

1930.  
NEW ZEALAND.

DEPARTMENT OF LANDS AND SURVEY.  
**SURVEYS**  
(ANNUAL REPORT ON).

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

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

SIR,—

Wellington, 21st July, 1930.

I have the honour to present herewith the report on survey operations for the year ended 31st March, 1930.

I have, &c.,

Hon. E. A. Ransom, Minister of Lands.

H. F. WALSHE,  
Surveyor-General.

REPORT.

THE main parts of the report for the year ended the 31st March, 1930, comprise a summary of the operations of the field parties, grouped under appropriate headings with a brief account of the office-work performed.

The attached tables, A and B, and 1 to 5 inclusive, contain a concise summary of the amount of work completed during the year under review.

The statement in Table A shows a general increase in the average costs of rural and Native Land Court surveys, whilst there is a considerable decrease in the average cost of minor-triangulation and topographical work. Road surveys also show a slight reduction in cost. Table B shows a considerable decrease in the total areas of Rural and Native Land Court Surveys.

TABLE A.

| Class of Work.                                | Area, &c.      | Average Cost.     | Total Cost. |
|---|----------------|-------------------|-------------|
|   |                |                   | £ s. d.     |
| Minor triangulation, by staff .. ..           | 59,200 acres   | 1-34d. per acre   | 330 18 4    |
| Contoured topographical, by staff .. ..       | 937·6 sq. m.   | £2·26 per sq. m.  | 2,120 13 9  |
| Rural, by staff .. ..                         | 85,656 acres   | 2-30s. per acre   | 9,865 4 11  |
| Suburban, by staff .. ..                      | 378·9 „        | 24-80s. per acre  | 469 17 8    |
| Town, by staff .. ..                          | 1,070 sections | £1-90 per section | 2,037 7 5   |
| Town, by private surveyors .. ..              | 8 „            | £1-84 „           | 14 14 0     |
| Native Land Court, by staff .. ..             | 9,099 acres    | 2-13s. per acre   | 969 10 2    |
| Native Land Court, by private surveyors .. .. | 63,691 „       | 2-10s. per acre   | 6,684 1 8   |
| Roads, by staff .. ..                         | 153·38 miles   | £25·6 per mile    | 3,927 17 11 |
| Other work by staff .. ..                     | ..             | ..                | 6,212 6 10  |
| Total cost of completed work .. ..            | ..             | ..                | 32,632 12 8 |

TABLE B.

| Land District.       | Rural Survey. | Native Land Court. |
|----------------------|---------------|--------------------|
|                      | Acres.        | Acres.             |
| North Auckland .. .. | 15,979        | 5,956              |
| Auckland .. ..       | 17,404        | 28,082             |
| Gisborne .. ..       | 1,720         | 8,176              |
| Hawke's Bay .. ..    | 2,357         | 3,047              |
| Taranaki .. ..       | 6,042         | 2,560              |
| Wellington .. ..     | 7,718         | 23,576             |
| Marlborough .. ..    | 155           | 735                |
| Nelson .. ..         | 2,808         | 339                |
| Westland .. ..       | 2,432         | ..                 |
| Canterbury .. ..     | 4,849         | 187                |
| Otago .. ..          | 18,777        | 26                 |
| Southland .. ..      | 5,415         | 106                |
| Totals .. ..         | 85,656        | 72,790             |

## MINOR TRIANGULATION.

An area of 59,200 acres is returned under this heading in the Nelson District at a cost of £330.

## CONTOURED TOPOGRAPHICAL SURVEYS.

The principal area of 700 acres under this heading was surveyed in the Southland District, with small areas in Auckland, Hawke's Bay, and Taranaki. During the coming year it is hoped to experiment in this work by means of aerial-photography.

## SETTLEMENT SURVEYS.

The Crown lands and lands-for-settlement areas surveyed during the year are set out in Table 2 under their appropriate headings for each land district.

## NATIVE LAND SURVEYS.

This work, of which nearly 90 per cent. was carried out by private surveyors, shows a decrease of 56,000 acres in the area.

## GEODETIC TRIANGULATION.

Good progress has been made in this work during the year, the area completed in the field to date being 17,500 square miles, while 13,500 square miles are partly completed. The main work for the year was the observation at ten main stations and seven auxiliary stations, the latter being a subsidiary network connecting the Dominion Observatory with the main network. Latitude was observed at nine stations and azimuth at two stations. The whole of the observations, both terrestrial and astronomical, are now being taken with the Wild primary triangulation theodolite, with a gain in speed and accuracy. The mean closing error per triangle is 1"·15 (48 triangles).

Towards the end of the period under report the system of night observations was instituted, electric-light signals from dry cells being used in place of the opaque signals used for the daylight observations. Further details will be published in the *Records of the Survey*.

## STANDARD SURVEYS.

Good progress in this work has been made in the Auckland and Invercargill metropolitan areas, and a small extension to the Christchurch standard survey was commenced. Rural standard work has been in progress in other land districts. The reconstruction of main highways has necessitated considerable work in protecting and replacing standard survey-marks.

## FIELD INSPECTIONS.

Field inspections have been carried out in most districts, and the results, with one or two exceptions, show that the high standard of survey-work in the Dominion has been maintained.

