

1886.
NEW ZEALAND.

SURVEYS OF NEW ZEALAND.

(REPORT FOR 1885-86.)

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, 27th July, 1886.

I have the honour to present the report on the land-surveys of New Zealand for the twelve months which ended on the 30th June, 1886.

In the reports from the officers in charge of the ten land-districts of the colony in the appendix, and from the tabulated returns of work done by each surveyor, there will be found in detail the different classes of surveys operated on, the areas completed, and the cost. The following statement gives that information in general and succinct form:—

FIELD-WORK.				Rate per Acre.			Cost.		
		Area.		£	s.	d.	£	s.	d.
Major triangulation	...	1,132,571 acres		0	0	0 $\frac{1}{4}$	1,141	19	11
Minor triangulation	...	511,297 "		0	0	0·86	1,841	8	9
Topographical and trigonometrical survey	...	2,972,934 "		0	0	0·8	9,919	0	8
Rural and suburban settlement survey	...	344,243 "		0	1	9	30,080	6	3
Town-section survey	...	{ 2,433 " =2,085 allots. }		0	18	5	1,921	1	7
Native Land Court surveys	...	146,428 acres		0	0	4·7	2,866	4	3
Native Land Purchase	...	8,877 "		0	0	5·69	210	10	3
Gold-mining	...	1,957 "		0	15	0·4	1,471	5	3
Roads, railways, &c.	...	431 miles		10	15	6 $\frac{1}{2}$	4,644	15	1
Miscellaneous and detention...	...	...		...	...	...	10,915	7	3
							<u>£65,011 19 3</u>		

TRIANGULATION.

The area under trigonometrical and topographical survey during the year was somewhat less than the average of former years, the reduction in staff restricting the operations to the more immediately necessary works in the country being dealt with.

In the centre of the North Island an area of 2000 square miles south-west from Lake Taupo is now under triangulation, and would have been completed but for the withdrawal of the surveyors to the boundary survey of the Waimarino Block of 400,000 acres on the urgent requisition of the Land Purchase Department. The completion of the trigonometrical survey will facilitate the investigation of Native-land titles, and give data for an accurate map of the interior of the country, showing forests, open land, river-system, altitudes of plains and hills, leading lines for future main roads, sites of Native settlements, and, generally, the features and capabilities of the country. In the forest-clad hills the surveyors have had very considerable difficulties in selecting trig. stations mutually intervisible for well-conditioned triangles, and they have had some annoyance and delay from the Natives wilfully destroying the signals on stations. Still, however, the area under survey being so extensive, the

cost of the whole operation, both trigonometrical and topographical, will not much exceed a penny per acre; and it is but due to the surveyors employed, Messrs. L. Cussen, H. M. Skeet, A. D. Wilson and his assistant W. H. Dunnage, John and Joseph Annabell, and Mr. Thorpe, to acknowledge their energy and devotion in a most arduous work, necessarily executed under much privation, and often with no small risk of life in the encounter with flooded rivers and the ascent of the lofty snow-capped Ruapehu.

Mr. Cussen supplies a valuable report (see Appendix No. 2) on the soil, forests, and resources of the country triangulated by him; also his notes on Ruapehu and Lake Taupo, which are especially interesting at the present time on account of the volcanic eruption at Tarawera on the 10th June last. It has long been known that there was on the summit of Ruapehu a small lake of hot water girdled in everlasting snows; but hitherto little credence has been given to any assertion as to steam issuing from it, and if it did occur it certainly has been for many years past a very rare event. However, during the months of April and May, steam was frequently seen to issue. Thus, Mr. Cussen states that early in April he noticed on several days a column of steam rising high above the mountain-top; and Mr. Wilson states: "When observing angles at Pipipi on the morning of the 15th May I noticed a column of steam about 300ft. high ascending from Ruapehu, and since then I have occasionally seen small quantities of steam issuing from it." Mr. Dunnage's interesting report in the appendix is a confirmation of the fact of steam issuing from Ruapehu, he having been on the summit of the mountain when he saw the hot lake and the steam rising from it. In the Proceedings of the Royal Geographical Society for May, 1886, at page 335, there is an account of the ascent of the volcano of Popocatepetl, Mexico (altitude 18,000ft.), and of the crater, from which steam and sulphur-fumes issue amid the snow, as in the case of Ruapehu.

The soundings of Lake Taupo, which are given on plan in appendix, are a valuable contribution in aid of forming a correct theory as to the origin of the lake-basin. The uniformity of depth—generally about 400ft.—the shape of the lake, and its surroundings, all so different from the long, narrow, deep lakes and West Coast sounds of the Middle Island, dispel at once any application of the theory of glacial action, which explains the gradation of soundings, moraine deposits, and other characteristics of these lakes and sounds, so well. Lake Taupo, by comparison, may be regarded as a great shallow natural reservoir on the line of the Waikato River, occupying a hollow, formed partly, it may be, by old volcanic craters and subsidence, and partly impounded by a rim of pumice, rhyolite, and other products of volcanic action. Were the lake to run dry, its bed would be a compact level plain of an area of 241 square miles, at an elevation of about 800ft. above the sea.

The great lakes of Otago, in the Middle Island, already referred to—viz., Te Anau, Manipouri, Wakatipu, Wanaka, and Hawea—cover an aggregate area of 419 square miles. They are long and narrow, occupying the old glacier-beds in the mountain-valleys, and of great depth—over a thousand feet at the deepest. They could not be run dry, as their beds are below the level of the sea.

The sudden rise and fall of the waters of Lake Taupo on the 28th August, 1883, referred to by Mr. Cussen as noted by Major Scannell, and also recorded by Dr. Hector in Vol. XVI., Proceedings of New Zealand Institute, page 536, is a striking testimony to the terrible force of the volcanic eruption at Krakatoa, Straits of Sunda, which occurred on the 27th August, about twenty-two hours before the wave of pulsation reached Taupo, a distance of about five thousand miles. It is recorded that in the great earthquake of Lisbon in 1755 the waters of Loch Lomond and other lochs in Scotland rose and fell similarly—the distance in this case, about thirteen hundred miles. The great lakes in America were similarly affected by the Lisbon earthquake.

The only other triangulation of note in the North Island is the completion by Mr. James Baber of a series of triangles over the Waiapu and East Cape District. This work was stopped by Native obstruction two years ago, and was only successfully resumed this season, and closed on the Opotiki coastal triangulation of Mr. C. A. Baker.

In the Middle Island, Mr. F. S. Smith, District Surveyor, and assistants, Messrs. F. A. Thompson and L. Paske, were engaged in the trigonometrical and topographical survey of the high back-country at the head-waters of the Clarence and Waiau-ua Rivers, and along the eastern side of the main range, and also on the road and sectional surveys and run-boundaries. They have booked a very good season's work, which is now in process of computation and mapping. A most grievous disaster befel this survey-party on the 9th June

as they were coming in to winter quarters at the Waiau. They were caught in a severe snow-storm in the early part of the day; but, in the expectation of finding less snow as they reached lower levels, they pushed on over Fowler's Pass into the Clarence Valley, only to find all tracks obliterated and the driving snow piled up in wreaths that rendered travelling either by man or horse at first difficult and soon almost impossible. Night came upon them, and at ten o'clock Mr. Paske died from cold and fatigue. At two in the morning Hugh Thompson also died, on horseback, in the arms of John Campbell, the leader of the succour-party from Macarthur's station, as he was being carried thither. Mr. Smith and Mr. Begley, who, with Hugh Thompson, remained with Mr. Paske, would most likely have shared his fate but for the sagacity of W. Mitchell, one of the survey-party, who, after battling for a time, with the other horsemen of the party, in the vain endeavour to make headway towards Macarthur's for help, rode into the Clarence River and worked his way down its channel for four or five miles to the station, and started back with the succour-party up the valley. Mr. Paske was an excellent young officer, of noble nature, who refused to ride on that fatal day because some of the others had to walk. Hugh Thompson was the head chainman, and is reported to have been a most respectable man.

In Canterbury Mr. Brodrick was engaged up the Waimakariri triangulating the country on the line of the projected Midland Railway. The topographical map will be of great service in connection with that enterprise.

In Southland the country on the southern shoulders of the Takitimo Mountains had never been mapped, except from reconnaissance survey, and practically there were no details of the upper courses of streams, of bushes, and other features, and great uncertainty as to run-boundaries. Mr. John Hay, District Surveyor, has extended a network of triangles over this country, and cleared up all uncertainties. A copy of his report and map are in the appendix.

For Westland, Mr. Mueller reports the heights above sea-level of three important mountain-passes on the main range, deduced from the Westland triangulation, and which show a near agreement with the heights of the same points derived from the triangulations brought up from the East Coast. Thus: Hurunui Saddle—height by Mr. W. S. Murray, 3,152·4ft.; by Mr. F. S. Smith, 3,141ft. Haast Pass—mean height by Mr. G. J. Roberts and Mr. T. W. Brodrick, 1847·4ft.; difference between the two determinations, 6·2ft. Arthur's Pass—height by Mr. G. J. Roberts, 3,015·2ft. These closures are very satisfactory when it is considered that they are the result, not of any special series of triangles carried on direct from each coast to the common meeting points, but of triangulations carried on over several years by a number of different surveyors, the general accuracy of whose work is thereby confirmed. In the case of the Hurunui Saddle the datum-points were the mean sea-level at Hokitika and Lyttelton, and in the case of Haast Pass, the mean sea-level at Jackson's Bay and Port Chalmers. As showing the accuracy attainable in trigonometrical levelling by a 6in. theodolite, Mr. G. J. Roberts's trigonometrical heights in Westland, based on mean sea-level at Okarito Jetty, showed a discrepancy of only 11in. when referred to mean sea-level at Jackson's Bay landing, ninety miles south along the coast from the starting-point. The trigonometrical height of Haast Pass—1,847ft.—is 131ft. higher than the height of 1,716ft. generally accepted hitherto, and which was the barometrical determination by Sir Julius von Haast in his exploration overland to the West Coast in 1863. For the future the height of the pass must be accepted as 1,847ft.

RECONNAISSANCE SURVEY.

The exploration of the extensive Tautuku Forest, Otago, was completed during the season by Mr. John Strauchon, District Surveyor. A perusal of his reports and maps, both of this and the previous year (see appendices in this and last annual report), shows that there is an area of forest-land of over a hundred thousand acres suitable for a settlement of cattle-farmers, saw-millers, and fishermen. To give the district a start, a road-clearing should be made through it, as suggested by Mr. Strauchon.

SETTLEMENT-SURVEYS OF RURAL AND SUBURBAN LANDS.

As this class of survey most immediately affects the occupation of the country, care was taken that the diminution of staff should operate as little as possible in lessening the out-turn of work. As a matter of fact, the area sectionally surveyed is considerably greater than in the previous year, while the average cost per acre is less. The tendency will, however, in

future be towards an increased cost per acre, as the surveys in bush will bear a greater proportion to those in open land than in the past; and for the same reason the selection of practicable road-lines will be more difficult. It is most essential that every care should be taken in the laying-out of road-lines; for a mistake once made in this matter can hardly ever be rectified, except at a cost which in many cases is prohibitory. The progress of some districts is very much hindered through a bad arrangement of road-lines. The officers of the department have had the importance of this work so well impressed on them that every road-line wherever the surface of the country is at all uneven is carefully graded, and taken over the lowest saddles, and to the best fords and bridge-sites; and gravel and quarry reserves are marked off where there is suitable material for road-formation. The difference in cost between a well-laid out scheme of roads through a block of country, and a chess-board or carelessly laid-out scheme, is only a few pence per acre; but the after-difference in value to the settler, once the country is occupied and fenced in, it would be difficult to over-estimate. The principal sectional surveys during the year have been in the Forty-Mile Bush, in the Wellington Province, with extensions into the bush in the Hawke's Bay District. In point of accuracy of measurement the sectional surveys close on the trigonometrical distances well within the limit of error allowed of 8 links to the mile. The increase of accuracy during the last few years is largely due to the use of the steel tape and wire instead of the linked chain.

NATIVE SURVEYS.

There have been sixty-four blocks, covering an area of 146,428 acres, surveyed for investigation of title before the Native Land Court, of which fifty-eight blocks, comprising 106,680 acres, were done at the cost of Government, a lien being registered against the land for recovery of advance. The survey of the remaining blocks of 39,748 acres were paid for direct by the Natives.

The area surveyed for land-purchase is only 8,877 acres; but there is now in hand the survey of the Waimarino Block purchase, of an estimated area of four hundred thousand acres, and there are also some large blocks on the west side of Lake Taupo under survey preparatory to investigation of title by the Native Land Court.

LAND TRANSFER SURVEYS.

The nature of this class of surveys and the principles on which they are conducted have been so fully described in former annual reports that reiteration will be unnecessary.

Very considerable delays in passing plans frequently arise from the inaccuracies brought to light in the subdivisions of areas Crown-granted on imperfect surveys. The investigation necessary to clear up discrepancies, it may be of only a few inches in a valuable street-frontage, is often a very tedious matter, requiring patient research in the office, and, it may be, involving the re-survey of a whole block. The standard surveys of towns and suburbs, and, in some few cases, of rural districts, have, whenever executed, greatly facilitated the dealings under the Land Transfer Act. It is proposed shortly to extend standard-survey lines through a portion of Auckland City which has not yet been overtaken.

PUBLICATION OF MAPS.

In Mr. Barron's report in the appendix, details are given of the out-turn of lithographic work and maps for the various departments of the public service, and more especially of the Survey Department proper. There is a great accumulation of topographical information stored up in the manuscript maps of the department which it would be of much convenience to the public to have published. This is being pushed on as rapidly as current work will permit; but it would be well if the lin.-scale district maps could be put through in greater numbers, as they are of very great utility for all general purposes, and save the labour and expense of making tracings from the original maps. One great hindrance to a more rapid rate of publication is the restricted room and small printing-presses, a drawback which cannot be amended until more extensive premises are obtained.

Two of the sheets of the map of Auckland Provincial District, to a scale of four miles to an inch, are issued, and of the two remaining to complete the map, one is now in the hands of the photographer, and the other is being prepared by the draughtsman.

For the Middle Island, the sheet of the geographical map on the eight-mile scale has been issued down to the 43rd parallel of latitude, comprehending the Provincial Districts of Nelson and Marlborough, and parts of Westland and Canterbury. The next sheet, going south to the 45th parallel, is in the hands of the draughtsman, and covers the remainder of Canterbury and Westland and a portion of Otago.

EXHIBITS AT THE INDIAN AND COLONIAL EXHIBITION OF LONDON, 1886.

With the view of disseminating information regarding the geography of New Zealand, the settlement and occupation of its lands, the location of its population, its commerce and resources, the following maps and diagrams were prepared and shipped early in January last by s.s. "Ruapehu" for London, in charge of the Exhibition Commissioner, Dr. (now Sir Julius) von Haast: Large physical map of New Zealand, mounted on rollers, 14ft. by 10ft., on the polyconic projection, to a scale of eight miles to an inch, showing clearly the river-systems, plains, mountains, coast-lines, and other natural features; map of same dimensions as physical map, showing land-tenure, also, by diagrams, the increase and changes from year to year in population and social statistics, in pastoral and agricultural products, in yield of gold, coal, and minerals, in trade and commerce; map of district around Auckland, showing the number and position of the old volcanic cones; two maps, one of each Island, showing density of population; two maps, sheets Nos. 2 and 3, Provincial District of Auckland; map of Provincial Districts of Hawke's Bay, Taranaki, and Wellington; map of Provincial Districts of Nelson, Marlborough, and parts of Canterbury and Westland; map of Otago, and map of Southland; plan of West Coast and Waimate Plains settlement, Taranaki; set of photo-lithographed plans, showing survey-districts, blocks, runs, and Crown lands sales plans; set of prints of New Zealand flora (twenty-two different varieties); nine views of New Zealand settlement-landscapes, mounted and framed; one volume of New Zealand Survey Reports, 1880 to 1885, with preface.

ECLIPSE OF THE SUN.

This phenomenon, which, although by no means infrequent, yet happens so very rarely to be visible at any one place on the earth's surface except at very long intervals, was seen from a narrow belt of New Zealand on the morning of 9th September, 1885. Apart from the rarity and weird splendour of the spectacle of the bright luminary of day going out, and darkness sweeping over the face of the earth, the interest which attaches to the phenomenon is the brief opportunity it gives for the study of the corona or aureole of light which is seen to encompass the sun when the moon has fairly hid his face from us. There have been many theories as to the cause of this appearance, such as that it has no more connection with the sun than has the halo round the lamp on a dark night in a foggy atmosphere. The more generally-accepted theory, however, according to Professor C. A. Young, is that the corona is an emanation or part of the sun—an atmosphere of incandescent gases—and, therefore, that in finding out its nature a step is made towards the elucidation of the nature of the sun itself. Unfortunately, there were no observations by the spectroscope, for want of suitable instruments. There were, however, numerous observers of the form and appearance of the corona. In order to be in a position to observe it as long as possible—not quite two minutes—a station was selected on Otahoua Hill, near Masterton, about sixty miles north-east of Wellington, and very near the central line of eclipse. The latitude of the trigonometrical station on Otahoua Hill is $40^{\circ} 58' 33.6''$ S.; longitude, $175^{\circ} 46' 10.6''$ E. of Greenwich; altitude of summit, 1,155ft. above sea-level. From this point of observation, well raised above the surrounding country, there was the hope of observing through a clear atmosphere; but, unfortunately, the weather was very bad—dense masses of cloud, driven before a cold southerly gale, obscured the sun to within a few minutes of totality. Just then, a clear patch of sky enabled the near approach of totality, its completion, and duration for rather more than a minute to be distinctly seen, when clouds again intervened. The instant of totality, in New Zealand mean time, was, according to Mr. C. W. Adams, 7h. 34m. 50.8s. New Zealand mean time is to the meridian $172^{\circ} 30'$ East, or 11h. 30m. in advance of Greenwich. The corona was of a vivid, soft-white brightness, very similar to the appearance of the electric light, easy and pleasant to the eye; in shape an annular ring; in breadth about one-fourth of the diameter of the sun, perceptibly broader on the line of motion of the moon over the sun. The observers at Otahoua were Mr. Arthur Beverly, of Dunedin, Mr. Thomas Humphries, Mr. C. W. Adams, and myself. On account of our cloudy sky, none of us saw the greater extension of the corona which was visible at Wellington in the clear sky prevailing there at the time. Several officers of the Survey Department sketched the corona from various positions in and around the city, and wrote down descriptions on the spot and before consultation with others. Mr. Barron has made an abstract of these reports, which is in the appendix along with the reports of Messrs. Beverly, Humphries, and Captain Hewitt. There are also the photographs by Messrs. Barron, Humphries, and Gell, and the sketches by

Mr. H. A. Gordon, of the Mines Department. In a matter pertaining to science it is important to record information from every trustworthy source, and, consequently, every sketch and report deemed worthy has been recorded in the appendix, with the name of the officer or contributor.

ROADS TO OPEN CROWN LANDS FOR SALE.

During the year which ended on the 30th June the work accomplished has been as follows:—

In Auckland $72\frac{1}{4}$ miles of cart-road have been constructed, $40\frac{1}{2}$ miles of bridle-road, $1\frac{3}{4}$ miles of drains made, besides several hundred culverts and bridges, and $26\frac{3}{4}$ miles of road have been graded ready for construction: the total expenditure being £20,938 2s. 8d.

In Taranaki $25\frac{1}{4}$ miles of cart-road have been constructed, and $5\frac{3}{4}$ miles have been felled and cleared, at a cost of £5,792 8s. 9d. for the year.

In Hawke's Bay 1 mile of road has been metalled, $12\frac{1}{2}$ miles of cart-road have been constructed, $51\frac{1}{4}$ miles have been felled and cleared, six bridges and seventeen culverts have been erected, and $8\frac{1}{2}$ miles of road have been graded ready for construction: the cost for the year being £8,572 9s. 9d.

In Wellington $3\frac{3}{4}$ miles of cart-road have been constructed, $7\frac{1}{2}$ miles have been felled and cleared, $12\frac{1}{4}$ miles of bridle-road have been made, $3\frac{1}{8}$ miles of drains dug, and $18\frac{3}{4}$ miles of road have been graded ready for construction: the cost to date being £5,451 2s. 11d.

In Nelson $16\frac{3}{4}$ miles of cart-road have been constructed, $3\frac{3}{4}$ miles of horse-roads, one bridge built, and $4\frac{1}{4}$ miles of road graded ready for construction: the cost for the year being £4,734 16s. 2d.

In Westland $9\frac{3}{4}$ miles of cart-road have been formed, and 2 miles of bridle-road, at an expense of £2,507 3s. 5d. for the year.

In Canterbury $21\frac{1}{4}$ miles of cart-road have been constructed or improved, at a cost of £2,841 15s. 4d.

In Otago 59 miles of cart-road have been formed, at a cost of £10,563 1s. 7d., and 53 miles have been graded ready for formation.

In Southland $8\frac{1}{2}$ miles of cart-road have been made, and $4\frac{1}{2}$ miles felled and cleared, at a cost of £2,403 11s. 5d.

The totals are 230 miles of cart-road made, 69 miles of cart-road felled and cleared through forest, $58\frac{1}{2}$ miles of bridle-road formed, 5 miles of drains and ditches, 111 miles of road graded ready for formation. The total payments to account are £63,804 12s.

FUTURE OPERATIONS.

The main field-work for the ensuing year will be the completion of the trigonometrical surveys now in hand and the extension of the settlement-surveys, more especially in the bush-districts of the North Island. In the survey-offices there is the usual routine work of reduction and compilation of plans, preparation of leases and certificates of title, with miscellaneous work for Property-tax, Census, Defence, and other departments, which during the past year was done at the cost of delaying the proper work of the department, the office staff not being sufficiently manned to meet all the extra demands made on it. It is to be hoped that in future the highly-trained draughtsmen who are engaged on the preparation of maps for publication will not have to be taken from that work to engage in disposing of the temporary exigencies which may arise in other departments.

In roads to open up Crown lands it is proposed to continue to completion the works now in hand, and to extend new road-lines through the various blocks as they are opened up by survey. The progress of settlement very much depends on the amount of this kind of work which can be undertaken; and there should be no remission in its steady prosecution, extending, as it does, to all the districts of the colony, as will be seen by a reference to the Public Works estimates for the current year.

I have, &c.,

J. McKERROW,

The Hon. John Ballance, Minister of Lands.

Surveyor-General.

No. 1.—RETURN of FIELD-WORK executed by STAFF and CONTRACT SURVEYORS, and of the COST of the SURVEY DEPARTMENT of New Zealand, from 30th June, 1885, to 1st July, 1886.

District.	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.		Detention by Native Offences and other Causes.		Miscellaneous.		Total Charges against the Survey for Twelve Months.		Supervision, Inspection, and Office-work.							
	Acres.	Cost per Acre.	Acres.	Cost per Acre.	Acres.	No. of Sections.	Cost per Acre.	Acres.	No. of Allotments.	Cost per Allotment.	Acres.	No. of Divs.	Cost per Acre.	Acres.	No. of Blocks.	Cost per Acre.	Acres.	No. of Sections.	Cost per Acre.	Miles.	Cost per Mile.	Cost.	Cost.	£	s. d.	£	s. d.	£	s. d.								
Auckland ..	253,000	0·21	139,500	0·52	1,526,000	0·53	d.	51,997	569	2/9·5	103	146	15/5	49,028	52	6·90	8,877	7	5·69	..	..	259½	11	3	2	178	13	12,136	6	3	17,985	11	2	7,835	17	1	
Hawke's Bay ..	..	..	56,000	1·08	36,200	2·36	14,641	83	3/8·4	246	68	55/1	39,748	6	3·92	..	..	..	..	..	..	19	9	13	5	86	12	1	519	19	0	4,627	4	4	1,858	18	5
Taranaki ..	..	..	..	..	320,000	0·55	18,718	90	2/7·6	24	96	15/7	..	..	..	..	..	..	..	..	23	21	8	3	53	7	0	979	13	4	5,560	8	5	1,433	7	8	
Wellington ..	332,696	0·08	45,611	0·28	545,844	1·33	79,987	1,224	1/6·2	1,397	895	16/6	50,290	4	1·82	..	..	..	..	..	42½	13	17	0	17	9	0	1,098	10	3	11,274	2	9	3,829	3	8	
Nelson ..	..	..	135,076	0·82	12,764	1·50	54,812	392	1/7·1	348	612	18/2	7,862	2	3·80	..	1,271	75	14/10·7	..	..	..	..	..	..	..	4,463	15	3	9,504	18	5	2,664	0	0		
Marlborough ..	467,000	0·25	..	..	222,200	1·02	3,891	5	7/1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	242	12	11	924	16	2	609	13	3			
Westland ..	79,875	0·93	116,910	1·42	62,400	1·40	16,259	104	1/0·0	..	..	..	..	..	..	..	144	6	6/9·5	35	3	18	0	..	..	102	6	6	3,075	7	9	1,196	15	4			
Canterbury ..	..	..	18,200	1·00	101,526	1·26	58,687	364	/11·5	..	..	..	..	..	..	..	110½	7	25/4·9	..	..	..	..	..	..	34	18	0	4,572	14	4	5,475	13	10			
Otago ..	..	..	..	..	..	..	41,272	255	1/2·16	315	268	18/9	..	..	..	..	432	39	15/6·2	51½	6	12	10	..	..	911	8	5	4,812	5	2	4,709	17	7			
Southland ..	..	..	..	..	146,000	0·81	8,979	150	4/11·8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	89	16	2	1,676	2	4	1,538	0	0			
Head Office ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8,745	7	0		
Means and totals ..	1,132,571	0·24	511,297	0·86	2,972,934	0·80	344,243	3,236	1/9·0	2,433	2,085	18/5·1	146,428	64	4·70	8,877	7	5·69	1,957½	127	15/0·4	431	10	15	6	4	336	1	210,579	6	1	64,013	10	10	39,896	14	7

Total expenditure £103,910 5 5
Less refunds for work done 11,351 12 1
£92,558 13 4

TABLES.

No. 2.—ABSTRACT of the SURVEYORS employed and of the WORK on HAND in each PROVINCIAL DISTRICT on 30th JUNE, 1886.

Chief Surveyors.	Surveyors employed.		Work on Hand.				
	Staff.	Temporary.	District.	Trig.	Settlement.	Native Block, &c.	Roads, Railways, &c.
				Sq. Miles.	Acres.	Acres.	Miles.
S. P. Smith, A.S.G. ..	19	2	Auckland ..	1,928	42,295	480,000	386
Thomas Humphries ..	7	2	Taranaki ..	203	8,000	..	9
H. Baker ..	4	3	Hawke's Bay ..	532	68,909	579,807	130
J. W. A. Marchant ..	10	9	Wellington ..	1,250	128,000	565,470	12
J. S. Browning ..	11	..	Nelson ..	..	56,336	..	..
H. G. Clark ..	1	..	Marlborough ..	30	4,429	..	..
G. Mueller ..	3	..	Westland ..	1,400	31,110	..	212
J. H. Baker ..	5	..	Canterbury ..	..	21,084	..	..
C. W. Adams ..	5	..	Otago ..	..	12,236	..	..
J. Spence ..	2	2	Southland ..	..	1,672	..	..
Totals ..	67	18	..	5,343	374,071	1,625,277	749

No. 3.—CROWN GRANTS and other INSTRUMENTS of TITLE from the CROWN prepared.

District.	Number.	Cost.	District.	Number.	Cost.
		£ s. d.			£ s. d.
Auckland	1,424	456 6 2	Westland	87	12 19 0
Taranaki	296	81 16 0	Canterbury	1,430	720 16 8
Hawke's Bay ..	355	55 0 0	Otago	722	475 0 0
Wellington	195	48 0 0	Southland	377	118 0 0
Nelson	532	257 12 0			
Marlborough ..	17	5 18 4	Totals	5,435	2,231 8 2

No. 4.—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	243	1,024	1,175 3 4	Westland	187	160	13 17 0
Taranaki	21	141	69 9 10	Canterbury	176	2,775	722 10 10
Hawke's Bay ..	86	28	337 16 7	Otago	62	712	431 17 4
Wellington	69	819	600 11 11	Southland	20	1,540	338 0 0
Nelson	137	326	225 0 0				
Marlborough ..	21	130	33 16 10	Totals	1,022	7,655	3,948 3 8

No. 5.—PHOTOGRAPHS.

Department.	Number of Plates taken during the Year.	Department.	Number of Plates taken during the Year.
Public Works	70	Silver prints—	
Survey	237	Survey	305
Museum	4	Forests	134
Exhibition	14	Public Works	90
Education	11	Premier	5
Premier	7	Exhibition	8
Post and Telegraphs	11		
Mines	12	Total	542
Defence	69		
Printing	6		
Forests	88		
Total	529		

No. 6.—LITHOGRAPHIC PRINTING executed from the 1st July, 1885, to the 30th June, 1886.

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	266	81,412	15,551	Native	5	..	230
Public Works	369	81,600	16,660	Treasury	5	..	726
Customs .. .	9	500	1,120	Property-tax	5	2,500	2,250
Geological	26	45,090	1,812	Registrar-General	15	..	1,251
Justice	19	500	1,856	Patent	1	..	100
Mines	115	93,650	1,447	Colonial Secretary	8	..	385
Insurance	1	..	150	Crown Lands	13	12,000	400
Railway	22	32,000	1,815	Defence	29	..	1,363
Post and Telegraph	15	4,000	1,900	Forest	35	26,000	2,879
Marine	26	8,250	1,273	Parliament	1	3,000	..
Education	47	8,500	3,099				
Premier's Office	54	83,025	..	Totals	1,138	496,902	56,489
Agent-General.. ..	8	5,600	..				
Exhibition	37	..	222				
Printing	7	9,275	..				

No. 7.—ABSTRACT OF LITHOGRAPHS PRINTED during the Year.

Head Office, Wellington	553,391
Auckland	2,950
Dunedin	13,800
Invercargill	1,600
Total	<u>571,741</u>
Maps mounted	2,584

HEAD OFFICE.

During the year just closed the correspondence has consisted of letters, &c., received and despatched, 8,032; references from other departments, 1,525.

The accounts represent an expenditure of £171,733 7s. 9d., of which £107,828 15s. 9d. is for surveys, and £63,904 12s. for road-construction. Of the latter sum of £63,804 12s. for road-formation, £23,511 18s. 4d. has been expended by local authorities, and £40,292 13s. 8d. directly by officers of the Survey Department. Number of vouchers passed, 8,210.

The recoveries from other departments and from the public for work done amount to £11,351 12s. 1d., and the amount due at the end of the year is £10,443 11s. 3d.

The maps prepared for publication in the Head Office during the past year have been fourteen survey-districts, scale one mile to an inch, fifteen sale-plans, four geographical maps, besides a great variety of minor works.

Maps for the census of 1886 were prepared entirely in this office (excepting the Census District of Westland). They numbered 674 separate plans, each of which was mounted on cloth, bound to the sub-enumerators' books, coloured to show boundaries of boroughs, with their wards, town districts, road districts, ridings, counties, electorates; and these were further divided into smaller areas, in case it should be necessary in the future to readjust the representation in Parliament. I am glad to say that, notwithstanding the liability to error, I have heard of only one case in which a mistake was made in the books issued. This is creditable to Mr. Flanagan, under whose direction the work was done, and also to the officers engaged upon it.

A further portion of the map of the Middle Island to be printed on the scale of eight miles to an inch has been in the hands of Mr. Grant and Mr. Malings. This part will extend from lat. 43° to lat. 45°, or, say, from the Hurunui to the Waitaki.

Drawings for Mr. Kirk's "New Zealand Forest Flora" have been further prosecuted: Mr. Graham has drawn twenty-four plates, Mr. Boscawen forty-seven plates, and the publication of Part I., containing twenty-six plates, is now in the press. As exact reproductions of the several specimens, they compare favourably with the best of this kind of work.

In the photographic gallery the number of negatives taken is 529. Of these 415 were transferred to stone, and 114 were used for silver prints. The out-turn is about one-sixth more than last year.

In the lithographic office the issue is 553,391 impressions, from 1,138 stones and 621 separate drawings. The Survey Department contributes to this total 96,963 impressions, from 266 stones; the Public Works Department, 98,260 impressions, from 369 stones; the Geological Department, 46,902, from twenty-six stones; the Mines Department, 95,097, from 115 stones; the balance being distributed among twenty-two other departments of the service.

I regret very much that another year has passed without more room being provided for the increasing work required from the photo. and litho. offices. The science and art of photography is developing so rapidly that, unless some effort is made to, at any rate, follow in the steps of experimenters and discoverers in other countries, we shall be unable to work up to the standard of public taste—unable to comply with the reasonable demands which the Government may make on the department. With the splendid atmosphere New Zealand has for the production of sun-pictures, we ought not to be unable to take advantage of the new processes yearly being discovered in Europe and America. Silver-printing, although yet the best for the reproduction of the most delicate details of shade, is such a slow and laborious process as to be practically unfit for books or parliamentary papers. Photo-lithography is applicable to drawings in line only, and for it special drawings have to be made; but in the transfer and multiplication of this class of work it is unsurpassed. We, however, still want a process which could reproduce works of art and pictures of nature equal to wood-engravings, and with equal facility for rapid multiplication in the ordinary or in the lithographic printing-press. If time could be spared, and some further room provided, improvement might be made in the methods or processes now employed, and possibly an advance made in the direction indicated.

A. BARRON.

INDEX
TO THE STATE OF THE
PUBLIC SURVEYS
IN
NEW ZEALAND

JUNE 1886.



JAMES MCKERROW
Surveyor General.

