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PART VI

DEPARTMENT OF THE INTERIOR

TOPOGRAPHICAL SURVEYS BRANCH

GENERAL REPORT OF OPERATIONS

FROM

1869 to 1889

Together with an Exposition of the System of Survey of Dominion  
Lands, and a Schedule of

DOMINION LAND AND TOPOGRAPHICAL SURVEYS

BY

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AND

J. S. DENNIS, D.T.S., Chief Inspector of Surveys.

FEBRUARY, 1892.

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DEPARTMENT OF THE INTERIOR,  
TOPOGRAPHICAL SURVEYS BRANCH,  
OTTAWA, 12th February, 1892.

SIR,—The surveys performed under the Topographical Surveys Branch of the Department of the Interior have been of varied character. The primary object has been the division of land for the purpose of settlement, and hence the bulk of the work has consisted of block, township outline, and township subdivision surveys, together with surveys of parishes and town plots. Other surveys have from time to time, in connection with these, become necessary, such as trail surveys, surveys of Indian reserves, exploratory and micrometer surveys, triangulation and phototopographical surveys, determinations of latitudes and longitudes, &c.

Altogether a very large amount of work has been performed, and although much of the information concerning it is contained in the reports of the Department of the Interior published yearly, yet the necessity of a general report of all the operations, for use as a book of reference, has become apparent.

With the hope of supplying this want, we have the honour to submit herewith the first two sections of such report. The first section contains a historical narrative of the surveys, with schedules showing the names of all surveyors employed, together with the work performed by each, also all trail surveys, reserves for the Hudson's Bay Company, Indian reserves surveyed under the Department of the Interior, micrometer and exploratory surveys, correction of resurveys, acreage of the yearly surveys, and all surveys of parishes, town plots and other miscellaneous work. It also contains a list of all Dominion land and topographical surveyors.

The second section treats of the theory of the Dominion lands system of survey, and contains a number of geodetic tables useful in calculations connected with surveys under the system, and an explanation of the method of using them.

We have prepared this report in the hope that it will be found useful as a book of reference in all matters connected with the surveys, and to that end we have made it as complete as possible in the lines indicated.

It is proposed to supplement the information herein contained by the issue from time to time of additional sections giving fuller details of the various operations.

We have the honour to be, Sir,  
Your obedient servants,

W. F. KING,  
*Chief Astronomer.*

J. S. DENNIS,  
*Chief Inspector of Surveys.*

E. DEVILLE, Esq.,  
Surveyor General,  
Topographical Surveys Branch.



# CONTENTS.

## SECTION I.

	PAGE.
Purchase of Rupert's Land by the Dominion.....	1
Surveys prior to transfer of Rupert's Land.....	1
Inception of surveys under Dominion Government.....	1
System first proposed.....	1
Facts in support of proposed system.....	2
Adoption and marking of governing lines of proposed system.....	2
Change in system and reasons therefor.....	2
Administration of Dominion lands placed under Secretary of State.....	3
Appointment of Col. Dennis as Surveyor General.....	3
Issue of the Manual of surveys and explanations regarding 2nd system.....	3
Inception of surveys under 2nd system.....	4
Surveys performed during season of 1869.....	4
Survey of the Winnipeg or Principal Meridian.....	4
Province of Manitoba created.....	6
Surveys during the season of 1871.....	6
Appointment of Lindsay Russell, Esq., as Inspector of Surveys.....	6
Schedule of rates adopted for surveys.....	6
Inception of survey of settlement belt parishes.....	6
Surveys during season of 1872.....	7
Commencement of the survey of the reserves for the Hudson's Bay Company.....	7
Adoption of system of daily pay for surveyors.....	8
Issue of first map showing Dominion lands surveys.....	8
Passage of Dominion Lands Act.....	8
Commencement of survey of international boundary.....	8
Surveys during season of 1873.....	9
Creation of the Department of the Interior, and transfer of Dominion Lands Branch to that Department.....	9
Geological Survey attached to Department of the Interior.....	9
Administration of Indian Affairs transferred to Department of Interior.....	9
Surveys during season of 1874.....	9
Survey of outer two miles in settlement belt.....	9
Lindsay Russell, Esq., appointed Assistant Surveyor General.....	9
Inception of the "special survey".....	9
Base-measuring apparatus for special survey.....	14
Surveys during season of 1875.....	15
Operations of the special survey during 1875.....	15
Surveys during season of 1876.....	16
Comparison of rates for township sub-division.....	16
Operations of special survey during 1876.....	17
Surveys during season of 1877.....	18
Surveys during season of 1878.....	19
Survey of Prince Albert settlement.....	19
Determination of latitude by W. F. King during 1878.....	19
Col. Dennis appointed Deputy Minister of the Interior.....	20
Lindsay Russell appointed Surveyor General.....	20
Surveys during season of 1879.....	20
Proposed change in manner of surveying block lines.....	21
Surveys during season of 1880.....	21
Exploration of Souris Valley and adjacent country by Prof. Macoun.....	22
Indian Branch detached from Department of the Interior and created a separate department.....	22
Surveys during season of 1881.....	22
Changes in system of survey and issue of 2nd edition of Manual.....	22
Appointment of E. Deville and W. F. King as inspectors of surveys.....	22
Exploration western slope of Duck Mountains and adjacent country by Prof. Macoun.....	23
Operations of astronomical section of the special survey, with schedule of latitude determinations.....	23
Surveys during season of 1882.....	23
E. Deville appointed Chief Inspector of Surveys.....	24
Marking of surveys with iron posts and tins.....	24
Bonus of 15 per cent to surveyors for filing returns without delay.....	24
Establishment of lithographic office.....	24

	PAGE
Division of North-West Territories into districts.....	2
Mr. Lindsay Russell appointed Deputy Minister of the Interior.....	2
Surveys during season of 1883.....	2
Mr. A. M. Burgess appointed Deputy Minister of the Interior.....	2
Surveys during season of 1884.....	2
Inception of the survey of old trails.....	2
Dominion Lands system extended to railway belt in British Columbia.....	20
Commencement of Dominion Lands survey in British Columbia.....	20
Retirement of Mr. Lindsay Russell from position of Surveyor General.....	20
Surveys during season of 1885.....	20
Commencement of work of longitude determinations.....	20
Traverse of Canadian Pacific Railway line in British Columbia.....	20
E. Deville appointed Surveyor General.....	27
Inception of work of correcting existing surveys.....	27
Surveys during season of 1886.....	27
Astronomical operations during the year 1886.....	27
Inception of topographical survey of the Rocky Mountains.....	28
First attempt to use photography on surveys.....	28
Appointment of Mr. W. F. King as Chief Inspector of Surveys.....	28
Amendments in provisions of Manual regarding marking surveys in grazing districts.....	28
Surveys during season of 1887.....	28
Determinations of latitudes and longitudes during 1887.....	28
Photo-topographical operations during the season.....	28
Mr. J. S. Dennis appointed Inspector of Surveys.....	28
Establishment of photographic branch.....	28
Correction surveys during 1887.....	28
Expedition sent to Alaska.....	28
Surveys during the season of 1888.....	28
Determinations of latitudes and longitudes during 1888.....	28
Exploration surveys during 1888.....	28
Photo-topographical surveys during 1888.....	30
Notes on the surveys, etc.....	30

## APPENDIX.

Schedule No. 1—Surveyors employed and work accomplished during season of 1869.....	32
do 2 do do do do do 1871.....	32
do 3 do do do do do 1872.....	34
do 4 do do do do do 1873.....	38
do 5 do do do do do 1874.....	43
do 6 do do do do do 1875.....	44
do 7 do do do do do 1876.....	46
do 8 do do do do do 1877.....	47
do 9 do do do do do 1878.....	48
do 10 do do do do do 1879.....	49
do 12 do do do do do 1880.....	51
do 13 do do do do do 1881.....	56
do 14 do do do do do 1882.....	62
do 15 do do do do do 1883.....	66
do 16 do do do do do 1884.....	70
do 17 do do do do do 1885.....	73
do 18 do do do do do 1886.....	74
do 19 do do do do do 1887.....	75
do 20—All trails surveyed in Manitoba and North-West Territories.....	76
do 21—Reserves surveyed for the Hudson's Bay Company.....	78
do 22—Showing all Indian reserves surveyed under instructions from the Surveyor (General).....	80
do 23—Showing micrometer and exploratory surveys performed.....	81
do 24—Showing all correction surveys performed to 31st December, 1888.....	82
do 25—Showing the acreage of Dominion land surveys for each year, 1869 to 1889.....	84
do 26—Showing all settlement, town-plot and miscellaneous surveys performed.....	84
do 27—Being a list of all Dominion land and topographical surveyors.....	84

## SECTION II.

## CHAPTER I.

*General Description of the System of Survey.*

	PAGE
Size of township .....	101
Governing lines—Initial meridian and base lines .....	101
Meridian township boundaries .....	101
Correction lines .....	101
Northern and southern boundaries of townships .....	101
Lengths of township boundaries and angles of townships .....	101
Differences between the first, second and third systems of survey .....	102
Position of corner posts with reference to the road allowances .....	102
Fourth system in railway belt in British Columbia .....	103
Advantage of the system of survey .....	103
General remarks concerning the tables .....	103
Limits of the different systems of survey .....	104

## CHAPTER II.

*Construction and Use of the Tables.*

TABLE I.—Lengths of arcs of meridian, parallel, &c., in different latitudes .....	104
TABLE II.—Corrections to Table I. for change in elements of figure of earth .....	106
TABLE III.—Latitudes of base and correction lines and lengths of arcs of meridian, parallel, &c., for the 1st and 2nd systems of survey .....	107
TABLE IV.—Latitudes of base and correction lines, &c., for 3rd and 4th systems of survey .....	108
TABLE V.—Chord azimuths, &c., for base lines, 1st and 2nd systems of survey .....	109
TABLE VI.—Chord azimuths, &c., for base lines, 3rd and 4th systems of survey .....	110
TABLE VII.—Chord azimuths, jogs, &c., for correction lines, 1st and 2nd systems of survey .....	110
TABLE VIII.—Chord azimuths, jogs, &c., for correction lines, 3rd and 4th systems of survey .....	111
TABLE IX.—Latitudes and widths in chains of northern boundaries of sections in 1st and 2nd systems of survey .....	111
TABLE X.—Latitudes and widths in chains of northern boundaries of sections in 3rd and 4th systems of survey .....	112
TABLE XI.—To reduce chains to decimals of a township side .....	112
TABLE XII.—Correction to widths of roads on correction lines on account of curvature .....	112
TABLE XIII.—Differences of latitude between township corners and section and quarter section corners .....	113

## CHAPTER III.

*Problems connected with the System of Survey.*

Correction for height above sea level.—Latitudes and longitudes of points in the system :—	
Latitude .....	114
Longitude, 3rd system .....	115
Longitude, 1st system .....	115
Longitude, 2nd and 4th systems .....	116
Effect of errors of survey .....	116
To find the position with regard to the survey system of a point given in latitude and longitude :—	
2nd, 3rd and 4th systems .....	116
1st system .....	117
Fractional township or range between parts of the country surveyed under different systems of survey :—	
Fractional township .....	117
Fractional range .....	117
Example .....	118
Example .....	119
Fractional sections adjoining an initial meridian :—	
Longitudes of the initial meridians .....	120
Example of the calculation .....	120



## CHAPTER IV.

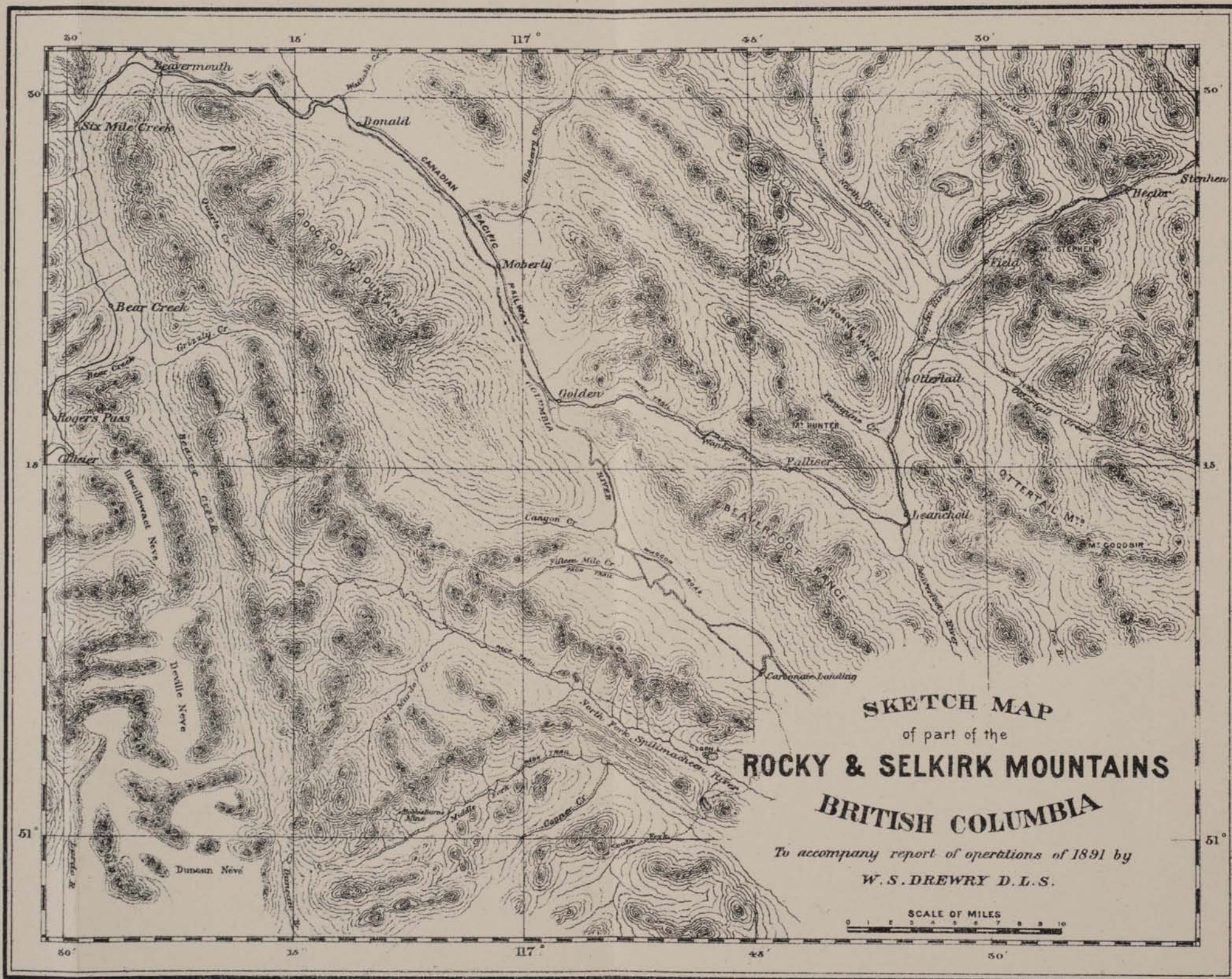
*Solutions of some Problems in Practical Geodesy.*

	PAGE
Given the latitude and longitude of a point and distance and azimuth to another point, to find the latitude and longitude of the latter and the reverse azimuth :—	
Spherical solution (for short distances).....	120
Correction for spheroidal figure .....	121
More accurate formulæ for long distances .....	121
Formulæ in terms of rectangular co-ordinates.....	122
Given the latitudes and longitudes of two points, to find the length and direction of their joining line.....	122
Knowing the latitudes and azimuths of one point from another, to find the distance.....	123
Given the latitude of one point, the azimuth from this to another, and the difference of longitude, to find the distance :—	
Trigonometrical levelling .....	124
To find the elevation of one station above another by observation of the angle of elevation or depression.....	124

## APPENDIX.

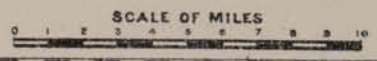
Tables.....	125
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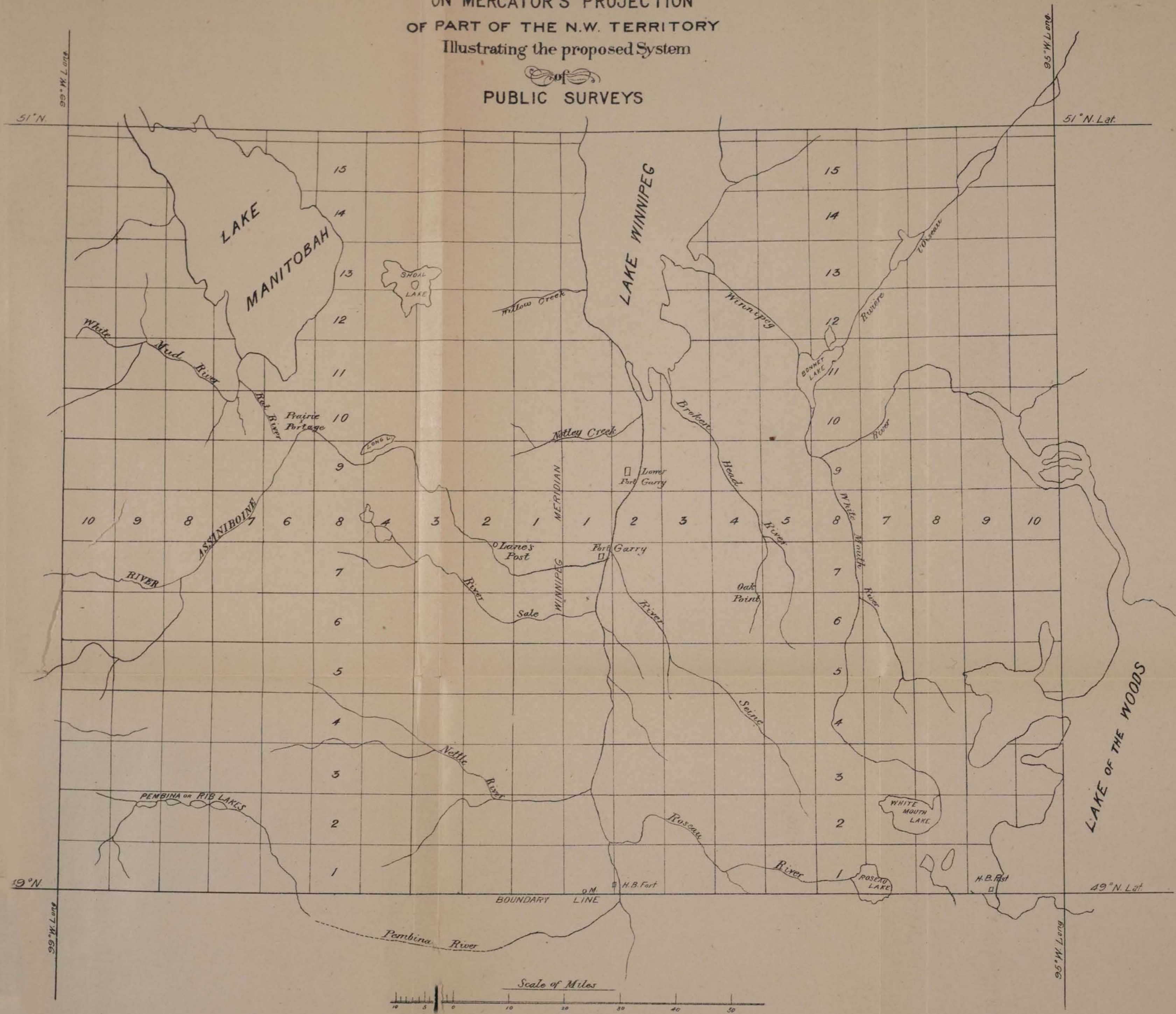
SKETCH MAP  
of part of the  
**ROCKY & SELKIRK MOUNTAINS**  
**BRITISH COLUMBIA**

To accompany report of operations of 1891 by  
**W.S. DREWRY D.L.S.**



**M A P**  
 ON MERCATOR'S PROJECTION  
 OF PART OF THE N.W. TERRITORY  
 Illustrating the proposed System

of  
**PUBLIC SURVEYS**





**PLAN  
OF  
TOWNSHIP**  
IN  
PROPOSED SYSTEM OF PUBLIC SURVEYS  
RED RIVER TERRITORY.

57	58	59	60	61	62	63	64
56	55	54	53	52	51	50	49
41	42	43	44	45	46	47	48
40	39	38	37	36	35	34	33
25	26	27	28	29	30	31	32
24	23	22	21	20	19	18	17
9	10	11	12	13	14	15	16
8	7	6	5	4	3	2	1

97.65

97.65

97.65

97.65

North and South 733.20

97.65

97.65

97.65

97.65

*East and West 733.20*

*Note— The Township is divided into 64 squares of 800 acres each exclusive of allowance for Road, which is five per cent. This five per cent is added into the sections as laid out upon the ground.*

*The sections number consecutively commencing in S.E. and ending in N.E. corners of Township.*

*The area of the whole Township including five per cent for Road is 53760 acres.*

*Fort Garry, Aug. 28<sup>th</sup> 1869*

*(Sgd) J. S. Dennis*









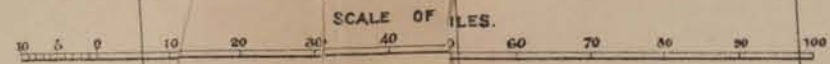
**MAP**  
 SHEWING  
**DOMINION LANDS**  
 surveyed or explored in the  
**PROVINCE OF MANITOBA,**  
 AND  
**NORTH WEST TERRITORY.**  
 Also Lands that it is desirable  
 to Survey in the Season of  
 1873.



