properly irrigate the land shown on plat in secs. 31. 32. & 6. M. Janus put water on this land about the middle of March when he built the dam and ditches shown. This was the first time in several years these lands were irrigated, but he is delivering all the water he can spare to the Indians who have cleared and planted some of the land immediately below the area shown as now under ditch. This land was once irrigated. Over all the area shown are the remains of borders and ditches though now it is covered by brush and grease wood.

I regard the lands now irrigated as the most valuable as they have several acres in orchards, a good portion in alfalfa and Mr Janus has planted the remainder in corn. When the wash runs dry these lands can be irrigated by the water now stored in Reservoir Canon.

The ands marked Hopi Lands are now being irrigated from the run of Reservoir Canon and the Springs on the North side of the wash

If there was sufficient water it would be possible to irrigate all the lands shown in the wash,

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but it appears the water is doing the maximum amount of service right where it is now being used.

Farther up the wash the land has been farmed to some extent by the Indians and much land could be reclaimed if a storage scheme is possible.

Diversion Dam.

The alterations on the dam in the wash have been completed In this about 300 yards of dirt were moved 210 yards of dry wall laid and about 270 sq. yds of protected by a brush mattress weighted down with stone and covered with gravel, A new head-gate was also built.

I do not expect this to stand any violent summer freshets but believe the heading of the ditch has been protected and floods can not do as much damage to the dam as before the alterations were made, and that in case of a bad flood the dam can be repaired Cheaper and easier than before. It should stand under any moderate rises of the wash.

For a permanent dam I send the enclosed. Suggested design of a timber rock filled weir

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This would store some 4 or 5 Acre Ft. and by making same as wide as the Channel would offer little obstruction to the floods and not confine same. This would make a permanent heading for the ditch

The estimated cost is $5000.00. Foundations hard pan and could be leveled off to bed frame work as shown Some clay for puddle is available about ½ mile from the dam site.

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Since the above was reported I have to amend same as follows.

The storms of the first few days in May increased the flow of the wash considerably. On the night of May 3rd the waters rose over the top of the dam and sluiced out some of the sand fill in front of the brush and rock portion of the dam. The riprap, mattress and rock work saved the whole sand fill from being washed away. Repairs were immediately commenced and by the morning of May 5th water was turned into the ditch again. The rest of the week was taken up in laying more riprap and mattresses for additional protection.

As mentioned above these repairs will probably have to be repeated every time the wash rises and a violent flood would necessitate the complete reconstruction of the dam

It seems that a permanent diversion dam is a necessity. Doing away with the continual repairing of the present dam and making the heading of the ditch secure.

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Reservoir Cañon.

The problem here is to store all the run of the Cañon during months the water is not used or to increase the present storage capacity. I suggest the following plan.-

Raise the middle lake 2ft above its present level but excavate a trench and place headgates so as to lower the lake 4ft below the present level. This would give a storage capacity of about 56 Acre Ft.

To put in a low side fill would involve moving about 2000 yds of dirt, ripraping 400 Sq. yds ~~and~~ excavating a spill way through soft sand stone and trenching for the head gates, Trench would be about 2'0" long and 4' deep.

Estimated Cost.

Dirt Fill	2000 Cu yds.	500.00
Riprap	400 Sq "	800.00
Spill way		200.00
Head gates		300.00
	Total	2000 ⁰⁰

Would use 2" pipe and valve for the head gates.

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Raise the lower dike about 3.5 ft. and put in a new and permanent headgate there placing same 5' below present water level about where the old one is now.

The present capacity (from soundings etc) by lowering the water 5 ft. is about 97 Acre Ft., by raising water 3 ft would increase the capacity 73 Acre Ft or a total of 170 Acre Ft for the lower lake

Capacity of both lakes 226 Acre Ft. about 7 months run of the springs. The Cañon has some drainage into it but this should be sufficient to impound all the water during the season when same is not used for irrigation.

Approximate Quantities & Costs - Work at lower lake -

Earth Fill	6000 cu yds	$1500.00
Riprap	1000 sq. "	2000.00
Spillway		200.00
Headgates		500.00
Total		$4200.00

Test pits (see plat) showed rock near the bluffs at the lower lake and on the east side at the upper lake.

In every pit but one as far as could be

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Nothing was determined, indicated as to quick sand as far as was possible to use a sounding rod.

For this reason do not like to raise the dams a bit more than necessary as below the toe of the present fill there is much seepage and the ground is quite boggy.

Believe it would be safe to raise the water to the top of the present dam using a wide bank and flat slopes. The present fill is fairly solid.

About 100 South of the proposed dam at the middle lake there is a thin bed of whitish clayed material but one end of this dam would here go buried in one of these shifting sand dunes making it very hard work to move enough of this to get a good seal on the ends of the dam.

Any kind of a cut-off or core would be very expensive and would have to be carried up to the proposed water level at least.

The best available material for the fill is light and sandy containing a very small percentage of clay.

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Rock for the riprap is to be had fairly handy as the bluffs are here capped with the blue limestone.

Work should be started after the reservoirs are emptied or some time in July as then there would be less danger of starting a leak when stripping the ground for the proposed fill, or cracking the old fill preparatory to joining same with the new one.

As soon as the Lower Lake is emptied somewhat work could be started on the lowering of the middle lake and placing the headgates there catching the water in the lower reservoir and distributing the water from the latter

Water could be put on land immediately below the lower lake or used for the lands in the west. There is by far more land that could be irrigated than there is water available

The present fill should be widened even if nothing else is done as I regard the same as likely to be washed by waves any time the wind happens to come from the right direction.