NORTH ISLAND

MIDDLE ISLAND

REFERENCE

Standard Survey shewn thus
Minor Triangulation
Section Survey under check
Section Survey built

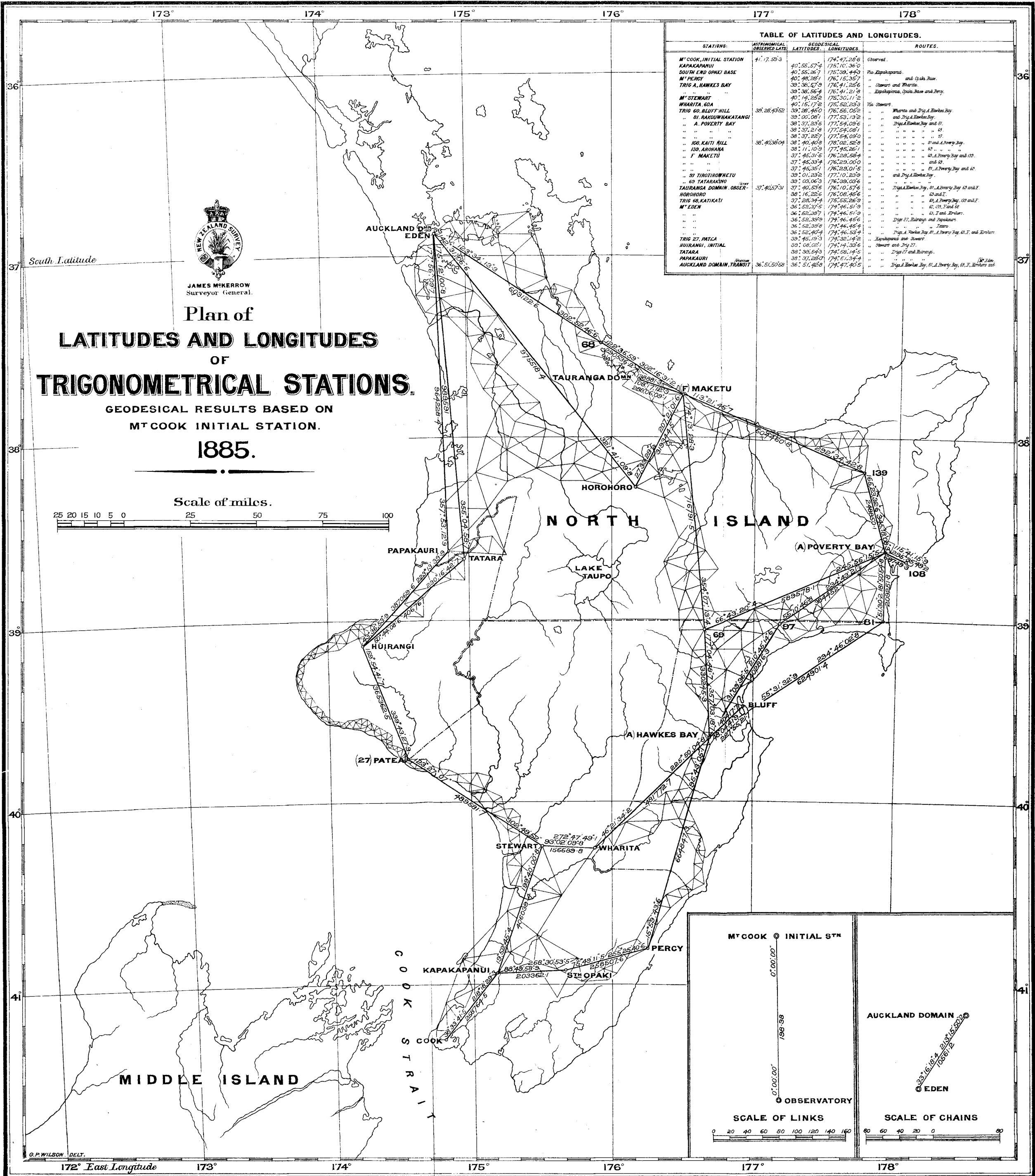
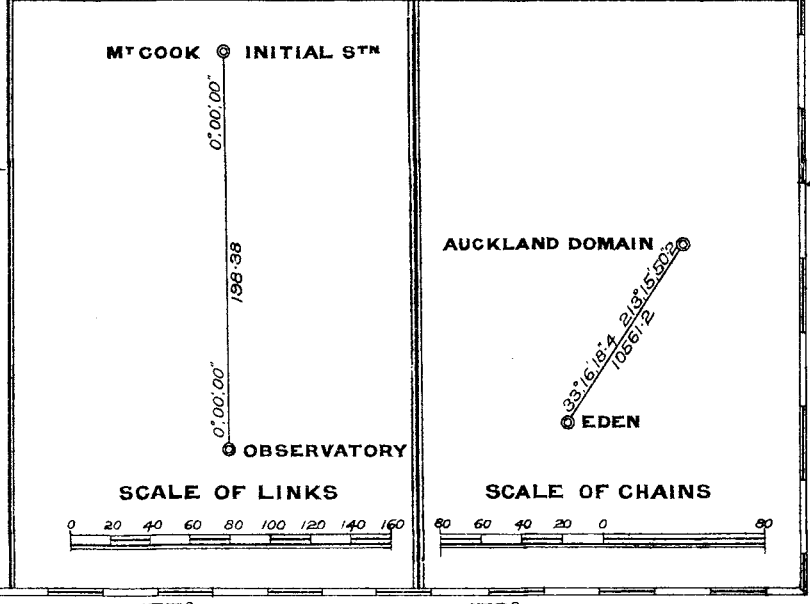


TABLE OF LATITUDES AND LONGITUDES.				
STATIONS.	ASTRONOMICAL OBSERVED LAT.	GEODESICAL LATITUDES	ROUTES.	
M ^t COOK, INITIAL STATION	41° 17' 55.3	41° 17' 55.3	Observed.	
KAPAKAPANUI	40° 55' 57.4	40° 55' 57.4	The Kapakapanui	
SOUTH END OPAKI BASE	40° 55' 26.7	40° 55' 26.7	and Cape Base.	
M ^t PERCY	40° 48' 28.1	40° 48' 28.1	Stewart and Wharita.	
TRIG A, HAWKES BAY	39° 38' 57.9	39° 38' 57.9	Kapakapanui, Opaki Base and Percy.	
M ^t STEWART	38° 38' 56.4	38° 38' 56.4		
WHARITA, 60A	40° 14' 25.2	40° 14' 25.2		
TRIG 60, BLUFF HILL	40° 15' 17.2	40° 15' 17.2		
81, RAKOUPHAKATANGI	39° 28' 45.0	39° 28' 45.0	Wharita and Trig A, Hawkes Bay	
A, POVERTY BAY	39° 00' 08.1	39° 00' 08.1	and Trig A, Hawkes Bay.	
	38° 37' 33.5	38° 37' 33.5	Trig A, Hawkes Bay and 81.	
	38° 37' 21.8	38° 37' 21.8	Trig A, Hawkes Bay and 81.	
	38° 37' 22.7	38° 37' 22.7	Trig A, Hawkes Bay and 81.	
108, KAITI HILL	38° 40' 40.8	38° 40' 40.8	Trig A, Hawkes Bay and 81.	
139, AROHANA	38° 11' 10.9	38° 11' 10.9	Trig A, Hawkes Bay and 81.	
F, MAKETU	37° 45' 31.5	37° 45' 31.5	Trig A, Hawkes Bay and 81.	
	37° 45' 33.4	37° 45' 33.4	Trig A, Hawkes Bay and 81.	
	37° 45' 35.1	37° 45' 35.1	Trig A, Hawkes Bay and 81.	
	39° 01' 23.2	39° 01' 23.2	Trig A, Hawkes Bay and 81.	
87, TIROTIROWHETU	39° 03' 06.3	39° 03' 06.3	Trig A, Hawkes Bay and 81.	
69, TATARAKINO	37° 40' 53.5	37° 40' 53.5	Trig A, Hawkes Bay and 81.	
TAURANGA DOMAIN, OBSER.	38° 16' 22.6	38° 16' 22.6	Trig A, Hawkes Bay and 81.	
HOROHORO	37° 28' 34.4	37° 28' 34.4	Trig A, Hawkes Bay and 81.	
TRIG 68, KATIKATI	36° 52' 37.5	36° 52' 37.5	Trig A, Hawkes Bay and 81.	
M ^t EDEN	36° 52' 39.9	36° 52' 39.9	Trig A, Hawkes Bay and 81.	
	36° 52' 40.4	36° 52' 40.4	Trig A, Hawkes Bay and 81.	
	39° 45' 19.3	39° 45' 19.3	Trig A, Hawkes Bay and 81.	
TRIG 27, PATEA	39° 08' 02.1	39° 08' 02.1	Trig A, Hawkes Bay and 81.	
TAURANGA, INITIAL	38° 38' 54.3	38° 38' 54.3	Trig A, Hawkes Bay and 81.	
PAPAKAURI	38° 37' 28.0	38° 37' 28.0	Trig A, Hawkes Bay and 81.	
AUCKLAND DOMAIN, TRANSIT	36° 51' 50.8	36° 51' 50.8	Trig A, Hawkes Bay and 81.	

COOK STRAIT



No. 8.—RETURN of FIELD-WORK executed by STAFF and CONTRACT SURVEYORS under the Supervision of Mr. S. PERCY SMITH, from 1st July, 1885, to 30th June, 1886.
PROVINCIAL DISTRICT OF AUCKLAND.

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.				Gold-Mining Survey.				Roads, Railways, and Water-races.			Detention by Native Opposition or other Causes.	Other Work.	Total Cost of Surveyor and Party from 1st July, 1885, to 30th June, 1886.	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 Acre.	Total Cost.	Acres.	No. of Divs.	Cost per Acre.	Total Cost.	Acres.	No. of Allotments.	Cost per Acre.	Total Cost.	Acres.	No. of Sections.	Cost per Acre.	Total Cost.	Miles.	Cost per Mile.	Total Cost.	Cost.	Cost.		
G. W. Williams. (General)	..	d.	£ s. d.	..	d.	£ s. d.	..	d.	£ s. d.	..	..	s.	£ s. d.	..	..	d.	£ s. d.	..	..	d.	£ s. d.	..	..	d.	£ s. d.	..	..	d.	£ s. d.	..	£	£ s. d.	£ s. d.	£ s. d.	£ s. d.	Also Field Inspector. Also Field Inspector in charge of East Coast. All rough forest country. Half bush, half open work, much scattered. 600 square miles. Major and minor work nearly completed. 7 miles of road completed in field. Mostly adjoining old surveys. Work much scattered. 10 miles of road completed in field. Half adjoining old surveys. Adjoining old surveys. 600 acres completed in field. Adjacent to old surveys. Broken bush country. Bush; 900 acres completed in field. In field since March, 1886. Heavy bush country. Open broken country. Open, very broken country. Mostly bush. Mr. Spencer left on the 10th October, 1885. Transferred to Hawke's Bay.
J. O. Barnard. Cook County	..	..	..	25,000	0·5	52 2 0	..	..	..	..	..	..	..	..	4	..	15 0 0	..	..	..	..	..	..	..	..	..	..	..	10	10	100 0 0	..	690 12 4	805 12 4		
S. Weetman. Great Barrier	..	..	..	..	..	..	..	..	..	6,149	33	2·97	913 2 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1·5	23·7	35 0 1	..	..	941 13 4		
E. C. Goldsmith. Tauranga, &c.	..	..	..	39,000	0·42	67 10 0	..	..	..	816	11	5·25	214 4 0	17	62	15·2	47 2 0	15,328	11	4·8	314 17 8	..	..	..	..	..	..	..	12	5	60 0 0	..	80 13 2	788 12 3		
L. Cussen, cadet, and one assistant. King Country	..	..	..	..	..	..	1,310,000	0·47	2,574 16 7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	80 0 0	50 0 0	2,599 15 2		
F. Simpson. Whangarei	..	..	..	..	..	..	..	..	..	1,965	20	3·1	304 11 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	80 0 0	50 0 0	2,599 15 2		
F. H. Edgecumbe. Maramarua, &c.	..	..	..	6,000	0·4	9 19 11	..	..	..	5,278	43	2·27	601 0 8	1·5	6	10·0	3 0 0	..	..	..	..	..	..	..	..	..	..	..	21·4	14	303 10 0	..	149 10 0	809 8 0		
R. Neumann. Bay of Islands	..	..	..	..	..	..	8,600	1·7	62 3 2	1,723	36	8·5	743 9 5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	23·95	6·9	167 7 6	..	..	771 8 1		
G. A. Martin. Kaipara	..	..	..	..	..	..	..	..	..	2,642	29	3·9	604 0 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 11 8	44 5 5	..		
E. H. Hardy and cadet. Tokatoka,	..	..	..	..	..	..	..	..	..	9,135	40	1·9	883 13 9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	14	14	196 0 0	..	..	797 14 6		
J. I. Phillips. Matakoho, &c.	..	..	..	..	..	..	..	..	..	8,037	89	1·4	541 11 9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	888 10 11		
C. Steven. Waipu, &c.	..	..	..	..	..	..	..	..	..	2,700	47	4·2	578 6 9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 0 0	..	..	802 19 2	
C. W. McFarland. Waiwera, &c.	..	..	..	7,400	1·3	41 0 0	..	..	..	1,700	23	5·6	478 7 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	120 0 0	698 14 0		
H. D. M. Haszard. Awhitu, &c.	..	..	..	13,000	1·0	54 3 4	..	..	..	3,557	85	2·6	459 7 2	4	16	14·3	11 10 0	..	..	..	..	..	..	..	..	..	..	..	6·7	11·5	77 0 0	..	28 8 6	707 9 3		
W. J. Wheeler. Hokianga	..	..	..	..	..	..	..	..	..	2,924	88	4·9	718 17 7	6·5	30	64·0	21 8 10	503	3	43·0	90 0 5	..	..	..	..	..	..	..	..	..	..	..	19 19 0	681 7 11		
M. C. Smith. Whitianga, &c.	..	..	..	..	..	..	..	..	..	348	6	3·8	65 17 5	0·2	2	160	1 10 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	63 14 2	308 8 11		
J. Baber. East Cape	253,000	0·16	223 0 0	..	..	..	253,000	0·52	557 9 0	10	240	..	20 0 0	..	..	..	..	8,532	6	3·34	118 19 4	..	..	..	..	..	..	..	..	..	..	..	..	12 14 0	134 0 8	744 17 2
J. E. Pickett. Tokomaru, &c.	..	..	..	49,100	0·37	76 17 4	..	..	..	..	..	..	..	74	26	3·5	13 0 0	..	..	..	..	..	..	..	..	..	..	..	73·25	8·9	651 19 6	..	54 13 4	796 10 2		
W. Armstrong. Mangatu, &c.	..	..	..	..	..	..	..	..	..	2,253	3	4·7	43 0 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	36·2	18·9	635 12 0	..	67 18 0	796 10 0		
W. C. C. Spencer. Coromandel	..	..	..	..	..	..	55,000	0·75	202 14 4	2,522	12	1·6	187 1 11	..	..	..	..	5,904	4	9·7	237 18 11	..	..	..	..	..	..	..	4·5	22·7	104 16 3	..	..	100 2 6		
H. G. Price. Waiau	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	8·2	43 16 0	..	..	43 16 0		
Authorized surveyors	253,000	0·16	223 0 0	139,500	0·52	301 12 7	1,526,000	0·53	3,397 3 1	51,759	567	2·99	7,256 11 0	103·2	146	21·8	112 10 10	30,267	24	6·7	861 16 4	..	..	..	..	..	..	247·5	10·1	2,718 3 9	178 13 12	1,136 6 3	16,246 6 2			
Means and totals	253,000	0·16	223 0 0	139,500	0·52	301 12 7	1,526,000	0·53	3,397 3 1	51,997	569	2·99	7,262 13 0	103·2	146	21·8	112 10 10	49,028	52	6·7	1,423 2 6	8,877	7	..	210 10 3	..	..	..	259·24	11·2	2,895 19 9	178 13 12	1,136 6 3	16,860 15 6		

PROVINCIAL DISTRICT OF TARANAKI.

Staff Surveyors.										Back Pegging, old work.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
A. O'Donahoo. Egmont, Opunake, and Mokau	..	..	..	..	..	..	..	..	2,150	26	d. 16·9	150 19 9	24	96	15·5	75 0 0	..	..	..	..	..	..	..	..	..	..	3	22	65 19 10	..	25 10 4	648 1 5	{ Cadet partly assisting. Standard survey of New Plymouth well forward. Left the service November, 1885. 130,000 acres triangulation nearly completed. Rough country, difficult for road work: 4,000 acres nearly completed. Left service 30th November, 1885. Left service 30th September, 1885.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
E. S. Brookes. Opaku..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6½	51·65	335 15 5	..	..	134 16 0	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
W. H. Skinner. Huiroa	..	..	..	..	..	..	..	..	7,876	24	23·4	767 16 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	714 18 0	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
H. M. Skeet. Ohura, Pouatu, and Mahoe	..	..	..	..	..	320,000	0·5	733 16 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,051 7 3		3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
H. W. Climie. Ngaire..	..	..	..	..	..	..	..	..	3,170	15	32·7	432 17 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	692 13 0		0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
C. Finnerty. Huiroa ..	..	..	..	..	..	..	..	..	3,462	15	60·2	869 6 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	314 8 4	4																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
F. Duthie. Huiroa ..	..	..	..	..	..	..	..	..	2,000	9	28·9	241 0 4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	69 7 4	4																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
A. C. Atkinson. Kaupokonui and Opaku	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	600 2 2	2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
P. A. Dalziel. Ngaire	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	327 5 8	8																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
T. L. Humphries. Huiroa	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	308 5 8	8																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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NOTE.—The whole of the work of the Taranaki staff, as shown above, with the exception of 150 acres of suburban land, has been in dense forest country.

No. 8—continued.—RETURN of FIELD-WORK executed by STAFF and CONTRACT SURVEYORS from 1st July, 1885, to 30th June, 1886.
PROVINCIAL DISTRICT OF HAWKE'S BAY.

Surveyor and District.	Major Triangulation.			Minor Triangulation.			Topographical and Trigonometrical Survey.			Rural and Suburban.				Town Section Survey.				Native Land Court Survey.				Gold-Mining Survey.				Roads, Railways, and Water-races.			Detention by Native Opposition or other Causes.	Other Work.	Total Cost of Surveyor and Party from 1st July, 1885, to 30th June, 1886.	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 Secs. or Divs.	Cost per Acre.	Total Cost.	Acres.	No. of Sections.	Cost per Acre.	Total Cost.	Miles.	Cost per Mile.	Total Cost.	Cost.	Cost.			
Walter Hallett. Norsewood, Woodville, and Tahoraite	..	d.	£ s. d.	41,000	d.	£ s. d.	..	d.	£ s. d.	5,590	62	3/6	£ s. d.	125	37	51/	£ s. d.	..	..	..	£ s. d.	..	..	..	£ s. d.	1 1/2	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	Bush country. J. Wilson assisting with section survey.
N. J. Tone. Weber	..	..	..	..	..	..	36,200	2/4	356 11 2	2,720	8	3/7	485 1 4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30 8 0	912 15 0	Expensive bush country. Side lines of sections traversed on fencing lines.	
F. Rich. Tautane.. ..	..	..	..	15,000	2	125 0 0	..	..	..	6,331	13	4/	1,266 4 0	..	..	..	..	..	..	..	..	..	..	..	6	10 0 0	57 10 0	..	..	977 5 9	Expensive bush country. Side lines of sections traversed on fencing lines.		
H. G. Price. Moeangiangi and Waihua	..	..	..	..	..	..	..	..	..	..	..	..	..	121	31	60/	93 0 0	..	..	..	..	..	..	..	..	4 1/2	12 12 0	56 15 4	..	..	56 16 4	Bush country. Assisting Mr. Hallett.	
J. Wilson. Norsewood and Woodville	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7	7 0 0	50 10 9	86 12 1	..	689 18 5	..	
B. Lambert. Clyde	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	53 18 8	..	
J. Rochfort. Napier	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	27 0 0	27 0 0	..	
C. D. Kennedy. Tahoraite and Woodville	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	168 15 0	168 15 0	Railway land survey, 14 miles.	
C. E. O. Smith. Norsewood	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	70 18 0	70 18 0	Cutting back-line sections.	
A. H. Ross. Porangahau	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	60 0 0	60 0 0	Road survey.	
R. B. McCartie. Weber	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	186 18 0	186 18 0	Traverse rabbit-proof fence line.	
C. D. Kennedy. Waimarama	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	35,386	3	..	..	..	..	..	..	..	..	..	..	..	..	..	Private survey for Native landowners.
L. Lessong. Tahoraite	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2,462	1	..	..	..	..	..	..	..	..	..	..	..	..	..	Private survey for Native landowners.
C. W. Reardon. Heretaunga	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,900	2	..	..	..	..	..	..	..	..	..	..	..	..	..	Private survey for Native landowners.
Means and totals	..	..	..	56,000	1.08	253 2 6	36,200	2/4	356 11 2	14,641	83	3/8	2,729 10 4	246	68	55/1	187 7 0	39,748	6	..	..	..	..	..	..	19	9 13 5	183 16 1	86 12 1	519 19 0	4,308 16 6		

PROVINCIAL DISTRICT OF WELLINGTON.

A. D. Wilson	..	..	..	..	..	..	20,000	2 1/2	228 2 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	953 9 4	No return.	
A. Dundas. Ongo, Tiriraukawa	..	..	..	..	..	..	18,800	2 1/4	187 17 6	5,299	21	2/2	585 14 10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,062 11 9	Hilly forest country.	
L. Smith. Mangahao	14,696	0.47	28 17 0	..	..	..	..	..	..	10,365	36	1/4	696 18 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,146 0 0	Nearly all hilly forest country.	
J. D. Climie. Waiohine, Wairarapa, &c.	..	..	..	..	..	..	..	..	..	151	1	2/1	15 19 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	914 18 10	Broken forest country.	
J. Annabell. Ngamatea, &c.	270,000	0.06	65 18 9	8,611	0.9	32 16 0	165,900	1.2	859 15 5	11,760	..	8/4	412 7 6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,548 0 0	Hilly forest country, very difficult of access.	
A. E. Ashcroft. Rangitoto, Wangaehu	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	80 14 8	877 2 1	Hilly and flat forest country, difficult of access.
R. P. Greville. Makuri, Mangahao	..	..	..	..	..	..	107,300	..	444 13 5	878	66	2/5	106 0 11 1/2	70	52	9/7	25 0 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	616 0 0	Nearly all hilly forest country, difficult of access.
C. A. M. Crombie. Wainuioru, Kaiwhata	..	..	..	..	..	..	..	..	..	2,204	13	1/5	155 0 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	712 0 3	Broken forest and scrub country.	
W. H. Dunnage	..	..	..	..	..	..	..	..	..	14,467	29	1/3	923 15 2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	95 18 6	No return.	
H. J. Lowe. Mangahao	48,000	0.18	25 0 0	37,000	0.13	20 0 0	..	..	..	2,862	24	1/5	202 13 2	37	31	19/3	29 16 1	604	1	1/2	30 4 0	..	..	..	..	..	..	..	..	..	..	563 17 10	Hilly forest country.
J. A. Thorpe. Rarete, &c.	..	..	..	..	..	..	86,000	1.8	635 18 9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	874 0 0	Hilly forest country, very difficult of access.	
J. R. Annabell. Kapara, Taurakawa, &c.	..	..	..	..	..	..	147,844	1	654 18 0	..	..	..	..	..	..	..	..	49,806	3	1/2	1351 18 4	..	..	..	..	..	..	..	..	..	..	774 0 0	Hilly forest country, very difficult of access.
R. H. Reaney	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	486 0 0	Employed in exploring for locating, and superintending construction of, roads, &c.	
J. W. Davis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	189 0 0	Miscellaneous surveys and inspection, Hut County.	
Means and totals	332,696	0.1	119 15 9	45,611	0.3	52 16 0	545,844	1 1/2	3,011 5 1	47,986	190	1 3/4	3,098 8 7	107	83	13/2	54 16 1	50,290	4	1 1/2	382 2 4	..	..	..	..	42 1/2	18 17 8	592 4 10	17 9 0	1,090 2 3	10,812 18 7		
Authorized and Contract Surveyors.	..	..	..	..	..	..	..	..	..	20,879	79	..	..	930	702	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Flat and hilly forest country.
Palmerson and Scott. Mount Robinson, Arawaru	..	..	..	..	..	..	..	..	..	5,819	63	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Mostly hilly forest country. Woodville-Tiraumea
N. H. Macdonald. Makuri	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Special Settlement Block.
C. D. Kennedy. Makuri	..	..	..	..	..	..	..	..	..	5,403	80	..	..	360	110	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Mostly hilly forest country. Pahiatua-Puke
A. J. Rawson	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Special Settlement Block.
Means and totals	..	..	..	..	..	..	..	..	..	32,001	222	..	..	1,290	812	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 8 0	..	Papawai and Dalefield Station site.

* Partly compass survey. † Village special settlement. ‡ 49,686 acres in Taranaki District. § Surveys for Wellington and Manawatu Railway Company.

PROVINCIAL DISTRICT OF MARLBOROUGH.

A. D. Wilson. (Standard.) Onamalutu, Mount Olympus, Patriarch, Raglan, Leatham, Avon R. F. Goulter. (Staff.) Whernside..	467,000	0.25	486 9 2	..	..	..	222,200	1.01	945 16 8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	152 10 0	Partly open, partly bush; country high and rough. No cadet assisting. Open country; very high and rough. No cadet assisting. Paid for by applicant.
J. W. Davis. (Private Surveyor.) Gore ..	..	..	..	..	..	..	..	..	..	3,866	4	/6.9	111 2 11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	242 12 11	680 9 9	
Means and totals	467,000	0.25	486 9 2	..	..	..	222,200	1.01	945 16 8	3,891	5	/7.1	114 15 2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	242 12 11	832 19 9	
Less fees deposited for survey																											111 2 11					
																											£721 16 10					

PROVINCIAL DISTRICT OF OTAGO.

Surveyor and District.	Major Triangulation.			Minor Triangulation.			Topographical and Trigonometrical Survey.			Rural and Suburban.				Town Section Survey.				Native Land Court Survey.				Gold-Mining Survey.				Roads, Railways, and Water-races.			Detention by Native Opposition or other Causes.	Other Work.	Total Cost of Surveyor and Party from 1st July, 1885, to 30th June, 1886.	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 Secs. or Divs.	Cost per Acre.	Total Cost.	Acres.	No. of Sections.	Cost per Acre.	Total Cost.	Miles.	Cost per Mile.	Total Cost.	Cost.	Cost.			
John Strauchon. Waikawa, Catlin's, Wyndham, Toetoes, Waipahi, Waikaka, Fortrose Town, Waipahi Town, Tokanui Town	..	d.	£ s. d.	..	d.	£ s. d.	..	d.	£ s. d.	998	22	4/2 ³ / ₄	£ 211 9 11	174	133	28/6	£ 189 13 4	..	..	..	£ s. d.	..	..	..	£ s. d.	47 ³ / ₄	£ 6 17 0	£ 325 7 5	£ s. d.	£ s. d.	£ 364 0 7	£ 1,090 11 3	Bush, 100 acres in goldfields. Had to pack provisions 40 miles and carry them 8 miles. Weather very wet. The area explored is about 124,400 acres, costing £282 3s. 7d. Cadet assisting.
D. Barron. Blackstone, Gimmerburn, Kyeburn, Tiger Hill, Upper Taieri, Maniototo, St. Bathans, Swinburn, Naseby, Naseby Town, Rock and Pillar, Highlay	..	..	..	..	..	..	..	..	..	15,588	67	/11 ¹ / ₂	746 18 6	0-14	2	30/	3 0 0	..	..	..	..	19	4	20/	19 0 0	1 ¹ / ₂	4 0 0	6 0 0	..	130 2 3	905 0 9	Open country, within a goldfield; surveys scattered over wide district. Cadet over one year assisting.	
G. Mackenzie. Glenomaru, Catlin's, Mount Hyde	..	..	..	..	..	..	..	..	..	589	7	5/2 ¹ / ₄	154 3 10	..	..	..	..	..	..	..	..	13	18/11	5 16 0	..	..	..	..	..	67 0 0	226 19 10	Bush and isolated surveys, part in a goldfield. No cadet.	
J. Langmuir. Greenvale, Wendon, Nokomai, Chatton, Hedgehope, Tuapeka East, Bluespur Town, Clyde Town	..	..	..	..	..	..	..	..	..	11,149	89	/10 ¹ / ₂	488 11 9	141	133	8/11	59 8 0	..	..	..	..	95	7	7/8	36 8 4	2	8 8 0	6 6 0	..	222 5 1	812 19 2	In a goldfield, open country; spotting surveys expensive on account of distance between them. In other work is included the observation for altitudes of trigonometrical stations over 150,000 acres, costing £187 10s. Cadet assisting.	
E. H. Wilmot. Glenorchy, Mid. Wakatipu, Earnslaw, Kawarau, Nokomai, Crown, Cluden, Cromwell, Bannockburn, Polnoon, Skipper's Creek, Lower Wanaka, Lower Hawea, Tarras	..	..	..	..	..	..	..	..	..	6,485	35	1/3	405 19 11	..	..	..	..	..	..	..	..	305	27	18/	274 1 4	..	..	..	..	101 5 6	781 6 9	Within a goldfield; mining surveys exceptionally rough, and many in bush. Surveys very much scattered. Party has to travel by steamer and take trap and horses; district very expensive to work. Cadet under a year assisting.	
D. M. Calder. Kurow	..	..	..	..	..	..	..	..	..	6,242	27	1/2 ³ / ₄	384 9 4	..	..	..	..	..	..	..	..	..	..	..	..	2	3 0 0	6 0 0	..	..	390 9 4	Broken country and open; within a goldfield. No cadet.	
Means and totals	..	..	..	..	..	..	..	..	..	41,051	247	1/1-98 ¹ / ₂	2,391 13 3	315	268	18/9 ¹ / ₂	252 1 4	..	..	..	..	432	39	15/6	335 5 8	51 ³ / ₄	6 12 10	343 13 5	..	414 19 8	4,207 7 1		
Private Surveyors.																																	
G. Mackenzie. Waikouaiti..	..	..	..	..	..	..	..	..	..	27	5	9/7 ¹ / ₂	13 0 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 10 0	22 10 0	Bush.	
John Cumine. Dunedin and East Taieri	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3 3 0	3 3 0	Verifying the position of a road.	
T. C. Dennison. Oamaru	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2 14 0	2 14 0	Sheep-dip.
Fee-system.																																	
G. Mackenzie. Glenomaru, Waihola, Waikouaiti	..	..	..	..	..	..	..	..	..	194	3	3/1 ³ / ₄	30 10 9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30 10 9	30 10 9	Partly bush, open country, and water.
John Cumine. Tokomairiro	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 8 0	11 8 0	On a goldfield.
Means and totals	..	..	..	..	..	..	..	..	..	41,272	255	1/2-16 ¹ / ₂	2,435 4 0	315	268	18/9 ¹ / ₂	252 1 4	..	..	..	..	432	39	15/6	335 5 8	51 ³ / ₄	6 12 10	343 13 5	..	441 14 8	4,277 12 10		

PROVINCIAL DISTRICT OF SOUTHLAND.

Staff.																																
John Hay. Wairaki, Centre Hill, Takitimo, Taringatura, Hokonui, Winton	..	..	..	..	..	..	146,000	0-8	492 14 2	2,433	44	3/3-5	400 8 6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5 7 8	898 10 4	Surveys partly in bush. Surveyor seven weeks off duty through illness. No cadet. 37,000 acres of the 146,000 acres were not triangulated (topography only). Work scattered; nearly all of it in heavy bush. Much wet weather in Stewart Island. No cadet. Party broken up in April last.
George Watson. Invercargill, New River, Winton, and Hokonui, and Paterson District, Stewart Island	..	..	..	..	..	..	..	..	..	931	96	10/9-5	502 8 2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	84 8 6	586 16 8	
Fee-system.																																
Norman Prentice. Invercargill, New River, Forest Hill, and Mabel	..	..	..	..	..	..	..	..	..	270	4	2/8	36 5 6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	36 5 6	Bush land; three saw-mill areas included. Saw-millers provided bushmen. Purchases; partly bush. Purchases; partly bush. Purchase.
T. S. Miller. Forest Hill	..	..	..	..	..	..	..	..	..	159	3	3/5	27 1 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	27 1 0		
A. K. Robertson. Waimumu and Campbelltown	..	..	..	..	..	..	..	..	..	126	2	3/	19 2 6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	19 2 6		
R. C. Taylor. New River	..	..	..	..	..	..	..	..	..	60	1	2/4	7 0 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7 0 0		
Means and totals	..	..	..	..	..	..	146,000	0-8	492 14 2	3,979	150	4/11-8	992 5 8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	89 16 2	1,574 16 0	

PROVINCIAL DISTRICT OF NELSON.