## TIDAL SURVEY.

The tide-tables for the year 1931, for the seven New Zealand standard ports (Auckland, New Plymouth, Wellington, Lyttelton, Dunedin, Bluff, and Westport) for which tidal predictions are published, were received in Wellington on the 2nd July, 1929, from the Hydrographer to the Admiralty.

The work of measuring the times and heights of high and low water was again performed at the Tidal Institute, University of Liverpool, England.

Investigations in connection with any movement in the Earth's crust at Westport in relation to mean sea-level, resulting from the disastrous earthquake which occurred in June, 1929, are in hand, the period covered extending from June, 1928, to June, 1930. The results of this investigation will be published in the annual report for 1931.

## MAGNETIC OBSERVATORY.

During the year the work of the Magnetic Observatory has been successfully carried on. The hourly values of the magnetic declination, horizontal magnetic force, and vertical magnetic force have been computed from the measurements of the hourly values obtained daily by means of the Eschenhagen magnetographs installed at Amberley Substation. The resulting mean values for the year 1929 reduced to Christchurch Absolute House values, are as follows:—

|                                   | Mean Value,<br>1929. | Change since<br>1928. |
|-----------------------------------|----------------------|-----------------------|
| Magnetic declination (east) .. .. | 17° 42·4'            | +5·0'                 |
| Magnetic horizontal force .. ..   | 0·22123              | — 3γ                  |
| Magnetic inclination .. ..        | —68° 17·6'           | — 0·3'                |
| Northerly component .. ..         | +0·21075             | —13γ                  |
| Easterly component .. ..          | +0·06713             | +14γ                  |
| Vertical component .. ..          | —0·55575             | — 9γ                  |
| Total magnetic force .. ..        | +0·59817             | + 8γ                  |

The tabulated hourly values for 1929 are printed as for Peg Absolute, at Amberley Substation, where the absolute observations have been made. The adopted values of the differences between Peg Absolute and the piers of the Christchurch Absolute House have been assumed from various comparisons made, as follows, with the conventional signs for D(+), H(+), Z(—):—

Christchurch—Amberley:—

|                             |       |
|-----------------------------|-------|
| Declination, east (+) .. .. | —2·7' |
| Horizontal force (+) .. ..  | —242γ |
| Vertical force (—) .. ..    | —323γ |

The Milne seismograph No. 16 has been kept recording, and a list of earthquakes recorded is being published. A complete set of Galitzin seismographs is being provided for this Observatory by the Department. The disastrous earthquake in the Buller district on the 17th June was specially reported on by myself and Mr. H. F. Baird, who visited the district. As usually happens after severe earthquakes, after-shocks from this earthquake still persist in that district. From our observations in the district definite lower limits for the actual horizontal acceleration in the main shock were determined to have been  $\frac{1}{3}$  g. at Murchison, and  $\frac{1}{5}$  g. at Bainham, Golden Bay. A similar inspection and report was also made on the lesser shock, which did damage in the mountainous regions near Bealey on the 9th March.

In order to enable pilot-balloon observations to be made daily on week-days, the staff of the Observatory has been reinforced by the addition of a cadet. For use in prediction, the results of the flights are telegraphed daily to the Director of Meteorological Services, Wellington. The usual thrice-daily meteorological readings have been made, and besides having been tabulated here the results have been made available to the public through the daily papers.

The Bensdorf electrograph has now been housed in a small special building in the North Domain. Some tabulations and results of its records over fourteen months 1928–29 will be printed in *Records of the Survey of New Zealand*. The results of the observations for thirteen months have also been communicated to the Department of Terrestrial Magnetism, of the Carnegie Institute, Washington, D.C., U.S.A., and by request are being published in the *Journal of Terrestrial Magnetism and Atmospheric Electricity* in a forthcoming number.

Some computations of observations in connection with the geodetic survey are being carried out at the Observatory. It is certain that this geodetic survey is destined to be of prime importance in determining the amounts of relative movement consequent upon seismic disturbance, and no doubt in some cases of those movements which actually preceded earthquakes. As yet repeated precise measurements seem to be the only way of identifying regions of varying strain where earthquakes

are liable to occur. Lines of precise levelling at least are advisable, intersecting if possible. In proved earthquake districts closed circuits should be aimed at. Owing to the great importance which earthquakes have on so many activities in this country, it is very desirable that the Survey Department of New Zealand should follow the example of such governmental institutions as the United States Coast and Geodetic Survey, who maintain fully equipped, magnetic, atmospheric electric, and seismological observatories in conjunction with their precise levelling and triangulation work.

An area of land in the State Forest Reserve at Eyrewell, some fourteen miles from Christchurch, has been under consideration as a site for the Observatory, where the instruments can be operated in a suitable position and housed in a manner meeting the most rigorous needs of modern investigations. Magnetic observations made at several points on this property have disclosed no appreciable local magnetic disturbance. Some eye-observations at one station with a vertical force balance did not disclose any appreciable tramway effects. The Z Adie balance has now been fitted with a separate clock drive, and is therefore available for getting preliminary test magnetograms on the site under actual recording conditions, and with higher sensitivity. These observations should definitely decide the question of the freedom or otherwise of the site from the effects of stray currents. It is worthy of note that the great city of Manchester, England, has definitely decided to abandon tramway-rails, and there is little doubt that in Christchurch electric trolley-bus extensions will be cheaper always than rail extensions with their expensive maintenance. Therefore, if our Z trial curves prove satisfactory, the Eyrewell site should remain suitable from all points of view. The site would also be suitable for other necessary services of our Department, and the installation of a first-class clock is requested, as it is necessary for the seismological and other observations. A short wave, transmitting and receiving, wireless set is also required. The determinations of precise local time will be available for the geodetic work.

