

clay cuttings, and good and economical work was done. The opening of this auxiliary channel will enable work to proceed above Kaitaia, which, although urgent, has of necessity been held up till the lower portion of the work has been completed. The diversion of Tarawataroa Stream, snagging of Kaitaia River to Johnston's old store, opening of Showground cut and Church Gully swamp, have all been held up pending the increased capacity of the channels for flood-waters. These are now under way, and should be completed before the worst of the winter sets in. It is gratifying to know that the plant for the construction of the spillway will soon come to hand.

*Kaitaia River.*—Steady progress has been made with the work on the river. The dredge-work has been of an exceptionally difficult nature on account of the heavy timber encountered and large quantities of sand. Moreover, the plant for the greater portion of the year was handicapped owing to the bad repair into which the grab was drifting. Stoppages for repairs and replacement of tines and bridles were frequent, and it was only after the new grab had been put into commission that better progress could be maintained. A further difficulty has been the height of the banks through which the plant is working. For the greater part of the summer the banks have averaged 8 ft. above the deck of the pontoon, the ends of the chutes just clearing the banks. To aid better clearance damming was necessary, but, owing to the sandy nature of the country and abundance of timber, dams were difficult to secure, and burst after freshes on two occasions. Two diversions have been cut through during the year, but the work has been heavy and difficult—two and three drops of the grab being required to loosen sufficient for a load. The total amount of spoil removed during the year was 51,500 cubic yards.

Snagging-work on the river has been carried out behind the dredge, large logs and stumps taken out by the plant having been from time to time pulled clear and stacked. With the second Priestman dredge in sight work on the river should be greatly expedited, and on completion of the lake-channels the two should work well in conjunction on the river between the lake-outlet and Awanui.

Timber for the erection of pontoons for the Priestman and Bay City plants has been ordered, and is being cut at Herekino.

*Drains and Roads.*—Hand-work on the swamp has been continued, and with the exception of a small area all main drains are constructed. In several cases it has been necessary to construct additional drains to those constructed in previous years to cope with the surface water and soakage. One of the most important drains completed during the year is the drain through the kahikatea swamp in O.L.C. 193 and 214. This drain, which is 172 chains in length, opens up some 1,100 acres of raupo and kahikatea swamp which could not efficiently be drained into the river. Several leaders are yet to be constructed from this main.

The opening-up of main-stream outfalls has been continued during the year at Kareponia and Pukepoto. A few main drains are yet to be constructed in the Waipapakauri district, through the gum swamps, to take the sandhill catchments. All Pukepoto streams have been tapped.

The maintenance of work done during previous year has been a considerable item owing to the exceptional growth of weeds and rushes in the channel. Several drains which were cleaned in the early spring required recleaning during the autumn. This has added greatly to the maintenance cost. However, the winter coming on will see all drains in good order.

Clay-and-peat road-formation has been pushed ahead steadily. All main-road drains have been completed from Ahipara to Waipapakauri, with leader from Wireless Road. The rough crowning of these roads was commenced late in the year, and is now almost completed. Being for the greater part through deep peat, considerable decomposition is necessary before the roads will be ready for traffic.

As soon as the scheme of subdivision of Crown land is completed party and boundary drains can be constructed.

*Stop-banks, Lower Awanui.*—The surveys for the erection of stop-banks in the tidal country on the Lower Awanui River, Waipapakauri and Pairatahi districts, were completed early in the year, and construction work commenced. All classes of country were encountered, and lines ranged as direct as possible from point to point with sweeping curves. Considerable trouble was experienced with settlers requiring small points enclosed within the banks which could not be banked except by too great an expense for a general scheme. An area of about 180 acres has so far been reclaimed from mangrove and wiwi. In several cases poor foundation was met with, and the scheme has necessarily been altered to follow sounder country.

There being some 7 ft. range of tide, there is ample room for gravity drainage, and concrete flood-gates have been placed between 5 ft. 6 in. to 6 ft. below high-water mark. All banks have been constructed on the principle of ditch and bank, the ditch being on the inside and taking the drainage to the gates. In mangrove country it was found that shallow ditches on each side with wide berm were better than a deep ditch on the inside. Old creek-crossings have proved difficult, and all will require timbering on the outside before fillings are done, as unless timbering is done it is found that the spew at the toe is very considerable, and all filling must be done on the tide. The problem on the harder country has not been so great, as good clay filling has been obtainable and the banks suffer far less shrinkage. In the mangrove country shrinkage has been as great as 4 in. per foot in bad country. Where small banks were required in grass country it was possible to construct banks with graders, and good work was done in this way, consolidation being hastened by constant tread of teams. All construction work has been done by means of piecework contract, but maintenance is in hands of a day-labour gang.

*Bridges.*—Timber for the erection of bridges over spillway at Kareponia Road, Quarry Road, and Donald's Road has been ordered, and some is on the ground. Piles and stringers have been hard to obtain owing to difficulty in handling long lengths. All timber is, however, in sight, and work at Kareponia is under way.