Surveyor and District.	Major Triangulation.			Minor Triangulation.			Topographical and Trigonometrical Survey.			Rural and Suburban.				Town Section Survey.				Native Land Court Survey.				Gold-Mining Survey.				Roads, Railways, and Water-races.			Detention by Native Opposition or other Causes.	Other Work.	Total Cost of Surveyor and Party from 1st July, 1885, to 30th June, 1886.	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 Secs. or Divs.	Cost per Acre.	Total Cost.	Acres.	No. of Sections.	Cost per Acre.	Total Cost.	Miles.	Cost per Mile.	Total Cost.	Cost.	Cost.	£ s. d.								
A. P. Rawson. Wai-iti and Motueka ..	..	d.	£ s. d.	..	d.	£ s. d.	..	d.	£ s. d.	1,905	17	53	421 0 9	..	..	..	£ s. d.	..	..	d.	£ s. d.	..	..	..	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	Bush country. Cadet assisting.						
J. H. Jennings. Maruia, Lyell, Oheka, Orikaka, Inangahua ..	..	..	..	..	..	..	..	..	..	1,140	30	86·3	410 0 3	..	..	..	..	..	..	..	..	159	9	15/11	126 7 0	4½10 0 0	45 0 0	..	291 13 9	749 14 6	6	Broken bush country.							
J. Snodgrass. Mokihinui, Ngakawa, Maruia ..	..	..	..	4,220	1·5	26 7 6	..	..	..	742	88	65	203 5 0	122	302	22/6	339 15 0	..	..	..	..	298	16	16/6	245 17 0	7 10 0 0	70 0 0	..	116 0 0	925 4 6	6	Broken bush country. Cadet assisting.							
J. A. Montgomerie. Reefton, Inangahua ..	..	..	..	..	..	..	..	..	..	669	10	42	113 11 11	26	310	14/	216 13 10	..	..	..	..	408	24	13/1	268 2 11	6½10 0 0	69 2 6	..	236 15 6	998 15 2	2	Broken timbered country.							
R. T. Sadd. Tadmor, Wangapeka, Motueka ..	..	..	..	..	..	..	..	..	..	*1,958	38	38	312 9 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Heavily timbered.							
G. H. Bullard. Inangahua, Maruia ..	..	..	..	..	..	..	..	..	..	5,352	62	19·4	432 11 2	..	..	..	..	..	..	..	..	120	5	16/7	99 7 10	14½8 0 0	116 9 11	..	252 4 4	801 5 5	5	6,370 acres Maruia. Field-work completed.							
F. S. Smith and F. A. Thompson. Dillon, Percival, Lyndon, Tekoa ..	..	..	..	74,856	0·8	103 19 4	12,764	1·5	79 15 6	28,973	28	11·7	1,339 18 10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,402 17 4	1,708 18 3	3	120,000 acres trigonometrical and topographical and 30,000 acres sectional field-work completed.						
C. Lewis. Aorere, Pakawau ..	..	..	..	56,000	1·6	334 9 2	..	..	..	2,301	29	33·8	324 17 6	..	..	..	..	..	..	..	..	32	2	17/4·5	27 16 4	..	..	..	..	80 5 0	723 4 0	0	Rough country.						
W. D. B. Murray. Wangamoa, French Pass ..	..	..	..	..	..	..	..	..	..	*372	3	36	55 16 0	..	..	..	..	7,362	2	3·8	116 16 0	..	..	..	..	10 9 0 0	90 0 0	..	631 5 2	928 2 5	5	45,000 acres trigonometrical and topographical survey. Field-work completed.							
W. C. Wright. Tainui ..	..	..	..	..	..	..	..	..	..	1,193	11	18	90 1 3	..	..	..	..	..	..	..	..	193	13	11/10	114 2 6	..	..	..	..	92 14 6	206 17 0	6	Very broken country.						
F. E. Greenfield. Howard, Motupiko ..	..	..	..	..	..	..	..	..	..	67	8	60	16 17 11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	341 5 2	358 3 1	0	About 10,000 acres in hand of re-survey.						
H. Tarrant. Waimea ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..						
Authorized surveyors ..	..	..	..	..	..	..	..	..	..	9,140	103	17	647 3 6	..	..	..	..	..	..	..	..	61	6	21/3	64 18 0	..	..	..	..	..	..	..	..						
Means and totals ..	..	..	..	135,076	0·8	464 16 0	12,764	1·5	79 15 6	54,812	392	19·1	4,367 7 1	348	612	18/2	556 8 10	7,362	2	3·8	116 16 0	1,271	75	14/10·7	946 11 7	65½9 3 7	599 0 5	..	4,463 15 3	9,969 9 9	9								
* Mineral leases.																										Less sectional and mining survey fees ..			2,487 5 6										
																										Less Native land surveys ..			116 16 0										
																										Less surveys for other departments ..			109 16 9										
																																							2,713 18 3
																																							£7,255 11 6

PROVINCIAL DISTRICT OF WESTLAND.

W. G. Murray. Tekinga, Turiwhate, Waimea, Kanieri, Arawata, Cascade, Macfarlane, Jackson	79,875	0·93	312 15 0	116,910	1·42	693 5 0	40,640	1·92	325 5 6	3,207	15	10½	143 17 2	..	..	..	..	..	..	..	144	6	6/9½	49 0 0	..	..	..	..	71 15 0	*1,595 17 8	8	Bush country within a goldfield. Cadet of one year's standing assisting for five months.
J. N. Smyth. Waiho, Wataroa, Okarito, Mahinapua	..	..	..	..	..	..	21,760	0·44	40 0 0	13,052	89	12½	669 14 0	..	..	..	..	..	..	..	..	..	..	..	35 3 18 0	136 10 0	..	..	30 11 6	876 15 6	6	Heavy bush country, in a very expensive district. Cadet assisting during ten months.
Means and totals	79,875	0·93	312 15 0	116,910	1·42	693 5 0	62,400	1·4	365 5 6	16,259	104	12	813 11 2	..	..	..	..	..	..	..	144	..	6/9½	49 0 0	35 3 18 0	136 10 0	..	..	102 6 6	2,472 13 2	2	
* This sum of £1,595 17s. 8d. includes an expenditure of £138 in connection with the erection of trigonometrical stations ahead of triangulated area, and £120 of Mr. Roberts's salary for assisting at calculations, &c.																										Less refund mining surveys, &c.			..	..	..	60 16 6
																																£2,411 6 8

PROVINCIAL DISTRICT OF CANTERBURY.

J. S. Welch ..	(Akaroa ..)	..	..	..	..	..	..	..	..	1,568	40	5/3	746 1 11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 0 0	755 1 11	1	{ Scattered bush sections. Three days' work for Marine Department, re-marking and surveying portion of Reserve 2166.
James Hay. Akaroa ..	(Selwyn ..)	..	..	..	..	..	..	..	..	*1,228	29	1	725 1 3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	725 1 3	3	
T. N. Brodric ..	(Selwyn ..)	..	..	..	..	..	101,526	1·26	536 13 6	2,186	22	3/	268 6 10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	805 0 4	4	Sections very scattered.
L. O. Mathias. Ashburton, Selwyn, Ashley, and Waimate ..	(Ashley ..)	..	..	..	..	..	..	..	..	*2,611	33	1	604 7 3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	23 8 0	627 15 3	3	{ Subdivision of Sections 111 and 114, Glenavy, into 18 lots, 209 acres, eight days, £17 8s. 3m. 20ch. road traverse, Russell's Flat, &c. Survey of Education Reserve 1578. The survey of the gold-mining leases includes the laying-out of a portion of the boundary-line between Canterbury and Westland. £107 10s. will be refunded.
G. H. M. McClure ..	(Selwyn ..)	..	..	..	..	..	..	..	..	1,172	25	2/5	317 5 5	..	..	..	..	..	..	..	..	94	6	..	140 8 0	..	..	..	..	..	673 18 1	1	
H. C. White ..	(Westland ..)	..	..	..	..	..	..	..	..	*1,038	24	..	140 8 0	..	..	..	..	..	..	..	..	16½	1	..	..	..	..	..	..	..	..	..	{ Finishing topographical plans in pencil. Survey extension of Quarantine Reserve.
Christchurch Office: Various Counties ..	..	..	..	..	..	..	..	..	..	7,972	104	1/5½	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	28 16 9	9	
Means and totals ..	..	..	..	18,200	1	75 16 8	101,526	1·26	536 13 6	2,198	53	/3	27 9 6	..	..	..	..	..	..	..	..	110½	7	..	140 8 0	..	..	..	..	34 18 0	3,645 13 1	1	

* Re-survey.

APPENDICES.

APPENDIX No. 1.

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

AUCKLAND.

I MAY preface my remarks with the statement that there are no features of particular interest which have characterized the operations of the Survey Department in this Province during the past year. The work has gone on steadily and efficiently without hitch. The reduction of the staff just previously to the date of last report has naturally resulted in a smaller output of work; but, on the whole, the wants of the public and other departments have been fairly met.

Major Triangulation.—We do not this year show nearly so large an amount of work; one reason being that a considerable portion of Mr. Cussen's operations in the extreme south of the King Country are incomplete, and although a considerable amount of country has been covered by this process the results will not appear till next year. Mr Cussen reports having 600 square miles of country covered by major sides, but in which some few angles are yet required to complete the series; when this has been done a junction will have been effected with the work of the Wellington Province in the neighborhood of Ruapehu and Waimarino. I beg to append an interesting report by that gentleman on the hydrographical survey he has made of Lake Taupo, and also remarks on Ruapehu Mountain, which have an especial interest at this time, in connection with the recent eruption at Tarawera Mountain. The character of his work is as usual very good. In twenty Ray Trace closures the mean ratio of difference per mile is 0.52 links, whilst the mean difference in bearing is 10". Mr. Jas. Baber has completed his major triangulation between the Waiapu River and the East Cape, during the course of which he had serious trouble to contend against in the opposition offered by the Maoris, but he has satisfactorily completed it, and effected a very good closure on to the Opotiki north-east coastal series of triangles.

Minor Triangulation.—Under this heading an area of 139,500 acres has been completed. It consists of small triangulations carried on from time to time to connect other surveys in progress.

Topographical and Trigonometrical Surveys.—Mr. Cussen's past year's work appears under this head, although the average length of his sides are much longer than the minor work, properly so called. The one and a third million acres returned by him covers the country south-west of Lake Taupo. It has been undertaken in the interest of the Native Land Court surveys, which are shortly to follow, to give titles to the Maori owners. Mr. Baber's East Coast surveys also appear here, as they fulfil the conditions of a topographical survey.

Rural and Suburban Section Surveys.—The area of sections prepared for settlement, or for the issue of Crown titles this year, is much less than for several previous years, the causes being the smaller number of surveyors at work, and the decreased demand for land. Included in the 51,759 acres in the return are 4703 acres surveyed in order that Crown grants might issue; and 10,388 acres, the boundaries of which had never been marked on the ground, though the lands had been sold and granted many years ago. The cost of surveying these two areas, scattered as they are over the whole province, was £2,411 10s. 0d., which sum represents an old Provincial liability, and is not fairly chargeable to the current expenses of the Survey Department as at present constituted. The price per acre for the whole area surveyed amounts to very nearly three shillings, showing a gradual increase for the past four years. A slight consideration of the conditions surrounding the applications as at present made, will convince anyone that such an increase of cost is quite natural, and follows from the scattered and isolated nature of the lands applied for, encumbered as they generally are by surveys, the ground marks of which have generally disappeared, this, together with the fact of our not having had any considerable area to sub-divide into contiguous sections, fully explains the reason, and points to what will probably be the cost in the future of section surveys of the same character. Although the department with its present force is not able to keep pace with the applications for land so well as could be wished in the interests of settlement it is more forward than it has been for some years past; but this is owing in a great measure to the decreased demand for Government lands, whilst so much private property is in the market, frequently offered on terms lower than the land laws allow of. One special settlement has been surveyed during the year at the cost of the applicants, and another is just about finished, the survey of which is being undertaken for the Government by contract. The united areas amount to about 6,000 acres. Under the Homestead Clauses of the Act, 42 sections, containing 8,542 acres, have been laid out by surveyors paid by fees deposited by the selectors.

Town Section Survey.—103 acres have been divided into 146 sections, principally in the towns of Rotorua, Kohukohu, and Uawa.

Native Land Court Surveys.—The area of 30,267 acres (principally in carrying out orders of the Court) has been surveyed by the staff, and twenty-eight other blocks, containing 18,761 acres, have been surveyed by authorised surveyors, the cost being advanced by Government. In addition, the Maori owners have had surveyed, at their own cost, 101 blocks containing 127,431 acres, most of which are

sub-divisions of old blocks, to carry out orders of Court. Some extensive surveys are now going on in the Taupo country to prepare lands for adjudication on by the Court, otherwise there is a general cessation of surveys of this character all over the Province, due in a great measure to the difficulty the Natives find in procuring the necessary funds to pay for their surveys.

Native Land Purchase Surveys.—Only 8,877 acres, in seven blocks, have been surveyed during the past year for the acquirement of title by the Crown.

Roads, Railways, and Water-races.—The survey staff completed the survey of 247½ miles of road and railway (twenty-five miles), nearly all of which was in exercise of the rights reserved under the different Acts. The twenty-five miles of railway surveyed was the first portion of the Main Trunk Line southwards from Te Awamutu. The demands on the services of the staff for other and more pressing surveys prevents us from exercising the road rights in a large number of cases, with the result that the rights are lapsing from the effluxion of time, causing serious trouble to those who have purchased native lands, and who now find that there is no way to, or from, them, without purchasing it.

Other Work.—Under this heading appears, as usual, the cost of field inspection, and sundry duties performed by the survey officers, which do not come under the tabular headings.

Standard Surveys of Towns.—The only work performed of this nature has been an extension of the City of Auckland survey into the suburbs, performed by Mr. Williams during spare time, when not inspecting, and which was rendered necessary by the spreading of subdivisions of property prior to bringing it under the Land Transfer Act. Mr. Williams reports the continued disregard of the stone standards, which have been placed at great cost by workmen connected with the local bodies, gas company, &c., and frequently we have to replace stones at great cost and difficulty. It has been pointed out in previous reports that to render the standard survey of the benefit that it might be, it is essential to commence a street alignment survey, for, until this is done, the Government are running a continual and increasing risk in granting titles under the Land Transfer Act in places where the buildings are rapidly increasing.

Land Transfer Surveys.—Mr. Foster reports that he has passed 208 plans containing 2,095 allotments, shewing an area of 32,880 acres, and Mr. Buscke, at the Gisborne office, 35 plans with an area of 16,580 acres. We have on hand, and referred back to the surveyors, 73 plans, a number far greater than should be, and which is the cause of constant enquiry by those interested in them. The examining staff of draughtsmen is not sufficient to keep pace with the influx of plans, nearly all of which require the most minute and searching enquiry, and this is made most difficult and tedious by the general absence of the original maps of the city and suburbs of Auckland, where most of the surveys under the Act lie. If the street alignment survey as proposed were once carried out, the difficulty, as far as the city is concerned, would be very much lessened, both as regards the department and the interests of the public. Mr. Williams speaks in terms of praise of the general accuracy, as surveys, of those cases which have been tested in the field. It is hoped that the new regulations—as soon as they are in the hands of the profession—will somewhat facilitate matters with respect to these surveys.

Field Inspection.—Mr. Williams is kept continuously at this work, the Land Transfer Surveys alone occupying quite half his time. He has made a start at a systematic inspection of the staff-surveyor's work, but the more pressing needs of the Land Transfer surveys caused him to interrupt it. He will, however, continue this work shortly. He has during the past year computed a new set of geodetical tables, derived from the latest data as especially applicable to New Zealand, which will shortly be submitted to your approval. Mr. Barnard, in addition to his duties of supervising the whole of the surveys for the Government and those made under the different Acts within Cook county, keeps an efficient and constant check on the surveys in the field, about sixty per cent. being actually so tested, and the results show that, as a rule, the work is faithfully done. The large extent of country he has to travel over, and the difficulties of communication, make the field inspection in his district particularly onerous.

Examination of Surveyors.—Mr. Inspector Williams held an examination for young men who wished to obtain the departmental diploma in the beginning of the year, when twelve candidates presented themselves, six of whom passed. It is found that the unsuccessful ones usually fail in a clear understanding of the regulations for surveys and the legitimate deductions to be drawn therefrom. Faulty draughtsmanship is also a frequent cause of failure.

Office Work.—The returns, supplied by the Chief Draughtsman, show in a concise form such matters of the daily routine of office work, as are susceptible of being entered in tabular forms; but the bulk of the work of the indoor staff is, of course, incapable of being noticed in these rigid forms. The results of the year's work of the Gisborne staff, under Mr. Featon's charge, are, of course, embodied therein. I regret to say that there are very considerable arrears of work in both offices, due to the reduction of the staff last year and to the complete stoppage of all survey work to aid the Property Tax Department in completing maps and schedules for their triennial assessment, the effects of which we are still feeling. Mr. Kensington informs me that we now have 1,543 ten-chain block sheets prepared, on which all survey work is entered as received; and in view of the estate surveys which will shortly come in, in the so-called King Country, this number will be greatly augmented during the coming year. Some progress has been made in the preparation of secondary record maps—a work which has been too long delayed. I am glad to report that on my late visit to Gisborne I found this branch of the record system to be well up to date. The increase of maps of all kinds which are yearly received, again requires me to notice the insufficiency of the safe accommodation. The map curator is put to all kinds of shifts to find room for the maps under his charge, whilst the letter records are in constant danger from being left in a wooden building, subject at any time to be burnt down. It is with great satisfaction that I am able to report that there are no arrears of Certificates or Crown grants, excepting those held back for want of surveys, and what the number of these latter may be it is impossible to estimate, for I constantly receive requisitions from the Commissioner of Crown Lands for grants for which people have never applied until now, though often entitled to them many years since. No doubt this is due to the destruction of the Provincial records by fire in 1874. During the past year only twenty-two lithographs have been published, though many more might advantageously be drawn. Some progress has been made with a new series of county maps to replace those made in 1877, which had become so worn as to be almost useless, and the ensuing

year will probably see the whole Province redrawn to the 80-chain scale. Sheet No. 4 of the Province, drawn by Mr. Pollen to the four-mile scale, has been completed and transmitted to you for photo-lithographing. When published it will prove the most interesting of them all, as it shows all the new surveys in the King country down to the 39th parallel. A start will shortly be made with the remaining sheet, embracing Cook county and part of the Bay of Plenty. The requirements of the public, other departments, and the local bodies have been fairly met, but, owing to the reduction of the staff, not nearly so expeditiously as I could wish. Mr. J. K. Johnston, the accountant, has checked and passed 1,204 vouchers, for a sum of £35,979 3s. 9d., representing expenditure on surveys, roads to open Crown lands, homestead surveys, and forest department, and has, with the assistance of a Maori boy, attended to the record of the correspondence.

Work for Ensuing Season.—The survey staff have a considerable amount of work completed in the field, the plans of which will come under next year's returns, and they also have instructions for some 27,000 acres of section survey, which will also be finished during the year. In addition to which there is an area of about 25,000 acres of land, for which instructions have not yet been issued. The triangulation of the King Country, in the southern portion, will shortly be completed, leaving then only the West Coast series of smaller triangles to finish it all up. Attention will be given to the very large mileage of roads which still requires to be defined on the ground. Doubtless the surveys to obtain titles in the King country will progress during the ensuing year, a start having already been made; and if this large area is to be submitted to the same slow process of minute division characteristic of the larger part of the Province—already dealt with by the Land Court prior to its alienation into European hands—there will be a field open to the profession, which will occupy them for many years to come, and which will necessitate the keeping up of a staff of draughtsmen in the office, which otherwise—in the natural course of events—might, at no distant date, be reduced. I hope to obtain your consent to the employment of one of the senior surveyors on the street alignment survey so urgently required in this city, as I feel sure that its cost will be saved over and over again within the next few years. During the past year one of the cadets has passed on to the grade of assistant surveyor and is now in the field, and I much regret to report the loss, by death, of a most promising young Maori lad, who held the position of record clerk and translator in the office.

S. PERCY SMITH, Assistant Surveyor-General.

TARANAKI.

THROUGH the retirement of four surveyors in the beginning of the year our out-turn of work has been necessarily reduced. The decrease in the strength of the field staff, which at the time affected the department generally, would, in any case, have shortly taken place here, owing to the completion of the large extent of surveys that had of late years so fully occupied a large staff. Thus, fortunately, settlement has not been retarded, but we have been able with the reduced staff to keep well ahead of the sales.

Triangulation.—We return this year 320,000 acres, with a further 130,000 in hand. This extends from the confiscation line to the Wanganui River, from Wangamomona to Ohura, and is formed of triangles with about eight mile sides, with about three stations to each survey district. Minor triangulation can follow in the future as required by "breaking down," care having been taken by Mr. Skeet in the selection of the stations with this in view. There is no necessity at the present time for incurring such an expenditure as would be required for this work, as in this locality it is not likely to be needed for many years to come. It may occasionally be necessary to "break down" for Native Land Court block purposes, but the expense would be trivial compared with a complete network of small triangles in a wooded country such as it is.

Rural and Suburban.—Of this class we have completed 18,718 acres, with 8,000 more in hand well forward, the average cost per acre has been 31.6d., and had it not been for one block which ran up to 5s., the rate would have been considerably lower. The whole of the work for this year, with the exception of 150 acres of suburban land, has been in dense forest, and in some parts the roads have given considerable trouble. Great credit is due to the surveyors for the patience and skill that have been exercised in the selection of the best lines.

Town Section.—A small town has been laid off at the Mokau Heads. Although in the Auckland District, the work was executed by the staff here, as it was more convenient and economical than sending a surveyor from Auckland.

Land Court Surveys.—£294 3s. 5d. appears in the schedule under this head. No area could be assigned to it as the expenditure related to but a comparatively very small portion of the boundary of the Aotea block.

Back Pegging Old Work.—During the year we have cleared off 17,931 acres of this work at a cost of 8.9d. an acre against 8d. last year. Nearly the whole of the sections where we are now working, have stream boundaries instead of the straight lines as in the previous year's work; this has a tendency to increase the cost, and the 38,000 acres yet to be dealt with are similarly bounded, and smaller areas, averaging about 80 acres.

Roads and Railways.—Nine and a half miles of road have been surveyed, and thirteen and a half of railway line for land plans at a cost of £21 8s. per mile.

Office Work.—In the early part of the year, fully a month's time of the whole office staff was engaged on Property-tax work, correcting, revising, and making additional maps of fourteen road and town districts. Plans and descriptions have been drawn for 179 grants representing 1183 plans of sections, and an area of 25,637a. 2r. 22p., sixty-nine Crown leases representing 9,067a. 0r. 19p., and 208 plans have been treated in the same manner on ordinary certificates of title; 440 diagrams have been drawn, and 21 surveyor's maps, under the Land Transfer Act, checked and passed. Besides this, 192 plans have been put on native leases, and there has been the general routine of office work, checking surveyor's maps, and recording them on the maps of various scales, &c.

Work in Hand.—The work in hand (incomplete) is 130,000 acres of triangulation, 8,000 acres of rural section work in Hawera and Opaku Districts, 38,000 acres back-pegging, and the standard survey of the town of New Plymouth, this latter is not worked continuously, but during winter months. Up to the present time, 30 concrete blocks which are provided by the Borough Council, have been fixed, and the positions fixed for the remaining 45 which are now rapidly being placed in position. The total cost to date is £252 4s. 10d., and the bulk of the work is done.

Proposed Future Operations.—The new surveys that I would recommend to be taken in hand are 1st. 15,000 acres in the Huiroa District, opening up the Waitara, Taramokau, and Manga Moahu Valleys, in which there are some thousands of acres of open and scrub land. I have little doubt but that settlement would rapidly spread in this direction, as the land is good, and the block is only ten miles from Inglewood Railway Station by the Junction Road, which is now in course of formation. A village settlement will be required also, as it is likely in the future, to be the centre of a considerable population. 2nd. A further extension of the settlement survey inland of Whareroa in the Hawera District, and also at the back of Mokoia, if on inspection it is found to be suitable. 3rd. Should the small grazing runs inland of Patea be leased, additional work would be required in this direction to meet requirements.

THOMAS HUMPHRIES, Chief Surveyor.

HAWKE'S BAY.

General Remarks.—Owing to the reductions in the staff, and to the various delays that have prevented the expenditure of the votes to open up Crown lands, the area surveyed this season shews a considerable falling off from previous years. There is a corresponding reduction in the total cost of the work completed, the expense of the field staff being less by £1,047 15s. 7d. The surveyors employed in the field have only been able to keep abreast of the demands for settlement surveys, consequently the other classes of work, such as triangulation, Roads and Native Land Court surveys, could not be worked off, and the arrears remain in much about the same position as they were at the end of last year. I am pleased to report that the triangulation and section survey, executed by Mr. Tone, and his work generally has given me great satisfaction.

Triangulation.—Mr. Tone has extended a network of triangles over the unsurveyed Crown lands, in the Tautane Block, Weber Survey District. The other small triangulations completed, 41,000 acres by Mr. Hallett, and 15,000 acres by Mr. Rich, were required to control section or road surveys.

Settlement Surveys.—The area laid off is 14,641 acres of forest land, cost per acre, 3s. 8d., average size of sections, 176 acres. In the Tautane Block the side lines, as well as the back lines of the sections of pastoral land, have been traversed over ground suitable for fencing. The character of the formation is such, that to have run the boundaries on right lines would have entailed considerable expenses on the selectors, not alone in the cost of fencing, but it would also have necessitated the exchange of land between adjoining holders. When making the valuations, on which the upset or reserved prices were based, the cost of the survey of the side lines was added to the price of the sections. A contract has been let for the survey of 5,000 acres, for the Tautane Special Settlement Association. Two village settlements have been laid out, one at Woodville, the other at Matamau.

Native Land Court Surveys.—Some 39,748 acres have been surveyed at the expense of the Native owners.

Roads.—The falling off from past years upon the mileage laid out is very marked, being nineteen miles, against an average, for five years, of eighty-three miles. The cost of the road surveys shews little variation, it stands this season at £9 13s. 6d. a mile.

Other Work.—Under this heading is included a variety of work, the chief items are £168 15s., railway land surveys, charged to Public Works Department, and £186 18s. for the traverse of the rabbit-proof fence line in the Tautane Block.

Land Transfer Surveys.—Mr. Dennon, the chief draughtsman, has examined and recorded eighty-six plans, covering an area of 45,375 acres, divided into 1,206 allotments. There is a steady increase in the business of this branch of the department. The cost for the year is £333 16s. 7d.

Office.—The value of the work done in the office for other branches of the service, and for local bodies is £305 16s. 5d. The plans put on titles number 383. Lithographs prepared for printing, six. The examination and recording of plans is kept up to date, as nearly as circumstances will allow.

Proposed Operations for 1886-7.—The area of work on hand under the different headings is as follows:—Minor triangulation 340,000 acres; settlement surveys, including Educational Reserves, 68,909 acres; roads, 130 miles; Native Land Court surveys, 579,807 acres. The officers of the permanent staff, at present stationed in the district, will not complete the surveys of lands required for immediate settlement. Unless further assistance is provided the survey of 8,000 acres in the Ruataniwha District must be let by contract. The triangulation and road surveys may stand over for another season without any serious inconvenience. It is never possible to gauge the demand for Native Land Courts surveys, for, as stated in previous reports, so much depends upon whether the owners are pressing to pass their lands through the courts, and, having obtained orders for titles or sub-division of blocks, whether they can find the money to pay the surveyors. However, I anticipate that 200,000 acres will be surveyed during the coming year.

HORACE BAKER, Chief Surveyor.

WELLINGTON.

To meet the increased activity of the Land Purchase and Native Land Court Departments the number of field officers was augmented; and as a better understanding had been arrived at with the Maoris of the Upper Wanganui and Taupo country, five officers were detailed to extend trigonometrical and topographical surveys over the Waimarino block and contiguous lands. The work has been energetically

and successfully prosecuted, notwithstanding the remoteness and inaccessibility of that part of the country. It is expected that within four months' time complete plans of over half a million acres will be ready for the Native Land Court, sketch plans of that area have already been prepared, and have served for investigation of titles.

The settlement surveys were chiefly extended in the Otairi (Clifton Block), Otamakapua (Pemberton Block), Mangatainoka and North Tiraumea blocks, Wainuioru and Kaiwhata districts, and on the hills near Featherston and Cross' Creek in South-west Wairarapa district.

This office also prepared specifications for, and supervised, contract surveys comprising 81,000 acres of land selected by ten associations under the Special Settlement Regulations.

The staff surveys have been carried out in accordance with requirements, as have, also, the majority of the contracts. Much expense and time have been devoted to the inspection of the latter.

The only town or village surveys were those of Pahiatua, Kopuaranga, and Cross' Creek, and the town and suburbs laid off by the Pahiatua-Puketoi Association in their Tiraumea block.

In the Upper Waitotara district surveys and complete plans were made of several large blocks of land for the Native Land Court, besides the extensive provisional plans of the Murimotu and Upper Wanganui claims, including Waimarino already mentioned, and the northern sub-divisions of Mangatainoka block.

Railway and road surveys were carried out as required by the Public Works Department and local bodies, also, in cases requiring legislation, but much of the latter class of work had to be deferred in consequence of other pressing demands upon staff-officers' time.

As indicating the extent to which assistance has been given to other departments and local bodies, I may mention that the cost of such services amounted to £3,240, which may be taken as representing the work of ten officers throughout the whole year.

To meet the increase in the Land Transfer Branch business another draughtsman was engaged temporarily, and he has given efficient assistance in inspecting the work of the licensed surveyors at and adjacent to the city. For some time to come his attention must be devoted to indoor duties.

From what has been stated it will be understood that the duties of this office have increased, the number of recorded letters alone amounts to 4,449. The clerks cheerfully worked much in overtime to keep down arrears.

I have much satisfaction in testifying to the zeal and ability bestowed by the staff-officers, one and all, on their particular duties.

The operations for the year 1886-7 might advantageously be directed as follows—(1) the extension of major and minor triangulation in the north-eastern portion of the Wellington district, to a junction with similar surveys by the Auckland staff, and likewise over the country served by the proposed North Island Trunk Railway, Marton-Te Awamutu; this class of work, combined with topographical survey, would prove invaluable in the preparation of plans for the Native Land Court, and for furnishing data to enable the Government to deal with the opening up by roads of the whole area of unoccupied lands of the interior, and the settlement, occupation, and improvement of the same on a general and comprehensive scheme. (2) Settlement surveys should be prosecuted in Otairi, Otamakapua, Waitapu, Upper Oroua and Pohangina, as well as in the Forty Mile Bush, Puketoi, and South Wairarapa districts.

The staff are already at work in most of the localities enumerated; and it only requires that ample and prompt advances be made for road-works to ensure a substantial expansion of settlement.

The lands specified are of such good quality, and the natural advantages and attractions of the country are such as to warrant the expenditure of the necessary money to make the occupation of the lands possible.

J. W. A. MARCHANT, Chief Surveyor.

NELSON.

Standard Survey.—It has been found necessary to extend a line of standard bearings through the lower gorges of the Buller Valley. This work has been completed by Mr. Jennings, who has erected and observed at six stations in a distance of 19 miles from Trig. E, closing on the Buller Circuit Initial Station with a difference in bearing of 46".

Minor Triangulation without Topography.—An area of 135,076 acres has been executed at a cost of 1½d. per acre; 60,000 acres of this area has been extension for sectional work at Mokihinui and West Wanganui by Messrs. Snodgrass and Lewis, and 74,856 acres, covering old surveys by Messrs. Smith and Thompson in the Amuri.

Trigonometrical and Topographical.—Of this class of survey 12,764 acres have been completed at a cost of 1½d. per acre by Messrs. Smith and Thompson, in the Percival, Lyndon, Dillon and Tekoa Survey Districts. The field work of 165,000 acres has been completed, but not mapped, by Messrs. Smith, Thompson and Murray, these officers working in the back country during the summer season and plotting during the winter months. Mr. Murray has closed his triangulation on the Marlborough district on side Tawhitinui Geo. Stn. on island, and Reference Geo. Stn. in Pelorous Sound, with a difference of 8" in bearing, after correction for convergence, and an equal length in distance. Mr. Snodgrass extended triangulation to connect mining surveys up the Mokihinui, and made two attempts to obtain a reconnaissance survey of the upper portion of the valley with a view to obtaining a line of road from the Wangapeka saddle, but was driven back by bad weather on each occasion. In the Amuri triangulation by Messrs. Smith and Thompson, in forty triangles the mean error in summation was 6"1, the largest 18", the least 0". In fourteen polygons the mean error was 03"34, the largest 10"3, and the least 0".

Sectional Surveys.—Three hundred and ninety-two sections have been surveyed by the staff and authorised surveyors, containing 54,812 acres at an average cost of 1s. 7d. per acre. The survey of some large areas in the Amuri district has contributed to establish a low average cost, while the remainder, being for the chief part separated by long distances in a rough and timbered district, have ruled at a

much higher rate. Surveys of two Native Land Blocks have been made in the Croixelles, amounting to 7,362 acres, at a cost of 3'8d. per acre, making with the former a total of 62,174 acres, averaging 1s. 5d. per acre. Owing to a large area of land being closed pending the negotiation for the construction of the Midland Railway, the applications for land during the past year have been comparatively few. The total area unsurveyed, including current applications, is now reduced to 223 sections, containing 56,336 acres. Of these a few old applications still requiring survey, remain in the Amuri district and the bays about the French Pass and Pelorous Sound. In the above area is also included a block of about 5,000 acres of applications made on the West Coast mining districts, the granting of which is held in suspense by the Waste Lands Board. Mr. Bullard has been engaged about nine months in survey of 10,000 acres into sections on the Maruia Block, and has completed the field work of 6,370 acres during the past season. This work will be plotted during the winter, the party being disbanded during the winter which has set in unusually severely in the high, back country districts. Mr. F. E. Greenfield has been employed since the 1st of January in revision survey of about 10,500 acres of freehold and leasehold sections near Lake Rototiti, the former of which has been in dispute for a number of years, and a re-survey of the latter is required on which to issue certificates on completion of purchase. About fifty-five and a half miles of traverse have been completed in the field, and, as the country is now covered with snow, he will plot this work during the winter. Mr. J. Snodgrass has in hand the sectionizing of land held under business licenses at the Waimangaroa, and suburban land adjoining. Visits of inspection have been made to the West Coast districts and the several survey camps, and the closures of work maintain a fair standard of efficiency.

Gold-mining and Mineral Lease Surveys.—There has been an increase during the year in applications for mining leases, sixty-nine of which and six mineral have been surveyed, eight mining and four mineral applications are in hand. The auriferous reefs in the Owen district have attracted some attention, and Mr. W. C. Wright, of the Nelson office, was instructed to proceed there and report to the Government upon the locality. His services were utilized while in the district in making twelve mining surveys, which, as the district is very rough and heavily timbered, has delayed his report—this is now completed and will be forwarded at once. The survey of some large mineral lease applications containing coal, in the district round Blackball creek, a tributary of the Grey river, near Brunnerton, has been completed during the year. Mr. C. Lewis has collected data for a map of the Para Para mineral and Collingwood gold-field district, but the publication is delayed pending some additional information.

Standard Surveys.—Mr. Montgomerie has completed standard surveys of Black's Point and Capleston townships, extending sections in the latter. At Westport similar work is required, but the District Officer has not yet been able to undertake it, owing to pressure of current work. Mr. W. D. Murray, during the winter months, besides plotting up the season's work, laid down thirteen miles of standard road survey in the Waimea district for the purposes of land transfer surveys.

Native Land Survey.—Two native blocks have been surveyed, viz., Wangarei, of 4,045 acres, and Okiwi, 3,317 acres, total 7,362 acres, at a cost of £116 16s., or 3'8d. per acre. These reserves had not previously been defined on the ground, and it was necessary to survey them, in order to lay down adjoining applications.

Road Surveys.—Mr. H. Tarrant surveyed twenty-two miles of road lines, to give access to leasehold sections not provided with roads in the old surveys, and also to open up back lands. Many of the lines are through freehold sections in which the right of taking roads has lapsed. Plans and reports have been furnished to the Chief Commissioner for the consideration of the Waste Lands Board. Mr. T. Sadd has traversed fourteen and a half miles of the Takaka new line of road for the purpose of adjusting areas of sections fronting on the old road.

Land Transfer Work.—During the year 156 certificates of title in lieu of Crown grants have been prepared; 137 plans examined and passed; forty plans plotted and registered; thirty-three tracings and compilations made; and 326 plans placed on certificates. Mr. Curtis in charge of this work has had no assistance till the last two months, and it has fallen into arrear.