A very important feature in connection with the Eyrewell site is that it will prove eminently suitable for atmospheric electric work, as it is well removed from sea, hills, and city smoke. Other countries are looking more and more to us as time goes on, to provide atmospheric electric observations from a site which is beyond cavil. Only recently the Carnegie Institution of Washington, D.C., forwarded particulars and detailed plans of their specially designed atmospheric electric house, as erected at their Observatories throughout the world in various parts. It is important that uniformity should exist among all observatories doing electric (atmospheric) work, therefore I recommend that at the new site at Eyrewell—if magnetically suitable, of course—a replica of the Carnegie Institution of Washington electric house should be provided at an early date. I consider this a matter of extreme urgency.

#### PROPOSED OPERATIONS, 1930-31.

*Geodetic Triangulation.*—Further reconnaissance work in Taranaki and southern Auckland districts will have to be undertaken during the year, linking the Eltham base with the Matamata and Kaingaroa bases. The observations to connect the Wairarapa and Eltham bases will be continued and possibly completed.

*Precise Levelling.*—Work on this will be started should it be possible to detach a surveyor from the more urgent settlement surveys in hand. The necessary instruments are now on order, and should arrive early in the year.

*Minor Triangulation.*—No new work is proposed under this heading, nor is it anticipated that any extent will be necessary to control settlement-surveys in progress.

*Topographical Surveys.*—Plane-table work in the Auckland and Taranaki Districts is being continued under reduced staffs. Two small areas in the North Auckland District are proposed to be photographed from the air, and the resultant photograms plotted. This work is of an experimental nature to demonstrate whether aerial photogrammetry can be economically carried out under local conditions.

*Standard Surveys.*—The Auckland city suburban survey is being continued. The field-work at Invercargill has been completed and plans of same are now in hand. It is hoped to complete the Christchurch standard extension and the rural work in Taranaki this year. Rural work in Gisborne and Southland will be continued.

*Town-section Surveys.*—With the exception of 47 acres in Wellington and two small areas in Christchurch and Southland, no work is in hand under this heading.

*Rural Settlement.*—Future operations show an area of 112,000 acres under this heading, principally in the North Auckland and Otago Districts, and it is anticipated that further areas will be made available during the year.

*Native Land Court Surveys.*—Authority for the survey of 56,000 acres of Native land is in hand at the beginning of the year, and it is anticipated that the time of one staff surveyor will be required for the survey of consolidated blocks in the Auckland District.

*Office-work.*—The routine examination and recording of plans, field inspections, photo-lithographic drawings, and the computation in connection with the geodetic, magneto, and tidal surveys will be continued in addition to the above field-work. The recomputation of the minor triangulation in the Bay of Plenty and Poverty Bay circuits is to be continued, and should be completed and results made available for use during the year.

#### GENERAL.

*Map-publications.*—In the Chief Draughtsman's report appended hereto will be found details of the maps published during the year.

*Town Subdivisional Surveys.*—There was a slight decrease in the number of plans and also the total area subdivided compared with the previous year. An analysis of the number submitted and of their division into classified areas is given in the Chief Draughtsman's report.

*Proclamation of Roads.*—During the past year a number of applications for the Proclamation of road-lines laid off by the Native Land Court under sections 48, 49, 50, and 52, of the Native Land Amendment Act, 1913, were considered and dealt with. Statutory notices of the intention to proclaim the road-lines as public roads, together with plans showing the location of same, were forwarded to the local authorities of the districts affected in terms of section 15 of the Native Land Amendment Act, 1914, and in the majority of cases no objections were raised to the Proclamation of the road-lines as public highways. Under the Land Transfer Act, 1915, 189 warrants for the issue of certificates of title were examined and certified to in terms of section 13 of the Act. A number of applications to bring land under the provisions of the Land Transfer Act were examined and approved of in terms of section 19 of the Act.

*Magnetic Observatory.*—A three component Galitzin type seismograph is now on order from the makers (the Cambridge Instrument Co., London), and it is proposed to instal it in the Magnetic Observatory, Christchurch, on arrival. The present instrument (an old type Milne instrument) will be available for use in recording local shocks whenever found necessary.

*International Geodetic and Geophysical Union.*—During the year I was appointed to represent the Department on the Permanent Committee of the Section of Geodesy, and the Dominion will be officially consulted in regard to matters affecting international geodesy.

*International Geographical Union.*—The formation of a national committee is still under consideration, and it is anticipated that the matter will be submitted for your decision at an early date.

