

I would not recommend that water under full pressure be let into the down-stream part of the tunnel below the cut-off wall, even if steel lining is provided. I propose, on the contrary, that the original way of operating the tunnel be maintained, and that the steel lining be postponed till it proves definitely unavoidable on account of the wearing of the concrete. In view of the experience already gained by the operation of the tunnel, this proposal does not seem to involve any risk for the public safety, and it is very unlikely that the steel lining will ever have to be put in.

The concrete lining in the tunnel has hitherto withstood the high velocities, and there is no reason why it could not, if properly mended and strengthened, endure similar conditions for shorter periods in the future, should need arise for the use of the tunnel.

It is apparent that the concrete lining in the tunnel needs repair in places. After the concrete has been repaired in places where required, the whole tunnel should be gunited. This should be done with the utmost care, by trying out a suitable mix for the gunite, and by using the very best workmanship in its application. The cover should be about  $1\frac{1}{2}$  in. thick, reinforced by a wire netting, and anchored to the concrete lining by means of special anchor-bars.

Not only the tunnel, but also all its operating arrangements, should at all times be reliable. It is therefore desirable that the control gates, including groove linings, are readily accessible for inspection and repair. Due to constructional features and to the necessity of releasing water continuously to the Horahora Power-station, and also due to the character of the rock in front of the gates, it would now probably result in very considerable costs and difficulties to arrange stop-logs in front of the gates. I therefore propose that other measures for inspection and reserve purposes be taken into serious consideration—for instance, an additional gate, or a pair of gates, as near as possible down-stream of the present gates.

#### COSTS.

It would be noticed throughout the report and this reply to the order of reference that I have done very little by way of estimating the cost of the various sections of the work. I feel that without considerably more knowledge of local conditions and prices I could not do this with any degree of accuracy. In view of the fact that I have described the works proposed in some detail, I have now no doubt but that the engineers of the Public Works Department could provide estimates with a fair degree of accuracy. Should it be possible for them to prepare preliminary estimates of the work proposed before it is necessary for me to leave New Zealand, I should be very pleased to confer with them to see that the measures I have proposed have been all provided for.

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