

1909.
NEW ZEALAND.

DEPARTMENT OF LANDS:
SURVEYS.
(ANNUAL REPORT ON).

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

The SURVEYOR-GENERAL to the Right Hon. the MINISTER OF LANDS.

SIR,— Department of Lands and Survey, Wellington, 25th May, 1909.
I have the honour to submit herewith the annual report on the survey operations of the Department for the twelve months ended the 31st March, 1909.
I have, &c.,
THOS. HUMPHRIES,
Surveyor-General.
The Right Hon. Sir Joseph G. Ward, P.C., K.C.M.G., Minister of Lands.

REPORT.

The output by the field staff for the year is summarised below, but the complete details for the different districts will be found in the attached tables and reports of the several Chief Surveyors in charge.

The total cost of the surveyors and their parties amounted to £71,068, which is about £2,800 in excess of that of the previous year. This is accounted for chiefly by the increased demands for settlement surveys, which necessitated the employment of additional surveyors, both staff and contract; at the close of the year, the former alone numbered seventy-six.

The following is a summary of the principal work completed during the past year :—

Class of Work.	Area.	Cost per Acre.	Total Cost.
	Acres.		£ s. d.
Minor triangulation	162,355	1·18d.	2,628 2 7
Topographical	75,486	3·76d.	1,182 6·10
Topographical, for selection as unsurveyed ...	38,052	4·07d.	646 15 9
Rural and suburban, by staff	365,949	1·53s.	28,018 18 10
Rural and suburban, by licensed surveyors ...	8,324	...	...
Town	525	£23·8	1,120 0 10
		per section	
Native Land Court, by staff	37,456	9·71d.	1,515 1 8
Native Land Court, by licensed surveyors ...	121,439	...	...
Maori Land Board	49,193	15·70s.	3,219 8 2
Gold-mining, by staff	248	3 08s.	38 5 2
Gold-mining, by licensed surveyors	6,108	...	...
Roads and railways	226 miles	£21 per mile	4,755 4 11
Miscellaneous work and other duties ... ..	...	...	12,879 8 1

The work returned as completed under the various classes is generally a little less than that of last year, excepting the actual settlement survey—*i.e.*, rural and suburban—which is largely in excess ; and there is also a very considerable area the survey of which is drawing near completion.

TRIANGULATION.

Four hundred and sixteen square miles of minor triangulation in different districts have been completed in the field ; but, owing to the mapping of 162 square miles not having been finished, only 254 appear in the tables. The unreturned work is a revision of triangulation executed in the early days, when the standard of precision was low as compared with present-day requirements. It was found to be of no service as a check on surveys executed, as they now are, with greatly improved methods and appliances.

In my previous reports the pressing need for a major triangulation has been referred to, and I would again respectfully draw attention to its urgent necessity, and strongly advise its steady and continuous prosecution ; which, besides its immense value in other respects departmentally, will give great satisfaction to surveyors, both official and those in private practice, in simplifying their work ; for it means linking up and bringing into harmony the very numerous series or groups of uncontrolled minor work, with their various standards of length—a very serious disadvantage, for all other surveys throughout the Dominion are now invariably based on a uniform standard of length—*viz.*, the “Imperial.”

From Wellington to seventy miles north of New Plymouth, a total stretch of two hundred miles, the permanent signals have been erected, and, with a few exceptions, the angular work completed over 10,000 square miles of country, and it now only requires the bases to be measured and a comparatively small amount of instrumental work to be done—the extent of which is shown on a map appended—to make it serviceable in controlling the minor triangulation now covering the area. Unfortunately, in the Taranaki portion, what with the unfavourable conformation of the country, combined with its densely wooded nature, the sides of the triangles have been unavoidably restricted to from ten to twelve miles in length. An improvement in this respect will no doubt be obtainable in years to come when the country has been cleared of the existing heavy forest. It is, however, very gratifying to report that under recent instructions this particular section of the work, which was suspended six years ago, has been resumed, and an excellent base of a little over eight miles in length at the south end, in the Wairarapa, has been selected and measured, particulars of which are published as a separate paper.

SETTLEMENT SURVEYS.

The survey of 374,273 acres into 1,169 sections, averaging 320 acres each, has been completed during the year ; but if the subdivision of Native land under Maori Land Boards for the purpose of offering it on lease to the public, comprising 49,193 acres, be added, the surveys executed for settlement purposes total 423,466 in 1,244 sections.

The Auckland District takes the lead in this particular class of work with 92,243 acres of sectionised Crown land, and 34,855 acres of Maori Land Board subdivisions ; the Wellington District returns 53,678 acres of Crown land subdivided, and 14,338 acres for Maori Land Boards ; Otago supplies 50,478 acres ; and the remaining districts from 39,374 in the Nelson District to 11,446 in the Hawke's Bay District, all Crown lands.

Besides the foregoing, there has been the subdivision of a pastoral run into small grazing-runs, amounting to 27,550 acres, so that surveys for settlement purposes in one way or another, exclusive of pastoral runs, have been completed during the year of 451,016 acres.

At the close of the year there were in the hands of the surveyors, together with unsurveyed selections, 615,000 acres of settlement surveys, 90,000 acres of which is finished in the field, but mapping not yet done, though it is hoped that during the winter season the plan-work will be mostly if not fully completed.

The surveys of “unsurveyed selections” are greatly in arrear, particularly in the Nelson District, where there are 68,565 acres of them in the hands of the surveyors, and a further 65,335 of similar selections awaiting survey ; in all 133,900 acres, of which, however, the survey of about 20,000 has lately been completed in the field, but not yet mapped. In view of this it is evident that the field staff in this particular district needs strengthening, more especially as two of the surveyors there have lately retired ; it would also be advisable to give private surveyors contracts, so as to speedily reduce the accumulation of arrears, and place the selectors in possession.

NATIVE SURVEYS.

Of Native Land Court surveys completed during the year, 37,456 acres were executed by staff officers and 121,439 acres by licensed surveyors under arrangements with the Native owners. The gross total for the four land districts in the North Island where the surveys were executed was 158,895 acres, of which the Auckland District contributed two-thirds.

Other surveys of Native lands were made by the staff to the extent of 49,193 acres at the request of the Maori Land Boards, to which also reference has been made under heading of "Settlement Surveys."

The survey of Native land now in progress for Land Court orders, Maori Land Boards, and Native Land Commissions, amounts to 210,000 acres, including 24,900 acres for landless Natives in the Southland District.

GOLD-MINING SURVEYS.

Only 73 fresh claims were surveyed, less in number than last year, but the area is somewhat larger. They were distributed among the districts as follow: Auckland, 35; Nelson, 12; Otago, 22; and Southland, 4.

INSPECTION OF SURVEYS.

There are three regular Inspectors in the two districts where the most surveyors—official and private—are engaged; in the other districts this duty is performed by the Chief Surveyors or one or other of the District Surveyors in conjunction with their other regular duties.

Ninety-five independent field checks have been made on various surveyors' work, chiefly those in private practice under the Land Transfer Act. In the very great majority of cases the work has been found to be of the usual high standard, and most creditable to the profession as a whole; but there have been a few exceptions which have proved the necessity for the practice of frequent inspection and field check.

OPERATIONS, 1909-10.

The ensuing year's field-work promises to be very heavy, for the surveys in the hands of the staff for settlement alone, inclusive of the subdivisions of some pastoral runs into small grazing-runs, amount to about a million acres, besides 210,000 acres of Native land, 338 square miles of minor triangulation, and 237 miles of road surveys. Of this, however, about 120,000 acres of settlement survey and over 100 miles of road survey is nearing completion. Full details of the foregoing, both as to position and extent, in relation to the several districts are given in the reports of the Chief Surveyors (Appendix I).

The above will undoubtedly be supplemented by surveys of other land to be thrown open for selection during the year, and numerous duties that the surveyors are invariably required to perform other than purely settlement-work.

In addition, the Department will be called upon to undertake the control of the surveys, whether by contract or otherwise, of Native land that will be set apart for settlement on the recommendations of the Native Land Commission.

The extension of the standard survey of cities and boroughs and their suburbs is very greatly needed, more particularly in the large centres, especially so in Auckland and Wellington, where so much subdivision has taken place in the environs. This is important owing to the fact that the land is now closely built upon and has vastly increased in value; as a consequence, the State's risk and responsibility has become greater, the titles being under the Land Transfer Act, so that, if at all possible, some of the work should be taken in hand during the ensuing year.

From the foregoing it is evident that the field staff will need strengthening to cope with the work required to be done.

SURVEYORS' BOARD.

The Surveyors' Board constituted under the Surveyors' Institute and Board of Examiners Act, of which the Surveyor-General was Chairman, held eleven meetings during the year, and, in conjunction with the Australian Boards, conducted two examinations.

At the September examination two candidates passed with credit, obtaining over 80 per cent. of marks, and three completed their examinations. At the second, in March last, six more completed their examinations, to all of whom licenses have been issued.

The Board also, under the provisions of the Act, issued licenses to four surveyors who held qualifications before the Board was constituted, and letters of recommendation to the Australian Boards were issued to two of the New Zealand licensed surveyors.

The list of surveyors to whom licenses have been issued under the Act by the Board now numbers 434.

Amended "Examination Regulations," approved by the Governor in Council, were issued and published in the *New Zealand Gazette* of the 11th March last.

A Conference of the Australian and New Zealand Surveyors' Boards was held in Sydney in April of last year, at which this Board was represented by the Hon. G. F. Richardson. One of the most important subjects discussed was the proposed Surveyors' Imperial Diploma, and to the Conference Recess Committee was delegated the authority of making preliminary arrangements with Great Britain and its oversea possessions.

MAGNETIC OBSERVATORY.

Throughout the year the work of the observatory has proceeded successfully. The Adie magnetograph and the Milne seismograph have been kept in constant operation. The latter instrument recorded forty-six earthquakes for the period, a much smaller number than has been previously recorded for a similar period.

It would be desirable to have additional apparatus provided for the seismograph, in order to secure a more open time-scale for its records, which would bring us into line with other observatories in this respect.

Substantial progress has been made with the tabulation of the hourly values of the magnetic elements.

Copies of the more remarkable seismograms and magnetograms are given with Mr. Skey's report (Appendix II).

In extension of the magnetic survey, further field observations were made last December at eleven stations in the West Coast Sounds, and the Marine Department has been advised of the correct value thus found for the "variation of the compass" off that coast, and observations have now been made at 309 stations in the Dominion.

The year was remarkable for the successful work of Lieutenant Shackleton's Antarctic Expedition, which returned to Lyttelton in March last. Besides the success of himself and party in getting within so short a distance of the South Pole, another party, with Professor David, of the Sydney University, and Mr. Mawson, of the Adelaide University, reached the South Magnetic Pole. The dip circle used by them in locating the position was verified at the Christchurch Observatory on their return.

SECULAR MOVEMENT OF NEW ZEALAND COAST.

In last year's report mention was made of the intention to have the zeros of the tide-gauges in the various parts of the Dominion connected by levelling to bench-marks in secure positions on the shore, so that the mean sea-level of to-day could be referred to them, and thus enable investigators in years to come to determine with certainty whether there has been elevation or depression of the land, and, if so, in what degree. It was also therein pointed out that such a work had an important practical value as well as being of scientific interest.

Not so much has been accomplished as had been hoped for, as at most of the ports the gauges are of the fixed-board pattern, and what records there are are too imperfect to be of value for the purpose; but an interest has been aroused, and it is the intention of some of the harbour authorities who hitherto have not done so to adopt self-registering tide-gauges, and carry out continuous records.

However, the Harbour Boards of six ports where systematic records have been maintained have very kindly lent the gauge-charts and other information, from which mean sea-level has been deduced and referred to permanent marks. These are more fully dealt with in Appendix III, with explanatory diagrams.

The Wellington Harbour gauge-charts exhibit many instances of very pronounced seiche oscillations, much more so than at the other ports. A specimen diagram of these will also be found in the appendix.

It is found that, in cases of pronounced seiches in the Wellington Harbour, they are in the great majority of cases accompanied by a change of wind from north to south or *vice versa*, generally strong, and in one instance of five successive days of seiches the seiche changes took place several times. In the United States Coast and Geodetic Survey Report for 1907, page 477, there is an interesting reference to the seiche oscillations in Wellington Harbour, the conclusion arrived at being that the period of oscillations is twenty-eight minutes.

In conclusion, as this is the last annual report that I shall have the privilege of submitting, owing to my intended early retirement from the service, I desire to express my sincere thanks to all the officers, past and present, who have served with me from the time that I first became a Chief Surveyor, for

the invariable ready assistance and hearty co-operation received at their hands, which, together with the amicable relations that have existed between us, has helped to make my varied duties a constant pleasure.

Mr. W. D. B. Murray, Chief Draughtsman at the Head Office, reports as follows for the year 1908-9:—

During the past year the following plans of towns have been drawn in this office: Kaikora North, Martinborough, Opotiki, Ross, Greymouth, and Rotorua Town District. Plans of these towns have been printed, including Manaia, Paeroa, and Waikouaiti.

There are also in the draughtsmen's hands, in a forward state, plans of Wanganui, Tauranga, Waipawa, Westport, and Hastings.

In course of publication are the towns of New Plymouth, Waipukurau, and Palmerston South, also the Counties of Buller, Inangahua, Kawhia, and Cheviot.

Republished, the Counties of Ohinemuri, Rodney, and No. 1 Tauranga.

Photo-litho. plans have been made showing magnetic stations in the North and South Islands; six plans showing the rise and fall of the tides at Wellington, Lyttelton, and Timaru; also a photo-litho. plan of the Hauraki Plains. Seventy-one electoral maps were made for Parliament, to replace those burnt; map of the North Island showing the proposed districts for Native Judges, with descriptions.

Thirty-one survey districts were revised and forwarded to the Government Printer, and eight of these have been published.

Numerous maps have been prepared for other Departments, such as Defence, Education, Registrar-General, Internal Affairs, &c.; also maps in connection with Waipoua Kauri Forest, and the triangulation of Canterbury, major and minor.

To enumerate all the miscellaneous duties performed by the draughting staff would be tedious, but I might mention—all field checks are recorded; bands tested for staff and outside surveyors, 19 1-chain and 17 5-chain; descriptions prepared in connection with Proclamations or otherwise. Sixteen plans were examined and fifty-six schedules were revised and amended for Bills going before Parliament.

During the past year 141 proposed township schemes, both Government and private, were submitted for the approval of His Excellency the Governor. A considerable amount of work is involved in connection with these, as they have to be carefully examined, and in many instances have to be returned to the surveyors to bring into accord with the requirements of the Act and Survey Regulations.

The number of tracings drawn during the year was 880. This is exclusive of tracings or plans drawn for photo-lithography.

Through the creation of five new counties in the North Island and one in the South, new county maps have been prepared and issued.

Of maps, lithographs, and tracings, 1,142 have been mounted by the office staff for office and outside requirements.

As this report is written on the eve of my severing connection with the Survey Department of the Dominion, after a continuous service of thirty-five years, during the last three of which I have acted as Chief Draughtsman in the Head Office, I take this opportunity of thanking the officers for the willing help and able assistance they have rendered me at all times when our duties have brought us together.

APPENDICES.

APPENDIX I.—SURVEYS.

AUCKLAND.

THE gross area of all classes of surveys completed this year was 225,729 acres, together with 81 miles of roads.

Minor Triangulation.—Mr. Wheeler completed 94,000 acres in the Bay of Islands County, the work being necessary for the subdivision of the Motatau No. 2 Block for the Tokerau Maori Land Board.

Rural and Suburban.—The surveys of 92,243 acres were completed during the year, the principal items being 20,981 acres by Mr. J. B. Thompson, of Te Akau Block, and the completion of the surveys of Selwyn Settlement; 18,870 acres by Mr. A. G. Allom, of Waiawa Block, Opotiki County; 13,529 acres by Mr. P. W. Barlow, of Tahora Block, Opotiki County; and 11,292 acres by Mr. A. L. Foster, of Tautari Settlement (contract survey), West Taupo County.

Native Land Court Surveys.—The total area surveyed during the year was 131,320 acres, subdivided into 193 subdivisions. Of this area, 36,030 acres were surveyed by staff surveyors, including 34,855 acres by Mr. W. J. Wheeler for the Tokerau Maori Land Board for leasing. The survey of this block (Motatau No. 2 Block) was discontinued under instructions from Head Office, and the Tokerau Maori Land Board are now completing the work by contract.

Standard Survey.—Mr. J. Langmuir, assisted by Mr. H. M. Kensington, completed the field-work of the Standard Survey of the City of Auckland, and part of the Borough of Devonport. Mr. H. M. Kensington is at present engaged on the standard survey of Rotorua Town. Mr. J. B. Thompson has also completed in the field a considerable portion of the standard survey of the Borough of Hamilton.

Other Work.—Under this heading many and various duties are included distinct from the actual cost of subdivisional surveys, comprising small surveys for school and cemetery sites, &c., renewing trig. points and standard blocks, reports on grass-seed areas, valuation reports, defining old boundaries, road-deviations, reports on drainage, &c.

Inspection of Surveys.—Mr. J. Langmuir made 4 inspections, Mr. W. J. Wheeler made 20 inspections, Mr. H. D. M. Haszard made 16 inspections, and Mr. R. S. Galbraith made 14 inspections. Some of the surveys inspected were fully up to the required standard, but I regret to say that in some cases the work inspected proved to be very unsatisfactory.

Land Transfer.—380 plans were received, and 334 were examined and approved, comprising an area of 107,765 acres. 109 plans were recorded; but there are still 630 plans approved but not recorded. Mr. H. D. McKellar has been appointed as Land Transfer Draughtsman *vice* Mr. J. R. Vaile transferred.

There were 2,889 plans indorsed on leases and Native Land Court orders, and 2,220 plans were indorsed on certificates of title.

Proposed Operations.—The field operations will comprise about 102,602 acres of ordinary rural-settlement work, and in addition to that area there is 19,513 acres being surveyed for the Tokerau Maori Land Board, and about 40,000 acres of Native land near Rotorua which is being surveyed to carry out the recommendations of the Native Land Commission. The localities of the various larger areas in the above total are as follow: 7,316 acres, Puniu Survey District; 3,600 acres, Pirongia and Kawhia South Survey Districts; 20,000 acres, Urutawa Survey District; 6,335 acres, Waoku and Hokianga; 3,000 acres, Rotoiti and Rotorua; 4,480 acres, Rotorua; 2,000 acres, Takahue; 5,500 acres, Hukerenui; 3,000 acres, Mangaorongo; 12,000 acres, Waihi South (to be opened as "unsurveyed").

Office-work.—Examination of plans: During the year 379 plans were examined and passed, covering an area of 247,357 acres, in 715 sections. These include 73 settlement plans, of 151,184 acres, in 392 sections; 60 Native Land Court plans, of 91,133 acres, in 164 subdivisions; 72 gold-mining plans, of 4,998 acres; 44 plans of residence and business sites, of 42 acres, in 87 sections; 130 plans of roads (taken and closed). Railways and reserves were examined and passed, having a length of 66 miles of roads taken, $21\frac{1}{4}$ miles of roads closed, and $45\frac{1}{4}$ miles of railway. 1,374 tracings were made for posters, surveyors, settlers, and others. The total number of plans of all classes of surveys, including Land Transfer, which have been examined and passed is 713, comprising 355,122 acres, $87\frac{1}{2}$ miles of roads, and $45\frac{1}{2}$ miles of railways. Five Native Land Courts were attended, £351 5s. collected on 40 blocks for survey charges, and 3,990 acres 3 roods 24 perches has been awarded to the Crown in satisfaction of survey liens amounting to £1,080 11s., in 34 blocks. 159 applications for authority to survey Native blocks were forwarded to Head Office, and 151 authorities were issued. Three examinations for "surveyors' unlicensed assistants" were held; 17 candidates passed, and 4 others also qualified, as they had partially passed the Licensed Surveyors' Examination. Authority has been given to 19 licensed surveyors to employ assistants. 203 chain lengths of steel measuring-bands were tested by Mr. T. K. Thompson for various surveyors and instrument-makers. There were 15 applications made to Head Office for Government loans of a total amount of £16,493, over an area of 54,544 acres.