**REFERENCE.**

- Townships Surveyed.
- Outline of Territory in which Indian titles has been extinguished.
- Approximate route of Canadian Pacific Ry. from Map accompanying Report of Chief Engineer.

UNITED STATES





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SECTION I.

A SHORT HISTORY OF THE SURVEYS PERFORMED

UNDER THE

DOMINION LANDS SYSTEM

1869 TO 1889

BY

J. S. DENNIS, D.T.S., Chief Inspector of Surveys.

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## SECTION I.

### A SHORT HISTORY OF THE SURVEYS MADE UNDER THE DOMINION LANDS SYSTEM 1869 TO 1889.

#### NARRATIVE.

The history of the surveys performed under the Dominion Lands System begins in the year 1869, shortly after the territory of Rupert's Land was acquired by the Dominion of Canada by purchase of the rights of the Hudson's Bay Company. Previous to that date, the only surveys, other than explorations, which had been effected in the territory purchased, covered a narrow belt of lots fronting on the Red and Assiniboine Rivers, and extending a short distance up and down these streams from their junction at Fort Garry. These surveys had been performed by Messrs. Sabine and Goulet, under instructions from the Hudson's Bay Company, with the object of defining the boundaries of holdings granted by that company to settlers living along these rivers.

As it was thought that a large portion of the newly acquired territory was good agricultural land, well adapted for successful farming operations, and it being expected that a large influx of immigrants would follow the transfer of the country to the Dominion, it was realized that one of the first duties of the Government was to devise and adopt a comprehensive scheme or system upon which to conduct the surveys of the country, and to proceed with the survey of such portions as were likely to be required for immediate settlement. To the Department of Public Works was relegated this important duty, and on the 10th July, 1869, instructions were issued by the Honourable the Minister of Public Works to Lieut.-Col. J. S. Dennis, Provincial Land Surveyor, instructing him to proceed to the Red River district to examine the country in the vicinity of Fort Garry, and to suggest a scheme or system upon which to base the surveys which were to be undertaken. He was accredited to the Crown Lands Departments both in Canada and the United States, with the object of procuring all the information and advice possible to aid him in drawing up the scheme or system for adoption by the Government.

Arriving at Fort Garry in August of that year, the country bordering the Red and Assiniboine Rivers and vicinity was examined, and after giving due weight to the information received from those competent to advise on the subject, a system for the survey of the country first into townships and then into farms was drawn up, and, with illustrating sketches, was forwarded to the Government under date the 28th of August, 1869. The proposed system was approved, and was brought into force by an Order in Council dated the 23rd of September, 1869, the Order in Council being based upon a memorandum from the Hon. Wm. McDougall, the then Minister of Public Works, who forwarded the proposed system and recommended its adoption.

The system adopted contained many points of difference from that now in force, and being of interest from an historical standpoint, it is here given *in extenso* :—

#### “PROPOSED METHOD FOR THE SURVEY OF THE PUBLIC LANDS IN THE NORTH-WEST TERRITORIES.

- “1. The system to be rectangular; all townships to be east and west or north and south.
- “2. The townships to number northerly from the 49th parallel of latitude and the ranges of townships to number east and west from a given meridian, this meridian to be drawn from the 49th parallel at a point say ten miles west of Pembina, and to be called the Winnipeg Meridian.
- “3. The townships to consist of 64 squares of 800 acres each, and to contain, in addition, 40 acres, or five per cent in area in each section, as an allowance for public highways.
- “4. The townships on the Red and Assiniboine Rivers where the same had ranges of farm lots laid out by the Hudson Bay Company, to be surveyed, the broken sections abutting against the rear limits of such ranges, so as to leave the same intact as independent grants.”

In submitting the above system, it was represented as being well adapted to the country to be surveyed. In devising the system, the views of those well versed in surveying operations, both in Canada and the United States, were made use of, and the following facts were offered in support of the scheme proposed :—

In comparing it with the American system then in force in most of the western states and territories, it was noted that in the latter there was no provision made for public roads, the area required for this purpose being subsequently taken by expropriation from out of the net area acquired by the settlers.

It was also suggested that the townships in the American system were unnecessarily small, and it was pointed out that in an open or prairie country the facilities for communication are greatly in excess of those in a broken or wooded country, and the larger townships were advocated in consequence of the economy which would result in the administration of municipal affairs.

The numbering of the townships north from the international boundary line and the numbering of the ranges east and west from a principal meridian, was recommended on account of its simplicity and the facility which it afforded for easy description in disposing of the Crown lands.

In the interval between the date of sending the proposed system and the receipt of further instructions as to its adoption or otherwise by the Government, it was decided to carry on the survey of the Winnipeg or Principal Meridian referred to in the scheme submitted. In doing this, an approval of the scheme was anticipated which might not have been obtained, but no doubt it was realized that any scheme adopted would, in its main features, resemble the one proposed, and would authorize the survey of the country into rectangular townships.

The line which it was proposed to run would serve as a base or initial meridian for any system decided upon, and in consequence of the absence of surveys of any kind from which a survey under a defined system could be begun, some line had to be adopted and surveyed as a starting point.

In the absence of information on the subject, it is impossible to say why the particular location in which the Winnipeg Meridian was run was adopted, but no doubt, judging from the information which we now have regarding the country traversed by this meridian, it was so located as to avoid the belt of timber along the Red River, and at the same time not too far west of the river to be readily available for the dependent surveys which it was proposed to effect in the vicinity of Fort Garry. It would seem that the intention was, pending the receipt of instructions regarding the adoption of the system proposed, to survey and mark the Winnipeg Meridian from the boundary line as far north as Township 11 in the proposed system, and then to project the line between Townships 6 and 7 easterly, and to subdivide a small tract in the vicinity of Oak Point. This was done, and it may be referred to as the first survey performed under authority of the Dominion Government in the territory of Rupert's Land.

In the fall of 1869, the outbreak known as the Red River troubles occurred, and this put an end to the surveys for the time being.

During the year 1870, nothing in the way of surveys was undertaken, but the subject of the future surveys, and the system to be followed, received considerable attention, and towards the end of the year steps were taken to amend the system authorized by the Order in Council of September, 1869. The Government was no doubt largely influenced in the decision to alter the system adopted, by the views of the Hon. (now Sir) Adams Archibald, the Lieutenant Governor of the newly created Province of Manitoba. The views of the Lieutenant Governor were very fully set forth in a despatch to the Secretary of State, under date the 20th September, 1870. By permission, the following notes taken from this despatch are here given in explanation of the very material change which was shortly to be made in the system authorized.

It was pointed out by the Lieutenant Governor that, while the general principle of the survey of the country into rectangular townships was a good one, at the same time he considered the townships too large; it was also noted that for a very long

time the American Government had been carrying on their land surveys under a system which provided for townships six miles square and containing 36 sections of 640 acres each, and that these sections were again subdivided into quarter sections of 160 acres each. Attention was drawn to the fact that many states of the Union had been laid out and peopled under this system, and, further, it was urged that, as the State of Minnesota and the Territory of Dakota, which would be surveyed under this system, adjoined our territories, and the two systems would be continuous, there were strong reasons for making our system somewhat analogous to theirs. Again, the American system being known all over the world to the emigrant classes, and a lot of 160 acres being the acknowledged extent of an emigrant's requirements for farm purposes, any change from that system, it was claimed, would act disadvantageously to our country. In reference to the 5 per cent of the acreage of each lot set aside for roads under the system authorized, the Lieutenant Governor urged that this system would act unfairly, for while one man's farm might be badly cut up by a road, his neighbour, subject nominally to the same charges, might escape altogether, and he therefore recommended a fixed allowance for roads as being the fairest method of providing for public highways.

In January, 1871, Col. Dennis submitted a memorandum in reference to the proposed change in the system in force; he recommended that "the system of survey be altered, retaining the rectangular principle, but making the townships six miles square, with road allowance on all section and township lines of 1.50 chains wide." This memorandum contained some additional recommendations regarding the boundaries of the newly constituted Province of Manitoba, and in reference to the disposal of certain lands within that province, but these latter recommendations had no bearing on the survey proper.

On the 7th of March, 1871, Col. Dennis was appointed Surveyor General of Dominion Lands, and during the same month the control and administration of the Dominion Lands was transferred to the Department of the Secretary of State, and a branch of that department called the "Dominion Lands Branch," was created.

We now come to what may be termed the starting point of the great work of surveying the vast country which had been acquired by the Dominion, and since this date the work has gone steadily on each year. The first important point requiring consideration and settlement, was the question of the proposed change in the system; the recommendations of the Lieutenant Governor and Col. Dennis seem to have met with favourable consideration, for we find that in April, 1871, on the recommendation of the Hon. the Secretary of State, an Order in Council was passed, bringing the new system into force, and on the 1st of May, of the same year, a manual of surveys was issued by the Surveyor General, explanatory of the system which had been adopted, and for the guidance of the deputy surveyors, as they were then called, who were to be employed in surveying Dominion Lands. This manual remained in force for some years, and as under its provisions a large portion of the country was surveyed, and as it was the basis for the new or amended manuals which have since been issued, its main features will be briefly referred to; it provided:—

"(1.) The public lands in Manitoba and the North-West Territories are to be laid off in rectangular townships, containing thirty-six sections of one mile square in each, together with road allowances between all townships and sections, of one chain and fifty links in width.

"(2.) The townships, therefore, will, subject to deficiency or surplus from converging or diverging meridians, as the case may be, measure on each side from centre to centre of the road allowances bounding the same, four hundred and eighty-nine chains.

"(3.) The townships will number in regular order northerly from the international boundary, or forty-ninth parallel of latitude, and will lie in ranges, which will be numbered, in Manitoba, east and west from a certain principal meridian, run in the year 1869 and styled the 'Winnipeg Meridian,' which starts from the said forty-ninth parallel at a point ten miles or thereabouts, westerly from Pembina.

"(4.) The said forty-ninth parallel or international boundary is the first base, or that for townships one and two; the second base will be between townships four and five; the third between townships eight and nine; the fourth between townships twelve and thirteen; the fifth between townships sixteen and seventeen, and so on northerly in regular succession.

"(5.) The correction lines, or those upon which will be allowed the 'jog' resulting from want of parallelism of meridians, will be as follows, that is to say: on the line between townships two and



three, on that between six and seven, on that between ten and eleven; and so on. In other words, they will be those east and west township lines which are equi-distant from the bases.

"(6.) In the survey of any and every township, the deficiency or surplus resulting from convergence or divergence of meridians is to be set out and allowed in the range of quarter sections adjoining the west boundary, and the north and south errors in closing on the correction lines from north and south is to be allowed in the ranges of quarter sections adjoining, and north or south respectively of the said correction lines.

"(7.) The dimensions and area of the irregular quarter sections resulting as above, whether the same shall be deficient or in excess, must in all cases be returned by the surveyor at their actual measurements and contents.

"(8.) Preliminary to the subdivision into townships and sections of any given portion of country proposed to be laid out for settlement, the same will be laid out into blocks of four townships each, by projecting the base and correction lines, and north and south lines (to be designated 'meridian exteriors.')

"(9.) On these lines, at the time of such survey, all township, section and quarter section corners are to be marked, which corners are to govern respectively in the subsequent subdivision of the block.

"(10.) Only a single row of posts or monuments to indicate the corners of townships or sections (except as hereinafter provided) will be placed on any survey line. These posts or monuments, as an invariable rule (with the exception above referred to) are to be placed in the west limit of the road allowance on north and south lines, and in the south limit of the road allowances on east and west lines, and in all cases will fix and govern the position of the boundary corners between the two adjoining townships, sections or quarter sections on the opposite side of the road allowance.

"(11.) The exception above referred to is in the case of the township, section and quarter section corners on the correction lines, which in all cases will be planted and marked independently for the townships on either side. Those for townships north of the line in the north limit of the road allowance, and those for townships south, in the south limit."

The manual contained detailed instructions for the guidance of deputy surveyors engaged in surveying Dominion Lands under the above system, and also much general information regarding the surveys.

The system and the manner of effecting the surveys under it are so exhaustively treated of further on in this report that it is not necessary to speak further on this point here.

With the issue of the manual the survey of Dominion Lands was actively begun, and it is proposed, in the following pages to give a short account of their prosecution since that date.

For convenience of reference, and as the most ready method of writing of the surveys since performed, each season's surveys are treated of by themselves, beginning with those of the season of 1869.

#### SEASON OF 1869.

The inception of the surveys during the early part of this year has already been referred to. The report regarding the system which it was proposed to follow in carrying them on was forwarded from Fort Garry about the end of August, and immediately afterwards the actual field work was begun at Pembina by a series of observations for latitude to determine the position of the 49th parallel.

These observations placed the boundary between the United States and the Territories about 200 feet further north than that determined some years previously by General Pope of the United States army.

Beginning from the point established by these observations, the 49th parallel was produced for a distance of ten miles west of the Red River and from there the survey of the Winnipeg or Principal Meridian was begun.

In establishing this portion of the 49th parallel it was found that the line surveyed from General Pope's post by American surveyors crossed the line run from the post established by Colonel Dennis, and that posts and mounds placed to mark sections in townships south of the boundary line stood on the north side of the latter line.

This fact was reported to the Government and their attention was drawn to the necessity for a joint commission to settle the position of the international boundary west of the Lake of the Woods.

By 28th September the Principal Meridian was completed up to the Assiniboine River, being marked with posts and mounds in accordance with the system submit-

ted. From this point the further production of the meridian was assigned to M. Hart, P.L.S., and a second party under the charge of Major Webb, P.L.S., was organized and started on the survey of the base line between Townships 6 and 7 from the meridian easterly to Oak Point.

Colonel Dennis then returned to Winnipeg and commenced the compilation of a map of that portion of the country between the Lake of the Woods and Fort Ellice and from the boundary line north for one hundred and twenty-five miles. It was proposed to show on this map the projected townships in accordance with the system approved, and the manner in which the convergence of meridians, &c., was to be allowed for. The work on this map, when nearly completed, had to be abandoned on the 30th of October owing to the political troubles which then broke out.

Mr. Hart had continued the Principal Meridian up to Township 11 and then turned west on the base between Townships 10 and 11 with the object of projecting it west as far as Portage la Prairie. However, after running this line a short distance west, he struck Shoal Lake.

He then returned to the meridian and, beginning at the line between Townships 9 and 10, produced it west across Range 1, then turning north he produced the meridian between Ranges 1 and 2 to Shoal Lake, and returning to the base he continued its production west, and had finished the greater part of Range 2 when the outbreak occurred.

The party was then withdrawn from this point and spent the remainder of the season in running the exterior lines of the townships lying between the Principal Meridian and the Red River, north of Township 8.

Major Webb had begun the production of the base line between Townships 6 and 7 from the Principal Meridian east, and had nearly reached the Red River when he was stopped on the 11th of October by a party of the discontented half-breeds; his party was, therefore, withdrawn and spent the remainder of the season in running the exterior township lines north of the Assiniboine River and east of the Principal Meridian, and in the survey of the lots of the settlement belt along the Assiniboine.

The field work was finally stopped on the 1st of December, the surveyors and several of the members of their parties being enrolled among those who were organized as a military force with which an attempt was to be made to restore order in the country.

On the 11th of December this force was disbanded, and an effort was made to continue the surveys; this, however, failed, and nothing further was done.

The following is from Colonel Dennis's report regarding the work accomplished up to the date at which surveys were stopped:—

- “ Meridian lines and east and west township exteriors drawn on the ground and marked by posts and mounds at quarter section . . . 182 miles.
- “ Survey of settled farms on west side of Red River and below parish of St. John's, and up the Assiniboine on north side between Fort Garry and Silver Heights (or a little beyond the latter, near Sturgeon Creek) ascertaining the present actual boundaries and position of buildings, situation of roads, and traverse of river in front . . . . . 20,000 acres.

“ OFFICE WORK.

- “ (1.) Map on large scale, embracing country from Lake of the Woods to Fort Ellice, and from 49th parallel north for 125 miles.
- “ (2.) Prepared one plan on scale of 60 chains to an inch, showing the Hudson's Bay Company's grants on Red and Assiniboine Rivers, as copied from their maps, and also showing where the township exteriors, according to the system decided upon, will intersect the same.
- “ (3.) One finished township plan on scale of 40 chains to an inch.
- “ (4.) Two finished tracings of Hudson's Bay maps, showing grants so far recorded.”

Considerable work was also done in connection with preparing copies of the Hudson's Bay Company's land register having reference to the lots granted along the Red and Assiniboine Rivers.

## SEASON OF 1870.

On the 20th of May of this year, the Act setting apart a portion of the territory of Rupert's Land as the Province of Manitoba was assented to, but, owing to the disturbed state of affairs in that province, nothing in the way of surveys was undertaken during this year.

## SEASON OF 1871.

The adoption of an amended system of surveys and the appointment of the Surveyor General in the early part of this year have already been referred to.

With the formation of the Dominion Lands Branch of the Department of the Secretary of State, and the issue of the Manual of Surveys, the survey into townships and sections of the immense territory was begun.

Instructions were issued to twenty-one deputy surveyors who were to be employed on the season's surveys; of these, fifteen were to be engaged in surveying block outlines and effecting subdivision surveys. The remaining six carried on surveys in the settlement belt along the Red and Assiniboine Rivers.

The number of surveyors employed, and the extensive field included in the surveys, rendered the appointment of an inspector necessary.

Mr. Lindsay Russell, who had visited the Red River country as far back as 1858-59, was offered this position, and in July became Inspector of Surveys. He had charge of the surveys in the field, and during the season visited many of the parties employed.

All the surveys during this season were performed under contract at so much a mile. The schedule of rates paid under these contracts was as follows:—

## SCHEDULE OF RATES.

Character of Survey.	1st Class.	2nd Class.	3rd Class.
	Open Prairie.	Poplar Woods.	Other woods—Heavy timber, windfall, or dense bottom scrub with vines or thick willow, hazel, etc.
	Per mile.	Per mile.	Per mile.
Block surveys .....	\$9 00	\$15 00	\$25 00
Subdivision surveys .....	7 00	11 00	18 00

The surveys during the season were much delayed, owing to extensive fires and the resulting smoke. Several of the parties were burnt out and lost everything, and in one or two cases the members had narrow escapes from the fire.

The Fenian "raid" into Manitoba, in the fall of this year, also retarded the work, but in spite of these drawbacks a very fair amount of work was done, as will be seen from the following extract from the report of the Inspector of Surveys:—

"The total amount of the season's work, reckoning it by mileage of line surveyed is to the nearest mile as follows:—

Block surveys .....	Miles. 1,207
Subdivision surveys .....	1,406
Settlement surveys, equivalent to above subdivision line .....	1,200

Total .....

