

1883.
NEW ZEALAND.

SURVEYS OF NEW ZEALAND.

(REPORT FOR 1882-83.)

Presented to both Houses of the General Assembly by Command of His Excellency.

The SURVEYOR-GENERAL to the Hon. the MINISTER of LANDS.

SIR,—

General Survey Office, Wellington, 8th August, 1883.

I have the honour to report the survey operations for the twelve months ended the 30th June, 1883.

The New Zealand system of survey is now so well established and understood throughout the colony by the staff and authorized surveyors that the numerous public and private surveys, whether of Crown or Native lands, or for purposes of land transfer, are executed and recorded within such narrow limits of error as to leave very little apprehension of any loss or inconvenience arising from imperfect description of title.

The out-turn of work for the twelve months is considerably in excess of some of the preceding years, and is set forth in detail, as formerly, in the reports of the supervising officers in the Appendix. Before touching on the various classes of survey, the following general statement will show the areas and mileage disposed of, and the cost thereof:—

	Area.	Rate per Acre.			Cost.		
		£	s.	d.	£	s.	d.
Major triangulation	1,348,490 acres	0	0	0.38	2,139	8	5
Minor triangulation	417,537 "	0	0	0.89	1,552	7	0
Minor triangulation and topography	3,348,246 "	0	0	0.88	12,257	17	10
Rural and suburban (settlement)	671,937 "	0	1	3.2	42,554	5	6
Town survey	{ = 1,539 1,768 allots.}	1	0	2½ per lot	1,786	12	11
Native Land Court surveys	486,573 acres	0	0	4.76	9,651	1	2
Native land purchase	32,718 "	0	0	3.87	528	4	8
Gold-mining surveys	8,987 "	0	14	1.3	6,339	7	3
Roads, railways, and water-races, 591½ miles, £11 18s. 9d. per mile							
Miscellaneous work and detention by Native opposition, &c.							
				
					8,255	0	6
					12,506	15	10

TRIANGULATION.

About six thousand square miles of country have been brought under triangulation and topographical survey during the year. This comprises some of the most rugged and mountainous districts in both Islands. In the North Island Mr. Baber had a most difficult task in the survey of the Urewera Bush country, aggravated by the opposition of the Natives. The same cause has hitherto prevented the surveys from proceeding over some of the King country west of Lake Taupo.

In the Middle Island Mr. A. D. Wilson extended a series of major and minor triangles, in continuation of his last year's work, from Awatere down the East Coast, from Flags River to a close on the Amuri triangulation; and from the same triangulation Mr. F. S. Smith triangulated west to the watershed of the dividing range between the two coasts. By extending a chain of triangles from the West Coast up the Ahaura along the standard line of bearings of the Grey circuit to

Mr. Smith's stations an excellent connection will have been made between the triangulations of the two coasts, and the delineation of the topography, the heights of passes, and other information accurately determined. In Westland Mr. G. F. Roberts, who has for several seasons been most indefatigable in the extension of a major and minor triangulation along the rugged West Coast from Hokitika southward, has succeeded in closing his triangles on the sides of the Otago and Canterbury triangulation in Makarora Valley, head of Lake Wanaka. The stations commanding the country from Haast River to Jackson's Bay and Cascade River are now in course of erection for next season's work. The further extension to join in with the Otago triangulation in Hollyford Valley will complete the correct survey of the coast-line from Waimangaroa to Martin's Bay, a distance of 280 miles. In Otago Mr. Wilmot has completed the connection between Martin's Bay triangulation and that of the Wakatipu District. This was an arduous work, involving much risk to life and limb, and was very well performed.

Mr. Farquhar completed a triangulation and topographical survey of the Dunstan Mountains satisfactorily, at the cost of only $\frac{1}{4}$ d. per acre.

The detailed reports of the Chief Surveyors in the Appendix show that these surveys were all closed and checked to very narrow limits of error, notwithstanding the mountainous character of the country under treatment. The immediate object of these trigonometrical and topographical surveys is, for the North Island, principally the investigation of Native title, and in the Middle Island for the correct determination of run boundaries and to serve as starting-points for sectional surveys. But, apart altogether from these objects, the surveys are indispensable for the delineation of the main features of the country, and for that purpose alone are worth far more than their cost, which is under 1d. per acre for field survey and mapping to a scale of 2 inches to the mile.

RECONNAISSANCE SURVEY.

This, as the name implies, is a cursory examination of country, in which the surveyor, availing himself of mountain-peaks, landslips, and other conspicuous natural marks as stations, conducts a rough triangulation over the country explored, making notes and sketches as he proceeds. Mr. John Hay, District Surveyor, Southland, undertook last summer the exploration of the unknown mountainous district in the south-west of the Middle Island, and lying west of Hauroto Lake and Princess Mountains. The country, as will be seen from Mr. Hay's report and map in the Appendix, consists of a mass of mountains with long, narrow, deep valleys running out from the main range to the coast; each valley containing its lake or sound, the bed of an ancient glacier. This characteristic of the Southern Alps is wonderfully persistent, as exemplified in numerous long, narrow lakes, which run out from the east side of the great range, beginning in Canterbury close to the existing glaciers of Mount Cook, and continuing in an unbroken series to Lake Hauroto, a stretch of 240 miles. On the other side of the range the same characteristic is maintained in the occurrence of the West Coast Sounds. The country surveyed by Mr. Hay, although highly interesting from a physical point of view, unfortunately offers little or no inducement to the settler, the surface being too broken and steep for cultivation, and all under dense bush or scrub up to the limit of tree-vegetation, about 3,500 feet above sea-level. The area, mapped to a scale of $\frac{1}{2}$ inch to the mile, is 850 square miles. It fills up a blank which long remained on the map of the Middle Island. The execution of the survey occupied four months. It was necessarily conducted under circumstances of great hardship and difficulty. The amount of work done is very creditable to Mr. Hay and his party.

TRANSIT OF VENUS.

The rare opportunity of observing the apparent passage of Venus across the face of the sun occurred on the morning of the 7th December, 1882. This, as is well known, is one of the few methods available for the determination of the distance of the earth from the sun. New Zealand being favourably situated for the observation of internal egress, it was selected by both the British and American Governments as one of their observing stations; Colonel Tupman, the leader of

the English party, being stationed at Burnham, Canterbury, and Mr. E. Smith and the American party in the Domain-grounds of Auckland City.

To guard against the accidents of weather Colonel Tupman invited the co-operation of all observers who had the necessary equipment, so that if observations failed at one station they might be obtained at another. The Survey Department was enabled, through the kindness of private gentlemen possessing good telescopes, and from the resources of the department itself, to equip stations at New Plymouth, Bidwell's (Wairarapa), Wellington, and Christchurch, at all of which the observation of internal egress was most successfully accomplished.

The actual observation of the transit being a record of the instant of the apparent meeting or contact of the limb of Venus with that of the sun, it becomes of the utmost importance to have the true sidereal or mean time determined with the greatest accuracy, and that the observers at different stations either all keep the same time or have the means of knowing their differences from one standard clock. With the view of securing this concert among the New Zealand observers, the greater number of them had their stations placed in telegraphic circuit. Time-signals were distributed from Colonel Tupman's station at Burnham to observers in the Middle Island, and from Survey Observatory, Mount Cook, Wellington, to several of the observers in the North Island and in Nelson. Another essential is the correct knowledge of the longitude of the stations. Exchange of signals for this purpose were made between Burnham and Auckland, Burnham and Wellington, Wellington and New Plymouth, Wellington and Bidwell's, Wairarapa. These New Zealand stations are therefore well connected together; and, as Colonel Tupman has had exchange of time-signals through the cable with Sydney, and the gaps in the exchange of time-signals between Sydney and Greenwich have been also completed since the transit, it will be seen that there is now an unbroken line of longitude determination, binding the various stations together.

The observations of internal contact at the stations enumerated hereafter were not attended with any phenomena of black-drop or pear-shaped appearance of planet or other perplexing phases such as were anticipated from the records of some of the observers of former transits. The first decided appearance, as seen by me through the 5-inch equatorial telescope at Mr. King's observatory, at Boulcott Street, Wellington, was a rapidly-forming haze between the limbs of Venus and the sun, through which, as the planet made its way, there seemed a disturbance on the limb of the sun. This lasted for nine seconds previous to the geometrical contact by the apparent touch of the two black edges, which phenomenon was instantaneous; there could be no doubt about it. From that instant a broadening band kept forming as the planet overlapped the edge of the sun. The external contact, an observation of very secondary importance to that of internal contact, and to which no great value is attached, was also very well defined; there was no clinging to the edge of the sun at parting. The planet went off quite uniformly. The only difficulty in the observation was to name the exact second that the blunt cusps of Venus met as they gradually approached each other on the edge of the sun. The time noted for this observation might be uncertain to two seconds. The decimal of a second given in the table hereafter arises from applying the clock-correction to the recorded time.

The various observers enumerated had each two assistants, one to count aloud the second-beats of the clock or chronometer, the other to note the minutes and the times given by the observer. In this manner the records of each observer were made, and his report of phenomena written before consultation with others, so as to guard against error or bias.

The weather was favourable for observation at all the stations; at Wellington especially so; the sky being bright and clear, no wind, and a steady atmosphere. There was no tremor or boiling of the sun's limb at the time of observation. With a power of 250, the definition was excellent in the telescope at Boulcott Street. The instrument is a splendid 5-inch equatorial telescope, 80 inches focal length, by Grubb, of Dublin. It was recently imported by Mr. T. King, and very generously lent by him for the observation. At Mount Cook Observatory, Wellington, Mr. C. W. Adams observed with a 4-inch telescope and a power of

70, through which he projected the sun's image on a screen attached to the telescope by a light framework. The telescope was the property of Mr. Barnard, and was kindly lent by him. Mr. Boscawen, at the same station, observed with an 8-inch transit theodolite; Mr. Humphries, at New Plymouth, with a 4-inch Cooke's telescope, power 200; Mr. O'Donahoo, at the same place, with a telescope, aperture $2\frac{3}{4}$ inches, power 110; Mr. Marchant, at Bidwell's, Wairarapa, with a 4-inch Browning refractor, focal length 66 inches, power 200, the property of Mr. David Gray, of Wellington. Captain Hewitt was also at Bidwell's with an $8\frac{1}{2}$ -inch Browning's reflecting telescope, the property of Mr. Pope, Inspector of Native Schools. Mr. Kitson, at Christchurch, observed with a 6-inch equatorial telescope, by Cooke, the property of Mr. Townsend. Mr. Kitson had time from Burnham, and co-operated directly with Colonel Tupman.

The times given in the following table are sidereal, and are all referred to the meridian of Mount Cook Observatory. The longitude of this station is the determination given by Mr. J. T. Thomson, derived from his observations of moon culminating stars at Rockside, Caversham, Dunedin, in 1869–71, corrected by Sir G. B. Airy to the actual observations of the moon's distances as taken at Greenwich, and connected with Mount Cook Observatory by telegraphic and trigonometrical connection. The longitudes of the other stations are based on that of Mount Cook.

The reports and details of the observations have been placed in the hands of Colonel Tupman for disposal. It would therefore be unseemly to enter on any discussion of them at present. But the general summary of them is as under:—

Observer.	Place.	Latitude	Longitude	Disturbance	Internal	External
		South.	East.	of Sun's Limb.	Geometrical Contact.	Contact.
		° ' "	H. M. S.	H. M. S.	H. M. S.	H. M. S.
James McKerrow...	Boulcott Street, Wellington	41 17 14	11 39 9.58	12 42 13.3	12 42 22.3	13 2 16.3
C. W. Adams ...	Mount Cook, Wellington	41 18 0	11 39 9.92	not observed	12 42 21.5	13 2 17.5
J. H. Boscawen ...	Mount Cook, Wellington	41 18 0	11 39 9.92	not observed	12 42 21.5	13 2 21.5
T. Humphries ...	New Plymouth	39 4 8	11 36 22	12 42 21	12 42 34	not obsv'd.
A. O'Donahoo ...	New Plymouth	39 4 8	11 36 22	not observed	12 42 30.5	not obsv'd.
J. W. A. Marchant	Bidwell's, Wai- rarapa	41 11 4	11 41 46	12 42 27	12 42 38	13 2 3
Capt. J. D. Hewitt	Bidwell's, Wai- rarapa	41 11 4	11 41 46	not observed	not observed	13 1 54

GEODETIC.

Latitude.—As will be seen from Mr. C. W. Adams's report in the Appendix, he has conducted, at the Survey Observatory, Mount Cook, Wellington, an extensive series of observations of stars north and south of the zenith for latitude, by means of the zenith telescope. In this method the constant instrumental and personal errors cancel each other, their effect on the observation of each of a pair of stars respectively north and south of the zenith being equal and opposite. Hitherto, in New Zealand, observations for latitude have been made either with reflecting instruments or transit theodolites, in both of which the altitudes of the stars are read from graduated arcs or circles. But with the zenith telescope the differences of the altitudes only are measured by means of a micrometer to the fraction of a second. The graduated circle, with its clamping and tangent screws, being thus superseded by the delicate micrometer, great steadiness is secured for the instrument, and consequently the essential condition of maintaining the instrument truly level during a set of observations is more nearly attained by this instrument than by any other. The large telescope, which the construction of the instrument permits to be used without making it unwieldy, enables stars of the sixth and seventh magnitudes to be observed with the greatest ease. There is, therefore, on every clear night, a great number of suitable pairs which may be selected from the star catalogues.

The objection which may be urged to this method of determining latitude is that the result is affected by any error in the declinations of the stars; but, as these are all determined at the great observatories, no great apprehension need exist on that point; and, if there should, it can always be set at rest by further observations. Thus, for the New Zealand latitude observations, Mr. Ellery has signified his willingness to verify, by observations at the Melbourne Observatory, the declinations of any stars which may be deemed uncertain. Taking the declinations as given in the Melbourne catalogue, and referring to Mr. Adams's list of observations of ninety-nine pairs of stars, it will be seen that only in eighteen pairs does the deduced altitude differ more than one second from the mean. The latitude, $41^{\circ} 18' 0'' \cdot 59$ S., given by him for Survey Observatory, Mount Cook, may be accepted as reliable within the fraction of a second. It is proposed to observe for latitude, during the ensuing season, at several main points in both Islands. The value of the level divisions and of the micrometer revolutions having been determined from many observations, and the constants which are used in the reductions computed, no great time need be occupied at any of the future stations.

Having obtained the latitude so satisfactorily at Mount Cook, Wellington, it may appear that latitudes of other stations might more easily be deduced from computation through the trigonometrical survey than from observation; and so they would. But the observations for latitude already obtained in the colony, and reported, clearly show that, on account of the unequal densities of the earth, the latitude of any single station should not be accepted as the datum from which to deduce the latitudes of all other stations. Hitherto, from inadequate instrumental means, the department could not assume a greater accuracy in latitude determination than $4''$ or $5''$. But with the zenith telescope the limit of error may be brought for each station within the narrow limits of half a second, plus or minus what is latent to the cause just referred to.

Longitude.—The longitude of the principal points in New Zealand have, it may be affirmed, been determined correctly for the purposes of navigation, or of placing the country in its true relative position on the map of the world; but for astronomical purposes, such as in connection with the transit of Venus, the determination is not deemed beyond challenge. Colonel Tupman exchanged time-signals through the cable with Mr. Russell, the Government Astronomer, Sydney, but, as unfavourable weather prevented star observations at both places on the nights of exchange, and of course compelled reliance on the rates of the clocks, he was not quite satisfied with his longitude results on leaving New Zealand, and accordingly requested the Survey Department to repeat the exchange for him, taking care to send signals only on those nights when the conditions were all favourable. Mr. Russell and Dr. Lemon having both kindly consented to co-operate, it is proposed to make the exchange very shortly, and so re-determine, by electric-telegraph signals, the difference of longitude between Sydney and Wellington.

SETTLEMENT SURVEYS OF RURAL AND SUBURBAN LANDS.

An area of 671,937 acres has been subdivided and marked on the ground into 4,173 sections, at an average cost of 1s. 3d. per acre; and 1,539 acres of town lands have been surveyed into 1,768 allotments. These works, of course, imply the selection and survey of road-lines, so as to secure that each section will have an access and frontage to what either is naturally, or can be made, a practicable road. As great dissatisfaction exists in some districts arising from the system pursued in some of the earlier surveys of running road lines straight without any regard to the features of the country, and in others from no road-lines of any sort being laid off, care is now taken to grade the road-lines in hilly country, and that each section wherever situated has a road-frontage. The greater care taken in this respect necessarily increases the cost of the surveys; but a few pence more per acre is nothing when set against the expense and heart-burnings which ensue where settlers have to begin and arrange for roads and deviations after they are settled on the ground. Roads are necessarily one of the greatest wants of a new country; and, as it is impossible that much can be done in formation for a long time on the hundreds of miles of main and occupation lines

annually laid off in the settlement surveys, it behoves the Survey Department to see that the most is made of the natural facilities in each district, by having the best practicable road-lines laid off before the settlers come on to the ground. There is no obstacle in the way of effecting this desirable result in those land districts where survey precedes selection; but where the contrary prevails, and the settler is first on the ground, there is always more or less difficulty in the matter of locating roads suitably. In the case where surveys are long in arrear this difficulty is greatly increased. With the exception of the Auckland, Nelson, and Canterbury Land Districts, there are no arrears. In these districts the aggregate still amounts to about 200,000 acres, but the work is well in hand.

The surveys for the Native Reserves Trustee made on the west coast of Taranaki amount to 21,731 acres, divided into 161 sections, at a cost of £1,734. They were executed mostly by the staff, and the expense will be recovered from the rents as they are leased.

NATIVE SURVEYS.

The operation of "The Native Land Court Act, 1880," in providing that all surveys of Native lands for investigation of title must come under the direction of the department, and the cost of the same will be advanced by the Government when so desired, is having the effect of inducing the aborigines to bring their land to a greater extent than formerly under law and registration, thereby rendering it negotiable. During the year, 110 blocks, aggregating an area of 432,919 acres, were surveyed, at the cost of £6,399, advanced by the Government, and 124 blocks, of an area of 441,955 acres, the cost of the survey of which was paid direct by the Natives. Much the greater part of these surveys were executed by authorized surveyors at schedule rates. Applications for survey are constantly coming in, and it is only a matter of a few years at most until the whole of the Native estate, extensive though it be, will have been surveyed and the titles thereto settled and individualized.

The surveys for the West Coast Commission amount to 70 blocks or divisions, containing an area of 73,700 acres, costing £3,252. These were executed by staff and surveyors temporarily engaged for the purpose.

The Native land purchase surveys have diminished from former years owing to change of policy. Seven blocks, comprising a total area of 32,718 acres, were returned for the year.

The liens registered against Native lands on account of surveys now amount to £46,901. During the year £1,757 were paid off.

MINING, ROAD, AND LAND TRANSFER SURVEYS.

The surveys of mining-lease areas on the gold fields, and of road-lines through freehold and Native lands, before the expiry of the right to do so has lapsed, have been prosecuted in the usual manner, and do not call for any special explanation, except that it may be mentioned that a road survey in the Chatham Islands has been in progress since April, 1882, and will be completed about the end of 1883. The surveys under the Land Transfer Act, being surveys of freehold lands, are executed entirely by private authorized surveyors for the landowners and at their cost, but subject in all the technical details of field survey and of record to the direction, check, and approval of the department.

PIONEER ROAD CONSTRUCTION.

It has been found of the greatest importance that the opening of bridle- and dray-tracks through the Crown lands should precede their occupation. It would, indeed, be of advantage if the pioneer roading could in all cases precede even the subdivision or sectional survey. This is being done in several districts, but more frequently the order of procedure is reversed. The total length of road-lines under the various stages of bush felling and clearing, of side cuttings and formations, for the year is 491 miles, at a cost of £81,788. In this sum is included the cost of erecting several bridges. These works are all under the general direction of the Chief Surveyors, aided in some cases either by the officers of the Public Works Department and of the local bodies, or entirely by the Survey officers, as is found most convenient. Full details are given in the Appendix.

PUBLICATION OF MAPS.

This very important work, immediately under the direction of Mr. Barron, has been, as will be seen from his report, actively prosecuted during the year, 125 maps having been published for geographical and Crown lands purposes, and 321 plans and maps for other departments. The great economy and convenience to the Government and the public in having maps on the 1-inch scale, although referred to in former annual reports, is again adverted to for the purpose of pressing attention to the necessity which exists for better premises in which to conduct the lithographic work. The number of maps for publication will increase with the progress of the survey, and reprints will have to be made from time to time as a matter of course. At present there is too much hand-press work, and in this, as in all other manual operations, it is easy to produce a block of work. With more room and machinery a much greater quantity of work could be got through at a less proportionate expense of time and money.

EXTRA DEPARTMENTAL WORK.

Under this heading may be enumerated the surveys executed and still in progress for the Native West Coast Commission, under Sir William Fox; and the subdivisional surveys for the Native Trustee, Mr. Thomas Mackay, also the sectional surveys of educational reserves for the Otago School Commissioners, and the supervision of the sectional survey of part of the Otago Boys' and Girls' High School Endowment, Strath-Taieri. As the Government guarantees the titles of all the dealings with these lands, it simplifies matters greatly to have all the surveys conducted in strict conformity with the system in vogue in the survey of the Crown lands.

The Property-Tax Department having had to revalue the whole of the freehold lands of the colony during the year—having had, in fact, to compile a Domesday Book—necessarily required a great deal of assistance from the department, which was rendered willingly, although often at considerable inconvenience and delay to the proper work of the district survey offices. By the time the next three-yearly valuation has to be made, it is to be hoped that the work for both departments will be greatly lessened by the publication meanwhile of many more sheets on the 1-inch scale.

FUTURE OPERATIONS.

For the ensuing survey season about twelve parties will be solely devoted to the extension of trigonometrical and topographical survey. Applications for survey of Native blocks, aggregating an area of 700,000 acres, await disposal, and fully 200,000 acres of sectional surveys of Crown lands. The survey and roading of other blocks of Crown lands will also proceed in anticipation of future land sales and settlement. There is still a great deal of work to do in the taking and legalizing of roads in the North Island. This is a most troublesome and expensive work, and one which the department would gladly see completed. In the offices the usual reductions of survey plans, compilation of records, and preparation of description of titles will be kept up, and as many maps prepared for publication as the existing plant can turn out.

I have, &c.,

JAMES MCKERROW,
Surveyor-General.

The Hon. W. Rolleston, Minister of Lands.

RETURN of FIELD-WORK executed by STAFF and CONTRACT SURVEYORS, and of the COST of the SURVEY DEPARTMENT, in the Colony of New Zealand, from 30th June, 1882, to 30th June, 1883.

Districts.	Chief Surveyors.	Major Triangulation.		Minor Triangulation.		Topographical and Trigonometrical Survey.		Rural and Suburban.		Town Section Survey.		Native Land Court Survey.		Native Land Purchase Survey.		Gold-Mining Survey.			Roads, Railways, and Water-races.		Miscellaneous Work.		Total Charges against the Survey Votes for Twelve Months.					
		Acres.	Cost per Acre.	Acres.	Cost per Acre.	Acres.	Cost per Acre.	No. of Sections.	Cost per Acre.	Acres.	No. of Allotments.	Cost per Acre.	Acres.	No. of Divisions.	Cost per Acre.	Acres.	No. of Blocks.	Cost per Acre.	Acres.	No. of Sections.	Cost per Acre.	Miles.	Cost per Mile.	Cost.	Field-work.	Supervision, Inspection, and Office-work.		
Head Office and General	..	..	d.	..	d.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	£ s. d. 4,878 8 1
Photo-litho. Branch	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	£ s. d. 2,708 14 2
Auckland ..	S. P. Smith, A.S.G.	917,280	0.42	308,473	0.97	1,072,793	0.63	112,084	612	1/2.76	655.3	818	28/8.4	351,659	71	73.32	3,179	4	14	..	..	..	..	..	..	£ s. d. 2,648 3 328,688 18 10
Hawke's Bay	H. Baker ..	30,000	0.25	17,500	1	167,000	0.62	35,800	111	1/10.89	..	..	..	244	2	..	3,000	1	10	..	..	..	..	..	..	£ s. d. 1,944 17 10
Taranaki ..	T. Humphries	..	..	..	..	149,000	1.2	{ 40,706 *21,731	389 161	2/ 1/7.7	{ 40 173,700	4	18/1.2	{ 5.5 /10.6	..	..	..	..	..	..	..	..	..	..	..	£ s. d. 2,512 2 4
Wellington	J. W. A. Mar- chant	..	..	11,376	0.7	335,340	1.8	40,516	162	1/10.8	91.75	23	49/6	6,682	4	79.4	26,539	2	1.9	..	..	..	..	..	..	£ s. d. 4,810 2 10
Nelson ..	J. S. Browning	..	..	60,571	0.35	239,581	1.4	43,870	279	1/5.4	48	253	17/3.9	..	..	..	..	..	..	..	..	..	..	..	..	£ s. d. 2,605 18 2
Marlborough	H. Clark ..	320,700	0.20	..	..	347,300	0.73	3,496	57	1/10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	£ s. d. 604 12 6
Westland ..	G. Mueller ..	80,510	0.5	..	..	157,860	2.15	26,362	50	1/10.2	1	1	40/	..	..	..	..	..	..	..	..	..	..	..	..	£ s. d. 1,970 0 0
Ganterbury	J. H. Baker..	..	..	3,300	2	..	..	138,255	1145	1/3.5	56.75	206	21/3	..	..	..	..	..	..	..	..	..	..	..	..	£ s. d. 6,822 15 0
Otago ..	W. Arthur ..	..	..	16,317	1.1	324,972	0.92	175,300	724	1/10	577	343	16/8	38	5	3/6.75	..	..	..	..	..	..	..	..	..	£ s. d. 4,697 3 2
Southland ..	J. Spence ..	..	..	..	..	554,400	0.237	33,817	483	1/6.4	70	80	5/7	..	..	..	..	..	..	..	..	..	..	..	..	£ s. d. 1,832 3 11
Road Surveys, from 15th April, 1882, to 30th June, 1883	Chatham Isds.,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	£ s. d. ..
Totals and Averages	..	1,348,490	0.38	417,537	0.89	3,348,246	0.88	671,937	4173	1/3.2	1539.8	1768	20/2.5	486,573	156	4.76	32,718	7	3.87	8,987	161	14/1.3	691.55	11 18 9	448 8	7 12,058 7	3 86,623 10	8 42,338 6 11

* Surveys for West Coast Commission. + Surveys for Native Reserves Trustee. This sum does not include all the cost of the West Coast Commission surveys, as they were not paid by the Survey Department before 1st April, 1883.

Total expenditure for the year £ s. d.
 Less fees for surveys, sale of maps, &c. 128,961 17 7
 Net cost 7,231 8 0
 £121,730 9 7

APPENDICES.

APPENDIX No. 1.

REPORT ON THE SURVEY OBSERVATORY, MOUNT COOK, WELLINGTON.

MR. ADAMS to the SURVEYOR-GENERAL.

SIR,—

Wellington, 31st July, 1883.

I have the honour to report as follows on the Survey Observatory, Mount Cook, Wellington, since it was placed in my charge in October last :—

The Observatory building and the piers for the support of the instruments were not finished till early in November, 1882. As there was barely a month to prepare in, before the transit of Venus on the 7th December, all my time was fully occupied in taking observations for time and azimuth, and exchanging time-signals with the various parties who observed the transit of Venus. As I have already sent you a report on the observation of the transit of Venus, 1882, I will not refer to it further in the present report.

The equipment of the Observatory at present consists of an eight-day astronomical clock, by Dent, of London, No. 38415; a transit instrument and zenith telescope, both by Troughton and Simms; also a chronograph for electrically recording the observations, designed by R. L. J. Ellery, Government Astronomer of Victoria, and made by Joseph Brothers, Melbourne.

The sidereal clock is suspended from a well-braced framework of wood supported on a brick pier. The compensation of the pendulum is effected by a cylindrical combination of zinc and steel. The rate of the clock has been very steady since it was erected in November last.

The telescope of the transit instrument has an aperture of 3 inches with a focal length of 3 feet. The length of the axis from shoulder to shoulder (that is exclusive of pivots) is 18 inches. The pivots are $1\frac{1}{4}$ inches long and $1\frac{1}{4}$ inches in diameter. The transit instrument is provided with a very beautiful reversing apparatus, by which the telescope can be reversed in a few seconds, without any of the risk of disturbing the instrument that always attends the operation of reversing by hand. There are two finding circles, 4 inches in diameter, one on each side of the telescope. They are graduated to minutes, and can be set to show either altitudes or zenith distances. There are nine fixed vertical wires and one movable micrometer wire; seven of the fixed vertical wires are at intervals of about $3\frac{1}{2}'$ apart; besides which there is one extra wire on each side of the middle wire, and distant about $2'$ from it. There are also two parallel horizontal wires, about $3\frac{1}{2}'$ apart. The integer revolutions of the micrometer were read from a comb in the field of view, and the micrometer head was divided into a hundred parts, of which tenths may be estimated. The first business of an observer is to adjust the transit instrument, to find the equatorial intervals of the wires, the value of one revolution of the micrometer-screw, the value of one division of the level, &c. The transit instrument was adjusted for collimation on the 19th November, 1882, and the adjusting screws have not been touched since. As neither the equatorial intervals nor value of micrometer screw had been determined at the time of the transit of Venus, the collimation error could not be obtained and applied in a direct manner; but its effect was eliminated by taking half the observations clamp east and half clamp west, and from these observations the collimation error for every night can be calculated by the method of "least squares," if it is considered desirable. The equatorial intervals of the wires have since been obtained from 60 transits of clock stars recorded by chronograph, and 30 transits of circumpolar stars recorded chiefly by "eye and ear." To determine these intervals in a satisfactory manner requires a large number of observations, and I shall therefore avail myself of every favourable transit of circumpolar stars that I shall hereafter observe in order to get a reliable value of the intervals. The mean value, as determined from the ninety transits already calculated, are as follows: There are nine wires, numbered 1 to 9, the wire No. 1 being nearest to the clamp. For Clamp W. 1 = +41.763s.; 2 = +27.877s.; 3 = +14.012s.; 4 = +9.219s.; 5 = -0.034s.; 6 = -9.294s.; 7 = -14.026s.; 8 = -27.846s.; 9 = -41.650s. I may remark that Colonel Tupman employed over five hundred transits in order to determine the true value of the equatorial intervals. His transit had only five wires, so of course one with nine wires requires a great deal more calculation. The value of one revolution of the micrometer screw has been determined from four sets of observations on σ Octantis (s.p.), comprising one hundred and fifty-four observations in all, giving eighty-eight results. The mean value of these eighty-eight results gives $57''.943$ as the value of one revolution. I should prefer to supplement these observations by others on different circumpolar stars, as it is only by taking the mean of a great number of observations that a thoroughly reliable value can be obtained. The value of one division of the striding level was not furnished by the makers, and, as there was no level-trier available, I affixed the level to a Troughton and Simms's levelling instrument, and, altering the inclination of the level, I observed the divisions on a levelling staff, set up a short distance away. I took two hundred and twenty-two observations, about one-half at a temperature of 62° and the rest at a temperature of 78° . The results, while showing that the average value was about $1''$, unmistakably proved that the curve of the bubble-tube was not regular, as the value of one division varied from $\frac{2}{3}''$ at one part of the tube to $1\frac{1}{2}''$ at another.