Accounts.—The number of vouchers passed through the books during the year amounted to 2,154, representing an expenditure of £44,259 5s. 3d. On the Chief Draughtsman's Imprest Account 974 vouchers requiring payment were made by 1,549 cheques, totalling £12,700, and the amount imprested by the Paymaster-General was £12,700. Accountant, 345 vouchers, 540 cheques, £4,770 14s. 11d.; the amount imprested by the Paymaster-General was £5,000. Official Account, 729 cheques, £10,868 14s. 8d. On Commissioner's imprest, 14 vouchers, 18 cheques, amount £1,616 10s. 7d., and amount imprested, £1,701.

Conclusion.—I have much pleasure in tendering to the field and office staffs of the Survey Branch my thanks and appreciation of their ungrudging assistance in carrying on the work at all times and under all circumstances.

JOHN STRAUCHON,
Chief Surveyor.

HAWKE'S BAY.

Minor Triangulation.—The only work of this class returned this year is an area of 9,580 acres, executed by Mr. Thomas Brook, District Surveyor, in connection with his survey of the settlement lands in the Piripiri Block, near Dannevirke.

Standard Surveys.—There has been no work carried out of this nature, but preliminary action has been approved for the establishment of a 5-chain standard at Gisborne, and the District Surveyor has authority to carry out the work. It is proposed to lay a similar one down at Napier at an early date.

Rural and Suburban.—Under this head there are 11,446 acres, divided into 93 sections, at an average cost of 2-35s. per acre, in addition to which the field-work has been completed of 32,672 acres, but the plans have not yet been handed in. Of this Mr. Cagney carried out the subdivisational survey of the Crown portion of the Waimarama Block, with a total area of 10,000 acres, and Mr. Farnie surveyed 11,623 acres of Crown lands in the Waipaoa Block. Mr. Roddick has nearly finished some 13,000 acres out of Pastoral Run No. 47, Ngatapa District, which is to be offered for selection under the optional system.

Native Land Surveys.—These comprise 35,605 acres, divided into 57 lots, and the cost averages 8-72d. per acre. Of this area Messrs. Wilson, Walshe, and Cagney return 30,162 acres, which represents the Waipuka, Okaihau, and Waimarama Blocks; the balance of 5,443 acres was surveyed by Messrs. H. Baker and W. O'Ryan (licensed surveyors), and represents areas at Pukekura (Hawke's Bay) and Tapuwaeroa (Poverty Bay) respectively. Mr. T. W. Hughes has nearly completed the survey of subdivisions of the Mohaka Blocks, embracing a total area of 24,726 acres.

Road Surveys.—Some 34 miles of roads have been laid off by Messrs. Brook, Wilson, Walshe, and Roddick respectively, at an average cost of £12-97 per mile.

Other Work.—This comprises miscellaneous surveys and inspections.

Inspections.—District Surveyor T. N. Brodrick has made 10 field inspections of various private surveyors' work; and District Surveyor Brook has made 1; the reports of which were of a satisfactory character.

Proposed Operations, 1909-10.—The following surveys are in progress: viz., 4,400 acres in the Tamaki Block, by Mr. Brook; 13,000 acres (part of Pastoral Run No. 47, Ngatapa Survey District), by Mr. Roddick; 7,750 acres in the Tutamoe District, by Mr. Farnie; and 8,400 acres (withdrawn from the Ruahine Forest Reserve), by Mr. L. W. Ward. In addition, there will probably be the subdivision of country recently held under Pastoral Licenses Nos. 13 and 14, Kaweka and Pohui Survey Districts, with an area of some 35,000 acres, in connection with which about 2,700 acres of freehold lands adjacent have to be defined in order to give titles thereto.

Office-work.—Mr. H. G. Price, the Chief Draughtsman, reports as follows: "During the year 353 plans have been examined and approved, representing an area of 217,089 acres. These, divided up in their several classes, are as follow: Land Transfer, 209 plans, 1,200 lots, with an area of 78,274 acres; 50 Native Land Court plans, 246 lots, with an area of 101,172 acres; 68 Public Works plans, 239 lots, with an area of 916 acres; 19 departmental plans, 66 lots, with an area of 36,528 acres; and 7 road plans, with an area of 199 acres. In addition to the above, 574 instruments of title, such as transfers, leases, mortgages, have been examined and reported on, and 470 tracings were prepared for settlers, local bodies, surveyors, &c. The Native Land Court plans of the Waimarama Block, 44 subdivisions, comprising over 30,000 acres, and tracings of same, were also prepared and completed by the office staff—the calculations and adjustments of areas in connection therewith entailing a considerable amount of work. Several new record plans and block-sheets have been made, and old ones brought up to date; tracings have been prepared for photo-lithography of Hastings and Waipawa Boroughs and Waipukurau Town District, besides a number of others for sale-posters; 180 plans have been mounted and prepared."

In conclusion, as I am myself retiring from the position of Chief Surveyor, I desire to place on record my sincere thanks to all the officers of the Department I have been associated with for the ready and valuable assistance they have at all times rendered me, and in parting with them I desire to wish them one and all every success in their future careers.

HENRY TRENT,
Chief Surveyor.

TARANAKI.

The gross area surveyed during the year under the various headings represents a total of 72,133 acres, together with 16-53 miles of road and railway and 48-55 miles of boundary survey.

Minor Triangulation.—An area of 43,000 acres has been triangulated, and plans completed of same, by Messrs. Bullard and Laing, in the Tangitu, Taurakawa, and Momohaki Districts, at an average cost of 1-4d. per acre.

Rural and Suburban.—The operations in this class amount to 22,955 acres, in 69 sections, at an average cost of 3·25s. per acre, all of which is in rough forest country. Of this, 5,300 acres consists of final survey of provisional work.

Town Sectional Survey.—This consists of 95 allotments, of an area of 59·5 acres, in the Mangaroa and Matire Townships.

Native Land Court.—Surveys executed during the year by staff surveyors comprised 2,260 acres, in 2 subdivisions, and by private surveyors 7,342 acres 2 roods 15 perches, in 3 subdivisions. An area of 6,119 acres has been subdivided into 8 sections by staff surveyors, at an average cost of 16·65d. per acre; also boundary surveys to the extent of 48·55 miles were completed.

Roads and Railway.—In this class, 12·17 miles were surveyed by staff surveyors at an average cost of £16·30 per mile, and 4·36 miles under contract at a cost of £22·51 per mile.

Inspections.—The usual inspections have been made over staff and private surveyors' work, with most satisfactory results.

Other Work.—The expenditure under this head amounts to £2,574 18s. 6d., made up of costs against boundary surveys of Whakaihūwaka Block—an extremely rough and difficult piece of work—and survey for Maori land settlement, cost of which will in part be recoverable from the Native owners; also road exploration and grading in Tangitu and Omara Districts; Mangaroa Town drainage; general miscellaneous work in the field; plans and reports on various subjects; and a variety of other matters.

Land Transfer.—There were 118 plans, with 197 traverse sheets, checked and approved, comprising 748 sections and subdivisions, of an area of 8,392 acres and 10·45 perches.

Titles.—The plans placed on instruments of title of all kinds, including Native Land Court orders, were 1,444, and 441 copies of leases and licenses were prepared.

OFFICE-WORK.

Examination of Plans.—The total number of plans checked during the year in the ordinary Survey Branch was 91, with 425 traverse sheets, comprising 217 sections, of a total area of 137,496 acres and 12 perches, and 94 miles 46 chains of roads taken and closed, and railway-land plans. Of these, settlement survey represents 21 plans, containing 133 subdivisions, of a total area of 66,247 acres; trigonometrical, 4 plans, containing 61,000 acres; 31 plans, defining 87 miles 66 chains, of roads taken and closed; 4 plans, of 6 miles 60 chains, of railway-land plans; 5 Native Land Court plans, containing 5 subdivisions, of 9,602 acres 2 roods 15 perches; 22 miscellaneous plans, of 14 subdivisions, and 426 acres and 4 perches; 3 plans, compiled in office, of 205 acres 1 rood 28 perches; and one township plan, of 15 acres and 5 perches, in 63 sections.

Miscellaneous.—The usual demands made on the office staff were attended to. These comprise supplying information to the general public, data to the staff for execution of surveys, information for local bodies and other Departments, &c. Two hundred and five tracings were made for the Valuer-General, ninety-five for Crown selectors. Six block-sheets were compiled, and all recording on block-sheets, record, reserve, and other maps, has been kept up to date. Eight tracings for photo-lithography were compiled, and twenty-five authorities for survey of Native lands were dealt with.

Proposed Operations for 1909–10.—A staff of one permanent surveyor (with cadet) and six temporary ones are at present engaged in different parts of the district on sectional work, covering an area of 81,000 acres, more or less, in Tangitu, Piopiotea West, Ohura, Mahoe, Omara, and Taurakawa Survey Districts. These lands lie in close proximity to the Main Trunk Railway, and in the valley of the Wanganui River. Three small grazing-runs in the Opaku District will require resurvey at an early date, before being reoffered for leasing.

FRANCIS SIMPSON,
Chief Surveyor.

WELLINGTON.

Triangulation.—Although no actual triangulation surveys in their usual acceptance have been undertaken this year, a most important start has been made at the reduction of the primary triangulation of the entire North Island by the selection of an excellent eight-mile base-line by Mr. Lowe, and is now under measurement by Messrs. Langmuir and Lowe preparatory to its subsequent extension by major triangulation as an accurate standard of length.

Topographical.—The only work coming under this head is Mr. Strachan's survey of the Wairarapa Lakes at different levels, covering some 15,300 acres.

Rural and Suburban.—The gross area under this heading, of which the field staff has sent in plans during the year, is about 67,940 acres, exclusive of small odd surveys. Of this area some 66,385 acres were intended for ordinary settlement purposes, and 1,555 acres represent scenery reserves. The principal items in the former area are Mr. Roberts's survey of Te Tuhi, Ahu Ahu, and Puketotara Blocks (Ngamatea District), and the survey of the Rautiti Block (Whirinaki and Manganui Districts) by Messrs. Girdlestone and Stewart. The survey of one land-for-settlements block, the Carrington Estate, was executed by Mr. Strachan, whose survey of the Wairarapa Lakes foreshore renders about 5,500 acres available for disposal by the Land Board in such manner as seems best in the interests of settlement. Mr. Stevenson surveyed 14,338 acres for selection purposes in the Morikau No. 2 Block; but this area is not Crown land, but Native under the administration of the Aotea Maori Council, and the cost of survey is recoverable as a lien. The Kaitieke Block, Crown lands selected before survey, has now been in great part surveyed by Messrs. Thompson and Campbell, so that leases may issue and selectors obtain possession by definite boundaries. Mr. District Surveyor Greville is making good headway with the Rangitatau Block in the Waitotara Valley, which will be the means of placing about 10,300 acres in the market in smaller farms than was originally intended.

Town Surveys.—Eighty-five acres have been subdivided into 252 lots, the principal items being township sections in the Pitt Settlement and Rangataua Township.

Native Land Court Surveys.—Surveys for the Aotea Maori Land Board, of two blocks, were carried out by Mr. Stevenson, and there were also 35 Native Land Court blocks surveyed by private surveyors, the total area being 35,044 acres, in 141 subdivisions. Although the cost of this class of work falls on the parties interested, still the Department has to supervise field and office work in the same manner as if done by our own staff; indeed, surveys of this kind as a rule give more trouble than those more directly under departmental control.

Roads, Railways, &c.—Little of this work outside of that forming part of settlement surveys has been undertaken. Mr. Johnston's special survey of fourteen miles for the Main Trunk Railway line being the principal. The average cost per mile, £17·9 for the 25½ miles returned, is not excessive.

Other Work.—A number of various duties are included under this head, distinct from the actual subdivisional surveys, comprising small surveys for other Departments, repairing and replacing trig. stations, standard blocks, redefining old boundaries, timber estimates, small road-alterations, &c., the character of which prevents their being returned under the usual headings. All are very necessary, and attending to them often interferes with our surveyors' duties to a far greater extent than the sums set against each represents.

Inspections.—Mr. Climie inspected 42 surveys during the year, being 31 Land Transfer (cost of which is recoverable) and 11 staff. The work done by surveyors generally maintains a high standard of excellence, often under adverse conditions; the work of one or two surveyors, however, was not found so satisfactory as might have been desired; but this in no way detracts from the good results of our staff and private surveyors, as evidenced by practical tests in the field by the Inspector.

Proposed Operations, 1909–10.—A staff of eleven surveyors is at present engaged in different parts of the district, and has an area of some 137,500 acres of subdivisional surveys in hand, consisting chiefly of bush land adapted for pastoral or mixed purposes, in areas suitable to the character of the lands in the various localities. Mr. Stevenson has the completion of the Whaharangi Block, Native land, Retaruke District, of about 27,000 acres, under his charge, for settlement under the Aotea District Maori Land Board. Mr. Girdlestone is undertaking the survey of the Riariaki Block, Crown land, about 24,000 acres, in the South Waimarino, Manganui District; whilst Mr. Stewart has the Mangatiti Block, of Crown land, comprising about 16,000 acres, in the South Waimarino, Whirinaki District, in hand. Mr. Johnston has the survey of 15 miles of the North Island Main Trunk Railway necessary for the land plans, and about 20 miles of service road for the Public Works Department; and 7,000 acres of scenery reserves. Mr. Campbell has completion for settlement purposes of about 9,000 acres of the Kaitieke Block, Kaitieke District, in view. Mr. Mountfort has the subdivision of Uriwera and Otiranui Blocks, about 16,400 acres, to determine the Crown awards. Mr. Roberts has the completion of the Te Tui, Ahu Ahu, and Puketotara Blocks, 14,500 acres; and Mr. Greville has an area of 10,275 acres in the Rangitatau Block, settlement survey, in hand. A considerable area of the above lands is completed in field, but not yet mapped, and as soon as the winter sets in the surveyors will come into the office to overtake arrears in their mapping.

OFFICE-WORK.

Examination of Plans.—During the year 151 plans of sectional and Native surveys, containing 100,686 acres, were received, and 123 finally approved. Ninety-two statutory plans were received, 88 approved, and 130 recorded; 123 were examined, and 71 sent out for proclamation.

Compilations.—Twenty-three drawings and tracings were prepared for photo-lithography, and 8 new Crown-grant maps were compiled, also 1 new trig. map; whilst all approved new work coming from the field was placed on the standard maps of the office, as well as all Crown titles being recorded.

Native Land Court Work.—The time of one officer and assistant is fully occupied in attendances at the sittings of the Court, and supervision of the office-work connected therewith. Sixty-seven nominations for survey were received and 23 authorities issued. Twenty-five applications for survey liens and 485 for land in lieu of lien were put through. Survey liens with interest paid amounted to £1,317 17s. 10d.; while orders vesting 750 acres in lieu of liens were made. Titles, orders, and other instruments to the number of 973 were indorsed with plans, and many other incidental matters were dealt with, including compilation of plans of 2,020 acres in four different blocks.

Land Transfer Office (Survey Branch).—There were 394 plans passed, an increase of 34 over last year, which does not include plans indorsed on transfers, &c., all of which have to be examined. Twenty-four Land Transfer plans and tracings have been mounted and repaired. The year has been a very busy one for this branch, and Mr. Mackay, Land Transfer Draughtsman, and his assistants have had their hands full; one reason being that plans of surveys of areas made early in the year are only now to hand.

Titles.—There were 3,732 deeds and other instruments passed, showing an increase of 562 over last year; 76 single and 2,173 plans in duplicate were placed on certificates of title, being a decrease of 112 as compared with last year. Of Crown leases, &c., a total number of 1,631 copies were prepared, either in duplicate, triplicate, or quadruplicate.

Miscellaneous.—The usual demands were attended to by the office staff. These comprised supplying information to the public generally, data for the execution of surveys by staff surveyors and others. Ninety-seven tracings, 3 general plans, 43 sale-plans, 140 lithos, 97 applications, and 8 plans were remounted or repaired, and a multitude of other duties performed.

In conclusion, I have to thank all the officers for the assistance rendered to me whilst I have been in charge of this district. To the outside licensed surveyors my thanks are also due for their co-operation in the various professional matters in which during the year I have been associated with them.

JAMES MACKENZIE,
Chief Surveyor.

NELSON.

Minor Triangulation.—The area of 8,800 acres returned for this class of work, at a cost of 2-6d. per acre, consists of extensions of subsidiary triangulation to control sectional surveys.

Topographical.—An area of 38,052 acres was returned under this heading; all this area, with the exception of 500 acres, is provisional survey, executed to enable a scheme of subdivision to be prepared for selection before final survey: this work cost 4-07d. per acre.

Rural and Suburban.—The area returned under this heading is 39,374 acres, in 134 sections, costing 2-55s. per acre; 14,564 acres of this area is situated in the Maruia North Block in fairly large sections; the remainder being principally in scattered applications. The work was situated in rough, hilly, heavy forest, and in some cases was only accessible by rough bush walking-tracks.

Gold-mining Surveys.—Only 3 surveys were executed by a staff officer, 184 acres, at a cost of 3-1s. per acre; 8 surveys of this class were executed by private surveyors, containing 2,551 acres.

Roads, &c., 13 Miles.—These consist of short lengths of roads in various localities, to give access to Crown lands opened for selection.

Other Duties.—The work in this class comprises various duties which do not come under any of the headings in the general return, and consist of general office-work at Reefton and Westport, field inspections, minor surveys, valuations, reports, and work executed for other Departments.

Field Inspections.—Owing to the urgency of settlement survey, it has been very difficult to spare an officer to attend to this work. Only 4 inspections have been made during the year, 2 of gold-mining surveys executed by private surveyors, 1 of D'Urville Island survey, and 1 of the Big Bush contract: the reports were satisfactory, and details with diagrams have been supplied. Field inspections should be made more frequently, not only to test the accuracy of the work, but to ascertain if the field-work is being carried on with diligence. It has been impossible for me to leave my office duties to attend to this work to a sufficient extent, and, owing to the large amount of settlement survey on hand, it has been extremely difficult to spare the services of a staff surveyor; also, more inspections should be made of the field-work of contract and Land Transfer surveys.