This amount of line surveys into farm lots an area of 1,535,530 acres."

The work carried on by the surveyors in the settlement belt was of a somewhat tedious and unsatisfactory nature. Their survey was only of a preliminary character so as to provide information for the compilation of plans upon which were to be

arranged the exact boundary lines of individual occupancies, and these limits had then to be marked on the ground.

Owing to the scattered way in which the claimants of lots in the settlement belt had erected their dwellings and effected their improvements, the work of defining their holdings was necessarily slow.

The surveyors employed on these latter surveys were paid at the rate of \$13.60 per day, which covered all charges for pay and subsistence of the surveyor and his party.

#### SEASON OF 1872.

The surveys during this season showed considerable expansion, as compared with those of the previous year.

Forty-six surveyors, in addition to the Inspector, Mr. Lindsay Russell, and Messrs. Milner Hart and A. H. Whitcher, who had been appointed Assistant Inspectors, were employed.

The necessary working parties for this staff involved a force of about 400 men, with 100 horses and carts for transport service. This gave many of the newly-arriving immigrants remunerative employment, and afforded them an opportunity to acquire, in the course of the surveys, a knowledge of the country valuable to them, when deciding as to the locality in which they would settle.

To insure that these numerous survey parties should incur no loss of time through difficulty of obtaining sufficient and wholesome supplies, large quantities of provisions consisting of bacon, biscuit, dried fruit, compressed vegetables, &c., were procured and forwarded to Manitoba, and there furnished the surveyors at cost price. This, of course, entailed a considerable amount of labour on the part of those looking after the surveys, but it was hoped that the progress of business in Manitoba would soon reach such limits that sufficient supplies could be furnished by private enterprise at reasonable cost.

The surveyors employed this year were divided as follows :—Eight were engaged in running block outlines ; twenty-three carried on township subdivision surveys ; five were employed in the surveys of the settlement belt parishes, and five were engaged in making explorations at different points in advance of the surveys.

The reserves granted to the Hudson's Bay Company at certain of their posts under the deed of surrender required survey. Instructions were issued to Mr. W.S. Gore, P.L.S. (now Assistant Commissioner of Lands and Works of British Columbia), to carry out this work, and he was also instructed to collect all information possible in travelling from one post to the next. This work was expected to occupy Mr. Gore for two years.

The following is the number of miles of line surveyed during the season :—

	Miles.
Block lines .....	1,019·22
Subdivision lines .....	10,147·00
Settlement belt surveys .....	532·00
Total .....	<u>11,698·22</u>

The surveys during this season, as in 1871, were all performed by contract, at so much per mile, but toward the end of the season, the surveyors engaged on block work represented to the Inspector the difficulty of carrying on these surveys under contract, at previously stipulated prices per mile, and represented that the method of paying for the surveys, most likely to be fair, alike to the Government and to the surveyor employed, was that of daily pay and allowances.

Upon their representations the Inspector reported as follows :—

“ The contract system suited well the conditions of character of country and facilities for transport that existed at the outset of most of the block surveys, and in anticipation of which conditions the prices allowed were fixed ; but the country to be surveyed proved not to be nearly as uniform in character as was expected, much less of it than had been estimated was found to be open prairie.

Obstacles to progress, in the shape of extensive marshes, thick woods, windfalls, &c., occurred, presenting varying degrees of difficulty and delay, to arrange prices corresponding to the different shades of which would be impracticable. Some surveyors who were fortunate enough to fall in good country, realized fair remuneration from their contracts, but the majority would not, unless some consideration beyond the terms of their contract were allowed for special difficulties encountered. This might at first sight seem simple to remedy, by allowing higher rates per mile for lines run in certain kinds of country; but the difficulty of so doing justly by both parties to the contract, lay in the impossibility of estimating beforehand for an unknown tract of country, to what extent obstacles to survey existed, and precisely what increase of cost they entailed. Only by fixing a rate per mile, so high as to be more than work of average difficulty would be worth, could it be ensured to the surveyor that he would in all cases make his fair daily pay. An average price though fair to the surveyors as a body, might prove exceedingly unjust to the individual. The cases of the block and the subdivision surveyors are widely different. The former, besides being the pioneer of the latter, extend over distances in some cases reaching a hundred miles and more, with consequent vicissitudes in the survey of the line and transport of supplies, that the varying character of the country traversed would produce. For example, one surveyor in the course of his season's work had cut 30 miles of road through the woods, to enable his carts to follow him with his supplies. Another, not very remote from him, worked all summer on open plain, where his horses hardly ever required to deviate from the line he was running. Where in the matter of transport, delay had cost the first surveyor weeks of his whole party's pay and food, they had not cost the second an hour. The contract price to each of these was not the same, but it was difficult, until the work was done, and actual cost known, to assign a difference in price per mile run that would exactly meet the circumstances.

"Their case thus set forth by the block outline surveyors is fairly stated. I would add thereto, in favour of their being remunerated by daily pay and allowances, that under the contract system, adverse circumstances, such as bad weather, difficult country, &c., act as a pressure on the surveyor to slight his work in his endeavour to make up, by hurrying through it, for lost time. It sometimes occurs at governing points, when, by the rules laid down to him, the surveyor should before proceeding further, check his positions by astronomical observation, that he is kept, with his whole party idle, waiting days for the requisite clear weather. He is here, by the dead loss of his disbursements for pay and expenses of a large and costly party, and of his own time, tempted to disregard his instructions, to proceed with his line and to assume that it is correct, thus involving that very liability to error against which the rule was intended to guard. As the subdivision of a township is confined to a distance each way of six miles, and its character is by the previously made block survey, to a great extent known, the contract system can be successfully applied to subdivision surveys."

The representations of the surveyors employed, aided largely no doubt by the Inspector's report, seem to have had the desired result, for the rule was adopted that all future block and outline surveys were to be performed under daily pay and allowances, and that subdivision surveys only should be made under contract. This rule has remained in force ever since, and there is every reason to suppose that the work has been much more carefully performed than it would have been if effected under contract.

A map showing the surveys completed in Manitoba and the North-West Territories was issued with the Surveyor General's report of this year. It is introduced here, being of interest as the first map issued to show the results of the surveys of Dominion Lands, and also the first official map of the Province of Manitoba.

In April an Act was passed called the "Dominion Lands Act" in which the manner of administering the lands in Manitoba and the North-West Territories was dealt with, and the system of survey explained. The Act also provided for the formation of a Board of Examiners who were to examine candidates for admission to practice as deputy surveyors, and provided for the admission to practice of surveyors from the different provinces.

With the passing of this Act the persons employed in surveying Dominion Lands were given the distinctive title of deputy surveyor. This title has since been changed, and numerous alterations have been made in the law regarding the qualifications necessary to be admitted to practice.

In the autumn of this year a joint British and American Commission commenced the survey of the international boundary between the North-West Territories and the United States, from the north-west angle of the Lake of the Woods to the summit of the Rocky Mountains.

## SEASON OF 1873.

Thirty-four surveyors were employed during this season. They were divided as follows:—Four were engaged on block surveys, one in the survey of reserves for the Hudson's Bay Company, and twenty-nine in subdivision surveys.

The representations of the Inspector regarding the payment of block surveyors by the day instead of by contract having been favourably considered, we find that during this year all the surveyors, except those employed in effecting subdivision surveys, were paid by the day, and the system of payment, inaugurated at this time, has remained in force ever since.

In May the Bill creating the Department of the Interior was assented to, and on the 30th of June the management and control of Dominion Lands was transferred from the Department of the Secretary of State to the newly constituted Department of the Interior. The Geological Survey was also at this time attached to the Department of the Interior, which was also charged with the administration of Indian Affairs.

## SEASON OF 1874.

The ordinary surveys were on a somewhat more limited scale during this season than they had been during the two previous years.

In the work of block and subdivision surveys eighteen surveyors were employed; of these, two were engaged in block outlines, and the others in subdivision or settlement belt surveys.

The survey in detail of all the holdings in the several parishes fronting on the Red and Assiniboine Rivers was completed.

The decision arrived at in September, 1873, conceding the land covered by the hay and common privilege in the "outer two miles" to the owners of front lots in certain of the parishes fronting on the Red and Assiniboine Rivers, necessitated the survey of the "outer two miles" to correspond with the river front lots.

A force of surveyors was detailed for this work, under the direction of Mr. Whitcher, one of the inspectors of surveys, and the larger part of the field operations was completed before the close of the season.

The lands reserved to the Hudson's Bay Company, under the deed of surrender, at several posts in the Lac la Pluie district were surveyed by Mr. D.L.S. Miles.

During this season the first surveys of Indian reserves were undertaken. On this work six surveyors were engaged, and reserves were laid out at several points in Manitoba and the North-West Territories.

## SPECIAL SURVEY.

In February an Order in Council was passed authorizing a special survey of bases and meridians through the North-West Territories, and extending to Peace River. This was the most important surveying work undertaken by the Government since the acquisition of the territory, and a short description of its objects, and of the work effected during the season, will be of interest.

The objects of this survey were:—

1. To establish a practical ground-work for the extension of township surveys at any point along the line of the proposed route for the Canadian Pacific Railway, thus tending by systematic settlement to the development of the country.

2. To contribute towards the construction of the railway by facilitating the location of the land grant along the line.

3. To obtain a knowledge of the character and resources in the way of soil, timber and minerals, as also of the flora and fauna, of the territories covered by the survey.

To the above may be added the possibility that data of value would be obtained for estimating the length of a degree of the meridian in the region covered. This will be understood when it is said that the work was intended to extend over some twelve degrees of latitude, and that all possible precision was to be aimed at in carrying on the work.

With this view, in addition to laying down the actual lines of the meridians and bases throughout the country, which was to be performed by a separate party under the supervision of the chief of the special survey, the position of these bases and meridians was to be definitely checked from time to time by means of a continuous triangulation to be carried on simultaneously over the most favourable belt of country that could be found for that purpose.

This triangulation was to be extended northerly from the 49th parallel, as fixed by the International Boundary Commission, and westerly from the Principal Meridian, in Manitoba, to the Mackenzie River near the outlet of Lake Athabasca.

This important survey was placed in charge of Lindsay Russell, Esq., Assistant Surveyor General, and early in the year a move towards initiating the work was made by ordering some of the instruments needed. Owing however to delay in receiving these the inception of the field work was somewhat delayed; however work was begun towards the end of July, and the following extract from the report of the Assistant Surveyor General upon the work accomplished this season will serve to show the beginning made in this important work :—

“ Towards the end of July a portion of our instrumental outfit arrived at Ottawa, sufficient to enable me to instruct Mr. A. L. Russell, D.L.S., my first assistant, to commence the field work by connecting, by careful survey, the iron boundary at the intersection of the Principal or Winnipeg Meridian and the fourth base line, with the astronomic station at Pembina, whose longitude had been telegraphically determined.

“ This he did in the following manner: Starting from the fourth base he made a check survey of the Winnipeg Meridian, with careful double chaining and repeated azimuthal observations throughout, down to the 49th parallel or international boundary.

“ Thence he measured along that parallel eastward, by thrice chaining each mile, the distance between the Winnipeg Meridian and the astronomic station above-mentioned. Careful comparison of the steel chains used by him, with standard, was made at the end of every mile.

“ On the 29th August, I left Ottawa with the remainder of the party, and sufficient instrumental outfit to do the principal part of the work of triangulation westward from Mr. A. L. Russell's point, the iron boundary before-mentioned.

“ We were delayed on our journey to Manitoba by the necessity of going down the Red River by steamer, on account of our instruments, chronometers, base apparatus, &c., that could not go by stage waggons.

“ These steamers are governed by circumstances as to time of sailing, and have not stated days of departure. We unfortunately arrived at such time as to lose altogether four days waiting for a steamer. This, with a slow passage down at low water, prevented our fairly getting to work at our base of triangulation until 18th September.

“ A few days after this Mr. A. L. Russell and his division of the party joined me. Having completed the part of the survey already described, I instructed him to proceed westward to the vicinity of the White Mud River, there to carry on a section of the triangulation.

“ The leveller, Mr. H. B. Smith, C.E., had hitherto—besides making some useful connections of the water levels below the rapids at St. Andrews on the Red River, the mouth of the Assiniboine, and the Red River at Pembina—been engaged in getting a profile along the lines surveyed by Mr. A. L. Russell.

“ Considering that the country, over which our triangulation would for the rest of the current season extend, had been fully examined and levelled by the engineers of the Pacific Railway survey, I judged it desirable to turn our levelling party to more profitable account than that of verifying facts already well obtained. I therefore instructed him, instead of carrying his line of levels westward, in our track, to take them up the course of the River Assiniboine, and at the same time to make such observations of the nature of the stream, and the obstructions to its navigation, as would enable him to report upon its value for that purpose, and approximately the ameliorations it might require.

“ I also directed him to make an examination, and obtain a profile between the River Assiniboine and the south end of Lake Manitoba, by the way of Long Lake, sounding the latter, and thence following the lowest intervening ground he could find, with a view to possible future connection by canal of the navigation of Lake Manitoba with that of the Assiniboine.

“ Mr. Hermon, P.L.S., had, a previous season, reported to me that during the course of a survey in the vicinity he had seen the possibility of such a connection from the existence of ground of a low level throughout, between Long Lake and Lake Manitoba, exceedingly favourable to a canalling project.

“ Mr. Hermon's judgment proved quite correct. Mr. Smith found a practicable line for the connection of navigation, and the relative level of the waters to be such as to admit of turning those of Lake Manitoba into the Assiniboine, to regulate its depth, and for the creation of water power, both objects of great importance in the locality concerned.

“ Returning to the main occupation of the survey—the carrying of a series of triangles from the Winnipeg Meridian westward—this was continued by both sections of the party until winter had set in and the weather became sufficiently severe to interfere with accurate observation of the angles.

"On the 10th November, the work immediately under my own charge had reached Mr. A. L. Russell's section, and closed with it. I then moved the whole party down to the vicinity of Sturgeon Creek, and, availing myself of the finer days, ran the triangulation from the Winnipeg Meridian into Winnipeg, tying in its geographical position by stations on Fort Garry, St. John's Cathedral, and the iron township boundary in rear of the town.

"This closed our work of this nature for the winter, making the total distance covered by the survey, from the astronomic station at Pembina to the western termination of A. L. Russell's triangulation, and including that between the Meridian and Fort Garry, a hundred and sixty miles.

"Having received, on my return to Winnipeg, your telegraphic instructions that the force of the party was to be employed during winter, under direction of Mr. A. L. Russell, in laying out meridians and bases for townships east of the Lake of the Woods and along Rainy River, I proceeded to make the necessary arrangements for placing supplies in depots in these localities.

"This was effected with some difficulty; no one was passing over the Lake of the Woods road east of its first thirty miles; therefore the road had to be broken along it, and over the ice on the Lake of the Woods, the rest of the 150 miles that supplies were drawn. The absence of any forage the entire way was also unfavourable.

"Food for the party for the winter having been thus placed in the centre of their work, and having provided them with an outfit of camp equipage suited for the season—snow-shoes, dogs and dog sleds for transport—I despatched them on the 8th December to the Lake of the Woods, starting myself the same day on my return to Ottawa.

"Having thus given an outline of the manner in which the party was occupied in the field, I shall proceed to give some details of the method of survey, the processes and instruments employed.

"The 49th parallel of latitude, as established by the International Boundary Commission, being the datum line across the continent to which our system of bases and meridians has to be referred throughout, it was necessary that the present survey should be connected with some fixed point upon it.

"It was also requisite for the accurate laying down of the geographic position of important places and features of the country to be traversed, that the absolute longitude of the commencement of the survey should be obtained.

"For the purposes of the British section of the International Boundary Commission, and those of the Dominion Lands Surveys, in 1872, Capt. Anderson, R.E., Chief Astronomer to the British Commission, at Pembina, in co-operation with myself at Chicago, determined, by the electro-telegraphic method, the difference of longitude between the observatory at Chicago, and his astronomic station at the former place. This, with the known relative position of Chicago and Greenwich, will give, by reference to the Pembina station, the necessary connection of all our future surveys with Greenwich.

"Hence the adoption of the astronomic station on the 49th parallel at Pembina as the point of departure of the present survey.

"The accuracy of position, relatively to the 49th parallel, of our bases, can always be checked by carefully observed astronomical latitudes, therefore the actual measurement on meridians, northing and southing, does not require to be made with as minute precision as that along the bases in the east and west direction, on which no direct astronomic observation gives a check of any value.

"Until telegraph lines are constructed, throughout the country traversed, the accuracy of differences of longitude will depend solely on that of survey measurement.

"For this reason it was necessary to employ the method of triangulation in carrying the survey westward. On the check survey of the Winnipeg Meridian careful double chaining was deemed sufficient. The interval of ten miles between the meridian and Pembina station was not triangulated, the circumstances being so favourable to accurate chaining, and the distance so short, that thrice measurement by that means was considered sufficiently accurate; the probable error being in a small ratio to that of the absolute longitude of the point of reference.

"I have reason to believe, from the close inter-agreement of the different measures of each mile, that the longitude of the Winnipeg Meridian from the Pembina astronomic station is determined to a couple of feet, or as closely as measurement with the ordinary chain will admit. The evenness of ground—perfectly level prairie—was in the utmost degree favourable to accuracy.

"As the computation of the triangles and of the astronomic observations is yet in progress, I am unable to show for the whole of the work, by closing results, the comparative accuracy of the triangulation, but the following differences were obtained for the portion calculated.

"From the initial base, by a chain of twenty-eight triangles, whose sides would average about two miles, to the first base of verification, the length of the latter by calculation differed from that obtained by direct measurement an inch and a half, or as the base of verification was about 69 chains long, a closing error of about  $\frac{1}{33333}$ .

"The double measures of these bases with our base apparatus had compared as follows:—difference of first and second measurement of initial base, three-tenths of an inch.

"The azimuth of the base of verification mentioned, deduced from the initial base through one side of the above chain of triangles, differed from that obtained by the other side four seconds of arc. In the next series, of twenty-two triangles, the azimuths similarly carried forward from the beginning to a common side at the end of the chain differed a second and a quarter.

"In measuring horizontal angles on the prairies, the cause of error most beyond control, is that of unsteadiness of image produced by irregular refraction. This occurs to so great an extent as to produce frequently an apparent lateral displacement, of the station under observation, of many seconds.



" In such cases there is no other resource than to wait for more favourable atmospheric conditions. Hence a good deal of lost time in observing. For two or three weeks in the fall our progress was similarly hindered by large prairie fires in our vicinity, their smoke making it impossible to see any distance.

" It is a question whether the difficulty of lateral refraction might not be considerably lessened by observing from the top of a framed staging at a height of 20 or 30 feet from the ground. Some experiments shall be made at the outset of next season's work, to ascertain whether the advantage in this direction, and in the increased range of sight to be gained on prairie by very moderate elevation of the observer, would warrant the cost of transport of portable framework for the purpose.

" The station signals used are similar to jointed flagstaves, and are capped by bright tin cones, with brush below; they are stayed by three rope guys, an iron pin in the foot of the mast being stepped into the station mark, an oak post with central hole in head driven down till even with surface of the ground.

" The angles are taken with 10-inch theodolites, by which five seconds can be read. To obtain greater precision, by taking the mean of many observations, a number of series of direction readings is taken at each station.

" A series consists of the successive readings, from that on the station adopted as zero, round on each station concerned, through 360 degrees back to the zero station. The difference between the first and the last direction reading on this station being the closing error of that series.

" To eliminate the instrumental errors of collimation, inclination of horizontal to vertical axis, and to decrease those arising from errors in graduation and from play in clamps and tangent screws, these series are arranged as follows, premising by way of explanation:—

" That 'face right' and 'face left' are positions of the verniers and telescope axis differing 180 degrees, or a semi-revolution in azimuth.

" That 'forward motion' indicates that the instrument is revolved in azimuth with a motion from left to right, in the same direction as the hands of a watch.

" Backward motion the reverse.

