APPENDIX.

EXTRACTS FROM THE REPORTS OF CHIEF SURVEYORS IN CHARGE OF SETTLE-MENT AND SECTIONAL OPERATIONS IN DISTRICTS.

AUCKLAND.

I MUST preface my remarks with the statement, that owing to the unprecedented bad weather prevailing during the last three months of the year ending on the 30th June, the field work has been seriously retarded, and the cost thereby materially increased, so much so, that I estimate the clear loss to the Department at £1,800.

Mean Degree of Precision in Survey attained during the Period.—In order to afford information as to the mathematical closures of surveys performed during the year, and to supply data for comparison with similar results obtained elsewhere, I called on the Staff Surveyors to supply a tabular statement of their field closures, of both trigonometrical and chainage work, the result of which, in as far as the Surveyors could furnish them (some not having kept records), is appended hereto.* From this you will observe that 54 trigonometrical closures, both major and minor, show a mean difference of 10.7 seconds in bearing, and a mean difference of 1.03 links per mile in length, whilst 98 chain closures of an aggregate length of 265.9 miles furnish a mean of 1.92 links per mile, as tested by the triangulation or by traverse simply. These results which are far within the limits of error allowed by the Regulations, are very creditable to the gentlemen producing them, and tend to induce a feeling of confidence that no troubles will hereafter arise through titles to land based on such work.

Major Triangulation.—Under this head a total of 932,200 acres is returned at a cost of less than a farthing per acre. The angles of the triangles have been observed with 10-inch and 6-inch instruments, the lengths of the sides varying from 6 to 14 miles. The portion executed by Mr. Goldsmith was undertaken to cover a country already minor triangulated, but in which a considerable accumulation of error existed. It resulted in reducing this error to small limits, whilst it at the same time afforded another closure between the Bay of Plenty and Mount Eden circuits, showing a mean difference of 0.5 links per mile on four sides. The larger area has been undertaken by Mr. Cussen in continuation of his last year's work in Patetere. It covers the country frem the latter district to Lake Taupo, and thence follows the east side of the lake into the Kaimanawa Mountains, closing on to the Tuhirangi circuit in the Province of Wellington. Serious delays arose through the opposition of a party of natives at the south end of the lake, and later on by the exceedingly bad weather which caused Mr. Cussen and his party to endure great hardships and privations in the snow-covered mountains of Kaimanawa. The closure on to the Wellington work is as follows :—

Bay of Plenty circuit side stations ...	38—43 =	58722.2
Tuhirangi circuit side	38—43 =	58725.6

$$\sim \quad 3.4 = 0.46 \text{ links per mile.}$$

Bay of Plenty circuit side ...	38—43 = 55°	48′ 42″
Tuhirangi circuit side	38—43 = 55°	50′ 13″ + convergence.

$$\sim \quad 1′ \quad 31″$$

This affords another example of the general excellence of the major work. The distance between the Maketu and Maraekakaho bases through the 53 triangle composing the Ray, is 184 miles. The closure in bearing is not so good, but it is affected by a quantity (47″) which should properly be applied to the Bay of Plenty triangles, and this would then reduce the discrepancy to 44″. No comparison of heights can be made, for the reason that those of Tuhirangi are merely approximate ones, obtained by myself with the aneroid in 1871, deduced from Napier, and are known to be inaccurate. The whole of the 657,000 acres has been topographically sketched by Mr. Cussen, and broken up into smaller triangles of about 4 mile sides ; but owing to the late period at which he left the field and his subsequent illness, this work will not appear until next year's return. Twenty-two other trigonometrical closures were obtained during the progress of this work, showing a mean of 0.5 links per mile on closure, a result which is quite in keeping with Mr. Cussen's usual careful work. The season's work in this district has brought out the fact that the Kaimanawa Mountains are much higher than was supposed, the highest peak being 5,700 feet. The height of Tongariro was also approximately ascertained to be 7,515 feet, being nearly a thousand feet more than has been accepted of late years, though the result nearly agrees with observations made by Mr. Heale, in 1868. In addition to the work shown in return as completed, Mr. James Baber has 132,000 acres of major triangulation completed in the field, and stations up over other 172,000 acres in the Urewera country, but owing to the inclement season and the difficulties of a country covered with dense forest without tracks, and the

* See note.