Proposed Operations for 1909-10.—Owing to the early retirement of Messrs. Montgomerie and Snodgrass, District Surveyors in charge of the Reefton and Westport offices respectively, the services of an extra surveyor will be required, as recommended in the estimates for this year. The arrears in the Westport District amount to approximately 12,000 acres, chiefly in the Kongahu and Oparara Districts; but the arrears in Reefton are small, and can be undertaken as opportunity offers. Mr. Carkeek, District Surveyor, proposes to complete the trig. and coastal survey of D'Urville Island by July, and it will then be necessary to define the subdivisions. I made a field inspection of this survey, and reported fully on the too-elaborate method adopted of defining the coast by a continuous coastal traverse. Mr. Thomson, District Surveyor, is engaged on scattered applications, containing 4,540 acres, in the Motueka, Kaiteriteri, and Mount Arthur Districts. Mr. Maitland, District Surveyor, after completing survey of 2,320 acres in hand in Waitapu District, will undertake the survey of selections in the Mount Arthur Survey District. He has 5,820 acres on his instructions. Mr. Cumine is now engaged on the survey of 6,616 acres of selections in the southern portion of the Mid-Maruia Block. Mr. Irvine is engaged on the survey of 2,150 acres in the Tadmor District, and after the completion of this block will be employed on the survey of 7,565 acres in the Dart Block, also situated in the Tadmor Survey District. Mr. Fairhall has the trig. and sectional survey of Braeburn Settlement, containing 18,000 acres, in hand; the triangulation is in progress, and about 5,000 acres of sectional survey completed in field. Mr. Springall is employed on the trig. and sectional survey of the Owen and Owen East Blocks, and has an area of 11,380 acres on his instructions. 4,650 acres of the sectional survey is completed in the field, and also 14,000 acres of trig. survey, to control the above survey. Mr. James Stevenson, who began work in this district in December last, has instructions to execute the triangulation of approximately 100,000 acres in the Maruia, Rappahannock, Warwick, and Glenroy Valleys, to control the surveys of large areas selected in those localities. The work is absolutely necessary, as a basis for the sectional surveys. In order to have the triangulation being executed in the Maruia Valley, the Owen Blocks, and Braeburn Settlement in terms of the Imperial Standard, the main series of triangles has been recomputed by polygons from a remeasurement of the Waimea base to the base near the Lyell. Allowing for the difference in length between the old Nelson Standard and the new Imperial, the closure was 1 link per mile on to the Lyell base. As time permits, the whole of the triangulation in the Collingwood and Nelson circuits is being recomputed through polygons in terms of the Imperial Standard. Closures have been worked out between bases measured at West Wanganui and Collingwood, and Collingwood and Waimea. The difference in closure from the West Wanganui on to Collingwood base is 0-65 of a link per mile, and between Collingwood and Waimea 0-5 of a link per mile. Mr. J. H. Buttress, an "authorised assistant," is employed on the survey of selections in the northern portion of the Mid-Maruia Block, containing 10,238 acres, of which 3,060 acres is completed in field. Mr. F. I. Ledger has just completed the field-work of the contract survey of Big Bush Block, 13,954 acres, and expects to return the plans by end of April. Mr. C. Lewis signed an agreement on the 16th March last to execute the survey of 5,250 acres in the Takaka Survey District, and has begun the work. The surveyors now employed have instructions to survey 91 applications, containing 39,427 acres. Of this area, approximately 12,820 acres, in 28 applications, is nearly completed in field. In addition to this there are 19 applications in the Big Bush Block, containing 13,954 acres, let by contract to Mr. Ledger, the field-work of which is just completed; also 4 applications, containing 5,250 acres, let to Mr. C. Lewis by contract on the 16th March ultimo. The survey of Braeburn Settlement, containing a total area of 18,063 acres, of which 9,934 acres has been taken up by 12 selectors, is also in hand, and 5,000 acres completed in field. The total number of applications allotted to surveyors, staff and contract, is 126, with an area of 68,565 acres. Of this area the survey of 31,774 acres, in 53 applications, is nearly completed in the field. The number of unallotted applications, including

those previously in the hands of Messrs. Montgomerie and Snodgrass, is 144, containing 65,335 acres. The blocks to be opened during the coming year comprise the Lee River Block Extension, 10,185 acres ; the Wairoa Forks Block Extension, 8,320 acres ; the Howard Block, 30,000 acres ; the Anatoki Block, 4,400 acres ; Extension Maruia North Block, 1,800 acres ; and the Waimea Block, 5,000 acres : total, 59,705 acres.

Land Transfer Office.—Mr. Curtis, the Land Transfer Draughtsman, reports that 59 survey plans have been examined and passed, 46 examined and returned, 150 deeds passed and 398 diagrams placed on 198 certificates of title in duplicate, 100 plans drafted, and 298 plans examined and issued. Arrears, 27 certificates of title in duplicate.

OFFICE-WORK.

Seventy-four certificates of title in lieu of Crown Grants (in triplicate) were examined and issued, 315 tracings examined, 56 reports furnished, 7 survey plans and compiled plans examined, and 51 leases &c., for warrants examined. There are 13 certificates of title in lieu of Crown grants (in triplicate) to issue.

The drafting-work for the year includes examination of 61 plans, with an area of 46,500 acres, in 200 sections ; mining surveys, 11 plans, 2,551 acres, in 30 sections ; 17 road plans ; 8 railway and 2 subsidiary triangulations : total number of plans, 99. Traverse sheets checked, 337.

Diagrams were placed on 121 Crown titles (by contract) in quadruplicate, 55 in triplicate, 46 in duplicate, and 4 singly ; and on certificates of title in lieu of Crown grant, in triplicate, 74 : total number of diagrams, 967. There are in arrear 21 Crown titles in quadruplicate and 7 in triplicate.

There were 5 plans drawn for photo-lithography of large blocks of land opened for settlement, as well as those reopened for disposal after surrenders, &c.

The office-work also included tracings and data for surveyors, rough tracings for settlers, for Valuation and other Departments.

A rough tracing of the Borough of Westport, to be redrawn for photo-lithography, has been prepared ; also photo-litho tracings of several districts brought up to date for reproduction and for county maps ; tracings for photo-lithography of the Collingwood and Takaka Counties are well in hand, and on the completion of these there only remains the Waimea County to be drawn. Several new selection-maps and a new map of Nelson City are required, but, owing to the urgency and volume of current work, have not yet been made. The safe register is not yet completed, the officer in charge of that work having to prepare all Crown grants for rebinding, also all the old traverse-reductions for the same purpose, and a great deal of time is taken up in looking up and attending to plans for the use of officers. Now that the Crown grants and traverse-reductions are all rebound, this work should soon be completed.

ROBT. T. SADD,

Chief Surveyor.

MARLBOROUGH.

No triangulation or topographical surveys have been completed during the period, but a little reobservation has been done by me on the lower Wairau plans—used for fixing standard points upon which to base Land Transfer work—also a few triangles to check settlement work as it proceeds ; but none of it covers new ground. A small topographical survey has also been made, but not large enough to tabulate ; another work of this kind is now being undertaken in the Wakamarina Valley.

Rural and Suburban Surveys.—19,579 acres have been completed at an average cost of 1-76s. per acre. As nearly all of this work is in broken bush country, with many old surveys to re-establish, the result has been much better than I anticipated. In the case of the survey of 270 acres costing 12-3s. per acre : this consists of 13 small scenic reserves laid off on the Mangamaunu Native Reserve, near Kaikoura, and was rendered costly because the lines had to be gone over again with a view of inflicting as little damage as possible on the adjoining landholders.

Road and Railway Surveys, &c.—Out of the 46-76 miles of roads completed this year, 11-38 miles are standard traverse of roads and streets in and about Blenheim ; and of the balance, 30 miles have been done by Mr. A. P. Seymour in the Pelorus Sound. This work is rendered very costly by the quantity of small and intricate boundaries to be picked up, and the generally tortuous nature of the lines.

Other Work.—Under this heading is included the sum of £247 11s., being the wages paid to survey parties while they were engaged in grass-seed sowing on the burnt Crown-forest lands last year. This will be included in the value of the land when offered for sale. Also £124, being the cost of standard marks in the Town of Picton. Out of the £203 9s. 6d., work done by self and staff, the sum of £159 5s. has been recovered for survey of sawmilling areas. The work not completed in the hands of the field staff at the end of March is valued at £831 5s. 2d., and is carried forward to next year's charges.

The proposed operations for the coming year are : Mr. A. P. Seymour to continue the survey of applications in the Pelorus Sound District, and make surveys of roads to legalise them ; owing to the delay in completing these, many titles cannot be issued. Mr. Wicks and Mr. Hodgkinson will proceed with the subdivision of about 20,000 acres of bush land at the head of the Wakamarina Valley, and several applications in the vicinity.

F. STEPHENSON SMITH,

Chief Surveyor.

WESTLAND.

Topographical Survey amounts to 32,600 acres. This class of work was undertaken to enable the rural sections to be best defined. Much information is necessary to locate the different interests incidental to the timber and mining industries, requiring a more detailed survey than would ordinarily be required.

Rural and Suburban Surveys cover an area of 33,444 acres of rural sections, and selections under the regulations in a mining district. Residence areas have caused a deal of trouble, as there was no previous survey to locate them, and it is only when the contiguous land is being divided that the areas then become known. The system of granting the residence areas under the mining conditions is causing overlap and endless complications. No attempt was made to provide road access, and now, when good houses are being built, the road problem is rather difficult to adjust.

Mining Survey.—Seven plans by private surveyors, of an area of 575 acres, have been checked.

Town Section Survey.—Three small townships have been laid off, two of which are to provide building-areas for miners engaged in the coal industry. Sections in the Town of Hokitika have been pegged off ready for sale.

Other Work includes incomplete surveys, rural selection, and topographical.

Proposed Operations for 1909-10.—The field-work for the coming year will be the survey of the lands up the Grey Valley that hitherto have been locked up by the sawmilling and mining interests, blocks in Kopara, Haupiri, Brunner, Hohonu, Waimea, and Kanieri Survey Districts. In the southern part of the district, areas in Wataroa, Waiho, and Poerua Survey Districts that have long been waiting to be put in hand will be undertaken. The urgency of the settlement surveys has kept the limited staff so fully engaged that little standard work has been done. Around Greymouth and Cobden so many subdivisions for building purposes have been made that the urgency of a standard survey along many of the new streets is apparent, if only to provide points for the private surveyors to close on to, and in the coming season it is to be hoped this work can be undertaken.

Office-work.—One hundred and four plans have been received, 27 of which were Land Transfer, 7 Mining, and 5 Public Works; checking has been kept well up to date; 846 plans have been placed on titles, of which Land Transfer have required 153; 531 tracings supplied for general returns and information; 8 block, 12 application, 3 run maps have been made, with 15 tracings prepared for photolithography; Crown-grant maps continued. For the ensuing year, the long-standing Land Transfer index and other maps will be put in hand.

My cordial thanks are due to the various officers, field and staff, who have so willingly and assiduously carried out their several duties.

G. J. ROBERTS,
Chief Surveyor.

CANTERBURY.

Rural and Suburban.—The total completed work under this heading is 30,882 acres, subdivided into 64 sections, at a total cost of £849 1s. 1d., or 0.55s. per acre. District Surveyor McClure subdivided the Culverden Estate, 25,829 acres, at a cost of £563 12s.; and Reserve 79, Christchurch District, 303 acres, at a cost of £12 12s.: making a total area of 26,132 acres subdivided into 48 sections at a total cost of £576 4s., or 0.44s. per acre. District Surveyor Allom subdivided 2,725 acres in the Lyndon District into 8 sections; surveyed 3 sections, containing 1,994 acres, in the Four Peaks and Acland Districts, and 5 small reserves in the Lyndon, Akaroa, and Okain's Districts: making a total of 4,750 acres subdivided into 16 sections at a total cost of £272 17s. 1d., or 1.15s. per acre. Work completed in the field, but which cannot be returned owing to the plans not being finished, includes reserves on the Pareora River, Reserve 2,166 Akaroa, various small reserves at Hanmer, and workers' dwellings sites in the Walker Settlement at Addington.

Town Surveys.—The only survey of this class was the pegging of 41 sections in the Culverden Township by District Surveyor Allom at a cost of £56 19s. 2d., or 27.8s. per section.

Road Surveys.—Under this heading 1.93 miles are returned at a total cost of £40, or £20.72 per mile. This work was done under contract by Mr. L. Webb, and consisted of the grading and surveying of the continuation of King Edward VII Drive along the summit of the Port Hills, eastward from Dyer's Pass through the Cashmere Estate. Mr. Allom graded and surveyed 41 chains through the Kennedy's Bush Reserve, but, as the plans are not completed, this work is carried forward to next year.

Field Inspections.—During the year District Surveyor Allom inspected 8 Land Transfer surveys by private surveyors, with satisfactory results.

Other Work.—Included under this heading is £656 15s., the cost of 18½ miles of the standard survey of part of Timaru completed by District Surveyor McClure, and £135 11s. 3d., the cost of the 8 field inspections made by District Surveyor Allom; also that of the survey of Pastoral Runs Nos. 61A and 62A, comprising 16,350 acres, by Mr. F. W. Freeman, contract surveyor, at a cost of £301, for disposal under "The Canterbury Agricultural College Reserves Act, 1905."

Proposed Operations for 1909-10.—Mr. Allom has the plans of various small surveys to complete, and will then survey 214 acres in connection with the proposed acquisition by exchange of a scenic area at "Sharplin Falls," in Alford Forest. There is an exchange of 80 acres to be surveyed in the Gladstone District, Mackenzie County, but this is not urgent, and can be done when other surveys are required in the vicinity. It is probable that some of the pastoral runs the present leases of which will expire in 1911 will require subdivision; and this work, in addition to the survey of any lands purchased for settlement, and the proposed major triangulation, will be more than the present field staff can cope with.

Office-work.—During the year 26 plans of sectional work have been examined and approved, and 65 road and railway plans have been similarly dealt with. Photo-lithographic work done includes alterations to the tracings of the Ashley, Selwyn, Ashburton, Mackenzie, and Waitaki Counties, rendered necessary by the readjustment of the boundary of the Canterbury and Westland Land Districts; completed plans of the Culverden Township and Hurst Survey District; 1 tracing of the Cheviot County, and 10 of lands for disposal; and the original photo-lithographic plans of the Spaxton and Grey Survey Districts brought up to date. Other work done includes the completion of 7 survey plans of the Culverden Settlement, and 4 of the Timaru standard survey; 7 township plans prepared for the approval of His Excellency the Governor; 26 cards prepared showing real estate vested in the Post and Telegraph Department, a work which involved much searching of titles; the copying of

19 sheets of Lyttelton tide-gauge registers; 318 plans placed on Crown grants and other instruments of title; 49 certificates recorded on Crown-grant maps; and the numbering and indexing in the section-books of some 70 miscellaneous survey plans belonging to previous years. The record map of the Culverden Settlement is in an advanced state, and, in addition to the foregoing, a large amount of work was done in making working and miscellaneous tracings, tracings and descriptions for *Gazette* purposes, and compiling information for other Departments. Urgent necessary work that should be done includes the compilation of a record map of Hanmer, maps of Lyttelton Borough and of Greater Christchurch, and the completion of old and the preparation of new block-sheets.

Land Transfer Branch.—Mr. Leversedge reports that the work has been less than last year, which is partly accounted for by the examination of plans of all road-diversion and proclamation plans having been taken over by the Survey Office as from the 1st June last. The plans requiring the approval of His Excellency the Governor as townships are not now copied in the office, the original survey plans being submitted for His Excellency's signature. As there appears to be a considerable decrease in the work coming to us from the Land Transfer Office, I hope to be able shortly to put in hand the work of adding to and renewing the Land Transfer record plans, which have become very worn through the pressure of work during the last few years.

ERIC C. GOLD SMITH,
Chief Surveyor.

OTAGO.

Topographical Surveys.—The total area returned under this head consists of 27,550 acres of run-surveys executed by Mr. D. Innes Barron, being the subdivision of what is known as the Ormaglade Run into small grazing-runs. The average cost of this work was 3-4d. per acre.

Minor Triangulation.—Mr. W. T. Neill has completed the field-work of an area of 104,000 acres, being revision of the triangulation in the Otago Peninsula and North Harbour and Blueskin districts; but, as the plans are not yet completed, the work is not included in this year's returns.

Rural and Suburban.—The principal item under this head was the subdivision of an estate acquired during the year under the Land for Settlements Act (the estate is now known as Kauroo Hill Settlement, and is situated near Oamaru). The surveys were executed by Messrs. D. Innes Barron and J. A. Johnston, and comprised an area of 19,567 acres. Messrs. D. M. Calder and W. T. Neill have been engaged upon the subdivision and roading of the Barewood Run of 30,143 acres. Several small sections were surveyed by Messrs. Barron and Calder in different parts of the district, comprising in all 266 acres, and Mr. S. T. Burton, since he joined the Otago staff, has been engaged upon spotting surveys in various parts of the district, completing an area of 502 acres. The total area returned by the staff is 50,478 acres, at an average cost of 0-87s. per acre. An area of 1,745 acres of sectional work was surveyed for the Department by private surveyors during the year.

Town Surveys.—During the year an area of 19 acres 3 roods 10 perches of town survey in the Towns of Waipori and Ranfurly was carried out by Messrs. Barron and Calder.

Gold-mining Surveys.—These surveys, with one exception, were undertaken and executed by private surveyors for fees deposited by the applicants, the number of claims surveyed being 22, having an area of 1,293 acres, the cost of the surveys averaging 4-63s. per acre. Besides the surveys, several applications for surveyed land were reported on, and the accompanying tracings for the Warden duly checked and certified to, and vouchers prepared for the Receiver of Gold Revenue in favour of the inspecting surveyor.

Land Transfer Surveys.—During the year 81 plans, representing an area of 106,509 acres, were examined, passed, and recorded, and 60 applications to bring land under the Land Transfer Act were dealt with. Eight hundred and eighty certificates of title in duplicate were prepared, in addition to checking all dealings affecting portions of land in titles and proclamations, &c.

Office-work.—During the past year 35 plans, comprising an area of 65,846 acres, were received from the staff surveyors, and have all been examined, passed, and recorded. Seven railway-land plans in triplicate and 18 road-plans in duplicate, sent in by private surveyors, have been similarly dealt with. One estate was acquired under the Land for Settlements Act and surveyed during the year, aggregating an area of 19,567 acres. One new Land Transfer map and two Crown-grant record maps were constructed, and three Land Office maps were prepared. Diagrams were drawn on 78 certificates of title, 45 lease-in-perpetuity, 2 occupation licenses with right of purchase, 26 occupation leases, 53 renewable leases, 1 agricultural lease, 1 mining license, 6 Native partitions, 40 small grazing-runs, 8 pastoral licenses, and 154 miscellaneous licenses in duplicate or triplicate, making a total of 1,074 copies; 213 working-tracings for various purposes; 355 cloth and paper tracings showing land transactions were supplied to the Land Valuation Department. A plan was prepared for the Police Department, and plans of the following were drawn for photo-lithography: viz., Ohau Lake, Hedgehope, Maruenua Survey Districts, and Kauroo Hill Settlement. Town of Waikouaiti, Ormaglade and Barewood Runs brought up to date, Silverpeak and Lammerlaw Survey Districts, Block IV Blackstone, Blocks V and VI Glenomaru District were drawn on transfer-paper for lithography and printed in this office. The District Road Surveyor's Office was supplied with maps of electoral districts, showing boundaries of counties, road districts, and boroughs, &c. The total number of maps printed was 1,009; mounted, 1,183; and books bound, 35. The work for the ensuing year will be the making of new Crown grant, Land Transfer, county, and road district maps. Many of the county maps have been waiting to be put in hand and brought up to date.

Proposed Operations for the Year.—All the surveyors will be fully employed for the year in carrying out the work in hand. This embraces 614,385 acres of small-grazing-run surveys—viz., Crown lands, 172,540 acres; and National Endowment, 441,845 acres.

The Staff.—As referred to in the Lands Report, the staff has been kept extremely busy during the year. All have done their best to keep abreast of the work, and deserve my thanks for the cheerful and satisfactory performance of their duties.

D. BARRON,
Chief Surveyor.

SOUTHLAND.

Minor Triangulation.—This consisted of one triangle, covering 6,975 acres, of which the angles were observed, and the calculation of sides based on results obtained, by Mr. Surveyor Macpherson last year.

