

1935.
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, 1st July, 1935.

I have the honour to present herewith the report on survey operations for the year ended 31st March, 1935.

I have, &c.,

H. E. WALSH,

Surveyor-General.

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

REPORT.

A SUMMARY of the operations carried out for the year ended 31st March, 1935, follows, grouped under appropriate headings. A concise summary of the field-work completed during the year is in Tables A, B, and 1 to 4 herewith.

Table A shows a further reduction in the cost of Native and road surveys, while the cost of rural surveys is practically the same as for the previous year.

Table B shows an increase in the area under both rural and Native surveys, by far the greater part under both headings being in the Auckland and North Auckland District.

MINOR TRIANGULATION.

The work under this heading was principally in connection with the rural standard surveys in the Hawke's Bay District.

TOPOGRAPHICAL SURVEYS.

Except for a small area in Westland, the work under this heading was confined to the Auckland District.

SETTLEMENT SURVEYS.

The returns show an increase of approximately 50 per cent. in the area of Crown lands and land-for-settlement surveys during the year. The areas are set out in Table 1 under their appropriate headings for each land district.

NATIVE LAND SURVEYS.

Practically the whole of the work under this heading was carried out in the Auckland and North Auckland District, partly by the staff and partly by private surveyors.

GEODETIC TRIANGULATION.

No work under this heading was carried out during the past year.

HAWKE'S BAY RE-ESTABLISHMENT OF SURVEYS.

Good progress has been made with the controlling rural standard survey work in the Hawke's Bay District, a distance of 166 miles being completed during the year by Staff Surveyors at an average cost of £18 12s. per mile, which is very satisfactory for this class of work. With the completion of the work in hand (a little over 100 miles) it is considered that, with the triangulation control effected, sufficient work will have been carried out to effectively control future surveys. Good progress has been made with the revision of the standard survey of Hastings Borough, and this work should be completed early in the year.

STANDARD SURVEYS.

With the exception of the standard survey work in connection with the re-establishment surveys in Hawke's Bay District and the maintenance of existing standards, no work was carried out under this heading during the year.

FIELD INSPECTIONS.

Ten inspections which were necessary for title purposes were made.

STANDARD OF ACCURACY.

In ordinary rural surveys the misclose of traverse circuits is usually less than half a link multiplied by the square-root of the number of miles in the circuit. Where this is exceeded, the cause may be ascribed to tortuous, short-line traverses in hilly or broken country.

A detailed report of the accuracy of the rural standard surveys will be made when a larger number of these has been adjusted.

TIDAL SURVEY.

The tide-tables for 1936 for the seven standard ports (Auckland, New Plymouth, Wellington, Lyttelton, Dunedin, Bluff, and Westport), for which predictions are published, were received from the Hydrographer to the Admiralty. The work of measuring the times and heights of high and low water was performed as usual by the Tidal Institute, University of Liverpool.

PROPOSED OPERATIONS, 1935-36.

Hawke's Bay Re-establishment of Surveys.—The control traversing of the principal roads will probably be completed during the year, about 100 miles remaining to be surveyed.

Some further minor triangulation will also be necessary, and this will be taken up as required. Recent triangulation work has disclosed discrepancies in the secondary triangulation in a particular district, due, so far as office computation can show, to a shift in the positions of two or more of the secondary stations. As this district was subjected to a severe earthquake in September, 1932 (after the completion of the secondary triangulation), it is extremely probable that a shift occurred then. A field revision of this triangulation is being put in hand immediately.

Adjustments of the minor triangulation and standard traverses to bring into harmony with the geodetic and secondary triangulations (already adjusted) will be continued. This, with the present staff, will take about two years to complete.

Geodetic Triangulation.—Work on this is being resumed during the year.

Standard Surveys.—Several works of this nature are urgently necessary in Auckland, Gisborne, and Canterbury districts, and will be put in hand.

Precise Levelling.—This work is still being held in abeyance, but it is hoped that it may be resumed at an early date.

Topographical Survey.—The results of a field survey of contours in Canterbury, undertaken by the Public Works Department, are being compiled in a suitable form and will serve as a basis for any topographical survey in the area covered. A large area in the North Auckland district is being considered for an aerial topographic survey to be made in collaboration with the Defence Department. Plane-table surveys over the areas in which the varved clay deposit is situated are being continued and will shortly be completed.

Town and Suburban Surveys.—About 232 acres of these are at present in sight for the coming year.

Rural Settlement.—Of this, nearly 50,000 acres is in hand, principally in Auckland, Hawke's Bay, and Canterbury Districts.