#### STAFF.

*Retirements.*—R. S. Galbraith: Mr. Galbraith joined the Department as a Cadet in 1883. Passing his examination as a surveyor, he was appointed Assistant Surveyor in the Department in 1890, District Surveyor in 1902, and Inspecting Surveyor in 1911. He carried out many surveys, including important underground engineering surveys in the Auckland District. Mr. Galbraith held the position of Chief Draughtsman at Invercargill and Wellington, and of Commissioner of Crown Lands and Chief Surveyor at Hokitika, Invercargill, and Dunedin. It can be said that in every case his professional and administrative capacity has been of the highest order, and that on relinquishing his duties he left an honourable and worthy record in the Department.

W. T. Morpeth: Mr. W. T. Morpeth joined the Department as a Clerical Cadet in 1886. Later, joining the field staff and passing his professional examination as a surveyor, he was attached to the Wellington Office. In 1893 Mr. Morpeth was transferred to the Taranaki District, where he carried out many important surveys. In 1908, at his request, he joined the Napier Office Staff as Computer, and was later appointed to the Auckland Office as Draughtsman in Charge of the Road-legalization Branch; the promotion to Land Transfer Draughtsman at Dunedin and Wellington following. Prior to assuming the duties as Commissioner of Crown Lands and Chief Surveyor for the Westland Land District he held the appointment as Chief Draughtsman in the Wellington Office. In conclusion, it can be said that during Mr. Morpeth's long service with the Department, both in the field and in the office, he carried out his duties in a highly creditable manner.

C. Otway: Mr. Otway joined the service in 1900 as a Surveyor in the Invercargill District, and with the exception of a short spell in Otago District has been engaged in that district during the whole of his service. His work, which was of a high order and includes the standard survey of Invercargill, has always been carried out faithfully and well.

*Resignations.*—Messrs. H. H. E. Knight, E. H. Densem, and C. C. Cowell resigned from the service during the year. I regret to record the death of Mr. J. Sainsbury, Field Cadet, who was accidentally drowned.

*Appreciation.*—In conclusion, I wish to bring under your notice the appreciation of the various Chief Surveyors of the manner in which their officers have carried out their duties during the year, and I desire to add my personal thanks to the whole of the technical staff, both office and field, for the efficient manner in which the work has been performed during the year.

H. E. WALSH, Surveyor-General.

**Table 1.**—RETURN OF FIELD-WORK EXECUTED BY HEAD OFFICE STAFF FROM 1ST APRIL, 1929, TO 31ST MARCH, 1930.

| District.         | Standard Surveys. |              |              |            | Geodetic Triangulation. |           |               |           | Other Work. |       |
|-------------------|-------------------|--------------|--------------|------------|-------------------------|-----------|---------------|-----------|-------------|-------|
|                   | Completed.        |              | In Progress. |            | Completed.              |           | In Progress.  |           | Cost.       |       |
|                   | Miles.            | Cost.        | Miles.       | Cost.      | Square Miles.           | Cost.     | Square Miles. | Cost.     | £           | s. d. |
| North Auckland .. | 36                | £ 2,145 16 3 | 75           | £ 254 12 9 | ..                      | ..        | ..            | ..        | £ 372       | 0 11  |
| Auckland ..       | ..                | ..           | ..           | ..         | ..                      | ..        | ..            | ..        | ..          | ..    |
| Gisborne ..       | ..                | ..           | ..           | ..         | ..                      | ..        | ..            | ..        | ..          | ..    |
| Hawke's Bay ..    | ..                | ..           | ..           | ..         | 17,500                  | 6,200 0 0 | 13,500        | 2,507 9 9 | 97          | 2 5   |
| Wellington ..     | ..                | ..           | ..           | ..         | ..                      | ..        | ..            | ..        | ..          | ..    |
| Taranaki ..       | ..                | ..           | ..           | ..         | ..                      | ..        | ..            | ..        | ..          | ..    |
| Southland ..      | ..                | ..           | 86           | 9,133 9 7  | ..                      | ..        | ..            | ..        | 53          | 14 5  |

**Table 2.—RETURN OF FIELD-WORK EXECUTED BY THE STAFF AND CONTRACT SURVEYORS ON LANDS ADMINISTERED BY THE LANDS AND SURVEY DEPARTMENT FROM 1ST APRIL, 1929, TO 31ST MARCH, 1930.**