Rural and Suburban.—20,194 acres are returned under this head. This area was subdivided into 113 sections at an average cost of 2.93s. per acre. This will be seen to be a higher rate than that returned for last year; but the explanation is that the greater part of the area is hilly, densely wooded country, a considerable portion of which had been milled over, rendering line-cutting very difficult; while in other parts the ground had been much cut up by sluicing operations, and was intersected by numerous water-races, involving a large amount of extra traversing. By the new regulations all boundary-lines of sections in bush country have to be cut and pegged. This cutting and pegging necessarily adds largely to the cost of section-work, probably 9d. to 1s. per acre, if the work is well done. A further reason for increased cost was frequent delays owing to bad weather. When everything is taken into consideration the cost per acre, 2.93s., which includes the selection and grading of roads, cannot be called high. 4,800 acres of the above area consisted of sawmill areas, mostly in rough bush country.

Town Surveys.—There was 1 survey of this class, comprised in 1 allotment of 3 acres, the cost of which was £6.

Gold-mining Surveys.—Special claims to the extent of 274 acres, comprising 4 allotments, were surveyed under this class, at an average cost per acre of 4.8s. On comparison with last year's figures, the cost will be seen to be higher. As usual, the surveys were made by private surveyors, the survey fees being deposited by applicants.

Roads, Railways, &c.—There was 1 survey of this class, 2.19 miles in length, of which the cost per mile was £32.75. This road is in broken country, and for half its length runs through heavy bush.

Other Work.—The total sum returned under this head is £2,423 7s. 8d. Of this amount only £183 9s. 8d. is strictly chargeable to "Other Work." The balance represents the amount expended on unfinished work, to be carried forward to next year.

Land Transfer Branch.—Mr. J. L. Dickie, Land Transfer Draughtsman, reports that 92 plans were examined and approved, containing 17,030 acres, and comprising 579 lots. Nine hundred and forty-seven diagrams were drawn on certificates of title, representing 456 in duplicate, 3 in triplicate, and 26 single. He also examined 22 leases and other instruments of title. During the first part of the year the amount of work put through was very much beyond the average, land transactions being very brisk; but during the last six months the work has slackened off considerably.

Office-work.—The Chief Draughtsman reports as follows: During the past year 63 plans, representing 11,217 acres, received from surveyors, have been examined; also 13 sheets of railway-land plans. In addition to these, a large amount of miscellaneous calculations was done. A lithographic drawing on a 40-chain scale was made of Invercargill Hundred to take the place of the old original drawing, which was obsolete and useless for the purpose of reproduction, and the original drawing of New River Hundred was revised and brought up to date. Lithographic drawings were also commenced of the Borough of Riverton and the suburban boroughs around Invercargill. A topographical plan was compiled of the interior districts in the north-western part of the land district on a scale of 80 chains to the inch. Some of these districts have never yet been lithographed, and when opportunity offers steps will be taken to have this done. New application maps were compiled of three districts, and 22 lithographic tracings were made for sale-plan purposes. Eight plans of townships were compiled, and forwarded for the Governor's approval. Twenty-four schedules in duplicate were prepared for local bodies' proposals for expenditure of "thirds," and 80 draft warrants for landless Natives were written and checked. The index-book of road-plans, mentioned in last year's report as having been commenced, has now been completed to date, and is found to be most serviceable. A new plan register is also partly compiled. Consequent upon the enlargement of the safe, the old system of portfolios for the storage of plans has been abolished, and sets of drawers, running on brass wheels, have been constructed. This involved a large amount of work in the rearranging and renumbering of plans; but the benefit of this is apparent in the saving of time which has been secured thereby in getting out plans. In connection with ascertaining the real estate possessed by the Postal Department, diagrams and other information were placed on 16 cards. Three plans were compiled showing proposed adjustment of street-frontages in East Invercargill. Seventy-six Land Transfer deposited plans were traced for the Valuation Office, and 339 miscellaneous and 242 working tracings were made for surveyors and others. Some 300 lithographs and plans were mounted.

Proposed Operations for 1909-10.—It is anticipated that surveyors Falkiner and Macpherson will be occupied during the ensuing year in cutting up the landless Natives' block, this work being much more troublesome than I had anticipated. Mr. Otway will complete the road-survey at Lake Hauko, on which he is at present engaged, and will then take in hand a block of bush land for settlement near Otatau. Mr. Drury will finish his present work of laying off mining-districts-land-occupation and renewable-lease applications near Orepuki, and will probably thereafter cut up a block of 2,000 acres for settlement on the west bank of the Waiau River. These works, with probably some smaller surveys, which should be done by staff men, will keep these two surveyors employed all this year. As usual, mining surveys and surveys of sawmill areas will be made by private surveyors, and other works, such as scenic-reserve surveys and small "spotting" surveys, where urgently required, will be placed in their hands. There is a persistent demand that more bush lands (abandoned sawmill areas) shall be cut up for settlement, but with the present staff of surveyors the demand can only partially be met, and I should very much like to see the staff increased by one or two surveyors used to bush-work.

E. H. WILMOT,
Chief Surveyor.

APPENDIX II.

THE MAGNETIC OBSERVATORY AND THE MAGNETIC SURVEY.

DURING the year the routine work of the Observatory has been carried on in all its branches with success, and, in addition, a considerable amount of field-work was done in further extension of the magnetic survey.

THE MAGNETOGRAPHS.

These have operated satisfactorily throughout the year, and uninterrupted records of the magnetic declination, magnetic horizontal force, and vertical magnetic force have been obtained. The records obtained have been developed and annotated to date. The necessary absolute observations required to standardise the magnetograms were made at intervals, and considerable progress was achieved in the measurement and tabulation of hourly values of magnetic elements for previous years. These tables have been completed for the years, 1902, 1903, and 1904, and are being used in the application of corrections to the field observations. It may be mentioned that Dr. Chree has remarked the small range of diurnal variation of the vertical magnetic force here, as compared with the range at Kew Observatory, England, which is not far from our geographical antipodes, though evidently considerably removed from our magnetical antipodes.

The magnetograms for some of the most magnetically disturbed days are reproduced herewith for the information of other observatories.

MILNE SEISMOGRAPH No. 16.

This instrument has been in continuous operation during the year, and the records obtained have been developed, annotated, and measured up. Records of forty-six earthquakes were obtained for the year, a considerably smaller number than has been previously recorded here for similar periods—viz., from the 1st April to the 31st March. This is seen from the following table showing the number of records at Christchurch:—

Year.		Number of Earthquakes recorded.	Year.		Number of Earthquakes recorded.
1902-3	.. ..	72	1906-7	.. ..	82
1903-4	.. ..	68	1907-8	.. ..	86
1904-5	.. ..	96	1908-9	.. ..	46
1905-6	.. ..	86			

The lessened frequency of quakes may possibly be connected with the increased volcanic activity in various parts of the world, including New Zealand in a minor degree. Nothing can be definitely affirmed on this head until the matter is subjected to a research based upon the reports from all the seismological stations throughout the world. Professor G. P. Agammenone, of the Italian Observatory of the Rocca di Papa, Rome, has nearly completed a discussion of the records obtained of the Calabrian earthquake of 1905, and has found the Christchurch record of very great value in his researches, since it is so nearly the antipodes of Calabria. Undoubtedly he will make a similar investigation of the recent disastrous Calabrian earthquake of the 28th December, 1908, which was also recorded here, which record is reproduced herewith.

It would be desirable to add to our seismograph the recently designed arrangement for securing a more open time-scale. This would greatly enhance the value of the records obtained. Some of the more important seismograms are reproduced for convenience of comparison with those of other observatories. A list of earthquakes is appended.

METEOROLOGICAL OBSERVATIONS.

Regular meteorological observations of the pressure and temperature of the air, humidity, cloud, wind, intensity of solar radiation, maximum and minimum air-temperature, &c., have been made twice daily throughout the year at 9.30 a.m. and 5 p.m. each day.

MAGNETIC SURVEY.

It was, fortunately, found possible to make magnetic observations in the south-west portion of the South Island, a district which the absence of roads had hitherto prevented us from reaching with our instruments. In December last a party of a semi-scientific nature left Christchurch and visited all the West Coast Sounds of Otago, in the s.s. "Rakura," specially chartered for the journey. I accompanied the party, and, though the time was limited and the weather for all but a few days execrable, still, through the hearty co-operation of Dr. C. C. Farr and Mr. H. D. Cook, it was found possible to observe eleven fresh stations in the Sounds. The party returned to Christchurch on the 6th January, the various scientists well pleased with the collections and observations they had made. The magnetic results are shown on the map published herewith. It is worthy of notice that the declination

observations showed that the compass-variations given on the Admiralty charts of that region were considerably in error, the variation being given too small by an amount which would throw a vessel depending entirely upon her compasses off her course by some ten miles in the course of a day's run.

The total number of stations at which magnetic observations have been made in the Dominion up to this time is 309, distributed as follows:—

							Stations.
North Island	..	..	..	..	..	..	123
South Island	..	..	..	..	..	..	152
Stewart Island	..	..	..	..	..	..	2
Chatham Islands	..	..	..	..	..	..	20
Snares Island	..	..	..	..	..	..	1
Auckland Islands	..	..	..	..	..	..	8
Campbell Island	..	..	..	..	..	..	3
							309

A map of portion of the South Island is published herewith showing lines of equal declination and embodying the results of the eleven West Coast stations recently observed.

GENERAL.

Reference must be made to the return of Lieutenant Shackleton's Antarctic Expedition in the "Nimrod," after getting one of their land parties to within a hundred miles of the South Pole and another party to the immediate neighbourhood of the South Magnetic Pole, thus verifying by actual observation the position of the latter as calculated from the magnetic data brought back by the "Discovery" expedition. The dip circle used by the "Nimrod" party was verified here upon their return last March. The explorers, and Lieutenant Shackleton in particular, are to be congratulated upon their magnificent success.

I wish to heartily thank the directors of the many observatories and scientific institutions that have kindly contributed their publications to the library of this Observatory.

In conclusion, I wish to acknowledge the valuable services of my assistant, Mr. B. V. Pemberton, throughout the year.

The magnetograms reproduced are reduced to three-eighths natural size, so that the published curves have the following values of scale:—

Declination curve + 1 mm. = - 3' arc.

Horizontal force curve + 1 mm. = - 0.00012 c.g.s. unit.

Vertical force curve + 1 mm. = - 0.00009 c.g.s. unit.

The Observatory regularly receives copies of seismograms from Alipore Observatory, by direction of the Director-General of Indian Observatories, and from the Royal Alfred Observatory, Mauritius.

HENRY F. SKEY, B.Sc.,
Officer in charge.

RECORDS OF MILNE SEISMOGRAPH NO. 16, AT CHRISTCHURCH.

Latitude: 43° 31' 50" S. Longitude: 172° 37' 18" E. Time employed: Greenwich Mean Civil Time.

Time: G.M.C.T., as stated above. P.T. = Preliminary tremors less than 2mm. complete range; A.T. = After-tremors less than 2mm. complete range; B.E. = Beginning and end of vibrations not less than 2mm.; Amp. = Half-range in millimeters.

Date.	P.T. from	B.	Maxima.		Amp.	E.	A.T. till	B.P.	Remarks.
			From	To					

APRIL, 1908.

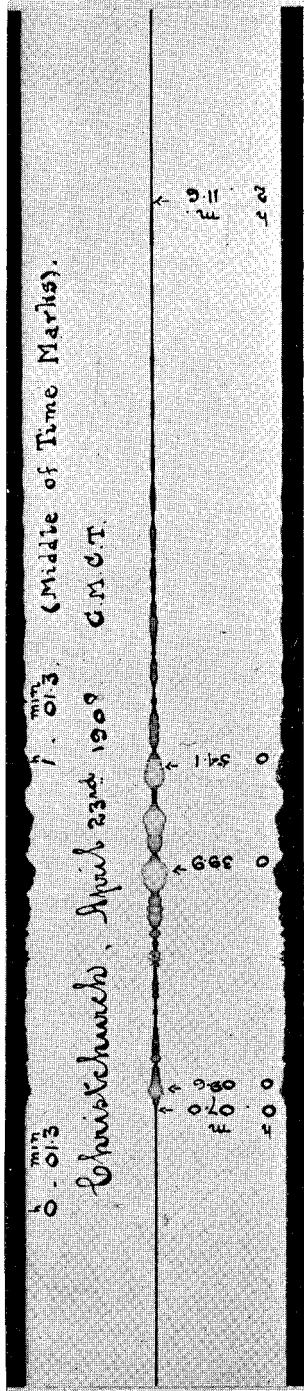
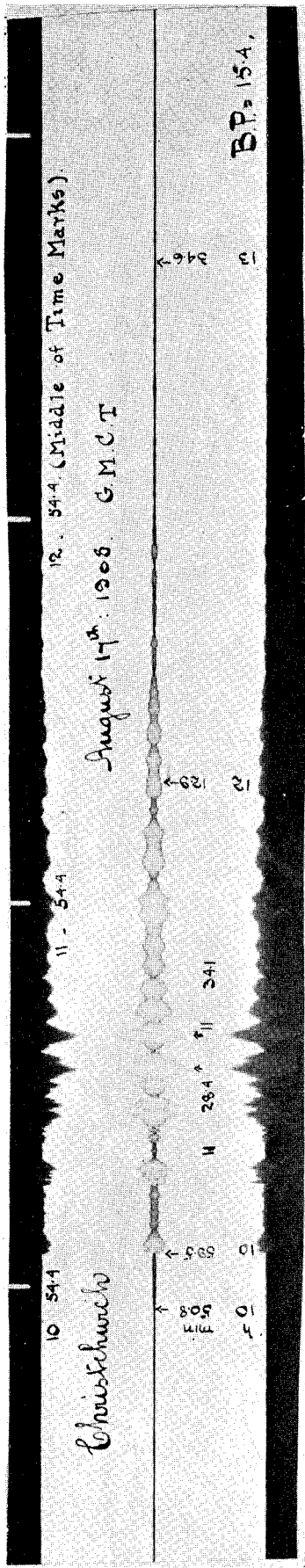
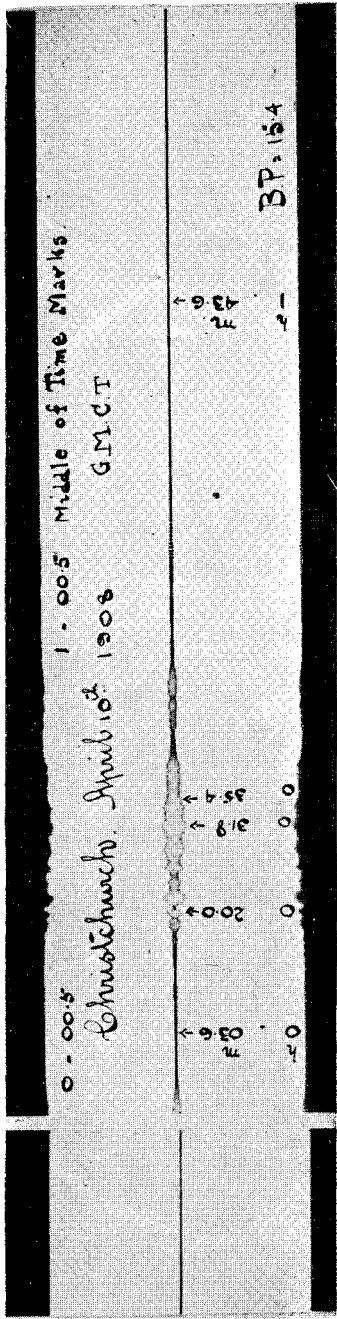
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10	0 03.6	0 20.0	0 31.8	..	1.55	0 35.4	1 43.6	..
12	9 09.1	..	9 14.8	..	0.1	..	9 25.6	..
12	19 18.4	..	19 36.0	..	0.75	..	19 53.7	..
15	6 06.1	..	6 17.4	..	0.4	..	6 27.8	..
23	0 07.0	0 09.6	0 39.9	..	1.85	0 54.1	2 11.6	..