" That for both motions, in bringing the observed object in coincidence with telescope wires, the tangent screw shall always be turned so that the motion shall continue onward in same direction.

" That positions 1, 2, 3 mean respectively, that the position of the fixed or graduated limb of the instrument is so shifted for each that if A be the line of graduation directed to the zero station in position 1, then will the lines A + 120, A + 240, come successively opposite that station in positions 2 and 3.

" The arrangement is then —

" 1st series, position 1, face right, forward motion.

" 2nd do do do backward do

" 3rd do do face left forward do

" 4th do do do backward do

" And so on for each of the two other positions, giving twelve series in all, and for each position eight vernier readings; therefore, 24 for any one direction, and 48 for any angle.

" The azimuths of the sides of the triangles are checked at intervals by referring them to circumpolar stars, the method of observation being similar to that already stated for horizontal angles of the triangulation with the addition of noting level readings and chronometer times.

" A reference mark is used, consisting of a box about 9 inches cube, firmly mounted on a stand, and placed at such a distance as to be seen clearly through the telescope without altering its stellar focus. The fronting face of the box has in it a vertical slit of about a quarter of an inch opening; inside is a lamp, and between it and the slit is a ground or white painted glass pane, preventing irradiation and producing sharp definition of the edges of the slit to ensure precision when bisecting it with the telescope wire.

" The scheme for azimuthal observations stands thus :

#### " POSITION 1.

##### " FACE RIGHT.

" Forward motion, ——— mark, ———, level reading, circle reading.

" " " " star, chronometer time, " " "

" Backward motion, ——— mark, ———, " " "

" " " " " " " " " " "

##### " FACE LEFT.

" Forward motion, ——— mark, ———, level reading, circle reading.

" " " " star, chronometer time, " " "

" Backward motion, ——— mark, ———, " " "

" " " " " " " " " " "

" And so on for each of the other two positions.

" When taking the measures of a horizontal angle, the result of reversing the instrument, the inclination of its vertical axis being considered constant, is to reduce the angle to its projection on a plane passing through the instrument at right angles to its vertical axis of rotation, and there is a further correction to reduce it to its projection on the plane of the horizon. This is obtained by level readings.

" In prairie country the stations to be observed are usually so nearly on the same level that, with ordinary care in keeping the rotation axis of the instrument vertical, this correction is inappreciable. The level readings require to be noted only when stations differ much in elevation, and that there is risk of change of inclination, or when one of the objects is a star, as in the scheme for azimuthal observations above.

" These azimuths are also checked by comparison with a meridian mark established by observing transits of circumpolar and southern stars.

" To obtain the latitude of astronomic stations the following methods are employed :

" 1st. Zenith distances of Polaris and other standard polar stars are observed in reversed positions of the altazimuth, with the chronometer times of observation ; also, an equal number of measures of circum-meridian zenith distances of standard southern stars, the mean of whose altitudes corresponds to that of the polar stars.

" 2nd. The latitude is deduced from the observed interval of time between the east and west transits of stars across the prime vertical.

" 3rd. Direct measurement, by means of a micrometer screw, of the differences of the meridian zenith distance of pairs of stars north and south of the zenith, Talcott's method.

" The special construction of the altazimuth used admitting of the equally careful application of all these methods, they become in a measure, from the difference of principle or procedure involved in each, independent checks on one another.

" Method No. 3 has the advantages over the others of rapidity of observation, simplicity of construction of instrument it requires, and freedom from the errors involved in graduation, or change of form of graduated circles ; but, in the present condition of star catalogues, has the drawback, that to comply with the restriction, of nearly equal altitudes of the north and south star in each pair—the cases of such coincidence occurring rarely among the fewer standard (best determined) stars, it is necessary to have recourse to the more numerous class, those whose positions are less accurately known.

" In the first method, by increasing the number of points at which the measuring circle is read, *i.e.*, the number of reading microscopes—and by being careful to select stars so that the averages of altitudes north and south shall not differ widely, the errors arising from undetected irregularities of graduation and from change of form can be rendered inappreciable. In this method, the condition of equality of altitude north and south is so modified that there is no difficulty in finding for any latitude suitable standard stars.

" The second method is of the three the least convenient of application in the field ; but is specially valuable as a check on either of the other two, on account of the, to some extent, independent data from which by it the latitude is deduced. It can be more successfully carried out in an observatory, where the stability of the instrument used can be better insured, where the small changes from fixity of position occur more slowly and are more uniformly proportionate to the intervals of time during which they take place. Satisfactory results can, however, be obtained in the field, with a properly constructed instrument, carefully placed and used in such wise as not to depend for too long an interval, without reference to stars, on its stability in azimuth.

" Common to all three methods, and entering directly in the results of all to its full amount, is any error arising from irregularity of action of levels, usually caused by alteration of curvature of the tubes due to their exposure, in course of observations, to changes of temperature. Attention to certain points in mounting them, and enveloping them, as much as their use will permit in non-conducting material, tend to prevent those rapid changes which have worst effect.

" For the first method, the following is the process of observation :—

" The altazimuth having been carefully adjusted and levelled, so that the outstanding instrumental deviations shall enter as exceedingly small factors, the telescope and vertical circle are firmly clamped at, approximately, the altitude of the polar star to be observed.

" The azimuthal motion is also clamped, and the star having been brought into a suitable position in the telescope field, the four circle microscopes are read and noted, also the three levels of the microscope bearer. A series of several measures is then made between the star and the middle fixed horizontal wire of the diaphragm, by means of the movable wire of the telescope micrometer, the chronometer time being noted with each measure ; then the readings of circle levels and microscopes are repeated in order the reverse of that at the first readings.

" The mean between the readings before observing and those last taken is the adopted circle reading, to which is referred each one of the intervening series of micrometric measures of the increments of zenith distance.

" The instrument is then reversed, and the same course pursued, with the difference that a double set of micrometric measures and three readings of microscopes and levels are made.

" Then the instrument is returned to original position and first series repeated, giving finally an equal number of zenith distances in the two positions—face right and face left.

" For the accurate interpolation of the changes of refraction throughout the observations, the thermometric temperature and height of barometer are read at beginning and end of each position. To eliminate the effect of errors in the adopted declinations or right ascensions of the circumpolar stars, the observations on them are repeated when they are at diametrically opposed points of their diurnal path.

" The southern stars are observed in a similar manner, near and on the meridian, in reversed positions of the instrument, with the slight difference that—the rapidity of their motion requiring change of azimuth of the telescope to keep them in its field of view during the series of micrometric

measures—it is necessary to read the levels at every measure to obviate the effect of any change of inclination that might be consequent on the movement in azimuth.

“The mean of the results, obtained by the foregoing method of observation of alternate northern and southern stars, gives a latitude free from the effects of flexure, or other constant known, or unknown, causes of error.

“For the application on this survey of the third or Talcott’s method—which is similar to the first in principle, but different in the process involved—an additional very sensitive level is connected directly with the telescope of the altazimuth, somewhat in the manner of the level attached to the zenith telescope, which is the instrument usually employed in this method.

“The following is the course of the observations and their record: The telescope having been clamped at the mean of the meridian altitudes of the pair of stars to be observed, it is set in azimuth for the star which culminates first, as the star crosses the meridian it is, by an onward motion of the micrometer screw, bisected by the movable wire. The telescope level is instantly read and noted, and next the micrometer reading.

“The instrument is then turned 180 degrees in azimuth and same process repeated with the other star of the pair.

“As the instrument is very closely placed in the plane of the meridian, the chronometer time of bisection is noted only when the observer has failed to make it exactly at transit, and that it therefore requires reduction to the meridian.

“When the stars used have been observed a number of times at standard observatories, results from them, on account of the greater certainty of their declination, have more than usual weight; it then becomes worth while to repeat the micrometric measures on them, noting the chronometer times as in the method of circum-meridian zenith distances; but this seldom happens with the available pairs of stars, generally of lesser magnitude, among which class the fortuitous concurrence of equality of altitude and shortness of interval between transit of each, with certainty of position is rare.

“The second method, that of obtaining the latitude by observing the transit of stars across the east and west verticals, is carried out as follows:—

“From the catalogues are selected two groups of stars whose declinations are about a degree less than the latitude, and so disposed that the stars of each come closely one after another, and with such interval between the groups as will admit of their being observed in the following manner:—

“The meridian reading of the azimuth circle of the instrument having been checked by reference to the previously established meridian mark, its upper or movable part is clamped at the reading which places the central wire of its telescope in the plane of the prime vertical, then the chronometer times of the transits of the stars of the first group over the several wires are noted for their passage across the east vertical. The axis level is carefully read for each star—it remains on the axis during the course of the observations.

“Reference to the meridian mark is again made in case of any small azimuthal change of position of the stand. The instrument is reversed, the ends of the telescope axis being revolved through exactly 180 degrees of azimuth, and again clamped in the plane of the prime vertical, then the times of transit of the first group of stars over the west vertical are similarly recorded. This gives for that group of stars a series of observations in each of the positions—face north and face south—of the instrument.

“In this latter position the east transits of the second group of stars are observed, and then by reversal back to the original face north position, the west transits of the same group.

“This proceeding eliminates from the result of these observations any effect of collimation or wire interval.

“Meteorological observations were not made, for the reason that our outfit for that purpose was not complete at time of starting to the field; further it was not judged of any profit to make partial observations, as the work would lie for the short part of the current season comparatively near to one of the fully equipped government meteorological stations—connected with the Magnetic Observatory at Toronto—by which full returns would be made.”

The requirements of the survey made it necessary to have some base measuring apparatus that would occupy an intermediate position, in point of relative accuracy and time consumed in working, between the rapid but rough measurements of the ordinary chain, and the base apparatus usually employed in primary triangulations—which latter, although giving fine results, is complicated and requires much time in its application.

A special base measuring apparatus was designed by Mr. Russell for use on this survey. The following concise description of the apparatus is extracted from the Surveyor General’s report:—

“Mr. Russell’s apparatus consists of well seasoned deal rods successively connected with each other by metal fittings working on the contact principle, the particular application of which principle is as follows:—Each joint consists of an accurately turned hard metal cylinder with its axis horizontal and transverse to the line of measurement; on this cylinder, which is at the end of one rod, rests the rectangular inverted V, or claw of metal fitting, at the end of the next rod. The line bisecting the rectangular claw will always pass through the centre of the supporting cylinder at any relative

inclination of the two rods, the distances, therefore, from dot to dot at the centres of these cylinders, with the temperature not considered—are constant for all inclinations of the rods. The objectionable feature of any measuring apparatus working on the contact principle is that of wear of touching surfaces and consequent alteration of length. This is to a considerable degree obviated, in the present arrangement, by a provision for turning the cylinder round, at equal intervals of use, to distribute the wear and ensure, as nearly as possible, its occurring symmetrically. It is evident that the cylinder might be decreased in size until nearly cut through, and yet, if its section continued to be a true circle, the distance from central dot to central dot remain the same.

“Effects of temperature are approximately taken into account by adopting the mean of several standard coefficients of expansion for deal. It is hoped that circumstances may admit of employing the more correct method of determining experimentally the expansions for both temperature and humidity of the particular rods used, and applying corresponding corrections to measures made with them.

“In an interesting report on deal measuring rods lately written by the Warden of the Standards of England, he shows that experiments made with them in measuring an important base in the Ordnance Trigonometric Survey of Britain cannot be deemed so conclusive as was then thought against their use. That, in the case in question, their expansion from humidity was, in a distance of 5 miles, about 4 inches only, instead of about 2 feet as first deduced.

“In using these rods on the survey now in question, their length will be frequently checked by referring them to a standard steel bar by means of a micrometric comparator, having due regard to atmospheric conditions at time of making such comparisons.

“The results obtained during the last season by this apparatus are such as to justify the belief that one mile in a day, over reasonably level country, may be measured with remarkable accuracy.

“For instance, two bases were measured, one of 60 chains, the other, a base of verification, of 66 chains 25 links. The difference of a double measurement, in each case, was in the former, three-tenths, and in the latter, two-tenths of an inch.”

#### SEASON OF 1875.

During this season thirty townships were subdivided, and 1,020 miles of block lines were run and marked. On this service twenty-one surveyors were employed, ten of whom were engaged on block surveys and the remaining eleven on township subdivision.

In addition to the ordinary land surveys, four surveyors were engaged in laying out Indian reserves at different points in Manitoba and the North-West Territories, and two in completing the surveys of the outer two-mile belt in parishes along the Red and Assiniboine Rivers.

Parts of the shore lines and adjacent islands of Lake Winnipeg and Lake of the Woods were surveyed, this work being performed in connection with the survey of timber limits.

The town plot called “Selkirk,” situate on the east side of the Red River, at the crossing of the latter by the line of the Canadian Pacific Railway, and the town plot called “Alberton” on the Rainy River at Fort Frances, were laid out during this year.

#### THE SPECIAL SURVEY.

The work on this undertaking was somewhat retarded owing to the accident which befell the chief, Mr. Lindsay Russell, who sustained a compound fracture of the leg early in the season, and was in consequence unable to personally superintend the field operations.

In spite of this serious drawback, the work accomplished was of a satisfactory nature. The following extract from the report of the Assistant Surveyor General regarding the season's operations will illustrate the results secured :

#### “BLOCK SURVEY EAST OF THE LAKE OF THE WOODS.

“Between the block outlines in the Province of Manitoba, already run, and the Lake of the Woods, there was an interval of unsurveyed ground ; therefore, in projecting the meridians and bases east of that lake, to insure conformity of position with the existing surveys to westward, it was necessary to produce the 49th parallel, as established by the International Boundary Commission, across the lake, to serve as a tie and basis of projection for all blocks to the eastward.

“The course of the parallel crossed 30 to 40 miles of open lake. This, at a season of the year when the thermometer was sometimes registered there below 40°, entailed the expense of arrangements for dragging camping fuel, and further the inaccuracy that is likely to attend instrumental

work done under so unfavourable conditions of extreme exposure. It therefore seemed preferable to get the position of the parallel on the eastern shore by the more indirect method of a diagonal tie-line from the before-mentioned commission's point at the north-west angle, which line would traverse a part of the lake fairly sheltered by occasional wooded islands furnishing fuel.

"In the computation of the triangle this involved, the differences of latitude and longitude were calculated by that known as 'Gauss's second method,' and frequent and close azimuthal verification obtained for the tie-line which was twice measured; it is therefore presumed that the intersection of the 49th parallel with the eastern shore of the Lake of the Woods was established with very little if any less accuracy than by direct production of the line, the probable difference being only in the greater effect of any possible departure, in that region, of the figure of the earth from that assumed, and in the greater length of survey by the detour.

"The instruments for an astronomic check on the latitude were not in the field, even were they available the season would have made any dependence on their results precarious.

#### "TRIANGULATION FROM WESTBOURNE TO 102° MERIDIAN.

"From Westbourne to the Little Saskatchewan, the best route for the purpose that could be found is sufficiently wooded to impede very seriously a triangulation survey in a flat country. While in this section but slow progress was made.

"Westward of the Little Saskatchewan it became more open; the work advanced more rapidly, but still subject, though in a lesser degree, to the retarding difficulty that has existed throughout the survey of getting triangular points in a country of so even a surface.

"Lateral refraction was, as in the first season's work, a constant cause of loss of time, and injurious to precision. To it, principally, are to be attributed all the larger closing errors that appear in the reduction of the triangles, and the resulting differences between computed and measured lengths of sides.

"From the first or Winnipeg Meridian to that of the 102 west longitude, six bases were measured at as nearly equal intervals as circumstances permitted. The average difference between computed and measured bases of verification was a little less than  $\frac{1}{250000}$  of their length.

"The base-measuring apparatus proved this season, as last, fairly equal to the work expected of it. Though necessarily much inferior in precision to the more complex and delicate apparatus usually employed on extensive national trigonometric surveys, it can be used with greater rapidity and gives sufficiently accurate results for triangulation of second order; the average departure from mean of different measures of same distance being about  $\frac{1}{75000}$  of the length."

#### SEASON OF 1876.

The general depression in commercial affairs, and the consequent falling off in immigration, added to the grasshopper plague which had occurred in Manitoba during the previous three years, all had their effect upon the surveying operations, which during this season were on a somewhat limited scale.

Exclusive of the staff of the special survey, eighteen surveyors were employed. Their work was divided as follows:—Five were engaged on block surveys, six on township subdivision, five in surveying Indian reserves, one on settlement belt surveys and one on survey of main highway.

In his report for this year, the Surveyor General gives a statement regarding the total acreage of lands surveyed up to the end of this year's survey season, together with a statement of the cost per acre, and a comparison between this cost and that for Ontario and Quebec.

This statement is given here, being of considerable interest:

"Since the establishment of the Dominion Land Office, in March, 1871, to the date of this report, 10,574,915 acres have been surveyed into townships, sections and quarter sections, and 341,666 acres, comprising all the old settled parishes on the Red and Assiniboine Rivers, have been surveyed and mapped.

"To the above has to be added the work of the special survey—as also the laying out of many Indian reserves, a number of exploration surveys, and, finally, the subdivision of large tracts of timbered land into wood lots for settlers.

"It is proposed to give the acreage cost, to the present date, of the Dominion Land Surveys, in connection with which it will only be proper to mention the principal features of the system.

"The township surveys involve the preliminary steps of laying out the territory into blocks of twelve miles square, or four townships, enclosed between meridians and base or correction lines.

"The running out of these blocks is performed by day-work of a surveyor and party; and where subsequently deemed expedient, such blocks are divided into townships, which in turn are subdivided into sections and quarter sections—such subdivision being performed by contract at mileage rates previously approved by Order in Council.

"The cost of block outlines surveyed to the present time averages \$36.83 per mile.

"The cost per acre of subdividing the blocks of four townships into sections and quarter-sections has been 2.91 cents; adding the cost of the block lines to the above acreage rates makes the total cost of all the township lands surveyed to date to be 3.83 cents per acre.

"The survey of the settled lands in the parishes on the Red and Assiniboine Rivers has been more expensive, having cost  $27\frac{1}{10}$  cents per acre.

"This, however, cannot be considered an extravagant price, when it is remembered that an immense amount of work was involved in surveying and mapping the lands in the several parishes, showing all the holdings with the exactness required to admit of their being described in letters patent.

"Adding the expenditure for settlement belt surveys to that for subdividing township lands, we obtain the average cost for all farm lands surveyed to this date 4.57 cents per acre.

"Let us compare the township survey rates proper, *i. e.*, 3.83 cents, with the relative cost of township surveys in Quebec and Ontario.

"It may be premised that, previous to the union of Upper and Lower Canada, in 1841, the surveys in the respective provinces were performed with the ordinary surveyor's compass, the lines being run by the magnetic needle, and were, therefore, subject to gross errors, arising from the effect of local attraction upon the needle; also from surveyors not ascertaining the variation of the latter when making their surveys; and, further, no check lines were drawn in any of these surveys previous to the year 1829, the result of all which was that the lots of land were not of the form or area intended, the concession or ranges lines in some cases being so crooked as to reduce some of the lots to one-fourth of their intended area, and increase others proportionately, giving rise to subsequent endless law-suits and difficulties between owners of the adjoining lands.

"Further, surveys made by the magnetic needle did not involve the opening out of lines by cutting down trees, etc., and surveyors could therefore draw their lines much more rapidly than by the astronomical method, which requires all obstacles to be cleared.

"Since 1841 Crown Land surveys have been performed astronomically, and check lines have been run, thus ensuring accuracy in the form and area of the lots or sections.

"In stating the average cost per acre of the earlier Crown Land surveys in Upper and Lower Canada, the amount of work performed in surveying is not shown, so that the rate cannot fairly be compared with the present rates. In the former, only one boundary of the lot, the front, was surveyed; at present, all the four are drawn. Thus, in the old surveys the running of one mile of line gave 800 acres; now it gives only 160 acres.

"The average cost of the Crown Lands surveyed in Upper and Lower Canada from 1841 to 1875 was  $6\frac{1}{10}$  cents per acre, each mile bounding 200 acres.

"The Dominion Land township surveys, on the other hand, have been made for 3.83 cents per acre, each mile bounding only 160 acres."