| District.      | Minor Triangulations. |                |             |       | Contoured Topographical Survey.<br>1—1934. |                |             |       | Rural. |                |             |       | Village and Suburban. |                  |                |             |       |       |       |   |    |
|----------------|-----------------------|----------------|-------------|-------|--|----------------|-------------|-------|--------|----------------|-------------|-------|-----------------------|------------------|----------------|-------------|-------|-------|-------|---|----|
|                | Acres.                | Cost per Acre. | Total Cost. |       | Sq. Miles.                                 | Cost per Mile. | Total Cost. |       | Acres. | Cost per Acre. | Total Cost. |       | Acres.                | No. of Sections. | Cost per Acre. | Total Cost. |       |       |       |   |    |
|                |                       |                | £           | s. d. |  |                | £           | s. d. |        |                | £           | s. d. |                       |                  |                | £           | s. d. | £     | s. d. |   |    |
| North Auckland | ..                    | ..             | ..          | ..    | ..   | ..             | ..          | ..    | 15,979 | 2.79           | 2,230       | 14    | 7                     | 207.54           | 21             | 16.67       | £     | s. d. |       |   |    |
| Auckland       | ..                    | ..             | ..          | ..    | ..   | ..             | ..          | ..    | 17,404 | 2.13           | 2,356       | 12    | 10                    | 21.47            | 2              | 43.78       | 173   | 0     | 0     |   |    |
| Gisborne       | ..                    | ..             | ..          | ..    | 70.4                                       | 9.65           | 679         | 18    | 4      | 1,720          | 3.33        | 286   | 6                     | 4                | ..             | ..          | 47    | 0     | 0     |   |    |
| Hawke's Bay    | ..                    | ..             | ..          | ..    | 67.2                                       | 4.43           | 298         | 0     | 0      | 2,357          | 1.86        | 219   | 0                     | 0                | ..             | ..          | ..    | ..    | ..    |   |    |
| Taranaki       | ..                    | ..             | ..          | ..    | 100.0                                      | 4.06           | 406         | 2     | 4      | 6,042          | 1.13        | 342   | 13                    | 4                | ..             | ..          | ..    | ..    | ..    |   |    |
| Wellington     | ..                    | ..             | ..          | ..    | ..   | ..             | ..          | ..    | 7,718  | 2.24           | 864         | 12    | 4                     | ..               | ..             | ..          | ..    | ..    | ..    |   |    |
| Marlborough    | ..                    | ..             | ..          | ..    | ..   | ..             | ..          | ..    | 155    | 3.90           | 30          | 10    | 0                     | 64.75            | 5              | 28.50       | 92    | 5     | 9     |   |    |
| Nelson         | ..                    | 1.34           | 330         | 18    | 4  | ..             | ..          | ..    | 2,808  | 4.62           | 649         | 7     | 6                     | 34.25            | 11             | 37.90       | 64    | 17    | 7     |   |    |
| Westland       | ..                    | ..             | ..          | ..    | ..   | ..             | ..          | ..    | 2,432  | 6.30           | 765         | 18    | 10                    | 18.00            | 1              | 11.93       | 10    | 14    | 6     |   |    |
| Canterbury     | ..                    | ..             | ..          | ..    | ..   | ..             | ..          | ..    | 4,849  | 1.25           | 303         | 7     | 3                     | 2.81             | 1              | 71.17       | 10    | 0     | 0     |   |    |
| Otago          | ..                    | ..             | ..          | ..    | ..   | ..             | ..          | ..    | 18,777 | 1.39           | 1,310       | 11    | 11                    | ..               | ..             | ..          | ..    | ..    | ..    |   |    |
| Southland      | ..                    | ..             | ..          | ..    | 700.0                                      | 1.05           | 736         | 13    | 1      | 5,415          | 1.87        | 505   | 10                    | 0                | 21.19          | 6           | 41.86 | 44    | 7     | 0 |    |
| Totals         | ..                    | 1.34           | 330         | 18    | 4  | 937.6          | 2.26        | 2,120 | 13     | 9              | 85,656      | 2.30  | 9,865                 | 4                | 11             | 370.01      | 47    | 19.24 | 442   | 4 | 10 |

  

| District.      | Town Section Survey. |                  |                   |             | Roads, Railways, and Water-races. |                |             |       | Other Work. |                               |       |    |        |    |    |
|----------------|----------------------|------------------|-------------------|-------------|-----------------------------------|----------------|-------------|-------|-------------|-------------------------------|-------|----|--------|----|----|
|                | Acres.               | No. of Sections. | Cost of Sections. | Total Cost. | Miles.                            | Cost per Mile. | Total Cost. |       | Cost.       | Total Cost of completed Work. |       |    |        |    |    |
|                |                      |                  |                   |             |                                   |                | £           | s. d. |             | £                             | s. d. | £  | s. d.  |    |    |
| North Auckland | 67.46                | 210              | £                 | 1.45        | 14.00                             | 22.49          | 314         | 17    | 4           | 1,337                         | 9     | 11 | 5,190  | 19 | 2  |
| Auckland       | 24.80                | 85               | 2.31              | 197         | 0                                 | 11             | 1,265       | 17    | 5           | 644                           | 9     | 8  | 4,360  | 7  | 4  |
| Gisborne       | ..                   | ..               | ..                | ..          | 51.70                             | 24.48          | 580         | 13    | 9           | 58                            | 15    | 0  | 925    | 15 | 1  |
| Hawke's Bay    | ..                   | 12               | ..                | 24          | 0                                 | 0              | 33          | 0     | 0           | 223                           | 0     | 0  | 797    | 0  | 0  |
| Taranaki       | 2.00                 | ..               | ..                | ..          | 17.14                             | 13.20          | 37          | 12    | 3           | 315                           | 16    | 2  | 1,102  | 4  | 1  |
| Wellington     | ..                   | ..               | ..                | ..          | 2.00                              | 18.80          | 71          | 4     | 2           | 1,749                         | 17    | 8  | 3,027  | 14 | 7  |
| Marlborough    | 52.99                | 160              | 1.56              | 249         | 14                                | 8              | 32          | 16    | 9           | 113                           | 8     | 0  | 241    | 12 | 4  |
| Nelson         | 23.83                | 66               | 4.82              | 318         | 1                                 | 0              | 15          | 0     | 0           | 244                           | 10    | 0  | 1,557  | 16 | 10 |
| Westland       | ..                   | ..               | ..                | ..          | 0.75                              | 20.00          | 172         | 10    | 8           | 125                           | 15    | 7  | 1,074  | 19 | 7  |
| Canterbury     | 53.78                | 245              | 0.82              | 201         | 16                                | 11             | 3           | 0     | 0           | 206                           | 7     | 0  | 724    | 11 | 2  |
| Otago          | 82.00                | 259              | 1.75              | 455         | 2                                 | 8              | 36          | 0     | 4           | 559                           | 1     | 4  | 2,360  | 16 | 3  |
| Southland      | 8.03                 | 9                | 1.78              | 16          | 0                                 | 0              | 55          | 5     | 0           | 264                           | 2     | 6  | 1,621  | 17 | 7  |
| Totals         | 234.89               | 1,046            | 1.69              | 1,766       | 1                                 | 8              | 2,617       | 17    | 8           | 5,842                         | 12    | 10 | 22,985 | 14 | 0  |