Native Land Surveys.—Five thousand acres are now in hand, but this will be much increased as requisitions come to hand during the year.

Office Work.—The routine examination and recording of plans, &c., will occupy a large portion of the time of the office staff during the year. This year will also see the preparation of maps for the forthcoming census. Further draughting work for the Valuation Department is also being undertaken. The year will be a very busy one for the office staff.

GENERAL.

Map Publications.—Details of these will be found in the Chief Draughtsman's report appended hereto. With the exception of a road map, the numbers and cost were much the same as the previous year.

Copyright in Maps.—Investigations during the year proved that a large number of maps were being published using the departmental maps as a base without proper authority. In one case legal action was taken and a conviction secured. In other cases agreements were entered into or publication ceased, and several are still under consideration. These latter will, however, be brought under the present system of license, and in future it will be possible to deal more drastically with map publications which infringe the Crown's copyright. Royalty fees for the year totalled £358.

Town Schemes.—As indicated in the report for last year, the numbers of these show a large increase of practically 100 per cent.

Warrants of Title.—One hundred and forty-seven warrants for the issue of certificates of title were examined and certified to under the provisions of section 13 of the Land Transfer Act, 1915. Sixteen proclamations of Native road-lines were dealt with, and three under the provisions of section 106 of the Land for Settlements Act, 1925.

Increase during Year.—There has been a very definite increase in the work for the year in practically all branches, and there are indications that this increase will be maintained during the present year.

Standard of Length.—During the year Standard Band (Imperial) No. 1 was forwarded to the National Physical Laboratory, Teddington, for comparison with the Imperial standards. Its length at 62° F. was determined as 99.9990, as against 99.9981 in 1915 and 100.0000 in 1903. Two new steel bands bearing finely engraved marks suitable for observation with the micrometer microscopes now employed on the testing bench were also obtained from Messrs. Chesterman and Co. and were compared at the National Physical Laboratory. Each of these bands is correct at 15° C. These bands have been numbered 13 and 14, following the present series of Imperial bands now used at the various district offices as standards. These latter were all called in and a series of comparisons made with the results tabulated in the Chief Draughtsman's special report attached.

STAFF.

The increased work coming forward during the year has kept the staff very busy. The chief losses to the technical branch were Mr. W. Stewart (appointed Valuer-General), Mr. E. C. O'Brien (retired on account of ill-health), and Messrs. Rickard, C. E. Pfeifer, J. Storey, R. Dyer, and J. Healy.

APPRECIATION.

The staff has given most efficient service and carried out its duties in a worthy manner, and I wish to add my appreciation of its work to that of the Chief Surveyors as expressed in their reports.

H. E. WALSH, Surveyor-General.

APPENDIX.

HEAD OFFICE, DRAUGHTING BRANCH.

(A. J. WICKS, Chief Draughtsman.)

Map Publications.—The number of editions of maps published during the year was 58, and the total cost of printing £1,049. The maps comprised survey districts ($\frac{1}{2}$ mile to 1 in.), 19; survey districts (1 mile to 1 in.), 20; counties (1 mile to 1 in.), 9; territorial (4 miles to 1 in.), 2; towns, 3; miscellaneous, 10. The number of maps printed being 13,942. In addition to the above, a special edition of 6,300 road-maps of the North Island in two sheets was published for the Wellington Automobile Association, making the total number printed under all headings 26,542. Cash sales of lithos from all districts amounted to £1,440, purchases by other Departments £214, and the value of maps issued free or used in the office amounted to £1,300. Royalties obtained from maps based wholly or partly on the Department's records and published by private firms or companies amounted to £358.

Town Schemes.—The number of town schemes approved during the year shows approximately 100-per-cent. increase over the past two years, 148 being approved, about 46 per cent. of which were in the Auckland and North Auckland Districts. Analysis of the schemes show that 749 acres outside the boundaries of boroughs and town districts were subdivided into residential lots, and of this area new roads accounted for 83 acres, recreation and other reserves 51 acres, leaving a balance of 615 acres subdivided into lots available for sale.

Draughtsmen's and Computers' Examination.—The annual examination was held in September, 1934, when 34 candidates presented themselves for examination. The results were as follow—Draughting: 22 candidates, of whom 7 obtained first-grade passes (Miss M. Pirrit, Messrs. W. A. Fraser, P. R. Malthus, K. P. Potete, W. Rogel, N. R. Stanton, and A. J. Stewart) and 7 obtained second-grade passes (Messrs. W. S. Boyes, L. S. Leslie, M. R. Magrath, A. E. Moore, E. N. Muir, H. F. Tomlinson, and R. B. Witten). Computing: 12 candidates, of whom 5 obtained second-grade passes (Messrs. A. L. Cullington, L. A. Graham, D. W. E. Hayward, K. V. Kennedy, and C. R. Lane).