#### SPECIAL SURVEY.

In accordance with the recommendation of the Assistant Surveyor General, the triangulation, which was being carried on by this survey, was stopped at the 2nd initial meridian, the intention being to establish the additional initial meridians by means of the electric telegraph line or by running standard meridians and parallels.

To effect these objects the following disposition of the force of the survey was made:—

Mr. A. L. Russell, D.L.S., in charge of the main section of the party, was instructed to proceed with the establishment of the meridians and parallels, and Mr. W. F. King, astronomical assistant, went to Battleford to co-operate with the chief at Winnipeg, in establishing the longitude by the interchange of telegraphic signals. However, the telegraph line between Fort Pelly and Winnipeg was never, throughout the summer, in sufficiently good order to admit of making through signals, and the attempt to establish the longitude of Battleford failed.

Mr. King devoted his time while waiting at Battleford to determining accurately the latitude of the place, and he also made a survey of the settlement and exploration of the district.

The main section of the survey was first engaged in connecting the 5th base and the 2nd initial meridian. The meridian was then measured and marked (it had been run the previous fall) for a distance of about 81 miles north of the 5th base.

Turning west from the initial meridian on the 8th base, the remainder of the season was spent in the survey of bases and meridians extending as far west as Fishing Lake. During the season about 180 miles of meridians and parallels were surveyed and marked, observations for latitude were taken at a number of points, and considerable exploration was also completed by the staff of the main section, and a very valuable report on the capabilities of a large portion of the country west and

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south-west of Fort Pelly was submitted by Mr. A. L. Russell, in charge of this division of the survey.

#### SEASON OF 1877.

Comparatively few surveys were undertaken during this season, the surplus of township lands previously laid out having rendered any further immediate supply unnecessary.

Seventeen surveyors were engaged in field work, distributed as follows:—two in charge of divisions of the special survey; one in surveying roads; six in surveying Indian reserves; five on subdivision surveys; and three in settlement belt or "outer two miles" surveys.

The staff being small, only a limited amount of work was completed. Exclusive of the operations of the special survey and the parties engaged in road and settlement surveys, seven townships were subdivided and thirteen Indian reserves laid out.

Very satisfactory progress was made in the work of the special survey, as will be seen by the following description of the season's operations. The survey was divided into two sections, the eastern section being in charge of Mr. A. L. Russell, and the western section in charge of Mr. W. F. King.

The eastern section was engaged in extending the 102nd meridian (2nd initial meridian) northward to the located line of the Canadian Pacific Railway and telegraph line, the intention being to use this point when establishing the longitudes by means of telegraphic signals. They then produced a system of base and meridian lines as far west as the 106th meridian (the 3rd initial meridian), which was carefully established and produced 72 miles north to the North Saskatchewan River. A portion of the 12th correction line was then run east from the meridian, and some meridians and outlines in the vicinity of Prince Albert settlement, and of the Indian settlement on the South Branch of the Saskatchewan River, and some of the trails in the vicinity were explored and roughly traversed.

This section of the survey surveyed and marked about 300 miles of line during the season, and also effected considerable exploration in the vicinity of the line run. When on their way home in the fall, Mr. Russell, accompanied by an Indian, made a rapid trip through the Carrot River district, and was thus able to report regarding what proved to be an excellent district.

The western section of the survey proceeded to Edmonton, having while on the way established the latitude of certain points by astronomical observation. They also while en route provided for the guidance of future travellers by marking the crossings of the leading thoroughfares between Manitoba and Battleford by other important trails, with painted finger boards on posts erected at the several intersections in question.

The intention was that Mr. King should make a survey of the settlements in the vicinity of Edmonton, and should establish and survey the 114th or 5th initial meridian, in connection with which it was hoped to employ the telegraph line in interchanging signals as a means of determining the longitude. This, however, in common with all other attempts to make any use of this worse than useless telegraph line, proved a complete failure, and the initial meridian was established by Mr. King by using the longitude of Edmonton as determined by the Canadian Pacific Railway survey.

This section of the survey wintered at Edmonton, and during their stay there they completed the preliminary survey of several of the adjacent settlements. The results accomplished by this division are, however, more fully treated of further on.

Under amendments to the Geological Survey Act, the Survey became a branch of the Department of the Interior during this season, and the Museum was moved from Montreal to Ottawa.

## SEASON OF 1878.

In his report of this year the Surveyor General said, speaking of surveys :—

“ In the Province of Manitoba and the territory adjoining, the large area that had been, in previous years, laid out in townships and subdivided, has, so far, met the principal needs of progressive occupation.

“ But various settlements springing up in remoter parts of the North-West Territory, it has become necessary to provide for these by making detached surveys of townships and river frontage farm lots.

“ The special survey of standard meridians and parallels has been prosecuted for some seasons past, with a view of affording that connection with existing surveys by which this could be effected, and of insuring that townships so laid out, in advance of the extension of the general system, in localities widely apart, and remote from the main body of surveyed Dominion Lands, should be found to have been correctly placed in the position they should occupy in that system when it is extended from Manitoba to British Columbia.

“ The survey in question also embraces the determination of the latitudes and longitudes of points throughout the territory, for the purposes of contributing to its correct cartography and as a check on the measured surveys.

“ The operations of the survey extend from the international boundary at West Lynne, on the Red River, following its valley and those of the Assiniboine and Saskatchewan Rivers, to a point about 15 miles west of Fort Edmonton, or nearly at the 115th meridian of west longitude from Greenwich, and approaching the base of the Rocky Mountains.

“ Besides its purely surveying results, much information respecting the character of the country traversed has necessarily been obtained.”

Including the staff of the special survey, twenty surveyors in all were employed during this season.

In reference to work they were divided as follows :—

Four in charge of sections of special survey.

Nine in surveying Indian reserves.

Three in subdividing townships.

One surveying boundaries of Manitoba.

One surveying public highways in Manitoba.

One surveying parish of Ste. Agathe.

One acting inspector of surveys.

The subdivision surveys covered only ten townships, which were all situated in the vicinity of Prince Albert settlement.

The survey of part of the boundary of the Province of Manitoba was completed and properly marked.

Thirteen Indian reserves were laid out in Treaties 2, 3 and 4.

A large amount of important work was accomplished by the four sections of the special survey, a short résumé of which is here given.

Section 1 was, as it had been since the formation of the survey, under the charge of Mr. A. L. Russell, D.L.S. The greater part of the season's work consisted in preparing the way for subdivision surveys in the Prince Albert district, 133 miles of outlines being surveyed and marked. In addition to this considerable exploring was done by Mr. Russell in parts of the country which were as yet outside the surveys.

Section 2 of the survey, which was more properly called the astronomical section, was under the charge of Mr. W. F. King, D.T.S. This division had, as already described, proceeded during the previous season to Edmonton for the purpose of establishing the longitude in co-operation with Mr. Lindsay Russell by means of the telegraph line, and to fix the position of and survey the 114th or 5th initial meridian.

On the way to Edmonton during 1877, Mr. King determined the latitude at several points, and also placed painted finger boards at the following points :—

(1.) Near Shoal Lake (Mounted Police station), to indicate the trail to Fort Pelly and Swan River barracks.

(2.) On the north side of the Qu'Appelle River, beyond Fort Ellice, to show the trail to Fort Pelly.

(3.) On the Pheasant Plain, at the point where the trail from Port Pelly to Fort Qu'Appelle crosses the main trail.



- (4.) Near Touchwood Hills trading post, to mark the trail to Fort Qu'Appelle.
- (5.) At the "Forks of the trail" (Humbolt), where the trails separate going to the various ferries on the South Saskatchewan River.
- (6.) On Gabriel's trail at the telegraph line, at which point branches off a new trail crossing the south branch at the telegraph line crossing.
- (7.) On the hills west of Gabriel's, where two posts are planted, one to indicate the trail to Carlton, the other at the separation from the Battleford trail running south to the Cypress Hills.
- (8.) In the valley of Eagle Creek, at the junction of the plain and river trails to Battleford.

After reaching Edmonton a careful series of observations for latitude were taken, after which the 14th base line was established by producing a meridian north from the observation point to the latitude of the base, and from the latter point a system of chords was run to the west for about 13 miles, and the 114th or 5th initial meridian established; the longitude of Edmonton, as fixed by the Canadian Pacific Railway survey, being used in the determination of the position of this meridian.

A portion of the initial meridian was surveyed by Mr. King at this time.

This section of the survey remained in winter quarters at Edmonton until February, during which month a traverse of the Big Lake settlement was made. At the end of February, a further and last attempt was made to determine the longitude by interchanging telegraphic signals with Winnipeg or Fort Pelly, but the attempt, owing to the wretched condition of the telegraph line, was a failure.

From this date until May the party was engaged in exploratory and settlement surveys.

On the 25th of May the party started for home, but shortly after leaving Edmonton received instructions to return to Edmonton and complete the settlement surveys. After work in the Edmonton district was finished the party moved to Prince Albert, some members of the party proceeding down the river in a boat, and carrying the chronometers so as to effect a longitude tie with the 3rd initial meridian at Prince Albert.

The remainder of the season was spent in surveying outlines near Prince Albert, the party reaching Winnipeg on the return journey in November, having been absent 18 months.

The 3rd section of the survey was under the charge of Mr. J. S. Dennis, jun., D.T.S., and was employed in establishing the 4th initial meridian. This was accomplished by producing the 10th and 11th bases westward from the 3rd to the 4th initial meridians. In doing this the latitude post which had been previously established at Battleford by the astronomical section was tied in. The production of this line into Battleford proved that place to be in error in longitude, as shown by the Canadian Pacific Railway surveys, about eleven miles.

Section No. 4 of the survey was employed during the season under Mr. M. Aldous, D.T.S., in surveying the settlements of Prince Albert and St. Laurent.

In the fall of this year one of the first important changes regarding the administration of the surveys was made. In November the Surveyor General, Col. Dennis, was promoted to the position of Deputy Minister of the Interior, and Mr. Lindsay Russell, the Assistant Surveyor General, became Surveyor General.

#### SEASON OF 1879.

The surveying operations of the department were on a somewhat more extended scale during this season than they had been during the previous two or three years. Thirty-two surveyors were employed. Of these twenty were engaged in the survey of outlines and subdivision of townships. Nine were employed in surveying Indian reserves, and three in locating and surveying timber limits.

A very considerable amount of work was completed, 51 townships being subdivided, and 875 miles of outlines surveyed and marked.

During the season the 5th initial meridian was established by a section of the special survey, under charge of Mr. M. Aldous, D.T.S. He produced the 4th initial meridian north from the 11th base, the point where it had been established during the previous season, and then ran west on the 14th base and adjoining lines to the 5th initial meridian.

The astronomical section of the special survey was, as in past seasons, under the charge of Mr. W. F. King, D.T.S. The season was spent in moving from point to point, and establishing the latitude carefully by astronomical observation. In this way the following stations were established :

No. 7. Near the north-east corner of section 25, township 35, range 17, west of 2nd initial meridian.

No. 8. Near north-east corner of section 52, township 46, range 20, west of 2nd initial meridian.

No. 9. Near a post on the 10th base, 58½ sections west of the 3rd initial meridian.

No. 10. On the 11th base, near its intersection with the 4th initial meridian.

No. 11. On the 14th base, about 64 sections west of the 4th initial meridian.

These observations were taken for the purpose of furnishing a check on the line surveys then in progress, and corrections were from time to time made in positions of posts on the initial meridians and intermediate base lines, to make them agree with the latitudes astronomically determined.

Besides the determination of the latitudes at the above stations, the season's work included a number of micrometer and track surveys made for the purpose of better locating the main topographical features of the country. The results of many of these track surveys, where they were taken along the main trails, were scheduled, giving distances from point to point, and subsequently proved a great convenience to persons travelling on these trails.

The explorations which were carried on in addition to the general surveys added very much to the stock of information regarding the topographical and climatic features of the country, and each year's operations proved that previously held estimates of the quantity of arable land in many parts of the Territories were very much below the mark.

In fact it was only after the surveying operations had extended west to the Rocky Mountains, and north to the Saskatchewan River that the full extent of the large areas fit for cultivation and grazing was fully realized. These surveys and explorations exploded the idea, at that time so prevalent, that large portions of the Territories were barren wastes or deserts, and may be said to have settled the question of the adaptability of the larger part of the country as a field for successful farming operations.

In his report of this year the Surveyor General referred to proposed changes in the manner of surveying block outlines, and with the object of reducing, if possible, the average cost per acre of the survey of lands. It was suggested that the square to be surveyed by block surveyors should include sixteen townships, instead of four as had up to this time been the rule.

This proposal was sanctioned and preliminary steps were taken to carry it into effect during the next season. With this in view a memorandum was prepared setting forth in detail the modifications of the process of survey previously employed, necessary to effect the new system, and otherwise instructing surveyors as to the method to be pursued.

Attached to this memorandum was a series of geodetic tables, which were computed by Mr. W. F. King, and azimuth tables computed by the Surveyor General for use by surveyors engaged in surveying blocks under the new system.

These tables and memorandum, were subsequently incorporated in the new Manual of Surveys. This, however, will be referred to in its proper place.

#### SEASON OF 1880.

This season saw the largest number of surveyors employed that had up to this time been engaged in surveying operations during any one year.

Fifty-five surveyors completed 3,418 miles of Standard meridians, parallel and township outlines, and 11,220 miles of township subdivision.

This showing was an exceedingly creditable one, the season having been unfavourable for surveying operations on account of the continuous wet weather and bad condition of the roads.

Among the most important lines surveyed during this year was the 5th initial meridian, which was run south from Edmonton to Fort Macleod, a distance of some 350 miles. This line traversed the country along the easterly slope of the Rocky Mountains for a great portion of its length, and the survey furnished reliable information regarding a beautiful tract of country both for cultivation and grazing purposes, and one in which good soil was found to be prevalent, and wood and water abundant.

An important exploration was effected during this season by Professor John Macoun, who was sent to thoroughly examine the Souris River Valley and adjoining region to the west and north. The Professor made a very careful examination of a large portion of the country, and his report did a great deal towards correcting many erroneous ideas about the agricultural capabilities of that district, and also furnished valuable botanical and ornithological information.

During this year an important change was made in the department, the Indian Branch was created a separate department, and assumed control of the surveys of the Indian reserves in Manitoba and the North-West Territories, which had hitherto been carried on under the Surveyor General.

#### SEASON OF 1881.

The surveys of this season again show a considerable increase over those of the previous year, and consequently are in excess of any previous season's operations.

Seventy-three surveyors were engaged in carrying on work, and the large amount of 6,435 miles of Standard meridians and parallels and township outlines, and 16,865 miles of township subdivision lines, or a total of 23,300 miles of line were surveyed and marked.

Some important changes were made this year in the method of laying out Dominion Lands. Road allowances were, throughout, reduced from one chain and a-half to one chain, or sixty-six feet in width; and three of the east and west roads in a township done away with. The effect of this change was to transfer a very large area of land from road allowances into that of land available for purposes of sale and settlement, without detriment to facilities for communication, and also to reduce the cost of survey of a township to such an extent as to make a saving in the survey of the Territories of probably two and a-half millions of dollars.

Incidental changes and improvements in the method of survey were made, and a new edition of the Manual of Surveys became necessary; this was issued in March. It contained very full and detailed instructions to surveyors, and explanations regarding the change in the system, and also several useful tables which had been prepared by Mr. King and Mr. Deville.

In June of this season, Mr. E. Deville and Mr. W. F. King were appointed Inspectors of Surveys. Mr. A. H. Witcher, who had been one of the inspectors of surveys up to this date, became Agent of Dominion lands at Winnipeg, and Mr. Milner Hart, the other inspector, retired.

The Surveys branch had been long and faithfully served by these two gentlemen, and much of the success in carrying on the field operations was due to their exertions and practical experience.

Although large settlements had by this time grown up in many parts of the Territories, and surveys in those localities were urgently needed, the rapid construction of the Canadian Pacific Railway through the Territories necessitated the employment of all available surveyors in surveying the country along the projected line of this road; however, the requirements of the outlying districts were not

altogether overlooked, and in the fall of this year large contracts were let for the subdivision of townships in the vicinity of Edmonton.

Arrangements were also made in the fall to employ two block survey parties, during the winter in producing the 5th and 6th initial meridians in the Peace River country. This portion of our territories having attracted considerable attention as a desirable field for immigration, it was desired to prepare for any subdivision surveys which might become necessary by having the initial meridians defined and marked on the ground.

During this season an exploration was made by Professor Macoun along the western slope of the Duck and Porcupine Mountains, and in the valley of the Red Deer River. This exploration afforded much valuable information regarding this hitherto almost unknown portion of the country.

In the early part of this season Mr. King was engaged in continuation of the work of the verification of the position of governing lines of the surveys, by astronomical observations. A table of the results of the observations which were taken with this end in view is given here.

In the latter portion of the season Mr. King, under his appointment as Inspector of Surveys, supervised the operations in the field of the survey force employed.

## STANDARD SURVEY ASTRONOMICAL STATIONS.

When observed.	No.	Place.	Latitude.	Probable Error Latitude.	Longitude.
Aug., 1875	1	Near iron bar on 4th Correction line, 12 miles east of 1st Meridian	49 53 06.40		97 10 41.51
July, 1876	2	On 102 Meridian, near 5th base	50 22 21.85	0.38	102 00 00.00
Aug. & Sept., 1876	3	Battleford	52 42 38.69	0.21	108 16 59.02
Aug., 1877	4	On 106 Meridian, on Carlton trail	52 34 32.69	0.26	106 00 00.00
Sept. & Oct., 1877	5	Fort Edmonton, on hill near fort	53 31 59.16	0.16	113 30 28.60
July, 1878	6	On river bank near Fort Pitt	53 34 05.28	0.19	109 47 10.00
July, 1879	7	North of Quill Lake	52 04 55.88	0.16	104 18 14.02
Aug., 1879	8	On 12th Correction line, near Carrot River	53 04 02.38	0.17	104 52 28.33
Aug., 1879	9	On 10th base, near Eagle Hill Creek	52 11 07.45	0.17	107 24 06.24
Aug. & Sept., 1879	10	Near corner 11th base and 110th Meridian	52 32 15.46	0.21	109 58 39.45
Sept., 1879	11	On 14th base west of the 110th Meridian	53 35 58.30	0.19	111 34 58.53
May, 1880	12	On 102nd Meridian on Ellice and Touchwood trail	50 42 29.74	0.09	101 59 56.77
June, 1880	13	At Swan River barracks	51 54 21.51	0.16	101 57 16.75
June, 1880	14	Near White Sand River north of Beaver Hills	51 38 40.70	0.26	103 07 57.58
July, 1880	15	Near Fort Qu'Appelle, in the valley	50 46 15.51	0.08	103 48 02.69
Aug., 1880	16	At Willow Creek, near Fort Macleod	49 45 20.64	0.21	113 24 00.04
Sept., 1880	17	On 114th Meridian, near Calgary	51 01 55.71	0.29	114 00 00.00
Oct., 1880	18	At Edmonton, in Valley	53 32 02.49	0.27	113 30 39.95
June, 1881	19	Near Touchwood Hills mission	51 18 31.27	0.25	104 15 35.17
July 1881	20	Qu'Appelle valley, near 106th Meridian	50 52 59.58	0.23	105 59 21.55
July & Aug., 1881	21	Two miles north of Red Deer Forks	50 57 57.62	0.22	109 56 04.08

## SEASON OF 1882.

Extensive preparations had been made for the prosecution of the surveys during this season, but the beginning of operations was very much delayed in the spring by the high water and floods in Manitoba, and the washouts on the Canadian Pacific Railway and American railroads.

Ninety-two surveyors were employed, divided into the three usual divisions of block, township outline, and contractors.

The work accomplished covered a very large area, the outlines of some 800 townships being surveyed, about 430 of which were subdivided into sections.

In May of this year Mr. Deville was appointed Chief Inspector of Surveys, and took charge of the Survey Branch of the Department. This change became necessary owing to the promotion of the Surveyor General, Mr. Lindsay Russell, who became Deputy Minister of the Department on the 1st of January, Colonel Dennis having been superannuated on account of ill-health.

