

for all possible data as to floods, such as heights, velocities, and duration at various gauging-stations on the river, being recorded in a concise and systematic manner as they occur. The value of this work, if carefully done, would be enormous, not only in connection with the Waihou and Ohinemuri Rivers improvement, but in connection with every other river-control problem in the Dominion. The results obtained by the recording-gauges now installed will be very valuable in the future, and had they been installed ten years ago works could now be designed with very much greater confidence. The results of the work on the rivers must be carefully watched as the works proceed, in order that any unforeseen effects which may require a modification of the first design may be promptly and intelligently provided against. Records of damage done by floods, expressed in pounds shillings and pence if possible, should also be collected, so that the value of protection may be assessed.

*Rainfall Records.*—The Meteorological Department supplied the Commission with particulars of the rainfall during all the large storms which have occurred during the past twenty years. These are interesting as showing by how much the intensity of the storm of March, 1910, exceeded that of all other storms in the series. A graphic representation of these average intensities is attached (Appendix D).

*Value of Lands affected by Floods.*—No information is available as to the value of lands so affected, and the Commission has had to sift the evidence given before the 1910 Commission in order to arrive at the fair average value of the lands affected.

*Damage caused by Big Floods.*—No fresh evidence has been adduced with respect to this, and the Commissioners rely on the evidence given before the 1910 Commission in arriving at an average value for same.

#### ECONOMIC ASPECT OF REMEDIAL MEASURES.

Your Commissioners very carefully went into the economic side of the question, and came to the conclusion that the amount of money which might with justice be expended on a scheme to keep floods off the areas affected by the Waihou below Ngahina is strictly limited, otherwise the annual charges due to interest and sinking fund on the cost of and maintenance of the flood-control works would exceed the monetary damage due to floods divided by the number of years between floods, or would exceed the monetary benefits which might be derived on account of immunity from such floods.

The paucity of the information as to areas affected, the present and probable improved values of same, the cost of drainage and improvements required (exclusive of flood-control works), and the actual extent of the damage caused by floods, either small or large, render any definite conclusion as to the justifiable expenditure extremely difficult.

Your Commissioners sifted all available data, and from their own inspection formed the opinion that adequate works, as recommended below, to control the largest flood likely to be experienced within a period of fifty years can be constructed at a cost not in excess of what the land can reasonably carry.

From all the available data your Commissioners calculated the volume of waters in floods which had been recorded in the past. It is found that the flow in the Ohinemuri River at the peak of the 1910 flood was not less than 30,000 cubic feet per second, while that of the Waihou in flood is probably, at its maximum, 12,000 cubic feet per second. The peaks of the floods would not occur simultaneously in both rivers. In calculations of this kind it is impossible to guarantee results within 10 per cent. either way, and for the Waihou the character of the channel is such as to make a determination more difficult than usual. For the Ohinemuri the data was more precise, and the results therefore ditto. The results of your Commissioners' investigations accord with the results obtained by the Public Works Department within the usual limits of such problems. This probably represents the greatest flood that need be expected for fifty years. If one-hundred-year periods are to be considered, then floods of about 10 per cent. additional are likely.