Standard of Length.—During the year 147 bands were compared with the standard, the total length being 326 chains. Of these, 93 were steel bands of a length of 159 chains and 52 were invar bands of a length of 167 chains.

Maps, &c.—During the year the drawing of the 4-mile series of maps was completed and good progress made with the standard maps on the 1 mile to 1 in. scale. The preparation of tracings still continues in connection with the Hawke's Bay re-establishment. A road map of the North Island for the Wellington Automobile Association was completed and printed during the year.

The preparation of an up-to-date topographical map of the Tararuas suitable for trampers is well under way; also a motorist's map of Wellington District.

IMPERIAL STANDARD BANDS.

REPORT BY CHIEF DRAUGHTSMAN.

In 1903 twelve steel standard bands were obtained from Messrs. Chesterman and Co., Birmingham. These bands, which were each $\frac{1}{4}$ in. wide and slightly over 100 ft. in length, were compared with the Imperial Standard by the Standard Branch of the Board of Trade, London (see Records of Survey, Vols. 1 and 3). In 1915 Nos. 1 and 3 were forwarded to England for retesting, and the results are given in Records of Survey, Vol. 3, page 19. Nearly twenty years having elapsed, Standard Band No. 1 was again forwarded to England in June, 1934, for retesting, and was returned in January, 1935. The various tests at 62° F. under a tension of 15 lb. give the lengths of the No. 1 band as follows—

Board of Trade	..	..	..	1903	100.0000
National Physical Laboratory	..	..	..	1915	99.9981
National Physical Laboratory	..	..	..	1934	99.9990

There is no satisfactory explanation of the shortage of 0.0019 between 1903 and 1915, and it is possible that the Board of Trade test in 1903 was not too reliable. As the marks on these standard bands had corroded to some extent since 1903 it was decided to order two new bands $\frac{1}{4}$ in. wide and slightly over 100 links in length from Messrs. Chesterman and Co., and these bands, Nos. 13 and 14, were received in January, 1935. The comparison by the National Physical Laboratory show the lengths of both bands to be correct at a temperature of 15° C. (59° F.) with a tension of 20 lb. Of the original bands obtained in 1903 nine are still in use, and the opportunity was taken of comparing these with the new bands, Nos. 13 and 14 (correct at 59° F. with a tension of 20 lb.). With the old bands a tension of 15 lb. was applied, and the lengths at a temperature of 62° F. were as follows:—

No. 1	..	99.9989	National Physical Laboratory test January, 1935,	99.9990
3	..	99.9984		
4	..	99.9987		
6	..	99.9982		
7	..	99.9979		
8	..	99.9980		
10	..	99.9993		
11	..	99.9967		
12	..	99.9979		

The method adopted was to lay out Nos. 13 and 14 with the band to be compared (say, No. 1) on the testing-band, which is fitted with microscope micrometers at each end for reading. No. 13 was then set accurately on the board and replaced by No. 1, the micrometer difference in the length being noted, six comparisons alternately being observed and the mean of the readings adopted. The same practice was then carried out in comparing the length of No. 1 with No. 14. This method was carried out on two separate days, and the final mean of the four results adopted as the length of the standard band.

Temperature readings were taken at the beginning and occasionally while testing, but at no time during the test was there any notable variation in the temperature. A comparison of the two new bands, Nos. 13 and 14, and the mean of the results of the comparisons with the old standard bands show that No. 13 was 0.00015 links longer than No. 14.

TABLE A.

Class of Work.	Area.	Average Cost.	Total Cost.
			£ s. d.
Minor triangulation	403,680 acres	0·41d. per acre	689 1 11
Topographical survey for settlement	33,318 acres	1·21d. per acre	168 10 8
Rural, by staff	47,907 acres	1·97s. per acre	4,709 18 7
Suburban, by staff	574 acres	13·27s. per acre	380 19 5
Town, by staff	92 acres	£3·70 per section	399 6 1
Native Land Court, by staff	17,121 acres	0·74s. per acre	636 3 0
Native Land Court, by private surveyor	10,472 acres	1·35s. per acre	705 7 2
Roads, by staff	269·9 miles	£18·8 per mile	5,077 19 2
Roads, by private surveyors	18·9 miles	£28·3 per mile	534 15 6
Other work by staff .. .. .	..	..	3,139 6 9
Total cost of completed work .. .. .	..	..	16,441 8 3

TABLE B.