By means of the zenith telescope (to which I shall hereafter refer) I can now test the divisions of any bubble-tube with ease and accuracy, and I expect to be able to furnish you with the results in a week or two.

Meridian Mark.—A north meridian mark was erected near the Wadestown Road, on the 27th October, 1882, a little over two miles north of the Observatory. It consisted of an ordinary trig. pipe, in which a carriage-lamp was fixed for night observations. From various observations it appeared that this mark was about 4 inches west of the true meridian, so, on the 4th May last, another pipe was put in 8 inches east of the first one, and the true north point is now supposed to be midway between the two trig. pipes. At the same time, a north meridian mark was erected for the zenith telescope, at 11.27 links east of the transit instrument meridian mark, as that is the distance between the two instruments in the Observatory. During the winter the smoke over the City of Wellington prevented the north meridian mark from being observed, except at rare intervals; besides which the north meridian mark did not show against the sky, which was a great drawback. It was therefore necessary to erect a south meridian mark on a spur near Island Bay, about three miles south of the Observatory, and this was done on the 6th July, at which time a south meridian mark for the zenith telescope was also erected. These marks are both painted black, and show out in bold relief against the sky. The south meridian mark for the zenith telescope serves a double purpose, as it is very convenient for finding the error of collimation of the transit instrument. Both north and south marks are at an altitude of 40', when viewed from the Survey Observatory on Mount Cook.

The Zenith Telescope.—This is the first instrument of the kind that has been used by the Survey Department of New Zealand for the determination of latitudes, and its use for that purpose, according to Captain Talcott's method, gives better results than can be obtained by any other portable instrument. The one in use at Mount Cook Observatory was made by Troughton and Simms, with all the latest improvements. The telescope has an aperture of $2\frac{1}{2}$ inches, and a focal length of 29 inches, two short eyepieces, with magnifying powers of 37 and 51, and a diagonal eyepiece with a power of 37. The micrometer screw carries a movable wire for the measure of the difference of zenith distances; its head is divided into 100 parts, of which tenths may be estimated. The whole number of turns are read off by means of a rack shown on the side of the field of view. There are also five fixed vertical wires, about $3\frac{1}{2}'$ apart, so that the instrument can be used as a transit instrument when required. The horizontal circle is 10 inches in diameter, graduated to read to $10''$, and the vertical circle is 6 inches in diameter, and is also graduated to read to $10''$. One division of the level = $1\frac{1}{3}''$ and one revolution of the micrometer = $70''$. The micrometer screw has an extreme range of $105'$ or $1^\circ 45'$, and may be safely used over a range of at least 1° . In America the instruments used are generally of the following dimensions, viz.: Aperture, $3\frac{1}{2}$ inches; focal length, 45 inches; magnifying power, from 60 to 120. One division of the level = $\frac{3}{4}''$, and one revolution of the micrometer = $45''$, and it is not considered advisable to use the micrometer over a greater range than $15'$ or $20'$. It will thus be seen that the American instruments have a much higher magnifying power, the level is more sensitive, and the micrometer has a slower motion, all of which conduce to the more exact measurement of an observation. On the other hand, the English instrument has a much greater range, besides being much more portable. On the whole, I consider the English instrument the most useful, and also calculated to give the best results, owing to the fact that many pairs of stars can be observed with it that are beyond the range of the American instrument. It must also be borne in mind that there is very little advantage in having an instrument with facilities for reading off an observation with very great accuracy, unless the observation itself can be made with nearly the same degree of accuracy. For instance, if an observer cannot observe an angle nearer than, say, $1'$, it is not of much advantage to him to be able to read off his angle to $1''$. As it has been proved that the average error of observation with the zenith telescope is about half a second of arc (owing to atmospheric disturbances and the difficulty of perfectly bisecting the star), it will be seen that the English instrument, by which an observation can be read off to a much smaller quantity than this, is amply sufficient for all practical purposes.

I will now give some details relating to the zenith telescope in use at Mount Cook Observatory. The value of one division of the level was ascertained in connection with the micrometer screw, by means of 216 observations to a distant terrestrial mark, and found to be = $1.303''$. The bubble-tube seems to have been ground internally with great care, as its indications have always been very regular. As the differences of zenith distance are measured by the micrometer, it is in the first degree important to ascertain with the greatest accuracy the value of one revolution of the micrometer. I have therefore taken 440 observations of κ Octantis at its eastern elongation, and 420 observations of ζ Octantis at its western elongation, making in all 860 observations, and the mean of all these observations gives $70''.174$ as the value of one revolution of the micrometer, with a probable error of $\pm 0''.004$. Taking a range of the micrometer screw = one degree, this probable error would amount to $0''.2$ or $\frac{1}{5}$ of a second of latitude. This is an extreme case; but, on the other hand, any small error in the estimated value of the micrometer screw may be eliminated by selecting the pairs of stars, so that the positive corrections may be equal to the negative corrections. But the most practical test, after all, is, what work does the instrument turn out? And here I am happy to inform you that the results obtained by this instrument seem quite equal in accuracy to those obtained in America and elsewhere.

I forward herewith a tabulated statement of the results obtained from the observations of ninety-nine pairs of stars, from which you will see that the resulting latitude of Mount Cook Observatory is $41^\circ 18' 0''.59$, with a probable error of $0''.05$, or only 5 feet when marked on the ground.

I have, &c.,

J. McKerrow, Esq., Surveyor-General.

C. W. ADAMS,
Geodesical Surveyor.

APPENDIX No. 2.

EXTRACTS FROM THE REPORTS OF CHIEF SURVEYORS IN CHARGE OF SETTLEMENT OPERATIONS IN DISTRICTS.

AUCKLAND.

Mean Degree of Precision attained in Surveys for the Period.—Following the course pursued last year, I have obtained from the surveyors a list of their trigonometrical and chain closures, a copy of which is appended hereto. I would point out that the paucity of closures under the first heading is due to the adoption of the Ray trace system of breaking down from the major triangles, which very often does not show any closure unless another Ray trace is adjacent to it and forms one of the closing sides. The mean discrepancy is 0.62 links per mile. In the chain closures it is 1.49 links per mile.

Major Triangulation.—The past season has not shown so large an extension of this class of work as was anticipated, the cause being that, for political reasons, it has not been deemed advisable to extend into the King country very far, though every preparation had been made and the work commenced. Mr. Cussen extended a few large triangles down to Kawhia to connect the Government township there with the other surveys of the colony. Mr. Baber returned again to his unfinished work in Urewera, and succeeded in covering a good extent of country, notwithstanding the opposition of a section of the Natives of those parts; but he finally had to leave the work incomplete for another season. The country in which the work lay is one of the most difficult in the colony to survey, consisting as it does of a mass of high forest-clad mountains without tracks, and in which the supplies have to be taken on men's backs for many days' journey. The pressure of Native Land Court surveys in that part of the Auckland Court District lying within the Province of Wellington was taken advantage of to extend the major triangles south and south-west of Lake Taupo, a work which was satisfactorily performed by Messrs. Simms and W. Cussen, authorized surveyors. During its progress stations were placed both on Ngauruhoe (Tongariro) and Ruapehu, from which more satisfactory heights for both those mountains were obtained, the former coming out as 7,376 feet, the latter as 8,878 feet; but, as these heights have not been checked from independent triangulations, they should in the meantime be considered as approximations only. Two polygonal closures by these gentlemen show the very small differences of 0.13 links and 0.4 links per mile respectively.

Minor Triangulation.—The 308,473 acres under this heading have been executed by the various officers in breaking down from the major work incidental to the requirements of section and other surveys; most of it is computed on the Ray trace system.

Topographical and Trigonometrical Survey.—The large area of 1,072,793 acres returned as completed includes 657,000 acres of work by Mr. Cussen, the plans of which were not ready to be included in last year's return, though the work had been completed in the field. It also includes the area of major work by Mr. Baber this year. The country sketched by the latter gentleman was quite unknown prior to his survey; it therefore adds considerably to the local geography of the southern Urewera country, and fills up the blank space on the maps of that part. The sketch furnished by Messrs. Simms and Cussen of their major work is not included under this heading, for, although it gives a great deal of useful information relating to a country hitherto not depicted on the maps, the work was not intended to be so complete as our usual style of topographical map. It would be very desirable in the interests of the public if the vast amount of topographical information accumulated in the Survey Office could be rendered more accessible and useful by publication on the one-mile maps.

Rural and Suburban Sections.—An increase in area of about one-third above the "output" for last season is shown for this season, the cost per acre of the 112,084 acres surveyed being 1s. 3d. per acre nearly, or slightly below the cost of last year. It will be observed, however, that the cost is brought thus low by the introduction of two surveys only, namely, that by Mr. Spencer of 34,687 acres, and that by contractor Ellison of 27,000 acres, both the surveys being in open country, and the sections averaging very large sizes. Exclude these two and the cost per acre of the other surveys is very high, except in one case. The reason is the same as that to which repeated reference has been made in past reports, namely, the trouble and time expended in picking up the old surveys abutting on to the new ones. During the past year most of the surveyors have been almost exclusively engaged on sections contiguous to or surrounded by old work, involving twice and three times the amount of labour incidental to new work. The areas thus surveyed in addition to the applications do not appear in the return, and thus tend to make the work appear more costly than it really is. There is no hope of this class of survey decreasing in cost. On the contrary, it must become greater, until the whole country has been resurveyed. The inaccurate surveys of former days, with their inefficient method of ground-marking, are now the direct cause of retarding settlement, as their rectification and identification take up the time of the surveyors, which might be otherwise much more beneficially employed in laying out more of the lands applied for. The delay in attending to the wants of the public in the matter of preparing lands for sale has frequently been a ground of complaint of late. Unless the survey-staff be largely increased the surveys cannot be kept up to date whilst so much time has to be devoted to insuring that what is done does not encroach on former granted lands. During the season 5,681 acres, in forty-three sections, were surveyed by private surveyors, under the homestead clauses of the Act. About 7,558 acres, at a cost of £1,254, were resurveyed in order that grants might issue, the original plans having been burnt, or information on them wanting; whilst about £1,567 have been expended in marking on the ground boundaries of land granted many years ago, but previously undefined.

Town Section Survey.—During the season a town was laid out at Kawhia by Mr. Edgecumbe, another at Te Aroha by Mr. Cheal, and a portion of Rangiriri by Mr. Stevens, and another at

Kawakawa (Newport) by an authorized surveyor. They have all had the usual standard points placed in them for future reference.

Native Land Court Surveys.—"The Native Land Court Act, 1880," which authorizes the advance to the Natives of the cost of the survey by Government has been much more widely taken advantage of this last year than at any previous time, and it is probable that the ensuing season will show a larger increase than the last. Of the 351,659 acres surveyed only 1,500 acres were done by the Government officers, the rest by the authorized surveyors working at schedule rates. The mean cost for the seventy-two blocks completed comes out at 3½d. per acre. In addition to this amount, eighty-five blocks, with an area of 326,498 acres, were surveyed and paid for by the Native owners or their agents. Part of this large area represents blocks which had been previously surveyed, but of which the Court had ordered subdivisions. Altogether 157 blocks, containing 678,157 acres, were prepared for the operations of the Court. As soon as the King country is fairly open to surveys extensive operations will commence. One block within that territory has already been completed. The subdivision of the old Native blocks is bringing to light great discrepancies. Mr. Inspector Barnard, at Gisborne, reports great trouble in reconciling the old with new work.

Native Land Purchase Surveys.—Only 3,179 acres, in four blocks, were surveyed for the department last year, though some extensive surveys of reserves within the purchased blocks are now in hand.

Roads.—Of the 110 miles laid out, about eighty were in exercise of the rights under the Native Land Acts, the rest either to open up Crown lands, or taken under the Crown grant reservations. A very large amount of this kind of work has to be done; very much more, indeed, than we shall be able to overtake before the rights lapse.

Detention by Native Opposition, &c.—The sum of £388 was incurred by opposition and delays caused through Native difficulties and others of a like nature.

Other Work, &c.—The principal items which go to make up the total under this head are: Inspection of surveys in the field, inspection of road works, cutting boundary lines not entered in the other columns, assistance rendered to other departments, repairs to trig. stations, and other matters which cannot be entered under an area head.

Standard Surveys of Towns.—During the year Mr. Williams has considerably extended the city survey, and enclosed some of the suburbs, and Onehunga; whilst he is at present engaged in laying down stone standards in Parnell, Newmarket, and Remuera. Mr. Barnard has also completed the Town of Gisborne. A very great deal of trouble has again been caused by some of the standards having been shifted, against which there appears to be no remedy.

Land Transfer Surveys.—A noticeable increase in the number of plans sent in for examination has taken place. In this office 199 plans of 22,256 acres, and in the Gisborne office ten plans, have been passed. This branch, now under Mr. Foster's charge, keeps three draughtsmen fully employed here, and one at Gisborne. The character of the work as a whole is very good, but a reference back to the surveyor for some further particulars is a constant occurrence.

Inspection.—Mr. Williams has examined a number of surveys during the year, diagrams of which, together with those by Mr. Barnard, have been sent to you from time to time. Owing to the large number of surveys received not more than 10 per cent. are examined in the field. I have visited ten of the parties engaged either on surveys or road works, having travelled 3,942 miles in the ninety-one days. I was away from the office on the service of the department.

Office-work.—The Chief Draughtsman's returns show that a large amount of work has been accomplished in the indoor branches of the department at Auckland and Gisborne, but of course the greater portion does not admit of its being exactly specified. As many as 699 plans of Crown land, roads, Native blocks, and land transfer work have been registered as received during the year, nearly the whole of which have to be replotted on to the block-sheets. This is an average of over two a day. It is manifest, therefore, that a large staff of draughtsmen is necessary to keep the work up; indeed the present strength of the indoor department is not equal to the work. The number of block-sheets prepared during the last six and a half years is 1,185, some work being shown on each; but it should be added that for a few districts, where the blocks are large and never likely to be subdivided into small holdings, the sheets are on the scale of 20, making four sheets to a district instead of sixteen. The number of record-maps is 128, and the trig. sheets of districts 148. I am sorry to say that the safe will not afford room for many more record-maps, all the available space being taken up. The lithographs printed are twenty-five, with 2,800 copies, the entire cost of producing which is £88 1s. 6d, whilst the sales amount to £51 3s. 6d. Eleven tracings of survey districts have been sent to the Head Office to be drawn for photo-lithographing, and others are nearly ready. They are much wanted, as the original lithographs on the one-mile scale are mostly out of print. Mr. Kennedy, the Crown Grant Draughtsman, has placed on grant, certificate, and Native title forms 2,027 marginal plans; whilst ninety-five Native title marginal plans have been prepared in the Gisborne office. The arrears of Crown-grant certificates on hand, most of them awaiting survey, amount to 231. Mr. Sturtevant has placed 720 marginal plans on the District Land Registrar's forms, making altogether 2,842 marginal plans for the whole district. Mr. Johnston, the accountant, has examined and passed 1,801 vouchers, representing a sum of £60,221 5s. 11d., being expenditure on surveys, roads, homesteads, and Great North Road. The correspondence, both in English and Maori, continues to increase. The refunds for surveys executed, and sale of stores, amount to £585 5s. 5d., which has been paid to the Public Account.

Work for the Ensuing Season.—The surveyors have already completed in the field, but the maps of which have not yet been deposited—Triangulation, 287,650 acres; sections, 14,570 acres; roads, 19 miles. They also have on hand, under instructions issued, 71,490 acres of section work, which will be worked off during the year, together with a large amount of triangulation and road surveys. In addition to the work for which instructions have been issued there is on hand 89,451 acres of section work in 375 localities, part of which is land requiring to be resurveyed before grants can issue. If this quantity is taken in conjunction with the new applications that are sure to come in during the

year, it is manifest that the staff will not get through with it. There are about 355,000 acres of Native block surveys now in the hands of authorized surveyors, which will be finished during the year. A considerable extension of the triangulation in the almost unknown country between Opotiki and Hicks Bay will be completed, and very probably the work will reach the King country if the present opposition of the Natives can be overcome. Two of the cadets trained by the department have passed on to the grade of assistant surveyors, and are engaged on surveys at the present time, and three more will have fulfilled their three years of service before next June. There is ample work for all of them.

S. PERCY SMITH, Assistant Surveyor-General.

AUCKLAND TRIGONOMETRICAL and CHAIN CLOSURES 1882-83.

Surveyor.	Trigonometrical.			Chain.			
	Number of Closures.	Mean Difference of Bearing of Closures.	Mean Ratio of Difference of Closures per Mile in Links.	Number of Closures.	Number of Traverse Lines.	Total Length of Traverse Lines in Miles.	Mean Ratio of Error of Closures per Mile in Links.
G. W. Williams* ... ..	..	...	...	4	30	5.9	0.58
S. Weetman ... ..	...	...	...	11	385	36.8	0.98
E. C. Goldsmith ... ..	...	...	...	5	73	10.5	3.34
L. Cussen	1	13"	0.5	7	85	17	2.3
F. Simpson ... ..	...	...	...	9	246	24.6	1.62
J. Baber	8	Polygon	0.52	...	...	...	...
F. H. Edgecumbe ... ..	...	...	...	19	235	39.7	2.2
R. Neumann ... ..	...	...	...	3	56	8.73	1.59
P. E. Cheal ... ..	...	...	...	6	134	40.1	0.7
W. J. Parris ... ..	...	...	...	4	76	4.9	5.1
J. H. Balnevais ... ..	...	...	...	17	406	32.7	1.9
G. A. Martin ... ..	...	...	...	16	180	20	2.9
E. H. Hardy ... ..	...	...	...	6	99	14.8	1.15
H. M. Smith	1	2"	0.6	11	283	23.2	2.3
C. Stevens	3	3"	0.45	9	158	29.2	0.53
J. Hannah	2	8".5	1.05	13	161	26.6	1.3
C. W. McFarland ... ..	...	...	...	5	81	28.1	2.5
H. A. Martin ... ..	...	...	...	17.	484	46.2	0.7
Totals	15	6".6	0.62	146	3,022	390.0	1.67

* Standard survey.

HAWKE'S BAY.

Triangulation.—The area triangulated is 214,500 acres. Mr. Hallett's surveys are 30,000 acres of major trig., cost per acre 0.25d., and 167,000 acres of minor trig. and topographical surveys, cost per acre 0.62d., extending over the Kidnapper, Te Mata, Waimarama, and Oero Districts. Mr. Irvine has made one small triangulation, 17,500 acres, connecting Portland Island with the mainland.

Settlement or Section Survey.—Out of the 35,800 acres surveyed, 18,773 acres are resurveys of old work, in which there is an excess of about 1,500 acres, sufficient to pay for the resurvey. The remaining 17,027 acres represent the blocks prepared for settlement and the lands purchased on application. The average cost for surveys in the open country is 9d. per acre; and in the bush, for sections containing from 30 to 320 acres each, 1s. 6d. per acre.

Native Land Court Surveys.—Only one block has been completed, a private survey, containing 244 acres.

Native Land Purchase.—A reserve of 3,000 acres for the Native owners has been marked off in the Raikaitai Block.

Roads.—There have been 123½ miles laid out in exercise of the road rights under the Crown Grants and other Acts, and through blocks which have been surveyed, but are not yet Crown-granted. The cost of the road surveys is subject to more variations than any other kind of work done in the district. In open and settled country the cost generally runs from £6 to £9 per mile, while in outlying and mountainous districts the price varies from £10 to £20 per mile.

Standard Surveys.—Mr. Rochfort has completed the field-work of the standard survey of the Town of Napier, and is now engaged upon the plans.

Land Transfer Surveys.—The area surveyed by licensed surveyors which has passed through and been examined is 38,984 acres, in 636 allotments, on 44 plans. The surveys of two large estates have also been examined, but will have to be carried on to next year's returns.

Office.—The tabular returns show that 327 plans have been drawn on Crown grants, certificates of title, and memorials of ownership. The maps completed, or commenced, under the present system number forty Crown-grant and land-transfer record-maps, twenty-seven trig. sheets, eighteen

topographical sheets, and 167 block sheets; in all, 252 plans. The eighty-chain survey district maps for lithographing will be pushed on as quickly as circumstances will admit. The return of work done for other departments shows that the cost of plans, tracings, descriptions, &c., for the Property-tax, Public Works, and Native Departments, and for local bodies, equals the salary of a junior draughtsman.

General Remarks.—The roads and triangulation completed by Mr. Hallett, who was absent from duty for two months on sick leave, have been executed expeditiously, and at a very small cost. Mr. Rich's surveys are very satisfactory, his maps being well drawn and his field-books and calculations exceedingly neatly kept. Mr. Irvine's surveys for the past year have not yet been inspected.

PROPOSED OPERATIONS AND WORK ON HAND, 1883-84.—The minor triangulation on hand for survey is 361,000 acres. Mr. Hallett, in connection with road surveys, will extend over 128,000, perhaps 200,000, acres, in the settled Districts of Waipukurau, Pouterere, and Porongahau. Standard bench marks will be laid down in the Townships of Kaikora, Waipawa, Waipukurau, and Porongahau. There are 145,000 acres to be done in the Waikare-Mohaka Confiscated Block; here, again, the triangulation will be carried out in conjunction with the surveys of blocks and roads. Mr. Price is closing the minor triangulation in the Hawke's Bay and Poverty Bay Circuits on the boundary line. Some small triangulations will be carried forward with the road surveys in several districts.

Section Surveys.—The area at present down for settlement surveys is 22,034 acres; for education reserves, 1,000 acres; for arrears of surveys, representing applications surrounded by old surveys, which must be marked off before titles can be issued, 4,666 acres; for new applications, school sites, &c., 279 acres: total, 27,209 acres.

Roads.—The mileage on hand through Crown-granted blocks and lands held under Native Land Court titles is 134. The most pressing demands being met, there is no occasion to anticipate the department not being able to overtake the roads required in all those blocks over which the rights have not yet expired.

Native Land Court Surveys.—An extensive area of 324,404 acres is down for survey; of this, 237,000 acres are subdivisions of the Waikare-Mohaka Confiscated Block. The back boundaries of the blocks abutting on the 39th parallel of latitude have never been defined; these will have to be surveyed: in other blocks use will be made of the old and adjoining surveys, which, in several cases, will only require to be connected with the triangulation. Sketch surveys of three blocks containing 75,814 acres, showing subdivisions and overlapping claims, have been prepared in readiness for the investigations to be held by the Court. In many cases where there are conflicting and overlapping claims the owners are saved much expense for surveys if sketch plans are first prepared, leaving the final traverse surveys to be made after the Court has decided upon the different claims.

HORACE BAKER, Chief Surveyor.

WELLINGTON.

UNDER the principal headings of the general return it will be observed that the out-turn of work consists of minor triangulation and topographical surveys, 346,716 acres; rural sectional surveys, 40,516 acres; Native Land Court and Native land purchase, 33,221 acres; roads, 108 miles; standard surveys of Wanganui and Marton.

Triangulation.—The extension of triangulation last season was accomplished—(1) by Mr. J. A. Thorpe, in the country lying between Otairi and Murimotu, on both sides of the road from Marton to Taupo; (2) Mr. District-Surveyor Dundas covered the Northern Otamakapua Block between Barton's road-line and the Rangitikei River; (3) Mr. District-Surveyor Northcroft completed the triangulation and topographical survey of portions of the Crown lands in the Forty-Mile Bush country, west of the Puketoi Ranges; and (4) Mr. District-Surveyor Climie's area comprises the mountains and hills between Port Nicholson and the Wairarapa Lakes. Considering that the triangulation was carried over mountainous and hilly forest country, generally difficult of access, the surveyors may be congratulated upon the low cost per acre. It will be observed that Mr. District-Surveyor J. D. Climie is entitled to most credit on account of the extent and cheapness of his work. The mean linear error derived from a comparison of all the closures made upon common sides amounts to $6\frac{3}{4}$ inches per mile. The mapping has been executed in a practical, complete, and finished manner. If the autumn weather had not been so unfavourable, Mr. Climie would have increased the out-turn of work under this head by 80,000 acres; and Mr. District-Surveyor L. Smith would have furnished diagrams and topographical plans of 120,000 acres in the Mangahao District; Mr. Assistant-Surveyor Struthers also had 60,000 acres of the Awhea country all but triangulated.

Settlement Surveys.—The lands surveyed under this head were either to define the remaining applications made in conformity with the original Wellington Land Regulations, or of ordinary Crown lands for sale; and comprise the Himatangi Block, South and East Mauriceville, and Dreyer's Rock country, and areas in the Wangaehu, Wainuiomata, Awhea, Pohangina, and Pakowhai Districts. There are now no arrears of applications to be defined. The sectional surveys are yearly becoming more costly, owing to the greater care and time bestowed in running trial grades for roads in forest country of complicated features, and the extra cutting and pegging necessitated in surveys of detached areas contiguous to imperfectly demarcated prior work. Return No. 4 shows that the mean linear error does not exceed two and a quarter links per mile. Before proceeding to the consideration of the other classes of survey, I desire to remind you that some of the sectional areas, besides others now being surveyed, cannot be offered for sale until opened up by roads, and that, owing to the time required by the counties or Road Boards to carry out such works, a considerable period of time must elapse before the blocks can be offered to the public, additions be made to revenue, or fresh areas of land be brought under cultivation. The blocks which require to be made accessible are the Paratieke, Karewarewa, and Heao, in the Wanganui District, the Otairi in Upper

Rangitikei, the Waitapu in Upper Manawatu, the Pohangina East, the Makuri, Forty-Mile Bush, and the country south of Eketahuna and Mangaone. These areas are in addition to the blocks in the Forty-Mile Bush District for which roads have been decided upon.

Native Land Court and Native Land Purchase Blocks.—Surveys of this class are beset with difficulties similar to those attending the settlement work. In addition to the area surveyed by the staff, authorized surveyors furnished twenty-eight plans comprising an area of 43,703 acres; these were all examined, verified, and approved, and in many cases the surveys were inspected upon the ground. With the addition of sketch plans the total area defined for the Native Land Court amounted to 130,150 acres.

Roads.—A large proportion of the road surveys was undertaken in accordance with the powers conferred by statutes to secure and dedicate to the public lines of communication in various localities. It would be difficult to estimate the value of the road surveys, but if account be taken of (1) the saving affected to County Councils and Road Boards in the avoidance of compensation claims; (2) the advantage and convenience accruing to the holders of sections to which rights of way have been provided; and (3) the facilities afforded to surveyors by these standard road traverses, there can be no question as to the great public gain accomplished.

Town Standard Surveys.—The standard surveys of the towns of Wanganui and Marton, executed by Messrs. John Annabell and J. F. Sicely, assistant-surveyors, supply a long-felt want; the imperfect and unreliable state of the original plans, and the absence of points of reference upon the ground, have hitherto rendered the demarcation of properties under the Land Transfer Act in those places costly and unsatisfactory. The advantages offered by the standard traverses will be appreciated by the local surveyors and their clients.

Miscellaneous Surveys and Duties.—Of the minor duties performed by the field staff, you will observe that much useful explorations of back country have been carried out by Messrs. Dundas, Annabell, and Sicely in the Wanganui, Turakina, and Rangitikei Counties, and by Messrs. L. Smith and Northcroft in the Forty-Mile Bush District; the results have already been furnished to you and the officers of the Public Works Department, to whom the information was, I venture to say, of some convenience and service. The surveyors have restored and permanently marked by iron tubes, &c., a large number of old trig. points; they executed surveys of small sections, such as sites of public buildings; a large amount of redemarcation of section lines in settled districts was done to the satisfaction of the settlers; incomplete plans of old surveys were finished from data found by actual survey. Apart from the survey proper of Crown lands it is manifest, from an examination of the returns, that the survey vote has been heavily taxed to carry out surveys and perform office work for the Land Transfer, Native Land Court, Property-Tax, and other departments of the public service; the sum thus expended in the Wellington District amounts to £3,719 12s. 5d. This may seem a large amount, but I doubt if the same results could be attained by any other agency or means for double the cost to the taxpayers; and I am convinced that much of the duties performed by the staff could not be so efficiently done by others, owing to lack of necessary experience and acquired information.

General.—There appears to be no necessity to reopen and discuss the various questions and difficulties referred to in previous annual reports; but it will suffice to state that attention has been given to every point raised in a manner approved by yourself. The requirements of the public, whether made known through the Government departments, local bodies, or by direct application, have been attended to. Field inspection has not been neglected, as my periodical reports will prove. The surveys were generally well executed in every detail; the quality of the work was good, and the field-books and plans are up to requirements. I have much pleasure in testifying to the general efficiency, zeal, and diligence of the surveyors. I have already drawn your attention to special cases of meritorious service.

Office.—Under Mr. Mackenzie's supervision good progress was made in overtaking arrears of mapping, and much useful work was performed. Increased duties have devolved upon Mr. F. H. Tronson, in consequence of the transfer of part of the Native Land Court duties to this office. Mr. Mason managed the Land Transfer Branch in a satisfactory manner. The clerk kept the accounts and conducted efficiently his share of a largely-increased correspondence.

Expenditure.—The expenditure for the year was apportioned as under: Field-work, £9,149 4s.; office expenses, £4,536 18s.; besides expenses of draughtsmen attending the Native Land Court, £72, and legal expenses, £33 12s. 6d. The liens registered for Native Land Court surveys, as per Return No. 5, sum to £1,129 19s. 7d.

Operations for the Year 1883-84.—It is proposed, with your concurrence, to direct the efforts of the staff as follows: Mr. Dundas to continue the triangulation of Otamakapua; to sectionally survey after laying-off and superintending the proposed road construction on Waitapu Block, of 29,000 acres; to make a standard survey of Palmerston North. Mr. L. Smith to survey sections at Eketahuna; two blocks of Native land at Otahoua; complete triangulation of 120,000 acres at Makuri, and extend same; survey the Masterton-Woodville Railway-line, where located about Eastwell's Clearing and Dreyer's Rock; and complete sectional surveys of Crown lands in the same locality and in Makuri District. Mr. Northcroft to complete settlement surveys of 10,000 acres at Rangitumau. Mr. Climie to complete triangulation of Rimutaka, Onoke, and other districts; to lay off and legalize road-lines to Terawhiti Gold Field, and through various blocks and sections in Hutt County, and undertake miscellaneous duties as required. Mr. Annabell to sectionally survey Paratieke and other blocks of 8,000 acres, and West Tokomaru Block of 4,000 acres; traverse Field's Murimotu Road; undertake the surveys of any roads required to be legalized; extend triangulation in back country; undertake any Native Land Court and miscellaneous surveys in the Wanganui District, and the construction of Murray's Murimotu Road. Mr. Sicely to survey and legalize roads in Rangitikei County, and extend triangulation in back country. Mr. Tone to survey and legalize roads in Wairarapa Counties; survey Native Land Court blocks, and complete triangulation of

Mangaraki country. Mr. Struthers to complete triangulation of the country between the Wairarapa Lakes and Awhea District; survey a block of 8,000 acres for the Native Land Court; and traverse and legalize roads in South Wairarapa. Mr. Thompson to complete back and side line survey of the Paraekaretu Block. Mr. Ashcroft to assist Mr. Annabell; Mr. Greville and Mr. Crombie to assist Mr. Smith.
 J. W. MARCHANT, Chief Surveyor.

TABLE showing TRIG. CLOSURES, 1882-83.