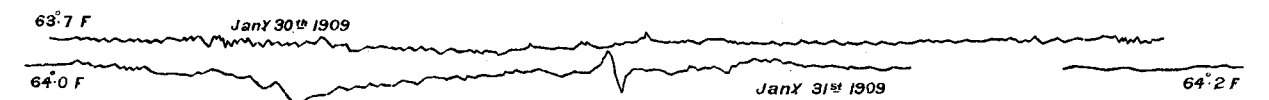
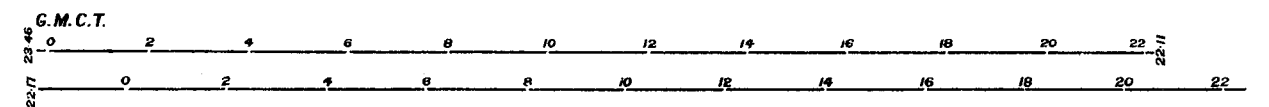
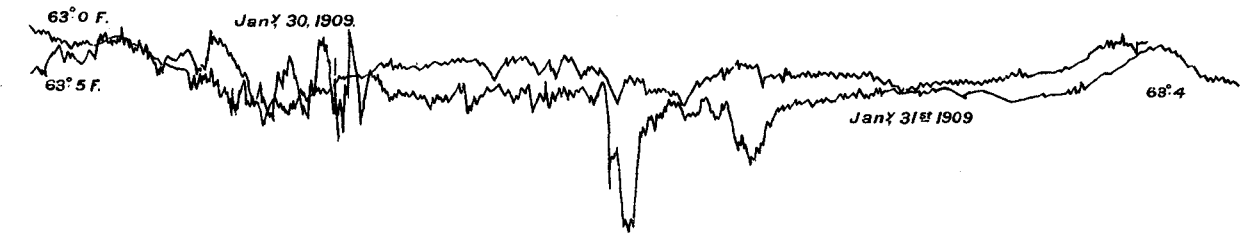
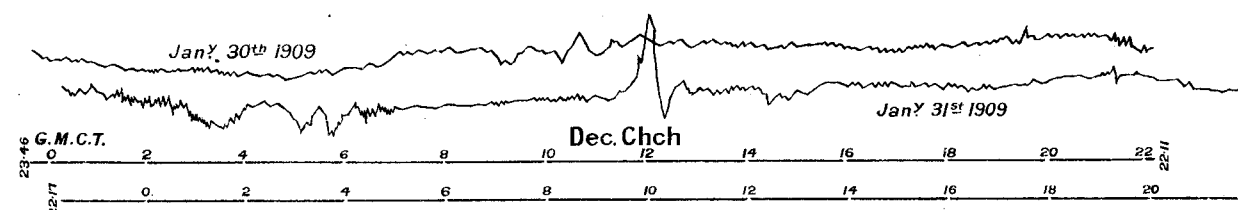
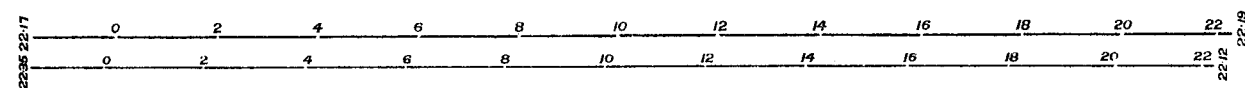
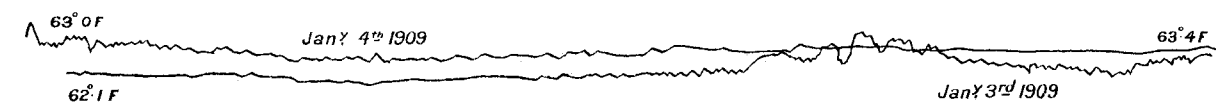
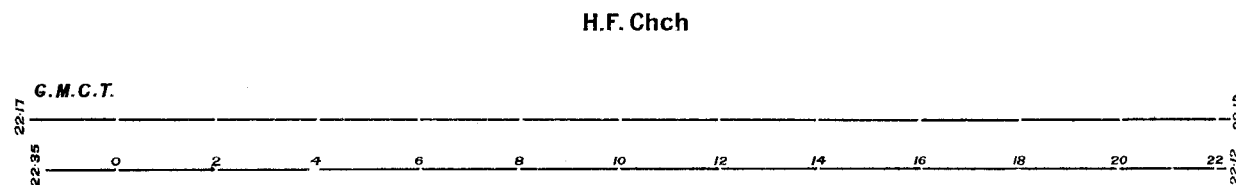
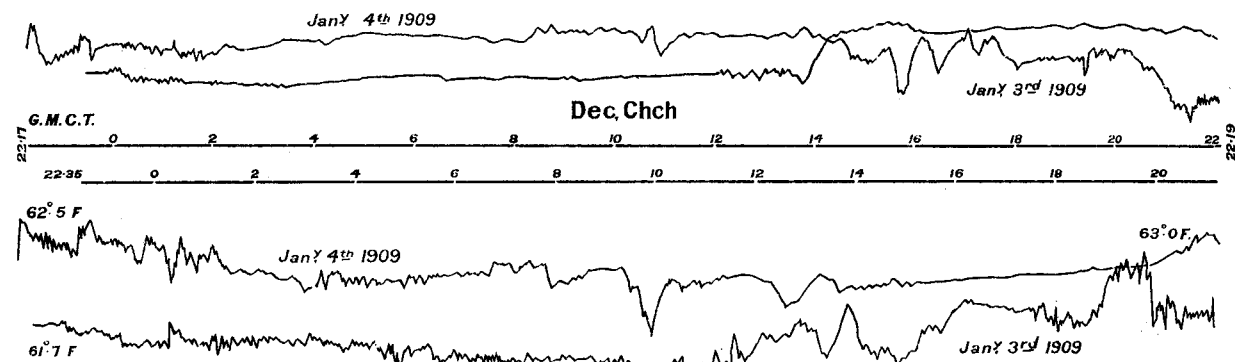
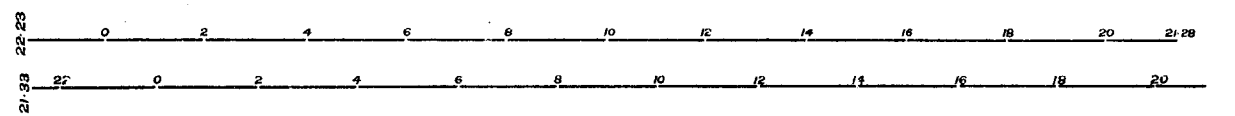
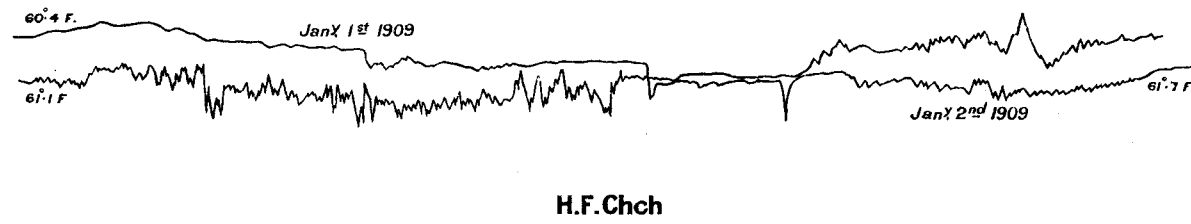
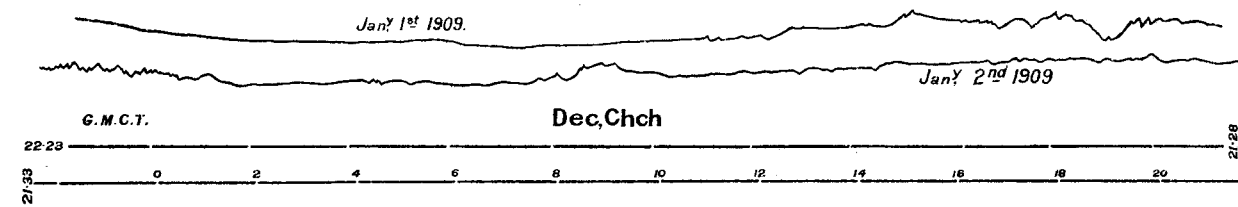
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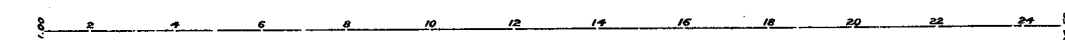
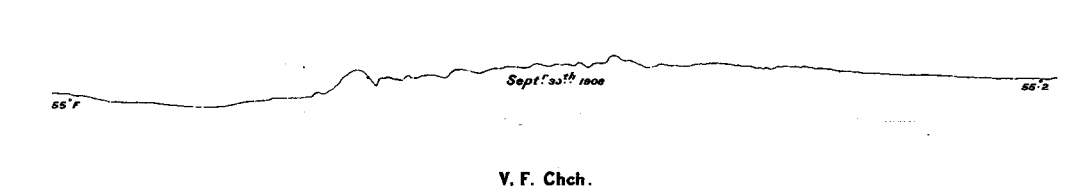
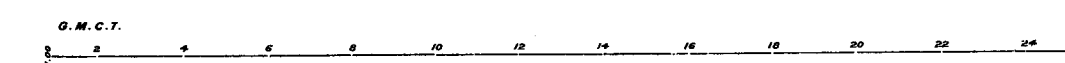
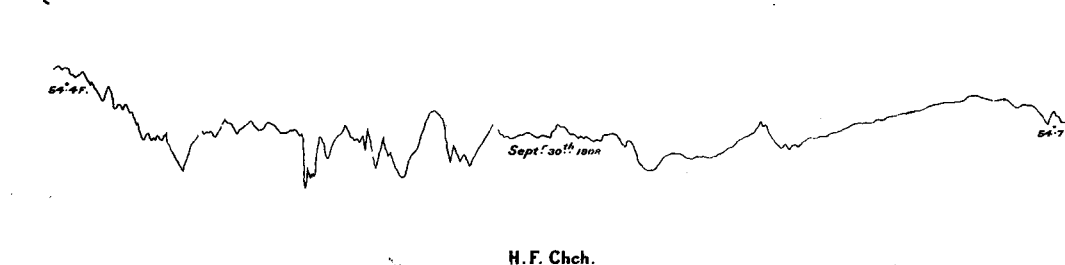
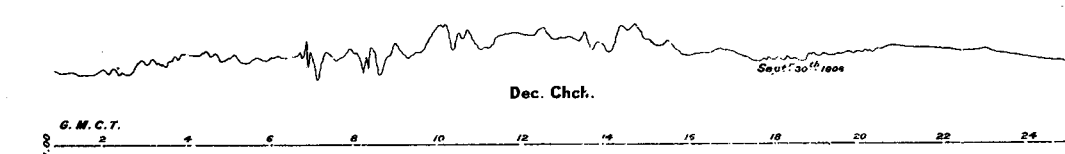
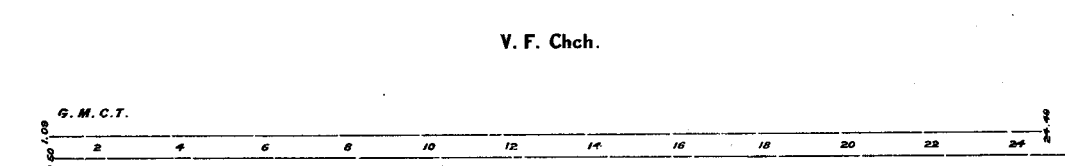
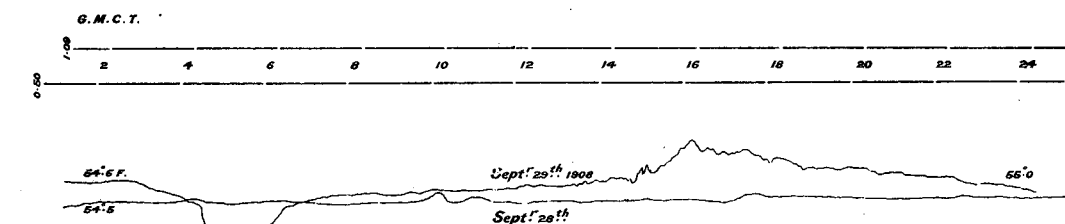
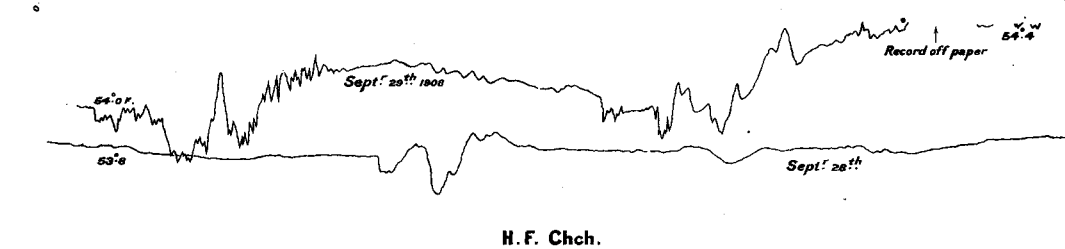
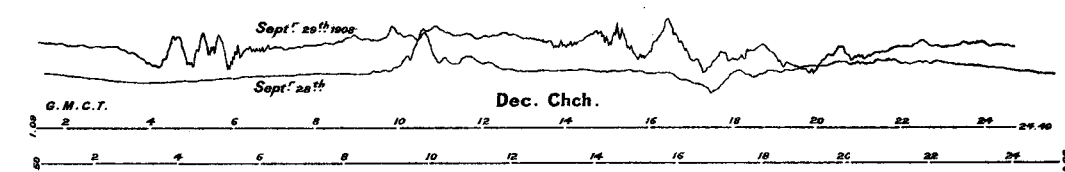
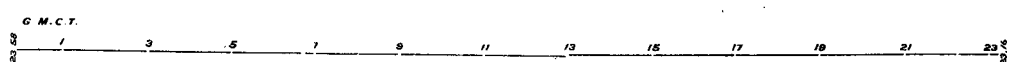
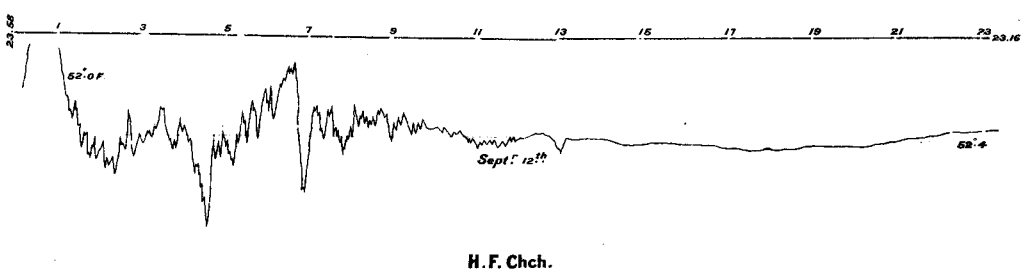
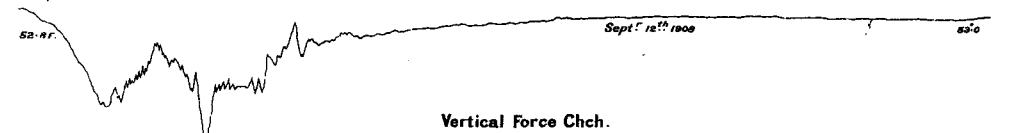
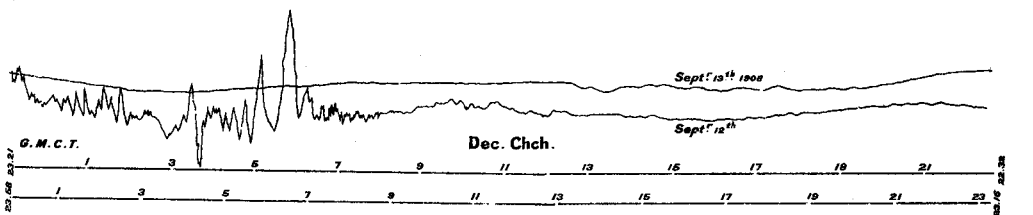
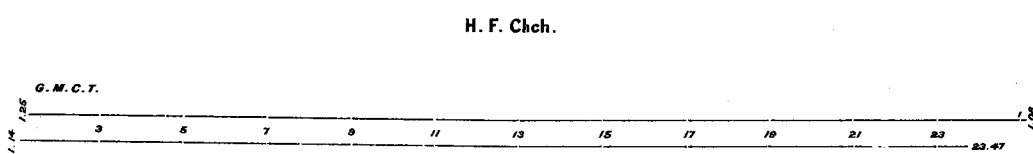
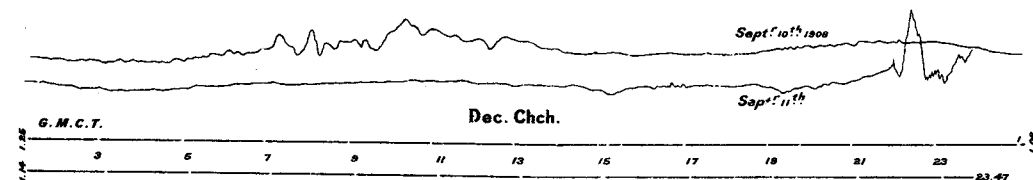
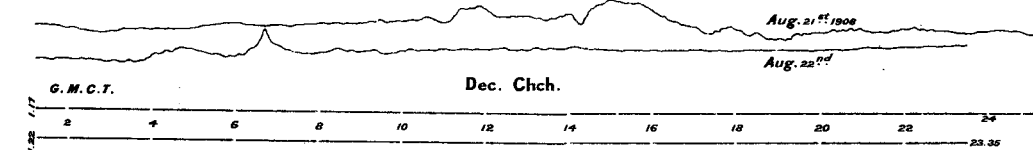
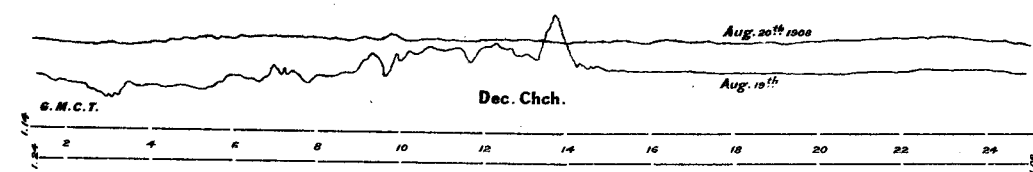
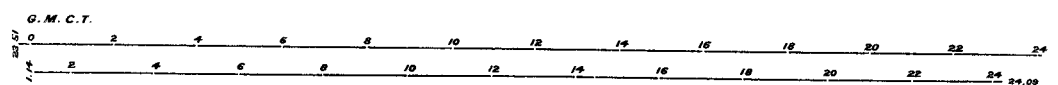
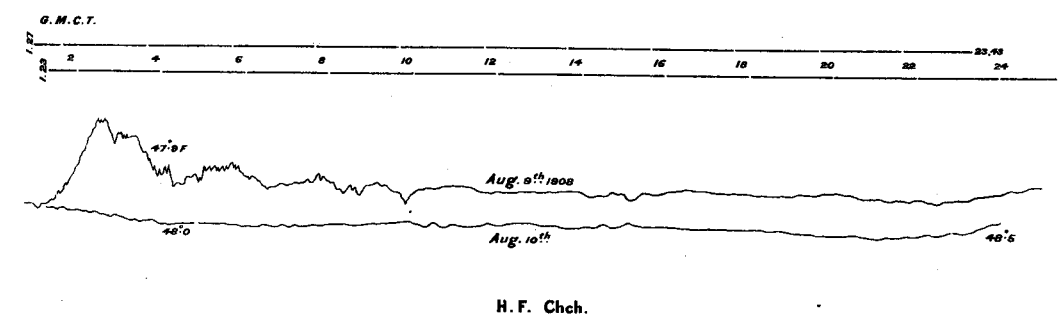
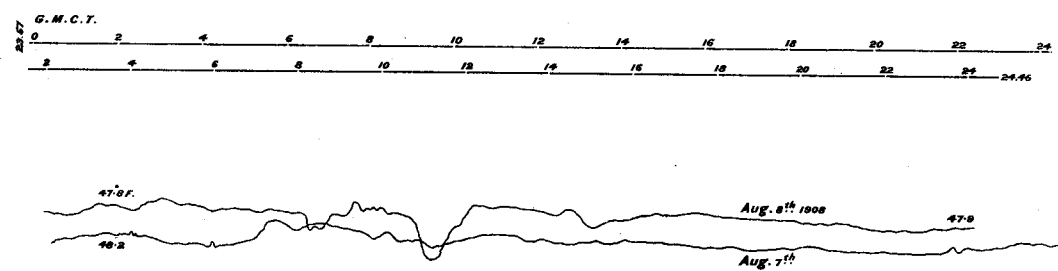
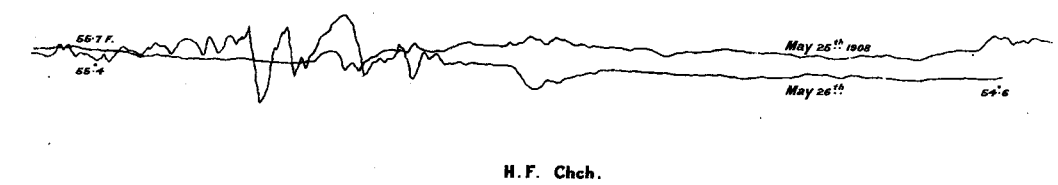
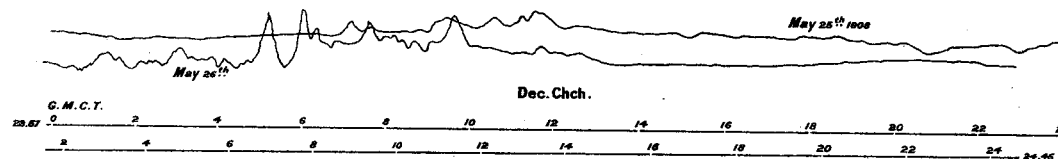
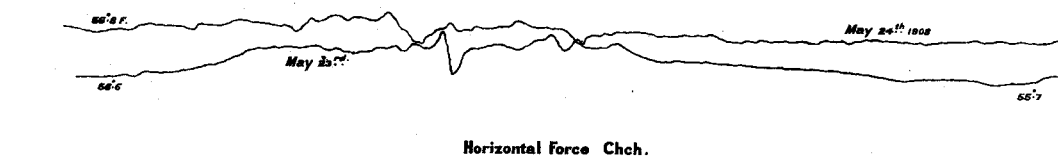
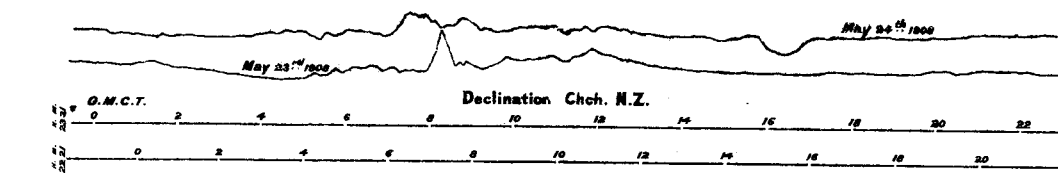
5	5 28.2	..	6 03.8 and 6 05.4	..	1.0	..	7 08.5	..	Followed by night tremors. Slight.
20	8 00.9	..	8 24.7	..	0.8	..	Indefinite	..	
21	7 19.1	..	..	..	..	..	7 33.6	..