**Table 3.—RETURN OF FIELD-WORK EXECUTED BY THE STAFF AND CONTRACT SURVEYORS ON LANDS ADMINISTERED BY OTHER DEPARTMENTS FROM 1ST APRIL, 1929, TO 31ST MARCH, 1930.**

| District.      | Village and Suburban. |                     |                | Town Section Survey. |        |                     | Native Land Survey. |             |        | Roads, Railways, and Water-races. |                |             | Other Work. |                | Total Cost of Completed Work. |             |
|----------------|-----------------------|---------------------|----------------|----------------------|--------|---------------------|---------------------|-------------|--------|-----------------------------------|----------------|-------------|-------------|----------------|-------------------------------|-------------|
|                | Acres.                | Number of Sections. | Cost per Acre. | Total Cost.          | Acres. | Number of Sections. | Cost of Section.    | Total Cost. | Acres. | Number of Sections or Divisions.  | Cost per Acre. | Total Cost. | Miles.      | Cost per Mile. |                               | Total Cost. |
|                |                       |                     | £ s. d.        | £ s. d.              |        | £ s. d.             | £ s. d.             | £ s. d.     |        | s.                                | £ s. d.        | £ s. d.     | £ s. d.     | £ s. d.        | £ s. d.                       | £ s. d.     |
| North Auckland | ..                    | ..                  | ..             | 16-84                | 8      | 14-76               | 110 2 0             | 5,956-00    | 84     | 2-69                              | 802 5 10       | 14-98       | 34-24       | 513 0 0        | 1,425 7 10                    | ..          |
| Auckland       | ..                    | ..                  | ..             | 33-28                | 12     | 11-80               | 141 12 0            | 28,081-50   | 195    | 1-84                              | 2,590 16 1     | 16-90       | 34-28       | 579 9 1        | 3,311 17 2                    | ..          |
| Gisborne       | ..                    | ..                  | ..             | ..                   | ..     | ..                  | ..                  | 8,175-50    | 64     | 2-02                              | 824 18 5       | ..          | ..          | ..             | 824 18 5                      | ..          |
| Hawke's Bay    | ..                    | ..                  | ..             | ..                   | ..     | ..                  | ..                  | 3,047-00    | 107    | 3-55                              | 542 0 0        | ..          | ..          | ..             | 542 0 0                       | ..          |
| Taranaki       | ..                    | ..                  | ..             | ..                   | ..     | ..                  | ..                  | 2,560-25    | 54     | 4-47                              | 572 12 1       | ..          | ..          | ..             | 572 12 1                      | ..          |
| Wellington     | ..                    | ..                  | ..             | ..                   | ..     | ..                  | ..                  | 23,576-00   | 156    | 1-69                              | 1,990 4 10     | ..          | ..          | ..             | 1,990 4 10                    | ..          |
| Marlborough    | ..                    | ..                  | ..             | ..                   | ..     | ..                  | ..                  | 735-40      | 12     | 3-09                              | 113 15 0       | ..          | ..          | ..             | 113 15 0                      | ..          |
| Nelson         | ..                    | ..                  | ..             | ..                   | ..     | ..                  | ..                  | 338-50      | 2      | 0-95                              | 16 2 8         | ..          | ..          | ..             | 16 2 8                        | ..          |
| Westland       | ..                    | ..                  | ..             | ..                   | ..     | ..                  | ..                  | ..          | ..     | ..                                | ..             | ..          | ..          | ..             | ..                            | ..          |
| Canterbury     | ..                    | 5                   | 62-00          | 13-75                | 12     | 2-85                | 34 5 9              | 186-89      | 21     | 13-82                             | 129 3 0        | 12-50       | 17-40       | 217 11 2       | 16 15 0                       | 425 7 9     |
| Otago          | ..                    | ..                  | ..             | ..                   | ..     | ..                  | ..                  | 26-00       | 6      | 17-87                             | 23 4 8         | ..          | ..          | ..             | 352 19 0                      | 376 3 8     |
| Southland      | ..                    | ..                  | ..             | ..                   | ..     | ..                  | ..                  | 106-27      | 3      | 9-12                              | 48 9 3         | ..          | ..          | ..             | 48 9 3                        | ..          |
| Totals         | ..                    | 5                   | 62-00          | 63-87                | 32     | 8-94                | 285 19 9            | 72,789-31   | 704    | 2-10                              | 7,653 11 10    | 44-38       | 29-50       | 1,310 0 3      | 369 14 0                      | 9,646 18 8  |