Land District.	Rural Survey.	Native Land Court.
	Acres.	Acres.
Auckland and North Auckland	32,477	25,805
Gisborne	1,151	22
Hawke's Bay	732	..
Taranaki	3,947	296
Wellington	715	1,469
Marlborough	2,368	1
Nelson	109	..
Westland	2,574	..
Canterbury	2,584	..
Otago	752	..
Southland	498	..
Total	47,907	27,593

Table 1.—RETURN OF FIELD-WORK EXECUTED BY THE STAFF AND CONTRACT SURVEYORS ON LANDS ADMINISTERED BY THE LANDS AND SURVEY DEPARTMENT FROM 1ST APRIL, 1934, TO 31ST MARCH, 1935.

District.	Minor Triangulation.			Topographical Survey for Settlement.			Rural.			Village and Suburban.			
	Acres.	Cost per Acre.	Total Cost.	Acres.	Cost per Acre.	Total Cost.	Acres.	Cost per Acre.	Total Cost.	Acres.	Number of Sections.	Cost per Acre.	Total Cost.
Auckland and North Auckland	33,250	0.145	£ 20 7 1	33,068	1.20	£ 165 8 2	32,477	1.72	£ 2,784 7 8	144	16	14.4	£ 103 16 2
Gisborne	..	..	..	..	..	..	1,151	0.76	43 11 7	..	..	..	..
Hawke's Bay	370,430	0.43	668 14 10	..	..	..	732	2.19	80 0 0	10	3	23.4	11 14 4
Taranaki	..	..	..	..	..	..	3,947	4.88	964 6 10	..	..	..	..
Wellington	..	..	..	..	..	..	715	3.71	132 10 1	41	1	3.73	7 12 11
Marlborough	..	..	..	..	..	..	2,368	0.90	106 10 0	58.3	6	3.43	10 0 0
Nelson	..	..	..	..	..	..	109	6.24	34 0 5	110	10	16.13	88 13 8
Westland	..	..	..	250	3.00	3 2 6	2,574	1.72	220 16 11	63	3	11.27	35 10 0
Canterbury	..	..	..	..	..	..	2,584	0.83	107 4 2	124.7	21	14.45	90 2 4
Otago	..	..	..	..	..	..	752	5.35	201 2 3	12.4	4	44.35	27 10 0
Southland	..	..	..	..	..	..	498	1.42	35 8 8	10.3	1	11.39	6 0 0
Totals	403,680	0.41	689 1 11	33,318	1.21	168 10 8	47,907	1.97	4,709 18 7	573.7	65	13.27	380 19 5

District.	Town Section Survey.			Roads, Railways, and Water-races.			Other Work.		
	Acres.	Number of Sections.	Total Cost.	Miles.	Cost per Mile.	Total Cost.	Acres.	Cost.	Total Cost of Completed Work.
Auckland and North Auckland	53.40	18	£ 92 11 10	44.8	23.0	£ 1,030 2 8	..	..	£ 4,585 15 2
Gisborne	1.00	2	4 10 0	..	..	..	..	..	28 19 0
Hawke's Bay	4.80	18	75 12 10	165.6	18.6	3,086 19 11	..	..	154 1 10
Taranaki	4.25	7	51 0 0	4.2	22.6	95 0 9	..	..	221 13 11
Wellington	6.25	9	30 6 6	20.9	12.2	255 10 11	..	..	852 3 11
Marlborough	3.40	4	7 1 0	..	..	..	..	..	279 9 3
Nelson	0.69	3	10 0 0	8.4	18.9	157 14 5	..	..	59 15 8
Westland	3.00	12	37 6 8	..	..	..	..	..	227 0 10
Canterbury	13.40	33	85 18 8	1.2	30.5	35 2 8	..	..	283 15 6
Otago	1.83	2	4 18 7	..	..	..	..	..	202 4 8
Southland	..	..	..	..	..	..	..	..	277 4 1
Total	92.02	108	399 6 1	245.1	19.0	4,660 11 4	..	..	2,975 10 3

Table 2.—RETURN OF FIELD-WORK EXECUTED BY THE STAFF AND CONTRACT SURVEYORS ON LANDS ADMINISTERED BY OTHER DEPARTMENTS FROM 1ST APRIL, 1934, TO 31ST MARCH, 1935.