Surveyor and Survey District.	Average Error in Summation of Angles.	Side.	Bearings.	Distances.	Error per Mile (Links).	Remarks.	
N. J. Tone, Kopuara-nga and Tiffin	7"	Arikirau-Rangitumau, close on Arikirau	° ' "	lks.	lks.	Four triangles to fix three new stations.	
		Pukehinau	186 48 26 48 30 diff. 4	22,092·8 22,092·8 0·0	..		
J. A. Thorpe, Mau-ngakaretu and Tiri-raukawa	8"	Base P-L not closed on a side, checked on Δ W	difference of 5·4 and 4·2 in	co-ordinates 453 chains	17,644·2	Three triangles to fix Two stations.	
		Starting from CG and CP, closing on BF 7 triangles	42·4		0·8
		From BF through 3 triangles to FA	diff. 1·8		0·7
		From UF through 4 triangles to US	24,749·5 51·8		0·1
		From SP through 4 triangles to ST	diff. 2·3		0·8
		From ST through 1 triangle to TH	20,592·1 92·4		0·4
		From XT through 2 triangles to VR	diff. 0·3		0·8
		CP	22,372·1 69·9		0·2
		PK	diff. 2·2		0·9
		KI	21,447·8 46·6		3·0
		IH	diff. 1·2		0·4
		HR	20,156·4 56·0		0·2
G. A. Northcroft, Mangaone and Kopu- aranga	9"	Side closed on itself through six triangles	diff. 0·4	Comparison with work by John Annabell.	
		BO from BA	200 33 53 40	18,357·9 59·9	0·9		
		SM from SU	diff. 13	diff. 2·0	0·4		
		BD from BE	201 14 3 13 48	16,515·5 21·7	0·2		
		BD from BS	diff. 15	diff. 6·2	3·7		
		BC from BT .. .. .	..	18,251·8 51·0	2·9	
		BC from BA .. .. .	..	diff. 0·8	2·3	
		.. .. .	..	21,574·2 74·8	0·2
		.. .. .	..	diff. 0·6	0·2
		.. .. .	100 23 30 23 37	30,966·0 52·2	0·6	
		.. .. .	diff. 7	diff. 0·6	0·2	
		.. .. .	90 14 4 14 2	18,169·7 63·0	0·2	
.. .. .	diff. 2	diff. 6·7	0·2				
.. .. .	..	45,488·2 501·2	0·8			
.. .. .	..	diff. 13·0	0·2			
.. .. .	..	27,470·4 69·7	0·2			
.. .. .	..	diff. 0·7	0·2			
.. .. .	..	35,290·4 89·6	0·2			
.. .. .	..	diff. 0·8	0·2			
.. .. .	..	46,057·2 57·0	0·2			
.. .. .	..	diff. 0·2	0·2			
.. .. .	..	15,760·3 58·5	0·2			
.. .. .	..	diff. 1·8	0·9			

TABLE showing TRIG. CLOSURES, 1882-83—continued.

Surveyor and Survey District.	Average Error in Summation of Angles.	Side.	Bearings.	Distances.	Error per Mile (Links).	Remarks.
G. A. Northcroft, Mangaone and Kopuaranga		AP from AM	lks. 59,188·7 79·8 diff. 8·9	lks. 1·2	Comparison with work by Messrs. Marchant, Dundas, and Carkeek.
		AE from AB .. ..	..	39,946·7 56·1 diff. 9·4	1·9
		NP from MP .. ..	..	33,139·7 34·8 diff. 4·9	1·2
		LM from SE .. ..	..	28,819·4 23·0 diff. 3·6	1·0
		RM from SU .. ..	..	39,378·9 74·5 diff. 4·4	0·9
J. D. Climie, Belmont, Pencarrow, and Rimutaka	10'	Somes-Cameron through 4 triangles on Somes-Korokoro	20,139·9 40·9 diff. 1·0	0·4	Comparison by closures within area of triangulation.
		Lowry - Hawtrey, close through 4 triangles on Lowry-Gear .. ..	..	24,758·6 57·7 diff. 0·9	0·3
		Hawtrey - Cameron close through 2 triangles on Hawtrey-McKerrow .. ..	..	27,067·8 71·0 diff. 3·2	0·9
		Lowry - McKerrow close through 2 triangles on Lowry-Fitzherbert .. ..	..	30,595·2 97·1 diff. 1·9	0·5
		Mowlem - McKerrow close through 3 triangles on Mowlem-Fitzherbert	18,243·4 40·1 diff. 0·7	0·3	Comparison by closures within area of triangulation.
		Cameron - Somes close through 5 triangles on Cameron-New Grace .. ..	..	21,445·5 40·4 diff. 5·1	2·0
		New Grace-Wangaepu close through 3 triangles on New Grace-McKerrow .. ..	..	21,679·2 82·0 diff. 2·8	1·0
		Wangaepu-Pencarrow close through 4 triangles on Wangaepu-Tapokopoko .. ..	..	24,182·2 80·0 diff. 2·2	0·7
McKerrow-New Grace close through 4 triangles on McKerrow-Puketaka .. ..	..	30,110·6 11·5 diff. 0·9	0·2		

Position of Trig. Devine from previous triangulation by Messrs. J. Mackenzie

and J. Sircom = N. 22,152·2 E. 71,577·9 from Somes

Position by Mr. J. D. Climie's triangulation = N. 22,146·1 E. 71,578·3

Difference in 26½ miles = N. 6·1 E. 0·4

Mean error = 0·85 links per mile.

TABLE showing TRAVERSE CLOSURES, 1882-83.

Surveyor.	District or Locality.	Average Length of Lines in Chs.	Error per Mile.		Remarks.
			Mn.	Pr.	
J. F. Sicely ..	Wangaehu ..	lks. 7·7	lks. 2·2	lks. 2·8	Road traverse; mostly open country.
N. J. Tone ..	Otahoua ..	8·7	1	2	Open country.
" ..	Kopuaranga ..	8·8	2·1	3·2	Section boundaries and road traverses; forest.
" ..	Tiffin and Huangarua ..	12	1·9	1·2	Road traverses on formed roads principally.
G. Struthers ..	Waipawa ..	3·4	3·2	2·5	Traverses in forest and open country; rough and broken.
" ..	Kaiwaka ..	5·8	1	0·5	Ditto.

TABLE showing TRAVERSE CLOSURES, 1882-83—continued.

Surveyor.	District or Locality.	Average Length of Lines in Chs.	Error per Mile.		Remarks.
			Mn.	Pr.	
E. R. Foster ..	Mikimiki ..	3.2	8.3	1.6	Traverses of roads and rivers; forest.
" ..	Kopuaranga ..	3.1	3.1	3.3	Road traverses and boundaries.
J. Annabell ..	Waipakura ..	3	1.3	2.2	Road traverses; open country, fairly level.
" ..	Mangawhero ..	15	0.2	0.2	Ditto.
" ..	Wairoa ..	6.1	1.8	1.4	Ditto.
G. A. Northcroft	Kopuaranga ..	8.4	2.2	1.4	Road traverses; undulating, partly forest.
L. Smith ..	" ..	4.6	4	1.8	Road traverses; three-quarters broken forest country, the rest formed roads.
A. E. Ashcroft	Castlepoint, &c. ..	4.7	2.7	3.4	Road traverses; mostly scrub.
" ..	Waipakura ..	5.5	..	1.5	Road traverse; open country.
R. P. Greville ..	Wellington ..	2.6	2.2	2.5	Boundaries; open country.
" ..	Akatarawa ..	4.5	1.5	4.3	
A. Dundas and C. Thompson	Pohangina ..	4.5	4.3	4.6	Road traverses and boundaries; broken forest country.
Ditto ..	" ..	5.3	1.1	1.8	Ditto.
J. D. Climie ..	Belmont ..	6.8	1.2	2.5	Mostly rough open country.
	Mean error ..	..	2.26	2.23	

STANDARD SURVEYS.

J. D. Climie ..	Wellington	0.56	0.65	Traverses of streets and unformed roads. Ditto.
J. F. Sicely ..	Marton ..	..	0.5	0.5
" ..	Bull's ..	..	0.3	0.6
J. Annabell ..	Wanganui ..	..	0.9	0.7
	Mean error	0.56	0.61	

TARANAKI.

THE following is a summary of what is to be found in detail in the accompanying tabular statement. Trigonometrical and topographical survey, 149,500 acres, at 1.2d., £770 16s. 9d.; rural and suburban (settlement), 40,706 acres, at 2s., £4,077 10s. 7d.; town, 40 acres, £44; Native Land Court, 54,250 acres, at 5.5d., £550 12s. 6d.; West Coast Commission, 73,700 acres, at 10.6d., £3,252 9s. 7d.; Native Reserves Trustee, 21,731 acres, at 1s. 7.1d., £1,734 10s. 1d.; railways and roads, 18½ miles, at £50 13s., £1,112 15s. 5d.; other work, including work in progress, £2,771 19s. 5d. The work performed this year has far exceeded that of any previous one. This is mainly due to our having, in October last, taken over the conducting of the surveys in connection with the West Coast Native Commission, and in the following December undertaking those required by the Native Reserves Trustee in subdividing for leasing the large reserves on the coast. The total area of the various classes of work executed during the year amounts to 340,000 acres, 93 per cent. of which is in forest.

Triangulation.—The 149,500 acres just finished completes the whole circuit around Mount Egmont, a distance of 120 miles. It commences at Waitara and follows the coast to the Patea District, which is all open land, and completes the circuit through the forest, thirty miles east of Mount Egmont, to the initial at Waitara. We have covered with triangulation nearly if not all the country that will be affected by settlement work for some time to come, but shall be obliged to extend it further northward, near the Wanganui River, and also towards the Mokau, as a basis for the Native Land Court surveys.

Settlement.—Of the 40,706 acres returned, 6,507 acres are near Cape Egmont, in what is commonly known as the Parihaka District, about half of which is in open country. The remainder lies in the forest at the back of the Waimate Plains, and abuts on the Stratford and Eltham Roads. The average cost of the whole of the sectional work is 2s. per acre—considerably lower than that of last year; but the rate will necessarily alter from year to year, the conditions being variable. The survey of a further 6,000 acres is in progress, and drawing near completion.

Native Land Court Survey.—Under this head are 54,250 acres, costing 5.5d. per acre, 12,390 acres of which have been for Natives who have refunded the expenses, amounting to £449. The 34,680 acres which appears on the return without a surveyor's name is part of the Mangaotuku Block, a Government purchase, and has been compiled from the late triangulation surveys of adjoining blocks done this year, and work done on the block in 1878, the cost of the latter appearing as £550 12s. 8d. The Tutaiairi Block, of 5,894 acres, was surveyed by a surveyor employed by the Natives, and who was paid direct from them. This was an old work, taken in hand previous to the Act of 1880. The work has been inspected and the maps approved, but it does not appear in the statement of work. Messrs. Palmerston and Scott have a contract for another block, estimated at 30,000 acres. They have been some months at work on it, but have as yet received no advances.

West Coast Commission.—In October last, in consequence of illness of the late Captain Skeet, it was arranged that the department should undertake the conduct of these surveys, and since that period nearly 74,000 acres have been completed, besides other work which cannot be enumerated in the schedule. The nature of this work is in a great measure unlike any other. A great portion of

it is subdividing into hapu divisions, varying from 1,000 to 15,000 acres. Another part is rural-section work of the severest type, in the locating of compensation awards to the precise acre, and of which there are 13,500 acres. These sections vary from twelve to 500 acres, the smaller predominating, as instance a case at Onairo, where 760 acres are cut into thirty-eight sections averaging twenty acres each. Since I have taken charge 103,400 acres of this work have come into the office to be dealt with, but the return only shows what has actually been done since that time, now nine months. Having in view the ultimate subdivision of the hapu divisions for leasing, road-lines have been run and made the boundaries wherever practicable, instead of arbitrary lines, which would of necessity have created great confusion in the cutting-up. This course has made the work more expensive, but will be a saving in the end, and is preferable in every respect. The bulk of the work is now done, everything is completed south of New Plymouth, and, with one or two exceptions, the Crown grants are either executed or now in preparation. To the north of New Plymouth 12,200 acres are surveyed, but there still remain about 24,000 acres to be done, 1,800 of which is in hand. What is before us is in very broken forest country, and the greater part compensation awards, so that the survey will be necessarily slower and more expensive than what has already been done. Notwithstanding this, I anticipate seeing the end of this particular work a few months hence. During the year there have gone out from the office 101 draft Crown grants to Natives, representing 103,440 acres, and seventeen more are in preparation, comprising a further 49,270 acres; these will be cleared off in July.

Native Reserves Trustee.—This is the subdivision for leasing of the lands that have been set apart for the Natives by the West Coast Commission. Notwithstanding that the exterior boundaries of the several grants have been surveyed, a considerable amount of work is entailed in laying-off roads through the larger blocks, and in scheming the sections, which latter are often altered as the work progresses, to suit the requirements of the Natives. In some cases work has had to be abandoned for this reason. These surveys were commenced in the latter part of November, and since that time there has been an average of three surveyors upon them, resulting in the subdivision for leasing of 21,731 acres. A further 3,000 acres is in hand on the Continuous Reserve, and the balance of that portion of the Opunake Block at present proposed to be leased.

Roads and Railways.—The rates on some of these items appear high, but when the circumstances are considered they are not unreasonable. The road over the Whitecliffs range has been a very difficult and tedious work. Trial lines have been cut through the forest and graded for miles in different places; but finally a line for the main road to Mokau has been determined upon, the steepest grade being 1 in 15. It will be an expensive road, but is the only practicable one through this piece of rugged wooded country. Again, the railway surveys have been costly, in consequence of two miles out of the five running through town and suburban lands; in fact, right into the centre of New Plymouth, and this amid surveys of forty years ago.

Other Work.—This item of £2,771 19s. 5d. includes the cost of surveys in progress (amounting to 23,000 acres), inspection, exploring, and a number of other works which could not be classed under any of the headings in the return. The latter is especially the case with the peculiar and intricate work of the West Coast Commission.

Inspection.—Having had as many as twenty-two parties in the field, I have been compelled occasionally to avail myself of the services of Mr. Bird, the senior Staff Surveyor. During the year I have made thirty-seven inspections, and Mr. Bird eight. Constant attention has been needed with the surveys for the Reserves Trustee, as so many questions arise beyond the power of the surveyor to decide. In the work that has been returned this year, 213 miles of road have been run, mainly in the forest. Inspection in this particular is very necessary, but, while a great deal has been done in this way, it has been impossible to go over all the lines. With regard to the character of the surveyors' work I have pleasure in reporting it to be thoroughly good. The closes, both instrumental and measurement, are quite equal to those of preceding years. While the work as a whole is excellent, I do not venture to say that there may not be a slip in such a mass of work, such as in laying-off a section-line.

Office Work.—After what has preceded, it is almost needless to say that the office work has been very heavy, and were it not for the additions latterly made to our small office staff we should have been overwhelmed with the great inrush of pressing work during the last six months. There has been pressure on all sides: From the Crown Lands to prepare land for the market; from the West Coast Commission to issue as speedily as possible the Crown grants to the Natives of the lands awarded to them; and from the Reserves Trustee to get the land ready to be leased with the greatest expedition. In justice to the officers, I must say that they have done well, and to their utmost have endeavoured to meet the demands. Both Commission and Reserves Trustee's surveys entail a great amount of office work, it all having to be arranged here, and complete schemes of the subdivisions made and given to the surveyors to work from. Of Crown grants plans and descriptions in quadruple, 146 have been prepared, comprising 103,824 acres; certificates of title, in lieu of Crown grants, 436, representing 1,854 plans; 1,020 plans placed on ordinary certificates of title; 46 land transfer surveyor's plans passed, and 22 drawings for photo-lithographing have been made.

Future Operations.—The triangulation, which has now reached Pukearuhe, I would recommend to be continued through to Mokau, and, as topography is always combined, it will give a good insight into and valuable information respecting a part of the country of which at present so little is known. The Native difficulty, which has for so many years been the obstacle to our operations in this direction, I have reason to believe is now removed. In the settlement-work we have to complete the forest land at the back of the Waitara, and I would propose that some should be done during the coming season in the Waitara Valley, near Kawau and Taramokou, where there is good land, both agricultural and pastoral, and will be but about twelve miles from the railway-line. We have, as stated before, 24,000 acres to complete for Sir William Fox; and the Reserves Trustee will be requiring, beyond the 10,000 acres we have in hand, a considerable amount more at Stony River and north of Waitara.

THOMAS HUMPHRIES, Chief Surveyor.

NELSON.

Minor Triangulation without Topography.—Under this heading an area of 60,571 acres has been triangulated for the purpose of locating old surveys and checking road traverses in the Amuri Circuit.

Topographical and Trigonometrical.—An area of 239,581 acres has been executed during the past year, at an average cost of a trifle less than 1½d. per acre. Of this amount 138,805 acres were in the Amuri Circuit, and some portion of it was in progress during last season. Triangulation has now been extended as far easterly as the main range, to the Hurunui, Hope, and Doubtful Passes, by Mr. F. Smith, while Mr. F. Thompson has carried up triangles as far north as Fowler's Pass on the Clarence River. They have been ably assisted by Mr. F. Greenfield, a promising young cadet, who has now completed his term. There has been much bad weather in the ranges during the past season, which has somewhat delayed field-work, as the stations are in high elevations. The mean height of the stations is 5,160 feet above sea-level, only three being under 4,000 feet. A close has been made on the Canterbury triangulation on side B (the mound), Mandamus District, to A, Culverden District, with a difference of 10" in bearing and 0.25 links per mile in distance. In 48 triangles the mean error in summation is 8".9, and in 38 subsidiary triangles, 7".7. Of subsidiary triangles 40,000 acres have been broken down from the above to give starting-points for future surveys on the lower grounds, and 100,000 acres of triangulation are in progress, and the field-work partially done, but which has been stopped for the present by the winter season. That so large an amount of work has been done in this mountainous part during the summer season speaks well for the zeal and perseverance of the officers engaged. In the Nelson Circuit triangulation has been extended to cover sectional surveys in the Hope and Howard Districts, by Mr. T. Sadd, over an area of 60,571 acres. In the Collingwood Circuit 44,688 acres have been triangulated for the same purpose by Mr. C. Lewis. This officer has been unfortunately disabled for several months during the year from an accident occurring when, at work. I am not able to report the closure of the trig. work of the Nelson and Collingwood Circuits this year, as some breaking-down is still required to obtain it.

Sectional Surveys.—There have been 279 sections surveyed, containing 43,870 acres. Although the area is about the same as last year, of this amount 20,134 acres, in fourteen sections, are surveys in the Amuri Circuit by Messrs. Smith and Thompson, of leases which had only previously been marked off on the office maps. Less settlement-work has been done during the past year than in the one previous, owing to increased activity, and the resulting demand for surveys, in the gold-mining districts.

Gold-Mining Surveys.—The surveys of 342 leases, averaging 16½ acres, have been made during the twelve months; also sundry mineral leases, specified under other work, and one water-race survey. The rush of applications for mining leases, reported as taking place at the end of last year, was continued into the present one, which began with 180 applications in arrear of survey in the Reefton District alone, and 202 more were received for survey during the year, besides a number of others afterwards withdrawn or refused. As the largest number were in the Reefton District, as much strength was concentrated there as was available, and latterly the services of Messrs. Watkin and Little, authorized surveyors, were obtained. By dint of hard work through a good deal of bad weather, 259 lease surveys were made, and the work so far overtaken there that by the 30th June only twenty-three applications were in arrear. Different localities were, as far as practicable, assigned to each surveyor, and general attention and arrangement of details, made necessary in surveying leases over such a rugged bush country, pegged out in claims for some miles by miners, was ably given by the District Surveyor, Mr. J. A. Montgomerie. With that officer's assistance, proper checks were made of the work done, and its excellent quality in so difficult a country is shown by the table of closures attached to this report, and reflects credit on the officers employed. Mr. T. Foy resigned his appointment at the end of the year, and I regret losing a very efficient though young officer. The mining surveys at the Waimangaroa, Mokihinui, and Lyell were undertaken by Mr. Snodgrass, Assistant-Surveyor, and Messrs. Young, authorized surveyors, and the arrears on hand at the end of the year only amount to sixteen. A few suburban sections were surveyed by Mr. Snodgrass adjacent to the Lyell Township, as the only available land in the neighbourhood was being squatted upon by miners or others.

Town Surveys.—An extension of the Lyell Township, amounting to 130 sections, was laid off by Mr. Snodgrass; and one of the Waiiau Township, where 123 additional sections were laid off by Mr. F. Smith.

Road Surveys.—Seventy miles of road have been traversed in the Amuri Circuit by Messrs. Smith and Thompson during the winter season, with a view of taking the necessary steps for legalizing those portions requiring it. There is a considerable length of roads in the Nelson District which have been constructed by the Provincial Government, Road and Highway Boards, at various times in the past years, with deviations also in many places. These require survey before the necessary steps to legalize them can be taken, and an officer is required who can devote his whole time to this work, which is urgently required, but at present must stand over on account of pressure of settlement surveys. Much of this work, I consider, ought to be done by Road Boards, but their funds are too small to pay for cost of survey, which, in scattered and thinly-settled districts, is expensive.

Land Transfer Work.—There have been 150 plans examined and passed, 422 plans placed on certificates of title, and on 11 Crown grants. This work is under the charge of and executed by Mr. F. Curtis.

Other Work.—The cost of the miscellaneous work done by the staff is shown in the accompanying return.

Office Work.—During the year one cadet has entered, and two draughtsmen have been added to the former staff. The work of plotting and recording field-work is carried on by Messrs. Thom-

son, Brown, and Begley, the first being computing draughtsman. Plans of 621 sectional and mining surveys have been examined and passed, and work recorded on thirty-four new block-sheets. Messrs. Pollock and Carrington have been generally employed in preparing leases. There have been 1,024 plans placed on titles, and 512 leases and licenses, containing an area of 305,171 acres, have been put through, and the previous arrears of which surveys had been made are now worked off. Much miscellaneous work has been done in the office for various departments, and mining maps have been prepared for photo-lithograph of the Lyell, Reefton, and Boatman's Districts, since published. Mr. Park, clerk and draughtsman, has been very useful in assisting with the accounts and correspondence of the office. Mr. J. Dreyer, having completed his term of office work, has been placed in the field. The office work is under the charge of Mr. H. Trent, chief draughtsman, and has been steadily increasing during the last three years, as shown in the accompanying statement. During the year we have been enabled to place our most valuable records, &c., in the fire-proof safe.

Arrears of Sectional and Mining Surveys.—The increase in the mining work being much larger than in the previous year, less sectional work was done. The arrears remain about the same as last year, although an increase in the number of applications received during the period ended has taken place. There is an increase in the area applied for over last year of fifty-four sections, amounting to 22,937 acres. The arrears at present are 90,873 acres; last year there were 91,121 acres. There has been a steady increase in the number of applications received for land during the past three years, which is shown in the return attached. On the West Coast Gold Fields the arrears of mining surveys on hand in the Reefton and Westport Districts amount to forty-three applications unsurveyed. In the Grey District there are none.

Future Operations.—During the next season Messrs. Smith, Thompson, and Greenfield will continue the trig. and topographical surveys in the Amuri Circuit, to cover leases applied for and now in progress, 100,000 acres of triangulation and 25,000 acres of leases. In the Grey Circuit extension of triangulation is necessary from Nelson Creek and Bell Hill up the Ahaura Valley, connecting with Messrs. Smith and Thompson's work on the eastern side of the main range. This has been required to cover sectional work in arrear at the Kopara for some time, but could not be undertaken last summer owing to press of mining work. I propose that this should be undertaken by Mr. Bullard, and settlement survey by Mr. Galwey. In the Buller District extension of triangulation has become necessary from north of Westport to Karamea, to cover the large area now opened out by mining enterprise about the Mokihinui and Rough-and-Tumble Creeks. True meridian was carried on to this part, on which to make the mining surveys required, and trig. is now required to connect them with the other part of the district. As there is only one officer in this district to maintain the current work, extra assistance must be given him for this triangulation. In the Collingwood Circuit extension is required over sectional work located among the inlets on the western side of Blind Bay, in which applications are constantly made for land. Here also assistance is required, as the surveyor placed there has more work than he can get through, with arrears and current applications of settlement survey. Unless there should be found any new auriferous localities to cause another rush on the department, I hope during next year to work into old arrears of sectional surveys, although much revision has still to be done in locating new applications. The amount of fees deposited for cost of surveys during the past year, if placed to the credit of the department, will show that, while more work has been done than in the previous year, the actual cost to the Government of field operations in this district has been less by £1,130 6s.

JOHN S. BROWNING, Chief Surveyor.

COMPARATIVE STATEMENT OF OFFICE WORK, 1879 to 1883.

Period.	Rural Leases.	Mining Leases.	Licenses (Various).	Certificates of Title.	Plans examined.	Block Plans constructed.	Crown Grants.	Acreege of Leases prepared during each Period.
1879-80 ...	280	61	25	320	124	—	187	Acres. 75,696
1880-81 ...	181	49	33	149	107	42	68	130,789
1881-82 ...	239	115	59	314	144	47	5	210,839
1882-83 ...	263	184	65	422	150	34	5	305,171

COMPARATIVE STATEMENT showing APPLICATIONS RECEIVED and ARREARS UNSURVEYED from 1879 to 1883.

Period.	Applications received.		Annual Increase in Acreege applied for.	Applications surveyed.		Arrears unsurveyed.		Annual Decrease in Arrears.
		Acres.			Acres.		Acres.	
1879-80 ...	122	7,726	...	171	18,994	665	113,024	Acres. 17,430
1880-81 ...	110	8,263	1,463	78	9,464	611	102,353	10,671
1881-82 ...	194	14,570	6,307	175	20,553	524	91,121	11,232
1882-83 ...	248	22,937	8,367	134	20,639	618	90,873	248

TABLE of CLOSURES, NELSON PROVINCIAL DISTRICT, 1882-83.

Surveyor.	District.	Number of Closures.	Length in Miles.	Mean ratio of error of Closures per Mile.	Average Length of Lines.
				Links.	Chains.
G. B. Sinclair	Wai-iti	7	23	2·6	4·7
A. P. Rawson	Wai-iti	18	54	3	8
J. A. Montgomerie	Reefton	8	21	2·2	13·4
J. H. Jennings	Reefton	1	2 $\frac{3}{4}$	3·6	6
G. H. Bullard	Waitahu	1	2 $\frac{1}{2}$	2·1	10·6
Bullard and Foy	Waitahu	1	4	1·9	9·7
Bullard and Jennings	Reefton	1	1 $\frac{1}{4}$	2·2	6·7
Jennings, Little, and Montgomerie	Reefton	1	3 $\frac{1}{2}$	2·6	8·9
Montgomerie and Jennings	Reefton	2	7 $\frac{1}{2}$	2	10·4
Montgomerie and Watkins	Reefton	1	2 $\frac{3}{4}$	2·8	9·7
Montgomerie and Little	Reefton	1	5 $\frac{1}{4}$	0·5	17·2
Smith and Thompson	Culverden and Mandamus	17	99	0·85	57
R. T. Sadd	Wai-iti	5	22 $\frac{1}{2}$	1·7	6
<i>Contract Surveyors—</i>					
J. B. Saxon	Wai-iti	2	9 $\frac{1}{4}$	2·7	6 $\frac{1}{4}$
H. Little	Reefton	1	1 $\frac{1}{2}$	4·2	7 $\frac{1}{4}$
C. E. Watkins	Reefton	1	1	5·6	8
<i>Land Transfer Surveys—</i>					
J. Rochfort	Motueka and Waimea	4	6 $\frac{1}{2}$	1·9	8
J. B. Saxon	Motueka and Wai-iti	5	6 $\frac{1}{2}$	0·5	8
T. J. Thompson	Waimea	2	3 $\frac{1}{2}$	2·1	35
R. T. Sadd	Wakapuaka	1	2 $\frac{1}{2}$	2·2	6 $\frac{1}{2}$
Totals		80	279 $\frac{3}{4}$	...	247·3
Means		80	3 $\frac{1}{2}$	1·84	10·9

NOTE.—The above shows a fair average of closures.

MARLBOROUGH.

Major Triangulation, Topographical and Trigonometrical.—Since my report of the 30th June, 1882, operations of this nature have been vigorously carried on by Mr. Wilson. The completed triangulations, amounting to 320,700 acres of major and 347,300 acres topographical and trigonometrical. These triangulations were reported last year as finished, with the exception of the mapping, and the results of the closings given. The major and minor triangulations were carried on concurrently at a total cost of £1,332 12s., at the rate of 0·20d. for the major and 0·73d. for the minor. These triangulations commenced on the 1st May, 1881, completed on the 20th October, 1882, embracing an area of 347,300 acres; are carried over parts of Cloudy Bay, Taylor Pass, Blue Mountain, Clifford Bay, Cape Campbell, and Hodder Survey Districts, extending southwards along the East Coast to the Flags River. During the remaining eight months of the year Mr. Wilson has been engaged on similar triangulations, continued from the neighbourhood of the Flags River (where the above triangulations left off) and joined with Mr. Marchant's Amuri Survey, the area being 363,905 acres of major, and 142,078 acres of minor; the cost from the commencement of the work on the 21st October to the 30th June, 1883, being £806 13s. 9d. The field-work is completed, the calculations are still in hand, and the plans have not yet been commenced. The country over which this work extends is generally of a rough and broken character, with bush in some parts, and covers parts of Whernside, Bui-Bui, Kaitarau, Mount Fyffe, Greenburn, and Hundalee Survey Districts, and parts of the Terako, Waiau, and Hawkswood Survey Districts, in the Nelson Land District. A base of verification was measured at Kaikoura, which showed a difference of 0·408 links in a mile less than Spring Creek base, the distance between the bases being about sixty-two miles, and 2·78 and 2·68 links in a mile greater than Amuri on sides, Highfield-Cookson and Highfield-Percival respectively. Taking the data for heights from mean high-water at Picton Harbour and the sea-coast near Kaikoura, and closed near the Clarence River, the difference shown by results obtained from Picton was 9 feet greater than those got from Kaikoura; the initial points being about eighty miles apart, the Kaikoura heights being about 10 feet less than Mr. Marchant's. There was no cadet assisting Mr. Wilson.

Section Surveys.—Of these, 3,496 acres of section survey, in fifty-seven sections, have been surveyed, forty-two of which are classed as revision surveys. Fifteen sections of the above have been laid off on application to go to auction and for selection under the deferred-payment system. The scattered positions of these sections in the bays of the Pelorus Sound, or in inaccessible localities adjoining old magnetic surveys requiring revision, necessitate a considerable amount of extra work in determining the boundaries of the adjacent surveys; and the revision surveys have been in connection principally with re-establishing these abuttal surveys.

Town Section Surveys.—No town section surveys have been made during the year; but, in the return of other work, it will be seen that thirty-two allotments as business sites under the Mines Acts have been set out at the request of Mr. Warden Allen in conformity with your instructions.

Mining Surveys.—Six gold-mining lease sections, amounting to eighty-one acres, at an average cost of 12s. 3d. per acre, have been laid off, and one mineral lease (coal) of 310 acres. They are all more or less timbered and expensive to survey.