**Table 4.**—RETURN SHOWING SURVEYORS EMPLOYED AND WORK ON HAND ON 1ST APRIL, 1930.

| Chief Surveyors     | Surveyors employed. |           | District.      | Work on Hand.   |                |               |             |             |                    |
|---------------------|---------------------|-----------|----------------|-----------------|----------------|---------------|-------------|-------------|--------------------|
|                     | Staff.              | Contract. |                | Topo-graphical. | Settlement.    | Native.       | Roads.      | Towns.      | Standard Traverse. |
|                     |                     |           |                | Sq.Miles.       | Acres.         | Acres.        | Miles.      | Acres.      | Miles.             |
| O. N. Campbell ..   | 5                   | ..        | North Auckland | 12              | 40,818         | ..            | 0.1         | 1.0         | ..                 |
| K. M. Graham ..     | 5                   | 10        | Auckland ..    | 574             | 15,781         | 25,483        | 33.9        | ..          | 72.0               |
| E. H. Farnie ..     | 2                   | ..        | Gisborne ..    | ..              | 10,000         | 28,505        | ..          | ..          | 31.0               |
| J. D. Thomson ..    | 1                   | ..        | Hawke's Bay .. | ..              | 800            | ..            | ..          | ..          | ..                 |
| W. D. Armit ..      | 2                   | 2         | Taranaki ..    | 400             | 607            | 96            | ..          | ..          | 40.0               |
| F. H. Waters ..     | 4                   | 6         | Wellington ..  | ..              | 3,062          | 1,657         | ..          | 47.0        | 10.0               |
| P. R. Wilkinson ..  | 1                   | ..        | Marlborough .. | ..              | ..             | 400           | 5.0         | ..          | 24.0               |
| A. F. Waters ..     | 2                   | ..        | Nelson ..      | ..              | 1,166          | ..            | 20.5        | ..          | ..                 |
| T. Cagney ..        | 1                   | ..        | Westland ..    | ..              | 2,700          | ..            | ..          | ..          | ..                 |
| W. Stewart ..       | 2                   | 3         | Canterbury ..  | ..              | 5,206          | 166           | 11.5        | 8.0         | 20.0               |
| N. C. Kensington .. | 3                   | ..        | Otago ..       | ..              | 32,630         | ..            | 2.0         | ..          | ..                 |
| S. L. Fairhall ..   | 2                   | ..        | Southland ..   | ..              | 61             | ..            | 19.0        | 7.0         | 25.0               |
| <b>Total ..</b>     | <b>30</b>           | <b>21</b> | <b>..</b>      | <b>986</b>      | <b>112,831</b> | <b>56,312</b> | <b>92.0</b> | <b>63.0</b> | <b>222.0</b>       |

**Table 5.**—PRINCIPAL CLASSES OF OFFICE-WORK DONE FROM 1ST APRIL, 1929, TO 31ST MARCH, 1930.

| District.         | Plans placed on Instruments of Title. |              |              |                | Deeds and other Instruments passed. | Plans examined and passed. |            |                |                    | Maps drawn for Lithography. |                 | Lithographs, &c., sold. |
|-------------------|---------------------------------------|--------------|--------------|----------------|-------------------------------------|----------------------------|------------|----------------|--------------------|-----------------------------|-----------------|-------------------------|
|                   | Crown.                                |              | Native Land. | Land Transfer. |                                     | Crown.                     | Native.    | Land Transfer. | Other Departments. | Standard Publications.      | Sale Plans, &c. |                         |
|                   | Leases, Licenses.                     | Freehold.    |              |                |                                     |                            |            |                |                    |                             |                 |                         |
| North Auckland .. | 478                                   | 406          | 122          | 9,925          | 5,426                               | 87                         | 36         | 514            | 189                | 10                          | 94              | £ s. d.<br>215 6 6      |
| Auckland ..       | 818                                   | 322          | 762          | 2,559          | 1,628                               | 138                        | 101        | 283            | 14                 | 14                          | 96              | 135 5 3                 |
| Gisborne ..       | 79                                    | ..           | 289          | 927            | 444                                 | 11                         | 53         | 44             | 32                 | 4                           | 4               | 39 16 0                 |
| Hawke's Bay ..    | 53                                    | 50           | 317          | 1,986          | 1,193                               | 14                         | 39         | 181            | 34                 | 11                          | 6               | 49 11 8                 |
| Taranaki ..       | 313                                   | 86           | 178          | 2,182          | 2,810                               | 20                         | 55         | 94             | 30                 | 3                           | 11              | 49 16 3                 |
| Wellington ..     | 899                                   | 414          | 171          | 9,400          | 3,664                               | 53                         | 66         | 635            | 99                 | 10                          | 23              | 191 3 6                 |
| Marlborough ..    | 65                                    | 20           | 22           | 992            | 472                                 | 11                         | 6          | 28             | 30                 | ..                          | ..              | 21 16 9                 |
| Nelson ..         | 346                                   | 36           | 14           | 2,264          | ..                                  | 32                         | 1          | 99             | 15                 | 2                           | 50              | 39 10 6                 |
| Westland ..       | 247                                   | 11           | ..           | 476            | 28                                  | 24                         | ..         | 16             | 12                 | ..                          | 3               | 33 5 0                  |
| Canterbury ..     | 565                                   | 90           | 40           | 4,602          | 3,115                               | 32                         | 20         | 395            | 55                 | 2                           | 4               | 215 7 1                 |
| Otago ..          | 340                                   | 186          | 18           | 4,054          | 448                                 | 35                         | 4          | 144            | 24                 | 2                           | 20              | 144 11 8                |
| Southland ..      | 326                                   | 68           | 6            | 1,592          | 1,037                               | 30                         | 1          | 86             | 21                 | 2                           | 9               | 111 13 0                |
| Head Office ..    | ..                                    | ..           | ..           | ..             | ..                                  | ..                         | ..         | ..             | ..                 | 27                          | ..              | 550 1 10                |
| <b>Totals ..</b>  | <b>4,529</b>                          | <b>1,689</b> | <b>1,939</b> | <b>40,950</b>  | <b>20,265</b>                       | <b>487</b>                 | <b>382</b> | <b>2,519</b>   | <b>657</b>         | <b>87</b>                   | <b>321</b>      | <b>1,797 5 0</b>        |