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Mocnave and Willow Springs

Visited Mocnave and Willow Springs on May 6, 7, & 8th collected all the information I could while there and send a rough sketch of the situation. While I do not pretend that the sketch gives more than an outline it shows the general features

For about seven miles along the bluffs there are frequent springs and seeps. At all places where there is any flow of water of mentionable size the Indians have leveled off land on the hillsides below the bluffs, thrown up borders, dug out small ditches and were planting and irrigating the land.

If let alone the flow from these springs runs but a little ways below the bluffs before it sinks into the sandy hill sides and is entirely lost. The only way the water can be utilized to any advantage is to store the flow in a reservoir for some time then apply the water suddenly to the ground it is desired to irrigate. This is fully appreciated by the Indians who have built these small reservoirs wherever possible

To save all the water it would be necessary

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to run the water from these springs directly into the reservoirs through pipes or lined open channels and also line the reservoirs. The cost of such work is prohibitive for only the few acres available at each spring.

The largest flow is at Moenave and amounts to 72 gallons per minute. The mormons formerly located at this place farmed about 35 Acres part of which was in orchards and vinyards. The Indians now there have a few acres in corn etc.

Here it might be possible to construct a series of small reservoirs in the channel from the springs About four of these could be built storing about 10 Acre ft of water, or approximately one months run of the spring by moving about 2000 cu yds of dirt. The cost would be about $2000.00 for dams, head gates and spillways

What the duty of the water would be here, I can not tell but should judge possibly 50 Acres could be irrigated by making these improvements

Can not think of any feasible or satisfactory scheme of improving conditions here except as mentioned

West of Willow Springs are some good grazing lands but little water. Two of the springs have

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been piped to watering troughs for stock. These systems are in poor condition now

Mr Janus has requested that blue prints of the sketches and copies of the reports be sent him for his information on the situation here.

While here Mr Janus has shown every possible courtesy and given all the aid he could to facilitate the work and investigations I have been doing and I would like to have his request granted.

I believe the ground has been fairly covered or as well as the time and means on hand permitted

It is my intention to make part of the return trip on horse back by way of Blue Canon in the Moencopie wash and get some idea of the general situation there as this can be done without delaying my return in any way.

Respectfully

Collin Ritter
Asst Engr.

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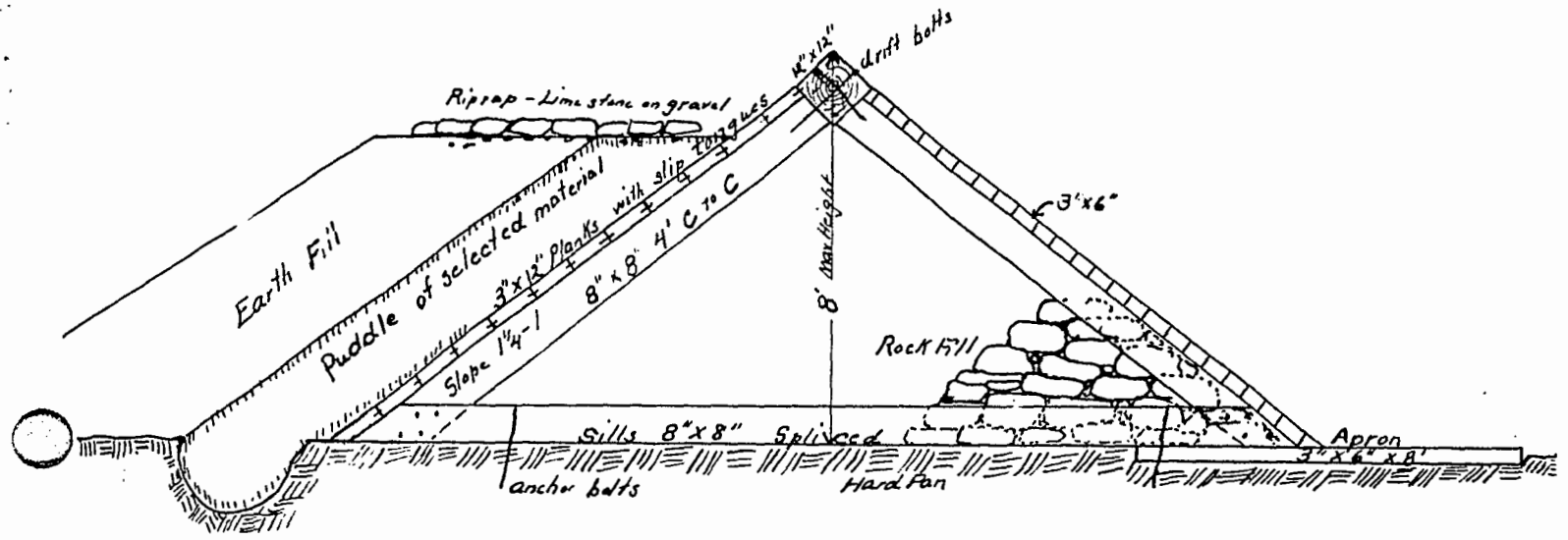
Suggested Type Diversion Dam in Moencopie Wash.



Frame work to be filled flush with the planking with flat lime stone rock hand laid and interstices filled with spalls and gravel.

Estimate:

Excavating and leveling for Frame work		$300.00
Lumber	32 M.	2000.00
Nails, Drift Bolts etc.		250.00
Rock Fill	600 yds.	1800.00
Dirt Fill		50.00
Puddle		100.00
Riprap		200 00
Erecting Frame work		300.00
		$5000.00 Total

Dam 150' long Lumber worth from $55.00 to 70.00 per M delivered at Tuba.

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