Road Surveys.—In conformity with your instructions the land plan survey of the main road-line through the Kaituna and Pelorus Valleys, from the Wairau River to the Pelorus Bridge, twenty-five miles, has been proceeded with. Sixteen miles of the road-line have been surveyed and pegged off, but a considerable amount of mapping and adjustment of the old with the new survey has to be done before the plans are ready for the Pelorus Road Board, to acquire the lands trespassed on by the present line of road and the exchanges of the old roads for the new.

Other Work.—This covers miscellaneous work not returnable under the headings given in the general return, such as subsidiary triangulation, 7,280 acres; pegging off business areas at Deep Creek, revising and completing mining leases partly done by Mr. Carkeek.

Office-work.—During the year eighteen surveyors' plans have been received, checked, and recorded, and plotted on their respective block-sheets, seven of which were constructed this year with more or less work plotted thereon. Two town and four rural Crown-grant record-maps have been constructed, and the work on five of them brought up to date. Assistance was rendered to Mr. A. D. Wilson in mapping his triangulation and topographical plans, fourteen in number. A considerable amount of work has been done for other departments and the various local public bodies; and the requirements of the Crown Lands Office have been attended to in the preparation of timber, pastoral, deferred-payment, mineral, and gold-mining leases and licenses, tracings, &c.

Land Transfer Work.—The work in connection with this branch has as usual claimed a large portion of the draughtsmen's time. Seventeen deposited plans of seventy-one allotments have been checked and recorded. 83 mortgages, 128 transfers, and 38 applications examined. 16 certificates in lieu of Crown grants. Ordinary certificates, 102, representing 263 allotments, and 252 marginal plans, prepared. Tracings have also been made of all the deposited plans, seventy-five in number, and fastened together in a convenient form for reference. This was done because, for the want of suitable accommodation in the Land Transfer safe, and the plans being therefore rolled up, they were rapidly becoming torn and otherwise damaged through being rolled and unrolled when in use. The practice now is to trace these plans immediately upon being examined and passed, and supply the Land Transfer Department with the tracings, retaining the originals in portfolios in the Survey Office safe. By these means a great saving of time to the department also has been effected, especially since the Land Transfer offices have been removed downstairs, from whence the plans had to be constantly carried backwards and forwards.

Proposed Operations for the Year 1883-84.—This year commences with major and minor-triangulation from the Flax River along the East Coast to the Amuri; the field-work completed but not mapped. Section surveys, 300 acres; and road surveys, twenty-eight miles; field-work of sixteen miles completed but not mapped. Mr. Goulter has now on hand the above road and section surveys, as well as the revision and connection with the trig. points of the old scattered surveys in the Pelorus Sound, of which some twenty-five sections in various parts of the sound still remain to be done. There is a large amount of work of this character in Queen Charlotte Sound, which I hope gradually to overtake; but, with the work in hand, and other demands for surveys that have to be met as they arise, I am afraid Mr. Goulter will not be able to make much progress in this direction. Upon the completion of the computations and mapping of the triangulations now in hand by Mr. Wilson, I recommend that a series of major and minor triangles be carried over the Waihopai and the upper parts of the Awatere and Wairau Valleys to close on the Nelson Circuit near Tophouse, and the major broken down into a minor series along the course of those valleys.

HENRY G. CLARK, Chief Surveyor.

WESTLAND.

Major Triangulation.—Area completed, 80,510 acres; at a cost of 0·5d. per acre. It covers portions of Otumoto, Arnott, Matakitaki, and Clarke Survey Districts, and was executed by Mr. Roberts simultaneously with a minor triangulation. The work, owing to the high altitudes of many of the stations, and the very broken and densely wooded nature of the country, has been particularly arduous, and great credit is due to that officer for the way in which he carried it out.

Minor Triangulation, Topographical and Trigonometrical Surveys.—Of these, 157,860 acres, at a cost of 2·15d. per acre, have been completed. Mr. Roberts's share of the work, 115,800 acres, comprises the northern part of Jackson's Bay circuit, and extends south-easterly up the Haast Valley, and across the divide into the Makarora Valley, where connections with three of the Canterbury trig. stations have been effected. That part of the Canterbury triangulation is an extension of the Lindis Peak circuit triangulation within the Otago District, and hence an opportunity is afforded in placing an additional check upon the positions of the Westland initial stations of the Okarito and Jackson's Bay circuits. The mean error in observing fifty triangles (Mr. Roberts's work) is only 5"·9, but the closure is not so satisfactory. It stands thus: LV to LW *via* Canterbury triangulation, 54,726·9 links; *via* Paringa (Westland) base, 54,737·1: difference, 10·2 links, equal to 1·5 links per mile. The difference of latitude, longitude, and convergency of meridian between the Westland and Otago initial stations I cannot furnish yet, having received the data upon which to calculate them—the positions of the Canterbury stations in relation to Lindis Peak initial—only a few days ago. The rest of the topographical and trigonometrical work completed during the year, amounting to 42,060 acres, comprises circuit traverse surveys in the Toaroha, Hohonu, Karangarua, and Gillespie's Survey Districts, and was executed by Messrs. Murray, Lord, and Smyth. The average closures of these come to 3·4 links per mile, which in a rough and densely wooded district like Westland, where frequently the longest lines in miles of traverses do not exceed 5 chains in length, may well be pronounced satisfactory.

Rural and Suburban.—26,362 acres, at 10·2d. per acre. The very low cost of this class of surveys compared with the cost in former years is attributable to the fact that three large blocks, a Harbour

Board endowment reserve of 15,000 acres, and two educational endowment reserves of 5,000 and 1,000 acres, respectively, are included. The average cost of ordinary section survey within Westland is about 2s. per acre, and in the case of small and scattered sections, such as were most of those completed this year, the cost is much higher.

Gold-Mining Surveys.—1,731 acres, at a cost of 7s. 3·4d. per acre. A great impetus has been given to mining within the past year by the formation of companies to work large areas of auriferous ground about Ross, Humphries, and Kumara. At the former the Ross United Gold-Mining Company, with a capital of £150,000, and several others with a capital ranging from £20,000 to £40,000, and at Humphreys the Humphreys Gully Gold-Mining Company, with a capital of £150,000, and others, have been successfully floated, and the work of constructing large dams, tunnels, and races, capable of carrying up to 100 heads of water, for the purpose of working the ground on a very large scale, are progressing now. The demand for surveys of mining leases and special claims was great, and much of the time of three of the officers was occupied in attending to these, and the work is not fully cleared off yet. The receipts for mining surveys during the year amounted to £744 15s. Mr. Lord, the officer stationed at Greymouth, was for about a month assisting at pressing mining surveys within the Nelson District. The receipts for these surveys are not included in the above £744 15s.

Roads, Railways, and Water-races.—Ninety-five and a half miles, at £190s. 1d. per mile. These include forty-three miles of graded road, the rest are simply surveys with three iron tubes fixed at every mile and a half in the case of road surveys. Of the graded roads, thirty-four miles are pegged every chain ready for contract for construction. The cost of Mr. Murray's road survey, £815 0s. 4d. for twenty miles, includes the cost of thoroughly clearing foot-track 4 feet wide, and benching 2 feet wide along all sidelings, and hence its great cost, namely, £40 15s. per mile. Mr. Roberts's twenty-nine and a half miles comprise the survey of Haast Pass Road, from the saddle to within about six miles of the sea coast, a work carried on together with the triangulation in the southern district.

Office Work.—Attached hereto is a miscellaneous return giving particulars as to Crown grants prepared, land transfer work, and lithographs. I started the year with a considerable amount of plotting in arrears, and had the misfortune, in addition to being short-handed, to be deprived through illness of the services of one of the draughtsmen for nearly the whole of the year. It was impossible therefore to clear off the arrear work, but I am pleased to be able to report that, in spite of these drawbacks, I have not lost ground. There were many necessary maps mentioned in former reports, which up to the present could not be commenced, and to these may now be added the compilations of the mining surveys in Ross, Humphreys, and Kumara, the want of which is much felt in the Warden's Courts, but which up to the present I could not put in hand yet, seeing the officers were fully employed at block, triangulation, and other regulation maps, of which completion could not be delayed.

General.—The reservations for necessary roads through sold lands, and the right of making, which expires before end of 1884, have, as far as I am aware, now all been made. All the surveyors were visited repeatedly, and their work examined and tested—in most instances I stayed several days at their camps. Inspection of surveys and supervision of works were generally attended to together, involving absence from Hokitika office for 111 days. But, while inspecting in the southern part of my district in March last, I embraced the opportunity of exploring the Upper Cascade country, the ranges between Mount Richards and Mount Aspiring, and the Gorge River from its source to its mouth, returning by the sea-coast to Barn Bay, and thence by open boat to Jackson's Bay. This trip took seventeen days, and thus the time spent during the year at inspection and supervision proper would be reduced to ninety-four days.

Proposed Operations, 1883-84.—Continue triangulation of Jackson's Bay circuit to the Cascade Plateau, and connect with the verification base, I purpose measuring there in the spring. Already the stations (38 in number) are erected between the area already triangulated and the Waitoto River, and the rest of them will be up by the time Mr. Roberts is ready to resume field-work again. The work contemplated will cover an area of from 150,000 to 160,000 acres. There will then remain only a stretch of about thirty miles in length—just another season's work—to connect with the Martin's Bay circuit triangulation and the Westland triangulation. Requirements for settlement surveys for many years to come may then be said to be completed. In the north connected with the Grey circuit initial within Nelson District, on the east with the initials of Mount Pleasant and Gawler circuits within the Canterbury District, and in the south with the initials of Lindis Peak and Martin's Bay circuits within Otago District, the geographical positions of the headlands and bays and outlying rocks along the 225 miles of Westland coast-line should then be fixed beyond shaking. Of rural and suburban lands, 544 sections, of an area of 48,187 acres, still require surveying. In that area are included 12,945 acres of old provincial surveys, which require connecting with standard survey and revising. The cost of doing this when many of the sections are isolated and scattered is frequently as great, and sometimes greater, than the original survey, and I have therefore classed them together. In addition to these settlement surveys there will be the mining, the water-race, and road surveys to be attended to. Of the mining and water-race surveys there are now a few months' work for a surveyor in hand. There are also various other surveys, such, for instance, as the laying down within Hokitika of trigonometrically fixed points to connect the town survey with, which, owing to pressure of work in other directions, have not yet been attended to.

GERHARD MULLER, Chief Surveyor.

CANTERBURY.

CONSIDERING the reduced number of officers employed during the latter portion of the year, the returns for this provincial district will, I think, compare not adversely with the results of previous years; though it must be borne in mind that the more scattered nature of the surveys, as the dis-

tricts become worked up, inevitably increases the cost, which has only been maintained at its present low average by the exceptionally favourable conditions under which several of the officers employed were enabled to complete large areas at a minimum rate.

Triangulation.—With the exception of a few square miles completed by Mr. Brodrick in order to connect former work with the standard traverse survey near Kaiapoi, no triangulation has been done during the past twelve months.

Standard and Trig. Closures.—These have given excellent results. Standard-stone No. 17, near Kaiapoi, was found by standard survey to be 102,978·5 links north and 32,988·8 links west of Mount Pleasant. The same point, determined by minor triangulation, is found to be 102,977·4 links north and 32,989·6 links west of the initial station, thus proving both surveys to have been executed with commendable accuracy. The standard survey was by Messrs. Adams and Maitland; the minor triangulation by Messrs. Welch, Broderick, and Pickett.

Sectional Surveys.—During the year eight staff surveyors and two temporary assistants have been steadily engaged in this work, and during a portion of the same period Mr. Houghton, now on leave owing to ill-health, Messrs McNicol and Seaton, transferred to the Otago District, and Mr. Watt, who has left the service, were similarly occupied. I am therefore able to report the survey and mapping of the following considerable areas, viz.: Of last year's arrears: 709 sections or reserves, containing 64,695 acres; of old provincial work, the resurvey of 255 sections, 26,406 acres; for sale under village-settlement conditions or on agricultural deferred-payments, 168 sections, 14,731 acres; pastoral country, the survey of thirteen blocks, 32,423 acres; town land, 206 sections, 56 acres: a total of 1,351 sections, containing 138,311 acres, at an average cost of 1s. 3¼d. per acre. Some of this work, which was hampered with old surveys, even though done by Messrs. Welch and Hay, two of my most experienced surveyors, cost 3s. 3¼d. and 2s. 10¾d. per acre respectively, which excessive rates cannot be attributed to the officers, but are inseparable from free selection before survey, under which system surveyors lose more time in finding old survey marks and re-establishing lost survey lines than in different conditions would suffice to do the work twice. Per contra, Mr. Pickett and Mr. Watkins, when laying out sections in the Lake Coleridge District and McKenzie country, free from old survey complications, were able to complete large areas at 11¾d. and 4d. per acre respectively. Mr. J. Adam has also surveyed a large acreage of pastoral country at a low rate.

Old Provincial Surveys.—During the period under notice steady progress has been made. In the Christchurch office 129 sections, containing 6,977 acres, have been checked and mapped. At the Timaru office Mr. Wright reports that 42 sections, aggregating 6,393 acres, were replotted and passed, in addition to 160 sections, equal to 19,862 acres, which were recalculated, and the areas duly reported to the Commissioner of Crown Lands. Under the heading, "Sectional Surveys," I have reported the resurvey of 255 sections, containing 26,406 acres, so that an aggregate of 426 sections, embracing 39,776 acres, have been added to the sectional work ready for the issue of titles. The late returns show that, with the exception of the old peninsula surveys—which must, I am afraid, wait yet another season to enable me to gather the information preliminarily to advising you what revisions may be necessary—there are but 163 sections, containing 12,807 acres, under this heading still to be dealt with. I therefore trust that another twelve months will clear away the bulk of the replotting and revision surveys, which have caused so much additional work, and to myself constant anxiety, since I took charge of this branch of your department.

Inspection.—Ten inspections only have been made, the diagrams of which were duly forwarded to you. The results are satisfactory to the office and to the surveyors whose work was tested. During the transit of Venus the Inspector, assisted by Mr. Munro, in charge of the Land Transfer Branch of this department, took observations from Mr. Townsend's observatory in Christchurch, the success of which was cordially acknowledged by Colonel Tupman, of the English expedition, as being of great value in corroborating his own observations at Burnham. A great deal of the Inspector's time has been taken up in the inspection of the road-formation contracts undertaken to open up the Crown lands on Teviotdale and at Waikari, and in preliminary inspection of the East Oxford to Upper Ashley and the Kaka Pass roads. For three months he was constantly engaged in making additions to the Christchurch standard survey, and for some time was occupied in taking levels in connection with the hot springs on Hanmer Plains. On the whole he has been very fully employed.

Office Work.—Mapping: Sixty-five large and ninety-six small plans, with traverse reductions, have been received from the field surveyors, showing a large amount of sectional work, a portion of which, together with work during the previous year, having been checked by the computers in the office, who passed seventy-seven large and 105 small plans. How well the traverse-reduction system works, in enabling surveyors to detect mistakes before sending in their plots, is evidenced by the fact that the officer in charge of the mapping-room reports that, of the great number passed, eleven only required explanation or additional information from the surveyors; other slips, generally in areas, were put right in the office. Ninety-six plans were recorded on the Crown-grant record-maps, and fifty-one on the block-sheets. Mr. Shanks reports that, owing to an insufficient number of draughtsmen, the compilation of new block-sheets is in a backward state, only eighteen having been constructed during the year. A large area of this work waits to be done. This, however, is not so urgent as the surveyors' plans, of which I am glad to report that, of 1,694 passed through the computer's hands, only thirty-five large and sixty-four small plans, including those received at the end of June, remain to be checked. I shall thus be able to get on with the district maps and plans for photo-lithography, which otherwise would be delayed.

Reduction Office.—New county maps of Geraldine and Akaroa have been completed, and mounted tracings of both are in hand for the head office, that of the Ashley County having been forwarded in the early part of the year. Three new district plans have been compiled, two traced for the public office, and two prepared for the photo-lithographer; seven more are in hand. Six of the district plans previously completed have had considerable additions made to them. The officer

in charge reports a very appreciable diminution in the year's work compared with that of the previous year, one of his best draughtsmen having resigned to go to Sydney. He also states that work chargeable to other departments has taken the draughtsmen from their ordinary duties for a considerable portion of the year.

Crown Titles.—Forty grants, for 1,397 acres, have been issued; 1,398 certificates of title, covering 2,725 sections or lots, aggregating no less than 237,400 acres, delivered to the Land Transfer Branch for issue; and 1,326 certificates of area were forwarded to the Commissioner of Crown Lands, to enable him to send to the purchasers the requisite notices of excess or deficient areas. It is found, however, that the titles for a very great number of sections cannot be prepared because the purchasers, though duly notified by the Commissioner to pay to the Receiver of Revenue the amounts owing for excess areas, neglect to do so. Steps are now being taken to enforce payment for these, so that the titles may issue, and the arrears be more expeditiously completed.

Land Transfer Surveys.—Mr. Maitland, who has been engaged on this work has nearly completed the Timaru standard survey, the stones, 107 in all, marking the various intersections of the street-lines, have been placed in position, and ten and a quarter miles standard survey chained, leaving about three miles still to be done. As, however, all the preliminary ranging and off-setting to fix the positions of the various blocks are done, the survey will not take long to complete. It is already utilized by the surveyors employed under the Land Transfer Act, and materially assists them to re-establish boundaries of the original town lots, which, owing to the disappearance of all the old pegs, and to the erratic method of showing on the plans supposed rectangular sections by sides of unequal length, had become somewhat complicated puzzles, the unravelling of which led to costly resurveys and much loss of time. It was found impracticable to rectify the encroachment which in many cases had been made on street-lines, as valuable brick and stone buildings had been erected; but each block has been made to agree as nearly as possible with existing occupation, and with the permanent marks now put in it will be comparatively easy to prevent further encroachments, against which it was impossible to guard when there were no recognized marks or original survey pegs to refer to. The officer in charge of the Land Transfer Branch of this department has had but little trouble in carrying on the routine work. Sixty-six plans, embracing 1,756 allotments, have been lodged under the Act; thirty-nine plans of railways or road diversions under the Public Works Act have been checked; 950 transfers checked prior to the drafting of the certificate of title; twenty-one mortgages, thirty-one leases, nine proclamations, and 329 applications have had descriptions, areas, or plans verified before being passed on for completion; 2,091 ordinary certificates were prepared in duplicate; and 1,483 certificates in lieu of grants were compared with the duplicates done by the contractors. On the whole, the work during the last two years shows no signs of diminution, and any increase in the value of property would probably largely augment the number of surveys passed through the office.

Proposed Operations, 1883-84.—Although the arrears of sectional work are now materially lessened, there yet remain to be done 1,047 sections containing 45,465 acres, 183 sections aggregating 12,807 acres of revision surveys on the plains, and the resurveys on the peninsula, the extent of which has to be determined; 65,595 acres of pastoral country, and the subdivision of 7,697 acres of reserves authorized to be alienated under the Public Reserves Sale Acts of 1878 and 1882. I cannot anticipate with my reduced staff to get all this done during the current year, but I hope to be able to spare Mr. Brodrick to complete the triangulation of the back Waimakariri country, and possibly one of the surveyors south of the Rangitata to connect the Pukaki with the Ohau River, and so join the Canterbury triangulation with that of Otago south of the latter river. There will then remain to be surveyed one considerable block of minor triangulation to the south of the Hurunui River, to include the Sumner and smaller adjacent lakes, but ultimately it will have to be extended up the Rakaia, Rangitata, Tekapo, Pukaki, and Ohau Rivers, in order to complete the topography of the occupied country. There is, however, plenty of time to think of this. Unless, therefore, some demands are made upon my staff for unexpected surveys, I hope by the end of the year to have the arrears so well in hand as to be able to spare an officer to extend the standard traverse survey and several other necessary surveys, which only the want of a larger staff has hitherto prevented me bringing under your notice.

JOHN H. BAKER, Chief Surveyor.

OTAGO.

I HAVE the honour to submit the annual report for the year ending the 30th June, 1883, of the work done by the Survey Department within the Provincial District of Otago. In doing so I have to point out that this year has, as well as last year, been an unusually busy one, due to the preparing of information and maps of runs covering 2,050,000 acres for re-lease, the terms of the present leases of which expire in March, 1884; also to the survey and preparation of maps of pastoral deferred-payment and agricultural blocks, reserved for settlement out of runs re-leased last year or in February, 1882; revising, examining, and copying maps, for the Otago High School, of Strath-Taieri endowment; together with the work of the Property-Tax Department in revising and correcting returns. In the field there has been considerable detention through rain and mist, particularly in the Strath-Taieri and in the Hollyford Valley. On the other hand it is only fair to mention that summer gales are not so common and continuous as was the case a number of years ago, as a hindrance to instrumental observations. The actual results of field-work in acreage and cost are given in the attached tabulated return, so that each surveyor's operations can be examined opposite his name. The acreage returned, however, does not always give a fair idea of a surveyor's efficiency. To find that out a number of circumstances should be known, as whether presence or absence of bush, roughness of the surface operated over, size of allotments, contiguity of work, and distance from supplies. The rates per acre likewise, in their respective columns, are to be understood with this qualification: that sometimes, indeed frequently, part of the cost of a large survey, incurred, say, during June, is included in that year's return, while the acreage proportioned to such

cost does not appear till the following year's return is sent in. This is owing to the rule that until a surveyor finishes his maps he cannot be credited with the acreage shown on these maps. I will now proceed to summarize the different classes of work done under the direction of this office.

Minor Triangulation.—The only work done this year has been for necessary connection with Otara and Toitois triangulation on the west, and Mr. Adams's at Waikawa Harbour; in extent 16,317 acres, at the rate of 1d. per acre.

Minor Triangulation with Topography.—The total area of country overtaken this year by minor triangulation with topography is 324,972 acres, the work having been done by District Surveyor Strauchon, Assistant-Surveyors Wilmot and Farquhar, and Contract Surveyors Dennison and Grant, at a mean rate of 0·92d. per acre. Mr. Strauchon's triangulation is of parts of the Mokoreta and Waikawa Districts, which together complete the connection between Waikawa Harbour and the settlements in the Tokanui Valley on the west, and the Wyndham Valley on the north; the area done by him is 50,591 acres, at a total cost of 2·63d. per acre. The topographical features of the country covered by this work have also been accurately mapped, so that a felt omission has now been supplied, and a basis established on which the survey may proceed of those blocks of land already reserved for settlement out of Runs 177 and 257, and which extend to about 7,000 acres of open land. The triangles close on Toitois District with a difference in bearing of 1' 3", and in linkage of two links to a mile, and the altitudes from Trig. H, Toitois District, carried through close to within 5·9' on Trig. C of Mr. Adams's in Waikawa Harbour. This latter does not necessarily mean an error, but it may show that the height of low-water mark varies on different parts of the coast, as the datum for Mr. Strauchon's altitudes is from the Bluff, while Mr. Adams's was taken on Waikawa Harbour itself. There is a disagreement also of 4·7 feet in closing on Mr. Connell's Trig. Q, Mokoreta District. Mr. Strauchon experienced very bad weather during part of this survey, with other causes of detention and difficulty, owing to a large proportion of the triangulation being in heavy bush, causing great labour in clearing stations, and considerable loss of time in getting about from place to place. Stores and trig.-tubes had to be packed on horseback to the ground from Fort-rose, or a distance of twenty miles on an average. Mr. Assistant-Surveyor Wilmot's triangulation has joined that at Martin's Bay with the farthest extension of similar work at the head of Lake Wakatipu. The extent done this year is 31,000 acres, covering parts of Martin's Bay, Hollyford, Caples, and Dart Districts, and which has cost at the rate of 2·35d. per acre, the total area surveyed by Mr. Wilmot from the West Coast to the Wakatipu being 64,000 acres, at a cost of 3·7d. per acre, including trigonometrical and topographical plans. This survey closes with that of Martin's Bay with a difference of 3·33 links. The Martin's Bay triangles are not well conditioned. The distances of Trig. E, Martin's Bay, from Geodesical Station, Mount Nicholas, on the meridian and perpendicular, will form the matter of a subsequent ordinary report when all the returns are complete. This triangulation has occupied three seasons, the work being undertaken during the summer only, owing to the extreme humidity of the climate. As you are aware, the configuration of this district is rugged and mountainous in the extreme, and throughout its length is intersected by dangerous rivers, while the mountains are covered by the usual heavy bush and dense vegetation characteristic of the west coast of the Middle Island to an altitude of about 3,500 feet. Stores and trig.-irons had to be carried on the men's backs over nearly the whole of this country, which added greatly to the labour and expense of the work now successfully finished. A very interesting general report by Mr. Wilmot, of his explorations to the east and west of the Hollyford Valley, including an account of his discovery of a pass to Milford Sound, I had the honour to forward to you on the 6th of last month, and which, by your permission, was subsequently published in the Dunedin newspapers. He also has found that the elevation of the margin of bush gradually rises as the bush recedes from the coast. Mr. Assistant-Surveyor Farquhar has completed the triangulation of the Dunstan mountains, embracing portions of Tarras, Cluden, St. Bathans, Wakefield, Lauder, Blackstone, and Leaning Rock Districts. The area surveyed is 195,500 acres, which has been done at the rate of less than $\frac{1}{2}$ d. per acre, including the preparation of trigonometrical and topographical maps. The bearings closed with adjoining triangulations with a mean difference of 10". This survey also fills up a much-felt blank in the topography of the interior, and will enable the runholders to arrange their fencing boundaries with fair certainty as to the acreages included. Being the first and only triangulation carried out by Mr. Farquhar, I am glad to say that he has done it creditably. Messrs. Dennison and Grant, contract surveyors, are credited with an area of 47,881 acres on the Kakanui Mountains, which, though actually finished last year, was not included in the annual returns for that year. The cost of this work was at the rate of 0·6d. per acre. For table of differences in closing see appendix, where the actual error is taken as half the difference.

Rural and Suburban Section Survey.—Thirteen staff surveyors and one private surveyor under contract (besides other surveys executed) have surveyed and mapped 175,300 acres of land, at the rate of 10d. per acre. The means of my checks, by triangulation on traverses, show an error of 2·2 links per mile. This land is classed as pastoral deferred-payment land, in areas or sections of from 600 to 4,600 acres, and agricultural sections averaging 100 to 320 acres each. The greater portion of this work lies within blocks reserved for settlement out of runs re-leased in February, 1882—that is, in the Strath-Taieri, Maniototo, and Upper Clutha Valley. In the case of the surveyors whose returns show the highest cost of survey per acre, it must be remembered that the reason lies in the great cost of isolated surveys, which always require much travelling, and of bush surveys being included in the gross amounts. The staff has done its work faithfully, the surveyors all exercising the greatest desire to effect accurate surveys. They have also been careful to tabulate the grades of roads, and to reduce those grades wherever practicable on the ground within the standard or ruling grade of 1 in 10 and 1 in 20.

Town Section Surveys.—The town section surveys done are—Sutton Township, in Strath-Taieri, near the site of the bridge at present being built over the Taieri River; sections in Naseby and Lawrence; and a town and village settlement in Block XI., Chatton District. The total number of allotments is 343, costing 16s. 8d. per allotment.

Native Land Court Surveys.—The only work done for Natives this year in Otago was laying off 38 acres, in four sections, in Ōtara District, at a cost of 3s. 3d. per acre; also a cemetery reserve at Port Molyneux.

Gold-Mining Surveys.—Of these, 54 claims, amounting to 1,131 acres, have been surveyed, at a cost of 8s. 8d. per acre. The greater part of this work has been in the Naseby and Queenstown Districts, and, as usual, has necessitated a great deal of travelling and expense, some of the claims lying in distant localities.

Road and Railway Surveys, &c.—There have been thirty miles of road- and railway-lines and water-races surveyed by the staff, whereof five and a half miles were railway surveys of parts of the Otago Central Railway. The total cost per mile has been £2 17s. 4d. Two and three quarter miles of the same railway have been resurveyed by the staff in addition to the above.

Survey Parties and Inspection.—Thirteen surveyors of the staff and one private surveyor have during the year been at work in the field. As with last year, so during this, I have had very much office work to look after, owing to the preparation of a large map for the Waste Lands Board of runs in Otago, to be re-leased in February, 1883, and advising the Board in connection with their subdivision of these runs prior to the sale. Besides this, and in addition to my regular duties, I had to prepare specifications and call for tenders for the survey of 10,000 acres in Strath-Taieri District, belonging to the Otago High School, and superintend the execution of this contract by Mr. Edie, the surveyor. I have also prepared contract drawings for and started the contractor, Mr. Templeton, on the Tokanui Gorge Road, and I have examined and approved plans for new roads at Billie's Ridge, from Houndburn to Horseburn, Deepdell Run, Road to Orbell's Run Waikouaiti, including those of bridges, such as the Strath-Taieri Suspension Bridge, Horseburn Bridge, Firewood Creek Bridge, Cromwell, and two bridges on Road Beaumont to Miller's Flat. I have made two inspections of Orbell's Runs, Waikouaiti; one visit to Hindon *re* land; one inspection of proposed road-works about Waikaia with Mr. Howorth, county engineer; and one journey to the interior, as far as Naseby, inspecting land for settlement, along with the Hon. Mr. Rolleston and yourself. Nevertheless, I have made thirteen inspections of survey parties in the field, including inspection of the District Survey Offices of Queenstown, Clyde, Naseby, and Lawrence, and have made eight field-checks on the ground. In pegging of surveys, trenching, and definition of block and other boundaries by chipping, the surveyors have done their work most satisfactorily. As to maps, the best are those sent in by Messrs. Strauchon and Langmuir, while the younger surveyors, Gibson, Armstrong, and Cook, produce very excellent drawings. From the pains taken and very neat work turned out by Cadet Calder in the preparation of topographical maps of Waikawa and Mokoreta Districts, under Mr. Strauchon's teaching, I anticipate he will prove a credit to the department. The other cadets are making fair progress, although not equally so in every case. As regards office accommodation I found the Clyde office, on a recent visit, still very confined and unsuitable, besides being very old. A new one was promised when the last loan was floated, I understood, and recently the District Surveyor reports that it will require £200 to put it into a proper state. In the circumstances I would suggest that it would eventually be found the cheaper way to put up a new one, rather than continue patching up so old a building.

Dunedin Office Work.—The draughtsmen have been very busy during this year owing to the large amount of extra work required in connection with the sales of the Otago runs and of pastoral deferred-payment allotments, as well as of agricultural blocks. In order to save time this office has been preparing duplicates of the working plans for the local offices, after making copies for the Land Office as application-maps. There has also been much work done for other departments. Mr. Skey, Chief Draughtsman, has had his hands pretty full in consequence, in addition to superintending the preparation of Crown grants and certificates of title. Mr. Nicholson and the other officers have all been fully engaged, and still a large list of arrears is on hand, which I hope gradually to work up. Mr. Thompson has examined and checked—of staff surveyors' plans, 182; road and railway plans, 58; gold and mineral leases, 26; and agricultural leases, 36. The Accountant, Mr. Runcie, received 316 plans, copied 810 vouchers, and recorded 4,169 letters and reports, and attended to the usual routine of office work.

Land Transfer Work.—Mr. Thompson has checked eighty-three plans for deposit. Mr. Treseder, and, during his leave, Mr. Mackay, have examined and checked the following: Applications, 112; transfers, 1,357; mortgages, 1,235; draft certificates, 1,549; leases, 90; and placed plans upon 1,021 certificates of title.