Office Work.—During the year this has been gradually getting into arrear. Mr. W. C. Wright, computing draughtsman, has been employed three months on field work, and on town re-surveys, necessary for the issuing of certificates. During the last two months the temporary services of Messrs. Spreat and Mason have been obtained, and arrears are being worked up, but another draughtsman is still required. 748 plans have been placed on leases and licences, 18 block plans have been made, and 167 survey plans examined and passed. There has also been a considerable amount of office work in preparing copies of plans and specifications connected with road work. Mr. E. W. Buckeridge, cadet, has taken the field with Mr. A. P. Rawson, Mr. J. McKay, office cadet, Reefton, has gone into the field with Mr. Montgomerie, and Mr. J. Drayer has completed his apprenticeship with Mr. Snodgrass, and is at present assisting that officer in field work. Mr. J. Thompson, cadet, will take the field in the spring. Office cadets are required in the Reefton and Westport district offices, these being in the centre of the mining and mineral localities, great inconvenience is felt by miners seeking information, the officers in charge being generally in the field.

Proposed Operations, 1886-7.—Messrs. Smith and Thompson to continue triangulation, and to mark out boundaries of large leaseholds in the Amuri district, held under purchasing clauses, also surveys of main roads. Mr. Snodgrass to extend triangulation northwards from Mokihinui, and connect with the Karamea circuit. Mr. Murray to continue triangulation over the bays and sounds, surveying current applications for land. Messrs. Bullard and Greenfield to complete work in hand. Messrs. Rawson and Sadd, survey of current applications, and necessary revision of old surveys. Much work has yet to be done in traverse of main roads, not yet laid down on plans.

I much regret the occurrence of a disaster to a survey party in the Amuri district, which ended fatally to Mr. E. Paske, cadet, a promising officer, and Mr. Hugh Thompson, chainman, who died from exposure on the night of the 9th June, 1886. The party were coming in for the winter from the mountainous country round Lake Guyon, and had crossed Fowler's Pass into the valley of the Upper Clarence, when they were caught in a driving snowstorm of great severity. They arrived within a few

miles of Mr. McArthur's station, St. James', travelling with difficulty through snowdrifts, when Mr. Paske became delirious. He recovered from this, but soon after lost the use of his limbs, and although every effort was made to help him, he succumbed. Some of the party reached the station, and men went out to rescue the others. Mr. Thompson, was so exhausted that he died in the arms of one of the rescue party, on horseback. Several of the party suffered from frostbites. The weather up to the previous evening had been very fine but cold.

JOHN S. BROWNING, Chief Surveyor.

MARLBOROUGH.

Triangulation.—Of this class of work Mr. Wilson completed 467,000 acres of major, and 222,200 acres of topographical and trigonometrical survey at a cost of $\frac{1}{4}$ d. per acre for the major, and 1d. per acre for the minor. Operations in connection with the above were commenced in March, 1884, and finished in September, 1885. As reported last year, the field work was done, the computations made and checked, the mapping only being required to complete the work. This triangulation is carried over the upper part of the Wairau Valley, from the Waihopai River to the Tophouse on the boundary of the district, closing with the Motupiko triangulation in the Nelson Circuit, on lines St. Arnaud—B. and Top 1.—A¹⁸, including within its limits parts of the Onamalutu, Avon, Mount Olympus, Patriarch, Raglan and Leatham Survey Districts. The nature of the country dealt with, and the results of the closings on the Nelson Circuit have already been given in last year's report. I had purposed this season extending the triangulation up the Waihopai and the upper part of the Awatere, and arrangements were made for Mr. Wilson to resume operations; by your directions, however, Mr. Wilson had to remove to the North Island. This extension will, therefore, have to remain in abeyance for the present.

Section Survey.—Of the 3,891 acres of section survey, 3,866 are located in the back country on the Chalk Ranges at the source of the Ure River, adjoining freehold lands disposed of many years ago, the boundaries of which had never been marked on the ground. The country is open, but very rough and high, and, considering the arduous nature of the work, and the distance to pack supplies, the cost, 7d. per acre, is moderate. The remaining 25 acres in Endeavour Inlet, Queen Charlotte Sound, were surveyed for a mineral lease for the Endeavour Inlet Antimony Company.

Other Work.—Under this heading the supplementary returns shew as follows:—

Completed Works.—*Sub-Triangulation*, 7,000 acres in Whernside Survey District, open country, extension of triangulation to section work, cost $\frac{3}{4}$ d per acre. *Standard Survey* of twenty-four miles on the Wairau Plain, including mapping, &c., of sixty-six miles returned last year as finished in the field only, amounting to ninety miles, completed at a total cost of £518 19s. 1d., at the rate of £5 15s. 3d. per mile. The twenty-six closed traverses in this survey shew a mean difference of 0.76 links with the triangulation, the greatest difference being 1.4 links per mile, the difference in bearing in no case exceeding 20". These results shew the work to have been carefully done, and are creditable to Mr. Goulter, who was entrusted with the survey. In the Tua Marina and Wairau, west parts of the plain, about fifteen miles of cutting through swamp, willow, and other growth, have added considerably to the cost of this part of the work.

Uncompleted Works, consisting of Revision Survey of 4,429 acres, in 51 sections, in 27 localities, in Queen Charlotte Sound, field work completed, maps and calculations partly done. 17,600 acres of sub-triangulation in connection with the above, and about 150 acres for a village settlement near Canvas Town, in the Wakamarina Valley, in allotments of from one-half acre to ten acres now being pushed forward. Owing to the trig. stations available in Queen Charlotte Sound being mostly on high wooded peaks, difficult to "break down" from, it was found necessary to extend a ray-trace of small triangles close to the water down Tory Channel, and in several places in the main sound. These stations will be available for future work.

Office and Land Transfer Work.—In connection with the Land Transfer Branch of the Department I have to report that during the year twenty-one plans, dealing with eleven original sections, and representing ninety-eight subdivisions, have been examined, passed, and recorded. Tracings of these have been supplied to the District Land Registrar, the originals being kept in the Survey Office safe. Sixty-five certificates of title of 143 allotments, representing 130 marginal plans, have been prepared in addition to seventeen certificates in lieu of Crown grants in triplicate. Twelve applications, seventy-nine transfers, twenty-nine leases, and 113 mortgages, have been examined and passed, and two Land Transfer record maps (one town and one rural) have been constructed. Of block-sheets three have been constructed this year, and together with those previously constructed, have all been brought up to date. One Crown grant record map (rural) has also been constructed. The Office records are now in a complete and satisfactory state, excepting the record maps, which are very much in arrear, ten only having been constructed, leaving twenty-three still to be done, and it will be many years, I fear, before the majority of these can be gone on with. As I have pointed out in previous reports, all the old surveys were executed on independent magnetic meridians, at various times, and with no fixed points to control them. It will be seen, therefore, that the work of compiling these maps in the settled parts of the district can only be satisfactorily accomplished by degrees as points become established in the course of settlement and Land Transfer surveys, a process which in the more remote parts of the district will be necessarily slow. The connections made in the standard survey of the main lines of road in the Wairau Plain, and the survey of the main roads through the Kaituna and Pelorous Valleys, have given me a start in that direction by enabling me to construct the record maps of Cloudy Bay, Onamalutu, and Wakamarina districts. Three surveyor's plans, dealing with 3,891 acres, have been received and checked, and three Public Works plans of railway land, plan surveys, road exchanges, and diversions, have been examined and passed. Tracings have been made of the topographical plans, and the triangulation plans, representing Mr. A. D. Wilson's last two seasons' work, are now being traced for photolithographing. The detailed returns show the work done for other departments; it is therefore unnecessary to particularize under that head, except to mention that for nearly five months a considerable

amount of the time of the office staff was taken up in attending to the work of the Crown Lands Office during the illness of Mr. White, clerk to the Crown Lands Office.

Proposed Operations for the ensuing year.—The main operations consist of the completion of the Village Settlement at Wakamarina; a land plan survey of about three miles (Dashwood section) of the Picton and Awatere Railway: section surveys as requisitions are sent in by the Land Board, and the revision and connection to trig. stations of detached surveys in Queen Charlotte Sound. Outside of the above, the present strength of the field staff will not permit much more being done. Of late, many persons have been enquiring as to suitable localities for carrying on Fish Curing works, it may therefore be expected that surveys will be required in this direction. In the Native Department I think it likely that surveys may be wanted of some of the Native Reserves in the district, of which there are a good number, that grants may be issued to the owners. Should it be required to complete this during the year, more field assistance will be necessary.

HENRY G. CLARK, Chief Surveyor.

WESTLAND.

Major Triangulation.—Area completed, 79,875 acres, at a cost of 0·93d. per acre. The whole of this work is situated within the Jackson's Bay Circuit, and was carried out by Mr. W. G. Murray. It brings the Westland triangulation to within twelve miles of the Otago boundary, and over the greater part of that area the trig. stations have already been erected, and one more season's work will effect the connection with the Martin's Bay triangulation. Mr. Murray had to contend with great difficulties in the execution of this triangulation, and deserves praise for the way in which he overcame them. While engaged at this survey he had an opportunity of fixing the principal peaks at the head of the Dart River; Gyroë, Ark, Gates, Tiber and others, and the dividing range between Otago and Westland can now be laid down with great accuracy. Calculations of certain closures in connection with the preceding years' triangulation not having been completed at the time my last annual report was furnished to you, I shall give results now:—

1st.—Close of Hokitika Circuit and Amuri Circuit Triangulation at Hurunui Saddle.—

Station A O to station H P by Smith's triangulation (Nelson department) =188424·3 links

Station A O to station H P by Murray's triangulation (Westland department)=188400·2 links

Difference 24·10 links in 23·5 miles, equal to 1·03 links per mile.

Convergency.—Mean observed difference between Smith's and Murray's

triangulations = 17·1"

Height of Hurunui Saddle.—

Station H P by Murray's triangulation... .. = 3152·4 feet

Station H P by Smith's triangulation = 3141·0 feet

Difference 11·4 feet in 136 miles, equal to 1·0 inch per mile.

Murray's sea level datum was brought from Hokitika, distance 56 miles; and Smith's from Lyttelton via Isolated Hill Station (Waiau River), distance 81 miles. Eliminating error on these bases the true height of Hurunui saddle is 3147·8 feet or 139·8 feet higher than given on the old maps.

2nd.—Close of Altitudes Jackson's Bay Circuit and Lindis Peak Circuit Triangulation at Haast Pass.—The difference between Brodrick's (Canterbury department) and Roberts' (Westland department), triangulation is 6·2 feet. Eliminating that error in proportion to distance of the points at which the respective sea level data were obtained, the true height of Haast Pass is 1847·4 feet or 131·4 feet higher than that marked on former maps.

3rd.—Height of Arthur's Pass.—By Mr. Roberts' triangulation this is 3015·2 feet, or 22·8 feet lower than previous determination.

4th.—Verification of Heights, Okarito Circuit and Jackson's Bay Circuit.—The closures of these (Mr. Roberts' triangulation) show a difference of only 0·92 feet in a distance of 90 miles. Mean sea-level datum of the former was observed at Okarito jetty, that of the latter at Jackson's Bay landing.

Minor Triangulation.—Completed 116,910 acres at 1·42d. per acre, by Mr. W. G. Murray within the Jackson's Bay Circuit.

Topographical and Trigonometrical Surveys.—Area completed 62,400 acres at 1·4d. per acre; of these, 40,640 acres by Mr. Murray, and 21,760 acres by Mr. J. N. Smyth. The closures of the circuit traverses connected with these surveys are satisfactory, considering the heavily-timbered and broken nature of most of the ground included in them.

Length of Traverse.		Total Error.	Error per Mile.
Miles.	Chains.	Links.	Links.
2	72	5·3	1·9
1	73	4·7	2·4
4	27	1·5	0·4
3	15	8·5	2·6
3	20	7·3	2·2
5	27	12·5	2·3
2	59	7·3	2·6
6	28	6·3	1·0
7	35	23·5	3·1

Mean Error per Mile =2·1 links.

Rural and Suburban Sections.—16,259 acres at 1s. per acre. As in the preceding year, these surveys include several large Endowment Reserves, which account for the low cost per acre. The return also comprises a number of revision surveys of small sections.

Gold Mining Surveys.—144 acres at 6s. 9½d. per acre. The cost of these has been nearly covered by the survey fees received through the Warden's Court.

Road, Railway and Water Race Surveys.—Thirty-five miles at £3 18s. 0d., comprising mostly the surveys of roads and tracks already constructed.

Office Work.—As it is impossible for Westland surveyors, owing to our wet climate, to do more in the field than simply furnish traverse tabulations and correct working plans, the preparation of the block, survey district, and triangulation maps, devolves upon the office staff. Moreover, the chief draughtsman is also clerk to the Land Board, and much of his time is taken up with that work, and with attending to the public. In spite of this, I am happy to say, the year's work has been fairly well overtaken, and the arrears in block and other maps, which existed last year, have been considerably reduced.

Proposed Operations during 1886-87.—Carry the Westland triangulation across Otago boundary, and connect with Martin's Bay Circuit triangulation, and overtake the arrears in settlement surveys, and attend to current mining surveys. There is besides this a considerable amount of work in prospect in connection with the Midland Railway Syndicate, *i.e.*, the surveys of the blocks of land proposed to be set apart in payment for the construction of this railway. On the other hand, also, there will be a brisk demand for survey of the lands comprised in the applications now held in abeyance pending the lifting of the Midland Railway Reservation.

GERHARD MUELLER, Chief Surveyor.

CANTERBURY.

Minor Triangulation and Topography.—Includes about 101,526 acres done by Mr. Brodrick between the trigonometrical survey in the back Waimakariri country—commenced by Mr. C. W. Adams—and the Puketeraki range, including the Waimakariri Gorge country, which the proposed Midland Railway will traverse. The probability that surveys would have to be undertaken in connection with this line necessitated the early completion of this work, which Mr. Brodrick, therefore, pushed on energetically; but the heavy falls of snow so early in the season made it impossible for him to finish his observations from some of the higher stations, though, practically, he has so nearly completed the work that the new topography and trigonometrical stations, in the vicinity of the railway line, are now available, and a new topographical plan, on a scale of one mile to an inch, is being prepared, which will embrace all the country within fifteen miles on each side of the projected line of railway. Mr. McClure has also completed the observations of 18,200 acres of minor triangulation, being an extension of Mr. C. W. Adams' work in the Coleridge Survey District. This was a necessary preliminary to the survey of the Educational Reserve in that district, now finished; the topographical portion of the work was executed during the survey of the reserve, and the cost, therefore, debited to that survey. Mr. White's trigonometrical survey in the Hewlings and Dalzell Survey Districts—which had not been checked when I reported last year—has been recalculated by Mr. Burns in the office, the base line from which the work is calculated is in the Gladstone District, and the closures are as under:—With Mr. Mitchell's work in the Hakateramea Valley an average error of .75 links per mile; with the Otago minor triangulation in the Kurow and Gala Survey Districts—calculating through a few triangles in the Gibson Survey District executed by Mr. Grant—an average error of 1.43 links per mile: Shewing that the surveyors named have executed the work with commendable accuracy.

Sectional Surveys.—During the year just ended I have made every effort to finish the remaining surveys under the Canterbury free selection system, and to this end considerable progress has been made, but many of these sections are in outlying districts and are quite detached from other work, and, in addition to these, there are the re-surveys rendered necessary by the refusal or failure of the purchasers to pay for the excess areas found in the sections after they were surveyed, in accordance with the applications, so that it will take another season to complete all this work. The surveys of the sections purchased on Banks' Peninsula are nearly all finished, about 32 only remain to be done; these I purpose that Mr. Welch shall complete during the winter season, as well as such of the old surveys as will have to be revised, so that during the summer months his services will be available for work in other parts of the district. The very detached nature of the sectional surveys executed by Mr. Welch during the past year has rendered his work somewhat costly when submitted to the test of an acreage rate. Mr. Hay who during last summer was also engaged on the Banks' Peninsula surveys, has completed all the sectional and revision surveys required at Little River, and with the exception of three or four sections I think that the titles to all the sections in that locality—a great many of which did not accord with the holdings—can now be rectified. Mr. Hay's services will, therefore, be available for surveys in other parts of the district. Mr. Mathias has been engaged on various surveys and subdivisions of reserves throughout the district, and Mr. McClure has completed the survey of a large Educational Endowment Reserve in the Lake Coleridge district, also the survey of the mining leases at the Wilberforce, and has laid out and permanently marked on the ground a portion of the boundary line between the Canterbury and Westland Districts at Browning's Pass.

Inspection.—Press of other work has prevented the Inspector of Surveys from making any field inspections during the year, and, in fact the work of one of the surveyors—which was minor triangulation—needed no inspection; further, all the officers have been on the staff for years, and their work has been tested on so many occasions that their trustworthiness and capability are well established. Still, however, it will be as well to continue the inspections at an early date, and I will give instructions accordingly. The inspector has checked the plans of eight applicants for licenses as authorized surveyors; two have passed and four are coming up for examination in practical mensuration. He has also had charge of the inspection of roads in course of construction from grants authorized to be expended through the Road Boards. His report on the work undertaken during the year, and a general report on the roads opened up, and the area

of Crown land thus rendered available or more accessible is sent herewith. In connection with his duties as Crown Lands Ranger for the Northern part of Canterbury, he has visited nine deferred-payment settlements and reported on the holdings of 120 licensees, visited and reported on fifty-two applications for grants under the Forest Trees Planting Encouragement Acts, inspecting a very large number of plantations situate in all parts of the district, and has, besides, visited and reported on various reserves and applications within river beds for the information of the Waste Lands Board. Mr. Fussell, the officer in charge of the Timaru office, has also—in the performance of his duties as Crown Lands Ranger for the country South of the Rangitata—reported on nineteen applications under the Forest Trees Planting Encouragement Acts, which included a large number of plantations; has visited fourteen settlements in various parts of the district, and reported in the cases of 374 licensees under the Deferred-payment system whether the conditions were being complied with.

Land Transfer Surveys.—Mr. Munro, the officer-in-charge of this branch of the Survey Department, reports that the amount of work has been nearly the same as last year, though the deposited plans show a considerable increase in the number of allotments to be dealt with. The number of deposit plans received was thirty, and the allotments shown thereon 1,054; seven plans of land taken for railway purposes; twenty-four plans of road deviations under the Public Works Act have been checked. Out of the plans received in the Land Transfer Office, 199 applications to bring land under the Land Transfer Act, 454 ordinary transfers, seven mortgages, twelve leases, and nine proclamations, were sent to him to be checked or verified; 1,314 ordinary certificates of title in duplicate, and 1,409 certificates in lieu of grants with the duplicates and triplicates of same, which have been checked with the schedules and draft certificates. In all 5,495 plans have been placed on certificate of title forms under Mr. Munro's direction.

Office Work.—The plans sent in by the staff surveyors include ninety-one of sectional work, six showing sub-divisions of reserves, &c., two of mining leases, and seventy-two of miscellaneous work. Mr. Shanks reports that the areas shown on 141 plans have been checked and the plans passed, the work of 169 of the surveyor's plans has been duplicated by putting it on the District block-sheets, and 175 plans have been recorded on the Crown grant record maps, of which four new ones have been constructed, the plans recorded being placed on these, or added to those returned in former years. Seventy-nine Crown grants and 1,359 certificates of title, embracing in all 2,079 sections or sub-divisions of land containing 161,960 acres, have been prepared and delivered to the Land Transfer Department. 495 area certificates showing the acreage surveyed in the sections sold under the free selection system have been made out and sent to the Crown Lands Department, so that in cases of excess or deficiency of area the necessary adjustments may be made of the purchase money. Mr. McCardell reports that for the first three months of the year all the officers under him were engaged in preparing plans for the Property Tax Department, and thus causing the current work of the office to get so much in arrear that very little progress was made in preparing district plans, but eight plans showing sub-divisions of reserves cut up for sale have been prepared and sent to the Head Office for photo-lithographing. A tracing for photo-lithographing was also prepared for the Defence Department, which took one officer two months to prepare. A county plan of the northern portion of the Selwyn County and two district maps, which were worn out, have been re-traced for the public map-room; three new districts, showing the latest additions from topographical surveys are also in course of preparation. Four county and fifteen district maps and the counterparts for the public room have been marked up with the latest information, and a plan on a scale of one mile to an inch showing this season's topographical surveys is in a forward state.

Proposed Operations, 1886-87.—The surveys on Banks' Peninsula are so nearly completed that Mr. Hay can be removed permanently to other work, and during, say, the six summer months, Mr. Welch's services will also be available for any special work required in other parts of the district, and for the remaining half of the year he could finish the survey of a few isolated sections still to be done on the Peninsula, and re-survey such as may be really necessary to make the old and the new surveys accord, or to rectify the Crown grants of such sections in which the recent surveys have disclosed serious discrepancies. The arrears of sectional work are now reduced to 211 sections, containing 9,343 acres, but in addition to these there are a number of sections, the proprietors of which have either declined or failed to pay the excess areas found on survey, these, therefore, will require such re-survey as may be necessary to cut off the excess areas at the cost of the owners. There are also still to survey about 164 reserves, containing 11,741 acres, which have been made for gravel, river-conservation, and other purposes. Moreover, I purpose during this year to get the triangulation and topographical plans completed of all the country north of the Rakaia which has been withdrawn from sale, under the contract for the construction of the Midland Railway, and also to push on—so far as the strength of the staff at my disposal will permit—the necessary topographical survey of the runs, the licenses of which terminate in May, 1890.

JOHN H. BAKER, Chief Surveyor.

OTAGO.

When I assumed charge of the Otago office on the 17th September, 1885, there were five staff surveyors and three cadets in the field. The office assistants numbered eleven with five cadets. Mr. George McKenzie left this department (owing to reductions) on the 7th October, same year. Mr. D. M. Calder took charge of a party to survey the Kurow Blocks on the 4th of January, 1886, and has constantly been in the field since. At present there are five staff-surveyors and three cadets in the field, and ten office assistants and two cadets. There are two draughtsmen in the country offices.

Exploration Survey.—The large extent of forest country extending along the south coast, between the Waikawa and Catlins Rivers, and forming part of the Tautuku Bush, is no longer a *terra incognita*, as Mr. Strauchon has thoroughly explored it while cutting the track which connects Waikawa with Catlins River. In the survey report, published last year, is a plan and report from him on the eighteen miles of track connecting Waikawa River with Tautuku Bush, and I forward, herewith, a plan and report of the

explorations undertaken by him during the past season, and of the sixteen miles of track cut between Tautuku Bay and Catlins River. I am glad to say that Mr. Strauchon reports that the land between Tautuku and Catlins River, is, on the whole, of much better quality than the country formerly explored. You will observe that the land lately explored, although for the most part bush, is of moderate elevation, as the highest peaks are not much above 2,000 feet high. Besides the through track, connecting Waikawa with Catlins River, another track has been surveyed and cleared down the Tautuku Valley, which connects with the track leading to Wyndham. This track, Mr. Strauchon reports, is the best for travellers on horseback.

Minor Triangulation.—I have no minor triangulation proper to include in this report, but Mr. Assistant-Surveyor Langmuir observed the vertical angles, and obtained the heights of the trig. stations in Glenkenich and Waipahi Districts, comprising 150,000 acres, at an expense of £187 10s. 0d., or a little over $\frac{1}{4}$ d. per acre.

Rural Sections Surveys.—The total area laid off during the past year is 41,272 acres, at a cost of 1s. 2-16d. per acre. Each year, as the better land is taken up, inferior land is brought under survey. The cost of surveying, therefore, naturally tends to increase, but part of the increase is due to the increased attention that is now paid to grading roads carefully. This extra expense, however, is more than recouped by the lessened expenditure required in subsequently making the roads.

Town Section Surveys.—These surveys have been principally executed by Mr. District-Surveyor Strauchon, who laid off sections in the Townships of Fortrose, Waipahi and Tokanui, and by Mr. Assistant-Surveyor Langmuir, who laid off the Blue Spur Township and sections in Clyde. The total number of allotments is 268, comprising 315 acres at a cost of £252 1s. 4d., or 18s. 9½d. per allotment.

Port Chalmers Standard Survey.—Referring to last year's report, I have to remark that the nine sheets referred to have been lately returned to this office by the Mayor of Port Chalmers, and the grades for the permanent levels have been inked in and the maps completed.

Mining Surveys.—Thirty-nine sections (containing 432 acres) have been laid off this year, as against thirty sections (containing 335 acres) last year. The cost per acre this year is greater than last, being 15s. 6d. per acre, as against 8s. 3d.

Roads.—Besides the ordinary roads laid off in the course of settlement survey, there have been fifty-one and three-quarters miles surveyed, at a cost of £343 13s. 5d., or at the rate of £6 12s. 10d. per mile. The greater part of these roads are in Mr. Strauchon's district. Mr. Calder returns two miles of roads. These are outside the blocks lately surveyed by him, but necessary to give access to the land. All the roads laid out by Mr. Calder were approved by the County Engineer, before being pegged on the ground.

Other Work.—The work done under this head by the field staff includes, amongst other things, report and plan of proposed Crofter block at Waikawa; plan of Munro's gully for Warden at Lawrence; running boundary between the Counties of Lake and Vincent, from Mount Barker to Mount Pisa; fixing the position of Criffel diggings, with levels for water-races to command the same.

Survey Inspections.—During the nine and a-half months I have been in charge of this district I have only made one field check, viz., Block X. Wyndham District, surveyed by Mr. T. Miller for the Otago School Commissioners. Besides this, I have visited Mr. Strauchon, at the Nuggets; Mr. Langmuir twice, viz., at Dusky Hill and Clyde; Mr. Wilmot and Mr. Adair at Queenstown, when I inspected roads to Skipper's Creek, and also at the head of the Lake. I also visited Mr. Calder at Kurow, and went over all the proposed road lines with him and Mr. Banks, the County Engineer. I also inspected run 171^E, on the Waikouaiti River, roads in Hawksbury District, and a road in Glenomaru District.

District Offices.—There are now only three District Survey Offices, viz., at Lawrence, Queenstown, and Naseby. The former is in charge of Mr. McLean, and I found all the maps and records in good order and marked up to date, when I visited the Lawrence office last month. I also inspected the Queenstown office, in charge of Mr. Adair, during the month of April last. The Naseby office is in charge of Mr. District-Surveyor Barron.

Dunedin Office Work.—By the statement at the opening of this report you will notice that, through various causes, there have been several reductions in the office staff, as there are now only ten assistants and two cadets, as against eleven assistants and five cadets when I took charge. I regret to state that Mr. W. F. Browne has been prevented by illness from attending to his duties since the 12th of last March. This is a serious loss to the office, as he was an excellent officer. Besides the ordinary routine work of the office, I wish to draw attention to the large amount of work done by this office for other departments, notably the Property Tax Department. The ordinary work done is as follows: Mr. Skey, chief draughtsman, has examined and prepared the following:—Seventy-five Crown grants prepared and recorded comprising 2,140 acres; 295 Certificates of Title, comprising 26,941 acres; seventy Perpetual Leases in triplicate; forty-two Pastoral Licenses in duplicate; ninety-eight Deferred-Payment Licenses in duplicate, and 46 Occupation Licenses in duplicate. Mr. S. Thompson, checked and examined 121 staff surveyor's plans and sixty-two land transfer plans; also the following in duplicate, viz.—forty-three plans of roads, &c., forty-one mining leases, and fifty agricultural leases. Mr. Nicolson, besides attending to the public room and safe, has furnished the Land Office with duplicate plans of all surveys received. He also receives all applications for unsurveyed lands, prepares tracings for the field surveyors, and records surveys on record maps. Mr. W. F. Browne besides recording gold-fields surveys and compiling working plans, has prepared, in duplicate, forty-four mining, forty-eight agricultural, and four exchange leases. Mr. Wadie has been kept fully occupied in keeping new run maps up to date, making out pastoral licenses and supplying Land Office with all information connected with runs. He has completed and colored a large lithograph map showing Otago runs, counties educational endowments, surveyed land, &c., for the use of the Waste Lands Board. He has also made out Survey Office contracts and examined and checked all other plans and specifications in connection with roads to open up Crown lands, and has charge of all railway and engineering plans. He has also made two large Land Transfer record maps, and has also done work for the following departments, viz.:—Property Tax, Census, Sheep Inspector, Official Assignee, Sheriff, &c., besides usual office work. In Road Office, Mr. Fynmore has recorded forty new

and closed road surveys on working plans, Road District and County maps; reported on fifteen road matters; supplied descriptions of new and amended boundaries of School Districts to Education office; assisted the Census enumerator in fixing boundaries and descriptions of sub-districts, and was engaged nearly a month in preparing Property Tax returns, besides attending to his usual routine duties. Mr. Marsh has prepared compiled working plans and Crown grant record maps, where they required renewing, besides usual office work. Mr. William G. Runcie, the accountant, besides the ordinary book-keeping and correspondence, has recorded précis of, and indexed 3,153 letters received and sent, and has checked and tabulated the monthly Survey and Road reports; 240 plans have been received and entered by him. He has charge also of the stores, &c., to be issued to surveyors and draughtsmen, and pays all salaries, despatches all plans, parcels, and correspondence, and attends to all the work of the office.

Land Transfer Work.—Mr. Thompson has examined and checked sixty-two maps for deposit, noted above, and Mr. Treseder has examined and checked eighty-six applications, 1,177 transfers, 890 mortgages in duplicate, ninety-four leases in duplicate, 126 transmissions, 979 draft certificates, and has placed 712 plans on certificates in duplicate.

Lithographic Branch.—Mr. Percival has reduced and drawn thirty-one plans on transfer paper, and seven plans for photo-lithographing, making thirty-eight plans in all. Mr. Ross has photolithographed seven plans and printed 12,900 copies from the above, besides 500 protractor forms, and 400 circulars. Mr. Bain has mounted 380 maps of various descriptions.

Proposed Operations for next Season.—As I have only five staff surveyors in the field, I expect the ordinary settlement survey will keep them fully employed. I therefore cannot undertake any large extent of triangulation this year, but whenever time can be spared, I shall endeavour to do what is most urgently required. In the Dunedin office there is a great deal more work to be done than I can possibly hope to accomplish with the present limited staff. First, the Land Transfer record maps are still very much in arrears, and, although I shall have all the future applications coloured on the maps, the work required to bring up the arrears to date would give employment to an extra hand for six months at least. Several Land office maps and Crown grant record maps require renewal, as some are nearly illegible. About twenty Road office maps also require renewal, as they are almost in pieces. There is a large amount of arrears to be overtaken on the compiled working plans. Mr. Browne's illness has contributed somewhat to this. The lithographic maps are also in arrears; a good many of the earlier blocks are out of print, and these, together with new lithographs required make up a large total. I should like very much to go on with some more of the eighty-chain maps of districts. I think it should be a special feature in these maps that railway stations, as well as railway lines, should be distinctly shown. I have made out a list of over twenty Survey Districts in Otago, which it would be a great advantage to have lithographed on the eighty-chain scale.

C. W. ADAMS, Chief Surveyor.

SOUTHLAND.

Field Work.—During the year there have been executed 109,000 acres of combined trigonometrical and topographical survey, also 37,000 acres of topographical survey only. Owing to the absence of a special column in the annual return form, I have been under the necessity of shewing the whole in one column, guarding against misapprehension, however, by a small note in the column of remarks. This triangulation, including topography, was executed along the eastern and southern flanks of the Takitimo mountains, being chiefly within the Wairaki and Centre Hill Survey Districts. There has always existed a gap in this locality on the triangulation maps, and the work that has been done will help to fill it up and give us an accurate idea of country that had formerly only been roughly sketched. During next season it may be desirable to completely fill up the gap by sending from the eastern side, across the Takitimos, a few large sized triangles, the apexes of which will join the narrow or ray trace triangulation, which some years ago was carried up the Waiau river. The high, broken nature of the country, which for years has been regarded merely as a waste, is, of course, the reason why the gap in the triangulation has existed so long, and I recommend its being filled in simply because during the season suitable for operations, it could be easily and economically effected. Mr. John Hay has sent in a special report in regard to the country, and I now forward it for your information along with plan to illustrate the report, same having been prepared by Mr. Deverell. In regard to rural and suburban surveys, there have been executed during the year 150 sections, embracing 3,979 acres. A large proportion of these sections was in bush, and this fact, combined with the small sectional size and the scattered nature of the surveys, will account for the cost being what it is. I might remark that nearly all the surveys were of sections that were laid off with the view of being offered for sale, partly for cash and partly on the deferred-payment system. Many of the surveys were for Village Settlement purposes, this system of small settlement having, in several places in Southland, been very successfully carried out. I might state that eleven of the sections included under the head of "Rural and Suburban Surveys" were partly purchases and partly sawmill areas. I need hardly say that purchases prior to survey have been rare during the year, and that—owing to the dullness of the sawmilling industry—surveys of sawmill areas have been fewer than usual. The field staff, as you are aware, has been very small, and—owing to leave of absence having been recently granted to Mr. George Watson on account of his health—the staff has now reached its lowest possible limit. Mr. Watson, I might state, is a promising, reliable, and efficient young officer, and I trust that his term of leave will restore his health and preserve his services to the department. It will be observed under the head of "other work" on general return, that Mr. Watson was engaged for a short time in the neighbourhood of the Bluff making special surveys and procuring additional topographical data for maps of "defence." I am glad to note that the surveys made and the plans of same prepared by Mr. Deverell, secured the approval of the Defence Department.

Office Work.—As will be seen from a return forwarded, there have been prepared during the year 131 Crown grants proper, these consisting principally of half-caste and native titles. In addition to these

there have been prepared 246 certificates of title in lieu of Crown grants. As these certificates are in triplicate, the number of plans prepared was 738. I have also to report that the number of plans placed on ordinary certificates of title for the Land Transfer department was 1,540, representing 770 certificates in duplicate. During the year twenty plans have been examined prior to being deposited in the Land Transfer Office. These plans contained fifty-nine original sections, which were sub-divided into 394 allotments, embracing 26,833 acres. In connection with this I may state that sixty-five leases have also been examined, as well as forty-six applications to bring lands under the Act. Eight Land Transfer record maps have also been prepared, as well as a number of ordinary Crown grant record maps. In regard to the plans lithographed and prepared for lithographing, I have to state that ten drawings were prepared and printed locally, said drawings being of village settlements and sub-divisional surveys of this kind. Some extensive drawings were also prepared during the year for the purpose of being photo-lithographed in Wellington. The most important of these was a large, complete map of the counties of Southland and Wallace. This map, in addition to the natural features, showed all the artificial features, including formed roads, railways, stations, townships &c., up to date. It is a map which was much required, owing to the fact that the previous maps failed to show the counties as a whole. In addition to this map we have prepared for photo-lithographing in Wellington, a map of Centre Hill District, a map of Paterson District (Stewart Island), also a map of the Town of Invercargill. We have now in hand a map of Wairaki District, and hope shortly to have all the districts in Southland photo-lithographed. The utility of these maps for general government and office purposes is very great indeed. There is necessarily a large amount of promiscuous work done in the office, which, of course, it would be impossible to particularize, and I presume it is unnecessary to do so.