JUNE, 1908.

3	Indefinite	..	21 25.3	..	1.0	..	Indefinite	..	In middle of continuous tremors.
18	1 39.6	..	1 43.7	..	0.25	..	1 54.0	..	

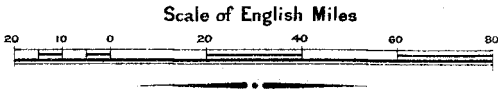




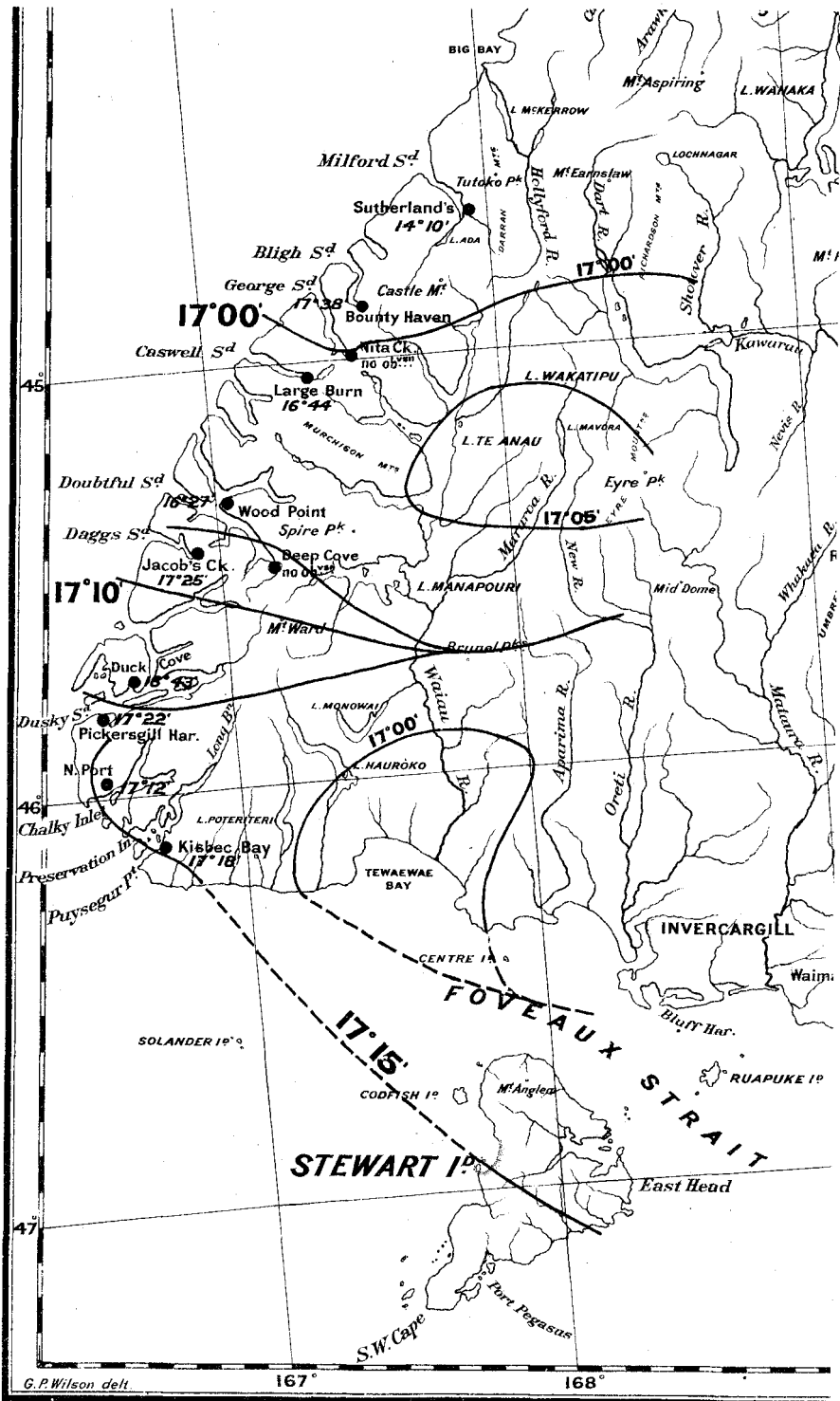


PORTION OF
SOUTH ISLAND
NEW ZEALAND

Shewing eleven additional Magnetic Stations from Milford S^d to Preservation Inlet.
December 1908 to January 1909



Magnetic Stations shewn thus..... Jacob's Ck. ●
Lines of equal Easterly Magnetic Declination for 1908 shewn thus ————
Annual Variation.....+3'



G.P. Wilson delt

167°

168°

RECORDS OF MILNE SEISMOGRAPH NO. 16, AT CHRISTCHURCH—*continued.*

Date.	P.T. from	B.	Maxima.		Amp.	E.	A.T. till	B.P.	Remarks.
			From	To					
AUGUST, 1908.									
17	10 50.8	10 59.5	11 28.4 and 11 34.1		5.5	12 12.9	13 34.6	..	
SEPTEMBER, 1908.									
2	Indefinite	..	21 15.8	..	0.9	..	Indefinite	..	P.T. and A.T. obscured by night tremors.
14	3 32.5	..	3 36.7	..	0.4	..	3 53.2	..	
21	6 55.7	..	7 11.8	..	0.9	..	8 39.2	..	
22	3 11.8	..	3 23.7	..	0.35	..	3 41.8	..	
26	5 27.4	5 32.0	5 34.1	..	4.9	5 41.8	6 40.8	..	
OCTOBER, 1908.									
7	1 00.7	..	1 21.9	..	0.8	..	1 53.5	..	
13	5 31.0	..	..	..	..	..	7 12.8	..	Swellings.
NOVEMBER, 1908.									
11	21 22.3	..	21 30.0	..	1.0	..	22 21.2	..	Preceded by night tremors.
15	2 00.8	..	..	..	..	..	2 22.0	..	Slight swelling.
22	22 52.7	..	22 58.4	..	0.25	..	23 13.4	..	
27	0 38.0	..	0 41.1	..	0.3	..	1 02.3	..	
30	21 24.1	..	21 27.2	..	1.9	..	21 52.0	..	
DECEMBER, 1908.									
1	3 05.4	..	..	..	..	..	3 43.7	..	Swellings.
2	15 12.5	..	15 15.6	..	0.25	..	15 35.2	..	
7	2 00.3	..	2 06.9	..	0.15	..	2 31.4	..	
8	0 26.1	..	0 26.4 and 0 27.5	..	6.0	..	0 40.6	..	Severe shock in North Canterbury and slight in South Canterbury.
16	..	..	6 07.7	..	0.4	..	..	15.4	In middle of continuous tremors.
28	4 40.9	..	{ 4 55.3 5 00.5 5 07.8 5 20.9 5 30.0 6 07.2 6 13.4 6 17.1 6 20.2 6 24.3 }	..	0.6	..	7 02.6	..	Subsequent tremor at 7h. 17.1 m. Origin Italy.
JANUARY, 1909.									
1	4 11.7	..	..	..	..	..	4 19.0	..	Swelling.
3	21 46.5	21 51.2	21 52.2 and 21 54.3	..	6.4	22 03.6	23 10.8	..	In progress while attending to instrument.
17	3 17.9	..	3 28.2	..	0.4	..	3 42.7	..	
21	2 38.4	..	2 47.7	..	0.5	..	3 07.3	..	
23	3 49.6	..	..	..	..	..	5 26.3	..	Tremors.
28	0 38.5	..	..	..	..	..	0 42.7	..	Thickening merely.
29	0 59.8	..	1 15.9	..	0.3	..	1 44.3	..	
29	..	..	13 26.7	..	0.4	..	..	..	In middle of night tremors.
FEBRUARY, 1909.									
11	H. m. Indefinite	H. m. 18 24.2	H. m. 18 25.8	H. m. ..	Mm. 2.3	H. m. 18 29.4	H. m. Indefinite	Secs. ..	P.T. and A.T. obscured by night tremors.
22	9 26.7	9 31.3	9 37.0	..	3.4	10 03.9	11 10.1	..	
27	Indefinite	..	13 33.4	..	1.5	..	Indefinite	..	P.T. and A.T. obscured by night tremors.
MARCH, 1909.									
8	11 45.7	11 56.0	11 56.5 and 11 59.1	..	1.9	12 00.2	Indefinite	..	A.T. obscured by night tremors.
10	7 37.4	..	7 38.4	..	0.45	..	7 42.0	..	
17	23 05.2	23 32.3	23 35.9	..	3.3	23 44.2	25 36.4 26 23.0 27 01.3	..	
22	22 05.3	22 06.4	22 07.4	..	17.0+	22 31.2	24 21.5	..	Direction N. and S. Felt in southern towns.
26	1 53.8	..	..	..	..	..	1 59.5	..	Maximum at beginning. Amplitude very slight. Felt in Christchurch. Direction N. and S.

APPENDIX III.

MEAN SEA-LEVEL.

THE mean sea-level at the ports of Auckland, Wellington, Lyttelton, Port Chalmers, Nelson, and Westport has been determined from the tide-gauge records and referred to permanent bench-marks on the adjacent shores, the details of which will be found in the following pages.

Attempts were made to arrive at it at other places where gauges had been in use; but the records were found to be so intermittent and unsystematic that they were of little value for the purpose in hand.

AUCKLAND.

The automatic gauge, from the tide-sheets of which the mean sea-level has been deduced, is situated at the Devonport Ferry Wharf.

Bench-mark A, 8.86 ft. below M.S.L., is a point on the sill of the Auckland Dock, marked by a copper bolt.

Bench-mark B, 27.26 ft. above M.S.L., is the top of the stone block of the City Standard Survey, situated at the intersection of Customs and Albert Streets, at the corner against Section 18.

Bench-mark C, 41.02 ft. above M.S.L., is the top of the standard block on the west side of Albert Street, and nearly in line with the north side of Mills Lane.

Bench-mark D, 43.17 ft. above M.S.L., is the top of the standard block at the intersection of Moore and Albert Streets, at the corner against Section 15.

Mean sea-level was determined by the mean of the high- and low-water records throughout the years 1907 and 1908, which, taken independently, differed just one-third of an inch. The mean for these two years, which, as in the other cases, is adopted, differs only $\frac{4}{100}$ in. from the mean of the four years 1905 to 1908, inclusive.

WELLINGTON.

The automatic gauge is on the Jervois Quay Wharf, in the south end of N shed.

Bench-mark A, 6.64 ft. above M.S.L., is on the north side of the western pillar of the 40-ton crane, between N and O sheds, on Jervois Quay. It is $6\frac{1}{2}$ in. below the deck-level of the wharf, and is marked by a gun-metal bolt.

Bench-marks, two in number, at B, are at the Equitable Building and Investment Company's office, No. 360 Lambton Quay. One 10.56 ft. above M.S.L., is marked by a gun-metal bolt in the wall about 12 ft. south of the doorstep and $6\frac{1}{2}$ in. above the footpath; the other, 10.75 ft. above M.S.L., is marked by a hexagonal gun-metal plug on the doorstep at the east end.

Bench-marks, two in number, at C, are at the Bank of New South Wales, Nos. 320 and 322 Lambton Quay. One 9.52 ft. above M.S.L., is marked by a gun-metal bolt in the wall about 3 ft. south of the main door and about 1 ft. above the pavement. The other, 8.55 ft. above M.S.L., is in the pavement close to the former, and marked by a hexagonal gun-metal plug.

Bench-mark D, 8.63 ft. above M.S.L., is marked by a hexagonal gun-metal plug in the doorstep of the main door of the Harbour Board Office, inside the left-hand door at the east end.

"Mean sea-level" was determined by the mean of the high- and low-water records throughout the years 1907 and 1908, which, taken independently, differ $\frac{7}{100}$ in.

The results are not so nearly accordant as those of Auckland or Lyttelton, which, however, is not surprising, considering the configuration of the harbour, with its narrow entrance, facing, as it does, Cook Strait, with its erratic and strong currents.

LYTTELTON.

The automatic gauge is situated near the south end of the small wharf in line with St. David Street.

Bench-mark A, 11.98 ft. above M.S.L., is 200 ft. westerly from the landing-steps of the small wharf referred to, and is a point on the south face of the south pier supporting the foot overbridge from the railway-station to the wharves. It is 2 ft. above the ground, on a ledge 3 in. wide and 8 in. from the south-east corner of the pier, and is marked by an inch copper bolt fixed in the concrete.

Bench-mark B, 8.05 ft. above M.S.L., is at the graving-dock, and is 26 ft. south of the dock tide-gauge outside the dock gate, which latter is marked by Roman numerals cut in the concrete face. The point B is marked by an inch copper bolt fixed in the concrete.

The "mean sea-level" was determined by the mean of the high- and low-water records throughout the years 1907 and 1908, which, taken independently, differ only $\frac{8}{100}$ in.

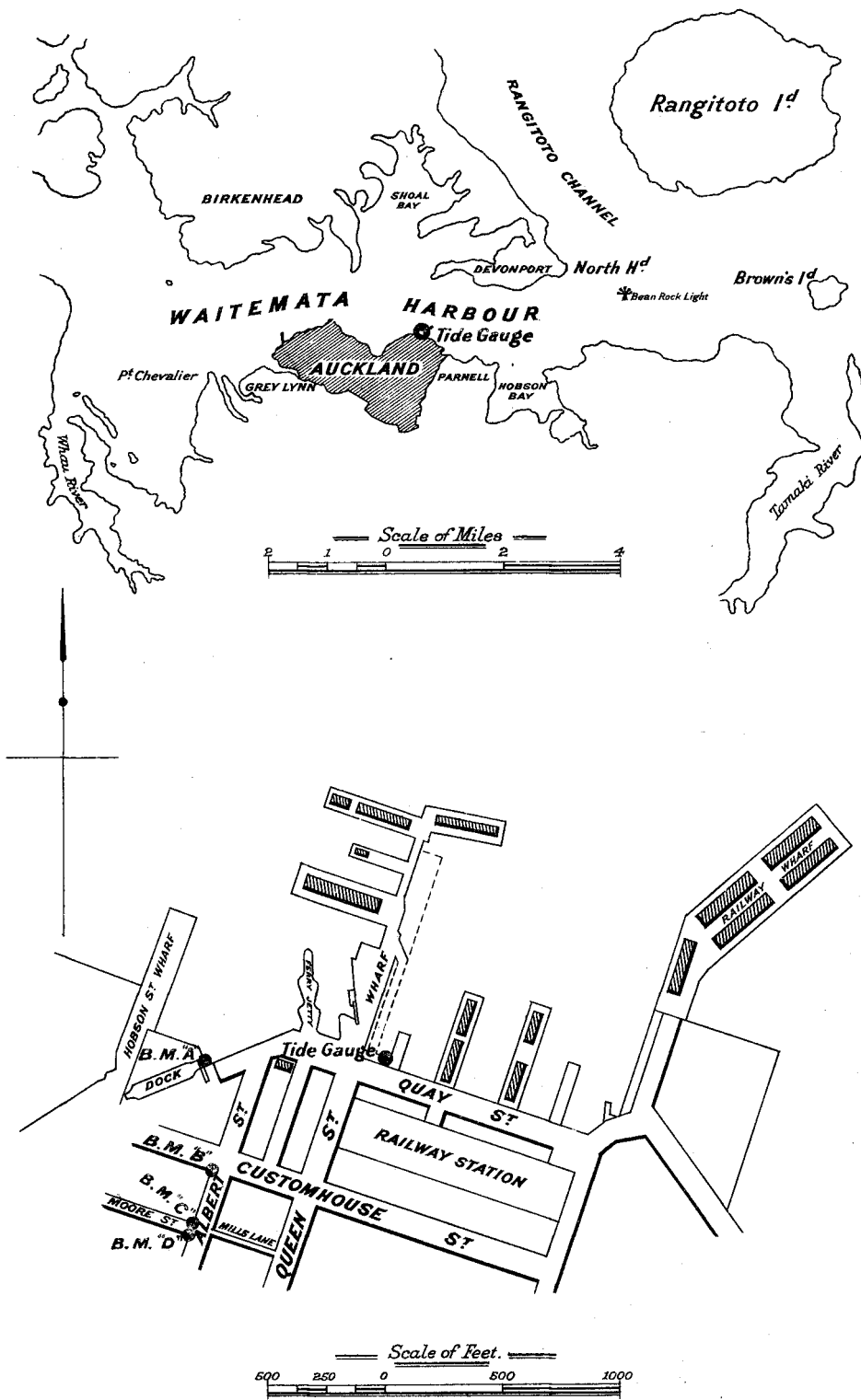
PORT CHALMERS.

The automatic tide-gauge is situated at the breastwork between George Street Wharf and Bowen Pier.

Bench-mark A, 4.80 ft. above M.S.L., is the top of the large concrete block, the Geodetical Station at Observation Point.

Bench-mark B, 6.42 ft. above M.S.L., is the top of the concrete cone on the above, and is marked by a $1\frac{1}{2}$ in. iron tube.

AUCKLAND



Note.