In Colonel Dennis's retirement the department lost an officer who had been associated from their inception not only with the surveys but also with the land administration branch, and one who owing to his large professional experience and deep interest in all things pertaining to the welfare of Manitoba and the North-West Territories had devoted his best energies with very material results to the advancement of both.

Mr. King, the Inspector of Surveys, had charge of operations in the field, and during part of the season established his headquarters at the Forks of the Red Deer and South Saskatchewan Rivers.

Owing to the lack of wood in the western portion of the Territories, and the consequent difficulty in procuring wood posts, some other provision had to be made for marking the surveys. To meet this difficulty iron posts were substituted for the wooden posts for marking section corners. These were of half-inch gas pipe, 3 feet 8 inches in length, the numbers used to indicate the section, township and range, being stamped on a tin square placed on top of the post.

Before the opening of the season's operations in the field a large number of these posts had been manufactured in Montreal and shipped to Winnipeg and from there were distributed.

In consequence of the delays which had up to this time occurred owing to surveyors delaying in completing the subdivision of townships allotted them, and in preparing the returns of their surveys after the completion of the field work, two rules were adopted having in view the correction of these delays. The first was to give a bonus of 15 per cent to surveyors filing in the department before the end of the year the plans and field notes of the whole of their survey. The other was to require all contract surveyors to report at a certain date their presence in the field, and to allot the work of the missing ones among those on the ground.

These rules were found to work well, and their enforcement materially assisted in enabling the large amount of work accomplished this season to be successfully completed, and the results in the shape of complete township maps to be put into the hands of the land agents throughout the Territories.

In order to prepare the required copies of township plans for use by land agents and in the department, and in consequence of the large number of these plans required, it was found necessary during this year to establish a lithographic office in connection with the Surveys Branch of the department.

In view of the increasing population, and for greater convenience in regard to postal and other matters, an Order in Council was passed on the 8th of May of this year, dividing the North-West Territories into four provisional districts, called respectively Assiniboia, Saskatchewan, Alberta and Athabasca.

#### SEASON OF 1883.

The surveys of this season were conducted upon what may be termed a gigantic scale.

One hundred and nineteen surveyors were employed, classed as follows:—

Ten surveyors of base lines, twenty-one of township outlines, four examiners of contract surveys, eighty-two contractors for subdivision surveys, one settlement belt surveyor, one town plot surveyor.

This large number of surveyors, together with the necessary assistants, labourers, teamsters and cooks, comprised a small army of men, and required for transport a large number of horses, carts, buckboards, &c.

The extensive surveying operations during this and the previous season became necessary owing to the rapid construction of the Canadian Pacific Railway, which in the fall of this year reached the Rocky Mountains.

During this year 11,300 miles of township lines were surveyed, and some 1,221 townships were subdivided, involving the survey of some 70,000 miles of line. The results of the season's operations, which provided about 27,000,000 acres of land ready for the agriculturist, probably stand unrivalled in the history of land subdivision in any country.

The surveys covered the country between the Touchwood Hills and the Rocky Mountains, and extended north from the second base line to the North Saskatchewan River, and one of the immediate effects of the information derived from the actual survey of this immense district, was the proof of the fact that only a very small portion of the district was unsuited to settlement.

In the early part of this year it was found that the business of the Department of the Interior had become so extensive that the offices of Deputy Minister and Surveyor General, which had been combined in the person of Mr. Lindsay Russell, were separated. Mr. Russell retained the supervision of the technical branch as Surveyor General, and Mr. A. M. Burgess became Deputy Minister.

The supervision of the surveys at headquarters was under control of Mr. Deville, Chief Inspector of Surveys, while Mr. King, Inspector of Surveys, had the direction of the operations in the field.

Mr. King established his office at Medicine Hat, on the South Saskatchewan River, which proved a great convenience to surveyors, who were thus enabled to confer with an officer of the department, without the delay of correspondence with Ottawa, and this convenience was augmented by the continuance of a system which had been inaugurated during the previous season, of a corps of mail carriers, who visited the different parties in the field, distributing the mail and carrying despatches to and from headquarters.

In May a third edition of the Manual of Surveys was issued, which contained very full instructions to Dominion Land Surveyors regarding all operations to be performed by them, and also many valuable tables to assist them in their work.

#### SEASON OF 1884.

The large area which had been surveyed and made available for settlement by the operations of the seasons of 1882 and 1883 was now found to be fully equal to the immediate requirements, and it was considered advisable to curtail operations in the field, as experience had shown that the posts and mounds in unsettled districts are from various causes obliterated, and in some cases the resurvey of the townships had been found necessary.

The surveys of this season were conducted chiefly in the districts between Carlton and Fort Pitt, between Edmonton and Calgary, and in the vicinity of Fort Walsh, about 300 townships in all being subdivided.

Seventy-one surveyors were employed, of whom forty-eight were engaged on subdivision surveys, thirteen in surveying township outlines, two in examining contract surveys, and the remaining eight on miscellaneous surveys at different points.

Among the surveys, other than those having in view the subdivision of land into agricultural holdings, which had from time to time been undertaken by the department, may be mentioned the survey of the old trails or roads, which was begun this season, the intention being to continue the survey from time to time of the important trails in the Territories.

These trails were surveyed and permanently located at the request of the Lieutenant Governor of the North-West Territories, and in accordance with the provisions of the North-West Territories Act.

A complete schedule of the trails which have been surveyed in the Territories, and also those surveyed in Manitoba, will be found in the appendix.

During the season of 1883 the township lines had reached the Peace River district, but owing to the distance from the main line of communication, the survey of these lines proved so expensive that they were discontinued, and exploratory surveys were undertaken for the purpose of obtaining general information regarding that country. With that end in view an exploration with micrometer traverse was made during this season of the Peace and Athabasca Rivers, and also of the Saskatchewan and Nelson Rivers from Prince Albert to York Factory.

A complete schedule of the exploratory and micrometer surveys performed by the department during the period treated of in this history will be found in the appendix.

The passage of the Settlement Act by the Legislature of British Columbia, and the transfer under its provisions to the Dominion Government of a belt of land 20 miles in depth on both sides of the Canadian Pacific Railway through that province, necessitated the opening of an office in Victoria, B.C., for the disposal of the land thus acquired, and also the initiation of the survey of the lands within the belt.

These surveys were begun in the vicinity of Port Moody and St. Mary's Mission, two surveyors being employed in subdivision surveys at these points; and two others were occupied in determining and laying down, as a general base for the surveys, the line of the Canadian Pacific Railway from Port Moody eastward.

The Dominion Lands surveys in British Columbia, and the amendments to the system in force in Manitoba and the North-West Territories, rendered necessary in order to make the system applicable to that mountainous country, are more fully treated of further on.

On the 30th of June of this year, Mr. Lindsay Russell, the Surveyor General, retired from the service on account of failing health.

In Mr. Russell's retirement the department lost a gentleman whose great abilities and professional skill were universally recognized, and the Dominion Land Surveyors lost a chief who was ever ready to assist by advice and encouragement all efforts towards improvement in methods and knowledge.

Mr. Russell had been associated with the Dominion Lands surveys almost from their inception, and his knowledge and indefatigable exertions very materially assisted in the successful prosecution of the surveys, and in developing their scientific and exact character.

#### SEASON OF 1885.

The surveys of this season were on a very limited scale when compared with those of the two previous years.

The proposed operations were somewhat interfered with by the troubles which occurred in the northern part of the Territories in the spring of the year, but in any case the surveying operations would probably have been limited, as the requirements of immigrants and the demand for subdivision surveys had been very fully provided for by the extensive surveys effected during the previous three years.

Thirteen surveyors only were employed, who were allotted work as follows:—

Two astronomers, one surveyor of railway line in British Columbia, one subdivider in British Columbia, one surveyor of trails, one explorer, three surveyors of town plots, and four subdivision contractors.

The two astronomers, Messrs. O. J. Klotz and Thos. Drummond, Dominion Topographical Surveyors, were engaged during the season in the important work of determining by means of the interchange of telegraphic signals, the longitudes of several points along the line of the Canadian Pacific Railway in British Columbia, and also the latitudes of these points by astronomical observation. These points were to be used for the purpose of fixing the positions of the initial meridians of the railway belt. At the same time Mr. Wm. Ogilvie was engaged in making a survey of the railway line to be used as a base for the future subdivision surveys at points along the line.

It may be well to refer here, briefly, to the system adopted for the survey of the lands within the railway belt, and the proposed method of making the surveys on the ground.

Owing to the mountainous nature of the railway belt it was seen that the system in force in the Territories required some amendments to make it applicable to this district. The chief amendment adopted was in reference to the road allowances, which instead of being provided on certain lines, as in the general system, were provided for by an allowance being made in the acreage of each section.

It would be an impossible undertaking to try and follow the usual method of projecting base lines and township outlines in a mountainous country, therefore some other base for survey operations throughout the belt had to be provided, and as the road-bed of the Canadian Pacific Railway afforded an easy route for a survey, an accurate instrumental traverse along this line was adopted, as a most convenient and accurate method of establishing points of reference, from which the surveys at different points throughout the belt could be started. The portion of this traverse between Port Moody and Revelstoke was completed by Mr. Ogilvie during this season as above mentioned.

The methods followed in effecting this traverse, and in putting the results in such shape as to be ready for reference in carrying on dependent surveys are very interesting; but any description of them would be out of place here: both subjects will be found ably treated of in section II of this report.

In the latter half of this season, Mr. Thos. Fawcett, D.T.S., made an exploratory survey from the Lake of the Woods to Cat Lake, *viâ* the English, Albany and Cat Lake Rivers, and his report furnished much valuable information regarding this portion of unsurveyed territory.

In consequence of the retirement of Mr. Lindsay Russell, already referred to, the position of Surveyor General became vacant. This vacancy was filled in March, by the promotion of Mr. Deville, the Chief Inspector of Surveys.

In the fall Mr. Dennis was appointed to carry on the work of making the necessary corrections to existing surveys, resulting from errors which had been made at certain points. The work done in this connection will be found more fully treated of further on.

#### SEASON OF 1886.

Forty-three surveyors were employed during this season. They were divided as follows:—

Two astronomers, one topographer, one surveyor at Banff Hot Springs, three subdividers in British Columbia, two subdividers in the North-West Territories, four surveyors correcting old surveys and examining contract surveys, twenty subdivision contractors, and nine surveyors of trails.

The astronomers, Messrs Klotz and Ogilvie, were engaged in the continuation of the work of determining the latitudes and longitudes of various points along the line of the Canadian Pacific Railway, and in the North-West Territories. In addition to this work, Mr. Klotz completed the traverse of the railway line from Revelstoke to the summit of the Rocky Mountains, which as already explained was to be used as a base for the extension of the Dominion Lands system of survey in British Columbia.

Mr. D. L. S. McArthur, this season, commenced the work of laying down the topography of the country on both sides of the railway line through British Columbia. He mapped the country between Canmore and Revelstoke, but was much delayed in his operations owing to dense smoke caused by forest fires. This work involved very hard labour and considerable danger in climbing to the top of the high mountain peaks.

A large number of the old trails in Manitoba and the Territories were surveyed during this year, nine parties being employed on that work. These trails were defined and marked under the provisions of the North-West Territories Act, and



many difficulties arose in surveying them, owing to the settlers having fenced up the original trails; these difficulties were however settled by reference to the Lieutenant Governor of the Territories.

The only other surveys out of the ordinary run of season's operations carried on during this year was a micrometer traverse of the shores of Lake Winnipeg by Mr. Wilkins, D.T.S.; the commencement of the topographical surveys at Banff Hot Springs, by Mr. G. A. Stewart, D.L.S.; and the initiation of the work of effecting corrections where required to existing surveys.

An attempt was made during this year to introduce photography on the surveys, a number of surveyors being supplied with cameras. It was proposed to illustrate surveyors' reports by reproducing their photographic views, and it was desired to test the usefulness of photographs in providing topographical information.

In July of this year, Mr. W. F. King, Inspector of Surveys, was promoted to the position of Chief Inspector, rendered vacant by the promotion of Mr. Deville.

As it had been found that in the grazing districts of the Territories, the cattle and horses destroyed the marks of the surveys, by knocking down the posts and tearing down the mounds by pawing, it was decided during this season to try and prevent the obliteration of the marks of the surveys in these districts, by dispensing with the mounds, and using a large iron post firmly driven into the ground, four pits being dug as usual, but the earth from these being scattered about instead of being made into a mound.

#### SEASON OF 1887.

Compared with the previous year there was a decrease in the surveying operations during this season.

Thirty-nine surveyors in all were employed, and the work effected was as follows:—

The determination of the latitudes and longitudes of certain points was carried on under the charge of Mr. W. F. King, Chief Inspector of Surveys, Mr. O. J. Klotz, D.T.S., being associated with Mr. King in this important work. During the season the position of Wapella, Kalmar and Port Arthur were accurately fixed.

In British Columbia five parties were engaged in subdivision surveys, the work performed being in the New Westminster, Kamloops, Thompson River, Little Shuswap Lake and Spellumcheen districts, and Mr. Dominion Land Surveyor Belanger was employed in planting section and quarter section posts in the vicinity of the railway line from the summit of the Rocky Mountains westward.

Mr. J. J. McArthur and Mr. W. S. Drewry continued the topographical surveys in the vicinity of the railway line. This work was carried on under a somewhat different system from that in vogue up to this time. The surveyors were provided, in addition to the ordinary surveying instruments, with small cameras with which views were taken from different points, the positions of which were fixed by rough triangulation; in mapping the district explored, the topographical details are supplied from the photographs.

This "photo-topographical" system of surveying was found to give good results, and allowed of large districts, which owing to their mountainous nature could not be surveyed by ordinary methods, being accurately mapped at a very small cost.

The development, enlargement, &c., of the large number of photographs taken in connection with these photo-topographical surveys, necessitated the employment of a professional photographer at headquarters, which position was filled in April of this year by the appointment of Mr. H. N. Topley.

Seven surveyors were engaged during the season, under the direction of Mr. Dennis, who, on the 7th of May, had been appointed Inspector of Surveys, in effecting corrections to existing surveys at different points in the Territories, and in examining subdivision contracts.

Ten contracts were let for subdivision surveys. This number, though small, provided for all immediate wants, as the subdivision surveys were found to be well in advance of settlement.

Until the previous year that part of the North-West Territories adjoining Alaska had not been visited by any parties under instructions from the Government, and the information regarding that vast district, derived as it was from travellers or foreign sources, was necessarily very vague.

During this year it was decided to send a joint geological and surveying expedition to make an examination of its resources. The expedition was in charge of Dr. Dawson, Assistant Director of the Geological Survey, with whom was associated Mr. W. Ogilvie, D.L.S., who, under instructions from the Surveyor General, was entrusted with the work of surveying the Pelly and Yukon Rivers, and defining the point where the 141st meridian (the international boundary between Alaska and Canada) intersected that river.

Mr. Ogilvie was instructed to winter at the boundary line, in order to complete the necessary astronomical observations at that point, and in the spring of 1888 was to start for the mouth of the Mackenzie River, by way of Porcupine River and Fort McPherson, and then ascend the Mackenzie River to Fort Chipewyan, at which place he would connect with his exploratory survey of the Peace and Athabasca Rivers, performed as already mentioned in 1884.

In June Mr. Ogilvie reached Chilkoot Inlet, in Alaska, and commenced his survey at one of the United States coast survey stations. He then crossed Taiya Pass, a distance of 18 miles, to Lake Lyndeman, the head of the Lewes River, and from there carried his survey down stream to the international boundary line.

This was much the most important and extensive exploration which had up to this time been undertaken by the department, and the results were looked forward to with a great deal of interest.

During this season Mr. Dominion Land Surveyor St. Cyr was engaged in defining the boundaries of the Rocky Mountains Park at Banff. Mr. Dominion Land Surveyor Miles located and surveyed reserves for the Mounted Police at different points in the Territories; and Mr. Dominion Land Surveyor Wilkins was detailed to survey certain lands occupied by the Methodist Church Missionary Society, adjoining or inside the boundaries of Indian reserves.

#### SEASON OF 1888.

The operations during this year, both in number of surveyors employed and work undertaken, shows a decrease as compared with 1887.

Thirty-five surveyors were employed, being distributed as follows:—

#### ASTRONOMICAL WORK.

The determination of the latitudes and longitudes was continued under the direction of Mr. King, Chief Inspector of Surveys, assisted as formerly by Mr. Klotz. During the winter a large astronomical transit and sidereal clock, with electric attachment, both by the well known makers Messrs. Cook & Sons, had been procured, and in the spring these instruments were set up in Winnipeg where Mr. King was located. Mr. Klotz during the summer occupied stations at Edmonton and Fort Pitt.

#### EXPLORATIONS.

Mr. Ogilvie continued his exploratory expedition in the Mackenzie district.

In the early spring he crossed over from his winter quarters on the Yukon to the Mackenzie River by way of the Porcupine, and from Fort McPherson began his survey of the Mackenzie. By the fall he had reached Fort Simpson.

An exploratory party under charge of Mr. D. T. S. Fawcett started in May from Athabasca Landing for the mouth of the Clearwater River, the object being to

connect the surveys of the Athabasca and Nelson Rivers by a survey down the Churchill River.

Mr. Fawcett was unable to reach the Nelson River. He finally reached the Saskatchewan by way of Cumberland, and descended that stream to Grand Rapids, and then by way of Lake Winnipeg to Winnipeg.

#### CORRECTION SURVEYS.

Five parties, under the direction of the Inspector of Surveys, were engaged during this season in carrying on correction surveys, among the most important of which may be mentioned the resurvey of the greater portion of the 5th initial meridian and part of the 4th initial meridian by Mr. D. L. S. Belanger.

#### BRITISH COLUMBIA.

In British Columbia the work of re-establishing the reference marks of the traverse of the Canadian Pacific Railway, and the marking of the nearest section and quarter section corners, was completed by Messrs. Fawcett, Dufresne, Garden and Cotton.

Mr. McLatchie and party were employed in effecting subdivision surveys in the valley of the Spillumcheen River, which is one of the best agricultural districts in that province.

Various subdivision surveys and resurveys were made by Mr. Cotton in the New Westminster District, and he also, by means of a traverse survey, established the limit of the railway belt on Pitt and Slave Lakes.

Mr. St. Cyr, who in the early part of the season completed the survey of the limits of the Rocky Mountain Park, and also some minor surveys in the Bow Pass, spent the latter part of the season in effecting a survey of the Columbia River for the purpose of defining the southern limit of the railway belt.

#### MANITOBA AND NORTH-WEST TERRITORIES.

Fourteen contracts were let for subdivision surveys in Manitoba and the Territories during this season, the larger number of the townships subdivided being north-east of Calgary.

Mr. Lestock Reid was engaged in surveying the Carrot River trail in the Prince Albert district, and also a main trail on the south side of the Saskatchewan River.

Mr. John Bourgeois made a survey of the trail from Carlton to Green Lake.

Mr. Green completed the survey of the more important trails in the Calgary district, and also effected the resubdivision of some townships in Southern Manitoba.

The highway from Westbourne to Gladstone, along the line of the Manitoba and North-Western Railway, was surveyed by Mr. C. P. Brown.

#### TOPOGRAPHICAL SURVEYS.

The "photo-topographical" survey of the Rocky Mountains was continued by Messrs. McArthur and Drewry, the former working in the Bow Pass from Copper Mountain eastward, and the latter being engaged in the Crow's Nest Pass.

The methods and instruments were considerably improved during this season, and a large tract of country was accurately surveyed.

#### NOTE.

In the foregoing history of the surveys performed under the Dominion Lands system an attempt has been made to consolidate the information relating thereto, which is now only to be found by reference to annual reports of the department, or to documents on record in the department. It will be understood that at best this narrative is only a compilation of information in a connected manner, so as to be

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useful for reference by those engaged in or interested in the survey operations of the department.

To refer briefly to some points connected with these surveys, and to the benefits which have accrued from their prosecution, may not be out of place.