JOHN SPENCE, Chief Surveyor.

APPENDIX No. 2.

GEOGRAPHICAL SURVEYS.

THE TRIANGULATION OF THE KING COUNTRY.

Mr. District Surveyor LAWRENCE CUSSEN to the ASSISTANT SURVEYOR-GENERAL, Auckland.

THE area comprised is 440,000 acres, it lies between the Ongarue River and Lake Taupo, extends southwards to Ruapehu Mountain, and follows the surveyed boundary of the Taupo-nui-atia block to the Whanganui River. This district has been covered by major triangles of fifteen-mile sides, which are broken down by a secondary series, of six-mile sides, in preparation for the Native Lands Court surveys; the field-work is approaching completion, and will, I hope, be finished by the end of July. About three-fourths of the area is covered with heavy forest, containing totara, matai, rimu, and other useful timbers, a good deal of which will be accessible from the Main Trunk Railway, which traverses the centre of the district from Taumarunui to the Waimarino plains. The open land lies chiefly in narrow strips along the sides of the rivers and streams, and it is generally of a very poor character, the river valleys being commonly filled up with volcanic ashes and pumice to a great depth. Here and there, in the river valleys, the tufa beds are covered over with a coating of loam washed off the hill-sides, in these places the surface is fertile and often covered with clover and English grasses. The quality of the land varies a good deal throughout the district, much of it being of excellent quality and some of it poor, much broken and cut up by gullies and ravines. I think about 200,000 acres in the district will be found suitable for settlement. Along the valley of the Whakapapa River, on the edges of the bush around the Waimarino plains, on the slopes of the Taurewa Ranges, and in the undulating country in the neighbourhood of Maungaku, land of fairly good quality and suitable for agricultural purposes can be found in considerable areas. The geological character is clay marls and sandstones; in the Hauhungaroa range, which is the backbone of the country, the lower formation is slate, over which lie deep marl beds; on the crown of the ranges the slate is found cropping out; the land is of good quality but broken and rather difficult of access.

In my monthly report for April I informed you that on ascending Ruapehu in the early part of that month we found a crater hollow on its summit containing warm, or probably boiling, water; as this matter may be of interest at the present time, it may be well to give a few details and a short description of the mountain, so far as I can from the few notes which I was able to make in the limited time I could devote to the subject, my object, of course, being to complete the trigonometrical observations at the trig. stations in time to descend to our camp before night. We ascended the mountain from the western side, following a long and tolerably regular ridge which runs down from the top of the cone to its base. The ascent was not very difficult, we accomplished it in four and a half hours from our camping ground, which was situated 5,000 feet above the sea-level; we had therefore 4,000 feet to ascend, nearly 3,000 feet of which was over frozen snow. As we ascended, on all sides of us were examples most various and instructive, of volcanic phenomena, and the forms and shapes assumed by lava in cooling. The most remarkable feature of the mountain is the crater lake on its summit. This lake is situated at the bottom of a funnel shaped crater, its steep sides being mantled with snow and ice. I had no time for measurements to ascertain the correct dimensions of the lake, and its peculiar surroundings made it difficult to estimate them with any degree of accuracy. The water seemed to me to occupy a circular basin about 500 feet in diameter; it is situated inside the two peaks Paritetaitonga and Ruapehu, which are about sixty chains apart on the southern portions of the mountain; the lake would be about 300 feet below the peaks and quite inaccessible, except with the aid of a long rope, and even then the descent over the icy masses would be attended with danger and difficulty. On first reaching the top of the peak I noticed small clouds of steam floating over the surface of the lake; on watching it more closely the water appeared now and then to assume a rotary movement, eddies and whirlpools seemed to pass through it from the centre to the sides, steam or vapour flashing up from the eddies.

It was impossible to discover the exact form and construction of the summit of Ruapehu, the whole mountain top being covered with a deep mantle of snow, which completely fills up and hides all the hollows between the peaks. Three prominent peaks are presented to view—Paritetaitonga, on which our station stands, is on the south-western end of the mountain; to the south-east of it, about sixty chains distant, is Ruapehu, which is the highest point of the mountain; exactly a mile to the northward of Paritetaitonga is the third peak, called Te Heuheu, not quite so high as Paritetaitonga. All between these three points, with the exception of the crater lake, is a great undulating snow field, intersected by irregular crevices of immense depth. From the vertical inward faces of the three peaks, their more gradual outside slopes and the general configuration of the mountain on the western side, it would seem that the peaks formed part of a circular crater ring, the diameter of which would be about one mile, and the western portion of the lips have been destroyed. The crater, in which the hot water now exists, would probably have been formed, with others, on the floor of the old truncated cone. As stated in my monthly report for April, I noticed on several days after our ascent of Ruapehu, a column of steam rising out of the crater and ascending high above the mountain top. I drew the attention of Te Heuheu, and several of the oldest natives in the district, to this fact, and they all agreed that it was quite a new thing, they had never heard of steam arising from Ruapehu before. I think it is more than probable, however, that a low state of volcanic heat prevailed in the crater throughout. Five years ago, when triangulating on the Kaimanawa ranges, I noticed a column of vapour arising from Ruapehu, in the position of the crater; but, not knowing of the existence of the lake, I thought it must be a clond or fog arising out of one of the gorges of the mountain, although it seemed very like a column of steam.

When observing angles at Paritetaitonga, although the stones which formed the station mound were frozen hard together, my instrument would not remain level; the same thing occurred at Hauhungatahi station, eight miles to the westward of Ruapehu, which was likewise frozen hard when I was observing there. Three years ago when taking angles on Ngaruahoe, I found the same difficulty in keeping my instrument level, although the ground on which it stood was formed of a solid conglomerate mass.*

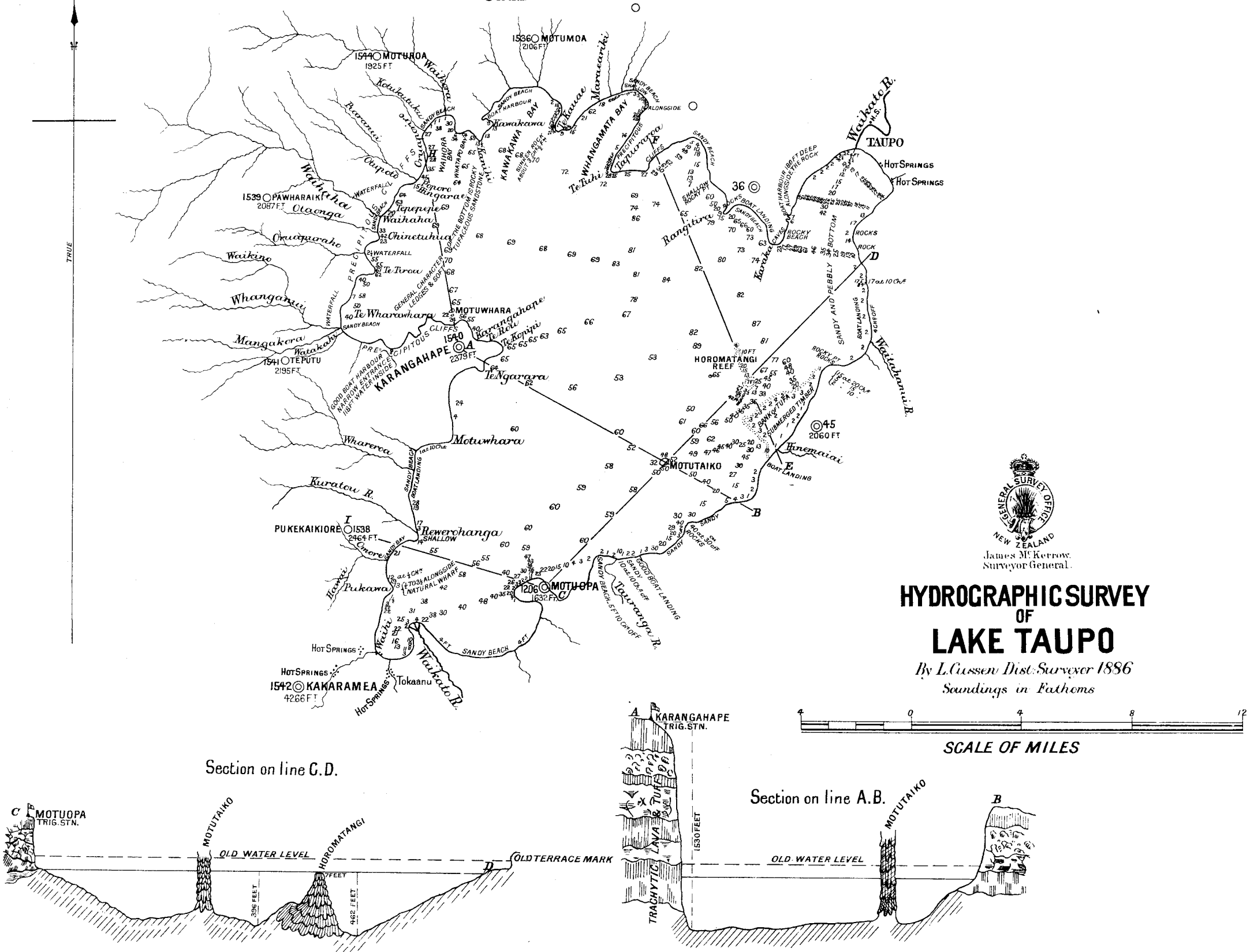
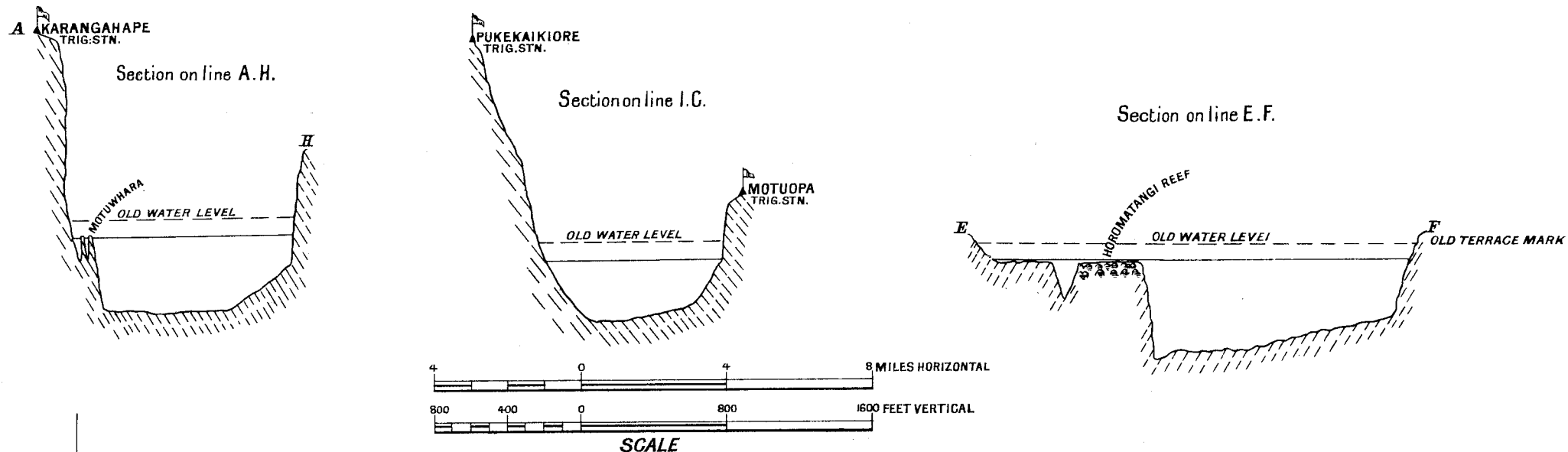
LAKE TAUPO.

In the month of January last, I took a series of soundings of Taupo Lake, the details of which are shown on the map accompanying my report. The Lake covers an area of 154,680 acres; its greatest length, from Tapuaeharuru to Waihi, is twenty-four miles seventy chains; its greatest width, from Waihaha Bay to the mouth of the Hinemaia River, is sixteen and a half miles. The result of the soundings shows that the Lake has an almost level bed, the average depth being sixty-five fathoms, and the greatest depth, at a point nearly in the centre, being eighty-nine fathoms. Only in one place was shallow water found at any considerable distance from the shore, this point is the reef about three miles to the north of the Motutaiko Island, where the rock is covered by only seven feet of water.

Motutaiko Island is one of the most interesting features of Lake Taupo. It is formed of a column of rhyolitic lava ascending perpendicularly from the bottom of the lake to a height of 600 feet, half of it being below the water, and the upper half covered with stunted timber and scrub. Its construction points to the probability that it is the neck of lava which filled an old volcanic vent, and it was probably surrounded by a cone of loose ejecta, which had been worn away by denudation, and now cover the floor of the lake. To the north-east of Motutaiko Island, and extending northwards from near the mouth of the Hinemaia River along the shore for a distance of three miles, is a ledge running about two miles out into the lake; this ledge is covered by only from two to three fathoms of water, and at its edge the depth suddenly increases to over thirty fathoms. All along this ledge are lying large totara snags, many of them protruding above the water, and they seem to be in a good state of preservation. The Maoris have no knowledge as to how they came there, nor have they any tradition of a change taking place in the formation of the shore; it is more than probable that they were deposited by a slip occurring on the high land of the shore, at a time when the surface was covered with forest. A land slip on such a scale would scarcely have happened since the natives have inhabited the district, without their retaining some account of it, and it, therefore, seems probable that the timber has been lying there for 400 years, or more.

The evil spirit, or Taniwha, of Taupo Lake, called Horomatangi, is said by the natives to inhabit a cave in the reef which lies to the north-east of Motutaiko Island. They say that when a canoe approached the reef, Horomatangi lashed the water into foam, throwing up pumice and stones, and creating such a disturbance that the canoes were frequently capsized. Another interesting legend in connection with the reef was told to me by Te Heuheu. He said that a totara log possessing great mana (or power) floated in the neighbourhood; sometimes it lay near Horomatangi reef, and sometimes it appeared with its end resting on the shore of the lake. It had worn for itself a passage through the snags from the shore to the reef; it would lie for days touching the shore and then suddenly depart, and travel through the clear passage to Horomatangi, a distance of nearly two miles. An elderly native assured me that, when a young man, in a journey from Tapuaeharuru to Motutere, he had sat on the log to rest as it lay on the shore of the lake; on returning in a day or two after, he saw it floating far out on the lake on its way to Horomatangi. When the mission church was built at Motutere, the missionaries induced the natives to use the log in the building of the church; the native who dragged it out of the water died soon after, and all those who assisted in carrying it to the site of the church, or preparing it for the building, also died within a short time after. The movements of this log—which, no doubt, were considerably exaggerated—may be due to the current of the Hinemaia stream, which passes slowly through the lake, being deflected in the direction of Horomatangi's reef by the ledge on which the submerged timber lies; the log would thus be carried out by the current which extends to the reef, where it might remain till a westerly or a north-westerly wind drove it back against the light current of the river, until it again reached its former position on the shore.

*NOTE.—Mr. A. D. Wilson, writing on the 20th July, reports the same trouble, he says:—"I experienced great difficulty in keeping my instrument level when observing at Hauhungatahi, even though the ground was iron-bound with frost. I ascribe this less to present volcanic action than to the place where the trig. is, being an old crater, which having been filled up with very loose materials never properly consolidated, the slightest weight upon the surface is sufficient to depress it. I am led to assume this from the character of the stuff, taken out when digging the hole for the tube, which looked as if it had first been burnt and then put through a crushing machine."—Ed.



HYDROGRAPHIC SURVEY OF LAKE TAUPO By L. Cassen Dist. Surveyor 1886 Soundings in Fathoms

C.R.P. del. Auckland July 7th 1886

S. Percy Smith Assistant Surveyor General

At Karaka point, a promontory, four miles south of Tapuaeharuru, are some interesting caves. They were worn by the action of the water on the volcanic conglomerate in which they are formed. The caves are about thirty feet above the present level of the lake. Underneath the tufa of the caves, and along the shore of the lake, the rocks are rhyolitic lava. Three miles to the north-west of Karaka Point, on the shore of the lake, a large deposit of iron pyrites appears in the rhyolite and tufa beds.

With the exception of the sandy bays of Whangamata, Waihora, Waihana, and the several smaller bays shown on the map, the whole of the northern and western shores are formed of steep rugged cliffs of rhyolite, intermingled with which are masses of tufa and volcanic ashes. The heights of these cliffs vary from 100 to 800 feet above the lake, with generally deep water close alongside them—from forty to fifty fathoms being found, with our boat made fast against the rocks. The scenery all round the western arm is picturesque and beautiful; there are numerous interesting waterfalls and many secure and picturesque boat harbors, with a depth of water from ten to forty fathoms within them, and safe anchorages can be reached with good shelter from almost every wind.

The western shores of the lake are in many places wooded to the water's edge; the trees frequently seeming to grow on the almost bare rocks, which protrude here and there through the foliage. The natives have their settlements inside the little sandy bays, and on the alluvial flats along the several rivers which empty into the lake.

Karangahape point, with the little island rock of Motuwhara, which lies a short distance off the point, would afford an interesting subject for the study of a geologist. The cliff is 1500 feet in height from its summit to its base, at the bottom of the lake. As will be seen from the section, it rises quite perpendicularly from the floor of the lake, a portion of it—600 feet above the water—overhung our boat, whilst the lead-line, dropped close alongside the cliff, showed a depth of 400 feet. The formation round the point is alternate beds of rhyolitic lava, scoreous tufa, and ashes. The little island of Motuwhara was probably a crater plug; it is composed of rhyolite; at one time it was an important part of the Ngati-tuwharetoas, and a safe retreat from their enemies in time of war. At Karangahape point are to be seen Tamatea's two dogs, which he left there to guard the point; they are represented by large masses of consolidated tufa, some thirty feet in height. It would be difficult to trace in their shapes any resemblance to the form of a dog. Many of the natives to the present day retain a superstitious awe of these stone dogs, and I have seen them cover their faces in passing by them, as to see Tamatea's dogs would probably cause a storm and the wreck of their canoe.

It is unnecessary for me to enter upon any description of Tokaano, its thermal springs and other natural curiosities, which are all pretty well known. I may mention, however, that there are a number of hot springs and fumaroles on Kakaramaea mountain, which, I believe, have not hitherto been known to Europeans. They are situated in the forest, at the head of the Waihi stream, and about three-quarters of a mile north of the highest point of Kakaramaea. They occupy a considerable area, extending for about twenty chains along the stream. The principal one is over one hundred feet in length, and about thirty feet in width; the water is muddy, of a greyish cream colour. Fumaroles, steam jets, and small mud volcanoes abound. Several of the springs are of a boiling heat.

A distinctly marked terrace extends right around Taupo Lake, 100 feet above the present water level. This terrace plainly indicates that the water stood for a long period 100 feet higher than it now is; the subsidence is probably due to the lowering of its only outlet—the Waikato River—where it probably broke through a barrier, about one mile from the point where it leaves the lake. Te Heuheu points out a flat rock at the edge of the lake at Waihi, which, he says, their ancestors used for a sacrificial altar, shortly after their first arrival in Taupo. This would shew that the lake has not altered its level within the last 400 years, and, from the appearance of the shores, it is probably a much greater length of time since the subsidence took place.

It has been suggested that a great deal more water flowed into Taupo Lake, from the many rivers which discharge into it, than goes through its only outlet, the Waikato River, and that probably the volcanic foci in the district might be fed by the lake. To anyone who has seen the volumes of the many rivers which flow into Taupo Lake, it certainly would appear strange that the seemingly small outlet of the Waikato River, would carry off as much water as is supplied by the infalling rivers. Whilst traversing the shores of the lake I took the opportunity to measure the volume of its rivers and streams. This was very carefully done and under favorable circumstances, in fine weather, no rain having fallen during the operations. The Waikato River was measured, where it leaves the lake, at three different periods of the operations, namely—at the start, when half the rivers had been gauged, and at the end; the results shewed that, practically, the same quantity of water was discharged as flowed into the lake.

I am indebted to Major Scannell for the following interesting narrative of the sudden rise and fall of the water at the north end of the lake, on or about 28th August, 1883. On the day mentioned a little schooner which used to ply across the lake, was lying afloat at Tapuaeharuru. Some men working close by noticed that the schooner was suddenly left high and dry. They went to shove her afloat again, and in doing so they noticed that the river had fallen about two feet; in the course of fifteen or twenty minutes it again rose to its previous level. This phenomenon was noticed by four or five people. It occurred at half-past twelve o'clock in the day. On that same afternoon, between one and two o'clock, Sergeant-Major Smith and Sergeant Miles, of the A.C. force, were bathing in a warm spring, called Waiariki, situated on the bank of the Waikato River, about a mile from the lake; the bath was fenced round with stones on the side next the river, and it stood about two feet above the level of the water. They found their bath become suddenly cold, and were astonished to find that the river had risen to a level with it; it remained so for about five minutes, and then suddenly resumed its former condition. So far as I have been able to learn, this was the only occasion on which the phenomenon occurred.

The origin of Taupo Lake is an interesting physiographical question, and one to be dealt with by an abler and more experienced observer than myself; sufficient evidence has probably not yet been collected to lead to any definite conclusion on the subject. The jagged appearance of the volcanic rocks forming the steep northern and western shores leads at once to the conclusion that they were separated from the masses, of which they originally formed part, by some violent agency, either of eruption or subsidence. The islands and reefs in the lake are more than probably plugs of volcanic vents and lava flows, and it

would seem reasonable to infer that the lake owes its origin, firstly, to eruption, which was followed by a subsidence, and that, subsequently, some of the vents within it continued active as subaqueous volcanoes, the ejecta from which now form the comparatively level floor of the lake, having been worn away from the cones by denudation. I brought down some specimens of the rhyolitic lava from Taupo, and I am indebted to Professor Thomas for the classification of it.

LAWRENCE CUSSEN, District Surveyor.

NOTES ON THE CRATER LAKE OF RUAPEHU.

MR. ASSISTANT SURVEYOR DUNNAGE, to the CHIEF SURVEYOR of Wellington.

THE report of the ascent on the 8th May for the purpose of erecting a trig. station is as follows:—The snow was in a favourable condition for climbing, but it was necessary to cut each footstep for the last 1,000 feet. The height indicated by barometer, which was very low that day, was 10,200 feet. I think the true height will be found to be about 9,300 feet. Large quantities of steam were issuing from the little lake in the centre of the crater, nearly 1,000 feet below us, but was all condensed before reaching the top of the crater. The cold was very severe.

Writing on the 5th July, from Karioi, Mr. Dunnage states:—In my report for May last, which was unavoidably late in being forwarded, I have already mentioned that on May 8th, when on Ruapehu, I had an excellent view of the lake in the centre of the crater, from which a quantity of steam was issuing. I was on the top for one hour and ten minutes, during the whole of that time the steam rose steadily; there was no commotion of the water, or great variation in quantity of steam, which was all condensed before reaching the top of the crater.

A few days after this, I think on the 15th, Mr. Wilson was at Pipipi, and saw a column of steam rise straight into the air from Ruapehu, this lasted for some time. As the crater is deep, I think the water on this occasion must have been boiling fiercely. Ngaruahoe (Tongariro) was at the same time emitting an unusual quantity of steam. The steam from Ruapehu on this occasion was seen by a good many different people.

Early on the morning of the 10th June, the reports from the eruptions at Tarawera and Rotomahana were very plainly heard here. I was camped on a hill open towards the mountains and Rotorua district, from which I heard the reports like discharges from heavy artillery very distinctly, they came in quick succession for several hours. I felt no shake whatever. I went outside, but as it was very foggy I could see nothing, and there being snow falling I was not tempted to remain out long. Until news of the disaster arrived in Karioi, it was thought that the report had come from Ruapehu and Ngaruahoe. On the night of Monday, the 28th June, I heard a sharp report in the direction of the mountains, which was followed almost simultaneously by a rather severe shock of earthquake.

On Saturday, 3rd July, I heard several rumbles from the mountains, and once or twice felt a tremor of the ground. Heavy snow was falling, and it is not an unusual occurrence for the mountains to rumble on such occasions.

There is one other thing that might be worth mentioning. The Wangaehu River has always been charged with sulphur and other minerals, but in very variable quantities. The river now, for more than a month, has been perfectly free from all minerals. I tasted the water near the mountain on June 6th, it was perfectly clear and free from sulphur. It is usually quite undrinkable in this place.

Mr. McDonnell, manager of the station here, and several old station hands tell me it is quite unusual for the river to be without sulphur, so near the mountain. The Wangaehu rises on the eastern side of Ruapehu, and evidently comes from the crater through the side of the mountain, but I have never had an opportunity of examining its source minutely. I think the outbreak at Tarawera has acted as a vent to Ngaruahoe and Ruapehu, and had the eruption taken place at the latter mountain, in full force, I think from the size of the crater, it would have been most serious.

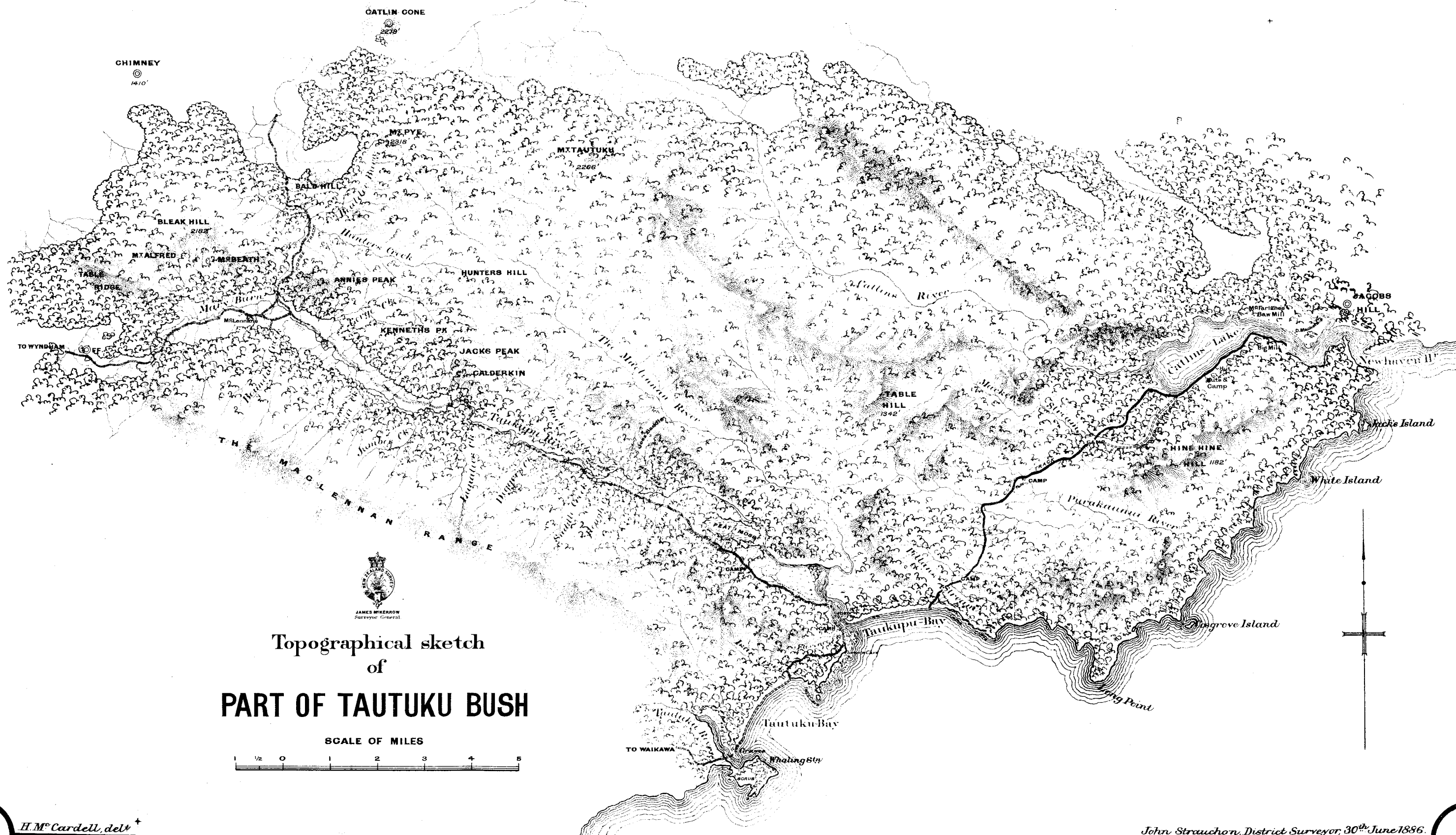
No Maoris seem to remember having seen or heard of any previous sign of activity at Ruapehu, and from the manner in which the rocks on the mountain sides have been cut and broken, from the action of severe cold in winter, which has been the work of many years; and also the bush on the slopes, tend to show that it has been a long period of time since any serious volcanic action took place from this mountain. Should an outbreak occur again, and lava be discharged, it would probably flow in an easterly and south-easterly direction; the crater is much more open on those sides.

WALTER H. DUNNAGE, Assistant Surveyor.

TOPOGRAPHICAL RECONNAISSANCE OF TAUTUKU FOREST.

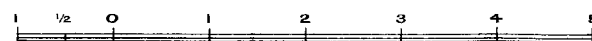
MR. DISTRICT SURVEYOR JOHN STRAUCHON to the CHIEF SURVEYOR, Dunedin.

I have now the honour to forward topographical sketch of north-eastern portion of Tautuku Bush, extending along the coast from Tautuku Bay to Catlin's River, and back to top of main range at Bleak Hill and Mount Tautuku. A good pack-horse track has also been cut and surveyed between Isa's creek, Tautuku Beach; and the Big Mill at Catlin's River. The positions of the most prominent hills are pretty accurately fixed by cross bearings taken from tops of trees, on hills along our route, and the principal streams, by explorations up their respective valleys. The sketch is on a scale of one mile to an inch and gives a very good idea of the topography of the country. The portion of main track cut this year is sixteen miles in length, many side cuttings and numerous creek crossings have been made and a few culverts put on; also some soft places have been corduroyed with fern trees, to allow of horses crossing. Near Catlin's Lake we went down on an old tramway for nearly two miles; the wood-work was in many places very rotten and cost a good deal to repair and replace, but it now forms a good and level portion of our track. The Catlin's River is broad and deep and cannot be forded anywhere near terminus of track, which I have made immediately opposite the house of Mr. Duncan McKenzie, who is a boat-



Topographical sketch
of
PART OF TAUTUKU BUSH

SCALE OF MILES



H. M. Cardell, del.

John Strauchon, District Surveyor, 30th June 1886.

Photo-lithographed at the General Survey Lithographic Office, Wellington, N.Z. July 1886.

man and would ferry passengers across at any time; horses would have to swim behind the boat. The Big Mill is now shut up and deserted, although the machinery is still there.

Character of Land.—The most of the land along the track is very fair, and with good roads made through it, fit for settlement. The ridges are not nearly so mossy and soft as those we passed through last year, on the S.W. side of Tautuku Bay, and on the whole I think the land much better. The track passes over one or two short softish flats, but does not go along a single soft ridge, and at only two places are these ridges very steep—but neither very long,—and at both places side cuttings, sufficient to allow a horse to pass along easily, have been made. When a dray road becomes necessary, deviations, as shown on sketch, will have to be made. There is also a considerable extent of good land on the banks of Catlin's Lake and River easily accessible by boats, the river being navigable for them for about two miles above the lake, although it would be all the better of having a few of the worst snags, near top end, removed. In the event of blocks being required for settlement I would recommend that the first be taken here and work gradually backward. There is also much valuable silver birch in this valley suitable for sleepers, and easily got at. I have already given you an account of my explorations in February last, along the coast, up this valley, over Table Hill, and down the McLennan Valley to the coast again, so it is unnecessary to repeat it here. I may, however, say that in coming up the coast, I missed the Devil's Blow Hole, as it is called, but again went back in April, and found it to be a long deep hole, probably about six chains long by two wide at top, and to all appearance about 150 feet deep. It communicates by a long subterranean cave with the sea, probably some eight or ten chains away; the waves can be distinctly seen rolling into the hole. In calm weather it makes little or no noise; I passed within two or three chains of it in February, and never heard it. The length of hole lies east and west, and is about three-quarters of a mile, S.W., from Jack's Beach. There is a sort of blazed track to it, but very crooked and hard to follow.

Timber.—The timber is similar to that passed through last year, being principally birch and red pine, with a few black and miro pines. We saw more totaras, however, along the banks of main streams. There is not nearly so much of the broad-leaved gum in this part of bush, and it is consequently not such good cattle-grazing country.

Rocks.—The rocks are principally of yellow sandstone. At the cliffs, near caves at N.E. end, Taupuku Beach, there are some well defined beds of stratified rock, of various thicknesses, and consisting of different colored beds of sandstone and conglomerate, one over the other. Beds of marine shells are also visible about Taupuku River, and also at Catlin's Lake and River.

Birds.—Wild pigeons and kakas are plentiful, also tuis and the other small birds. Grey and teal ducks are plentiful up Catlin's River, but are very shy. There are also a few about Taupuku, but there are a good many blue and mountain ducks up this latter river, and they are easily approached. There are a few penguins on beach.

Fishes.—Large shoals of mullet frequent the estuaries of the Taupuku and Catlin's Rivers; flounders are also plentiful at the latter. There are trout in the Upper Taupuku, having been put in by the Acclimatisation Society years ago up at Catlin's cave, under the impression that it was the Tautuku River; eels are also plentiful and very large. A good many porpoises visit Taupuku, and go a considerable distance up, remaining in for days. I saw only one dead seal on the beach.

Wild Cattle.—There are no wild cattle along the coast nor along the track; there are, however, plenty far up the Catlin's, and also up the McLennan. Wild pigs are not very numerous, although they are scattered about all over the bush, a few here and there.

Taupuku Valley.—A good track has been surveyed from where McLennan's track leaves the one between Waikawa and Wyndham Valley (near Trig. FF, Mokoreta District) via McLennan's Station, and Taupuku Valley down to the sea, a distance of over twenty miles. Where necessary the bush has been cleared, good crossings made at creek fords, culverts put on a great many, where bottom soft, and two bridges erected, one over Lunatic Creek, and the other over Diggers' Creek. Travellers can now ride from Wyndham to Catlin's River by this route, and have a better and safer road than those coming from Fortrose and Waikawa by our last year's track.