District.	Native Land Survey.				Roads, Railways, and Water-races.			Other Work (Cost).	Total Cost of Completed Work.	
	Acres.	Number of Sections.	Cost per Acre.	Total Cost.	Miles.	Cost per Mile.	Total Cost.			
Auckland and North Auckland	25,805	192	s. 0.92	£ 1,188 16 5	22.8	£ 26.6	£ 605 8 5	£ 56 11 11	£ 1,850 16 9	
Gisborne	22	2	1.38	1 10 0	2.4	16.4	39 0 0	16 4 3	56 14 3	
Hawke's Bay	..	..	..	..	..	..	..	..	..
Taranaki	296	2	3.37	45 0 0	..	..	..	..	45 0 0
Wellington	1,469	11	1.34	98 3 9	..	..	..	..	98 3 9
Marlborough	1	3	129.00	8 0 0	..	..	..	..	8 0 0
Nelson	..	..	..	..	0.5	43.0	22 7 5	47 1 0	69 8 5
Westland	..	..	..	..	16.5	12.7	209 9 6	32 0 4	241 9 10
Canterbury	..	..	..	..	0.5	131.8	65 18 0	..	65 18 0
Otago	..	..	..	..	1.0	10.0	10 0 0	11 19 0	21 19 0
Southland	..	..	..	..	..	..	..	..	..
Totals	27,593	210	0.97	1,341 10 2	43.7	21.8	952 3 4	163 16 6	2,457 10 0	

Table 3.—RETURN SHOWING SURVEYORS EMPLOYED AND WORK ON HAND AT 1ST APRIL, 1935.

Chief Surveyors.	Surveyors employed.		District.	Work on Hand.						Standard Traverse.	
	Staff.	Contract.		Topo-graphical.	Settlement.	Native.	Roads, &c.	Towns.	City.	Rural.	
R. G. Macmorran	8	..	Auckland and North Auckland	Sq. Miles. ..	Acres. 22,395	Acres. 2,813	Miles. 55	Acres. 45	Miles. ..	Miles. ..	
H. L. Primrose	1	..	Gisborne	..	..	..	..	..	..	..
P. W. Barlow	4	..	Hawke's Bay	..	13,745	..	1	61	93	179	
F. H. Waters	2	1	Taranaki	..	2,800	1,076	38	11	..	..
L. J. Poff	3	2	Wellington	..	..	1,396	..	..	..	..
P. R. Wilkinson	1	..	Marlborough	..	..	..	1	..	..	..
A. F. Waters	1	..	Nelson	..	108	..	..	11	..	..
T. Cagney	1	..	Westland	..	100	..	½	4	..	..
C. G. S. Ellis (Deputy)	2	..	Canterbury	128	5,553	..	74	64	5	..	
N. C. Kensington	1	..	Otago	..	3,400	..	4½	36	..	..
B. C. McCabe	1	..	Southland	..	34	..	..	..	..	..
Totals	25	3	..	128	48,135	5,285	174	232	98	179	

Table 4.—PRINCIPAL CLASSES OF OFFICE-WORK DONE FROM 1ST APRIL, 1934, TO 31ST MARCH, 1935.

Land District.	Plans placed on Instruments of Title.				Deeds and other Instruments passed.	Plans examined and passed.				Maps drawn for Lithography.		Lithographs sold.
	Crown.		Native Land.	Land Transfer.		Crown.	Native.	Land Transfer.	Other Departments.	Standard Publications.	Sale Plans, &c.	
	Leases and Licenses.	Frec-hold.										
Auckland and North Auckland	610	454	478	9,326	5,665	251	50	557	167	23	68	£ 207 18 0
Gisborne	105	..	53	445	..	15	8	23	18	..	3	138 6 0
Hawke's Bay	140	180	36	574	1,010	34	32	189	8	2	..	34 9 0
Taranaki	281	..	12	537	424	9	4	45	27	1	..	30 11 9
Wellington	235	164	39	2,431	1,386	17	4	155	87	5	8	112 8 9
Marlborough	69	10	6	133	..	17	2	16	15	1	..	17 1 0
Nelson	173	34	..	843	..	34	..	104	9	..	..	60 7 6
Westland	213	..	..	418	10	40	..	16	14	..	..	40 11 9
Canterbury	259	102	10	1,805	978	33	4	161	17	3	..	110 7 9
Otago	272	..	..	2,801	1,660	42	..	144	22	4	43	115 16 4
Southland	157	56	..	637	..	12	..	55	13	3	..	74 0 0
Head Office	..	..	..	..	..	..	..	..	..	3	..	1,070 0 1*
Totals	2,514	1,000	634	19,950	11,133	504	104	1,465	397	45	122	2,011 17 11*

* Includes £358 fees received in royalties.

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