When the vast country, now known as Manitoba and the North-West Territories, was acquired by the Dominion, the information possessed regarding its topography, soil and climatic conditions was very vague. It is true the greater portion of it had been explored by the hardy pioneers connected with the Hudson's Bay and North-West Fur Companies, and exploratory surveys had been made by Captain Palliser and others, which afforded much valuable information; but in so far as reliable data or statistics, of use in inducing immigration, were concerned, the Government practically knew nothing.

The primary consideration, having in view the future welfare of the country, was to devise a system under which the country could be rapidly and accurately subdivided into farm holdings. The system adopted and the manner of carrying it into effect have been treated of in the preceding pages.

The prosecution of these surveys has resulted not only in the subdivision of the country in a thorough and accurate manner, but also in the acquirement of a mass of reliable information which has enabled us to affirm that in Manitoba and the North-West Territories, the Dominion possesses an heritage which, for healthy climate, richness of soil and general adaptability for agricultural pursuits, compares favourably with any country on the habitable globe.

The manner in which the surveys have been performed, both as regards the quantity of work done and the accuracy of results accomplished, reflects the greatest credit upon those connected with the administration of the survey operations; and we are able to boast that never in the history of any country has so large a quantity of work been so successfully accomplished in the same space of time, and further that our land subdivision surveys, under the Dominion Lands system, stand unrivalled for accuracy and permanency of marking.

In the appendix will be found a schedule for each season, giving the names and residences of the surveyors employed, the character of the work upon which each one was engaged, and details of the work completed.

Schedules showing the trails surveyed, the reserves surveyed for the Hudson's Bay Company, Indian reserves surveyed by the Department of the Interior, micrometer and exploratory surveys performed, correction or resurveys completed, the acreage of the yearly surveys, and all settlement, townplot and miscellaneous surveys effected, are also appended.

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## APPENDIX.

## SCHEDULES.

SCHEDULE (No. 1) showing Surveyors employed and work performed by each, during the year 1869.

Name.	Residence.	Description of Work performed.
Dennis, Lt.-Col. J. S., P.L.S.	Toronto, Ont. ....	Superintendence and direction of surveys.
Hart, Milner, P. L.S.	St. Mary's, Ont. ....	Survey of part of Winnipeg Meridian and of outlines east of the same.
Webb, A. C. ....	Brighton, Ont. ....	Survey of part of Winnipeg Meridian and of outlines east and west of same: also settlement survey on north side of the Assiniboine River.

SCHEDULE (No. 2) showing Surveyors employed and work performed by each, during the year 1871.

Beatty, W. ....	Delta, Ont. ....	South boundary Township 3, Ranges 1 to 14, inclusive. North do do 4 do 1 to 14 do North do do 6 do 1 to 8 do East do Townships 3 and 4, Range 13. East do do 3 and 4 do 11. East do do 3, 4 and 5, Range 9. East do do 3, 4, 5 and 6, Range 7. East do do 3, 4, 5 and 6, Ranges 3 and 5. East do do 3 and 4, Range 15. (All west of the Principal Meridian.)
Brabazon, S. L. ....	Portage du Fort, Que.	Sub-division of Townships 11 and 12, Range 2. East boundary do 11 and 12, Range 5. North do Township 11, Range 5. (All east of the Principal Meridian.)
Beaudry, J. H. ....	.....	Part of the parishes of St. Vital and St. Norbert.
Doupe, Jos. ....	Angus, Ont. ....	South boundary Township 7, Range 1 to 6, inclusive. North do do 8 do 1 to 6 do North do do 10 do 1 to 4 do East do Townships 7, 8, 9 and 10, Range 3. East do do 7 and 8, Range 5. (All west of the Principal Meridian.)
D'Auteuil, L. J. ....	.....	Traverse Red River, Dean's Farm to Pembina.
Doucet, G. A. ....	.....	Traverse of part of Red River.
Hart, Milner ....	St. Mary's, Ont. ....	Principal Meridian, Townships 1 to 16, inclusive. East boundary Townships 15, 16 and 17, Range 3. Part east boundary Township 17, Range 5. Part east do do 15 do 5. East do Townships 12 and 13, Range 7. East do do 12, 13 and 14, Range 9. East do Township 15, Range 11. Part north do do 17 do 4. North do do 16 do 1 to 4, inclusive. South do do 15 do 1 to 5 do South do do 15 do 9 to 12 do (All west of the Principal Meridian.)

SCHEDULE (No. 2) showing Surveyors employed and work performed by each, during the year 1871—*Continued.*

Name.	Residence.	Description of Work performed.
Hermon, R. W....	Listowel, Ont. ...	North boundary Township 13, Range 6. East do Townships 12 and 13, Range 6. Sub-division do 12 and 13 do 6. do Township 12, Range 5. do south $\frac{1}{2}$ Township 13, Range 5. (All west of the Principal Meridian.) North boundary Township 11, Ranges 1 and 2. East do Townships 11 and 12, Ranges 1 and 2. Sub-division do 11 and 12 do 3. (All east of the Principal Meridian.)
Johnston, J. ...	Hull, Que.....	North boundary Township 8, Ranges 1 to 8, inclusive. North do do 10 do 3 to 4 do East do Townships 7, 8, 9 and 10, Ranges 2 and 4, inclusive East do do 9 and 10, Range 6. East do do 11 and 12 do 4. (All east of the Principal Meridian.)
Kennedy, L .....	Toronto, Ont. ....	South boundary Township 3, Ranges 1 to 4 inclusive. North do do 4, do 1 to 6 do North do do 6, do 1 to 6 do East do Townships 3, 4, 5 and 6, Ranges 2 and 4. East do do 5 and 6, Range 6. (All east of the Principal Meridian.)
Magrath, B. ....	Aylmer, Que.....	North boundary Township 12, Ranges 1 to 6 inclusive. North do do 14, do 4 and 6. East do Townships 13 and 14, Ranges 4 and 6. Part of east boundary Township 13, Range 2. (All east of the Principal Meridian.)
McLatchie, John	Templeton, Que...	Sub-division Township 12, Range 7. Part do do 14, do 9. West boundary do 12, do 7. South do do 12, do 7. East do do 13, do 8. (All west of the Principal Meridian.) Sub-division south $\frac{1}{2}$ Township 10, Ranges 1 and 2. North boundary 9, Ranges 1 to 4 inclusive. East do 9 and 10, Ranges 1 and 3. Part of eastern boundary of 10, Range 2. (All east of the 1st Meridian.)
McPhillips, Geo., sen.	Winnipeg, Man...	Survey of St. Francois-Xavier, Baie St. Paul and Headingly.
McFadden, M....	Newry, Ont.....	Along settlements.
Staunton, F. H. L.	Dundas, Ont.....	North and east boundaries Township 13, Range 10. East boundary Township 14, Range 10. Part of sub-division of Township 14, Range 10. (All west of the Principal Meridian.) Sub-division of Townships 9 and 10, Ranges 3 and 4. (All east of the Principal Meridian.)
Sinclair, Donald ..	Winnipeg, Man...	Sub-division of Townships 13 and 14, Range 7. do Township 14, Range 8. North boundary do 13, Ranges 7 and 8. (All west of the Principal Meridian.) Sub-division of Township 11, Range 3. do Townships 11 and 12, Range 4. North boundary of Township 11, Ranges 3 and 4. East do Townships 11 and 12, Range 3. (All east of the Principal Meridian.)
Sadler, David.....	Dalhousie, N.B. ...	Sub-division of Township 9, Ranges 1 and 2. East boundary do 9, Range 3. (All east of the Principal Meridian.)
Wagner, William ..	Toronto, Ont. ....	Sub-division Township 13, Range 8, west of the Principal Meridian. do do 13 do 9. South boundary do 12 do 8. North do do 13 do 9. (All west of the Principal Meridian.) Sub-division Townships 11 and 12, Range 1, east of the Principal Meridian.

SCHEDULE (No. 2) showing Surveyors employed and work performed by each, during the year 1871—*Concluded.*

Name.	Residence.	Description of Work performed.
Webb, A.C. ....	Brighton, Ont. ....	North boundary Township 12, Ranges 1 to 10 inclusive. North do do 14 do 1 to 5 do North do do 14 do 9 to 12 do East do Townships 11, 12, 13 and 14, Range 3. East do do 13 and 14, Range 5. East do do 13 and 14 do 11. (All west of the Principal Meridian.)
Sinclair, Duncan..	Ottawa, Ont. ....	Survey part of the parishes of St. John, Kildonan and St. Paul.

SCHEDULE (No. 3) showing Surveyors employed and work performed by each, during the year 1872.

Bray, Edgar .....	Oakville, Ont. ....	Sub-division of Townships 9 and 10, Range 5. North boundary Township 9, Range 5. East do Townships 9 and 10, Range 6. (All west of the Principal Meridian.) North boundary Township 10, Ranges 5, 6, 7 and 8. South do do 11 do 5, 6, 7 and 8. North do do 12 do 7, 8 and 9. East do Townships 11 and 12, Ranges 6 and 8. (All east of the Principal Meridian.)
Beatty, W. ....	Delta, Ont. ....	North boundary Township 6, Ranges 9 to 14 inclusive. East do do 6, Range 9. East do Townships 5 and 6, Range 11. East do do 5 and 6 do 13. East do do 5 and 6 do 15. (All west of the Principal Meridian.)
Beatty, W. & D. ....	do .....	Sub-division of Township 2, Ranges 1 to 14 inclusive. do do 5 do 3 and 4. do do 5 do 11, 12, 13 and 14. do do 6 do 3, 4, 11, 12, 13 and 14. North boundary Township 1, Ranges 1 to 14 inclusive. North do do 2 do 1 to 14 do North do do 5 do 3, 4, 11, 12, 13 and 14. East do do 2 do 2 to 15 inclusive. East do do 5 do 4, 12 and 14. East do do 6 do 4, 12 and 14. (All west of the Principal Meridian.)
Brown, C. P. ....	Fredericton, N.B. ....	Sub-division of Township 15, Ranges 11 and 12. do do 16 do 11 and 12. East boundary Townships 15 and 16, Range 12. North do Township 15, Ranges 11 and 12. (All west of the Principal Meridian.)
Burke, W. ....	Cobourg, Ont. ....	Sub-division of Township 3, Ranges 3 and 4. do do 4 do 3 and 4. North boundary of Township 3, Ranges 3 and 4. East do do 3 and 4, Range 4. (All west of the Principal Meridian.) Sub-division of Township 4, Range 5. do do 5 do 5. East boundary of Townships 3, 4, 5 and 6, Range 5. North do do 3, Range 5. (All east of the Principal Meridian.)
Bouchette, C. J. ....	Montreal, Que. ....	Sub-division of Township 4, Ranges 5 and 6. do do 3, do 5 and 6. do do 10, Range 8.* North boundary of Township 3, Ranges 5 and 6. East do do 3 and 4, Range 6. East do do 10, Range 8. (All west of the Principal Meridian.)

\* The township was completed in 1873 by Bouchette.

SCHEDULE (No. 3) showing Surveyors employed and Work performed by each, during the year 1872—*Continued.*

Name.	Residence.	Description of Work performed.
Bayne, G. A. . . . .	Pictou, N.S. . . . .	Sub-division of Townships 13 and 14, Range 6. do part of Townships 13 and 14, Range 5. East boundary of Townships 13 and 14, Range 5. North do Township 13, Range 6. Part of north boundary of Township 13, Range 5. (All east of the Principal Meridian.)
Campbell, D. S. . . . .	Mitchell, Ont. . . . .	Sub-division of Township 9, Range 2. North boundary of Township 9, Range 2. (All west of the Principal Meridian.)
Cooper, T. W. . . . .	Guelph, Ont. . . . .	Sub-division of Townships 9 and 10, Ranges 3 and 4. North boundary of Township 9 do 3 and 4. East do of Townships 9 and 10, Range 4. (All west of the Principal Meridian.)
Chapman, C. F. . . . .	Preston, Ont. . . . .	Sub-division of Township 11, Ranges 3 and 4. do south $\frac{1}{2}$ of Township 12, Range 4. do north-east part of Township 12, Range 3. East boundaries of Townships 11 and 12, Range 4. North do Township 11, Ranges 3 and 4. (All west of the Principal Meridian.)
Cheeseman, Thos. . . . .	Mitchell, Ont. . . . .	Sub-division of Townships 7 and 8, Ranges 5 and 6. North boundary of Township 7 do 5 and 6. East boundaries of Townships 7 and 8, Range 5. Sub-division of Township 14, Range 4. do part do 13, Ranges, 3 and 4. East boundaries of Townships 13 and 14, Range 3. North do Township 13, Ranges 3 and 4. South do do 7 do 5 and 6. (All east of the Principal Meridian.)
Caddy, E. C. . . . .	Cobourg, Ont. . . . .	Sub-division of Township 15, Range 1. do do 14, Ranges 2 and 3. do do 13, Range 3. do Townships 9 and 10, Ranges 5 and 6. North boundary of Township 9 do 5 and 6. East do Townships 9 and 10, Range 5. North do Township 15, Range 1. East do do 15, do 1. East do do 14, do 2. Part north boundary of Township 13, Range 3. (All east of the Principal Meridian.)
Davidson, O. B. . . . .	Amherst, N.S. . . . .	Sub-division of Township 5, Ranges 9 and 10. do do 6, Range 10. North boundary do 5, Ranges 9 and 10. East do Townships 5 and 6, Range 10. Sub-division of Township 9, Range 1. North and west boundaries of Township 9, Range 1. (All west of the Principal Meridian.)
Doupe, Joseph . . . . .	Angus, Ont. . . . .	North boundary of Township 8, Ranges 7 to 14, inclusive. East do Townships 7 and 8, Range 7. Part east boundary of Township 8, Range 15. East do do 9 do 9. South do do 7, Ranges 7 and 8. North do do 10 do 9 and 10. South do do 11 do 9 and 10. South do do 11 do 1, 2, 3 and 4. (All West of the Principal Meridian.)
Dennis, John. . . . .	Weston, Ont. . . . .	Exploration—Country on Brokenhead River, and towards the foot of the Lake of the Woods.
Grant, John . . . . .	Winnipeg, Man. . . . .	Sub-division of Townships 3 and 4, Ranges 1 and 2. North boundary of Township 3 do 1 and 2. East do Townships 3 and 4, Range 2. (All west of the Principal Meridian.) Sub-division of Township 14, Range 1. East boundary do 14 do 1. Sub-division do 4 do 6. (All east of the Principal Meridian.)
Harris, M. . . . .	Thunder Bay, Ont. . . . .	Exploration—Duck Mountains, Dauphin Lake, west shore of Lake Manitoba, south of Manitoba House.



SCHEDULE (No. 3) showing Surveyors employed and Work performed by each, during the year 1872—*Continued.*

Name.	Residence.	Description of Work performed.
Hermon & Bolton.	Listowel, Ont. ....	Sub-division of Townships 13 and 14, Ranges 3 and 4.
		do Township 14, Range 5.
		do north half of Township 13, Range 5.
		North boundary of Township 13, Ranges 3, 4 and 5.
		East do Townships 13 and 14, Range 4.
		Sub-division do 13 and 14, Ranges 11 and 12.
		North boundary of Township 13, Ranges 11 and 12.
Johnston, John....	Hull, Que .....	East do Townships 13 and 14, Range 12.
		(All west of the Principal Meridian.)
		Sub-division of Township 13, Range 7.
		East boundary do 13 do 7.
		South do do 7 do 1, 2, 3 and 4.
		North do do 8 do 9 and 10.
		East do do 7 and 8, Ranges 6, 8 and 10.
Kennedy, L .....	Toronto, Ont. ....	East do do 9 and 10 do 8 and 10.
		(All east of the Principal Meridian.)
		Sub-division of Township 2, Ranges 1, 3 and 4.
		North boundary do 1 do 1, 3 and 4.
		North do do 2 do 1, 3 and 4.
		East do do 2 do 1, 2, 3 and 4.
		West do do 2 do 1.
Lawe, Henry.....	Dunnville, Ont. ....	South do do 3 do 5, 6 and 7.
		North do do 6 do 7 and 8.
		East do do 3 and 4, Range 6.
		(All east of the Principal Meridian.)
		Sub-division of Township 13, Range 1.
		North boundary do 13 do 1.
		East do do 13 do 1.
Lippé, A. W.....	Acton, Que. ....	Sub-division of do 11 do 5.
		do do 11 and 12, Range 6.
		East boundary do 11, Range 5.
		North do do 11 do 6.
		(All east of the Principal Meridian.)
		Sub-division of Township 7, Range 3.
		do do 7 and 8, Range 4.
LeBer, Charles. . .	Montreal, Que. ....	North boundary do 7, Ranges 3 and 4.
		East do do 7 and 8, Range 3.
		Sub-division do 7, Range 5.
		North boundary do 5 do 5.
		(All east of the Principal Meridian.)
		Sub-division of Townships 5 and 6, Ranges 3 and 4.
		North boundary do 5, Ranges 3 and 4.
LeBer, H. ....	St. Wenceslas, Que. ....	East do do 5 do 3.
		(All east of the Principal Meridian.)
		Sub-division of Townships 3 and 4, Ranges 11 and 12.
		North boundary do 3, Ranges 11 and 12.
		East do do 3 and 4, Range 12.
		(All west of the Principal Meridian.)
		Sub-division of Township 13, Range 2.
Morris, John.....	Perth, Ont. ....	North and east boundaries, Township 13, Range 2.
		(All east of the Principal Meridian.)
		Sub-division of Townships 5 and 6, Ranges 1 and 2.
		North boundary do 5, Ranges 1 and 2.
		East do do 5 and 6, Range 2.
		(All west of the Principal Meridian.)
		Sub-division of Townships 7 and 8, Range 7.
Martin, A. F. . . .	Bic, Que.....	do do 7, Range 8.
		North boundary do 7 do 7 and 8.
		South do do 7 do 7.
		East do do 7 and 8, Range 7.
		(All east of the Principal Meridian.)
		Sub-division of Townships 3 and 4, Ranges 3 and 4.
		North boundary do 3, Ranges 3 and 4.
McGuin, S. O. . . .	Loughboro, Ont. ....	East do do 3 do 3.
		East do do 4 do 3.
		(All east of the Principal Meridian.)

SCHEDULE (No. 3) showing Surveyors employed and Work performed by each, during the year 1872—*Continued.*

Name.	Residence.	Description of Work performed.
McLatchie, John	Templeton, Que...	Sub-division of Townships 15, 16, 17 and 18, Ranges 13 and 14. South boundary do 15, Ranges 15 and 16. North do do 15 do 13 and 14. North do do 16 do 11, 12, 13, 14, 15 and 16. Part north boundary Township 16, Range 17. North boundary Township 17, Ranges 13 and 14. North do do 18 do 13, 14, 15 and 16. East do do 15, 16, 17 and 18, Ranges 13, 14 and 15. East do do 15 and 16, Range 17. 5 miles in Township 17, Range 11. (All west of the Principal Meridian.)
McFadden, M.	Newry, Ont.....	Survey of part of Parishes of Baie St. Paul, Poplar Point, High Bluff and Portage la Prairie.
McArthur, Jas.	Aylmer, Que....	Sub-division of Townships 3 and 4, Ranges 7 and 8. North boundary do 3, Ranges 7 and 8. East do do 3 and 4, Range 8. (All west of the Principal Meridian.)
McPhillips, G., sr.	Seaforth, Ont.....	Survey of part of Parishes of St. Charles, Headingly, St. Anne's and St. Francois Xavier.
Newcomb, Geo. F.	King's Co., N.S...	Exploration of west shore of Lake Winnipeg, including islands and rivers as far north as the Narrows.
Otty, W. & J. McG.	St. John, N.B....	Sub-division of Townships 5 and 6, Ranges 5 and 6. do do 3 and 4 do 13 and 14. North boundary do 5 do 5 and 6. East do do 5 and 6 do 6. North do do 3 do 13 and 14. East do do 3 and 4 do 14. (All west of the Principal Meridian.)
Reid, J. Lestock.	Bowmanville, Ont.	North boundary, Township 10, Ranges 5, 6, 7 and 8. East do 9 and 10 do 5 and 7. East do 10 do 9. East do 9 and 10 do 11. (All west of the Principal Meridian.) North boundary, Township 14, Ranges 1 and 2. Part east do 13 do 2. 6 miles of Township 14, Range 2. (All east of the Principal Meridian.)
Rainboth, G. C.	Aylmer, Que.....	Exploration of east shore of Lake Winnipeg, including rivers as far north as Beren's River.
Richard, J. B.	Wotton, Que.....	Sub-division of Townships 3 and 4, Range 1. do do 7 and 8 do 1 and 2. do do 5 do 6. North boundary, Township 3 do 1. North do 7 do 1 and 2. East do 7 and 8 do 1. (All east of the Principal Meridian.)
Russell, A. L.	Ottawa, Ont.....	South boundary, Township 11, Ranges 5, 6, 7 and 8. East do 11 and 12 do 5. East do 11 do 7 and 9. (All west of the Principal Meridian.)
Sinclair, Duncan.	Winnipeg, Man...	Part of Parishes of St. James, St. Charles, St. John, Kildonan, St. Paul, St. Boniface, St. Vital and St. Norbert.
Snow, John A.	Hull, Que.....	Sub-division of Townships 7 and 8, Ranges 1, 2, 3 and 4. North boundary do 7 do 1, 2, 3 and 4. East boundaries do 7 and 8 do 2 and 4. (All west of the Principal Meridian.) Sub-division of Townships 5 and 6, Ranges 1 and 2. North boundary do 5 do 1 and 1 mile in Range 2 East. (All east of the Principal Meridian.) East boundary of Township 6, Range 1. East do 5 do 1. (All east of Principal Meridian.)