Land.—As you will see on sketch, there is a good deal of clear land in patches in this valley. The upper clear near McLennan's Station is of fair quality, but light, is good summer country, growing a fine kind of grass and fern. This grass does not stand the winter well, being delicate, the snow grass and silver tussock, are however beginning to establish themselves, and I expect the grazing capacity of this ground will be improved with them. When Mr. McLennan went in first it was all covered with dense scrub and flax, and was almost impenetrable, he deserves great credit for his perseverance in burning, scrub-fencing, clearing and cutting tracks in the bush. A few men like him settled in the scrub valleys of Chasland and Longbeach would soon make some clearings, and would be worth encouraging by giving long leases of small runs, with some compensation for surface sowing with English grasses and clovers. In the middle part of this valley there is some excellent land, principally bush, some of the clears are also good, and grow splendid grass, putting one in mind of many of our best runs over twenty years ago. A number of our best grasses are to be found here, and one I have never seen before, which, I think, would make splendid hay for winter feed. The lower portion of valley is poor, wet and spongy, with a good deal of peat and manuka swamp near river.

Timber.—There is some splendid timber about the middle of valley, below upper long clear, and down to large peat bog, all the best timbers are to be found—black and red pine, totara, kowhai, &c. The trees are also very large, the ground easy to work by sawmills, and water power would be available for driving machinery. After crossing the Taupuku River below upper or long clear, there is a splendid forest of silver birch, the trees very tall and straight, and would afford a long employment for a saw mill, as it extends for a considerable distance on both sides of river. White birch is also mixed through it, but I don't think it is valuable unless for inside boarding.

Taukupu River.—The greatest difficulty would, however, be to get the timber to a market after being cut, as the Taukupu, though having a large estuary, and being navigable for large boats for probably five miles from mouth, yet vessels, even small ones, cannot enter on account of the rocks about outside and in. There is also a shallow bar just where the track crosses, on which, at low water, there is not more than from twelve to fifteen inches of water; there is, however, a tidal rise of about five feet at high water; above this point the river cannot be forded, even at low water, for over three miles, where there is a sort of rocky bar, having about eighteen inches of water at low water; here one can cross easily. On our track at mouth there is a splendid ford, with an even bottom of sand and gravel, quite safe for foot passengers up to half tide. We have erected a finger post in middle of river, with directions carved on a board, and pointing both tracks. A mark is also placed, showing height at which it is safe for foot passengers to cross.

McLennan River.—The McLennan River is navigable for boats for nearly three miles above its junction with the Taukupu, the banks on both sides are soft for probably two miles up, and are heavy walking.

Concluding Remarks.—In concluding, I desire to remind you that a considerable sum has now been spent, and well spent, in opening up these tracks, and that it would be a pity to allow them to become blocked up by falling trees; or overgrown, for the sake of a few pounds. I would recommend that a couple of men be sent through, say every second summer, to remove fallen trees, and otherwise repair any damage done. It would not take them long, probably a fortnight or less. I am informed that some trees have fallen on the portion we cut last year.

JOHN STRAUCHON, District Surveyor.

TOPOGRAPHICAL SURVEY OF THE TAKITIMO COUNTRY.

Mr. District Surveyor JOHN HAY, to the CHIEF SURVEYOR, Invercargill.

The numerous spurs on west side of forest, running down from the various summits, appear to be good summer country for sheep. Judging from their appearance (not having been over the country), I should say, the pasturage is very good, as the vegetation appears rough, apparently not having been subjected to indiscriminate burning, a practice which appears to have caused more injury in denuding the high country of pasturage, than that caused by the rabbit pest. On the country adjoining the eastern margin of forest, the rabbits have been wonderfully kept in check; in fact, in localities such as the Waterloo Valley, where but a few years ago, they must have been very numerous, it is astonishing to now see so few, and such excellent pasturage. From this it may be assumed that they are not very numerous on the high country above referred to.

There is some very good agricultural land on the banks of the Waterloo Burn, but its extent is limited, owing to the narrow nature of the valley. It would be an easy matter to construct a road up this valley, and I think without much difficulty might be extended over the saddle behind Mount Hamilton, and down the Princhester Creek to the Mararoa District. The Takitimo forest covers a large area, and consists almost exclusively of white, black and red birch, the latter a very valuable timber, excellently adapted for fencing, and other building purposes. At some future date this forest will become very valuable, as there are many miles of its frontage (Wairaki River to Coal Creek) of easy access from the Jacob's River Valley. Black pine will be found up the Aparima River, as I have seen large logs brought down by the floods; but I do not anticipate any great quantity. Up Waterloo Valley, and in Coal Creek, just where it debouches from the forest, I observed a seam of brown coal; it is visible in the creek bed, and can be traced for some chains in terrace near south bank. This coal, I presume, is similar in quality to the Night Caps, although in appearance it looks harder, and brighter in colour. Trusting these notes may be of some service to the Department.

JOHN HAY, District Surveyor.

APPENDIX No. 3.

THE TOTAL ECLIPSE OF THE SUN, 9th SEPTEMBER, 1885.

No. 1.—THE OTAHOA OBSERVATIONS.

Wellington, 10th September, 1885.

Observations during the Solar Eclipse on the morning of the 9th inst., on Mount Otahoua, near Masterton.

The weather was very unfavorable for observation, the wind being very strong, with a succession of snow showers, which benumbed our hands and our observing faculties to some extent. The sky cleared about ten minutes before totality and enabled the moon's edge to be seen passing a large spot near the eastern margin of the sun. A thermometer in the shade, exposed to the wind, indicated 36° fah. at that time, and 33° just after the end of the total phase. The fall of 3° may have been in a great measure owing to a violent snow shower, which reached us about 40 seconds before the end of the total phase and cut off our view.

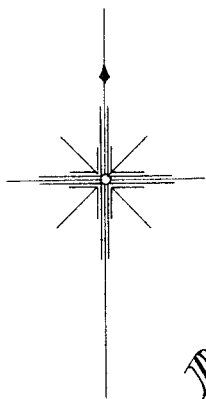


James McKerrow
Surveyor General.

Topographical Map OF PARTS OF TAKITIMO, CENTRE HILL & WAIRAKI DISTRICTS

to accompany Report by
John Hay, District Surveyor

SCALE OF MILES
0 1 2 3



W. Deverell, del.

John Spence, Chief Surveyor.



James M. Kennedy
Surveyor General

Isochronal Lines

for Beginning and End of the

SOLAR ECLIPSE.

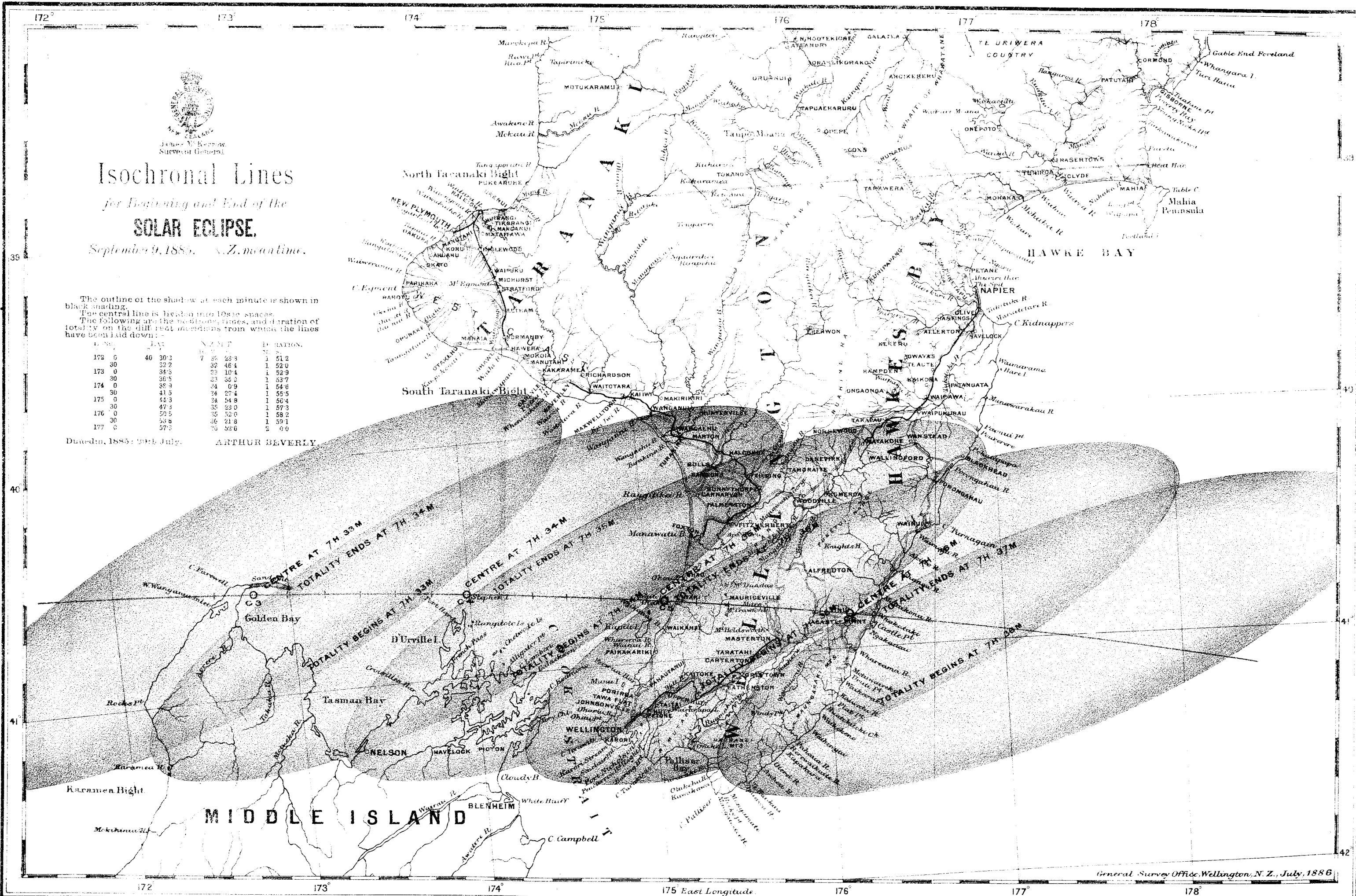
September 9, 1886. N.Z. mean time.

The outline of the shadow at each minute is shown in black shading.
The central line is divided into 10 sec. spaces.
The following are the positions, times, and duration of totality on the different meridians from which the lines have been laid down:

LONG.	TIME.	N. Z. TIME.	DURATION.
172° 0'	40 30.3	7 35 28.3	1 51.2
173° 0'	32.2	32 46.4	1 52.0
174° 0'	34.5	23 10.4	1 52.9
175° 0'	36.5	23 36.3	1 53.7
176° 0'	38.9	24 0.9	1 54.6
177° 0'	41.5	24 27.4	1 55.5
178° 0'	44.3	24 54.8	1 56.4
179° 0'	47.3	25 23.0	1 57.3
180° 0'	50.5	25 52.0	1 58.2
181° 0'	53.8	26 21.8	1 59.1
182° 0'	57.3	26 52.6	2 0.0

Dunedin, 1885: 29th July.

ARTHUR BEVERLY



About half a minute before the beginning of totality I removed the sun shade from the eye-piece of the telescope, and then saw the uncovered portion of the sun as a very fine crescent, rapidly diminishing in length and breadth, the outer edge very sharply defined, the inner edge slightly serrated. Presently detached points of light began to appear at the retreating cusps and disappear immediately; and in two or three seconds more, the remaining fragment of the crescent, now very slender, broke up irregularly into fragments (not like beads, but more like a line of stars) and vanished immediately, being replaced by a jagged reddish line, which extended to a considerable distance round the edge of the moon.

While the last of the crescent was vanishing, the corona came rolling round the edge of the moon both ways; like two great waves, which met each other at the point where the light disappeared. The changes were so sudden and impressive, that I omitted to note the second called out at the beginning of totality. Neither did I observe when the corona first became visible at the west side of the moon, my attention being occupied at the east side. About two minutes before totality, however, the disc of the moon, especially near the edge, was plainly visible, of a creamy tint on a darker background.

The corona, as seen through the telescope, seemed to be bristling with fine radial lines, something like what appears about an electric arc light, but not so long, extending from the base somewhat beyond the indefinite outline. The breadth varied from about a fourth of the diameter at the poles, to a third of a diameter near the equator. No gaps or long rays were seen. The accompanying sketch gives a fair representation of what I saw, but the prominences may not be in their exact position, as taking angular measurements under the circumstances was out of the question. Several who have seen the drawing say that the large prominence on the west side is drawn too small.

ARTHUR BEVERLEY.

Wellington, 16th September, 1885.

The instrument used by me at Bennett's or Otahoua Hill, near Masterton, for the purpose of photographing the corona, was a 5" refracting telescope, kindly lent by G. V. Shannon, Esq.

The whole of the eye-piece and connections were removed, and into the main tube another was slid, to which was attached a plate-box to carry plates $4\frac{3}{4}$ inches square. This gave a focal length of 75 inches, and an image half-an-inch in diameter. The actinic focus was found by taking a series of photographs of the moon the previous week.

The eventful day broke with a strong gale of wind accompanied by snow showers, and turned out anything but favorable for photographic purposes at the time of totality.

The small portable observatory used, was not of a size sufficient to place the whole of the telescope inside, and, notwithstanding that the utmost precaution was taken to shelter the exposed two feet from the strong wind, by a screen made of a tent fly, the only photograph we succeeded in getting, shows that it was greatly shaken during the short exposure of one second. Three plates (Wratten's rapid) were exposed for corona $42''$, $1' 3''$, and $1' 19''$, after beginning of totality, respectively, with exposures of 1", 3", and 4". Immediately after the third the corona was completely obscured by a dense cloud. In developing, No. 1 came up indifferently, and is almost useless, except, perhaps, in connection with other photographs; moreover, some outside light appears on the plate in the shape of a large ray, striking diagonally downwards from the principal prominences, which must not be confounded with impressions given by the corona. It is singular that this plate only, out of the eight exposed before, during, and after totality, should show signs of foreign light having got to it. Plate No. 2, with the utmost pressure in development, showed but a slight trace with no printing density, and No. 3 gave no impression whatever.

It is evident from this, that although the inner corona for a time was plainly seen by the observers around, the advance of the heavy cloud covered it and absorbed the actinic rays. As a proof of the want of clearness in the atmosphere, the observers saw nothing of the outer corona.

The print from negative No. 1, such as it is, shows the position of the prominences, and also the extension of the corona at the equator more so than at the poles.

In the operations I was assisted by Messrs. T. L. Barker and T. L. Humphries.

THOS. HUMPHRIES.

NO. 2.—THE WELLINGTON OBSERVATIONS.

Notes on the Solar Eclipse of September 9th, 1885, as observed at Wellington, N.Z., Lat. $41^{\circ} 17' 28''$ S; Long. $174^{\circ} 47' 11.5''$ East.

The arrangements made for the observations were:

1. Mr. Gordon with a 5" theodolite to note times of beginning and end of totality, the structure of the corona, the form of the protuberances, sun spots, stars.
2. Mr. Grant to sketch outline and form of corona, and estimate its distance in solar diameters from the moon's edge.
3. Mr. Watt to note the intensity of light during totality by experiment on print, to watch approach of shade, wind before, during, and after totality, read barometer and thermometer before, during, and after totality, to notice the appearances of faces, birds, fowls.
4. Mr. Barron to photograph with a $2\frac{3}{4}$ " refracting telescope of 4ft. focal length, by Elliot Brothers, the property of Mr. Thomas Humphries.
5. Mr. Richards to expose at the object glass.
6. Mr. McCardell to note times of photographs. David Barron to call out times for Mr. Gordon.

Previous to the day of the eclipse, a map of the central line of eclipse and form of moon's shadow had been prepared, with the times of the beginning and end of totality marked thereon. This indicated that the beginning of totality would be at 7h. 35m. and its duration about 88secs.

The sky was obscured at sunrise by a dense bank of clouds, the wind blowing strong and with frequent gusts from the cold south. The bank of clouds remained on the horizon, and at 6h. 41m. the first glimpse of the sun was obtained, with the moon sharply defined on the upper left edge.

The sun was now clear of the clouds and the advance of the moon could be clearly seen.

Photographs were taken before, during, and after totality, but only one of the totality, when developed was worth preserving. Apparently the telescope, which was very easily moved in azimuth, had been blown aside by one of the furious blasts, and only a part of the corona is included in the field. It, however, clearly shows the form and position of the largest prominences, and the general form of the corona, such as could be taken in the time of exposure. The plates used were Wratten's rapid, and the exposure given to this plate was 1 second, and the time at which it was exposed was 7h. 35m. 13s.

The observations by Mr. Gordon shew that totality commenced at 7h. 34m. 46s. and ended at 7h. 36m. 15s. New Zealand mean time, equal to 11h. 30m. east or earlier than Greenwich.

Mr. Gell, an officer of the Public Works Department, took a photograph in an ordinary camera at 7h. 35m. 18s., of which an enlarged copy is given. His observation was taken in Lat. $41^{\circ} 16' 40''$, Long. $174^{\circ} 47' 10''$.

The readings of the barometer are as under:—

At 6h. 20m.	...	Barometer—29.68	...	Thermometer—46.3	...	In Shade
„ 7h. 6m.	...	„ 29.7	...	„ 45.	...	„
„ 7h. 35m.	...	„ 29.7	...	„ 45.	...	„
„ 7h. 47m.	...	„ 29.7	...	„ 44.8	...	„

Mr. Watt records a slight change in the direction of the wind at 7h. 15m. and that at totality there was a sensible decrease in the strength of the gale for about a minute. The appearance of faces around was as if a green light had been thrown upon them—fowls looked ill and hurried to their roosts, birds fluttered about. The cold during totality was quite perceptible to the person, but the mercury indicated no change readable. Small Brevier, No. 2 old style print, could be read in ordinary light at 54 inches, during totality it was read at 24 inches.

Mr. Gordon notes having observed three protuberances on the south-eastern limb, close together, the one nearest the horizon being the largest; three on the north-western limb, not distinctly separated, but merged into each other, the middle one projecting farthest; and one about at right angles to those on the lower limb of the sun. The drawing gives their position.

These protuberances had the appearance of clouds or some gaseous substance, having a mixture of rose and grey tinted colours. The corona he describes as rose tinted all round. The protuberances, especially those on the north-western and south-eastern limbs, projected far beyond the corona, or for a distance of a quarter, to a third of, the sun's diameter.

During totality he observed the planet Jupiter, below and west of the sun, apparently three diameters distant.

The two large spots shewn on the drawing, were clearly seen as shewn, with easterly and westerly elongations.

The moon was off the sun at 8h. 43m. as nearly as could be ascertained through drifting clouds.

Mr. Grant describes the scene, when the sun quite emerged from the clouds, at 7h. 13m. 33s., as very grand, the rays from the partially hidden sun very brilliant, and apparently those which emanated from the right-hand side of the sun were stronger and less steep than those from the other side, where the moon was, the observations amounting at the time to about four-sevenths of solar diameter. At 7h. 21m. 33s. the sun was still perfectly clear. Immediately before totality, and while the extreme lower right hand portion of the sun still remained uncovered, the form of the moon was visible almost in its entirety as a ghostly shape, whose spherical appearance was obscured through a graduated light being thrown from the sun upon the edge of the hitherto disc-like figure. This graduated edge was about one-tenth of a solar diameter in width. At this period, also, a peculiar change in the sun's rays seemed to take place. The rays of the sun, hitherto much lighter than the dark mass of cloud beneath, resumed now the appearance of dark bands, or rays of a darker shade than the clouds through, and upon which they shot.

At totality a bright coronation appeared all around the moon's edge, quite broken or serrated, but of an almost uniform width of about one-fourth the solar diameter. No protuberances were seen, except at the point of first contact, on the sun's upper left-hand edge. This part of the corona, at which the sun is first uncovered, seemed to take the form of a protuberance, having at its base—that is, on the moon's edge—a starlike spot which he took for a star, and anticipating it to be the major axis of an elliptical corona, looked for its complement on the opposite side, but without success. On examining the seeming protuberance it seemed to glow larger and brighter, until a blaze of sunshine informed us that the sun's face was again uncovered.

A reflected light appeared all round the inside of the moon's face during totality, the general width being about one-fourth of the lunar diameter and of greater width at the top than at the bottom. A narrow band appeared upon the extreme edge of the moon's face and extended inwards about one-twelfth the lunar diameter, which remained unlit by this apparently reflected light, and was of the ordinary gloomy colour. The light above mentioned was of a scintillating character, and, although graduated from the edge towards the centre of the moon, seemed to be composed of innumerable points of glistening silver. See sketch.

The colour of the corona is described as a brilliant white, very like the electric light, with perhaps in places, the faintest flame colour, the general appearance giving the idea of some white molten metal, whose top skin of dross had been disturbed, discovering the white hot liquid mass. This, together with a dazzling electric-light appearance which it seemed to possess, are the impressions made on the mind by the appearance of the corona.

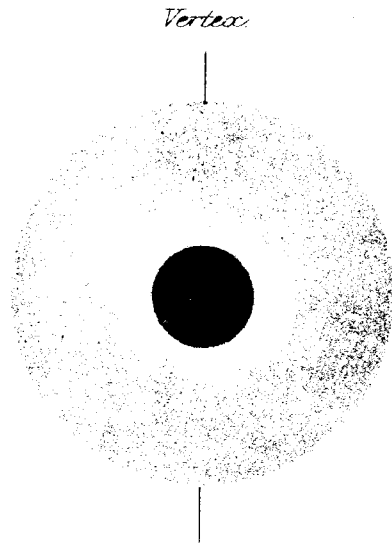
Jupiter was seen and stated as about 30° left of the vertical, and about one solar diameter distant.

A plummet was suspended as a guide for the vertical.

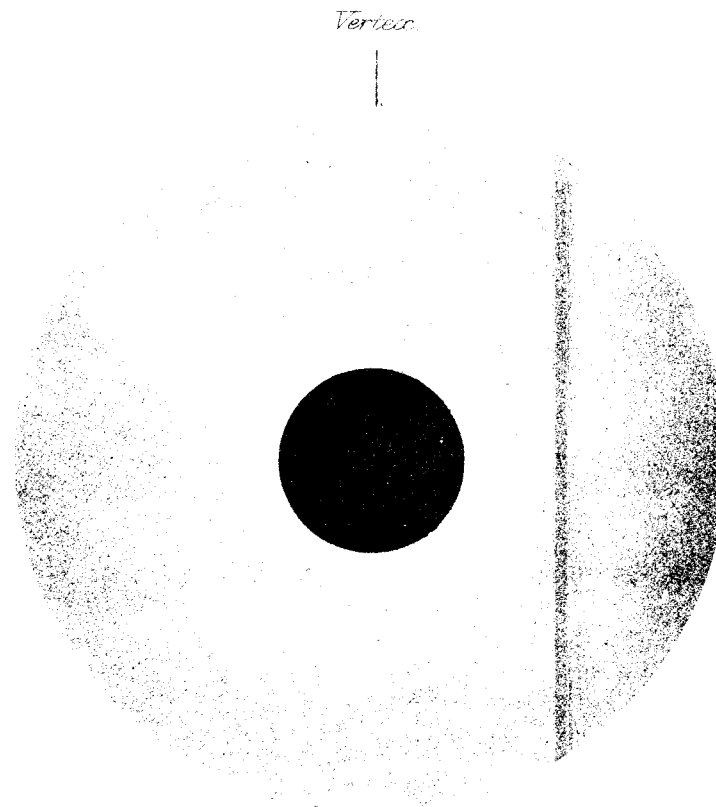
The star like spot on the sun's left upper edge was seen immediately after totality; indeed, although closely observing, at no time was the sun's face quite obscured by the moon, the bright spot—infinately brighter than a star—being always present.

At 8h. 21m. 3s. the altitude of the sun's upper limb was $23^{\circ} 55'$.

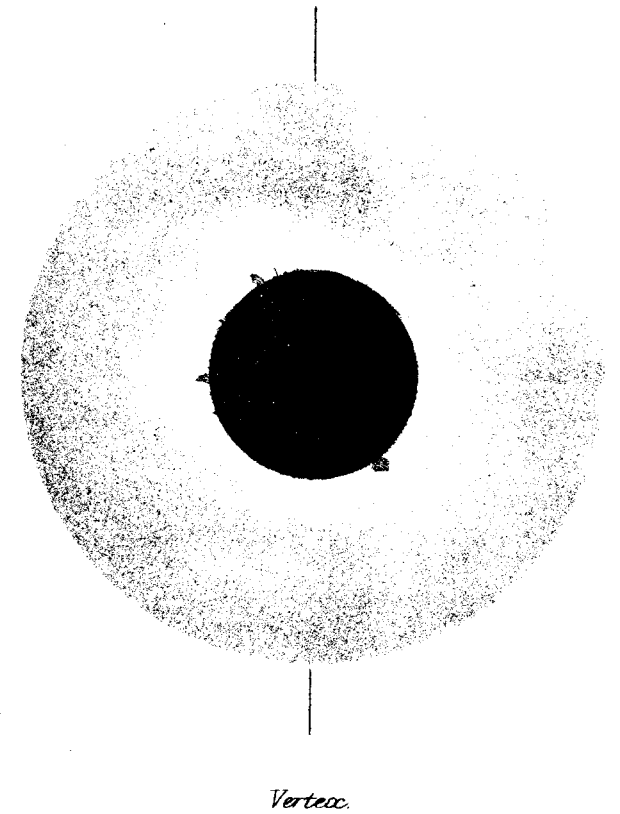
*Sketch of Corona as seen with 3 in. aperture inverting telescope
and power of 36.*
Arthur Beverly.



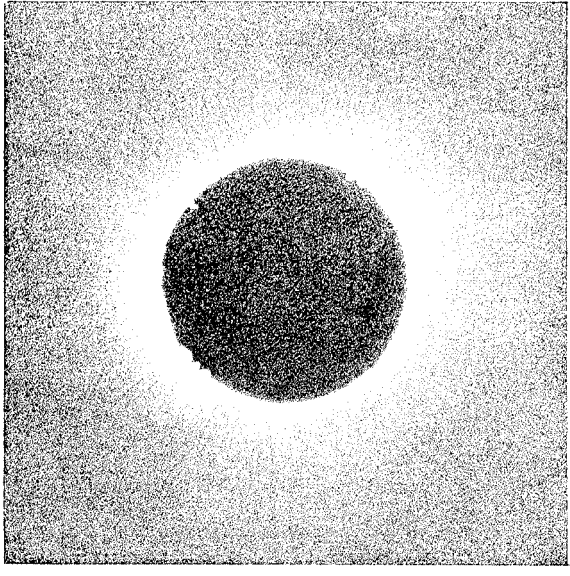
Solar Eclipse 1885, Sept. 9.
As seen with the naked eye at Wellington.
From a drawing by H.E. Taylor.
N.3. Survey Dep^t.



Solar Eclipse 1885, Sept. 9.
As seen with the naked eye at Wellington.
From a drawing by F. Bull.
N.3. Survey Dep^t.

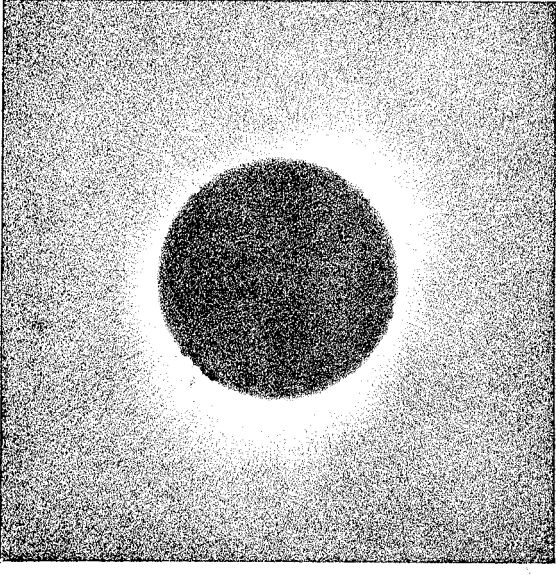


*Solar Eclipse of Sep^r 9 1885.
 From an enlarged photograph by Edward Gell, Public
 Works Department, taken at Wellington at 1h 35m 12s.
 N.J. mean time, with an ordinary Landscape Camera,
 Lat 41° 16' 40" Long 174° 47' 10"*



↑
Corona

*Solar Eclipse of Sep^r 9 1835.
 Chiefly from an enlarged photograph taken
 by A. Barron at 7h 35m 13s. N.J. mean time,
 Lat 41° 17' 28" Long 174° 47' 11.5, inverted.*



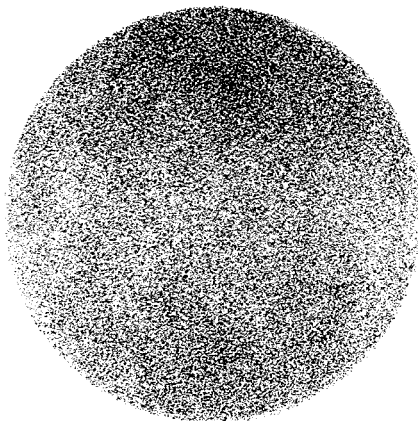
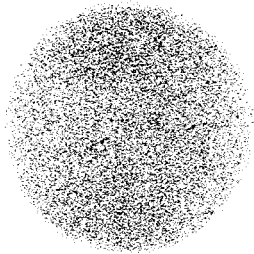
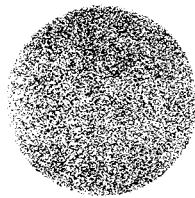
↑
Corona

↑
Sun's path

↑
Corona

Small black dots on a white background.

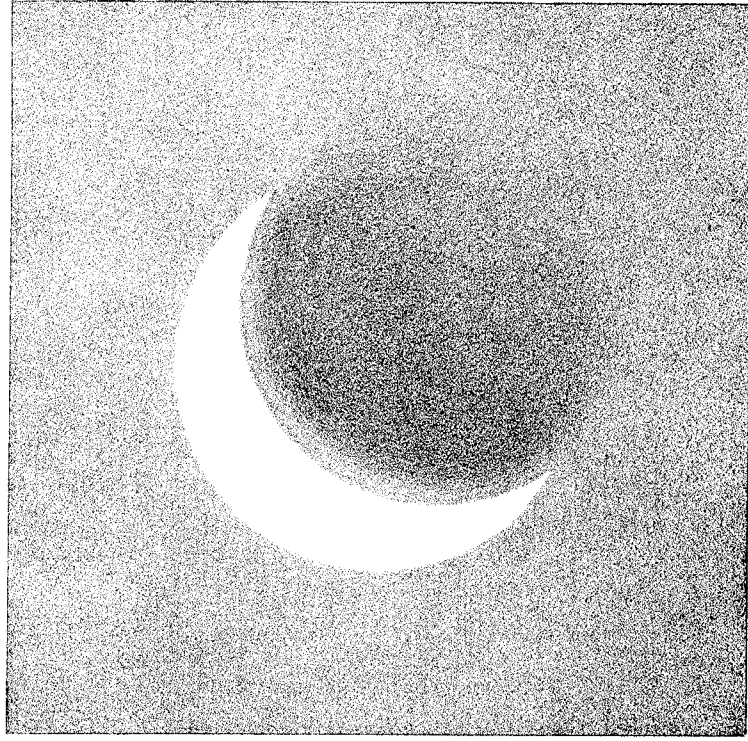
Small black dots on a white background.



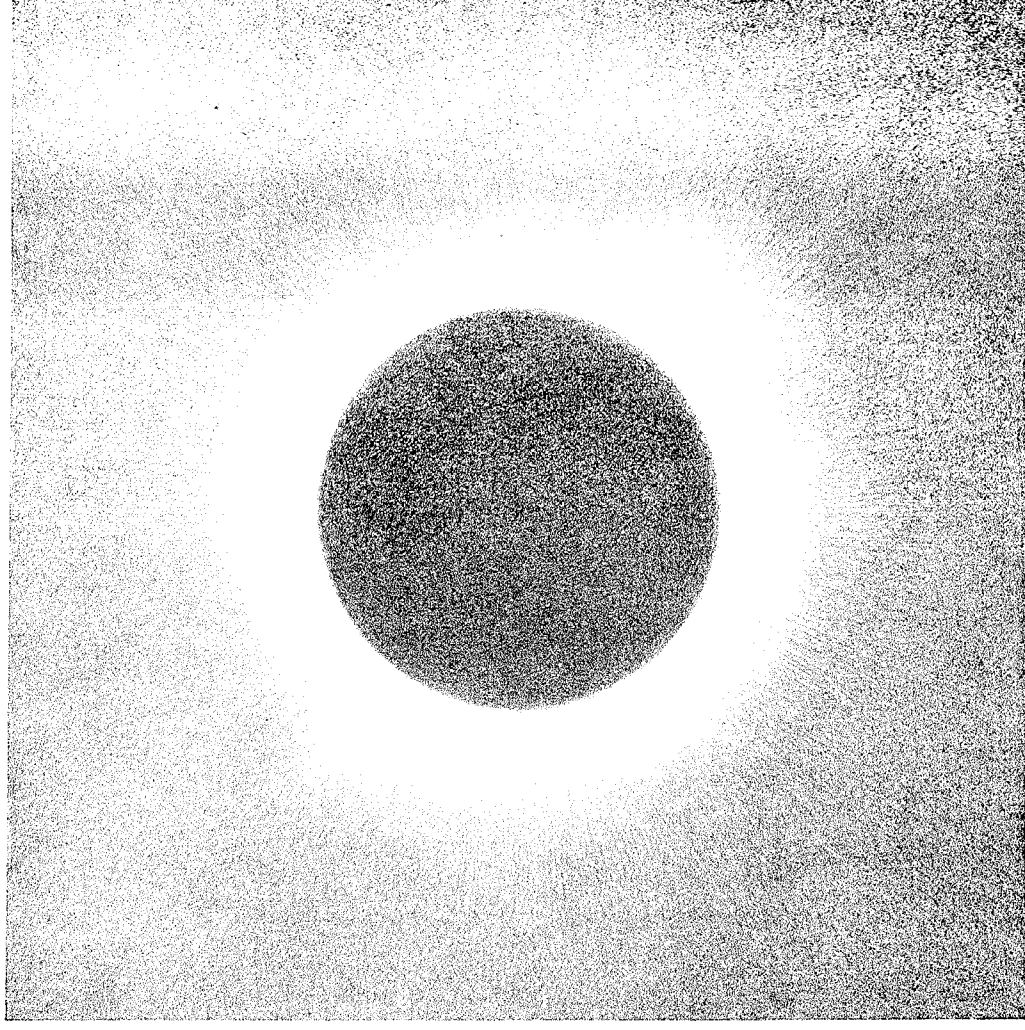
Small black dots on a white background.

