

This may prove to be a very important consideration indeed if heavy floods are experienced, and one that might easily result in a good deal of economy.

The quantity of concrete that has been placed in the dam to date is 27,277 cubic yards.

The quantity of excavation for the dam, apart from that involved in the coffer-dam, that has now been done is 104,000 cubic yards.

*Power-house.*—The excavations for the power-house, which involved the removal of 60,000 cubic yards of rock and surface stripping, were completed during the year. In June, 1930, the excavation had progressed far enough to commence concreting, and from that date to the present time over 29,000 cubic yards of concrete have been placed in position.

The work here has been planned in order to give precedence to the foundations that enclose and support the two turbines which comprise the first installation, whilst the remaining foundation work is being completed to such a stage as will allow the three additional power units which complete the station to be installed, when required, with very little structural work.

In April last a commencement was made with the installation of the turbines, and this work has now progressed far enough to permit of the surrounding concrete being completed to the level of the generator floor. Simultaneously the main columns at the other end of the building have been concreted almost to full height, and forms have been placed and concreting is in progress in each of the fifteen penstock-ducts. In the power-house to date 29,346 cubic yards of concrete have been placed, 898 tons of reinforcing-steel have been bent and 967 tons fixed in position, while 1,363,000 superficial feet of timber has been used on the work.

*Tail-race.*—To the 30th June 70,000 cubic yards had been excavated from the tail-race. By the aid of pumping, the work, although mostly below river-level, has so far been done under dry conditions, and, in order to give employment to as many men, with as little machinery as possible. This method will be continued until it becomes uneconomical, when mechanical plant will be employed. The gravel excavated from the tail-race now constitutes the main source from which the aggregates for concrete are derived.

*General.*—The service railway from Kurow to the works has been adequately maintained, and since this railway came into operation in December, 1928, 25,531 tons of materials and 3,500,000 superficial feet of timber have been carried. Charges based on tariff rates are debited to the particular section of the work to which transported materials belong, by which means the capital cost of the railway should be extinguished when the works are completed. To date about half the cost has been written off in this way. All centres of activity at the works have been connected with this railway and interconnected with one another, and this provides a rapid, safe, and economical solution to the problems of transport. Six locomotives are in service day and night, and they have almost entirely obviated the employment of motor-vehicles.

To retain access to sheep-stations which will be cut off by the reservoir behind the dam on the Canterbury side of the river, a large steel bridge is in course of erection. This is a cheaper and better proposal than the formation and maintenance of an extensive deviation of the present road, which was considered as an alternative. During a period of exceedingly low water in the river last August the foundations to the concrete piers of the bridge were, by a week's concentrated effort, placed in position, thereby greatly simplifying what would in normal years have been a difficult task. A contract for the fabrication of steelwork has been let, and it is anticipated that the substructure will be completed and a start made on the erection of the steel-girder spans next December.

Permanent buildings are being erected in concrete blocks, and during the year ten residences, a large hostel, and a garage have been completed, as well as the necessary road access to these, and fencing, water-supply, and drainage. During the year the permanent steel-tower transmission-line from Glenavy to the works was pushed on, one of the circuits was completed, and the new line came into service at the end of June. This obtaining of power direct from Lake Coleridge terminated the contract for supply from the Waitaki Power Board. The whole of the extensive plant on the works is now well supplied with power and is working with greater efficiency. To assist towards the relief of unemployment, however, work, where possible, is being carried out by manual labour rather than by mechanical means, whenever such a course can be economically justified.

The number of employees during the year has varied between 1,000 and 1,240, including transmission-line workmen. Provision has been made for separate accommodation for 233 married men and their families, while huts and hutments to the number of 434 were provided for single men or those without their families.

## RIVER IMPROVEMENT AND PROTECTIVE WORKS.

### WAIHOU AND OHINEMURI RIVERS IMPROVEMENT.

As was the case the previous year, the chief work carried out during the year just ended has been the raising and strengthening of the upper Waihou stop-bank system. The stop-banks are being raised and strengthened by adding a banquette on the side remote from the river-channel. In addition, the berm between the stop-bank and the river-edge is being graded, borrow pits filled in, and the growths of blackberry removed. Two  $1\frac{1}{2}$ -cubic-yard dragline excavators have been continuously employed on this work, and have made good progress. There is not much of this work now to do, save the cleaning-up of the berm. The reconditioned stop-bank and berm are being harrowed and grassed as work is completed. The completed work represents that portion between Ngahina and Tirohia stop-banks, and has resulted in an immense improvement to the flood-carrying capacity of the river.