Bench Mark A	below mean sea level	8.86 Feet
"	" B above	27.26 "
"	" C "	41.02 "
"	" D "	43.17 "

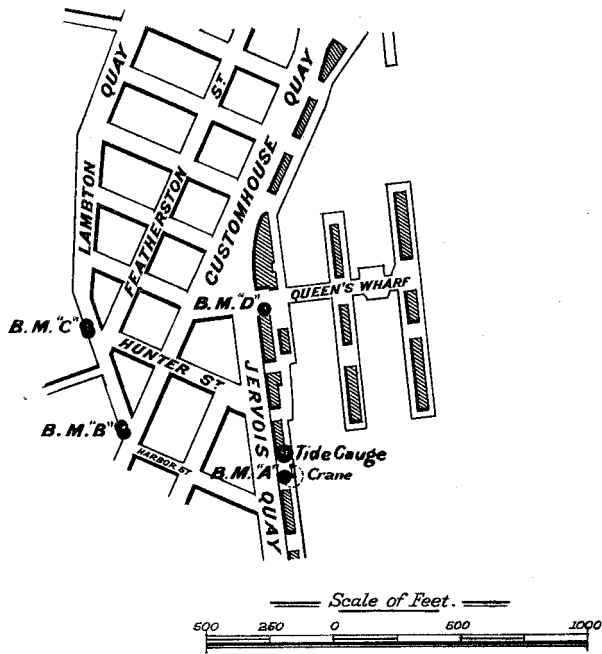
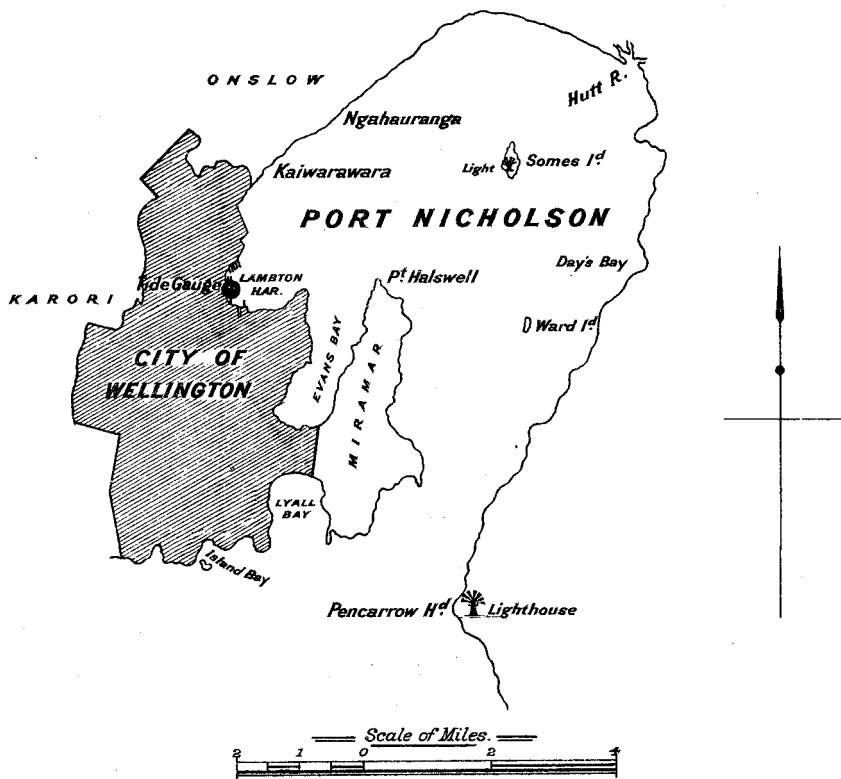
Page 20

Page 21

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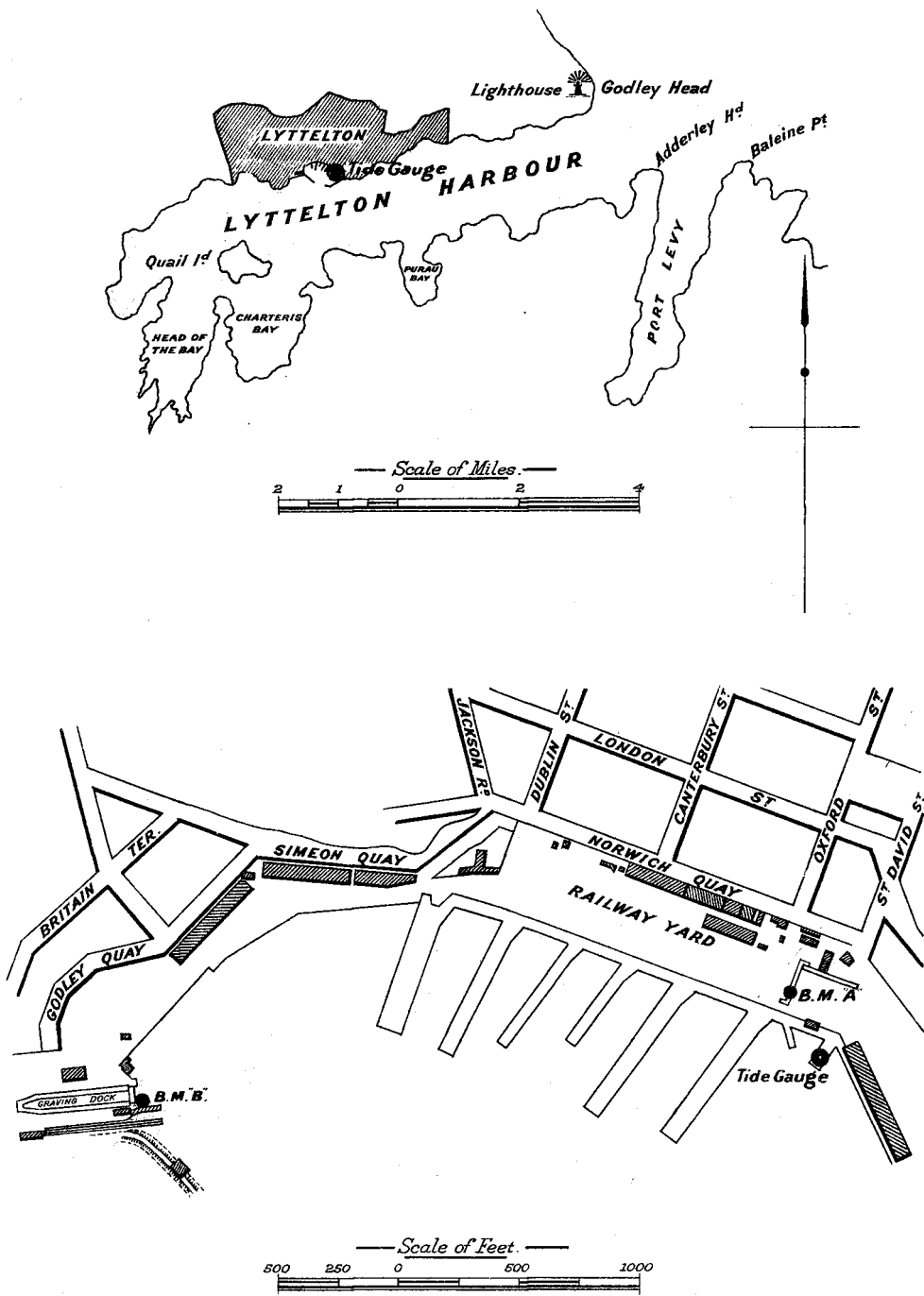
Page 23

WELLINGTON



Bench Mark	A	above mean sea level	6.64	Feet
"	B	"	10.56	"
"	C	"	10.75	"
"	D	"	9.52	"
"		"	8.55	"
"		"	8.63	"

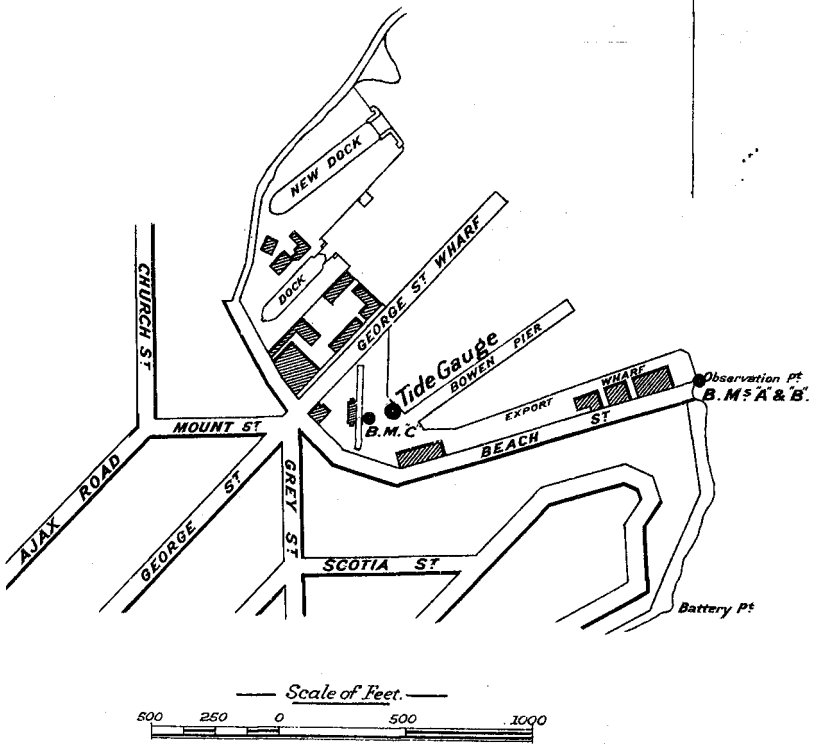
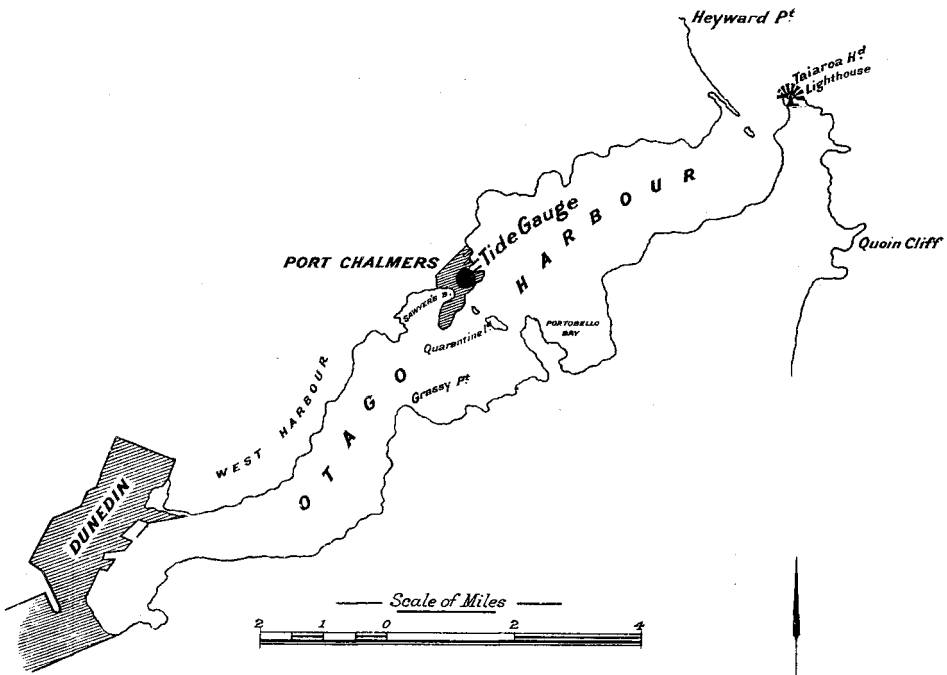
— **LYTTELTON** —



Note.
Bench Mark A above mean sea level 11.98 Feet.
" " B " " " " 8.05 "

— 401 —

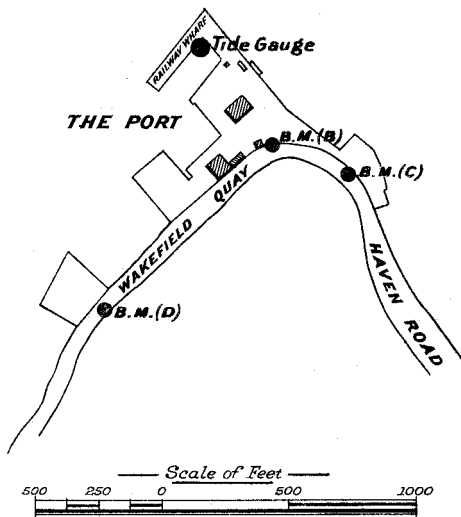
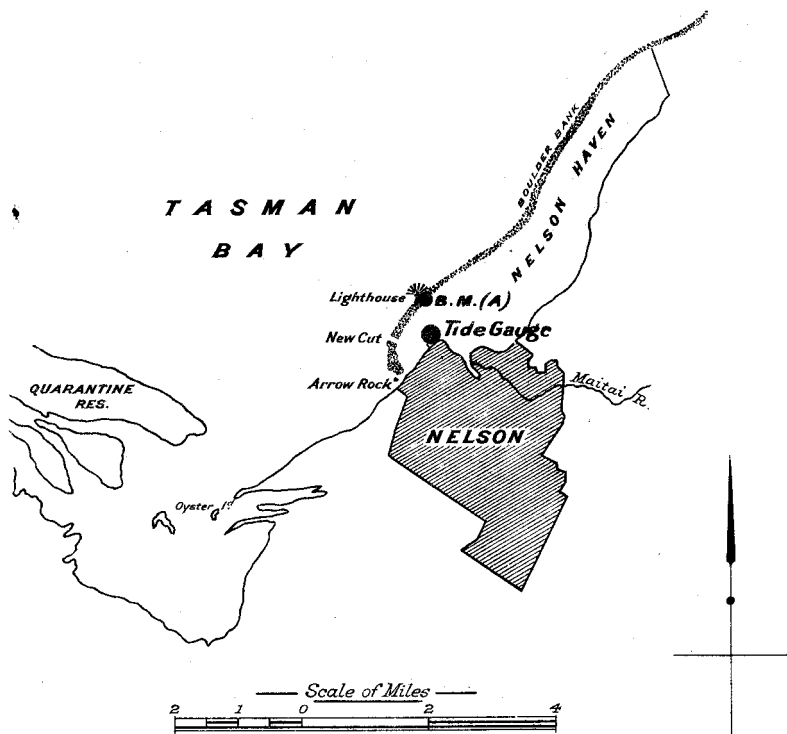
PORT CHALMERS



Note.

Bench Mark A	above mean sea level	4.80 Feet.
"	" B "	6.42 "
"	" C "	11.44 "

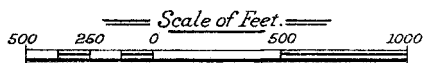
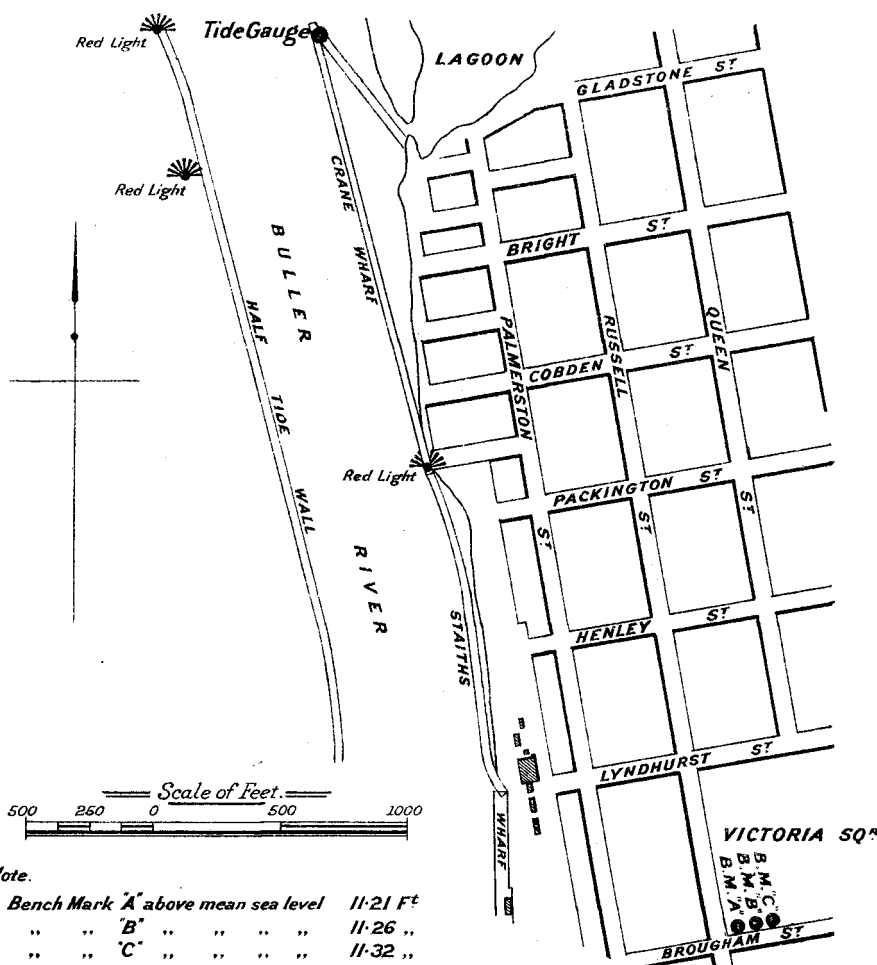
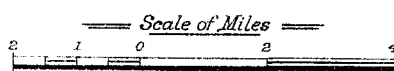
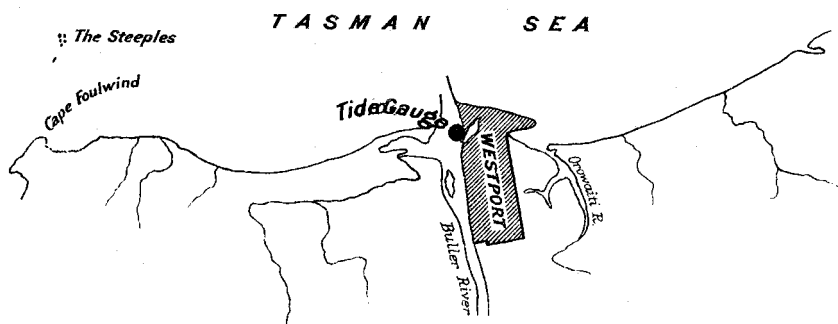
NELSON



Note.

Bench Mark	A	"	above mean sea level	14.22	Feet
"	B	"	"	10.82	"
"	C	"	"	10.21	"
"	D	"	"	12.07	"

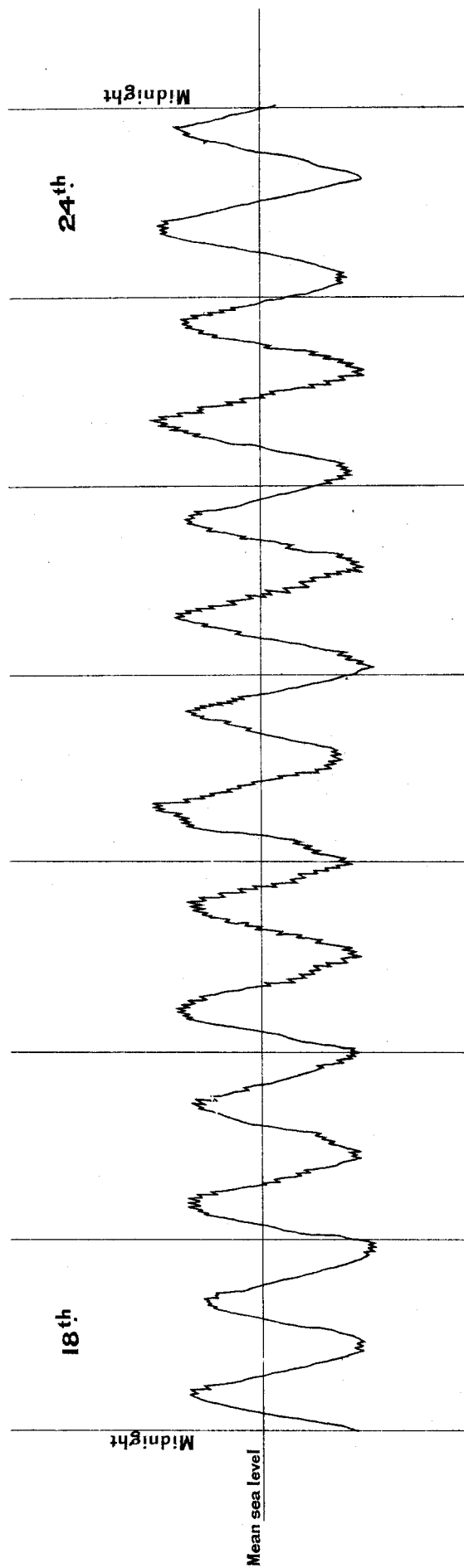
WESTPORT



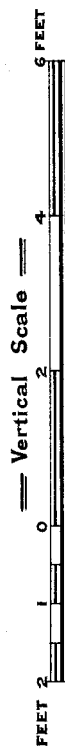
Note.

Bench Mark "A"	above mean sea level	11-21 Ft
" " "B"	" " " "	11-26 "
" " "C"	" " " "	11-32 "

— January 1908 —



— **SEICHE OSCILLATIONS** —
For five consecutive days in Wellington Harbour.



C.—1A.

Bench-mark C, 11.44 ft. above M.S.L., is the railway bench-mark at Port Chalmers Station.