## APPENDIX.

## HEAD OFFICE, DRAUGHTING BRANCH.

*Map-publication.*—The total maps published during the year were 123, and the cost for printing £1,827. The maps comprised survey districts ( $\frac{1}{2}$  mile to 1 in.), 38; survey districts (1 mile to 1 in.), 52; counties (1 mile to 1 in.), 3; towns (8 chains to 10 chains to 1 in.), 12; territorial (4 miles to 1 in.), 8; territorial (8 miles to 1 in.), 1; miscellaneous, 10. The total number of copies printed was 39,524. Cash sales of litho maps from all districts amounted to £1,797.

Other Government Departments were supplied with maps to the value of £582. Maps to the value of approximately £1,100 were used in the office or issued free.

Good progress has been made with the 4-miles series of maps, and the standard maps on 1 mile to 1 in. scale, although still in arrears, are gradually being brought up to date. Owing to other more important work, little progress has been made with the 8-miles series of maps.

*Town Schemes.*—The town schemes approved show a slight falling-off in the numbers, 230 being approved this year, as against 239 last year. The percentage of the various districts were—North Auckland, 34.35; Canterbury, 21.3; Wellington, 17.8; Auckland, 14.3.

Analysis of the schemes shows that 2,108 acres were subdivided into residential lots outside the boundaries of boroughs and town districts; and of this area new roads account for 244 acres, road and access reserves 5 acres, recreation and other public reserves, 180 acres, leaving a balance subdivided into lots available for sale of 1,679 acres.

*Draughtsmen's and Computers' Examination.*—The annual examination was held in December, 1929, forty-seven candidates presenting themselves for examination.

The results were as follows: Draughting: Twenty-nine candidates, of whom five obtained first-grade passes (Messrs. J. F. Berry, W. J. Burton, H. J. Fletcher, G. T. Railton, and G. C. Wilson), and eight obtained second-grade passes (Messrs. C. H. Baigent, H. Barnes, T. E. Brown, F. H. Cunningham, A. Jamieson, W. Roberts, L. A. Stokes, and D. K. Walker). Computing: First grade, one candidate (Mr. J. W. Beagley) who passed; Second grade, seventeen candidates, of whom eleven passed (A. T. Bell, A. V. Brown, C. T. Brown, W. R. Dyer, R. P. Fletcher, K. W. T. Holcroft, S. W. Markham, R. S. Odell, N. R. Stanton, E. R. Simpson, and D. K. Walker).

The outside examiners for the special subject of photo-litho drawing were again Messrs. M. Crompton Smith and J. N. Sturtevant.

*Standard of Length.*—During the year sixty-two bands were compared with the standards, the total length being 3 miles 75 chains. Of these forty-eight were ordinary field surveyors' steel bands, of a length of 287 chains, and seven were invar bands, of a length of 28 chains.

*Civic Survey Maps.*—During the year the map of Christchurch was completed and published, the map of Wellington was brought up to date and will shortly be on issue. Sheets of the civic maps of Auckland and Invercargill are being published as completed. Maps of Hamilton, Rotorua, Te Awamutu, and Masterton were prepared and published.

*Topographical Maps.*—During the year maps for the Defence Department were published of an area in Hawke's Bay, and similar maps are in preparation of a large area in Taranaki.

*Tourist Maps.*—During the year a perspective map of the Mount Cook region was prepared and published, and it is hoped to have similar maps of the Franz Joseph and Tongariro Park regions prepared during the coming year. A map of the Taupo fishing-grounds was prepared, and a new tourist map is under way of the hot lakes district.

*Road-maps.*—Maps on 4-miles scale, showing main and secondary highways in both islands were prepared during the year and road-maps showing all classes of roads are in preparation.

*Approximate Cost of Paper.*—Preparation, not given; printing (925 copies), £12 10s.

By Authority: W. A. G. SKINNER, Government Printer, Wellington.—1930.

Price 6d.]

