

HIKURANGI DRAINAGE AREA (50,000 ACRES), WHANGAREI COUNTY.

The weather conditions throughout the year have been generally favourable for the vigorous prosecution of excavation work, the only serious hindrance in this direction being the late arrival of low-water-level conditions in the Wairua River, which was necessary to facilitate the rock-excavation operations in the upper portion of the river-diversion at the Rapids.

The gauge at Ruatangata recorded falls of rain on 137 days, the total fall for the year being 48·04 in. The months of June and July were particularly wet, when falls of 7·86 in. and 8·82 in. respectively were recorded, whilst January was the driest month, with a fall of 0·67 in. spread over five days.

The following is a summary of the operations carried out during the year under review :—

Wairua River Diversions.—The diversions of the river at the rapids at Ruatangata is the key to the whole scheme, and every endeavour was made to have these diversions completed to the designed grade by the end of the year. There is still a certain amount of work to be completed at the upper end of No. 4 diversion before the ordinary level of the river above can be lowered to 6 ft. above datum, representing a lowering of over 12 ft. from the original summer level. The works completed have already had a most beneficial effect on the discharge of the river, and this effect is felt for a considerable distance above the diversions. During November preparations were put in hand for commencing work again on No. 4 diversion, but it was not until December that the water-level fell low enough to enable the steam-shovel to operate in safety on the low level, the river being diverted meanwhile round the old channel. Since that date long hours have been worked in order to expedite the completion of this work, but a flood in March seriously interfered with the operations. Provided no floods are experienced during April, only the satisfactory opening-out of the ends of the diversion should remain uncompleted at the end of that month.

All the rock from this excavation is loaded by the steam-shovel into trucks, and then dumped along the sides of No. 1 lagoon. The only other work carried out on the main diversions was at the upper end of No. 3, where an accumulation of rock which had fallen into the channel from the batter was removed. The large slip towards the mouth of the No. 2 diversion appears to be stabilized, there having been little movement from the upper side. The toe of the slip is composed of a solid mass of stone which projects into the channel, and it will probably be advisable at a later date to remove part of this as it obstructs the flow of the water.

The construction of the spillways round the diversions, which were authorized during 1926–27, has been proceeded with when work was not possible on the main river work. These spillways are being constructed with a formation level of 6 ft. above datum at No. 2 lagoon, running on an even grade to 9 ft. above datum at the junction with the upper end of No. 4 diversion, the bottom width being 35 ft. throughout.

The stripping of the overburden of clay with the drag-line along the long spillway round Nos. 2 and 3 diversions has been completed, and during the coming winter the excavation of the rock will be continued, the spoil being loaded into trucks and dumped into the western side of No. 2 lagoon. This necessitates the construction of a temporary bridge across the mouth of No. 2 diversion, and this work is now well in hand.

One drag-line convertible to a steam-shovel was retained for this work, and during the first two months of the year the major rockwork was completed in the old channel at No. 4 diversion. Owing, however, to the winter rains this work was stopped, leaving about 2 chains still to complete. The carrying-out of this work will be simplified next summer when the river will be running through the main diversion.

The total amount of spoil excavated on the above works was 37,807 cubic yards, of which quantity 24,536 cubic yards were rock, the balance being rubble, pug, and clay.

Up-stream Diversions.—Two drag-lines, each equipped with a 50 ft. boom and a $\frac{3}{4}$ -cubic-yard bucket, have been employed continuously on these channels, which are being excavated to the full digging-capacity of the machines—namely, 110 ft. on top width, with batters of 1 to 1. Diversions Nos. 1 to 3 were completed during the previous year, and no further work has been carried out on these particular cuttings. During this year diversions Nos. 1B, 4, and 5 have been excavated, although a small amount of work is still required at the mouth of No. 4. No. 6 diversion has been commenced, but difficult country has been encountered, especially for the first 6 chains, where rock, stiff pug, and sandy clay have been met with. The greater portion of the rock has been left in the meantime, and later on this barrier will have to be shot and removed.

The scattered nature of the above works has necessitated the shifting of the drag-lines for quite long distances, and in some cases over rough country for this type of machine. It is worthy of record that during the shifting operations no accidents occurred.

The amount of spoil excavated by the two machines on the above works was 115,635 cubic yards, the average cost of the actual excavation being 1s. 4·48d. per cubic yard. During the latter portion of the year the excavation has been carried out on a piecework-contract basis, and this system has had the desired effect of increasing the output of the machines.

Ngāraratunua Canal (Block IV, Purua Survey District).—The excavation of this canal to its junction with the Wairua River was completed by No. 3 Dredge (Priestman) at the end of the year, the spoil dredged amounting to 69,559 cubic yards, covering a distance of 129 chains. The unit cost of the excavation was 10·61d.

This dredging has been particularly difficult owing to the hard nature of the clay, and for a considerable distance it was found necessary to loosen the clay by shooting with gelignite. Owing to the excessive fall into the Wairua River, the stream had to be dammed in order to keep the dredge afloat. From a point about 40 chains from the river the canal has been increased in width, as the Mangahahuru Stream from the Hikurangi arm of the swamp junctions at that point.