

REPORT.

THE work executed by the staff, both in the field and the office, during the year ended 31st March, 1938, is set out in tabular form below. A comparison with the previous year shows that very large increases are recorded in three particular classes of survey—housing, where the work has increased nearly eight times; roading, two and a half times; and rural surveys, twice that of last year. As may be expected with such a large increase in urgent work, a falling-off in the lesser urgent class of basic control surveys may be noted, this work having to remain in abeyance for the time being.

Brief reports of the more important aspects of the operations during the year are given below in their respective headings.

FIELD.

Geodetic Triangulation.—I have again to report excellent progress by the geodetic party, an area of 8,500 square miles being completed in the North Auckland peninsula and reconnaissance carried out over the northern end of the South Island, where five very high stations, averaging 6,600 ft., have also been occupied. In the North Auckland area forty-five stations were occupied, seven being on islands, on several of which delays were incurred in awaiting favourable weather for landing. The average closure of the 106 triangles is 0.66 second, the maximum closing error being 2.17 seconds. Latitude and azimuth were determined at nine stations. This area completes the observations for the North Island, except those required for the Laplace equations at several stations; these are being held over until the work in the South Island is sufficiently far advanced for the whole of the Laplace stations being determined and observed.

A new instrument is on order for this work, the present Wild primary triangulation theodolite No. 77 now having been several years in the field, although no difficulty is being experienced in obtaining the requisite accuracy for this work. The new theodolite, a Cooke, Troughton, and Simm's Geodetic Tavistock, is expected to be available for the opening of the season in spring, as for this coming year, owing to the height of the stations, it will not be possible to continue observations during the winter.

Triangulation.—No second order work was done during the year, owing to the necessity for completing the geodetic work as early as possible. The principal third order work was an area of 408 square miles, comprising twenty-nine stations, and covering the Poverty Bay flats and an area to the south-west joining up with the Hawke's Bay triangulation. The average triangular error of the ninety-four triangles observed was 2.8 seconds, the maximum being 8.0 seconds. An area of 12 square miles, comprising the whole of Raoul Island in the Kermadec Group, was covered by minor triangulation for the Public Works Department. This consisted of fourteen stations with measured base-line and with determination of latitude, longitude, and azimuth at one of the stations.

Topographical.—Scattered areas principally for development purposes (Native and Crown) were topographically surveyed by ground methods during the year. Besides these, the whole of Raoul Island, of 12 square miles, was also topographically sketched from fixings by the triangulation survey.

The aerial work in Hawke's Bay commenced last year was continued, but owing to the absence of the ground control surveyor in Raoul Island for some nine months, only 400 square miles were completed in the field.

Standard.—As mentioned before, this work shows a decided falling-off, only 45 miles of rural standard traverse being returned as completed during the year. While work in the Auckland City and suburban boroughs is being gone on with steadily by Mr. H. M. Kensington, that in Dunedin and elsewhere has had to be placed on one side by more urgent work. Present indications tend to show that it may be some considerable time before this important survey matter can be again actively prosecuted.

Precise Levelling.—This work also has been much delayed by having to place the surveyor (Mr. C. L. Cox) on urgent work from time to time. However, much preliminary work has been done in laying down bench marks and fixing their co-ordinate positions by survey. The bench marks are as follows:—

Fundamental cast in concrete <i>in situ</i>	..	..	..	..	..	14
New stones cast in concrete <i>in situ</i>	..	..	..	..	..	83
Old triangulation stations	..	..	..	..	..	3
Old survey stones	..	..	..	..	..	118
Existing B.M.'s of other organizations	..	..	..	..	..	20
New marks in piers, &c.	..	..	..	..	..	16

These total 254 in the 150 miles length of line to be levelled. The line of levels commences at Lyttelton, and after traversing the andesitic formation of Banks Peninsula passes over the gravels forming the Canterbury Plains. Consequently, only one fundamental mark is sited on rock, the balance being in gravel or other recent formation. These latter consist of a broad based slab of concrete 7 ft. square, cast *in situ* with one point well below ground-level, the other rising above ground-level and being suitably protected.

Rural Surveys.—128,167 acres of rural lands were surveyed during the year at the remarkably low figure of 1s. an acre. This is partly accounted for by the large area of runs subdivided in the Otago-Southland area (a total of some 66,000 acres). Were this excluded, however, the average cost of the balance would be only 1s. 6d. per acre.