Crown Grants and Certificates of Title.—Mr. Skey has prepared and recorded 259 Crown grants, representing 15,428 acres, and has ninety ready for issue. Of certificates of title prepared and recorded, 419, equal to 50,078 acres; deferred-payment licenses, 80; agricultural leases, 64; mining leases, 54; and miscellaneous leases, 36.

Lithographic Office.—Mr. Percival has prepared fifty-five maps for the stone, from which Mr. Ross and his assistant, Mr. Bain, pulled 14,078 copies, besides the following: Photo-lithographed, 1 map, 250 copies; circulars, 1,000 copies; traverse forms, 1,000 copies; protractor forms, 500 copies; printing note *re* forest reserves, on lithographs, 900 copies; photo-lithographing for Education Board, 300 copies; maps mounted, 435.

Proposed Operations, 1883–84.—In triangulation there are one or two blanks still to fill in on Mr. Barron's Naseby Office District, which I propose that officer should survey during the coming summer. In the Clyde and Queenstown Districts I should like some more work done by large-sided triangles to complete the connection across Mount Pisa from the Clutha River to the Cardrona, and from the Nevis to the Nokomai. This is to get the topographical features laid down so that the run boundaries may be understood more intelligently with relation to existing natural features. I would also ask your approval of my extending similar work down the Mararoa Valley to Lake Manipori, including the lake itself, also upwards to the Te Anau Lake, in anticipation of settlement, and as assisting in future explorations towards the West Coast. Then I would point out the necessity of

something being done soon for the opening-up of the Tautuku bush, by means of extensive triangulation, based as to linkages on the surrounding trig. surveys, which are now right up to the ranges on its northern limits. The remaining lands in blocks reserved out of runs, amounting to about 70,500 acres, will also require to be sectionized.

W. ARTHUR, Chief Surveyor.

OTAGO TRIGONOMETRICAL CLOSES, 1882-83.

Surveyor's Name.	Difference of Bearings.	Difference of Linkages per Mile.	Mean Error per Mile.	Remarks.
John Strauchon ...	0° 1' 3"	1.4	0.70	The close on bearings is only one line from 1 to H Toitois.
E. H. Wilmot ...	0° 15' 28"	3.33	1.66	This difference in the bearings is due to an independent meridian having been used for the Martin's Bay triangulation.
H. A. R. Farquhar	0° 0' 10"	1.6	0.80	

NOTE.—In section survey work the mean of eight checks on the surveyor's work shows an error of 2.2 links per mile, but many independent closures of the surveyors themselves give much smaller errors.

SOUTHLAND.

Field Work.—There have been executed during the year some 554,000 acres of rough topographical survey. This has been in the County of Fiord, the work of exploration and of reconnaissance survey having been carried on by Mr. John Hay, District Surveyor. Owing to the exceptional nature of the country the work has been very labourious, and necessarily also very expensive. Of the total acreage mapped it will be seen from the plan that some 416,000 acres were covered with bush, some 109,000 acres embraced open land, and some 29,000 acres were occupied by lakes. A more detailed summary of Mr. Hay's explorations will appear in a special form at the close of this report. Under the head of *Rural and Suburban* survey there have been executed 483 sections, embracing 33,817 acres, during the year, at a cost of 1s. 6½d. per acre. Of these, 212 sections, embracing some 6,000 acres, were in bush. This fact, as well as the scattered nature of the surveys, must be carefully borne in mind when the acreage cost is judged of. Owing to the inactivity prevailing at the Longwood reefs we have only one section to include under the head of gold-mining Surveys. In making an analysis of the Rural and suburban surveys, I find that nineteen sections, covering 4,060 acres, were under the absolute-sale and free-selection system. Again, eleven sections, covering 2,230 acres, were surveyed as saw-mill areas, and two sections, embracing 160 acres, were applied for as coal-mining areas. In connection with all of these sections, survey fees were deposited, the total amount of the same being £538 13s. 2d., which amount the department is entitled to be credited with. The remaining sections and acreages, under the head of rural and suburban, embrace chiefly either rural deferred-payment land, or are subdivisions of existing reserves to be disposed of either by absolute sale, or on the village-settlement or ordinary deferred-payment principle. The rural deferred-payment blocks were situated partly in the Districts of Taringatura, Eyre, Hokonui, Centre Hill, Wairio, and Wairaki. They comprise some sixty or seventy sections, and contain some 17,000 acres. During the year several education reserves in the Waimea Plain were subdivided into sections ranging from 150 to 320 acres. These sections number twenty-nine, and cover near 6,000 acres. They lie comparatively close to the Waimea railway-line; and I might state, in passing, that, owing to their convenient position, and the general good quality of the land, the sections afford excellent scope for a number of settlers. I might state that under the head of rural and suburban surveys there are included several village and small-farm settlements. The sections in these are generally of suburban size, occupying in acreage and design an intermediate position between townships proper and rural deferred-payment blocks. These small settlements are now increasing over the district, and form convenient and much-needed centres, where workmen connected either with farms, saw-mills, or other branches of industry find both a home and a profitable scope for their spare labour. The wise provision, made by the Lands Department in the early days, of having a large number of small reserves left over the country, enables the Government now, while creating little centres of population, to get in most cases village prices for land which would otherwise have gone at a small figure. The saw-milling industry has been slack during the year, but it will be seen, from the number and acreage of saw-mill areas applied for, that something has been doing, and that confidence is felt in its future. The immense resources of Longwood Forest in this way have now, since the partial opening of the Riverton-Orepuki line, begun to be recognized, and, as the line is extended, and the demand for timber improves, this forest will, no doubt, yet be the scene of extensive saw-milling operations. The rural deferred-payment blocks surveyed during the year are, as a rule, some little distance away from existing railway-lines, but, as these are being extended, there can be little doubt that in a short time most of the sections will be taken up and settled upon. Ere closing my remarks on the field-work, I may say that the surveys were all made in triangulated districts, and, owing to the steel tape having now entirely superseded the old form of chain, a chainage accuracy has now been reached that formerly was not practically possible.

Office Work.—In addition to the usual routine work of the office, much of which, such as checking working plans as they come in, bringing the various maps up to date, and numerous other necessary duties which it would be impossible to particularize, there have been prepared during the year plans of 656 certificates of title, of 434 Crown-grant certificates, and of 39 Crown grants proper,

As the plans of certificates of title are in duplicate, and those of Crown-grant certificates in triplicate, it will be seen that during the year, in connection with this branch of the work, 2,653 plans have been prepared. The number of deposited plans passed in connection with the Land Transfer Office was thirty-seven. These dealt with 310 original sections, which were subdivided into 1,058 allotments, embracing 78,810 acres. In addition to the checking of these plans, eighty-four ordinary Land Transfer application plans, including descriptions, were checked. In regard to maps prepared for lithography and photo-lithography, I have to report that several important maps were prepared and forwarded to Wellington to undergo the latter process. These include maps of Longwood District, Makarewa Township, subdivision of educational reserves, Waimea Plains, pastoral runs near Athol, &c. A draft map of Lindhurst District was also forwarded, and a map of Waiau District is now being prepared. Nearly all the survey districts in Southland have now been lithographed on the prescribed scale of a mile to an inch, and both the department and the public have found their publication to be of immense utility. In addition to the maps prepared for photo-lithography, we have prepared a considerable number of maps for ordinary and local lithographing. These comprise twelve original drawings; the total number of lithographs struck off being 1,750. The maps in question are of rural deferred-payment blocks, village settlements, &c.; one of their main objects being to guide the public in selection. In concluding my remarks under this head I may state that during the year the office has had exceptional work thrown upon it owing to the necessity for preparing tracings for runs about to be re-leased, duplicate diagrams on licenses for Land Office, additional maps and tracings, &c., for Property-Tax Department, Government valuers, and statistic collectors, &c.

General.—There are still a good many reserves scattered over the district, the ultimate subdivision of which will be rendered necessary by the requirements of small settlers. The various deferred-payment blocks in the vicinity of railways have now been almost entirely surveyed, and during the coming year the at present somewhat outlying blocks in the Districts of Centre Hill, Wairaki, and Takitimo will, to a considerable extent, be operated upon by the department. As mentioned in my previous reports, Longwood and Seaward Forests each comprise a large and compact mass of Crown land, the edges of which merely have been touched by surveys; and in a short time, with the progress of roads, railways, and population, the necessity will, no doubt, gradually arise to have the land cut up partly for saw-mill purposes and partly for settlement. The reconnaissance work in Fiord County, executed by Mr. John Hay, belongs to the Otago District, and was only, under your instructions, undertaken by us on account of our proximity to the country. In summarizing the results, however, I may say that, while the survey reveals some interesting and peculiar topographical features, there is little, except perhaps the belt of flattish-timbered land along the coast-line, which would give any commercial value to the country explored. The further extension of the survey northwards might be interesting from a geographical point of view; but it seems clear, from the ever-narrowing nature of the country west of Waiau and Lake Te Anau, from the high and abrupt mountain-peaks that fringe both Te Anau and the coast-line, and the short distance between, and also from the northward prospect, obtained by Mr. Hay, that the unexplored country is somewhat similar to, but evidently rougher than, that explored, and that the discovery of any extent of pastoral, much less of agricultural, land becomes almost impossible. I forward a separate report, giving a more detailed summary of Mr. Hay's explorations.

JOHN SPENCE, Chief Surveyor.

HEAD OFFICE.

DURING the year which ended on the 30th June last the business of the Survey Department has been quite equal to that of any previous year. The correspondence has taxed the diligence and capacity of Mr. Lakeman and his assistants; and the accounts, although numerous, because of the expenditure on roads to open lands for sale, have been put through expeditiously, so that no complaints of delay in their payment have been due to want of expertness in dealing with them here. The letters received and despatched amount to about 9,583, and the sum represented by the accounts passed for payment is £212,111 16s. 5d.

The tedious labour of writing or revising descriptions of counties, ridings, road districts, municipalities, and such like, and the work of preparing maps showing them, has engaged the time of two draughtsmen nearly continuously for nine months of the past year. The number of road districts, ridings, and counties exceed seven hundred, all of which had to be most carefully described and revised.

In the publication of maps the progress, although considerable, has not been very great, bearing in mind the work to be done, and its usefulness. Sixteen districts have been drawn on the 40-chain scale, and reduced and printed on the mile scale. Thirty-one sale-maps were prepared, besides additions to maps partly done in district offices: some of these being of large size, and most of them were printed in one or more colours. Twenty-nine geographical and general maps have been drawn and printed.

The map of the Middle Island, on the scale of twenty-five miles to an inch, which was in hand by Mr. Spreat, was completed during the year. It has been executed in four colours, in the same style as the map of the North Island, published in 1881, and is an excellent specimen of lithographic art, quite equal to the best of the publications of the Royal Geographical Society.

Mr. Boscawen has lithographed, from photographs and sketches, some of the scenery of the Hot Lakes and of the country in the North Island, and of the Alpine scenery in the Middle Island. A book of sixteen drawings was published in 1882, and seven more are ready for printing.

The work done, and the work on hand in the litho-printing office, it will be seen by the statement annexed, is very great, considering the appliances for its performance. At the present time the machine-room is full for months in advance. No doubt the excellent printing done, and the efforts which have been made to improve the style of the publications, have created the demand for them; so

that it is now usual, instead of issuing 250 copies of sale-maps, to supply from 500 to 1,500, and for pamphlet-maps and such like it ranges from 1,400 to 10,000. It would be a great relief to the department were the site of the new offices fixed on, and a new building, with machinery suitable to the time, erected, so that the current wants of the Government might be supplied promptly. I am certain that it pays the country well to distribute freely all that is known of its detailed geography, not only of the geography of its saleable lands, but of its scenery, its roads, its many subdivisions for purposes of Government; and also to publish to its colonists the best information relating to the utilization of the productions of the soil. With the few hand-presses and one steam-press it is hopeless to try to meet the demand. The office is getting into discreditable arrears, notwithstanding that about £900 worth of work had to be given out to the trade in Wellington.

In the coming year the publication of 80-chain district maps will be pressed forward as fast as the very numerous calls on the time of the draughtsmen for urgent current work will permit.

The map of Central Auckland, drawn in Auckland by Mr. H. Pollen, is being placed on stone, and when finished it will be very useful for many local purposes. With the appliances with which it is hoped the new building will be furnished, maps such as this could be much more quickly published, and their benefits would be more speedily realized.

A. BARRON, Office Surveyor.

APPENDIX No. 3.

ROADS TO OPEN CROWN LANDS FOR SALE.

Extracts from Reports and Statements by Supervising Officers and Local Authorities.

AUCKLAND.

THE extremely bad weather of last winter retarded our work and increased its cost very materially, by destroying or injuring the works immediately on completion.

Kaihu to Kaikohe.—No work has been done on this line during the past season, the immediate settlement of the lands it affects having been delayed by the withdrawal of the lands from sale in connection with the Kaihu Valley Railway scheme.

Homestead Blocks, Mangonui.—A grade survey has been made of a line through the Kaiaka Block of four and a half miles, preparatory to calling for tenders for contract. The road will be of the usual 6-feet bridle-road character. It junctions with Fairburn's Great North Road, and will open some good land for settlement.

Wairua to Sandy Bay.—Work on this line was commenced during the past season by small contracts and a road party under the charge of Mr. E. J. Fairburn. Up to date eight and three-quarter miles of from 5 feet to 11 feet in width have been completed, out of twelve and a half miles surveyed, as far as the boundary of a block of Native land, through which it will be necessary to take it when arrangements can be come to, the right of road having lapsed. It will end at Whananaki, a small harbour on the coast.

Wairua to Helena Bay.—This road is a branch from the last, running through the Crown lands to a sheltered landing-place on the coast at Mimiwhangata. Mr. Fairburn has constructed five miles of road from 5 feet to 8 feet wide, mostly through forest, on good grades, at less than £100 per mile, the work being done by a road party. The length from junction with the last road, as laid out by Mr. G. S. Anderson, is eight and three-quarter miles, leaving, therefore, three and three-quarter miles to make this year.

Whangarei through Takeke.—Nothing has been done on this line, but the grade survey should be commenced this season.

Purua and Mangakahia.—Tenders have been called for building a bridge over the Wairua River, which at present prevents access to the Crown lands and already-formed roads on the other side. A short piece of road about a mile in length is under survey, preparatory to formation, leading to the bridge. When these works have been completed a considerable extent of good land will have been rendered comparatively easy of access from Whangarei.

Tangihua No. 3.—Nothing has been done on this line beyond arranging for the purchase of a portion of the road through private property, but the works will go on as soon as I can spare an officer to attend to it.

Pakiri Block.—The Rodney County Council has erected a substantial bridge over the Whangaripa River, on the Matakana-Tarai Road. This will aid in opening a block of Crown land of about 10,000 acres.

Maunganui Bluff to Kaihu.—The total length of this road is about thirty miles, out of which about twenty-six have been completed as a bridle-road. Mr. J. C. Blythe has about two miles of heavy bush and formation to finish before it can be said to be open, the work being partly done by a road party and partly by piecework. It has been more than usually expensive on account of swamps and the number of bridges. When finished, which will be about September next, a good bridle-road will exist from Mangawhare, on the Wairoa, to the beach north of Maunganui Bluff. Great difficulty is experienced in getting labour in this district, where the timber and gum trades offer high inducements to the labouring man.

Takahue to Manganuiwae.—This line was completed last year. I merely refer to it to say that when I passed over it with the Hon. the Minister of Lands in February last it was in fair condition, but much wanted a little attention to the water-tables, &c., which might very well have been done by the counties through which it passes.

Okaihau to Victoria Valley.—Work was commenced on this road during the season, and four contracts let for eight miles, which are now nearly completed; whilst tenders have been called for the next section, 1 mile 72 chains, ending at the Waihou River. The line has been carefully

explored right through, and the fact that an excellent line can be obtained has been proved. At the northern end Mr. Garsed has graded three miles ready for contract, besides running four miles of grade-line, which we afterwards determined to abandon as the main line, though this will make an excellent settlement-road, running as it does through a country very suitable for that purpose. At the extreme northern end the survey was stopped by the Natives from going through lands where the road-right has lapsed. This has been reported to you. Until this difficulty has been overcome we shall not be able to let the contracts. During the ensuing season we propose building a bridge over Waihou, and continuing the grade survey to Mangamuka, which portion will probably also be let for construction. Mr. E. Fairburn has inspected the road, and generally directed the works, Mr. R. Blundell being the local inspector.

Helensville to Kaipatiki.—The long swing-bridge over the tidal waters of Kaipara, of 251 feet length, was completed satisfactorily early in the season. Early in June, 1883, the construction of the road from the bridge towards Babylon was commenced under Mr. J. C. Blythe's direction, and six small contracts have been let, principally for clearing scrub and ditching the roadsides. Tenders have also been called for the erection of two bridges. The building of the bridge induced the public to purchase nearly every section offered for sale in that locality, which shows the advantage of opening up the Crown lands by roads.

Waikato River to Block XVI., Awaroa.—Mr. A. B. Wright was some time engaged on the continuation of this road, twenty-three and a half miles having been opened since it was commenced, except that several of the culverts are not yet up. There is a contract going on for the supply of timber, and three men are engaged in building culverts as the timber is supplied. The length completed this year is six and a half miles. I may add that the last part of it is, however, only roughly done, in order that a way through to the West Coast might be available.

Waikato River to Block VII., Awaroa.—On this road-line two and a quarter miles have been made, partly by Mr. J. C. Blythe, partly by Mr. A. B. Wright, with road parties. A total distance of eighteen miles has been constructed from Churchill, giving a through road to the West Coast. I understand that one of the small bridges has been burnt, thus closing the road for a time, but, as there must be a certain amount of money accruing from the deferred-payment sales, the local authorities ought to be able now to keep the line open. This line, and the last referred to, will have opened up a considerable extent of Crown land, the quality of which, especially on the first, is excellent, some of which it is proposed to cut up during the summer.

Hikutai to Ohinemuri.—This road was completed last season. I understand that it is the best part of the coach-road from Thames to Te Aroha.

Tauranga to Te Puke and Matata.—Up to the 30th June Mr. Goldsmith had completed nineteen and a quarter miles of this line as an 18-foot cart-road, thirteen and a half miles having been made during the season, at a cost, including everything, of £171 12s. per mile. As this includes some very heavy embankments, side-cuttings, and expensive bridges, I consider the price to be very small. Ten miles were made by a road party, and three and a half miles by Natives at piecework. When two bridges now building, and a small piece of road now under construction, are finished, a coach-road will have been opened from Tauranga to Otamarakau. It is proposed to make about a mile and a half more to connect with the Public Works road from Opotiki and Matata, which will finish this part. It is also proposed to explore a line from Otamarakau through the Crown lands in as direct a line as possible to Te Teko, and afterwards make it.

Opotiki to Waiotahi.—Mr. Crapp, of the Public Works Department, reports that 13 $\frac{3}{4}$ miles of road-line have been laid off for construction, 24 chains of side-ditches for road formation through swamp, 550 cubic yards of earth moved for filling-in swamp, 13 chains of side-cutting formed 18 feet wide, 18 chains 8 feet wide, and 11 chains 10 feet wide; 2,700 feet of puriri timber has been cut in the bush for small bridge on this road. The land along this line of road has all been lately bought from the Crown, but this road, when constructed, will be the means of opening up a great deal of back country; estimated area, about 16,000 acres. The above work has been done out of £500-grant to the Opotiki Highway Board.

Opotiki to Ormond.—During the year the works on the Gisborne side of the Motu River consisted in repairing and keeping the line open. Mr. Krippner, under Mr. Barnard's direction, let two contracts for clearing, 3 feet on each side, of thirteen miles, and for building ten additional bridge culverts; and a party of five men were engaged in removing slips and clearing the paddocks as resting-places for stock. The burning-off was a failure, however, owing to the wet, so that very little grass was sown. No work is going on just now at all. This road will always be a source of expense owing to the nature of the country through which it runs. On the Opotiki side Mr. Crapp reports that ten miles have been formed 4 feet wide, and the forest cleared 1 chain wide. There have been 1,673 cubic yards of rock excavated in widening precipitous portions of this road from 4 feet to 8 feet wide. About nine miles of road have yet to be laid out to form a junction at the Motu Bridge. This is now being done, and the work of construction will be put in hand as soon as the season will permit.

Te Aroha-Katikati Road.—This road, under the supervision of Mr. A. C. Turner, has been completed as an 8-foot bridle-road during the season, nine and a half miles having been added to the three and three-quarter miles finished last season, making thirteen and a quarter miles altogether. Very heavy side-cutting, a good deal of which was in rock, has been met with. Slips during the formation were frequent, and are likely to continue for some time, for which reason two men have been continued on pay, under Mr. Goldsmith's supervision, to keep the road open. It affords a direct means of communication between Tauranga and Te Aroha, and will be a favourite route for equestrians from the fine views obtained along it. It would be, comparatively speaking, inexpensive to convert this into a coach-road, as the grades are excellent everywhere.

Huihuitaha to Patetere.—This road was just on the point of completion at the date of last year's report. It has been open some ten months, and is a good deal used, especially in summer-time, by people driving from Cambridge to Taupo.

Ormond to Waiapu.—The southern part of this road has been under the supervision of Mr. Krippner, who has made nineteen and a half miles of 8 feet and 12 feet wide, with a number of bridge culverts. The northern end, starting from Te Awani Village southwards, has been in charge of Mr. Haig, who has completed five miles of 9 feet and 12 feet road. The difficulty of dealing with the Native opposition to this road has been very great, entailing great loss of time and money. On my visit there in March last I found everything at a standstill, but works have since been progressing. There is a very long piece to make before the two ends of this road are joined, and part of it is very difficult; but should no further Native troubles arise, next year should see at least half this distance disposed of. When completed a great boon will have been conferred on the Waiapu settlers, as it will allow them to use a well-graded road instead of the present abominable coast track.

Waipiro Branch of the above road was made specially to give access to the Waiapu Valley from the Waipiro landing. It is eight and a half miles long, 12 feet wide, and is complete all but some culverts. Some of the settlers in the district gave monetary assistance to make both this and the next branch road.

Tuparoa Branch of Waiapu Road.—Mr. Haig has finished two and a half miles of this road, 12 feet wide, except that some of the culverts are not in. Native difficulties have prevented its completion, which will be very easy when work can be continued.

Gisborne to Waimata.—Works on this road have been repairs, removing slips, and building culverts. The heavy floods of a few months ago carried away most of the timber for the small bridges. It would be advisable to continue this road a few miles further, as it runs through Government land of first-rate quality.

Gisborne to Wairoa.—About twenty-eight miles of this road have been completed during the two past seasons, *i.e.*, the works have been spread over that distance, parts of the road having been previously formed as a bridle-road. One contract for culverts is still in hand, and cannot be completed until timber can be taken over the road. The County Engineer has had charge of the works, subject to Mr. Barnard's advice, who reports that the road is in fair condition. To effect a junction with Mr. Baker's work at Te Reinga a distance of seven miles remains to be converted from a bridle- to a cart-road, at an estimated cost of £1,120.

Taupo viâ Rotoaira to West Coast.—This line, which is part of an important main road of the future, was commenced in February last by Mr. A. B. Wright. It starts from about a mile on the Napier side of Taupo, and follows generally the shores of Lake Taupo till near its southern end. The works of formation are generally remarkably easy, except in two places, where the solid rock is being blasted out, and also excepting the bridges, some of which will be very large works. The Maoris have completed to date about two miles out of the fourteen already graded, and a contract for building a bridge of three 30-foot spans over Waitakanui has been let. The Natives are doing the work by the piece, most of the fourteen miles being let, but as this is the winter season very little progress is being made. The blasting is in the hands of four of the Constabulary, detailed to that work by Major Scannell. It is to be feared the work will take a long time to finish, as it is deemed expedient to leave it in the hands of the Natives, who are constantly away on one pretext or another. This road when opened will join Field's track to Wanganui, and will pass close to Lake Taupo, the Tokanui, Hot Springs, Tongariro, and Ruapehu Mountains, thus opening to easy access another district famed for its natural wonders.

Ruakituri Block.—The works in this district are under the charge of Mr. Lambert, of the Survey Department, under the supervision of the Chief Surveyor, Napier. Mr. Lambert has furnished a very complete report, from which the following information is compiled:—

Marumaru to Te Tuhi Branch.—Seven and three-quarter miles have been completed as a 5-foot-in-the-solid bridle-road, which is immediately to be continued on from Te Tuhi for three miles to the Ruakituri River. The grades are all good, but the crossing at the Wairoa River will often be an obstacle to traffic until a ferry is established. The works cost about £55 per mile.

Ohuka-Pukemaru Branch.—Total length, 13.25 miles, of which 9.75 miles have been made during the season, 5 feet wide. This line starts from the main road, Wairoa to Waikaremoana, and runs through the Taramarama and Ruakituri Blocks. The works were performed by Native contractors, at the very small price of £24 10s. per mile.

Ruakituri Valley Road.—This line starts from the Gisborne-Wairoa Road at Te Reinga, the crossing to Hangaroa River being effected by a canoe-ferry; 9.75 miles were completed during the season. It will junction with the line from Te Tuhi when made.

Te Tuhi-Pukemaru Road.—This line, of 6.75 miles in length, is formed as a stock-driving road, to effect a junction with two of the other lines already made. It does not follow the permanent grades, but will be very useful as affording access to the country about to be offered for sale. This series of roads, laid out to and through the block called Ruakituri, will render access to most of the sections comparatively easy, and should have the effect of hastening settlement in no small degree. All the works have been completed at a very small cost per mile, thanks to the arrangements made by Mr. Lambert.

Wairoa-Gisborne.—This road, which is a continuation of the Gisborne-Wairoa Road, through the Wairoa County, has also been under construction during the season by Mr. Lambert, directed by Mr. Baker, two and three-quarter miles having been completed; whilst other portions, including several bridges, are in hand. Its completion, from Opoiti to Te Reinga, will render the whole road from Gisborne to Wairoa tolerably easy for traffic.

Attached hereto I beg to furnish a schedule of road-works performed by the department in opening up Crown lands prior to sale. From it you will gather that 136.65 miles have been completed during the season, whilst forty-five miles have been graded in addition, preparatory to commencing the work of construction.

SCHEDULE of ROAD-WORKS to open Lands before Sale completed within Provincial District of Auckland during the period from 1st July, 1882, to 30th June, 1883.

Name of Road.	Bridle-road.	Cart-road.	Graded in Addition.	Bridges not included in Roads.	Remarks.
	M. ch.	M. ch.	M. ch.	Feet.	
Homestead lands, Kaiaka ...	...	...	4 5	...	
Wairua-Sandy Bay ...	8 25	...	4 25	...	Work still progressing.
Wairua-Helena Bay ...	5	...	3 75	...	" "
Maunganui Bluff to Wairoa ...	...	10 25	...	...	" "
Victoria-Okaihau... ..	...	6 25	9 25	...	" "
Helensville-Babylon ...	...	...	2 5	251	Helensville swing-bridge.
Waikato River to Block XVI., Awaroa	6 25	...	...	...	Completed.
Waikato River to Block VII., Awaroa	2 25	...	...	...	"
Tauranga-Matata ...	...	13 5	...	...	Work still in progress.
Te Aroha-Katikati ...	9 5	...	...	...	Completed.
Huihuitaha-Patetere ...	...	1	...	...	"
Ormond-Waiapu ...	19 5	5	...	...	Work still in progress.
Waipiro Branch ...	...	8 5	...	...	Culvts. not finished; in progress.
Tuparoa Branch ...	...	2 5	...	...	"
Taupo-Murimotu... ..	...	2	12	...	Work still in progress.
Ruakituri Block—					
Marumarū-Te Tuhi Branch ...	8	...	3	...	Work still in progress.
Ohuka-Pukemaraū Branch ...	9 75	...	...	...	Completed.
Valley Road Branch ...	9 75	...	...	...	"
Te Tuhi-Pukemaraū Branch ...	6 75	...	...	...	Stock-driving road, completed.
Gisborne to Wairoa—					
Opoiti-Te Reinga Section ...	2 75	...	5 75	...	Work still in progress.
	87 65	49	45	251	

S. PERCY SMITH, Assistant Surveyor-General.

HAWKE'S BAY.

Puketitiri Block, Pohui District.—The Hawke's Bay County Council constructed six miles of dray-road, connecting with the Inland Patea Road, near the Konini; and cleared two and a half miles of road through the heart of the Puketitiri Bush, at a cost of £1,020 14s. 6d. The vote for the year 1881-82—£520—has been expended on this road by the County Council.

Puketoi and Tahoraite.—A considerable area of land in the same locality being open for sale, it was thought advisable to delay the settlement of Block XIV., Tahoraite District, until more of the adjoining lands had been taken up. The road-works and surveys in Block XIV. are now being pushed forward, for there are only eight sections of rural land remaining unsold out of the eighty-six which have been offered to the public, in Blocks VI. and IX., Woodville District, and Blocks IX. and XIII., Tahoraite District. One contract, for clearing 1 mile 60 chains of road-line, has been let. Out of the £1,331 voted, a sum of £318 15s. 8d. has been expended in Block XIII., Tahoraite District, on works mentioned in last year's report, including a sum of £75 paid to the Woodville and Kumeroa Road Boards in aid for a bridge and 50 chains of heavy side-cutting on the road connecting the Township of Woodville with the Village of Kumeroa. The votes appearing for the Ngamoko Block, Norsewood District, and the Ahuaturanga Block were expended before the 30th June, 1882. Particulars of the works entered upon on these lands were published last year.

Maharahara Block.—The exploration surveys of over fifteen miles of road have been completed since the 14th April; the levels and preparation of contracts are now in hand. There was no occasion to press on the roads in this block, for the Waste Land Board has determined not to sell the land until after the railway is opened to Tahoraite.

Tautane, and Tautane to Tahoraite.—The main line of road opening out a block of 59,000 acres of bush land, and connecting from the sea-coast at Wainui with the railway line at Tahoraite, has been thoroughly explored. The particulars of the work done during the year are as follow:—Through the forest—Road-line explored, 38·5 miles; road-line graded and levels taken, 11·5 miles; packhorse-track cut, 3 miles: at a cost of £746 10s. 6d. The exceedingly wet season, and the expense of carrying provisions on men's backs into the bush, has added very much to the cost of the survey. A contract has been let for clearing six miles of road through the bush; price per chain, £1 4s.

On the 1st March, after a close inspection of the routes that have been explored by Mr. McCartie, I reported to you on the subject. The appropriation for the Tautane Block, £3,515, and Tahoraite to Tautane, £2,000, will be sufficient to open out the greater portion of the block for settlement. The estimated cost of completing a road right through from the sea to Tahoraite, a distance of forty-seven miles or thereabouts, not including metalling or the bridging of fordable streams, will certainly not be less than £12,000. The proposed route through the Tautane Block is not the nearest or cheapest cross-road to construct. An easier line could be obtained from Wallingford, on an old disused horse-track. The advantage of the Tautane route is, that a large

block of Crown land will, by the construction of the road, be rendered available for settlement. The sale of Crown lands will recoup the outlay on the construction, and the occupation of the country will provide for maintenance. The line from Wallingford does not touch any Crown lands, but passes, for the first thirteen miles, through private properties, then enters the bush, goes through Native land for fifteen or twenty miles, coming out on Mr. Hamilton's leasehold, the same as the Tautane route.