Small black dots on a white background.

Perma.

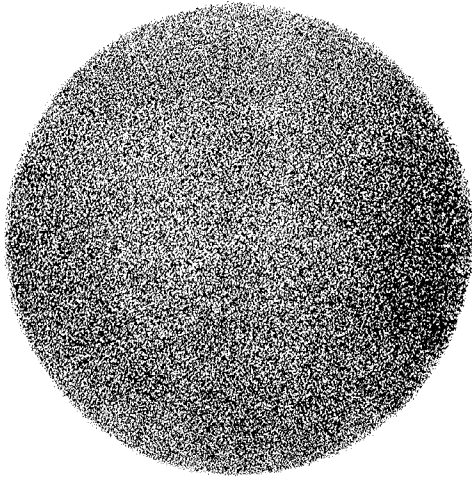


*Solar Eclipse of Sep. 9 1885.
After totality.
H.A.R. Farquhar. del.*

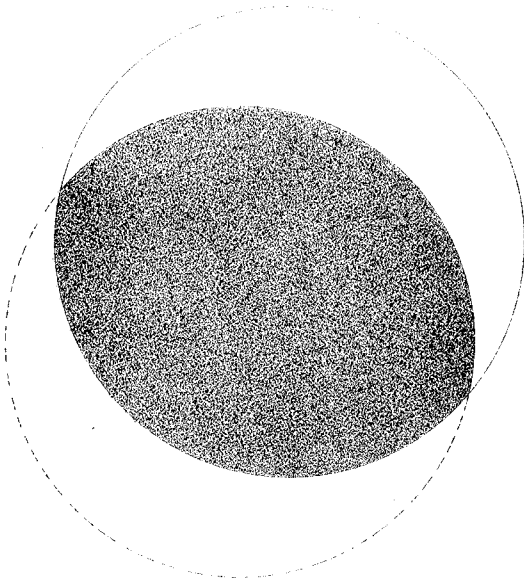


*Solar Eclipse of Oct. 4th 1885.
As seen by H.A.R. Farquhar, H. Survey Instrument with the aid of an
of an 8 inch Theodolite, object glass 18 inch under at Wellington, N.
Lat. 41° 17' 42". 4, Long. 174° 48' 00".*

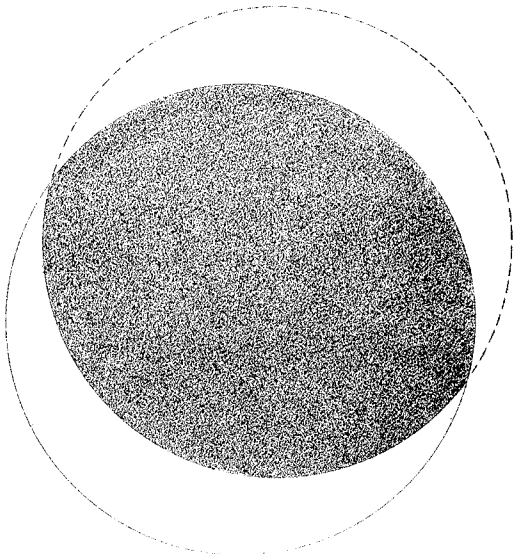
*Solar Eclipse of Sep^r 9 1885.
Totality as sketched by H.A. Gordon.*



Vertex
↓



Vertex
↓

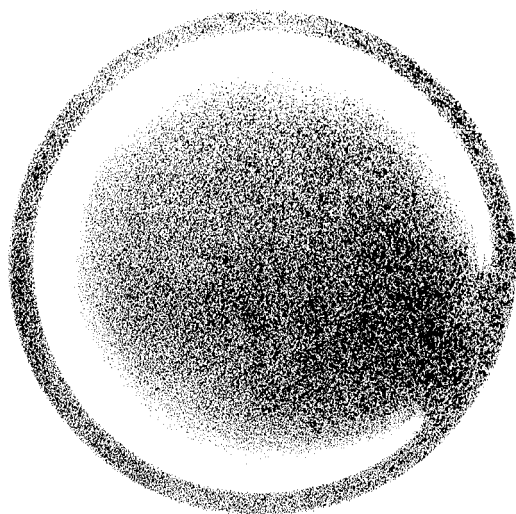


Vertex
↓

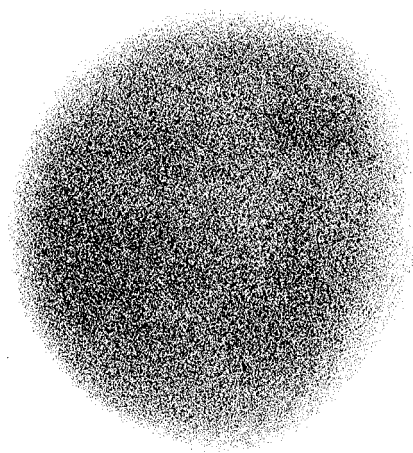
*After totality, showing sun spot.
H.A. Gordon, del.*

*Before totality, showing sun spot.
H.A. Gordon, del.*

Solar Eclipse, Feb 21 1886.
Observed at Station by J. M. Grant.
E. Bell's drawing.



2.



Mr. Farquhar, who observed from Wellington also—Lat. $41^{\circ} 17' 42.4''$, Long. $174^{\circ} 48'$ —notes that as the shining crescent of the sun narrowed to a white band of light, the advancing limb of the moon was beautifully illuminated with a silvery white band, and he could distinctly see the rugged formation of the moon's surface. The solar spot was reached at 7h. 32m. 53s. The white band of light extending round nearly a third of the moon's circumference was very beautiful, and just before totality it appeared to be broken to pieces, which seemed to be drawn into the moon, the last fragment disappearing at 7h. 34m. 24s.

Immediately after totality he noticed a protuberance on the lower right-hand side, extending 12° or 13° round the dark disc of the moon and a quarter diameter in height, and as he had determined to confine his attention to one, selected it for scrutiny. It seemed a rosy golden tint, not unlike a luminous cloud, but having a more defined form and permanent appearance. Another protuberance was noted as high as the first, but very narrow, shooting out like a flame in the opposite direction. Totality ceased about 7h. 35m. 51s. At first the bright band of sunlight was unsteady, but it immediately formed into a crescent, the receding limb of the moon became beautifully illuminated with a band of golden yellow and bright red.

Mr. F. Bull, who observed from a spot overlooking Wellington Harbour, furnishes a sketch bereof. He describes the most noticeable feature of the corona, as the long films on the left-hand upper limb at the point where afterwards the sun reappeared. The greatest distance these films reached seemed about one and a quarter solar diameters, and they appeared somewhat curved as if fanned by a breeze. There was a strong body of bright rays on the opposite lower limb in the line of the moon's transit, but they did not reach a great length like those on the upper limb.

Mr. Malings, who furnishes two sketches, of which one is reproduced, observed the eclipse through the telescope of a 5" theodolite, noticed that shortly after first contact, when the sun emerged from the clouds, there appeared round that portion of the moon which seemed to cut into the sun, a narrow, dark, yellow border, and that the light was gradually so affected as to cause the birds to notice it, as was well seen by their manner, larks rose on the wing and fluttered about, poultry seemed scared. At 7h. 13m. the colour of the yellow border deepened to orange, and a similar tint was observed on the outer edge of the sun. At 7h. 23m. the cusps, which had hitherto seemed sharp, deadened and assumed blunter points, continuing so until the eclipse was total.

During totality tongues of flame, at short intervals, shot out in the direction opposite to the moon's passage, one huge flicker projecting one-third of the sun's diameter, while the opposite edge seemed to scintillate and glisten. There appeared on the moon a light resembling a distorted comet, the nebulous part being highest, and this continued nearly up to the time of totality. At 8h. the band of colour round the moon appeared of a greenish yellow, and the sun also appeared as having a band of the same colour extending for about 50° beyond the moon's contact with its outer edge.

Two spots were seen, the larger one was covered by the moon, without any perceptible change in its appearance.

A. BARRON.

THE first thing I noticed after totality, about 5 seconds after the disappearance of the sun's disc, was three feathery projections of a brilliant crimson with sparkles of green through them, at a point about 135° from the upper end of a vertical line through the sun—they did not seem to be connected to the sun, but had more the appearance presented by a burning jet of gas issuing from a black piece of coal, the flame of a brilliant red. The centre one projected furthest and appeared to extend to one-twelfth of the sun's diameter.

At 315° , or exactly opposite, were two well-marked red projections, which appeared to mark the centre of greatest disturbance, as from this point the coronal light extended furthest. I traced it distinctly to a distance equal to a full diameter of the sun, and just beyond it I saw 7 or 8 streaks of silver white light, sharply defined and parallel, which must have extended $2\frac{1}{2}$ to 3 diameters, as in following them along, I quite lost sight of the coronal light. The best idea I can give of them is by comparing them to 7 or 8 very fine, brilliantly polished silver wires reflecting an electric light. I saw them distinctly for about 5 seconds, but, after looking back at the moon to see if there was any change there, I could not pick them up again.

There were two other crimson projections, one at about 25° and another about 220° degrees from the vertical line; they projected about one-eighteenth of the sun's diameter.

The red projections appeared perfectly steady, but the shape of corona varied a good deal. I have sketched it as it appeared to me about the middle of totality.

About ten seconds before the conclusion, the most brilliant red flames were visible along an arc of about 30° , of which the two red projections noted at 315° , formed the centre, they increased in brilliancy till the sun emerged near that point. This was the most brilliant display of colour during the whole scene.

My sketch does not bring out as clearly as I should like, the distinction between the two classes of coronal light, the inner very white light extending about a quarter of the sun's diameter all round, and fading into the outer which gave the idea of a light reflected by a vapoury mass, and the marked changes in its shape giving more the idea of a varying amount of light falling on it at different parts than any change in the shape of the material itself.

To guide me with regard to positions, I had a circular protractor suspended on a plumb line, by which I formed an idea of the relative positions before totality commenced.

Captain Acland, R.N., tells me he distinctly noticed 5 bright sharp streaks of light extending $2\frac{1}{2}$ diameters from 315° , and particularly remarked their parallelism, as I did; he was using binoculars. He says they were visible for quite half the duration of totality.

J. DUDLEY R. HEWITT.

APPENDIX 4.

ROADS TO OPEN CROWN LANDS FOR SALE.

Extracts from Reports and Statements of Supervising Officers and Local Authorities on the Work done from 1st July, 1885, to 1st July, 1886.

AUCKLAND.

Okaihau to Victoria Valley Road.—At the date of last year's report we had $17\frac{3}{4}$ miles of this road opened as a cart road for 10 miles, and as a bridle road for $7\frac{3}{4}$ miles. During the past season $4\frac{1}{2}$ miles of bridle road have been added, making $22\frac{1}{4}$ miles in all, which brings it to the crossing of the Mangamuka River, a bridge over which is now being built by contract. The direct area affected by this road is 7,200 acres; indirectly, the opened country is vastly greater, and will become more advantageous as it progresses. Mr. Garsed has had charge of the work supervised by Mr. E. Fairburn.

Kohukohu-Rakautapu.—The Hokianga County has had the $5\frac{1}{2}$ miles length of this road in hand for some eighteen months. It is, I believe just on the point of completion. It renders communication with Victoria Valley far easier, and opens directly 387 acres of Crown land at Kohukohu already cut up, and awaiting sale. It also opens indirectly an area of 15,000 to 20,000 acres.

Lower Waihou.—This line has been laid out by Mr. Wheeler, leading from the landing place to the Crown lands in Whangape for a distance of 8.1 miles, and arrangements have been made to let the work for the first $2\frac{1}{4}$ miles to the natives living in the vicinity. When completed, it will open up some 8,000 to 10,000 acres of Crown land.

Waimamaku Bridge.—This bridge of 271 feet length, and with approaches two chains long, has been completed under contract. Although not built specially to open Crown lands, it effects that purpose to a certain extent, whilst it at the same time affords a safe crossing to a very dangerous river. About 11,000 acres will have been indirectly opened by this work. Mr. Fairburn supervised, the county inspecting.

Drains—Tatarariki.—A drain of about 58 chains length has been made by the Hobson County Council, which has had a very good effect over some 2000 acres of Crown land, nearly all swamp.

Paparoa-Waikiekie Road.—About 4 miles on this line have been surveyed and graded for engineering works, and also properly surveyed for securing the title. Questions of compensation have hitherto delayed the commencement of the work, but tenders for $1\frac{1}{4}$ miles are now called for. The road when opened will be very beneficial to the neighbourhood, and will open for settlement some 12,800 acres. Mr. Fairburn has been in charge.

Wairua to Helena Bay.—Nothing on this line has been done beyond arranging for an exchange of landing places, to make the terminus of the road more available.

Awaroa Swamp Drains.—The Waipipi Road Board undertook the supervision of this work, which, when completed, will open about 3000 acres of good swamp. A length of about $1\frac{3}{4}$ miles of drain is in hand, the material thrown out from it forming a road. Under the same heading are included two other items of the road Votes, "Awaroa Swamp and Whiriwhiri," as they all refer to the same work.

Aka-aka Swamp Drains.—This work, also, after having been laid out by Mr. Murray, is under the supervision of the Waipipi Road Board. A contract has been let for the first portion of a little over $1\frac{1}{2}$ miles. When this drain is finished, it will have opened up about 3,700 acres of good swamp land.

Waerenga Road.—At the date of last report, $3\frac{1}{4}$ miles of this road had been formed as a bridle road. Since then, Mr. Fairburn has laid out and constructed 4 miles additional of seven feet bridle road, and built a twenty foot bridge. The road opens a way to some fairly good country suitable for settlement, and is also useful as giving a through route to the Piako block. About 3000 acres of land have been opened up by it, besides giving access to several private properties.

Churchill Punt.—A contract has been let for building a punt to enable settlers to cross the Waikato River at this place, a want which has hitherto been much felt. It renders communication with a road which the department constructed three years ago, comparatively easy, and opens up a large extent of country. The contract is still proceeding.

Whaingaroa to Kahuru.—This work is in extension of the line opened last year. Mr. Fairburn has formed 8 miles of seven foot road, which leads down to a landing-place on the Whaingaroa Harbour. The bridges on this line have not yet been completed, but 3000 feet of timber have been sawn ready for them, and about 10 miles of old road cleared and repaired. This will prove a most useful work when completed, to effect a junction with the main road from Waikato to Raglan, and it forms as well, a portion of a main road, Huntly to Kawhia. The country opened amounts to about 5,000 acres.

Kawhia Aotea Road.—Some heavy slips on this line have been removed, and some fascining done on the most dangerous crossings along the Aotea Harbour.

Kawhia Waipa Road.—Mr. Fairburn has had this road under his charge. The works have consisted in widening out six feet bridle road into a cart road fifteen feet wide, a distance of 18 miles, and the construction of two bridges and about 25 culverts, corduroying with punga, and fascining with tea-tree. The bush has been burnt off, and the ground sown with clover and grass for 15 miles. It is doing very well.

Alexandra-Hikurangi Road.—This road which leads into the Kawhia Waipa Road, mentioned above, and forms the connecting link between it and the town of Alexandra, has been formed for $6\frac{1}{2}$ miles, which added to last year's work makes a length of 10 miles formed from fifteen to eighteen feet wide. In addition, forty feet of bridges and culverts have been built, and 2,300 cubic feet of embankments made, with twenty-two chains of fencing erected where the road passes through native cultivations. There still remains further work to render this road available for wheeled traffic; about 100 feet of bridging which is still under contract, but Mr. Fairburn hopes to complete this work three months from now.

Cabbage Bay to Cape Colville.—This road is in charge of the Coromandel County which has, I believe, done some work on it, but to what extent I cannot say.

Puriri to Tairua.—The works on this line are to be undertaken by the Thames County, but at present no start has been made, except the exploration by Mr. Fairburn of a long deviation which the settlers pointed out, and which proves to be an improvement on the surveyed route. As soon as this new line is graded, the work will go on.

Waikou Ferry through Komata.—The Ohinemuri County report that this drain has been made, and it is now awaiting the receipt of their plans and specifications to be inspected; until that has been done, I can give no details. It will open about 3,500 acres of Crown land.

Rotorua Galatea via Rotomahana.—This line which Mr. J. C. Blythe has had in charge, starts from the Wairoa village (lately destroyed), and was intended to pass Rotomahana on the way to Galatea, but through the opposition of the Maoris, the first part could not be made. A start was therefore made at Okaro Lake, and a line laid out to the Rangitaiki River near Galatea, and $10\frac{1}{2}$ miles formed as a cart road. Mr. Blythe had just returned to the Wairoa to go on with the grading of the first part, when he and others were overtaken by the fearful eruption of Mount Tarawera, on the 10th June last, from which he barely escaped with his life. Nothing of course has been done since, nor will it now be necessary, in consequence of the physical changes in the country.

Galatea-To Kapu via Waikaremoana.—Mr. J. C. Blythe has constructed $15\frac{1}{2}$ miles of bridle road, extending from the Rangitaiki River to the Ahikereru native village, and has secured some excellent grades in a difficult country. Had it not been for the obstruction of the Uriwera tribe, this road would be much further advanced, though at the same time, I should say, no work can be done in that mountainous country in the winter. I sent a full report of the meeting I had with the Uriweras so need not repeat it here. When the end of August comes, the line ought to be pushed on again, and an endeavour made to enlist the Uriwera themselves in the work. The Ngatimanawa and Ngatiwhare will help all they can to push the work forward.

Taupo via Rotoaira and Murimotu to West Coast.—The Waimarino branch of this road has been continued this year under Mr. A. B. Wright's direction to Otuku, a native village east of Rotoaira, a distance of $10\frac{1}{4}$ miles of sixteen-foot road having been completed by native contractors in a very efficient manner, whilst a considerable length is still under contract. A cart road now exists continuously from Taupo township to Otuku, a distance of $56\frac{3}{4}$ miles; but great difficulty is experienced in crossing the Waikato River during winter, as it is not yet bridged. The Murimotu branch of this road leading from that place to Whanganui, and which is more generally known as Field's Track, has had some attention paid to it by Mr. Wright, but as there is a great difficulty in getting from end to end of it at this time of year, Mr. Wright is not able to furnish exact data as to what has been done. At the Murimotu end about 1 mile has been contracted for, and is now about finished, whilst two contracts are in operation at the Whanganui end. The old track has been repaired and vegetation cleared off it for about 22 miles, but this still leaves it one of the worst roads to travel over I ever experienced—not on account of the grades, which are good, but from the mud.

Opotiki to Ormond.—Mr. Sidney Crapp, Public Works Inspector in charge of this road, reports that the work has consisted of rock excavations in widening the road from four feet to eight feet wide at all the rocky and precipitous places, as under:—5,402 cubic yards of hard rock, 6,122 $\frac{3}{4}$ cubic yards of picking rock has been excavated, and 153 chains of rock stripped. Maintenance.—Four surfacemen have been employed on this work; the length of road maintained has been about 60 miles all through forest, and, considering the small number of men employed, has been kept in fair order for horse traffic.

The Cook County Council have had the control of the following road works, but subject to Inspector Barnard's approval of the specifications and final inspection of the work. A sum of £8,876 has been spent by them—very advantageously as Mr. Barnard reports:

Tolago Bay to Arakihiki.—Mr. Winter, the County Engineer, has constructed 10 miles, which, I gather, is ten feet wide, and has pegged off an additional $5\frac{3}{4}$ miles ready for contract. This line will be a useful road, opening up some good land suitable for pastoral purposes. The fund's however, will not admit of any further works at present.

Ormond-Waipapu Road.—On this line, $6\frac{3}{4}$ miles of bridle road have been widened out to a cart road ten feet in the solid, and a large number of culverts put in, draining done, and stumps cleared away, rendering the route available for carts in summer time a distance of $38\frac{1}{2}$ miles from Gisborne. The County Engineer estimates that the 44 miles yet to construct will cost £10,000.

Waipiro Branch of above Road has been kept in repair, and $\frac{3}{4}$ of a mile in addition formed, a width of twelve feet in the solid and additional culverts added, and 8 miles of road flattened at the bends, and grades eased.

Tuparoa Branch of Ormond-Waipapu Road.—4 miles of this road have been improved by widening and easing grades, and a bridge of forty-two feet span built, besides several culverts.

Gisborne-Waimata Road.—Of the 7 miles of new line laid off $5\frac{1}{2}$ have been formed this year as a ten-feet-in solid road, involving the erection of sixty-five culverts and five bridges, and this work has rendered a considerable area of Crown Land open for selection and settlement—the total length open from Gisborne being 21 miles, available for cart traffic.

Gisborne-Wairoa.—On this main line 4 miles have been completed during the past year to a width of twelve feet, and nine bridges (one of seventy feet span) have been erected, besides a large number of culverts (ninety-six). It is believed that the remaining $2\frac{1}{2}$ miles now under contract will be completed in six weeks' time, and then the road will be open to driving from Gisborne to Wairoa.

Mr. Baker in his report states—The contract for the bridges over the Haipapa and Kaiterahai formed road been completed, and the sum of £50 18s. expended in clearing away slips on the newly-streams have line. The total expenditure for the year, exclusive of sum granted to Wairoa County Council is £266 8s. 7d.

In these works undertaken by the Cook County, the Government grants have in most cases been largely supplemented from County funds.

I beg to furnish below a tabular statement of the works carried on during the year.

Name of Road.	Bridle-road.	Cart-road.	Graded in Addition.	Bridges not included in Roads.	Area Opened.	Remarks.
	Miles.	Miles.	Miles.		Acres.	
Okaihau-Victoria	4·5	...	...	...	7,200	Bridge in hand, building
Kohukohu-Rakautapu	5·5	...	...	...	387	Just completed
Lower Waihou	...	...	8·1	...	...	Contracts let for 2½ miles
Waimamaku Bridge	...	...	...	271ft.	11,000	Completed
Tatarariki Drains	...	...	...	0·75mils.	3,000	Completed
Paparoa-Waikiekie	...	...	4	...	...	Tenders called for
Awaroa Drains	...	...	...	1¼mils.	3,000	In progress
Akaaka Drains	...	...	...	...	...	In progress
Waerenga	4	...	...	...	3,000	About complete
Churchill Punt	...	...	...	...	...	In progress
Whaingaroa-Kahuru	8	...	...	...	5,000	In progress
Kawhia-Aotea	...	...	...	...	8,000	Complete
Kawhia-Waipā	...	18	...	...	...	In progress (bridges)
Alexandra-Hikurangi	...	6·5	...	...	...	In progress (bridges)
Cabbage Bay-Cape Colville	...	...	...	...	...	Uncertain
Puriri-Tairua	...	...	...	...	...	Explored
Waihou Ferry, through Komata	...	...	...	...	3,500	Complete—no detail
Rotorua Galatea	...	10·5	12·5	...	61,000	Delayed
Galatea-Te Kapu	15·5	...	...	...	...	Delayed
Taupo-Waimarino	...	10·25	2	40ft.	...	In progress
Murimotu-West Coast (Field's track)	3·0	...	...	...	...	In progress
Tologa-Arakihi	...	10·0	...	...	7,300	In progress
Ormond-Waipu	...	6·75	...	...	67,000	Delayed
Waipiro and Tuparoa	...	0·75	...	...	...	Completed
Gisborne-Waimata	...	5·5	...	...	19,500	Completed
Gisborne-Wairoa	...	4·0	...	70ft.	67,000	In progress
Totals	40·5	72·25	26·6	...	204,887	

S. PERCY SMITH, Assistant Surveyor-General.

HAWKE'S BAY.

SINCE the first votes to open up Crown land were taken in 1880, to the end of the past financial year, the sum of £29,755 has been expended on roads giving access to lands which have been prepared for settlement, and the area selected in the same period out of the blocks affected by this expenditure is: By cash sales, 8,091 acres, price £12,875; on Deferred-Payments, 39,972 acres, price paid or to be paid, £51,526; on Perpetual Leases, 7,868 acres, capital value, £10,045; total area, 55,931 acres; total value, £74,446.

The grants to the Road Boards from the lands taken upon deferred payments and perpetual leases amount to £19,685, a sum sufficient to materially assist in completing the preliminary works undertaken to give access to the different blocks before they were thrown open for selection.

Rotokakarangu Block.—Acreage to be rendered better accessible, 32,574 acres. The expenditure of the sum of £900 has been placed at the disposal of the Wairoa County Council for the Ohinepaka-Putere Road; a portion of the grant (£275) is to be laid out in forming a bridle track from the Cricklewood Junction to Putere, and the balance in making a commencement with the dray road starting from the Ohinepaka Valley. Since the construction of the road was put in hand, seven small grazing runs in the Waihua Block, covering an area of 13,923 acres, have been taken up. As stated in previous reports, the sum voted for this block is not sufficient to do more with, than to make a commencement on the work. The road is an important district road and gives access to the properties of several enterprising settlers who are occupying land in the back country.

Puketitiri Bush.—There has not been any expenditure on the roads in this locality during the past year.

Makeretu Block.—8½ miles of road line have been explored for, and graded through the bush, and contracts are about to be let for clearing the road one chain in width. The area opened out by this road is about 8,000 acres of pastoral forest country. Cost to date, £192 4s.

Te Ohu Block.—Area to be opened up, 2,000 acres. Mr. Bargh, road surveyor, is now engaged exploring for a road-line through this block.

Umutaoroa Block.—Area affected by expenditure, 7,067 acres. The land in this block, at all suitable for settlement, has been taken up by the Danevirk and Waipawa Small Farm Associations. 11 miles of road have been cleared, stumped, and sown with grass, sixty-five chains of formation completed, one bridge and eleven culverts laid down, at a cost of £2106 11s. 5d.

Maharahara Block.—The works on this block are now finished, unless it is found on survey that the lands in the Mangaatea Valley, under the Ruahine Ranges, are suitable for small holdings. If such is the case, any expenditure for clearing the roads can be provided out of the miscellaneous vote. Road clearing one chain in width, 15 miles; formation, 2 miles forty chains; thirty-six culverts and one bridge have been carried out, at an expenditure of £3,501 7s. 4d. Area rendered accessible by this expenditure, 8,693 acres.

Victoria and Bush Mills Settlement.—The Woodville Road Board have expended the sum of £703 2s. 3d. on the roads in these settlements, and have completed fifty-five chains road clearing, 249 chains formation, 80 chains metalling, and 13 bridges and culverts. There is a balance of £96 17s. 9d. not yet laid out. Area affected by expenditure, 5,820 acres.

Tahoraite.—A grant of £50, out of the vote, has been spent by the Kumeroa Road Board on the bridle track in the Otawhao Valley, Puketoi Block.

Tautane Block.—The Tahoraite-Wainui Road has now been cleared through bush from end to end, and horses can travel over the line. The work completed is 24½ miles clearing and stumping through forest. Formations and side cuttings, 6 miles; culverts, thirty-seven; bridges, three; at a cost of £6,552 1s. 11d. Tenders have been invited for 5 miles fifteen chains of formation. During the year 10,914 acres, valued at £10,289, have been taken up on the deferred-payment and perpetual lease systems. The area of Crown land remaining to be opened up is 48,000 acres. The main road through the block connects the coast settlements with the railway at Tahoraite, and will become an important district road; for, besides giving access to lands in this district, it will be an outlet for a large area, say 15,000 acres, of limestone country in the Wellington Provincial District. It is estimated that a further sum of £8,500 will be required to open up the block. This does not include bridging the large rivers or metalling the road.

Miscellaneous.—One contract has been let for clearing forty-four chains of road through the Woodville Village Special Settlement.

HORACE BAKER, Chief Surveyor.

TARANAKI.

MR. G. F. ROBINSON, Crown Lands Ranger, who has had charge of the major portion of the road works in this district, reports:

Roads through Native Leased Lands between Opunake and Stony River.—The improvement of these roads by clearing, culverting, and part formation, was commenced last year, and completed early during the present one. The vote of £1,000 was all expended, the lengths of roads opened up being nearly 18 miles, and the amount paid on account of the work during the past year was £753.

Tariki Road, from Block VI., Huiroa to Waitara River.—This part of the Tariki road now forms part of, and is named, the Junction Road, being a continuation of the Junction Road from New Plymouth to the Waitara River. The work on the above portion was the formation of the road over the watershed between the Manganui and Waitara Rivers. It consisted principally of heavy side cuttings in papa rock. The length of the work was 2 miles sixty chains, the cost £1,197.

Junction Road from Inglewood District to Waitara Valley.—This is a part of the main road, which eventually will run from New Plymouth to the Crown lands in the Ngatimaru and Taramouku districts, in the valleys of the Waitara River and its tributaries. The portion of the road on which work has been done during the past year is from the settled lands in the Inglewood district to the point where the road joins with the Tariki Road, a distance of about 5½ miles. The work has consisted of felling the bush one chain wide, and clearing and stumping a cartway in the centre, twenty feet wide. This work is nearly finished, and the first mile of it has been laid off and let—at very low rates—for culverting, tunnelling, and formation. The cost of the felling and clearing to date has been £361 19s. 5d., the liabilities at date for completion of felling, and the first mile of formation amount to £253. There still remains about 4½ miles of culverting and formation to do—which will be shortly in hand—and the erection of a bridge across the Manganui River, also two smaller bridges over streams, to make this road practicable for dray traffic to the Waitara River.

Eltham Road, from about Kaweora Road to Taungatara Stream.—The work on this road for the past year consisted of one contract for forming and gravelling sixty-nine chains of road, and the formation and gravelling of 1½ miles of the road by a working party of Armed Constabulary. This completes the road—excepting bridges—from Opunake to the boundary of the Taranaki and Hawera Counties. Until, however, bridges are erected over the Mangahunui and Taungatara Streams, the road cannot be generally used for drays westward of the Mangahunui stream, the ford over the latter being changed by almost every freshet. The cost of the work for the past year has been £432 18s. 9d.—namely, contract for sixty-nine chains of road, £187 12s.; Armed Constabulary labour and material, £245 6s. 9d. Timber is now being cut for the erection of a foot bridge over the Mangahunui stream, the liability on account of the bridge being about £20.

Roads in the Iron Sand Block, Egmont Survey District.—The works entered into, viz., the extension of the Egmont, Dudley, and Durham roads, are now nearly completed. The contracts let will absorb the whole of the £360 authorized. The payments to date are about £197 19s.; the liabilities are about £162. The contracts were for felling the Egmont road to the Mount Egmont forest reserve, the Dudley and Durham roads to the Cambridge road—the roads being felled one chain wide and cartway cleared sixteen feet wide. There are also contracts for culverting and draining parts of the Egmont and Dudley roads.

Kahiu Road, from Main South Road at Rahotu, to Mount Egmont Forest Reserve.—This road runs through a portion of the 20,000 acre native reserve in the Parihaka district, and will lead to Crown lands—about 9,000 acres lying between the native reserve and the forest reserve. 3 miles ten chains of the road has been felled one chain wide, and a cartway, twenty feet wide, has been cleared,

culverted, graded, and formed. About 2 miles seventy chains—the balance of the road to back line of reserve—is now being felled and cleared, after which it will be culverted and formed. The cost to date has been £764 5s. 11d., and the liabilities for works in progress amount to £210. The work has been done entirely by natives, the contracts were taken a little below average rates in the district, and the work has been done in a most satisfactory manner; in several cases work being done not required by the specifications. The completion of this road will be a great boon to the settlers in the Rahotu district, as it will enable them to obtain sawn timber, fencing, and firewood of which they are in great want. A sawmill will probably be erected on native land, adjoining this road, during the ensuing summer. The total expenditure on roads under my actual supervision during the past year has been £4,019 12s. 2d. In addition to the before-mentioned works, I have had the supervision of the plans and specifications, and the inspection and the issuing of certificates, on account of the following works entrusted to Road Boards.

Stratford-Opunake Road, being the completion of the formation and metalling of this road between Stratford and the Waingongoro stream. This work, consisting of the forming and metalling of about ninety chains of road, is being carried on by the Ngairi Road Board. The contracts for the formation, and some tunnels, are now well advanced, and are expected to be completed about October, and the metalling will be commenced so soon as the road is dry and firm. The vote of £1,000 is expected to complete the road—including metalling—from Stratford to the top of the hill on the west side of the Waingongoro stream, excepting the approaches of the Waingongoro bridge, which will be made at the cost of the Waimate and Ngairi Road Boards. No payments have yet been made on account of this work.

Bridge over Waingongoro Stream, Stratford-Opunake Road.—This work is being done under the supervision of the Waimate Road Board. The concrete piers are built, and a large amount of the material for the bridge is on the site. The bridge will probably be completed in August and open for traffic in about October. No payments have yet been made on account of the work. The certainty of the Opunake Road being constructed to the Waingongoro Stream, and the erection of the above bridge, have been the means of selling a very large area of Crown lands in Blocks VII. and VIII., Kaupokonui, which previously had been unsaleable. Nearly all the sections open for sale have now been disposed of, and those abutting on to the forest reserve will soon be in demand.

Roads through Native Leased Lands, Blocks X. and XI., Opunake.—The formation of parts of the Ihia-Kaweora and Waituka roads, so far as the lands have been leased, was entrusted to the Stony River Road Board. The various works—draining, culverting, and formation—are just completed, the whole of the vote, £700, having been expended.

Motuwhero Valley Road.—The opening this road, to give access to the Crown lands inland of Waverley and Waitotara, has been placed in the hands of the Wairoa Road Board, who have employed a surveyor—Mr. Fraser—to lay off the best line obtainable. A very good, and practically level line of road has been found, of easy formation, and, I presume, the road work will be soon commenced.

In connection with all of the above works, I may state that I have carefully examined the various plans and specifications, and have visited and inspected the several works as occasion required.

In addition to the supervision of the road work placed under my charge, I beg to state that during the past year I have also performed the following work in connection with my duties as Crown Lands Ranger:—Inspections of 21,110 acres of deferred-payments and perpetual lease lands, held by 215 selectors, in the Taranaki and West Coast districts; nine inspections under the Forest Trees Planting Encouragement Acts; thirty-two special inspections, at various times, for valuations, or granting certificates to deferred-payment settlers to purchase their freeholds; the reporting on eleven Road Board schedules of proposed expenditure of deferred payment monies, in many cases requiring my inspection of the Road Board books; and the usual office work, including the plans and specifications for the various road works; 153 reports and certificates, and outward correspondence of over 420 letters.