"Mean sea-level" was determined by using the gauge records from the 9th July, 1905, for the period of 369 days.

NELSON.

The tide-gauge from which the records were taken is of the fixed-board pattern, and is situated about 4 chains south of the lighthouse.

Bench-mark A, 14.22 ft. above M.S.L., is a point on the top of the foundation of the lighthouse, at the south-east corner, and is marked by a copper bolt.

Bench-mark B, 10.88 ft. above M.S.L., is the top of "standard stone" No. 82A at the corner of Wakefield Quay and Haven Road.

Bench-mark C, 10.21 ft. above M.S.L., is the top of standard stone 81A, Haven Road.

Bench-mark D, 12.07 ft. above M.S.L., is the top of standard stone No. 83A, Wakefield Quay.

B, C, and D are each marked by a copper bolt.

"Mean sea-level" was determined by the mean of high- and low-water records throughout the years 1907 and 1908, which, taken independently, differ just 1 in.

WESTPORT.

The automatic tide-gauge is situated at the north end of Crane Wharf.

Bench-mark A, 11.21 ft. above M.S.L., is a dressed-granite block, within and at the south-west corner of Victoria Square, against Brougham and Russel Streets, marked by a copper bolt.

Bench-mark B, 11.26 ft. above M.S.L., is in the same locality, of the same character, and marked in the same manner as A, and is distant therefrom, in a direction parallel to Brougham Street, 64.8 ft.

Bench-mark C, 11.32 ft. above M.S.L., is of the same character and marking as A, and is distant therefrom 131.6 ft. in line with A B.

"Mean sea-level" was determined by the mean of the high- and low-water records throughout the years 1907 and 1908, which, taken independently, differ 0.98 in. This is a tidal river subject to very heavy floods, and the gauge is about a mile and a quarter from its mouth.

Table 1.—SUMMARY of FIELD-WORK executed by the STAFF and CONTRACT SURVEYORS from 1st April, 1908, to 31st March, 1909.

Land District.	Minor Triangulation.		Topographical Survey.		Topographical Survey for Selection as "Unsurveyed Land."		Rural and Suburban.			Town Section Survey.			Native Land Survey.			Gold-mining Survey.			Roads, Railways, and Water-race.		Other Work.		Total Cost of Surveyors and Parties from 1st April, 1908, to 31st March, 1909.		
	Acres.	Cost per Acre.	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 Secs.	Cost per Acre.	Acres.	No. of Sections.	Cost per Acre.	Miles.	Cost per Mile.	£	s.		d.	
Auckland ..	94,000	1.02	..	..	..	..	89,733	253	1.68	76	110	34.72	(^a) 1,175 (^b) 34,855	1 16.42 37 8.31	..	..	..	..	81.15	25.04	£	s.	d.
Hawke's Bay ..	9,580	1.	..	..	..	..	11,446	93	2.35	..	..	..	(^a) 30,162	47 8.	..	..	..	..	34.00	12.97	1,065	19	8
Taranaki ..	43,000	1.4	..	..	..	..	22,955	69	3.25	59.5	95	37.67	(^a) 6,119	8 16.65	..	..	..	..	16.53	17.94	2,574	18	6
Wellington ..	..	..	15,936	3.4	..	..	53,678	125	2.58	85.0	252	15.46	(^b) 14,338	28 33.6	..	..	..	..	25.8	17.9	2,063	0	5
Nelson ..	8,600	2.6	..	..	38,052	4.07	39,374	134	2.55	0.5	2	30.00	..	..	184	4	3.1	..	13.0	12.46	1,105	15	5
Marlborough..	..	..	..	..	..	..	19,579	75	1.76	..	..	..	..	..	..	..	..	..	46.76	25.78	733	14	6
Westland ..	..	..	32,600	4.2	..	..	33,444	143	1.95	208.0	441	22.46	..	..	..	..	..	..	5.00	13.63	420	13	3
Canterbury ..	..	..	..	..	..	..	30,882	64	0.55	90.0	41	27.8	..	..	..	..	..	..	1.93	20.72	1,222	14	9
Otago ..	..	..	27,550	3.4	..	..	50,478	69	0.87	..	..	..	..	..	64	1	3.05	..	..	..	260	15	7
Southland ..	6,975	0.49	..	..	..	..	14,380	65	3.35	..	..	..	..	..	..	..	..	..	2.19	32.75	183	9	8
Means and totals	162,355	1.18	75,486	3.76	38,052	4.07	365,949	1,090	1.53	519	941	23.80	86,649	121	248	5	3.08	226.36	21.00	12,879	8	1	71,063	2	9
Licensed surveyors (paid by applicants) ..																							68	..	
Totals ..																							73	..	

(a) Native Land Court. (b) Maori Land Board.

Table 2.—RETURN showing SURVEYORS EMPLOYED and the WORK on HAND on 1st April, 1909.

Chief Surveyors.	Surveyors employed.		Work on Hand.						
	Staff.	Tempo- rary.	Land District.	Trig.	Settle- ment.	Town.	Native Land Sur- vey.	Roads, &c.	Mining and Mineral Leases.
				Sq. Ml.	Acres.	Acres.	Acres.	Miles.	Acres.
J. Strauchon ..	16	5	Auckland ..	60	115,672	308	59,538	166	..
H. Trent ..	7	1	Hawke's Bay ..	..	66,729	..	24,726	10	..
F. Simpson ..	2	5	Taranaki ..	..	71,880	..	2,870	..	..
J. Mackenzie ..	11	..	Wellington ..	..	79,561	2	57,966	15	..
R. T. Sadd ..	7	5	Nelson ..	278	123,293	..	40,000	8	..
F. Stephenson Smith ..	1	3	Marlborough ..	..	103,500	..	..	30	..
G. J. Roberts ..	3	1	Westland ..	..	34,000	..	..	..	..
E. C. Gold Smith ..	1	..	Canterbury ..	..	90	2	..	0.5	..
D. Barron ..	3	1	Otago ..	..	294,000	..	..	..	..
E. H. Wilmot ..	2	2	Southland ..	..	2,400	..	24,900	8	..
Totals ..	53	23	..	338	891,125	312	210,000	237.5	..

Table 3.— PLANS placed on CROWN GRANTS and other INSTRUMENTS of TITLE from the CROWN from 1st April, 1908, to 31st March, 1909.

District.	Number.					Cost.
	Singly.	In Duplicate.	In Triplicate.	In Quadruplicate	Total Copies.	
						£ s. d.
Auckland ..	..	266	551	176	2,889	140 18 0
Hawke's Bay ..	8	186	57	92	919	62 8 6
Taranaki ..	..	7	80	55	474	46 14 8
Wellington ..	1	76	842	712	1,631	81 11 0
Nelson ..	4	46	129	121	967	111 13 6
Marlborough ..	4	28	50	5	230	41 11 4
Westland ..	..	184	14	109	846	110 0 0
Canterbury ..	39	21	7	54	318	46 2 3
Otago ..	..	155	240	..	1,030	218 0 0
Southland ..	41	85	88	10	515	29 17 6
Totals ..	97	1,054	2,058	1,334	9,819	888 16 9

Table 4.— WORK DONE under the LAND TRANSFER ACT, &c., from 1st April, 1908, to 31st March, 1909.

District.	No. of Plans passed.	Deeds and other Instruments passed.	Number of Plans placed on Certificates of Title.			Miscellaneous Plans drawn or compiled.	Cost.
			Singly.	In Duplicate.	In Triplicate.		
							£ s. d.
Auckland ..	334	1,785	17	2,203	1	10	442 10 0
Hawke's Bay ..	209	574	..	753	113	25	608 17 0
Taranaki ..	118	..	12	401	52	970	302 12 8
Wellington ..	394	3,732	76	2,173	..	25	1,390 0 0
Nelson ..	59	150	..	198	..	..	120 0 8
Marlborough ..	24	..	..	117	4	..	40 18 2
Westland ..	27	50	..	60	11	..	97 2 4
Canterbury ..	359	2,361	29	1,970	12	32	1,211 17 3
Otago ..	..	1,445	12	880	12	9	334 4 3
Southland ..	92	22	26	456	3	..	295 0 0
Totals ..	1,616	10,119	172	9,211	208	1,071	4,843 2 4

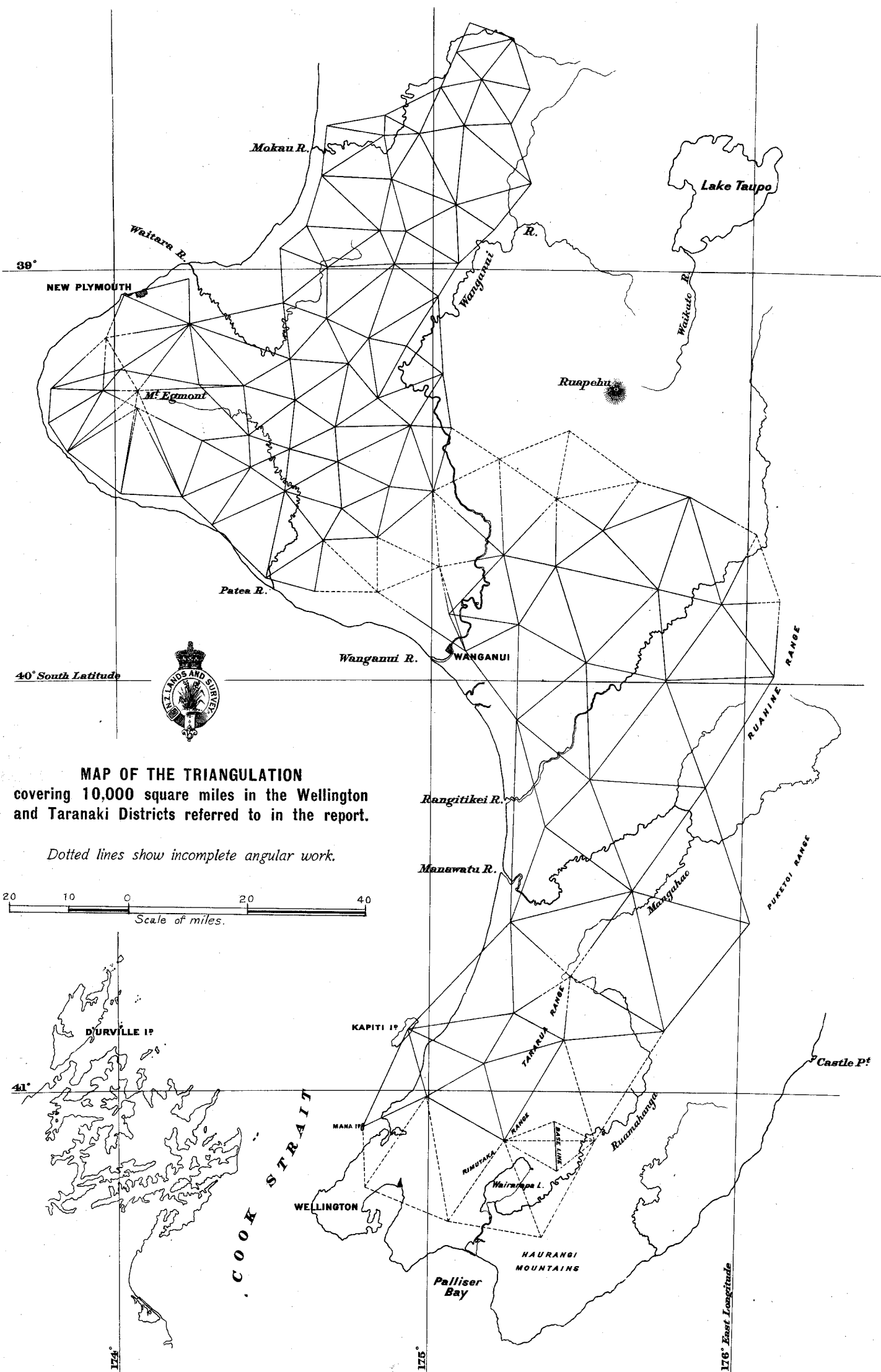
Table 5. — LITHOGRAPHS and PHOTOGRAPHS printed and sold, from 1st April, 1908, to 31st March, 1909.

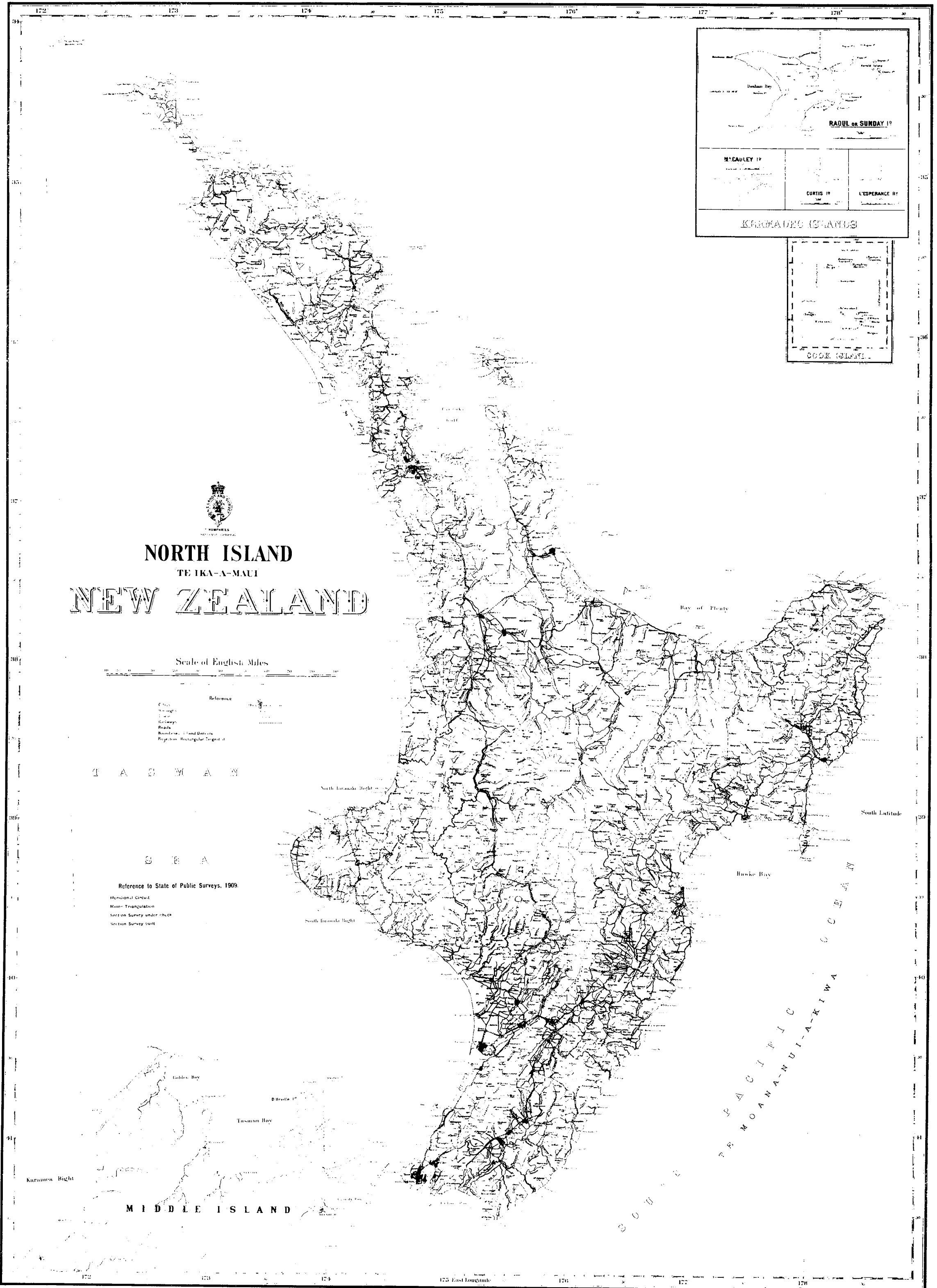
District.				Number of Lithographs printed.	Number of Photographs printed.	Amount of Fees received from Sale of Maps and Lithographs.
						£ s. d.
Auckland	..	..	..	1,601	..	123 12 2
Hawke's Bay	..	..	..	..	..	51 10 7
Taranaki	..	..	..	..	..	57 7 5
Wellington	..	..	..	..	..	62 2 2
Nelson ..	..	..	..	..	..	43 14 11
Mariborough	..	..	..	..	..	21 5 7
Westland	..	..	..	..	..	9 19 3
Canterbury	..	..	..	..	..	36 9 0
Otago ..	..	..	..	1,009	..	85 4 1
Southland	..	..	..	..	..	29 8 5
Totals	..	..	..	2,610	..	520 13 7

Approximate Cost of Paper.—Preparation (not given); printing (1,500 copies, including maps, &c.), £119.

By Authority : JOHN MACKAY, Government Printer, Wellington.—1909.

Price 2s.]

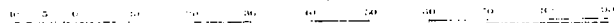






SOUTH ISLAND (TE WAI-POUNAMU) NEW ZEALAND

Scale of English Miles



Reference

Cities

Boroughs

Towns and villages

Railways and stations

Roads

Boundaries of Land Districts

Projection Rectangular tangential

Mentioned Circuit

Minor Triangulation

Section Survey under check

Section Survey built

T A S M A N I A N S E A

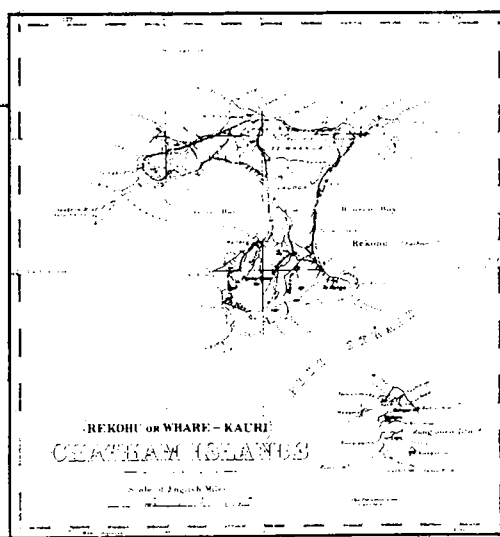
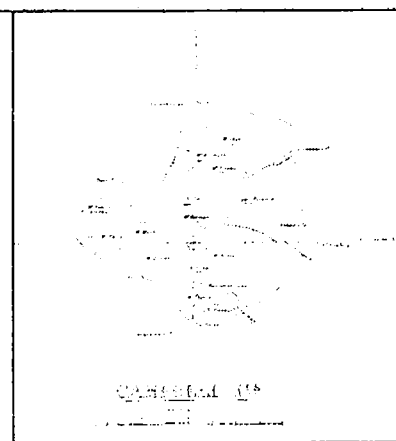
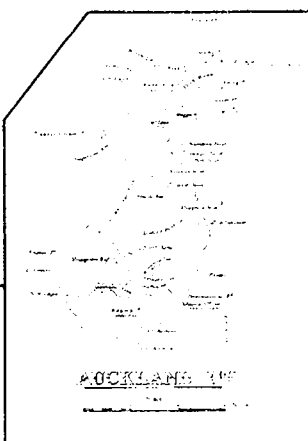
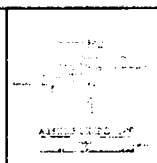
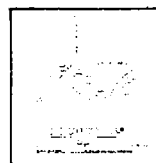
South Latitude

S O U T H P A C I F I C

(TE MOANA-NUI-A-KIWA)

O C E A N

Stewart Island



167

168

169

170 East Longitude

171

172

173

174