Tukituki to Waipawa, Ruataniwha Survey District.—The works completed on this block are five and a half miles of bridle-road cleared through the forest, and formed for horse traffic; cost, including exploration surveys, levels, and supervision, £844 13s. 2d.; and three and a half miles cleared through the forest; cost, £168. The area opened out by the roads is 5,211 acres; the cost per acre for road works is 3s. 3d. These lands were offered for sale in June, when 1,828 acres, value £2,461 15s. 8d., were taken up on deferred payment, and 313 acres, value £236 11s. 3d., were sold for cash.

Rotokakarangu Block.—The works on the road from Turiroa, through the Waihua Block, to the Rotokakarangu Block, have not been commenced, for the same reasons as were stated in my report for last year.

Mohaka to Waitara.—The grade survey of this road has been commenced by Mr. C. D. Kennedy. The road from Mohaka, connecting with the Napier Taupo coach-road at the Mohaka Bridge, will be much used by stock travelling from Poverty Bay and Wairoa to the Waikato District. A track following close to the proposed bridle-road is now used for stock-driving, but it is very rough, and much in need of being opened out.

HORACE BAKER, Chief Surveyor.

WELLINGTON.

Tokomaru Block.—£100 was expended by Mr. Assistant Surveyor, John Annabell, in extending the central road. The work executed consisted of one mile of horse road cleared $\frac{3}{4}$ chain wide and formed 5 feet in width. This line was made passable for horses half a mile further.

Marton-Murimotu Road.—The works carried out on this line consisted of the felling 1 chain in width, and clearing and stumping 24 feet wide, over a length of six miles from a point near Hunterville to the centre of the Otairi Block; and the removal of slips, reconstruction of small bridges and culverts over a distance of twenty miles, so as to make the track passable. The cost amounts to £766.

Otamakapua (Barton's Line).—Ten and a half miles of this road have been laid out and graded, and the whole line to Murimotu well explored; pack-tracks have been cut in, and we shall soon be ready to call for clearing contracts. Expenditure to date, £369 9s.

J. W. A. MARCHANT, Chief Surveyor.

County of Wairarapa East.—The following works have been constructed during the year:—

Name of Road.	Length of Formation.	Bridges.	Conditions of Works at this Date.	Approximate Area of Crown Land opened.
Upper Taueru Road	Ch. lks. 62 0	...	Completed	Acres. 6,000
Mataikuna-Pakowai Road	25 50	1 20-ft.-span bridge	"	5,000
Aohanga-Mareinanga Road* ... ..	...	...	"	...
Wangaehu Road Contract No. 2	50 48	...	Completed	...
Ditto, No. 3	63	...	"	...
Ditto, No. 4	55	...	"	2,000
Ditto, No. 5	84	...	"	...
Ditto, No. 6 ... ..	...	1 26-ft.-span platfm. bridge	"	...
Mauriceville S. Roads Contract No. 5	74	...	"	...
Ditto, No. 6	11 64	...	"	5,000
Ditto, No. 7 ... ..	...	1 40-ft.-span truss bridge, 1 26 ft. 6 in. platfm. bridge	In progress	...
Hawera Road Contract No. 1	54	...	Completed	...
Ditto, No. 2	112	1 40-ft.-span truss bridge	In progress	3,300
Ditto, No. 3	83	...	"	...
Ditto, No. 4†	80	1 26-ft.-span platfm. bridge	"	...
Pahiatua Roads Contract No. 2	79 46	...	Completed	...
Ditto, No. 3	45 4	...	In progress	...
Ditto, No. 4	70	...	Completed	2,050
Ditto, No. 5	66 30	(Through Wellington City Corporation Endowment)	"	...
Makakahi Road Contract No. 1†	56 61	1 30-ft.-span truss bridge	In progress	150
Dreyer's Rock Road Contract No. 1	74	...	"	...
Central Mangaone Rd. Cont. No. 1†	80	...	"	640
Alfredton-Tiraumea Rd. Cont. No. 1	108 72	...	Completed	...
Totals	1,247 25	6 bridges ... ..	...	13,140

* The work on this road was performed by day labour, and opened up about five miles of a dray-road towards the Aohanga and Mount Cerberus Blocks.

NOTE.—With the exception of works marked thus † the above contracts were under the control of Wairarapa West County Council, until the change in boundaries threw them into this county.

Wanganui County.—There have been made by the County Council about thirty miles of pack-track known as Field's line to Murimotu, partly opening up the Rangitaua Block, 23,000 acres, and the Paratieke Block, 6,000 acres; and 9 miles 14 chains, partly opening up the Tokomaru Block, 16,547 acres.

TARANAKI.

The various works have not been proceeded with so rapidly as I had hoped they would have been, partly in consequence of the unusually wet season we have had since January last, and partly through the difficulty of obtaining labour. These difficulties still exist, and I have now a large amount of work on hand, which is but slowly being taken up. The difficulty is not removed by calling for tenders for the work, because as a rule the prices asked are unreasonable. The reason for this state of things is that a very large area of bush is being felled in the Waimate, Ngaire, and Kaupokonui Districts, and most of the available labour is absorbed by these contracts.

By the schedule of works which I now forward you will notice that during the past year about thirty-eight miles of roads have been felled in the West Coast Land District, at a cost of £2,438 10s. 3d., and that the sum of £2,982 18s. 8d. has been spent in bridging, culverting, &c., the above works being let in sixty-two contracts. Of these sums £1,284 5s. 4d. will be charged to vote "Continuous Reserve," and refunded. The Eltham Township has been felled, burned, and grassed, and is now ready for sale. Nearly the whole of the above works have been done under the system of small contracts, the average value of the contracts being about £90, the work, in the majority of cases, being done by deferred-payment settlers, who were thus afforded an opportunity of earning money wherewith to pay for their lands.

The works in progress and those required during the coming year will include the completion of the felling and culverting the roads running through the Native lands in the Hawera, Waimate, Kaupokonui, Opunake, and Cape Districts—about thirty-five miles of road work. Also the felling of about twenty-three miles of roads through Blocks VII. and VIII., Kaupokonui, the culverting of about ten miles of Eltham Road, from Auroa Road to Opunake; the formation of part of Motoroa Road, Wairoa—Momohaki District, and probably the improvement and extension of the leading roads running east from the railway line in the Inglewood-Stratford District.

About one-fourth of the above work is now in hand, and a large proportion of the remainder will be commenced within the next two months, if labour can be obtained.

G. F. ROBINSON, Crown Lands Ranger.

RETURN OF ROADS through CROWN LANDS in the TARANAKI and WEST COAST LAND DISTRICTS.

Name of Road.	District.	Width.		Cart-way.	Length.	Cost of Felling.			Culverts, Bridges, &c.			Total.		
		Chains	Feet.			£	s.	d.	£	s.	d.	£	s.	d.
Eltham ¹ ...	Kaupokonui and Opunake	2	16		693-19	866	9	8	275	4	9	1,141	14	5
Opunake ² ...	Ngaire ...	1	16		...	...			544	9	8	544	9	8
Skeet ³ ...	Kaupokonui ...	1	16		95-60	66	18	4	536	13	8	603	12	0
Hastings ⁴ ...	Kaupokonui and Waimate	1	16		131	62	13	4	40	16	6	103	9	10
Rama ⁵ ...	Ditto ...	1	16		240	216	0	0	...			216	0	0
Oeo ⁶ ...	Ditto ...	1	16		212-75	144	3	9	...			144	3	9
Omuturangi ⁷ ...	Ditto ...	1	16		221-70	154	12	4	...			154	12	4
Palmer ⁸ ...	Ditto ...	1	16		114-50	104	14	1	...			104	14	1
Tempsky ⁹ ...	Ditto ...	1	16		312-55	208	17	4	95	1	0	303	18	4
Katetauru ¹⁰ ...	Ditto ...	1	16		177	53	9	0	...			53	9	0
Fraser ¹¹ ...	Hawera ...	1	16		280	203	18	0	...			203	18	0
Waingongoro ¹² ...	Kaupokonui ...	1	16		38	26	12	0	...			26	12	0
Salisbury & Croydon ¹³ ...	Huiroa ...	1	16		...	...			211	6	1	211	6	1
Kaharoa ¹⁴ ...	Patea ...	1	16		515-81	330	2	5	330	1	0	660	3	5
Motoroa ¹⁵ ...	Wairoa ...	1	16		...	...			818	12	0	818	12	0
Richardson ¹⁶ ...	Wairoa ...	1	16		...	...			130	14	0	130	14	0
Eltham Township ¹⁷ ...	...	...	...		...	...			...			193	14	8
Extras ¹⁸ ...	...	...	...		...	...			...			16	1	0
Overseers' wages and travelling expenses ¹⁹ ...	...	...	...		...	...			...			409	2	0
Totals ...	...	...	...		3032-10	2,438	10	3	2,982	18	8	6,040	6	7

REMARKS.—¹ Felling from Auroa Road to Opunake, and culverting (part) from Manaia to Auroa Road. ² Culverting (part) from Waingongoro to Manaia Road, and formation Mountain Road to Cardiff Road. ³ Completion of opening road, railway-line to Oeo River. ⁴ Opening road from Hokorima to Skeet Road. ⁵ Opening road from Main South Road to Skeet Road. ⁶ Ditto, ditto, ditto (part). ⁷ Ditto, ditto, ditto. ⁸ Opening road from Tempsky Road to Skeet Road. ⁹ Opening road (part) from Hastings Road to Palmer Road, and branch to Skeet Road. ¹⁰ Opening road (part) from Normanby Road to Tempsky Road. ¹¹ Opening road (part) from Austin Road through Tiroitiromana Reserve. ¹² Opening part of road unfelled to Barclay Road. ¹³ Earthwork and culverts to open up roads for cart-

NELSON.

Hampden to Maruia.—During the past year twenty-two miles of this horse-track have been finished. The two final contracts are now in hand, and would have been finished during the year if bad weather had not been so constant. They will be completed in July, making the total length twenty-six and three-quarter miles from Hampden to the Maruia Saddle. The road was carefully graded throughout, and plans and specifications of work prepared by Mr. H. Tarrant, Road Surveyor. The bush was felled 66 feet wide, cleared and ditched 10 feet, formed 5 feet, gravelled 3 feet by 8 inches throughout.

Tadmor and Sherry to Buller.—During the year Mr. Tarrant has graded thirteen and a half miles in the Tadmor Valley to the Hope Saddle on the eastern side, and Mr. T. Sadd three and three-quarter miles on the western side, making a total length of seventeen and a quarter miles. Two sections of two miles each have been let by contract, and are now in progress, providing for the bush-felling, clearing, and formation of a cart-road 12 feet wide. Good grades have been obtained, but the earthworks on the upper sections will prove rather heavy. Contracts have been called for two more sections of two miles each, but tenders were not accepted, one being too high and the other withdrawn. Fresh tenders have been invited. The expenditure on this road to the 30th June has been £416 18s. 2d., and the outstanding liabilities for work in progress £889 11s. 2d. Applications for leasing lands fronting on this line are being rapidly made.

Sherry Valley Road.—A length of about four and three-quarter miles has been graded up this valley to the end of the available land. Beyond this distance the land is poor, and the valley narrow and gorgy.

Wakefield and Stanley Brook.—The Waimea County Council was authorized to expend this vote, subject to inspection by the department. A length of 195 chains was graded, and the horse-track constructed. Plans and specifications were prepared by Mr. J. Thompson, and approved of. Tenders were accepted, and contract let by the Council; the cost of work, including survey, advertising, &c., was £170. The balance of £30 left out of vote was expended, under authority, by the Upper Motueka Road Board in part construction of 86 chains on the lower part of the same road in Stanley Brook, also subject to supervision.

Oronoko and Rosedale Road.—The Pangatotara Road Board was authorized to expend this vote in widening the present horse-track into a cart-road 12-feet wide, subject to inspection by Chief Surveyor. Surveys were made and plans with specification prepared by Mr. J. Thompson, and approved of. Tenders were called for the work in two sections, and No. 1, of a length of two miles, was accepted by the Board, although much higher than the original estimate. The amount contracted for is £322, and the work is now in progress. Fresh tenders for No. 2 section have been called for, but none were satisfactory; and this section has been divided into two lengths, and tenders again called for. Labour is difficult to obtain in the country districts, as at this time small settlers are busy on their lands.

Baton to Karamea.—This vote was intrusted to the Waimea County Council to expend, subject to inspection of Chief Surveyor. As the County Council had an interval of three months between its sittings the work was undertaken by the Upper Motueka Road Board. Plans and specifications have been prepared and approved of, and tenders have been called for the work, but I have not yet been notified of any being accepted. Inspections of the works on the above roads while in progress have been made by the Chief Surveyor during the year.

JNO. S. BROWNING, Chief Surveyor.

NELSON.

Mr. F. W. Martin, Resident Engineer, Public Works Department, Greymouth, reports as follows:—

Cobden via Coal Creek to Seventeen-Mile Diggings.—The sections of this road in progress during year, were—(1) A length of 3 miles 1 chain in the Coal Creek Valley, which was in hand at the commencement of the year. The work has been completed as far as possible under the vote of £1,500; but a further authority of £600 is required to finish it properly, so as to be available for horse-traffic throughout. (2) A length of 48½ chains of side cutting at the Ten-Mile Bluff to make the ascents at each end practicable for pack-horses. This also was in progress at beginning of year, and has been satisfactorily completed during year.

Grey Valley to Teremakau via Bell Hill and Bruce's Paddock, and to Upper Ahaura.—The works in progress on this road have been—(1) Lake Poerua Contract; a dray-road, 1 mile 10 chains in length, extending from the open ground at Bruce's Paddock to the settlers' homesteads at Lake Poerua. This has been completed. (2) Hatter's Terrace to Haupiri Plains. Of this division a length of six miles has been constructed as a bridle-track. Three miles out of the six were in progress at the beginning of the year, and the other three miles were let early in the year, and completed about the middle of it.

Survey.—The survey of the whole of the road both to the Teremakau and to the Haupiri has been completed during year; but, owing to scarcity of draughtsmen, I have not been able to get the plans all plotted yet. The accompanying tables show the lengths of surveyed line, and the state of the works under construction. The general nature of the country through which both lines pass is easy, and the line has been carefully selected so as to be available as a main road-line.

traffic. ¹⁴ Includes earthwork formation (three contracts) to open road for cart-traffic. ¹⁵ Bridge over Momohaki, and heavy earthwork cuttings. ¹⁶ Earthwork and culverts, to open up road for cart-traffic. ¹⁷ Includes felling 73 acres, burning, and grassing. ¹⁸ Day-labour, chaining and pegging roads, repairs to fords, &c. ¹⁹ Wages of two overseers; also travelling expenses of Superintendent of Road Works and of Crown Lands Ranger, Wellington Land District.

STATE OF CONSTRUCTION WORKS.

Item.	Description of Item.	Unit of Measure.	Total in Progress during Year.	Quantity done up to 30th June, 1883.	Remaining to be done.
<i>Cobden via Coal Creek to Seventeen-Mile Diggings.</i>					
<i>Section in Coal Creek Valley.</i>					
Felling ...	40 ft. wide ...	Lin. ch.	241	241	Nil.
Clearing for formation	10 ft. wide, over flat ground ...	"	241	241	"
Formation ...	6 ft. wide, mostly about 1 ft. of bank	"	241	241	"
Metalling ...	3 ft. wide on top, 8 in. thick ...	"	241	81	160
Drains ...	2 ft. wide at bottom ...	"	190	180	10
Culverts and bridges...	Timber 5 ft. wide across road ...	Lin. ft.	240	240	Nil.
<i>Section at South End of Ten-Mile Bluff.</i>					
Felling ...	Width of track and slopes ...	Lin. ch.	22	22	Nil.
Formation...	6 ft. wide, all on steep sidling ...	"	22	22	"
Box-drains	12 in. by 12 in. in clear inside ...	No.	3	3	"
<i>Section at North End of Ten-Mile Bluff.</i>					
Felling ...	Width of track and slopes ...	Lin. ch.	26½	26½	Nil.
Clearing ...	Width of track and slopes ...	"	26½	26½	"
Formation...	6 ft. wide, all on steep sidling ...	"	26½	26½	"
Metalling ...	4 ft. wide on top, 6 in. thick ...	"	26½	26½	"
Box-drains	12 in. by 12 in. in clear inside ...	No.	3	3	"
<i>Grey Valley to Teremakau via Bell Hill and Bruce's Paddock, and to Upper Ahaura.</i>					
<i>Lake Poerua Contract at Teremakau End of Road.</i>					
Felling ...	66 ft. wide ...	Lin. ch.	90	90	Nil.
Clearing for formation	16 ft. wide ...	"	90	90	"
Formation...	12 ft. wide, mostly light embankment	"	71	71	"
Metalling ...	8 ft. wide on top, 8 in. thick ...	"	71	71	"
Drains ...	2 ft. wide at bottom ...	"	65	65	"
Culverts ...	Timber 9 ft. wide across road ...	Lin. ft.	23	23	"
<i>Hatter's Terrace-Haupiri Flat Division.—Sections Nos. 1, 2, 3, 4, 5, and 6.</i>					
Felling ...	40 ft. wide ...	Lin. ch.	480	480	Nil.
Clearing for formation	6 ft. wide ...	"	480	480	"
Formation...	12 ft. wide, mostly light embankment	"	480	480	"
Metalling ...	3 ft. wide on top, 8 in. thick ...	"	480	480	"
Drains ...	2½ ft. wide at bottom ...	"	441	441	"
Level crossing	10 ft. wide across road ...	Lin. ft.	370	370	"
Culverts ...	6 ft. wide across road ...	"	5	5	"

STATE OF SURVEYS.

Grey Valley to Teremakau via Bell Hill and Bruce's Paddock, and to Upper Ahaura.

Points.		Distances.			Remarks.
From	To	Total.	Surveyed up to June 30, 1883.	Remaining to be Surveyed.	
Hatter's Terrace ...	Commencemt. of road	Ml. ch. 1 28	Ml. ch. 1 28	Nil	Existing county track along here.
Commencement of road	Bell Hill Junction ...	9 15	9 15	"	
Bell Hill Junction ...	Haupiri Plains ...	11 71	11 71	"	No road through here at present.
Bell Hill Junction ...	Teremakau at Bruce's paddock	15 51	15 51	...	Ninety chains of this constructed.
Totals ...		38 5	38 5	...	

STATE OF SURVEYS—continued.
Cobden, via Coal Creek, to Seventeen-Mile Diggings.

Points.		Distances.			Remarks.
From	To	Total.	Surveyed up to June 30, 1883.	Remaining to be Surveyed.	
Cobden	Coal Creek Crossing beyond saw-mill	Ml. ch. 3 0	Ml. ch. Nil.	Ml. ch. 3 0	Existing road here.
Coal Creek Crossing beyond saw-mill	Seven-Mile Creek ...	3 1	3 1	Nil	Road in progress, one mile being completed.
Seven-Mile Creek ...	South end of Ten-Mile Bluff	3 40	Nil	3 40	Old horse-track in existence along here.
South end of Ten-Mile Bluff	End of Section No. 2 of Ten-Mile Bluff improvements	0 22	0 22	Nil	Road completed.
End of Section No. 2 of Ten-Mile Bluff improvements	Beginning of Section No. 3 of Ten-Mile Bluff improvements	2 0	Nil	2 0	Old horse-track in existence along here.
Beginning of Section No. 3 of Ten-Mile Bluff improvements	End of Section No. 5 of Ten-Mile Bluff improvements	0 26½	0 26½	Nil	Road completed.
End of Section No. 5 of Ten-Mile Bluff improvements.	Seventeen-Mile Diggings	6 0	Nil	6 0	Old horse-track in existence along here.
Totals ...		18 9½	3 49½	14 40	

CANTERBURY.

Teviotdale Road.—To open up a block of pastoral country sold under the deferred-payment system. There have been 4 miles 9 chains laid out by Mr. Adam; and of this, 2 miles 57 chains have been formed 12 feet wide, at a total cost of £1,271 12s. 5d. It will give a very fair access to the country, the steepest grade being 1 in 11, but the ruling grade is only 1 in 15. A small amount of ditching and maintenance remains to be done.

Black Hills or Waikari Road.—To open up a block of pastoral country similar to the above. There were 3 miles 41 chains contracted for and formed 12 feet wide, at a total cost of £772 0s. 2d. The ruling grade is rather steep, being 1 in 10, and for a short distance 1 in 6·38, with 2 miles 18 chains on the flat; it will, however, allow of machinery being taken on the ground; and, no doubt, it increased the price obtained for a block of over two thousand acres, to which it gives access—at least £1 per acre, and therefore it has paid the Government to make it.

Kuku Pass Road.—This has been formed under Mr. Dobson's directions, up to the top of the Karetu Pass, 20 feet wide, and is as substantially formed as any coach-road in the district; the length remaining, 18 miles 40 chains, into the Ashley country, has been graded and benched 4 feet wide. It has, however, been determined only to form the continuation of it 12 feet wide; and, in consequence, two gullies or ravines can have side cuttings made into them, instead of the expensive bridges originally designed by Mr. Dobson. The vote of £3,000 which the Ashley Road Board has been intrusted to expend in continuing the formation will therefore extend much farther than it would otherwise have done. Two contracts have been let by the Road Board, and are now in progress. Payments will be made on the certificate of the Inspector of Surveys, after due inspection of the work.

Oxford Bush Road to Upper Ashley.—This road is all through bush, and will be about ten miles long; it will open up a considerable block of good bush, which is still Crown land. Contracts for felling the bush 66 feet wide, and formation 12 feet wide, for 3 miles and 10 chains, have been let by the Oxford Road Board, who have been intrusted with the opening-up of this road, and the contracts are now in progress; payments to be made on the certificate of the Inspector of Surveys, as in the preceding road. £4,000 has been voted for this work.

Malvern Hills Road.—The sum of £80 was paid to Mr. Rutherford, to cover cost of fencing and severance damages for a piece of road taken through his freehold to connect with the road laid out by the surveyor to open up the blocks for sale in the Malvern Hills under the pastoral deferred-payment system.

JOHN H. BAKER, Chief Surveyor.

Mathias Pass Road.—On the work done on the Canterbury side of the Mathias Pass Road, Mr. A. D. Dobson, C.E., writes as follows: The work intrusted to my charge has been finished, the foot-track being completed from the junction flat to the top of the saddle. I found it impossible to avoid rock-cutting, as in all the most difficult places it was impossible to get past the cliffs without it; I therefore made the track on the proper level. The track is from 18 inches to 5 feet in width, with the exception of about ten yards at Cañon Creek Cliff, where two blocks of rock yet remain to be blown out to complete the track throughout. At this point so much water pours down the rock that it can only be worked in fine dry weather; and as, with the aid of a stout rope which

I have fixed, this point can be easily passed on foot, I did not think it necessary to keep the men longer on the work waiting for a spell of dry weather. When the widening is commenced a few shots will finish this piece. With this exception the track is everywhere finished and carefully graded. The greater part of the track could be worked with pack-horses, and about £500 spent in widening would enable horses to reach the top of the saddle. This sum would not widen it sufficiently for stock-driving, for which purpose a much wider road is required. The total length of the track from the junction flat to the top of the saddle is 7 miles 62·49 chains, and the rise in that length is 2,582 feet. You will see by the section I make the height of the saddle 5,100 feet above sea-level, and that there are at least six miles of road on the east side of the saddle over 3,000 feet high. Assuming the same on the west side gives twelve miles of road over 3,000 feet;* that is, there would be twelve miles of road above the level of Arthur's Pass, on the present West Coast road, the highest part rising over 2,000 feet above the level of Arthur's Pass. On the whole I consider that, although this line might be of use in the summer for stock-driving, its great altitude renders it totally unfit for purposes of general traffic.

MARLBOROUGH.

Awatere Valley Road.—My report for last year shows this line of road completed and opened for traffic through the Awatere Shearing Reserve to the Jordan Ford. This section, 7 miles 20 chains, has stood well during the past season; the cleaning-out of the water-tables and making-up of slopes in a few places were all the repairs required. In conformity with your instructions specifications for the engineering and land plan survey of a further section of the road, 7 miles 10 chains in length, from the Cam River to the Grey River, have been prepared and furnished to the Awatere Road Board, so that tenders might be invited for the same. This survey is now completed, and covers the intervening gap between the Cam River and the road in course of construction by the Board from the Grey River to the Saxton Pass, where it joins the road down the Acheron, leading southwards to Canterbury. During the current year four contracts have been let, amounting in the aggregate to nine and a quarter miles, for the sum of £3,942 17s., or on an average of £426 5s. per mile. There have been completed to date 6 miles 32 chains, and the remaining portions are being pushed forward as fast as the scarcity of labour and the season of the year will admit. These contracts commence at the Jordan Ford and terminate at the Hodder River. The greater part is on side cutting, cut into the solid to a depth averaging 12 feet to 18 feet, making up the roadway from 18 feet to 20 feet in width. The line of road included in the above has been carefully selected and graded to a mean grade of 1 in 35, the steepest grade being 1 in 9, which was unavoidable; the broken and rough nature of the country passed over practically confining the selection of this part of the line within such narrow limits that better grades could not be obtained, unless at a cost quite unwarranted at the present time. There are heavy sections of rock-cutting along this line, and the full width of the road on the steep sidings, where most of the rocky portions occur, has to be cut the full depth into the rock. Following the practice adopted last year the contracts have been let in short lengths, thereby bringing them within the scope of small parties of working-men. This system has been found to work well and economically.

HENRY G. CLARKE, Chief Surveyor.

WESTLAND.

Mapourika to Gillespie's Road.—The construction of sections 1, 2, and 3, length 2 miles 65 chains, contract price £517 10s., was completed in November last, and the construction of sections 4, 5, and 6, length three miles, and contract price £1,440, was completed in April. Sections 7 to 12, length six miles, are under contract, and of these about two miles are completed. The contract price for sections 7 to 12 is £3,073 14s. The next six miles (sections 13 to 18) will take the road across the saddle between the Waikukupa and Wehenga Rivers into the Cook's River flats. The road construction consists of clearing 33 feet wide, formation 9 feet, and metalling 5 feet wide.

Mahitahi to Haast Road.—At the beginning of the year the contract for sections 14 to 18, length five miles, was in hand, but the work had been completed to section 18. Since then section 18, length one mile, at £416 17s., and sections 19 to 24, length 6 miles 14 chains, contract price £4,381 13s., have been completed. The construction of the last part of this road, sections 25 to 29, length 4 miles 50 chains, contract price £2,143 10s., is being proceeded with; about a mile of it is completed, and three and a half miles remain to be done before through communication to the Haast and Jackson's Bay is established. This last contract includes the erection of a small bridge, but in every other respect the character of the work is the same as that of the preceding road.

Mathias Pass Road.—No contracts for construction are let yet. The survey has been completed, and a party of men following up the surveyor have thoroughly cleared the road-line 4 to 5 feet wide, and benched all the sidings 2 feet wide, so that there is now a good foot-track to the pass. The cost of benching and clearing during the past year amounted to £321 17s. Plans and specifications for the first ten miles of the road, which will give access to all the lands suitable for cultivation in the Hokitika valley, will shortly be completed.

Kumara to Beach.—This is a road constructed by the County Council under my supervision. By means of it the land between Kumara and the beach will be made accessible for settlement, and the timber available for mining purposes. Two miles of dray-road have been contracted for at £1,115, clearing 33 feet, formation 14, and metal 10 feet wide; nearly a mile of it has been completed.

In addition to the works enumerated above there have been others constructed, and are now in progress of construction, the plans and specifications of which required my approval, and over the construction of which I was directed to keep a general supervision.

GERHARD MULLER, Chief Surveyor.

* The west side being steeper, the road would be sooner at a lower level.

OTAGO.

THE following roads are nearly all executed by the County Engineers, under the Chief Surveyor's supervision:—

WAIKOUAITI COUNTY.

Road across Waikouaiti River.—To open up 7,000 acres now under survey, being part of original Runs 171 and 171A. Seven small contracts were let in June, covering a length of 5 miles 14 chains, from Mr. M. Orbell's station, on his freehold west of Waikouaiti River, and extending up the Garden Creek to Scratchback Hill. The amount of these contracts is £1,243 1s. A very fair road has been laid off, with a grade on an average of 1 in 8—many parts better, and only one pinch of 1 in 6. The contracts being let so near the end of the year there is no work to report as done.

TAIERI COUNTY.

Road, Cottesbrook, through Run 250.—This road, which connects Strath-Taieri with Moonlight Flat, has been finished. It is eleven miles in length, and has been made passable for dray-traffic, at a cost of £1,719 4s. 6d., including a bridge over Sheepwash Creek.

Strath-Taieri Suspension Bridge.—The piers (stone) and approaches are finished; also all the ironwork and wire ropes are on the ground. There will be some extra masonry required yet. The amount paid on works to date is £832 15s., and the amount of contract, £2,724 19s. 3d.; vote, £3,000.

Nenthorn Bridge and Road.—This work and one mile of approaches have been finished for some time, at a cost of £1,943 0s. 8d.

Road, Billie's Ridge to Nenthorn Flat.—This work, which has a length of 1 mile 38 chains, has been formed to about three-quarters of its length, at a cost of £540; contract amount, £680.

MANIOTOTO COUNTY.

Deepdell Road.—To open up lands on Run 210. This road has been formed for a length of three miles, at a cost of £850; length under contract, five miles; total amount of contracts let is £1,292; vote, £1,500. Mr. Brown, the County Engineer, reports that a further sum of £800 must be expended before the road can be fit for through traffic. Whole length of road, 8 miles 38 chains

VINCENT COUNTY.

Road, Cromwell to Perriam's, East Bank of Clutha River.—This road has been finished, but the Firewood Creek Bridge is not yet completed. Amount expended, £2,123; amount of vote, £2,600.

TUAPEKA COUNTY.

Road, Beaumont to Miller's Flat.—The work completed is over seven and a half miles of road formation, mostly rock-cutting; width, 15 feet; including three bridges—one of 53-feet span and one of 12-feet, both having stone abutments and timber superstructure; one, arch of masonry. Amount expended, £2,855 1s. 3d.; vote, £3,000. Mr. Smaill estimates that this road will open up 36,000 acres of Crown lands on east bank of Clutha River.

Road to Run 140A.—Work completed, 62 chains; formation, 16 feet; also 82 chains formation, 18 feet, mostly rock-cutting, and includes 136 lineal yards of dry stone culverts. Amount expended, £1,000; vote, £1,500. Area of Crown lands opened up by this road, 6,540 acres.

Road to Block X., Benzer District.—This road, nearly finished last year, is now completed. The length is 112 chains, about one and a half miles, formation width 20 feet, mostly rock-cutting, including 183 lineal yards of dry stone culverts and 82 cubic yards of masonry. Expended during the year, £500; vote, £500.

Road to Block XIII., Greenvale District.—Work completed this year, 78 chains of formation to a width of 24 feet, also bridge over Heriot Burn 68 feet in length by 14 feet roadway, and 150 lineal yards of dry stone culverts. Area of Crown lands opened up, 4,000 acres. The expenditure for the year has been £182 18s. 1d., and the vote £500.

Road to Run 106.—Work completed, 4 miles 20 chains of road formation to a width of 15 feet, also 332 lineal yards of dry stone culverts, 127 cubic yards of masonry, and 100 chains ditching. Expenditure, £1,000; vote, £1,000. Area of Crown lands opened up, 6,600 acres.

Tuapeka Mouth Bridge.—Traffic bridge over the Tuapeka Stream at Dalhousie, 100 feet in length, stone abutments, superstructure of ironbark and black pine. Expenditure, £397 16s. 0½d.; part of cost in addition to this is borne by the Tuapeka and Bruce County Councils.

