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Albuquerque, N. M., January 13, 1912.

Mr. J. J. Granville,
Acting Chief Engineer,
526 Federal Building,
Los Angeles, Cal.

Dear Sir:

As reported to your office in my report for July 1911, the dam in the Moencopi Wash at Tuba was badly damaged by the high water, and it will be necessary to rebuild it before the irrigation season commences in the spring if they are to get water on their fields.

The flood which damaged the structure was unprecidented in height, as it passed over the top of the headgate walls, which are 13 feet above the crest of the dam. The length of the dam was 140 feet, and the normal flow of the stream is not to exceed five second feet.

In the last twenty years there have been built some seven or eight dams across this stream, all of which have gone out.

The difficulty has been in the lack of material of which to construct a dam, within a reasonable distance, and the heavy costs of bringing in material from the railroad - a distance of 90 miles.

Lumber costs in Tuba from $55 to $60 per M according to its weight. Cement costs about $9. per bbl delivered. All sand and gravel has to be washed and costs over $3 per yard, and is very poor at that. The stone of the country is principally sand rock which disintegrates when in water, and a very little hard stone which is found in layers capping the mesas from 4" to 6" thick.

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A dam was built in 1907 - went out and was rebuilt in 1908; both of them really temporary structures of rock and brush. In Feb. 1909 I reported on the conditions, with plans for work (see report), and was directed to build the can canal extension and the loose rock dam with the brush and the wire netting as a binder.

This was done, being completed in May 1910. Good concrete headgates were also constructed.

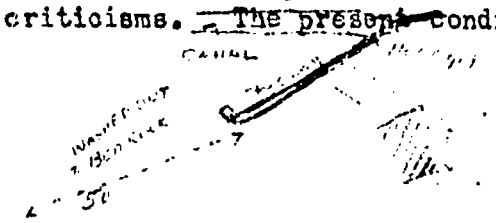
The floods of that year did considerable damage, as per my letter of February 6, 1911 (which see), The rock used was of such small sizes that it would not withstand much current, and the bags of wire netting were torn open by the branches of large trees and logs which the flood carried down catching and being driven on by the heavy current.

To prevent this, it was suggested that a deck of concrete be built over the loose rock, the slabs to be about 10 feet square.

This was done, and the waterway widende, the crest of the dam being 140 feet long. The tremendious flood of last July, however, carried out about 30 feet of the center of the dam, clean to bed rock, took out the toe wall across the entire length of the dam and carried away much of the loose rock.

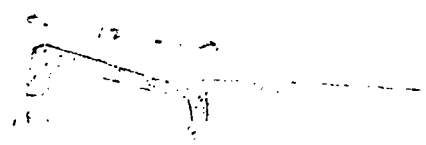
When Mr. Kinney, Assistant Engineer, was in that section of the country last fall I had him examine the conditions and report on the same. He reports as Follows:

"In pursuance with your instructions I yesterday examined the Moencopi diversion dam. It is much easier for one to pick flaws after a failure and to say what should have been done, and I hope I will not be construed, by any one, as personal in my criticisms. The present condition of the dam can best be shown by a sketch.



I believe that the principal cause of failure is the shape. The angle up stream seems to have concentrated the flow, and thus the center was first to go out. (I do not concur in this! H. F. R.). All the wash is from the lower side and not being firmly anchored the loose rock filling was carried out as shown in the figure. The concrete seems very weak also. This is due to two causes. One, lack of bond between the cement and the smoothe black pebbles and the second is the disintegration of the sandstone rock in the concrete. I am told that the best gravel in the vicinity was used and washed before being placed in the mixture so it will probably be necessary to crush rock before a satisfactory concrete can be obtained.

For repairs the only thing I can see is to put in a new structure entire. The waterway will need to be widened at least 50 feet in order to let the water pass easily. To do this will necessitate the removing of the hand placed dyke on the south bank. Then the section should be changed. My idea is something like the following sketch.



Above all things anchor the lower side firmly to the bed rock.

To summarize then, the dam should be replaced in a straight line, extended fifty feet in length, the section to be of such shape that the water will have no direct fall on the bedrock below, and the lower edge of the dam anchored at least two feet into the bed rock to prevent undermining."

I am willing to confess that I cannot decide on just what is best to do in the premises. Good concrete can be made, as witness the headgate which I put in myself, but the cost is something of an item with the high rate of freighting in.

I would request that you suggest what is best to do, or at some date a little later send someone in to look over the ground and make suggestions or decide.

If Walter Hill or one of the consulting engineers would be available, would suggest one of them.

It is 90 miles from Flagstaff to Tuba and it is necessary to camp on the road - so it will be a pretty hard trip during the cold weather, but if delayed too long it will make the repairs too late for the next irrigation season.

Very truly,

P.S. Funds are available for this work

Superintendent of Irrigation.

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