

WESTLAND.

Major Triangulation.—Total area completed 146,406 acres, at a cost of 1.16d. per acre. It extends from the head-waters of the Weheka (or Cook's) River to the Paringa Valley. The base-line in Paringa Valley was measured in October, 1880, and declared to be 24,843.33 links. In June, 1881, the triangulation had extended to Paringa base, and the calculated length was found to be 24,842.89 links, equal to an error of 0.14 link per mile. The direct distance between Wataroa base (the one previously measured in connection with the Westland triangulation) and the Paringa base is 59 miles; the number of triangles observed is 113, and the average closing error in these only 5.5 seconds. The calculation of altitudes are not completed yet, but, judging from results already obtained, they promise to be equal to Mr. Roberts's work in preceding year between Hokitika and Okarito, where the difference between the mean sea-level, carried by calculation from the former to the latter—a direct distance of 55 miles, and by stations varying up to 3,600 feet in height—and the mean sea-level marked at Okarito Wharf, and determined by a period of tidal observations taken by Harbourmaster there, was found to be only 4 feet 7 inches. The question of the heights of Mount Cook, Mount Tasman, Mount Hardinger, and nine more of the principal peaks of the dividing range can now be finally set at rest. Altitude observations to Mount Cook alone have been taken from twenty-four of the main stations, situated between Mount Graham, 70 miles north-east, and Mount Argentine, 39 to the south-west of Mount Cook. In connection with the major triangulation Mr. Roberts has completed the topographical survey of 96,000 acres outside the triangulated area, and has supplemented to a great extent the topographical features given on maps of former surveys.

Minor Triangulation, Topographical and Trigonometrical Surveys.—101,074 acres completed, at an average cost of 2.8d. per acre. It comprises traverse circuit survey of 25,760 acres in Grey and Hokitika Districts, executed by Messrs. Murray and Lord, and 75,314 acres of minor triangulation and topography, completed by Mr. Roberts. Of the latter, 19,424 acres are situated within Westland, and 55,890 acres within Canterbury District. The connection with Canterbury triangulation *vid* dividing range by head-waters Wanganui River into Rakaia Valley has been tested by the measurement of base in January last: its length was then declared to be 27,881.038. In March the observations were completed, and the calculated length of Rakaia base found to be 27,877.113, equal to an error of 1.1 links per mile, which, considering that the altitudes of ten of the stations range from 5,296 to 7,065 feet, and that the difficulties which had to be contended with in carrying out this work have been exceptionally great, is a most satisfactory result. The average error (taken from 155 triangles) involved in minor triangulation observations within Westland is 5.7 seconds, and within Canterbury (mean of 31 triangles) is 6.9 seconds. The calculations of the differences of latitude, longitude, and convergency between the Westland and Canterbury circuit initial stations are now in hand, and will shortly be reported upon.

Rural and Suburban Section-surveys.—Area, 9,827 acres; cost, 2s. 2½d. per acre. These surveys have been very scattered, and involved a large amount of bush-cutting in almost every instance, which accounts for the comparatively high cost per acre. Simultaneous with the section-surveys have the circuit traverses and road surveys been carried on, the closures of which I find to be as follow: W. G. Murray—7 traverses; total length, 44 miles; average error per mile, 1.5 links. E. J. Lord—8 traverses, total length, 38 miles; average error per mile, 4 links. H. G. Price—9 traverses; total length, 30½ miles; average error per mile, 4.6 links. Total length of proved traverses, 112½ miles; average error per mile, 3.2 links. Mr. Murray's traverses covered favourable ground throughout as compared with the rough portions of the survey districts within which the other surveyors were employed, and hence the better closures in his work. In addition to the above, the surveyors had to connect old section-surveys wherever any of the traverses passed within easy reach of them; and this part of their work, which is not returned separately, inasmuch as it cannot be classed as either "new" or "revised" surveys, helped much towards swelling the cost of the work returned.

Roads and Water-race Surveys.—88½ miles, at £13 8s. 7d. per mile. Mr. Smyth's surveys under this heading only require special mention, and, amongst these, more particularly the road from Mahitahi to Haast, traversing some very difficult country: it necessitated the cutting of many miles of trial lines before the best route for main road could be finally fixed upon. The work has been well executed; the grade of road does nowhere exceed 1 foot in 15 feet, and longitudinal and cross sections are prepared throughout its entire length.

Office-work.—Land Transfer, Crown grant, certificate of titles, &c., as per return. Of triangulation maps, 12; topographical maps, 3; block maps, 37; application maps, 9; Crown-grant record maps, 6; Land Transfer and road record maps, 6—have been plotted during the year. Besides these, maps for various departments, such as Crown Lands, Land-tax, Education, counties &c., have taken up a deal of the draughtsmen's time.

Proposed Operations, 1881–1882.—Extend minor triangulation from Weheka (Cook's) River to Paringa River, and major triangulation to Matakitaki Range, with view of connecting with Jackson's Bay circuit initial station. Arrears of section surveys, 55,935 acres, and of office-work consisting of about thirty-four maps (triangulation, topographical, block, Crown grant, &c.), to be overtaken as far as possible.

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