

The following is a summary of the main features of the year's work :—

*Wairua River Diversions.*—Excavating-machines : No. 12 Bucyrus, equipped as a steam-shovel, and No. 14 Bucyrus, working with automatic skips over the 15 ft. extension to the drag-line boom, have been concentrated during the whole of the year on the rock excavation of the No. 2 cut. No. 13 Bucyrus, working solely as a drag-line, assisted with the above operation till the middle of October, 1924. From this date No. 13 concentrated on the No. 4 cut till the middle of February, 1925, thence returning to assist in making the river-crossing between cuts Nos. 2 and 3, and at the middle of March, 1925, this machine was moved to the mouth of the No. 2 cut to assist in the removal of the big slip at that point.

No. 3 Priestman has, since the end of October, 1924, been continuously engaged on the excavation of the dredge cut through Block IV, Purua Survey District.

No. 2 cut : The excavation of this cut has now, except for the removal of the big slip at the mouth, been completed, the main working-face, as at 31st March, 1925, being half-way across the river-bed between cuts Nos. 2 and 3. The material met with has been a solid mass of rock except between pegs 17c and 20c, where massive boulders were encountered tightly wedged into the grey pug. Between these chainages the floor of the cutting was very treacherous, causing great trouble in keeping a travelling-track for the steam-shovel. The rapidity of the rock-drilling operations being the key to the rate of excavation, as many drillers as possible have been at all times concentrated on the working-face. For the latter half of the year the drillers have worked a regular ten-hour shift, and when there has been sufficient rock shot out the excavating-machines have at times worked an eleven-hour shift. The cutting has been excavated at least 1 ft. below plan grade ; and for a depth of another 2 ft. the rock floor has been well shattered by the shots. The operations on this cut were hindered on two occasions by serious floods, the first reaching its maximum height on the 7th April, 1924, and the second on the 26th May, 1924. Both these caused the river to rise so high that for just about two weeks on each occasion the flood-waters overtopped the bank on the river side of the cut. As soon as the water dropped to bank-level again we were at once able to get Nos. 13 and 14 working, but on each occasion another week elapsed before the No. 2 lagoon was low enough to allow of our pumping out to restart No. 12.

In order to facilitate the excavation of the river-bed between Nos. 2 and 3 cuts, No. 13 machine drag-lined a by-pass, 30 ft. wide and some 4 chains in length, leaving the river 2 chains above the crossing between the two cuts, and entering the No. 2 cut on the right side opposite peg 24c. The jobs of building protective dams both behind No. 12 machine and across the river were carried out expeditiously by means of the excavating-machines, and the water was turned through the by-pass early in March, 1925. The excavation of the river-bed crossing is now well in hand, No. 14 machine building its spoil-bank ahead of itself (and, of course, in the old river-bed), and using this all the time as a travelling-road. For the last two weeks of the year No. 13 machine has been at the mouth of this cut, concentrating on the big slip there, and, although there is a large percentage of very massive stone to cope with, good progress has been made towards removing the obstruction.

No. 3 cut : Except for a bar of about a chain at each end this cut was stripped previous to June, 1923. No. 13 machine has now completed the stripping of the clay bar at the bottom end of the cut, as much as possible of the spoil thereby being dumped at once to form a portion of the protective dam across the river. This machine has also "prospected" over the entire length of the cut with a view to finding a working-face suitable for the drag-line. Results, however, proved unfavourable, everything tending to show that this cut is going to be just as hard a proposition as the No. 2 cut.

No. 4 cut : Except for a bar  $\frac{1}{2}$  chain wide at the mouth, this cut was stripped for an average depth of 11 ft. up to the 7.5c peg, prior to June, 1923. No. 13 Bucyrus has now excavated the cut to the full depth and width as far as the 2c peg, and for full depth and a half width from 2c to 6c ; also, the stripping has been carried on to 8.2c. The material met with has been very stiff clay and rubble, with a fair proportion of massive blue-metal boulders : all, however, proved quite workable with the drag-line.

*Relief to Swamp Proper.*—It is hoped that the No. 3 cut will be finished by the end of December next, and, though No. 4 cut will not be completed, every endeavour will be made to have it sufficiently far advanced to provide a passage for flood-waters during the following winter.

*Output.*—During the year 39,238 cubic yards and 12,974 cubic yards of stiff clay and rubble have been excavated, at a total cost of £11,421, or 4/4.49 per cubic yard.

The total excavation on the Wairua River diversions to date amounts to 173,764 cubic yards, at a total cost of £46,868, or 5/4 per cubic yard. The total excavation on the whole project of reclaiming the Hikurangi Swamp to date amounts to 207,999 cubic yards.

*Dredge Cut, Block IV, Purua Survey District.*—Drainage of this arm of the swamp is being carried out by means of a Priestman dredge, cut generally following the existing waterway, the Aritu Stream, some  $4\frac{1}{4}$  miles in length, and entering the Wairua River near the outlet of spillway No. 9. Beyond the 2-mile peg (the traverse chainage increasing towards the river) the existing creek is very tortuous, and numerous diversions have therefore been adopted for the line of the dredge-cut so as to make a permanent and satisfactory job. The necessary timber for the pontoon was landed at the erection site towards the end of last period, and a start was made on the building of the pontoon at the end of April, 1924. This was carried out by day labour. In the meantime the dredge machinery, on transfer from the Rangitaiki works, was thoroughly overhauled at Thames prior to being forwarded to Whangarei. At the end of October, 1924, the dredge was in working-order, and at once commenced operations on the cut, a ten-hour shift being worked. For the first 20 chains the machine had easy going, but since then a great proportion of hard stiff clay has been encountered. To date the machine has lifted 34,235 cubic yards of spoil, at a cost of 5.39d. per cubic yard.