Waipori to Antimony Mine.—On this road £50 has been spent, and on road, Waipori to bush, £33 1s. 4d.

SOUTHLAND COUNTY.

Tokanui Gorge Road.—On this road 5,716 cubic yards of formation have been executed, 55 cubic yards of masonry, and 179 cubic feet of timber in box culverts. The length of the road under contract is nearly two miles. Expenditure during the year, £333 10s. 2d. It will require about £1,000 to finish this road properly.

Waikaia Roads.—Tenders were ready for the roads to open lands for settlement on blocks surveyed within education endowment within the year, but the amounts have not yet been reported by the County Engineer. The extent of road-lines over which the works are spread is—on Block I., Waikaia District, 3 miles; Block X., Waikaia District, 5½ miles; Block VII., Wendon District, 3½ miles; Blocks VIII. and IX., Wendon District, 4½ miles; Block I., Wendonside District, 3¼ miles; total 20¼ miles. As the amount available for this work is £3,000 you will readily understand that it will not go very far on twenty miles of road-making.

STATEMENT of CONTRACTS and POSITION of ROAD WORKS to OPEN UP CROWN LANDS in OTAGO,
on 30th June, 1883.

Name of Work.	Amount of Vote.	Amount of Contract.		Value of Work to Date.		Length.	Remarks.
	£	£	s. d.	£	s. d.	M. c.	
<i>Waikouaiti County.</i> Road to Orbell's Runs 171 and 171A	1,500	1,243	1 0	Nil		5 14	To open up 7,000 acres. Work just let.
<i>Taieri County.</i> Cottesbrooke to Run 250	1,000	1,719	4 6	1,719	4 6	11 0	Work finished.
Strath-Taieri Suspension Bridge	3,000	2,724	19 3	832	15 0	...	Connects Cottesbrooke with Strath-Taieri. Being built.
Nenthorn Bridge and Road	1,800	1,943	0 8	1,943	0 8	1 0	Work finished.
Billie's Bridge to Nen- thorn	680	680	0 0	540	0 0	1 38	Connects with Cottesbrooke Road. Nearly finished.
<i>Maniototo County.</i> Deepdell Road, Run 210	1,500	1,302	0 0	850	0 0	8 38	Five miles under contract. Partly formed.
<i>Vincent County.</i> Road, Cromwell to Per- riams, east bank of Clutha River	2,600	2,433	0 0	2,123	0 0	3 0	Road finished. Bridge not yet finished. Extras will be £94 15s.
<i>Tuapeka County.</i> Beaumont to Miller's Flat	3,000	...		2,855	1 3	7 40	Total length ten miles.
Road to Run 140A ...	1,500	...		1,000	0 0	1 64	Work finished.
Road to Block X., Bengel District	500	...		500	0 0	1 40	Work finished.
Road to Block XIII., Greenvale	500	...		182	18 1	5 0	Seventy-eight chains finished, and work completed.
Road to Run 106 ...	1,000	...		1,000	0 0	4 20	Work finished.
Tuapeka Mouth Bridge ...	...	...		397	16 0	...	This is a subsidized work.
Waipori to Antimony Mine	...	...		50	0 0	...	
Waipori to Bush ...	...	...		33	1 4	...	
<i>Southland County.</i> Tokanui Gorge Road ...	...	818	14 8	333	10 2	2 0	It will require £1,000 to finish this road by metalling, and extras.

W. ARTHUR, Chief Surveyor.

SOUTHLAND.

Seaward Forest to Coast.—The remaining portion of this road from the end of the old formation to Awarua Bay has, during the last year, been formed under the auspices of the Invercargill Road Board, and supervised by the Board's Engineer. The work done at this part consists of double ditching and formation, including fascining (in places) and the construction of a bridge and several culverts. To open the road for traffic from Woodend to Awarua Bay will yet necessitate some two miles of gravelling. When this has been done the natural road along the beach, with a trifling expenditure, will afford ample and convenient access to the lands abutting on and at the head of the bay. This road will, no doubt, be largely utilized in time, as a through road from Toitois District, more particularly if deferred-payment settlement takes place, as expected, in the neighbourhood of Waituna Lagoon.

Forest Hill Tramway.—For some time back the Forest Hill Tramway, starting at Winton and running eastward some six miles to the Gap, has been completed, but has not as yet been used for traffic. It is, as you are aware, proposed to extend the tramway some five miles farther. The engineering survey has been made by the Public Works Department, and I understand that tenders have been called for to execute the work. When completed, the tramway will very materially help to open up a district that has hitherto, owing to the absence of good means of communication, remained in a more or less backward state.

Orepuki to Waiau.—The Chairman of the Wallace County reports that this road is through the block lately opened under cash and deferred payments. Of this, 1 mile 65 chains are completed, consisting of bush clearing, forming, and gravelling; two bridges measuring 44 lineal feet, and six culverts. Other works at present in hand will carry it some 80 chains farther, opening some 1,600 acres of Crown lands.

Wakapatu to Pahi.—The Chairman of the Wallace County also reports that six miles of this road have been fascined and partly gravelled, and one bridge erected. This opens surveyed village allotments on Pahi, and also unsurveyed Crown lands in Wakapatu Bush.

Branch Road from Wilson's Crossing to Forest Hill.—Some five miles of this road were formed, ditched, and partly fascined during the previous year, making the road, as far as it went, fit for light traffic. During the past year the work has been extended, under the supervision of the engineer, to the Southland County, and up to the present date some 63 chains of double ditching and formation, including culverts, have been executed. This road will tap the Forest Hill country at the south end,

as the Winton Tramway taps it at the north end; and it may therefore be expected, when both outlets are completed, that this somewhat backward part of this district will begin to make visible progress.

Tomogalak Creek to Deferred-payment Land.—The work has been handed over to the Southland County for execution, and tenders were called for and one accepted some considerable time ago. The work extends over several miles, but it is only in particular places that formation, gravelling, &c., are required. Up to the present date 99 chains of formation, 40 chains of gravelling, 19 chains of ditching, 17 chains of flax-clearing, 634 cubic yards of excavation, and three stone culverts have been executed. The work is proceeding apace, and when finished will help considerably to open up the Crown-land block at the north end.

Bay Road to Otatara Bush.—This road is to open up a block of some 1,200 acres or so at the south end of the Otatara Peninsula. The land is comparatively close to Invercargill, but, owing to the absence of roads, it has remained up till now all but inaccessible. The work was intrusted to the Southland County Council, and a tender for the same was accepted some months ago. Up to the present date 88 chains of bush felling and clearing, 154 chains of formation, 134 chains of ditching, 94 chains of gravelling, 9 chains of fascining, and three culverts have been executed. The road when formed will give a real value to lands that, prior to their being made accessible, could only be speculated upon; and I think will attract a good many settlers to the locality when the sections have been thrown open.

Bush Land East of Makarewa Township.—The block which this road is designed to open up adjoins the Makarewa Township on the eastern side, and embraces the old bush reserve. It contains some 900 acres. The locality is becoming a thriving and populous one, and the opening-up of the land in moderate-sized sections, preceded by the formation of a road down the heart of the block, will, I feel sure, have the effect of extending settlement. Many township settlers in Makarewa feel their present holdings to be rather small, and these, along with fresh would-be settlers, will doubtless cause many of the sections to be taken up, though the whole might not be disposed of at first. The road work is the hands of the County Council, and up to date 100 chains of bush felling and clearing, 20 chains of formation, and three culverts have been executed.

Port William to Half-Moon Bay, Stewart Island.—A road from Oban to Horseshoe Bay, &c., is being formed under the supervision of the Public Works Department. A road is also being constructed from the Oban Township along Half-Moon Bay to Section 34, Block I., Paterson District, the distance of the same being about 40 or 50 chains. The old track from Horseshoe Bay to Port William is also being recut, and several small tracks are being cut from Half-Moon Bay to Paterson Inlet.

JOHN SPENCE, Chief Surveyor.

APPENDIX No. 4.

REPORT of EXPLORATION in the COUNTY of FIORD by Mr. JOHN HAY, District Surveyor.

SIR,—

Riverton, 22nd June, 1883.

I have the honour to forward herewith reconnaissance map of part of Fiord County. As will be seen from the plan, it embraces all the southern portion of the said county; the northern limit of survey is bounded by a line running in a south-east direction from near north-east arm of Dusky Sound to south side of Monowai Lake; and the western boundary by a line from head of Long Sound to near north-east arm of Dusky Sound. The survey is based upon the position of the known Peaks of Titiroa, Cleughearn, and Helmet Hill, and the altitudes depend on Cleughearn, 5,156 feet above sea-level. The country included within these boundaries, with the exception of a strip of bush land, three or four miles wide, bordering Foveaux Strait, is exceedingly rugged, wholly consisting of high rocky peaks and mountain spurs, intersected by innumerable ravines. Out of 554,400 acres the open land only amounts to 109,200 acres, ranging in altitude from 3,000 to 5,500 feet above sea-level; and this, of course, is made up of high peaks, tops of tortuous mountain ranges, and spurs. This open area is not in one continuous block, but is made up of areas from 5,000 to 17,000 acres, separated by precipitous wooded ravines, in many places quite impossible to cross. The country generally is poorly grassed, and where not rocky is of a wet peaty nature, sparsely covered with a wiry kind of grass, the nutritious qualities of which are very doubtful. Taking into consideration that the country is poorly grassed, high, broken, and most inaccessible, I fear it cannot be profitably used for pastoral purposes, even as summer country, as there is absolutely no low ground upon which stock could be wintered.

Coast Line.—From Puysegur Point to Kiwi Burn, a distance, say, of eight miles, the average elevation is about 100 feet; and extending back from this for a distance of, say, four miles the country gradually rises until it attains an altitude of about 1,800 feet, the whole block being of a wet, mossy, and peaty nature, partly open, but mostly covered with a dense growth of bog pine, mixed with stunted birch. From Kiwi Burn to Big River, a distance of, say, eight miles, the coast-line is rather higher, but as the country extends away towards the foot of the mountains it becomes more broken and ridgy; the land is poor in quality, very mossy, and densely covered with birch and bog pine. In the whole distance from Puysegur Point to Big River there is no timber of any commercial value, and the land is of a most miserable quality. From Big River to Waitutu River, a distance of, say, six miles, the land is of a very good quality, with an average breadth of about one mile; but it probably extends back for two or three miles pretty level. This country is mostly covered with birch, but towards the back, I think, it becomes of a mixed nature. The land between Waitutu River and Wairaurahiri River, a distance of, say, six miles, is of a very good quality, better than that mentioned in the preceding block, and of a greater extent, as the good land appears to run up the banks of both rivers for a distance of, say, three miles. There is here a large block of land, moderately level, extending in a north direction from the coast-line to a line from a point about six miles up from south end of Poteriteri Lake to a point about two miles south of Hauroto Lake.

There is some very good timber in this block; although a birch forest, it contains a considerable mixture of red pine; and in the immediate vicinity of the coast there is a large quantity of most excellent iron-wood. From Wairaurahiri River to Sandhill Point, a distance of, say, seven miles, the level land is very good, but it narrows down considerably to a strip of about three-quarters of a mile wide, a little broken and ridgy, and covered with mixed bush of rather an inferior nature. I may here mention that the land immediately on the coast-line from Big River to Sandhill Point maintains a pretty uniform elevation of about 100 feet. The land between Sandhill Point and the big bight in Te Waiwai Bay, a distance of, say, eight miles, is similar in quality and breadth to the preceding block; but considerably steeper, and covered with a mixed bush probably of an improving nature. Immediately behind Mussel Beach I noticed some good red pine, which appeared to run up the spurs some distance towards the Hump. I presume a report has already been made on the land from the big bight in Te Waiwai Bay to Waiau Mouth, a distance of eleven miles, but I may mention that it is similar in quality and breadth to that between Waiau Mouth and Orepuki. Between Te Waiwai Bay and the east arm of Hauroto Lake it appears to be poor, mossy, ridgy land, covered mostly with birch. There is some red pine on the spurs adjacent to the south side of the east arm of the lake, but no great quantity. It will be seen that there is a strip of good land in breadth, about one mile, running along the coast from Waiau Mouth to Big River, which will at some future date, no doubt, be used for settlement. The great drawback is there are no harbours in the whole distance (about forty miles), but there are a number of good boat-landings in northerly and easterly weather. From Puysegur Point to head of Long Sound, although bordered the whole distance with timber, it is of no commercial value, being principally birch and of a very inferior description, and in the interior it is even of a more inferior nature, consisting mostly of stunted birch and bog pine.

Lakes.—Hauroto is about twenty-two miles long by about one wide, and covers an area of about 17,000 acres. Poteriteri Lake is about eighteen miles by one, and next in size is Lake Hakapoua, at the head of Big River, which is about four and a half miles long by half a mile wide, and is tidal. There are a number of other lakes scattered throughout the country, but none of them are of any great size.

Birds.—I did not see any that are not common to the high country; kiwis are not very numerous in the interior, but kakapos are very plentiful in most places. No signs of the takahe (*Notornis Mantelli*), but I am led to believe that this bird is more likely to be found in the country west of Lake Te Anau. I may mention that the rabbits have not yet reached the Princess Mountains, but there are a few round the south-east side of Lake Hauroto, and I saw traces of them on the east side, as far up as opposite Caroline Peak; but I neither saw them nor their traces on the Billow Mountains opposite the above-mentioned peak.

All through the interior I take the rock to be mica schist and gneiss, the latter probably a white granite. From a point about two miles up Long Sound from Kisbee Bay the formation changes to sandstone, slate, and granite, and this extends along the coast, with an occasional break of conglomerate, to about three miles east of Big River. From here to Sandhill Point a bed of drift gravel 20 to 50 feet deep overlies a soft slate formation. A mile or two east of Windsor Point I noticed on the beach a seam of coal cropping out, and this I presume is a continuation of the coal worked some years ago at Preservation Inlet. In concluding this report I may say that the country to north of that which I have gone over appears equally rugged, of about the same altitude, but probably more rocky and destitute of vegetation.

J. Spence, Esq., Chief Surveyor.

I have, &c.,
JOHN HAY, District Surveyor.

TABLES.

No. 4.—ABSTRACT of the SURVEYORS Employed in each PROVINCIAL DISTRICT, and of the WORK ON HAND, on 30th June, 1882.

Chief Surveyors.	Surveyors Employed.		Work on Hand.				
	Staff.	Temporary.	District.	Trig.	Settlement.	Native Block, &c.	Railway, Road, and Water-race.
S. P. Smith, A.S.G. ..	23	16	Auckland	Sq. Miles. 3,615	Acres. 175,603	Acres. 355,652	Miles. 337
T. Humphries ..	7	11	Taranaki .. ..	..	7,500	18,000	} 10
H. Baker ..	4	3	Hawke's Bay ..	561	6,500	25,000	
J. W. A. Marchant ..	11	4	Wellington	629	27,979	324,404	134
J. S. Browning ..	10	5	Nelson .. ..	..	24,000	..	..
H. G. Clarke ..	2	..	Marlborough ..	..	90,873	..	..
G. Mueller ..	5	..	Westland	531	315	..	28
J. H. Baker ..	9	..	Canterbury .. ..	..	48,187	569	94
W. Arthur ..	11	1	Otago .. ..	..	131,563	..	..
J. Spence ..	4	..	Southland .. ..	..	71,515	..	..
Totals ..	86	40	..	5,336	505,853	723,625	603

No. 2.—CROWN GRANTS and CERTIFICATES of TITLE from the Crown Prepared.

District.			Number.	Cost.	District.			Number.	Cost.
				£ s. d.					£ s. d.
Auckland	743	680 0 0	Westland	66	13 4 0				
Taranaki	809	82 0 0	Canterbury	1,523	494 15 2				
Hawke's Bay ..	122	90 9 0	Otago	1,002	415 0 0				
Wellington ..	458	40 3 0	Southland	473	140 0 0				
Nelson	5	1 5 0	Totals	3,064	1,962 11 2				
Marlborough ..	16	5 15 0							

No. 3.—LAND TRANSFER WORK.

District.				No. of Plans Passed.	No. of Plans Placed on Certificates of Title.	Cost.	District.				No. of Plans Passed.	No. of Plans Placed on Certificates of Title.	Cost.
						£ s. d.							£ s. d.
Auckland	199	720	620 0 0	Westland	322	226	46 2 6						
Taranaki	46	1,020	200 0 0	Canterbury	105	2,091	735 18 10						
Hawke's Bay ..	44	11	270 0 0	Otago	83	1,021	512 0 0						
Wellington ..	56	1,684	120 16 8	Southland	37	1,312	250 0 0						
Nelson	150	422	180 10 0	Totals	1,059	8,609	2,983 13 0						
Marlborough ..	17	102	48 5 0										

No. 4.—PHOTOGRAPHS.

Department.				Number of Plates Taken during the Year.	Department.				Number of Plates Taken during the Year.
Public Works	125	Telegraph	13						
Survey	209	Postal	2						
Museum	48	Total	421						
Marine	4	Silver prints	61						
Education	3								
Architect	17								

No. 5.—LITHOGRAPHIC PRINTING executed from July, 1882, to June, 1883.

Department.	No. of Separate Printings.	Number of Impressions		Department.	No. of Separate Printings.	Number of Impressions	
		By Machine.	By Hand.			By Machine.	By Hand.
Survey	676	193,697	27,826	Native	15	1,005	
Public Works ..	365	3,150	29,238	Treasury	2	85	
Customs	61	2,250	4,325	Architect	9	402	
Geological	43	51,937	..	Prisons	10	440	
Justice	41	250	3,925	Property-Tax ..	5	3,030	
Mining	17	19,650	350	Postal	12	2,500	
Railway	31	..	3,120	Registrar-General	17	2,904	
Annuities	6	760	3,630	Patent	2	150	
Telegraph	7	7,860	25	Colonial Secretary	13	300	
Marine	20	2,200	1,770	Immigration ..	3	225	
Education	38	5,400	5,379	Crown Lands ..	7	675	
Railway Commission	16	23,200	..	Totals	1,417	314,604	
Printing	1	1,450	..			92,716	

No. 6.—ABSTRACT of LITHOGRAPHS PRINTED.

Head Office	407,320
Auckland	2,800
Westland	2,350
Dunedin	18,028
Invercargill	1,750
Totals	432,248

No. 7, continued.—RETURN of FIELD-WORK executed by STAFF and CONTRACT SURVEYORS, from 1st July, 1882, to 30th June, 1883. PROVINCIAL DISTRICT OF HAWKE'S BAY.

Table with columns: Surveyor and District, Major Triangulation, Minor Triangulation, Topographical and Trigonometrical Survey, Rural and Suburban, Town Section Survey, Native Land Court Survey, Native Land Purchase Survey, Roads, Railways, and Water-races, Detention by Native Opposition or other Causes, Other Work, Total Cost of Surveyor and Party from 1st July, 1882, to 30th June, 1883, Remarks. Rows include Staff Surveyors (W. Hallett, F. Rich, J. L. D.A. Irvine, J. Wilson), Contractors and Temporary Surveyors (A. Teesdale, C. D. Kennedy, H. Ellison, J. Rochfort), and Private—Native Land Court (H. Ellison).

PROVINCIAL DISTRICT OF WELLINGTON.

Table with columns: Surveyor and District, Major Triangulation, Minor Triangulation, Topographical and Trigonometrical Survey, Rural and Suburban, Town Section Survey, Native Land Court Survey, Native Land Purchase Survey, Roads, Railways, and Water-races, Detention by Native Opposition or other Causes, Other Work, Total Cost of Surveyor and Party from 1st July, 1882, to 30th June, 1883, Remarks. Rows include A. Dundas, F. W. Knowles, E. R. Foster, Llewellyn Smith, J. D. Climie, John Annabell, J. F. Sicely, N. J. Tone, G. Struthers, C. W. H. Thompson, A. E. Ashcroft, R. P. Greville, and Totals for Contract Surveyors, Maungakarata and Tiriraukawa.

No. 7, continued.—RETURN of FIELD-WORK executed by STAFF and CONTRACT SURVEYORS, from 1st July, 1882, to 30th June, 1883.
PROVINCIAL DISTRICT OF WESTLAND.

Surveyor and District.	Major Triangulation.			Minor Triangulation.			Topographical and Trigonometrical Survey.			Rural and Suburban.			Town Section Survey.			Gold-Mining Survey.			Roads, Railways, and Water-races.			Other Work.	Total Cost of Surveyor and Party from 1st July, 1882, to 30th June, 1883.	Remarks.			
	Acres.	Cost per Acre.	Total Cost.	Acres.	Cost per Acre.	Total Cost.	Acres.	Cost per Acre.	Total Cost.	Acres.	No. of Sections.	Cost per Acre.	Total Cost.	Acres.	No. of Allotments.	Cost per Allotment.	Total Cost.	Acres.	No. of Sections.	Cost per Acre.	Total Cost.	Miles.	Cost per Mile.		Total Cost.	Cost.	£ s. d.
W. G. Murray, Waimea, Kanieri, Toaroha, Totara, Mahinapua	..	d.	£ s. d.	..	d.	£ s. d.	15,500	2½	161 14 0	17	5	13 4½	11 7 0	..	..	..	..	108	22	26/8½	144 4 6	20	40 15 0	*815 0 4	44 19 6	1,177 5 4	Rough bush country in the centre of a gold field. Had the assistance for about three months of a cadet under one year's service.
E. J. Lord, Arnold, Hohonu, Greymouth, Waimea	..	..	..	..	..	..	9,920	2½	102 16 8	1,025	1	1 7½	351 18 8	1	12 0 0	2 0 0	21	4	14/6¼	15 5 0	20	16 1 8	321 14 0	94 15 0	888 9 4	Broken bush country within a gold field. Unassisted by cadet.	
J. N. Smyth, Karangarua, Gillespie's, Toaroha, Kanieri, Waimea	..	..	..	..	..	..	16,640	¾	50 4 4	1,049	12	3 10½	203 0 4	..	..	..	..	420	14	7/10	164 15 2	26	14 5 5	371 0 0	31 8 8	820 8 6	Heavily timbered and expensive country. No cadet assisting.
E. J. Roberts, Landsborough, Arnott, Okuru, Mahitahi, Abbey Rocks, Clarke, Governor's Pass	80,510	0½	185 10 6	..	..	..	115,800	2½	1,103 14 6	5,834	4	0 6¼	152 11 0	..	..	..	..	..	..	..	..	29½	10 8 6	307 10 0	90 0 0	1,839 6 0	Very rough mountainous country; densely timbered.
H. G. Price, Turiwhati, Kanieri ..	..	..	..	..	..	..	..	..	..	15,088	1	0 6¼	1388 13 10	..	..	..	..	15	4	23/4	17 10 6	..	..	..	60 15 4	255 6 4	The surveys were situated in thick bush country, and within a gold field. The officer (H. G. Price) was transferred to Napier at the end of December last.
R. Wither, Totara, Kanieri ..	..	..	..	..	..	..	..	..	..	11	2	22 8	12 9 0	..	..	..	..	1,167	36	4/11½	288 13 8	..	..	..	18 16 6	319 19 2	Thickly timbered and broken country in the Totara Mining District.
Totals ..	80,510	0·5	185 10 6	..	..	..	157,860	2·15	1,418 9 6	26,362	50	10·2	1,119 19 10	1	12 0 0	2 0 0	1,731	80	7/3·4	630 8 10	95½	19 0 11	1,815 4 4	340 15 0	5,300 14 8		

* £815, covering cost of clearing and benching for permanent foot-track, in addition to cost of survey proper.

† This amount includes the sum of £211 13s. 4d., expended upon the survey of this block in the previous year. (Vide my report on surveys for year ending 30th June, 1882.)

PROVINCIAL DISTRICT OF CANTERBURY.

W. Kitson, Selwyn ..	..	..	..	..	..	..	..	..	..	97	2	0 10½	4 4 0	..	..	..	..	..	..	..	..	..	..	..	..	55 4 5	59 8 5	Includes wages paid for additions to Christchurch standard survey.
C. W. Adams, Selwyn ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	46 5 2	46 5 2	Removed to Wellington.
J. S. Welch, Selwyn and Akaroa	..	..	..	..	..	..	..	..	..	3,133	54	3 3½	855 15 0	..	..	..	..	..	..	..	..	..	..	..	..	..	855 15 0	Detached and intricate surveys on the Peninsula.
James Hay, Akaroa	r2,069	12	2 10½	825 14 0	825 14 0	" " " "
T. N. Brodrick, Ashley and Selwyn	3,300	2	27 10 0	4,421	89	1 2¾	821 6 6	848 16 6	Includes 1,074 acres, Oxford Bush.
H. Maitland, Geraldine ..	..	..	..	..	..	..	..	..	..	r1,334	14	1 6	299 19 2	..	..	..	..	..	..	..	..	..	..	..	..	599 18 5	899 17 7	Timaru standard survey yet uncompleted.
H. C. White, Waimate ..	..	..	..	..	..	..	..	..	..	3,703	40	2 11	752 17 0	2½	9 1 16 8	16 10 8	..	..	..	..	..	..	..	..	..	..	769 7 8	Partly-detached, isolated surveys.
J. E. Pickett, Selwyn and Ashburton	..	..	..	..	..	..	..	..	..	r9,516	26	0 11½	765 9 7	..	..	..	..	..	..	..	..	..	..	..	..	..	765 9 7	Sectional surveys not hampered by old work.
A. Houghton, Akaroa ..	..	..	..	..	..	..	..	..	..	pc4,012	3	3 7	512 2 9	..	..	..	..	..	..	..	..	..	..	..	..	..	512 2 9	Detached bush surveys on Peninsula.
G. H. M. McClure, Geraldine ..	..	..	..	..	..	..	..	..	..	r4,276	66	4 9	686 19 8	..	..	..	..	..	..	..	..	..	..	..	..	..	636 19 8	Detached isolated surveys.
F. Watkins, Geraldine ..	..	..	..	..	..	..	..	..	..	12,331	93	0 4	364 18 10	..	..	..	..	..	..	..	..	..	..	..	..	..	444 17 10	Very large sections, not hampered by old work.
L. O. Mathias, Ashley ..	..	..	..	..	..	..	..	..	..	r3,181	76	1 10¼	605 7 0	5	16 1 1 0	16 15 0	..	..	..	..	..	..	..	..	..	..	622 2 0	Principally subdivisions of reserves.
M. McNicol, Ashburton and Geraldine	..	..	..	..	..	..	..	..	..	2,332	51	1 5¼	356 5 6	..	..	..	..	..	..	..	..	..	..	..	..	..	356 5 6	Principally survey Rangitata Islands.
A. Seaton, Akaroa ..	..	..	..	..	..	..	..	..	..	r519	6	5 5	305 12 3	..	..	..	..	..	..	..	..	..	..	..	..	..	305 12 3	Bush work.
D. Watt, Akaroa ..	..	..	..	..	..	..	..	..	..	1,126	8	4 3¾	449 17 3	..	..	..	..	..	..	..	..	..	..	..	..	..	449 17 3	Open hilly country.
Christchurch office, Ashley, Selwyn, &c.	491	11	Completed from adjoining surveys.
Timaru office, Geraldine and Waimate	..	..	..	..	..	..	..	..	..	r1,592	12	0 8½	87 18 9	4¾	11 1 0 0	11 1 0	..	..	..	..	..	..	..	..	..	..	98 19 9	Partly completed from adjoining surveys; partly actual field survey.
James Adam, Ashley ..	..	..	..	..	..	..	..	..	..	4,575	132	0 10¾	115 12 11	..	..	..	..	..	..	..	..	..	..	310 9 9	..	..	..	{ Subdivision of reserves and survey of pastoral country. Road surveys charged to "Roads to open up Lands."
W. Darby, Geraldine ..	..	..	..	..	..	..	..	..	..	2,325	64	0 3¾	404 8 7	44¾	170 1 0 6	174 15 3	..	..	..	..	..	..	..	..	70 0 0	..	..	{ Includes 4¾ miles standard survey. Agricultural deferred-payment blocks.
A. J. Lewis, Selwyn	r200	7	0 6	292 17 0	{ Reserves on Rakaia Island.
W. A. Nalder, Ashley	1,719	33	..	24 7 6	{ £34 16s. paid for last year, but area not then returned.
Totals ..	..	..	..	3,300	2	27 10 0	..	..	..	138,255	1,145	1 3¼	8,744 14 3	56¾	206 1 1 3	219 1 11	..	..	..	..	..	..	..	310 9 9	771 8 0	10,073 3 11		

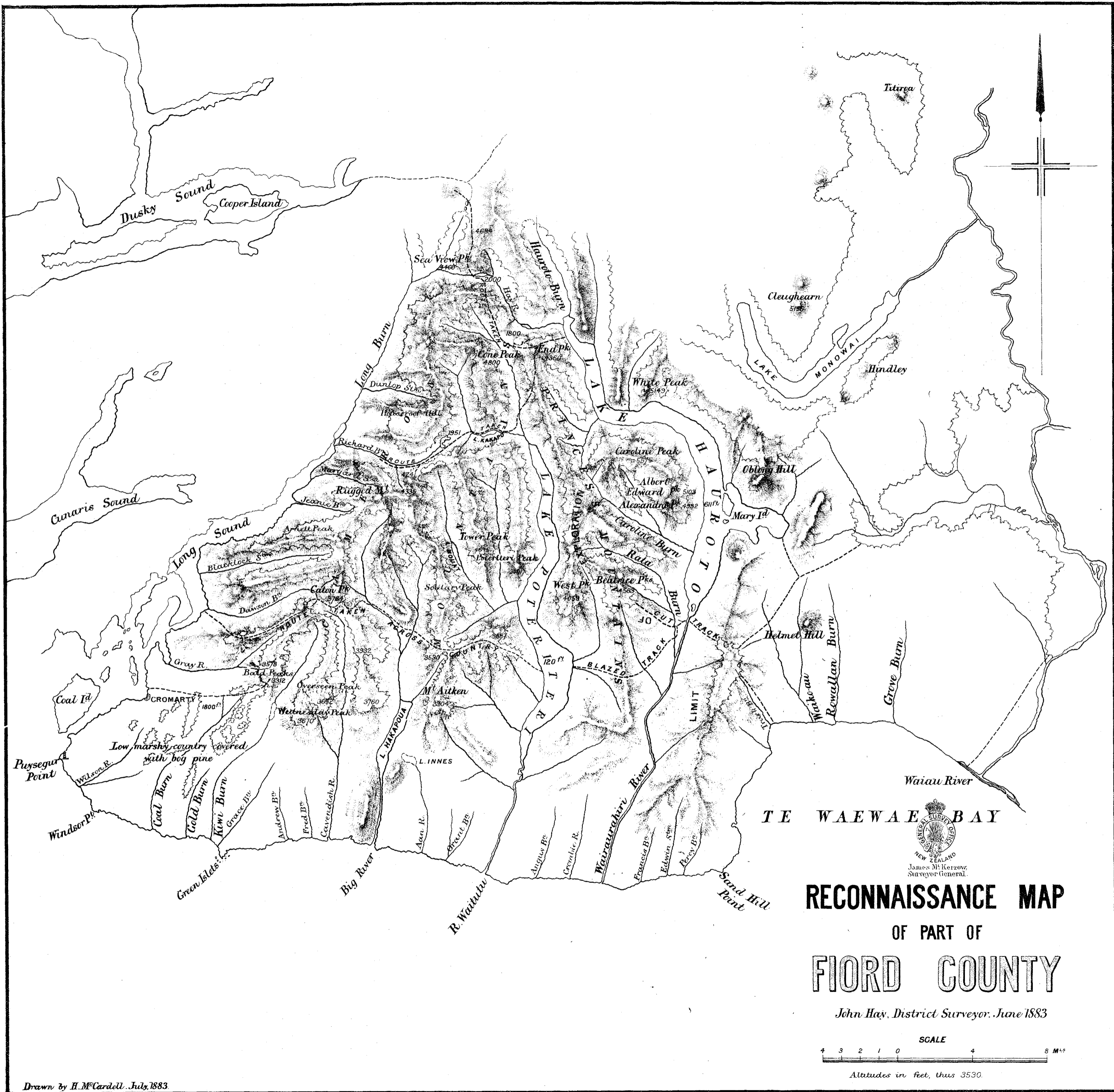
NOTE.—r, resurveys; pc, pastoral country.