G. F. ROBINSON, Crown Lands Ranger.

WELLINGTON.

Otamakapua-Waitapu Block.—Kimbolton Road extension work done, sixty chains felled and cleared, sixty-six feet stumped thirty-three feet in width, 148 chains formed twenty feet in width, at a cost of £346. Also, 553 chains felled, cleared and stumped, sixty-six feet and sixteen feet, and 524 chains formed seven feet in width, and maintenance on 10 miles of roads, and sowing grass seed, at a cost of £676. The works have been carried out by Mr. Charles Field in a thoroughly workmanlike and satisfactory manner. He is now extending the horse road to the Pemberton Association's block. The Kiwitea Road Board have in hand the metalling of $1\frac{1}{4}$ miles of this road, to cost £260. The works on the branch road to the Oroua, to give access to the Feilding Special Settlement block, are ready to be advertised. The area opened up or served is about 75,000 acres.

East Side of Pohangina.—Work done: $152\frac{1}{2}$ chains of bush felling, stumping, formation, fourteen feet wide, culverting, &c., at a cost of £667. This road is also a useful and important line, it gives access to the Wanganui Harbour Board's Endowment block, and the Crown lands on the east side of the Pohangina river; the area opened up or made more accessible is 10,000 acres.

Mangahao and Mangatainoka.—Mr. Reaney explored about 53 miles of roads, including the proposed cross-roads over the Taranui Ranges to Manawatu, of which he located about 20 miles. Levels were taken over 11 miles, complete plans and specifications for contract were prepared of $9\frac{3}{4}$ miles of roads, and 7 miles more were graded and laid off for contract with the Abney clinometer. The contracts let, and now in progress, comprise:—1. The Pahiatua-Mangahao road: $4\frac{1}{2}$ miles to be felled, cleared, and stumped, sixty-six feet and thirty-three feet respectively, and formed and culverted as a dray road thirteen feet in width, at a cost of £1,235. 2. The

Mangatainoka central road: Two contracts for $4\frac{3}{4}$ miles of bush felling, clearing and stumping sixty-six feet and thirty-three feet in width respectively, the contract price being £430. Mr. Reaney is superintending the works. Tenders are about to be called for the construction of a dray road from near the Mangatainoka bridge to the Masterton-Mangahao Special Settlement block, a distance of $5\frac{1}{4}$ miles. The area benefited by these roads is about 15,000 acres.

Kaiwhata Roads.—The Wairarapa West County Council have in hand the formation of the Gladstone East Coast road, between the Wainuioru and the Kaiwhata Rivers, and have let contracts, I understand, covering about $7\frac{1}{4}$ miles, the cost to be about £563. This road benefits about 20,000 acres.

Pahiatua-Mangaone, &c.—Mr. Reaney located 11 miles, and levelled over 2 miles, and contracts were let for $11\frac{1}{2}$ miles of roads as follows:—

Tiraumea North,	completed,	$4\frac{1}{4}$ miles.	Contract price,	£353
Mangaone Roads	"	$5\frac{1}{4}$ "	" "	£650
Pahiatua Village Roads	"	$1\frac{3}{4}$ "	" "	£120
Makakahi Road	"	$3\frac{1}{2}$ "	" "	£270

The area affected is 15,000 acres.

Tokomaru Block.—Contracts were advertised for the construction of a branch road to West Tokomaru, but owing to opposition of property holders no tender was accepted.

Marton to Murimotu.—The Rangitikei County Council undertook the metalling of part of this road near Hunterville. Several bridges and culverts have been constructed, about fifty chains of road metalled. The line is now open to Pukeore, and gives easy access to the Crown lands in the Otairi block.

Karewarewa Block.—A branch road was cleared and stumped, sixty-six feet and twenty feet, and formed as a horse road four feet wide for 2 miles, at a cost of £233. This line connects with the Wanganui-Mangawhero-Murimotu Road, and serves about 7,000 acres. The block is now partly occupied on the Small Run system.

Paratieke Block.—Two contracts were completed, comprising $3\frac{3}{4}$ miles of horse roads, cleared sixty-six feet, stumped twenty feet and formed four feet wide. The cost was £484, and the area affected is about 10,000 acres. Most of the adjacent country has since been taken up on the Small Run system.

Rangitumau.—No road works have been let, in consequence of the difficulty in acquiring legal rights of road.

Otairi Block.—The surveys have been made, and plans and specifications have been prepared by Mr. Alexander Dundas for the construction of a horse road 2 miles in length, through the Clifton Special Settlement Block, to cost £300.

Wairanga Drain.—The Manawatu Road Board were entrusted with the widening and deepening of the main drain. Three contracts were let for £465, of which, I understand £350 was provided by the Government. 250 chains of the main drain have been widened and deepened from section 1556, Block V. to its discharge at the Taonui swamp.

Maungakaretu Block.—The Rangitikei County Council was authorised to expend £200 in opening up this block by the Ongo line, the worst portions between Mangahoe Junction and Turakina River, adjoining the Maungakaretu Block have been formed for cart traffic, and the necessary culverts put in, the remainder is under contract.

J. W. A. MARCHANT, Chief Surveyor.

NELSON.

Tadmor and Buller Road.—The total length of this dray road to open 10,000 acres of Crown lands is $17\frac{3}{4}$ miles. At the date of last report 12 miles had been formed, and partly metalled at a cost of £4153 8s. 6d. During the year 2 miles more have been completed, $1\frac{3}{4}$ miles are in progress, and another section of 2 miles has yet to be done, to open and complete this work. In March, Contract No. 22, a 2 miles section was let at the Hope Valley end, and completed in June for £520. In April, Contract No. 20, $1\frac{3}{4}$ miles section, on the Tadmor side of the saddle, was let for £710, and is yet in progress. One progress payment of £100 15s. 3d. has been made. Balance due, £609 4s. 9d.; supervision £61 10s. The remaining section of 2 miles length lies between Nos. 20 and 22. The bush was felled sixty-six feet wide, clearing fourteen feet, formation twelve feet, fillings and approaches to bridges and culverts only, have been metalled.

Aniseed Valley Dray-road.—This line has been constructed for the purpose of opening a large tract of Crown lands containing minerals. At the date of last report a length of 2 miles had been constructed at a cost of £470 13s. 8d. During the year a length of $7\frac{1}{4}$ miles has been constructed, making a total of $9\frac{1}{2}$ miles at a cost of £3447 1s. 5d.; of this the Champion Copper Mining Company contributes one-third of the amount, £1149 0s. 8d. Contract No. 24, 4 miles, was constructed at a cost of £1338 5s. 9d., and No. 25, $3\frac{1}{4}$ miles, £1638 2s., including survey and inspection. A large amount of rock cutting was done on this road, the bush was felled sixty-six feet wide, and the formation was twelve feet.

United Creek, Road and Bridge.—This is a branch line from the main valley road constructed to give access to mineral land at the head of the United Creek, and to the Champion Company's works. The Government granted a sum of £600, the company to pay the balance. Contract No. 26, 1 mile forty-three chains has been completed at a cost of £842 5s. 6d., and bridge Contract, No. 27, for £113. The total cost, including survey and supervision, amounts to £955 5s. 6d., and the company contributes £355 5s. 6d. This road is similar in construction to the main valley road.

Improvement of Richmond Hill Horse-track.—A sum of £100 was contributed by the Government towards this work. From the summit of the hill to the main road in the Aniseed Valley, a new line of $3\frac{3}{4}$ miles was laid off on dray-road grades, averaging about one in twenty, and two traverses constructed on the Richmond side to ease steep pinches. Contract No. 28 was completed at a cost of £251 14s. 4d., of which the company contributes £151 14s. 4d.

Amuri Horse-track.—The total length of this line as surveyed from the junction of the Lewis and the Boyle Rivers, Upper Waiau, to the Maruia Valley, with dray-road gradients, is $15\frac{3}{4}$ miles and gives access from the Amuri District to a block of 10,000 acres of Crown lands in the Maruia, and forms a portion of a stock-driving road from Canterbury to Westland. During the year a length of 6 miles, from the top of the Lewis saddle to Maruia Valley, has been constructed, being let in Contracts Nos. 29, 30 and 31, in two-mile sections. The cost is £1,300 16s. 1d. The timber is cleared sixty-six feet wide, formation 5ft, metalling 3ft. This portion of the line has relieved the travelling through a very dangerous part of the old track, known as Cannibal Gorge.

Pigeon Valley, Wakefield to Dovedale.—A length of $4\frac{3}{4}$ miles on the top of the saddle has been surveyed with dray-road grades, for the Waimea Road Board, at a cost of £62 13s., to be refunded to the Government.

JOHN S. BROWNING, Chief Surveyor.

WESTLAND.

Teremakau to Bell Hill.—Giving access to 12,000 acres of good agricultural lands (vote, £1,400). A road extending from abreast Lake Poerua to the Crooked River. The construction of it, under the supervision of the Resident Engineer, Greymouth, was recently placed in the hands of the Grey County Council.

Kumara to Beach.—Giving access to 4,000 acres of fair settlement lands (vote £1,000). A dray road, $2\frac{3}{4}$ miles in length, formation width fourteen feet, metal ten feet; constructed by the Westland County Council under my supervision. About 2 miles of it were completed during 1884 to 1885, and the remainder in September last. The total cost of the work was £1,086 14s., the County Council defraying the cost (£86 14s.) in excess of the vote.

Waikukupa to Cook's River Flat.—Giving access to 4,000 acres of very good agricultural lands (vote, £1,000). A continuation of the Main South Road, length $2\frac{3}{4}$ miles, formation width nine feet, metal five feet. The work contracted for amounts to £1,113 10s. Nearly half of it has been completed, but progress payments to the amount of £112 10s. only, have been made. The road is being constructed by the County Council under my supervision.

Gillespie's to Cook's River Flat.—Giving access to 7,500 acres of very good agricultural lands (vote, £1,920). Length, 8 miles, formation width seven feet, metal four feet. The contract for part of the work amounts to £1,022, and provision needs still to be made for the forming and metalling of above 1 mile of swampy ground, and for the bridging of two of the creeks. It was considered advisable by the County Engineer and myself to postpone contracting for these works until the bush clearing, throughout the whole length of the road, had been effected.

Moeraki to Otumotu.—Giving access to 2,500 acres of very good agricultural lands (vote, £1,500). This road, 9 miles in length, formation width five feet, metal three feet, was in process of construction at the beginning of the Departmental year. About 3 miles of it had been completed in the preceding year, and the remaining 6 miles since July, 1885. The contract amounted to £1,386 15s., and extras, £28. Thus bringing the total to £1,414 15s. The work was completed in November, 1885.

Cascade Valley Road.—Giving access to 16,000 acres of good, and 4,000 acres of fair, agricultural lands (vote, £1,120). Length $4\frac{1}{2}$ miles, formation width five feet, metal three feet. Tenders for this road close this month (July, 13th); it, like the two preceding roads, is being constructed by the County Council under Departmental supervision.

Cedar Creek Road.—Giving access to about 1,200 acres of fair settlement lands (vote, £3,000). Length $6\frac{1}{2}$ miles, formation width ten feet, metal eight feet. The construction of this road, and the others following, has been undertaken for the purpose of giving access to auriferous lands, and should, strictly speaking, appear on the Goldfields Roads and tracks; but, inasmuch as they (with the exception of two of them) make Crown Lands suitable for settlement accessible, and are works carried out under my supervision, I enumerate them here. 4 miles of this Cedar Creek Road are now under contract; about 2 of these are completed, and the subsidy paid by Government towards the construction of these is £1,000.

Browning's Pass Reef Road.—Giving access to about 3,000 acres of fair settlement lands (vote, £2,000). Length about 24 miles, clearing ten feet wide, and formation and metalling where necessary, to admit of pack-horse traffic. Up to the present the County has expended about £1,400 on this road, but no subsidy has as yet been paid by the Government towards it. By the Arahura Valley, about 13 miles of the track are now fit for horse traffic, and in the Styx Valley, the old track has been cleared up to the Arahura Saddle. The County surveyors are still engaged at the marking out of the upper portion of this road.

Larrikin's to Loopline.—Giving access to about 1,000 acres of indifferent settlement lands (subsidy, £333 6s. 8d.) Length $2\frac{3}{4}$ miles, formation width six feet, metal three feet. This road also was partly constructed in the preceding year, and finished in February, 1886. Its total cost was £449 11s., towards the payment of which Government contributed £299 14s.

Rough-Wainihinihi to Upper Kawhaka Dam.—Giving access to about 1,200 acres of indifferent settlement lands (subsidy, £300). Length, 3 miles. Contracted for last month (12th June, 1886). Amount of contract, £598. Work on this road has been commenced.

Gentle Annie Track Extension.—Leading to and traversing broken country only (subsidy, £146 10s.) Length, 1 mile. Contract, as in the case of last road, only entered into on 12th June, 1886. The contract price of this 1 mile (part only of the proposed extension) is £123 10s.

Kanieri Lake to Humphrey's Gully.—Giving access to about 1,500 acres of fair settlement lands (subsidy £373 6s. 8d.) Length $1\frac{3}{4}$ miles, formation width seven feet, metal four feet. The construction commenced in preceding year, and it was finished in August, 1885. Total of subsidy paid by Government (two-thirds of actual cost), £279 2s.

Ross to Greenland.—Traversing high lands, well timbered, but unfit for settlement (subsidy £960). Length $6\frac{1}{2}$ miles, formation width six feet, metal three feet. The greater part of this road was constructed in the preceding year, and it was completed in October, 1885. The total of the Government contribution amounted to £843 16s. 8d., being a subsidy of £2 for every pound expended by the County.

Okarito Forks to Teal Duck Creek.—Giving access to about 1,600 acres of fair settlement lands (subsidy, £400). Length, 2 miles. Tenders for this road are invited, and close this month, viz: July 13th.

GERHARD MUELLER, Chief Surveyor.

CANTERBURY.

Black Hills Road along Hurunui.—Length of road, 72 chains; area affected, 9235 acres; Pastoral Deferred Payment Sections. The money was granted for this road to enable the settlers on the south bank of the Hurunui, principally pastoral deferred-payment people, to get down the south side of the river Hurunui with wheel traffic, without having to cross the river, which in times of flood is very dangerous. The work was entrusted to the Waipara Road Board and is now finished, but at a larger cost than the grant of £500 covered. The road is seventy-two chains in length only, but the cross sections are exceedingly steep, in fact the cuttings are on the face of a cliff or bluff below the traffic bridge, where the river is narrowed by the rocky formation.

The Black Hills Road by the Karaka Creek.—Length, 3 miles 41 chains; 8,241 acres affected. This road was made before the sale of the Pastoral Deferred Payment Sections, Nos. 35,160, 35,161, 35,162. Lying on the slopes of Mount Alexander, it extends from the Main North road up the valley of the Karaka Creek and by side cuttings to a saddle near the western boundary of 35,161, a distance of 3 miles forty-one chains. The original cost of the formation, as carried out by this office, was £778 4s. 11d. Since then £220 was obtained by the Waipara Road Board from the Government for making ditches, metalling, and other improvements, making total cost £998 14s. 11d.

Road to Pastoral Deferred Payment Lands, Teviotdale.—Length, 5 miles 60 chains; 10,800 acres affected. Originally carried out up to 4 miles forty-eight chains by this office, for the same purpose as the last named road, at a cost of £1,640 10s. Since then £150 has been granted in aid to the Waipara Road Board to extend the road to Mr. Greenwood's gate, ninety-two chains further. Besides these sums the Waipara Road Board was subsidized to improve the Omihia Cutting, which leads to this road from the railway.

Road to the Upper Ashley by the Oxford Bush.—Length, 13 miles; 30,000 acres affected. It is now formed for 13 miles into the open country on the Townshend, about 4 miles having been done during present year. Cost in all £4,285 0s. 7d., of which £3,988 10s. 9d. has been drawn, leaving a balance due to the Board of £296 9s. 10d. I have estimated that 30,000 acres are opened up, or at least made more accessible by this road, half of which area is bush land. 2,134 acres of the latter has been divided into blocks, and is now open for application on perpetual lease, 223 acres being already taken up. This work has been done very efficiently by the Oxford Road Board.

Road to Mount Cook along Western Bank of the Tasman.—Distributed over about 16 miles; 40,000 acres affected. The work has been carried out by the Mackenzie County Council. It extends over about 16 miles, in patches, often over work previously done, either destroyed by water or imperfectly done in the first instance. I estimate that 40,000 acres have been rendered more accessible by this road, but they consist of pastoral country only, the flats being not more than sufficient for the working of the runs on the hills. A good driving road is now completed to the Hermitage, the hotel at the foot of Mounts Sefton and Cook; £1,000 has been received on this account by the Mackenzie County Council, and the balance due, £200, has been anticipated, except a small balance of £5 15s. 6d.

Road to Hakateramea by the Waihao.—Length 9 miles, 10,000 acres affected, is now being constructed by the Waimate County Council, with funds half contributed by the Government, and half by the county. At present there have been a series of small contracts let, extending over about 9 miles, 5 miles on the more direct line, and 4 miles on a branch from Meyer's Creek. Tenders have been invited for a bridge over the Waihao at the junction of these roads. By this means about 10,000 acres of Crown lands are rendered more accessible, besides that, they form connecting links with the Waimate, Hakateramea road via Meyer's Creek (leading to the lower valley of the Hakateramea), and the roads in the upper part of the same valley over the Upper Waihao and Hakateramea water-shed. All these are arterial lines, through good sheep country, although very rough, and hitherto impassable for ordinary horse-traffic. The Hakateramea Valley is one of the most fertile in the Provincial District, and capable of maintaining a large agricultural and pastoral population, although now almost all the good land is held by large companies.

Blackford Road towards Redcliffe.—Mr. Baxter County Engineer reports that "there has been expended during the year ending 30th June last, £204. The formation has now reached a point about $6\frac{1}{2}$ miles from Blackford Rural Section 33,501 to the vicinity of Terrible Gully (near Rural Section 32,428)—and further work is in progress. The Crown lands along the route are situated on broken and hilly ground, but the road now in course of formation renders them fairly accessible."

Eyre Water Race.—The clerk to the Oxford Road Board reports :—"The total amount spent is £3151 3s. 8d., and the amount received, including £6 9s. from Mackle for maintenance, is £3032 9s., leaving a balance due to the Board of £118 14s. 8d. The expenditure was principally expended in a lower apron to prevent the dam from being undermined, and blowing below the wall. The length of the race is 10 miles. The Crown lands benefited by this race are those between the Waimakariri and Burnt and View Hills.

WALTER KITSON.

OTAGO.

In reporting on roads to open up Crown lands for sale, I would like to express the opinion that these roads are amongst the most desirable works that the Colony can undertake, and I think no works give a better return for the money expended on them.

Precipice Creek Road.—Earnslaw Survey District, Lake County, through Block II.—The approximate area of surveyed land benefited through the construction of this road is 5,000 acres, and the area of unsurveyed land about 74,000 acres.

Glenorchy Road up Rees and Dart.—Town of Glenorchy, Upper Wakatipu and Dart. This road, commenced last year under the supervision of the Chief Surveyor, begins at the intersection of Mull and Aban streets, to creek in Section 2, Block III., Dart. It is 6 miles fifty chains in length, the improvements consisting of formation, culverts, scrub clearing and side drains. The area of surveyed land benefited by this road is about 9,900 acres, and that of unsurveyed about 28,800 acres.

Upper Clutha Blocks Road.—Lower Wanaka Survey District, Lake County. This road, under the supervision of the Chief Surveyor, was begun at the north boundary of Pembroke and extended to the north boundary of Section 28, Block XIV., Lower Wanaka. It is 1 mile fifty-seven chains in length, was formed and culverted. Approximate area of surveyed land benefited—about 2,400 acres, and unsurveyed about 5,200 acres.

Arthur's Point to Skipper's Road.—Shotover Survey District, Lake County. This road, passing through Block XI., is 2 miles in length, is formed and culverts and retaining walls constructed. The area of unsurveyed land benefited is about 42,500 acres.

Mr. L. D. Macgeorge, engineer to Vincent County, reports :—

Upper Clutha Blocks.—Lower Hawea Survey District, Vincent County.—This road passing through Blocks III. and IV., seventy-seven chains, and Block V., forty chains, is formed, and the area of surveyed land benefited by it is about 4,300 acres.

Lauder Block.—Lauder Survey District, Vincent County.—Road through Block V., twenty-four chains of which is formed and gravelled, culverts put in and pitched crossing made. Area of surveyed land benefited by this road about 1,100 acres, and unsurveyed about 43,400 acres.

Ida Valley Road (Naseby to Ophir).—Poolburn Survey District, Vincent County. This road passes between Sections 28, 22, 31, 21, and 4, 5, 7, Block III. It is formed for 1 mile forty chains, culverted and gravelled. Approximate area of surveyed land benefited, 1,700 acres; unsurveyed, 12,800 acres.

Waikaia Bush to Clutha Valley Road.—Cairnhill, Teviot, and Whitecomb Survey Districts; Vincent, Tuapeka, and Southland Counties, respectively. Road passes through Block VIII., partially improved. About 44,000 acres of surveyed land are benefited.

Mr. C. Banks, Engineer to Waitaki County, reports as follows :—

Kurow Run Road.—Kurow Survey District, Waitaki County. This road extends up the Kurow River through Blocks IV., VIII., for 2 miles ten chains, and through Blocks IV., VII., to southern boundary of Block V., 5 miles twenty chains. It is formed, culverted, and crossings pitched. It is estimated that about 7,200 acres of surveyed and 27,000 acres unsurveyed land, will be greatly benefited by this road.

Mr. R. H. Browne, Engineer to the Maniototo County reports :—

Ida Valley Road (Naseby to Ophir).—Blackstone Survey District, Maniototo County. This road extends between Sections 2, 10, 13, and 1, 11, 12, and between 19, 22 and 20, 21, Block XV., 3 miles of which, in Block XV., are partially formed, and 2½ miles formed in Block XVI. The approximate area of surveyed land improved through the construction of this road is 5,300 acres, and unsurveyed, 14,200 acres.

Taieri Lake, Block XV., Maniototo.—Maniototo Survey District, Maniototo County. This road fifty-nine chains in length, passes between Sections 5, 7, 8, 3, and 1, Block XV., is formed, culverted, and ditches have been dug. Approximately 8,700 acres of surveyed and 33,400 acres unsurveyed land, will be benefited by it.

Block II., Blackstone.—Blackstone Survey District, Maniototo County. This road between Sections 50, 51, 20 and 49, 48, 36, Block II., which is 1 mile forty-seven chains in length, is formed, culverted and ditched, and a bridge has also been built on it. The road is being widened from half-a-chain to one chain, when about 2,400 acres of surveyed land will be greatly benefited by it.

Lauder Block Road.—Lauder Survey District, Maniototo County. This road passing between Sections 9, 8, 7, 6, and 13, Block V., is 1 mile eight chains in length. It has been formed, culverted and ditched. Fascines have been used in the formation, and three small bridges built. About 1,800 acres of surveyed land will be benefited.

Mr. A. Valentine, Road Inspector to County of Waikouaiti, reports :—

Hummockside District Road.—Hummockside Survey District, Waikouaiti County. This road passes through Sections 8, 3, 2, 7, Block IV., and 5, Block I. 2 miles sixty chains have been formed, culverts made, and crossings pitched. About 2,800 acres of surveyed land will be improved through the construction of this road, and Block I. will be improved by the Mount Watkins road.

Mount Watkins Road—Hawksbury Survey District, Waikouaiti County. Road through Blocks IX., X., XI. 1 mile twenty-three chains have been formed and culverted. About 1,800 acres of surveyed land, and 20,000 unsurveyed, will benefit by its construction. This road passes through sold land, and was commenced last year.

Mr. J. Edie, County Engineer, Tuapeka, reports :—

Beaumont to Miller's Flat Road—Benger and Beaumont Survey Districts, Tuapeka County. This road passes through Blocks IX. and XII., Benger, and Block VII., Beaumont, of which 2 miles forty chains have been improved by formation, culverts, and a bridge over Talla Burn. It is estimated that about 3,300 acres of surveyed, and 16,800 acres unsurveyed land, will be greatly benefited by its construction.

Mr. R. Hay, County Engineer, Taieri, reports :—

Taieri Punt.—A punt to serve as a ferry at the mouth of the Taieri, has been constructed at the expense of the Government and the two counties of Bruce and Taieri.

Taieri Bridge to Nenthorn Bridge Road—Nenthorn Survey District, Taieri County. Road formation and culverts, 6 miles twenty chains, through Blocks I., II., by which about 26,000 acres of surveyed land will be improved. This work was commenced last year.

Mr. M. Paterson reports as follows :

Road to Section 25, Block V., Glenkenich—Glenkenich Survey District, Clutha County. This road, between sections 1 and 9, Block I., 33 chains in length, has been formed, and culverts made. Approximately 10,400 acres of surveyed land will be benefited by its formation.

Road from Sections 2 to 5, Block V., Glenomaru—Glenomaru Survey District, Clutha County.—This road has been cleared of bush for 3 miles 10 chains, thereby improving about 2,500 acres of surveyed land.

Mr. C. H. Howorth, County Engineer, reports as follows :

Wyndham to Otarua, via Mimihau—Wyndham and Tutarau Survey Districts, Southland County. This road through Sections 11, 52, 53, 54, Block II., 10 and 20, Block III., and 101, Block VII., is 2 miles 60 $\frac{3}{4}$ chains in length. It has been formed and culverted, drain pipes put in, bush cleared, crossings pitched and partly gravelled. This will improve about 14,800 acres of surveyed land.

Pyramid Bridge to Waikaia Road—Wendon Survey District, Southland County. This road, between Sections 11, 12, and 8, 9, Block X., is 87 chains in length. It is formed, gravelled, and culverted. There has also been a bridge constructed on it, having a span of 20ft. The area of surveyed land benefited by this road is about 3,900 acres, and unsurveyed, about 14,800 acres.

Pyramid Bridge—Wendon Survey District, Southland County.—This bridge consists of 3 spans of 80ft. and 2 spans of 20ft. and 14ft. roadway. The piles, which are of iron bark, are driven to an average depth of 20ft. below the bed of the river. The bridge was completed and opened for traffic on March 17th, 1886.

Waikaka to Pyramid Road—Wendon and Chatton Survey Districts, Southland County.—This road passes through Blocks III. and IX., and will be the means of improving something like 4,600 acres of surveyed land.

Roads in Wendonside—Wendonside Survey District, Southland County. These roads, passing through Blocks I. and II., will improve approximately 10,700 acres of surveyed and 21,600 acres of unsurveyed land.

Road through Runs 177 and 257 (Tokanui to Waikawa)—Toetoes, Otara, and Waikawa Survey Districts, Southland County.—This road is cleared, formed, and culverted for 8 miles 77 chains. Water-openings, side-drains, and fascines were also made where required. It passes through Blocks IX., X., Toetoes, III., IV., V., Otara, and II., III., Waikawa, and will greatly improve about 20,700 acres of surveyed, and 11,100 acres unsurveyed land.

The total length of road made or improved is 59 miles 3 chains, and 195,000 acres of surveyed land and 365,600 acres of unsurveyed land, have been increased in value thereby.

C. W. ADAMS, Chief Surveyor.

SOUTHLAND.

Road "Blackmount to Deferred Payment Land.—Proposed mileage, 2. Acreage that will be rendered more accessible, 5,000 acres. This work has been entrusted to the Wallace County Council. It consists chiefly of side cutting of uniform grade over the lowest saddle of the Blackmount Hill. This hill, which, owing to steepness, has hitherto been quite impassable for dray traffic, is the chief barrier to communication up the Waiau Valley. The work is very necessary, and will open up the agricultural terrace land extending along the Waiau, between Redcliffe Creek and Mararoa River. The County has arranged for a sectional survey of the road, but the work evidently cannot be proceeded with to any advantage till the winter is over.

Forest Hill Tramway.—Mileage opened during year (extra to the 5 miles twenty-four chains previously opened), 5 miles. Acreage that has been rendered more accessible, nearly all of which has been now taken up on the deferred payment system, 5,000 acres. The extension of this tramway from the gap to the Makarewa River (5 miles) was completed some six months ago, and is now in use by the settlers. The original deferred-payment block in this locality embraced land of poor quality, and on this account was opened at the lowest figure permissible by law. All the deferred-payment sections have now been taken up, except two or three which show a large proportion of peat. The district tapped by the tramway has always been a backward locality, and putting aside the opening of Crown lands, the advantages conferred by the tramway have been distributed over a large area.

Hedgehope Road.—Mileage gravelled to date, 1 mile. This work was entrusted to the Southland County Council. Some 80 chains of gravelling was done, being part of a 2 mile contract, the remainder of the work having been delayed till spring. The road runs along the Hedgehope stream from near the Titipua Stream, north-eastwards. The County contributed £1 for £1.

Waimatuku Bush.—Mileage, bush felled, cleared and grubbed, $1\frac{1}{4}$ miles; acreage that has been rendered better accessible, or that will be rendered so when road operations have been completed, 1,800 acres. This road, which was entrusted to the Southland County Council, runs through a compact block of bush land that has been cleared of sawmill timber, and recently cut up into sections, averaging 100 acres. The road in process of formation runs from bush edge to bush edge, through nearly the heart of the block. Owing to the compact nature of the block, and its convenient position relative to the railways, etc., it affords good scope for settlement, and I have no doubt that the road expenditure will prove reproductive. The County Engineer, Mr. Howorth, estimates that a further sum of £500 will be required to form, gravel, and culvert the worst portions, so as to properly open the land and make a passable track.

Otatara Bush.—Mileage bush felled, cleared and grubbed, $\frac{3}{4}$ of a mile; acreage rendered, or that will be rendered better accessible when road is completed, 700 acres. This work—which was entrusted to the Southland County Council—comprises, up to date, 60 chains of bush felling, clearing, and grubbing. The block to be opened up is all bush-clad, and has been surveyed into sections of 20 acres or thereby. It is not far from Invercargill and will yet probably be a flourishing settlement. The bad weather and the incoming of winter have caused road operations to be delayed till spring.

Bush Land, Makarewa.—Mileage gravelled up to date, $\frac{3}{8}$ of a mile; acreage rendered better accessible by last year's and previous expenditure on road, 400 acres; mileage proposed to be gravelled in all, $\frac{1}{2}$ mile. This road—which is entrusted to the Southland County Council—consists, up to date, of nearly $\frac{3}{8}$ of a mile of gravelling. The land is all bush-clad, and has been cut up into sections of from 5 to 15 acres. I observe that the Government have announced their intention of throwing Makarewa sections open on perpetual lease, under the Village Special Settlement Regulations. This step will no doubt facilitate the occupation of unsold sections; but, of course, it will necessarily have the effect of making the above road expenditure less immediately reproductive. The township is gradually getting settled, and in view of the quality of the land and its accessibility to Invercargill and to the railway, it will, I have no doubt, become, by-and-bye, a thriving and comfortable settlement.

Seaward Forest to Coast.—Mileage bush felled and cleared, $2\frac{1}{2}$ miles; mileage formed, $\frac{1}{2}$ mile; acreage which will be rendered better accessible, when current vote is expended, 5,000 acres. This road, the construction of which is being supervised by the Southland County Council, extends from Oteramika Bight, on the north edge of Seaward Bush, through the Bush to what is known as Seaward Moss. The entire road through the bush has already been bush felled and cleared, the operations for the current year being confined to the forming of road, the construction of the necessary culverts, and to gravelling in places that are naturally too soft for traffic. To connect the road through the bush with the formed district road to the north, some expenditure will be incurred; but this will be supplemented by the Southland County, the expenditure for the entire road being within the sum stated as available. There is a large extent of land south of Seaward forest, much of it no doubt of little account, but here and there are exceptional patches of passable land, and I have no doubt that the road expenditure will ultimately repay itself. Hitherto, owing to its inaccessibility, it has been regarded as a complete waste, and would, doubtless, have remained in this state for years, had something not been done to connect it with a settled district and to make it accessible to settlers.

Seaward Moss to Awarua Bay.—Mileage proposed to be gravelled and improved, 2 miles; mileage re-formed and gravelled, $\frac{1}{2}$ mile; acreage rendered better accessible by road, when formed and completed, 2,500 acres. This road, the supervision of which has been undertaken by the Southland County Council, extends from the Awarua Bay, northward, to the terminus of the gravelled part of the Woodend-Awarua road. Forty chains of gravelling and re-forming have been done to date, the bad weather and approaching winter having caused operations to be suspended till spring. The road, when completed, will form a much needed link in the chain of communication from Woodend to the coast line. Some of the land intersected by the road is very wet, and there is a difficulty in regard to outfall drainage. Apart, however, from giving access to sections abutting on the road itself, the road opens up direct communication, from Woodend, with a large extent of country, which, practically, cannot be approached in any other way. Of course there is a large amount of useless land in the heart of Seaward Moss itself, but along the line of road, and along the margin of Awarua Bay, as well as on the Tewaewae peninsula itself, there is a considerable extent of land of a passable character, which the road will gradually, but ultimately be the means of opening up for settlement.

West's to Mokotua, or Blocks II. and III., Campbelltown.—Mileage formed and ditched, including culverts, $\frac{3}{4}$ of a mile; acreage rendered better accessible by proposed expenditure, 800 acres. This road, which has been undertaken by the Southland County, is an extension of the road from West's, on Bluff Road, down Mokotua Creek, to Block XII., Campbelltown Hundred. As stated above, 60 chains have been formed and ditched, and 7 culverts constructed. The amount spent was not large, and a good many sections will be opened up by the expenditure. The sections alongside have meanwhile been reserved until the present extension is completed.

Half-Moon Bay, Stewart Island.—These roads or tracks are now being proceeded with under the direction of the Public Works Department. As they have only lately been started, it would be difficult to give details in regard to the amount of work done. Out of the vote it is proposed to improve the connection between Half-Moon Bay and Horse-Shoe Bay, to improve the injured road along the latter bay, to open up the unsold sections in the township of Oban, to cut a track between Horse-Shoe Bay and Lee Bay, and to extend the existing track in the direction of Kaipipi Bay and Freshwater River. It would be impossible at present to fix the mileage proposed to be formed or cut, or to estimate the acreage which would be rendered more accessible.

JOHN SPENCE, Chief Surveyor.