No. 7, continued.—RETURN of FIELD-WORK executed by STAFF and CONTRACT SURVEYORS, from 1st July, 1882, to 30th June, 1883.
PROVINCIAL DISTRICT OF OTAGO.

Surveyor and District.	Minor Triangulation.			Topographical and Trigonometrical Survey.			Rural and Suburban.				Town Section Survey.				Native Land Court Survey.				Gold-mining Survey.				Roads, Railways, and Water-races.			Other Work.	Total Cost of Surveyor and Party from 1st July, 1882, to 30th June, 1883.	Remarks.	
	Acres.	Cost per Acre.	Total Cost.	Acres.	Cost per Acre.	Total Cost.	Acres.	No. of Sections.	Cost per Acre.	Total Cost.	Acres.	No. of Allotments.	Cost per Allotment.	Total Cost.	Acres.	No. of Secs. or Divis. ls.	Cost per Acre.	Total Cost.	Acres.	No. of Sections.	Cost per Acre.	Total Cost.	Miles.	Cost per Mile.	Total Cost.	Cost.	£ s. d.		
J. Strauchon, Waikawa, Mokoreta, Slopedown, Otara, Waipahi	16,317	d. 10 79 1 0	£ s. d. 1 0	50,591	d. 15 454 8 1	£ s. d. 1 0	10,705	17	0 10 2	432 17 11	38	4	3 3 1/2	6 5 0	13 19 0	1,036 11 0	
D. Barron, Long Valley, Kyeburn, St. Bathans, Rock and Pillar, Blackstone, Gimmerburn, Maniototo, Naseby, Upper Taieri	7,391	30	1 1	402 17 9	3	11	31 0	17 1 0	..	..	..	..	264	18	12 5 1/2	164 16 6	2 1/2	10 4 0	13 0 0	298 0 4	895 15 7		
A. R. Mackay, Leaning Rock, Tiger Hill, Tarras, Nevis, Wanaika, Fraser, Cairnhill	13,528	52	0 8 1/2	489 12 0	..	..	..	..	..	..	..	..	..	..	..	..	20	4 7 3	87 5 6	103 8 5	680 5 11		
George Mackenzie, Dunedin and East Taieri, Dunback, Hummockside, Waikouaiti	9,835	80	1 8 1/2	853 19 10	..	..	..	..	..	1	..	10 0 0	..	..	..	..	5 1/2	6 14 3	36 18 6	26 5 0	927 3 4	The charge under Native Land Court is for the survey of a Native cemetery at Port Molyneux, 1 rood 19 perches.	
W. D. B. Murray, Upper Taieri, Waikaia, Otama, Crockston, Glenkenich	16,565	68	0 10 1/2	720 13 6	285	103	28 1	144 13 2	..	..	..	..	..	..	..	..	..	..	..	75 13 4	941 0 0		
J. Langmuir, Mount Hyde, Table Hill, Teviot, Beaumont, Benger	27,000	82	0 7	796 15 0	2	3	45 4	6 16 0	..	..	..	..	22	3	13 8 1/2	15 8 4	2	16 11 0	33 2 0	28 5 0	880 6 4		
E. H. Wilmot, Kawarau, Shotover, Skippers, Wakatipu, Hollyford	31,000	2 36	304 14 8	10,209	75	0 10 1/2	448 2 1	..	..	..	..	..	..	..	..	249	26	13 1 1/2	163 14 11	..	..	..	2 10 6	919 2 2		
William Armstrong, Strath-Taieri, Budle, Swinburn, Hummock	23,789	45	0 8	788 9 3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	788 9 3		
D. W. Gibson, Tiger Hill, Lauder, Blackstone, Poolburn	16,757	26	0 6 1/2	441 0 6	..	..	..	..	..	..	..	..	92	4	2 3	10 7 8	..	..	..	323 2 1	774 10 3		
H. A. R. Farquhar, Tarras, Lauder, St. Bathans, Wakefield, Cluden, Tarras	195,500	0 45	368 0 6	7,500	38	0 7 1/2	241 7 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13 10 0	622 17 6		
John Cook, Sutton, Nenthorn, Blackstone, Strath-Taieri	16,241	113	0 9 1/2	642 8 6	287	226	10 4 1/2	117 6 5	759 14 11	
M. McNicol, Wendon, Wendon Side, Waikaia	8,875	32	1 0 1/2	468 8 9	468 8 9	Transferred from Canterbury staff in December, 1882.
A. Seaton, Wendon	6,021	25	1 1 1/2	339 16 2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	339 16 2		
<i>Private Surveyors.</i>																													
J. Campbell, Clyde, Cromwell	341	4	1 6	25 11 6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	25 11 6		
Dennison and Grant, Kakanui	47,881	0 6	119 14 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	119 14 0		
<i>Fees.</i>																													
J. Campbell, Clyde, Cromwell	543	37	4 6	120 10 6	..	..	..	..	..	..	..	..	504	13	5 10	146 10 8	..	..	..	..	267 1 2		
Totals	16,317	1 10 79 1 0	£ s. d. 1 0	324,972	0 92	1,246 17 3	175,300	724	0 10	7,262 10 3	577	343	16 8	285 16 7	38	5	8 6 1/2	16 5 0	1,131	64	8 10	500 18 1	30	5 12 10	170 6 0	884 13 8	10,446 7 10		

PROVINCIAL DISTRICT OF SOUTHLAND.

<i>Staff.</i>																												
John Hay, Fiord County	..	..	..	554 4	237	547 0 0	1,121	66	7/4	411 0 8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	25 18 1	983 18 9	Rough topographical survey only. Country explored extremely broken and almost entirely bush-clad. Rural sections nearly all in bush.
William Hay, Wairio, Wairaki, Oreti, New River, and Invercargill	..	..	..	..	..	..	4,615	226	3/6 4	816 1 8	..	..	..	..	..	..	..	..	..	..	..	1 1/2	4 0 0	5 0 0	9 9 0	880 10 8	More than half the sections, embracing about a quarter of the acreage, in bush. Work scattered.	
James Blaikie, Taringatura, Centre Hill, Eyre, and Hokonui	..	..	..	..	..	..	19,904	138	7/8 7	722 8 10	70	80	5 7	22 8 8	..	..	..	..	..	..	..	..	..	..	..	49 6 4	794 3 10	Chiefly deferred-payment and education-reserve land. Work scattered.
George Watson, Hokonui and Taringatura	..	..	..	..	..	..	4,936	34	1/2 5	299 0 5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 8 0	327 8 5	Spotting surveys and deferred-payment blocks, the latter being remote, irregular in shape, and broken. In progress: Subdivision of bush reserve near Winton; cost to date, £20.
<i>Fee System.</i>																												
George Hateley, Invercargill, Longwood, Winton, and Forest Hill	..	..	..	..	..	..	1,755	9	2/0	176 8 3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	176 8 3	Eight saw-mill areas and one purchase.
T. S. Miller, Longwood, New River, and Jacob's River	..	..	..	..	..	..	760	5	2/7 3	99 4 6	..	..	..	..	..	..	..	..	9	1	19 4	8 14 0	..	..	..	..	107 18 6	Comprising three saw-mill areas, two mineral (coal) areas, and one gold-mining area; all in bush.
D. W. McArthur, Stewart Island (Pegasus District)	..	..	..	..	..	..	50	1	8/0	20 0 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	20 0 0	Survey in remote locality and in dense bush. Fees paid privately.
J. R. Cuthbertson, jun., Hokonui and Mabel	..	..	..	..	..	..	674	3	1/2 7	41 7 4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	41 7 4	Spotting applications; one in bush.
W. F. Ward, Campbelltown	..	..	..	..	..	..	2	1	2/10 0	5 0 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5 0 0	Spotting application.
Totals	..	..	..	554 4	237	547 0 0	33,817	483	1/6 4	2,590 11 8	70	80	5 7	22 8 8	..	..	..	..	9	1	19 4	8 14 0	1 1/2	4 0 0	5 0 0	93 1 5	3,286 15 9	



TE WAEWAE BAY



James M. Kerrow, Surveyor General.

RECONNAISSANCE MAP
 OF PART OF
FIORD COUNTY


John Hay, District Surveyor. June 1883

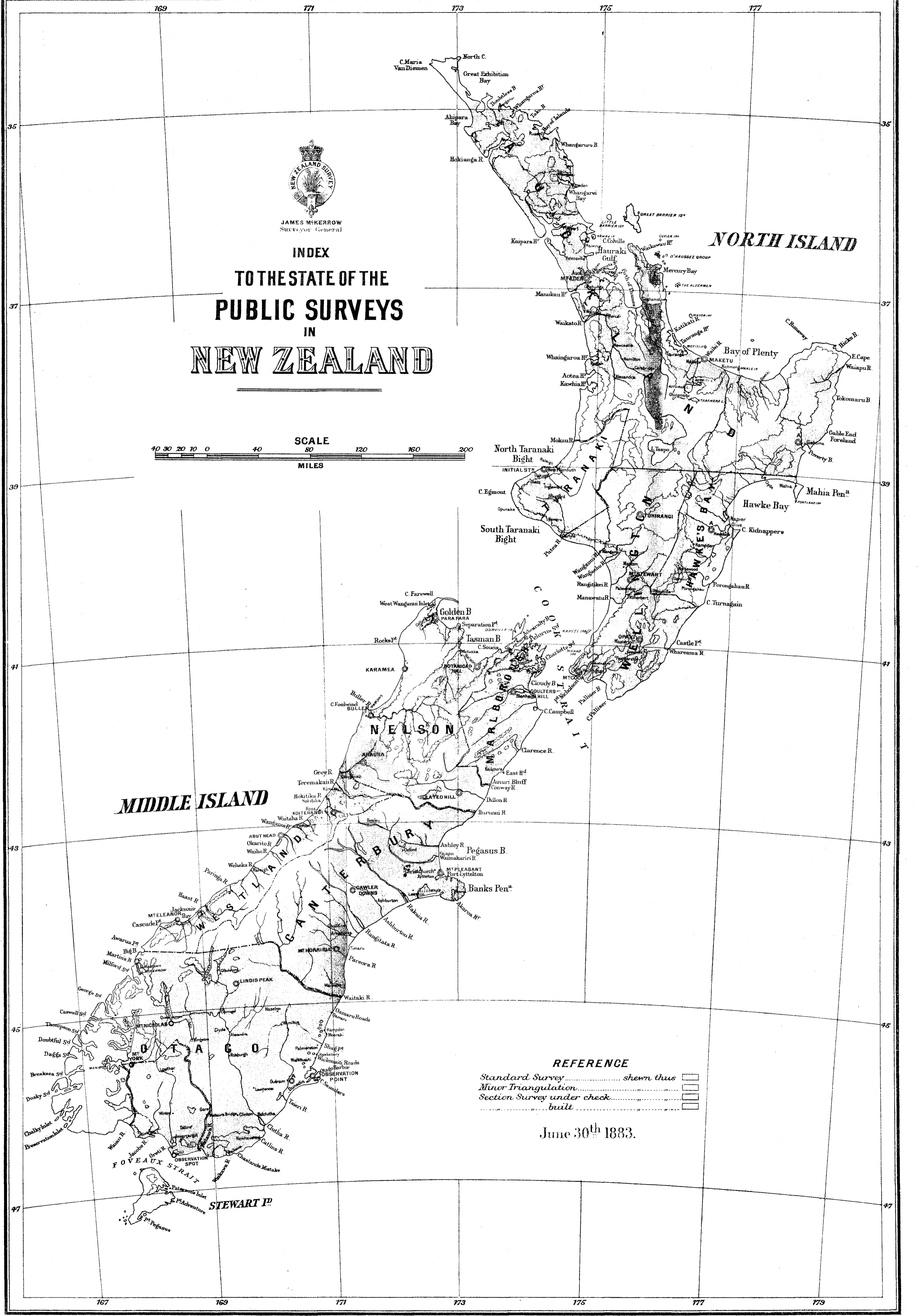


Altitudes in feet, thus 3530.

Drawn by H. M. Cardell. July, 1883.

Photolithographed at the General Survey Office, Wellington, N. Z. July, 1883.


JAMES MCKERROW
 Surveyor General
INDEX
TO THE STATE OF THE
PUBLIC SURVEYS
IN
NEW ZEALAND



REFERENCE

Standard Survey shewn thus
 Minor Triangulation
 Section Survey under check
 built

June 30th 1883.



JAMES MCKERROW
Surveyor General

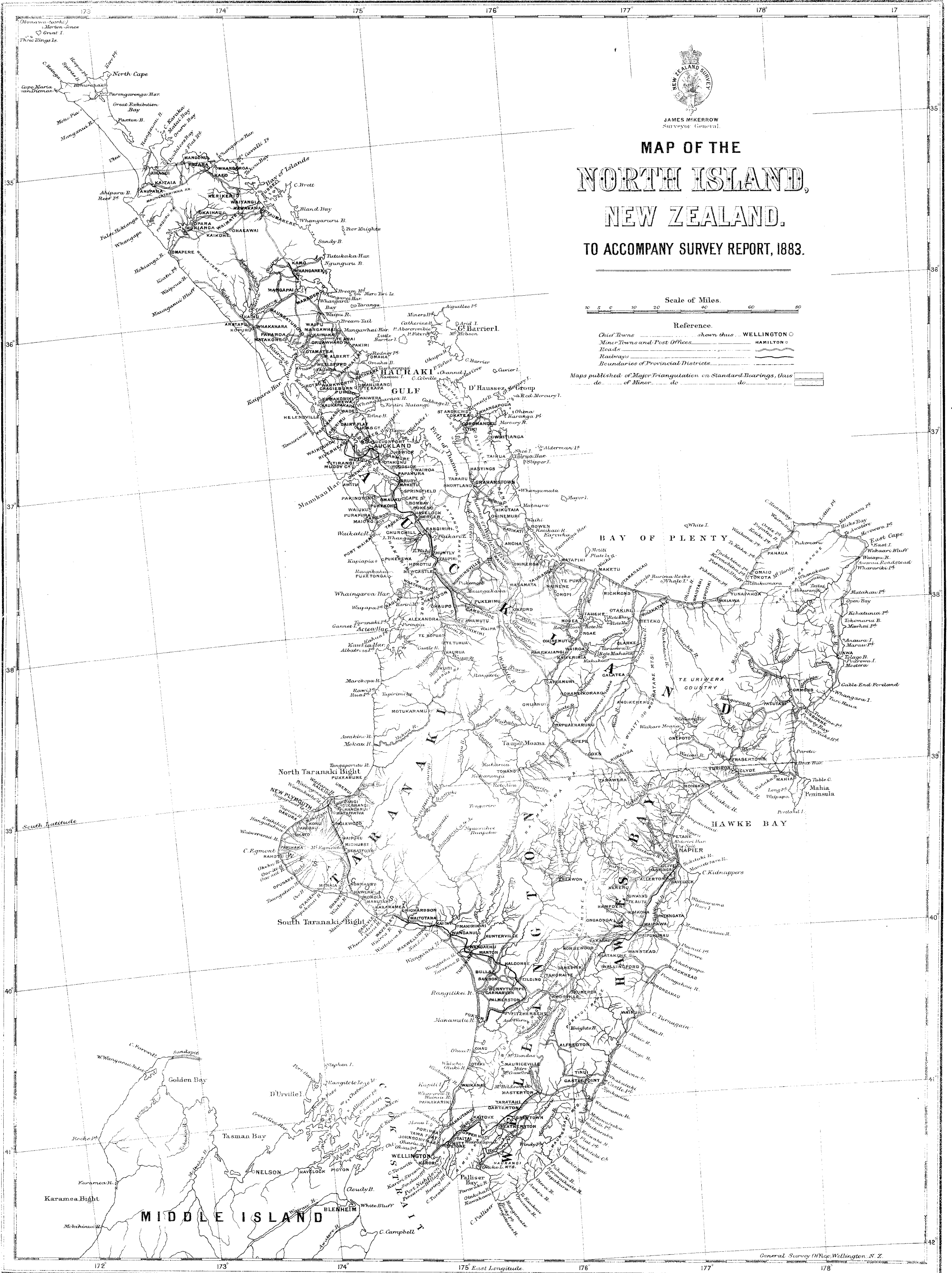
MAP OF THE NORTH ISLAND, NEW ZEALAND. TO ACCOMPANY SURVEY REPORT, 1883.

Scale of Miles.



Reference.

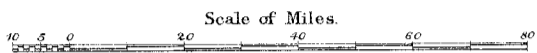
- Chief Towns shown thus WELLINGTON ○
 - Minor Towns and Post Offices HAMILTON ○
 - Heades
 - Railways
 - Boundaries of Provincial Districts
- Maps published of Major Triangulation on Standard Bearings, thus do of Minor do





JAMES MEKERRON
Surveyor General

MAP OF THE MIDDLE ISLAND, NEW ZEALAND. TO ACCOMPANY SURVEY REPORT, 1883.



Reference.

Chief Towns ... shown thus **DUNEDIN** ○

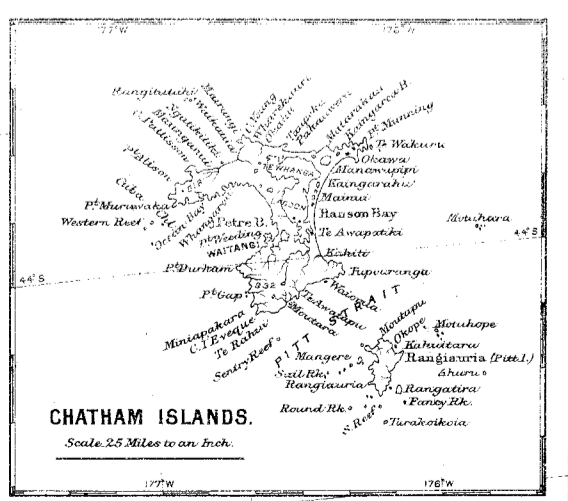
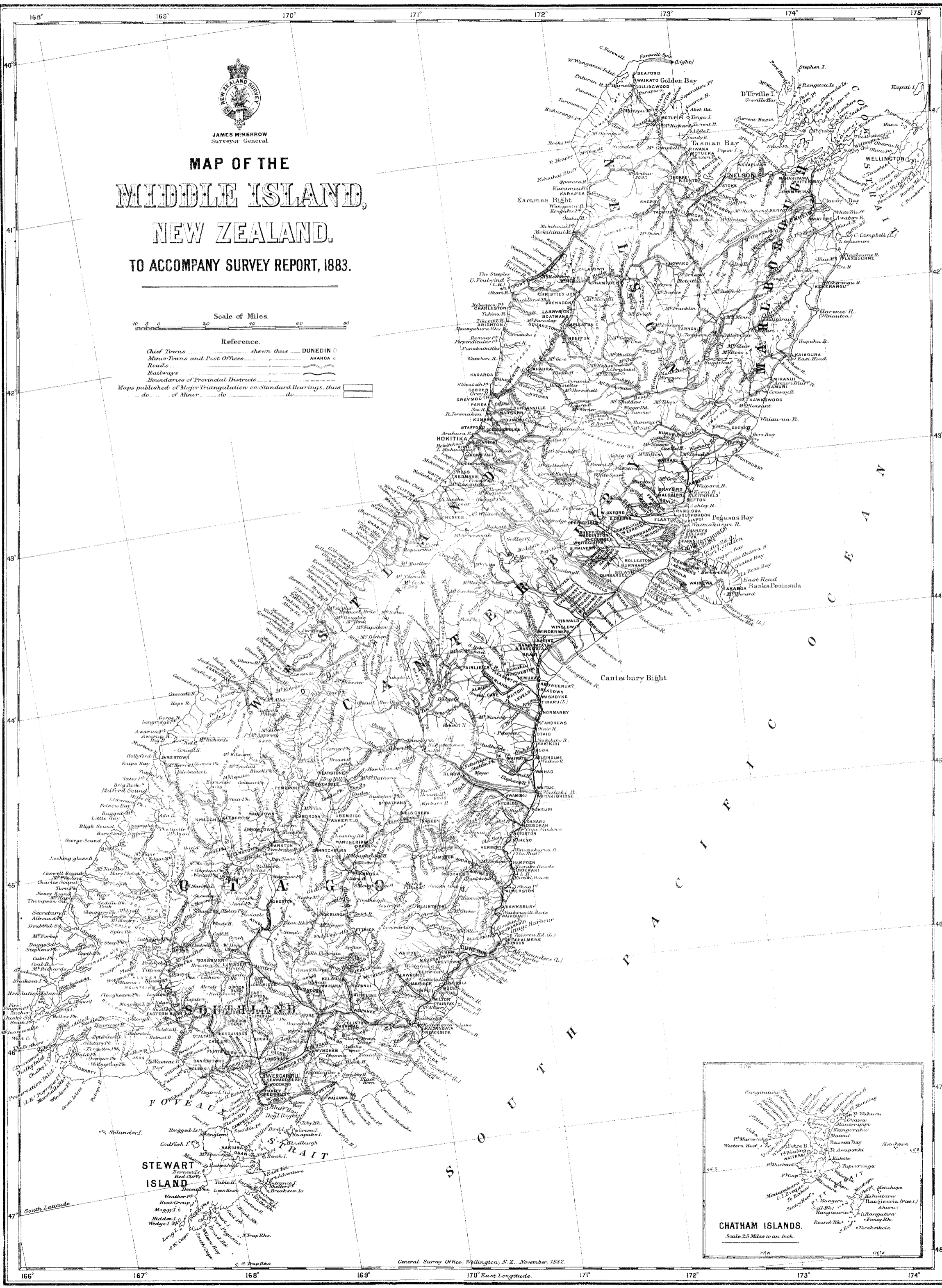
Minor Towns and Post Offices ... **AKAROA** ○

Roads ...

Boundaries of Provincial Districts ...

Maps published of Major Triangulation on Standard Bearings thus

do. of Minor do. do.

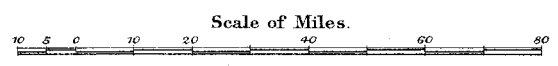


173° 174° 175° 176° 177° 178° 17

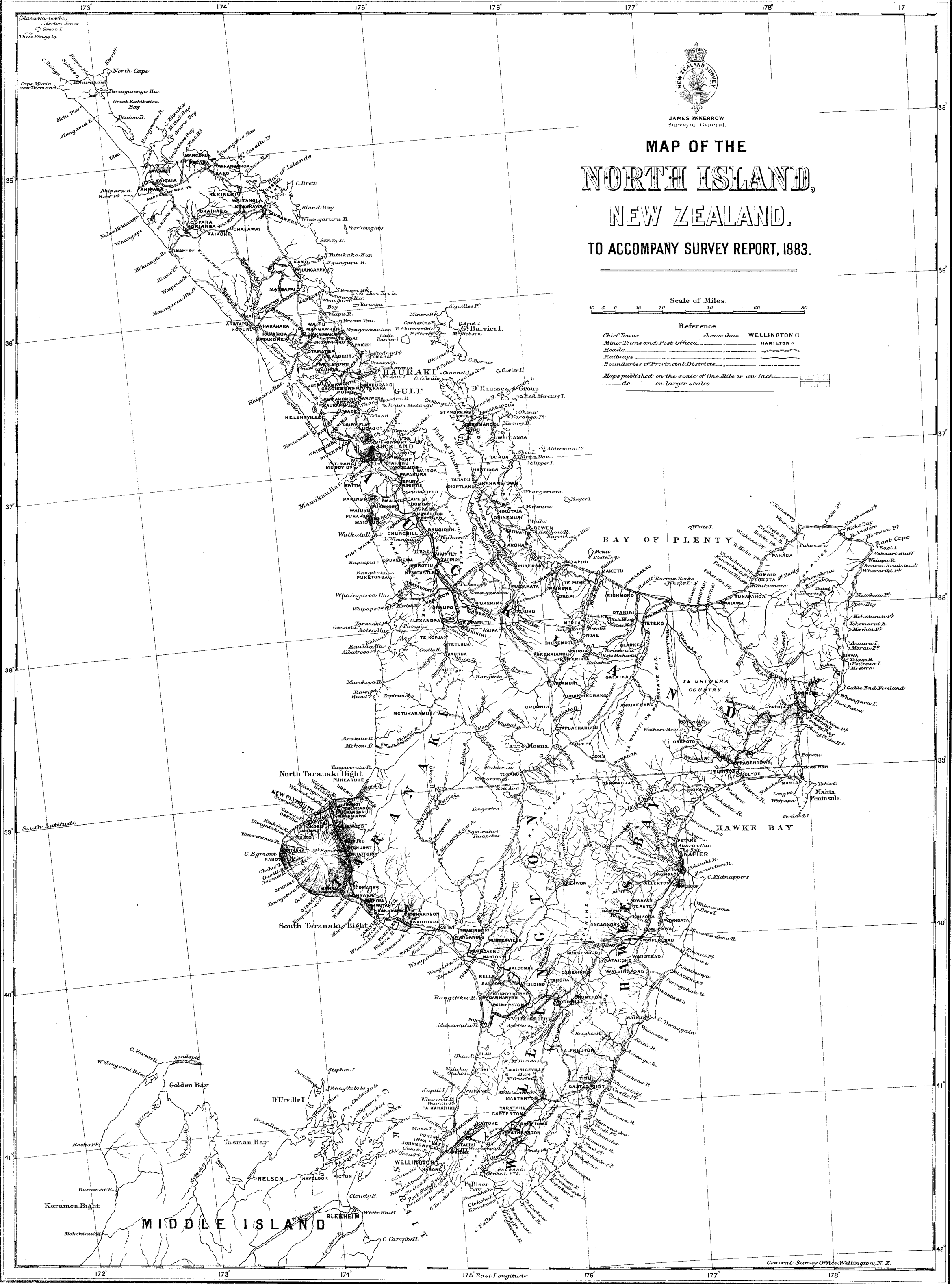


JAMES MCKERROW
Surveyor General.

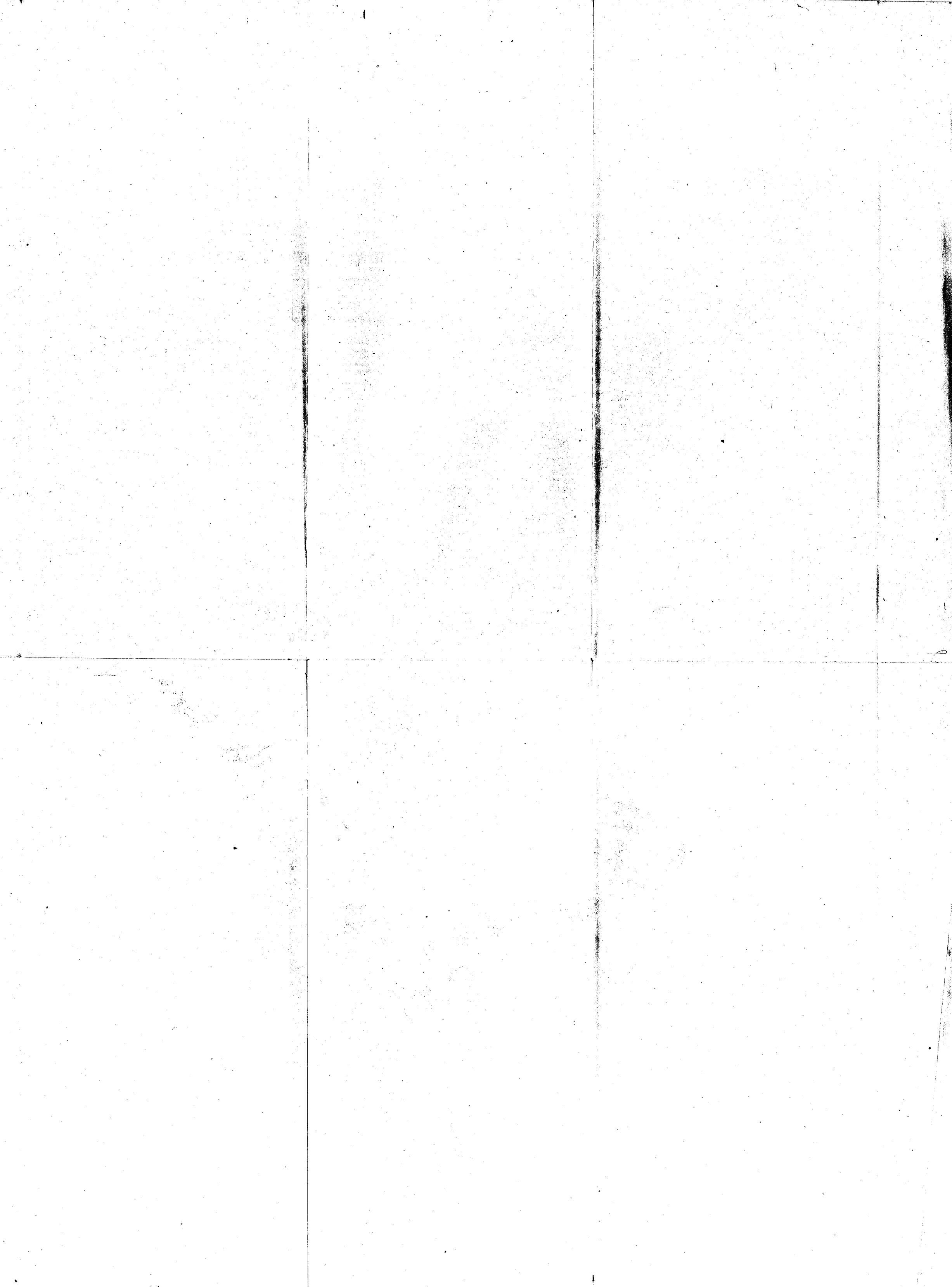
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Reference.
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Minor Towns and Post Offices shown thus HAMILTON ○
Roads ————
Railways ————
Boundaries of Provincial Districts ————
Maps published on the scale of One Mile to an Inch
do on larger scales



172° 173° 174° 175° East Longitude 176° 177° 178°

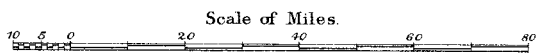




JAMES MCKERROW
Surveyor General.

MAP OF THE MIDDLE ISLAND, NEW ZEALAND.

TO ACCOMPANY SURVEY REPORT, 1883.



Reference.

Chief Towns	shown thus	DUNEDIN	○
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Roads			—
Railways			—
Boundaries of Provincial Districts			—
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do on larger scales			—