SCHEDULE (No. 3) showing Surveyors employed and Work performed by each, during the year 1872—*Concluded.*

Name.	Residence.	Description of Work performed.
Sadler, David.....	Dalhousie, N.B. . . .	Sub-division of Townships 13 and 14, Ranges 1 and 2. North boundary do 13 do 1 and 2. East do 13 and 14 do 2. (All west of the Principal Meridian.) Sub-division of Township 6, Range 6. South boundary do 6 do 6. Sub-division do 12 do 5. East boundary do 12 do 5. (All east of the Principal Meridian.)
Staunton, F. H. L.	Dundas, Ont. . . . .	Sub-division of Townships 7 and 8, Range 5. North boundary do 7 do 5 and 6. East do 7 and 8, do 6. Sub-division of parts do 14 do 9 and 10. (All west of the Principal Meridian.)
Svenkernd, H. . . . .	Ottawa, Ont. . . . .	Exploration of the Lake of the Woods and Lake Roseau.
Smith, H. B. . . . .	Ottawa, Ont. . . . .	Explorations on Lakes Winnipeg, Manitoba and Winnipegosis, and survey for canal at Meadow and Mossy Portages.
Vaughan, A. H. . . . .	Bury, Que. . . . .	Sub-division of Township 10, Ranges 1 and 2. East boundary do 10 do 2. North do 10 do 2. (All west of the Principal Meridian.)
Warren, J. . . . .	Acton, Ont. . . . .	Sub-division of Township 9, Range 7, east of the Principal Meridian. Sub-division of parts of Townships 11 and 12, Ranges 1 and 2. East boundary do 11 and 12 do 2. North do do 11 do 1. Sub-division do 11 and 12 do 9. North boundary do 11 do 9. East do do 11 and 12 do 10. (All west of the Principal Meridian.)
Webb, A. C. . . . .	Brighton, Ont. . . . .	North boundary of Township 12, Ranges 11, 12, 13 and 14. North do 14 do 13 and 14. East do 11 and 12 do 11. East do 11, 12, 13, and 14, Ranges 13 and 15. South do 15, Ranges 13 and 14. (All west of the Principal Meridian.)
Wagner, W. . . . .	Toronto, Ont. . . . .	Sub-divisions of Townships 15, 16 and 17, Ranges 1, 2, 3 and 4. do part of Township 15, Range 5. North boundary of Township 15, Ranges 1, 2, 3 and 4. North do 17 do 1, 2, 3 and 4. East do 17 do 1 (2 miles.) East do 15 and 17 do 2. East do 15, 16 and 17 do 4. East do 15 do 5. (All west of the Principal Meridian.) East shore of Lake Manitoba, from Province Lines to the Narrows. Part of Oak Point Settlement. Part of Settlement of St. Laurent.

SCHEDULE (No. 4) showing Surveyors employed and Work performed by each, during the year 1873.

Albright, G. N. . . . .	Portage la Prairie, Man.	Sub-division of Townships 9 and 10, Range 6. do do 11, Range 5, and part of Tp. 11, Range 6. North boundary, Township 9, Range 6. North do 11 do 5. East do 11 do 6. East do 11 do 7. (All west of the Principal Meridian.)
Beatty, W. & D. . . . .	Delta, Ont. . . . .	Sub-division of Townships 7 and 8, Ranges 13 and 14. do do 11 and 12 do 13 and 14. do do 13, 14, 15 and 16, Range 17. do do 13, 14, 15 and 16 do 19. do do 15 and 16, Ranges 21, 22, 23, 24, 25 and 26.

SCHEDULE (No. 4) showing Surveyors employed and Work performed by each, during the year 1873—Continued.

Name.	Residence.	Description of Work performed.	
Beatty, W. & D...	Delta, Ont. ....	South boundary, Township 7, Ranges 13 and 14.	
		North do 8 do 13 and 14.	
		South do 11 do 13 and 14.	
		North do 11 do 13 and 14.	
		East do 7, 8, 9, 10 do 13.	
		East do 7 and 8 do 14 and 15.	
		East do 11 and 12 do 14.	
		North do 13 do 17.	
		North do 15 do 17.	
		East do 13, 14, 15, 16 do 18.	
		North do 15 do 19.	
		East do 16 do 19.	
		North do 15 do 21, 22, 23, 24, 25 and 26.	
		East do 15 and 16 do 22, 24 and 26.	
		(All west of the Principal Meridian.)	
Bayne, G. A. ....	Pictou, N.S. ....	Sub-division of Townships 11 and 12 and part of 13, Range 10.	
		North boundary, Township 11, Range 10.	
		Sub-division of do 20 do 16.	
		South boundary do 20 do 16.	
		(All west of the Principal Meridian.)	
		Sub-division of Townships 9, 10, 11 and 12, Range 7.	
		do do 11 and 12 do 8.	
Burke, W. ....	Winnipeg, Man. ....	East boundary, Townships 9, 10, 11 and 12 do 7.	
		North do 9, Range 7.	
		North do 11 do 7 and 8.	
		(All east of the Principal Meridian.)	
		Sub-division of Townships 17 and 18, Range 17.	
Bouchette, C. J. ...	Montreal, Que. ....	East boundary do 17 and 18 do 18.	
		(All west of the Principal Meridian.)	
		Sub-division of Townships 9 and 10, Range 7.	
		do do 9 do 8.	
		do do 11 do 8.	
		North boundary do 9 do 7 and 8.	
		East do do 9 do 8.	
		East do do 11 do 8.	
		Sub-division do 17 and 18 do 15.	
		North boundary do 17 do 15.	
East do do 17 and 18 do 16.			
(All west of the Principal Meridian.)			
Bray, E. ....	Oakville, Ont. ....	South boundary of Township 19, Ranges 11, 12, 13 and 14.	
		North do 20 do 11, 12, 13 and 14.	
		North do 22 do 13 and 14.	
		East do 19 and 20, Range 11.	
		East do 19, 20, 21 and 22, Range 13.	
		(All west of the Principal Meridian.)	
Brown, C. P. ....	Winnipeg, Man. ....	Sub-division of Townships 15, 16, 17 and 18, Range 9.	
		do do 15, 16, 17, 18, 19 and 20, Range 10.	
		do do 17 and 18, Ranges 11 and 12.	
		North boundary do 15, Ranges 9 and 10.	
		do do 16, 17 and 18, Ranges 9 and 10.	
		do do 17, Ranges 11 and 12.	
		do do 18 do 11 and 12.	
		do do 19 and 20, Range 10.	
		Part east boundary do 16 and 17 do 9.	
		East boundary do 15, 16, 17, 18, 19 and 20, Range 10.	
		do do 18, Range 11.	
		do do 17 and 18, Range 12.	
		Part of sub-division do 16 and 17 do 8.	
		North boundary do 16 do 8.	
(All west of the Principal Meridian.)			
Caddy, E. C. ...	Cobourg, Ont. ....	Sub-division of Township 16, Range 1.	
		do do 15 and 16, Ranges 2 and 3.	
		do East half of Township 14, Range 3.	
		North boundary of Township 16, Ranges 1 and 2.	
		do do 15 do 2 and 3.	
		do do 14 do 2 and 3.	
		East boundary do 16 do 1.	
do do 15, 16 do 2.			
South boundary do 15 do 2.			
(All east of the Principal Meridian.)			

SCHEDULE (No. 4) showing Surveyors employed and Work performed by each, during the year 1873—*Continued.*

Name.	Residence.	Description of Work performed.
Davidson, O. B...	Winnipeg, Man...	Sub-division of Township 5, Range 7. do do 5 and 6, Range 8. do do 6 do 9. do Part of Township 6, Range 10. (All west of the Principal Meridian.)
Doupe, Jos.. . . .	Winnipeg, Man...	Sub-division of Township 8, Range 7. West and south boundaries of Township 8, Range 7. East boundary, Townships 21 and 22, Range 15. North do 22 do 15 and 16. North do 10 do 15, 16, 17 and 18. North do 8 do 15 and 16. East do 9 and 10 do 15 and 17. (All west of the Principal Meridian.)
Eaton, W. Case, . .	St. James, Man, . .	Sub-division of Townships 19 and 20, Range 15. North boundary do 19 do 15. East boundaries do 19 and 20 do 16. (All west of the Principal Meridian.)
Gore, W. S. . . . .	Gore's Landing, Ont.	Survey of Hudson's Bay Company's Reserves at— Fort Ellice, Fort Pelly, Fort Qu'Appelle, Touchwood Hills, Fairford Mission, Carlton House, Prince Albert, Fort la Corne, Moose Woods, Battle River, Fort Pitt, St. Paul, Fort Victoria, Fort Edmonton, Lac la Biche, Pigeon Lake, Rocky Mountain House, Fort Assiniboine, Old White Mud Fort, Lac la Nonne, Lac Ste. Anne, Cumberland House, Moose Lake, Grand Rapids West, Grand Rapids East, Shoal River, St. Albert.
Grant, John. . . . .	Winnipeg, Man...	Sub-division of Townships 3 and 4, Range 2. do 2 and 3 do 5 and 6. North boundary of Township 3, Range 2. North do 1 and 2, Ranges 5 and 6. North do 3 do 6. East do 2 do 5 and 6. (All east of the Principal Meridian.)
Hermon & Bolton.	Listowell, Ont. . . .	Sub-division of Townships 13 and 14, Range 20. do 11 and 12 do 12. do 13 and 14 do 23, 24, 25 and 26. North boundary Township 13 do 20. East do 13 and 14 do 20. South do 11 do 12. North do 11 do 12. East do 12 do 12. North do 13 do 23, 24, 25 and 26. East do 13 and 14 do 24, 26 and 27. North do 12 do 26. (All west of the Principal Meridian.)
Holmes, J . . . . .	. . . . .	Sub-division of Township 13, Range 14. do 16 do 20. do 11 do 16. do 14 do 21. do 15 do 20. do 13 do 21. do 14 do 14. do 12 do 16. North boundary Township 13 do 14. North do 15 do 20. North do 13 do 21. South do 12 do 16. East do 15 and 16, Range 20. (All west of the Principal Meridian.)
Johnston, John. . . .	Hull, Que . . . . .	Sub-division of Township 13, Range 8. do 14 do 7 and 8. East boundary of Townships 13 and 14, Range 8. East do 14 do 7. North do 13 do 7 and 8. North do 14 do 7 and 8. (All east of the Principal Meridian.)

SCHEDULE (No. 4) showing Surveyors employed and Work performed by each, during the year 1873—Continued.

Name.	Residence.	Description of Work performed.
Johnston, John...	Hull, Que . . . . .	Sub-division of Township 15, Range 18. do 15 and 16, Range 15. North boundary of Township 15 do 15. North do 15 do 18. (All west of the Principal Meridian.)
Kennedy, L. . . . .	Toronto, Ont. . . . .	East boundaries of Townships 3, 4, 5 and 6, Range 10. East do 3, 4, 5 and 6 do 8. South do 3 do 8, 9 and 10. North do 4 do 7, 8, 9 and 10. North do 6 do 9 and 10. (All east of the Principal Meridian.) North boundary of Township 11, Range 11. East do 11 do 12. East do 12 do 12. South do 11 do 11. Sub-division of Townships 11 and 12, Range 11. (All west of the Principal Meridian.)
Lloyd, Geo. . . . .	.....	Sub-division of Townships 15 and 16, Range 16. do 17 and 18 do 16. do 17 and 18 do 18. North boundary, Townships 15 and 17 do 16. North do 17 do 18. East do 15 and 16 do 16. (All west of the Principal Meridian.)
LeBer, H. . . . .	St. Wenceslas, Que.	Sub-division of Townships 15 and 16, Range 4. North boundaries of Township 16, Ranges 3 and 4. do do 15, Range 4. South do 15 do 4. East do 15 and 16, Ranges 3 and 4. (All east of Principal Meridian.) Sub-division of Townships 19 and 20, Ranges 13 and 14. do 13 and 14, Range 13. North boundaries of Township 19, Ranges 13 and 14. do 13, Range 13. East boundaries of Townships 19 and 20, Range 14. do 13 and 14 do 14. (All west of Principal Meridian.)
McLatchie, J. . . . .	Ottawa, Ont. . . . .	South boundary of Township 15, Ranges 17 to 28, inclusive. North do Townships 16 and 18, Ranges 17 to 28, inclusive. East do do 17 and 18, Range 17. do do 15, 16, 17 and 18, Ranges 19, 21, 23, 25 and 27. (All west of Principal Meridian.)
Martin, A. F. . . . .	Emerson, Man. . . . .	Sub-division of Township 8, Ranges 3 and 8; do part of Township 2, Range 2. Part of north and south boundaries of Township 2, Range 2. (All east of the Principal Meridian.) Traverse of part of Red River.
McFadden, M. . . . .	Newry, Ont. . . . .	Sub-division of Township 8, Range 8. do Townships 9 and 10, Ranges 9 and 10. East boundary of Township 8, Range 9. do Townships 9 and 10, Range 10. North boundary of Township 7, Range 8. do 9, Ranges 9 and 10. (All west of Principal Meridian.)
McArthur, J. . . . .	Aylmer, Que. . . . .	Sub-division of Township 6, Range 7. do Townships 3 and 4, Ranges 9 and 10. North boundary of Township 5, Ranges 7 and 8. do 3 do 9 and 10. East boundary of Townships 5 and 6, Range 8. do 3 and 4 do 10. (All west of Principal Meridian.)
Otty, Wm. . . . .	St. John, N.B. . . . .	Sub-division of Townships 7 and 8, Range 12. do 11 and 12 do 18. do 11 and 12 do 20. Sub-division of Township 11, Range 22.

SCHEDULE (No. 4) showing Surveyors employed and Work performed by each, during the year 1873—*Continued.*

Name.	Residence.	Description of Work performed.
Otty, Wm. ....	St. John, N.B. ....	East boundaries of Townships 7 and 8, Range 12. do Township 12, Range 18. do do 12 do 20. do do 11 do 22. North boundaries of Township 7, Range 12. do 11 do 20. do 11 do 18. South boundaries of Township 7 do 12. (All west of Principal Meridian.)
Otty, J. ....	St. John, N.B. ....	Sub-division of Townships 7 and 8, Range 11. do 11 and 12 do 19. Sub-division of Township 12, Range 22. do 21 do 16. do 11 do 23. Sub-division of Townships 11 and 12, Range 17. North boundaries, Township 7, Range 11. do 11 do 19. do 21 do 16. do 11 do 17. do 11 do 23. South boundaries, Township 7 do 11. do 12 do 22. East boundaries of Townships 7 and 8, Range 11. do Township 12, Range 22. do Townships 21 and 22, Range 16. do Township 11, Range 20. do do 11 do 18. (All west of Principal Meridian.)
Reid, J. L. ....	Port Arthur, Ont. ....	South boundaries of Township 19, Ranges 15, 16, 17 and 18. North do 20 do 15, 16 and 17. East boundaries of Townships 19 and 20, Range 15. do 19, 20, 21 and 22, Range 17. (All west of Principal Meridian.)
Reiffenstein, J. H.	Ottawa, Ont. ....	Sub-division of Townships 13 and 14, Range 16. do Township 12, Range 25. do Townships 13 and 14, Range 22. East boundaries of Townships 13 and 14, Range 16. do 13 and 14 do 22. North boundaries of Township 13, Range 16. do 13 do 22. South boundaries of Township 12 do 25. (All west of Principal Meridian.)
Richard, J. B. ....	Wotton, Que. ....	Sub-division of Townships 13 and 14, Range 15. do Township 12, Range 23. do Townships 13 and 14, Range 18. do do 11 and 12 do 24. North boundaries of Township 13, Ranges 15 and 18. do 11, Range 24. East boundaries of Townships 11 and 12, Range 24. (All west of Principal Meridian.)
Russell, A. L. ....	Port Arthur, Ont. ....	Sub-division of Township 1, Ranges 3 and 4. East boundaries of Township 1, Ranges 3 and 4. South do 1 do 3 and 4. (All east of Principal Meridian.)
Sinclair, Duncan ..	Winnipeg, Man. ....	Sub-division of Township 5, Range 8. North boundary do 5 do 8. (All east of Principal Meridian.)
Vaughan, A. H. ....	do	Sub-division of Township 17, Range 2. do do 17, Ranges 3 and 4. do do 18 do 3 and 4. East boundary do 17 do 1, 2 and 3. East do do 18 do 2 and 3. North do do 17 do 2, 3 and 4. North do do 18 do 3 and 4. South do do 17, Range 3. (All east of Principal Meridian.) Survey of part of Red River and Indian Settlement, in the Parish of St. Peter. Survey of part of Indian Reserve line in the Parish of St. Peter.

SCHEDULE (No. 4) showing Surveyors employed and Work performed by each, during the year 1873—*Concluded.*

Name.	Residence.	Description of Work performed.
Webb, A. C. ....	Brighton, Ont. ....	South boundary of Township 11, Ranges 15 to 25. North do do 12 do 15 to 25. North do do 14 do 15 to 26 East do do 11, 12, 13 and 14, Ranges 17, 19, 21, 23 and 25. (All west of Principal Meridian.)
Warren, J. ....	Kincardine, Ont. ....	Sub-division of Townships 11 and 12, Ranges 15 and 21. East boundary do 11 and 12, Range 16. North do do 11, Ranges 15 and 21. (All west of Principal Meridian.)
Wagner, Wm. ....	Ossowa, Man. ....	Sub-division of Townships 19 and 20, Range 5. do do 20, Range 6. do part of Township 18, Range 5. do part of do 19 do 6. do part of do 20 do 7. North boundaries do 19 and 20, Ranges 5 and 6. Part of north boundaries of Township 18, Range 5. North boundary of Township 20, Range 7. East do do 18, 19 and 20, Range 5. East do do 20, Range 7. Part of east boundary of Township 19, Range 6.

SCHEDULE (No. 5) showing Surveyors employed and Work performed by each, during the year 1874.

Albright, G. N. ...	Portage la Prairie.	Sub-division of Townships 7 and 8, Range 6. North boundary do 7, Range 6. (All west of Principal Meridian.)
Bolton, L. ....	Listowell, Ont. ....	Sub-division of Township 8, Ranges 9 and 10. North boundary do 7 do 9 and 10. East do do 8 do 10. (All west of Principal Meridian.)
Burke, W. ....	Winnipeg, Man. ....	Sub-division of Township 17, Range 20. do do 18 do 19. North boundary do 17 do 19 and 20. East do do 18 do 20. East do do 17 do 20. Sub-division do 17 do 19. (All west of Principal Meridian.)
Brown, C. P. ....	do	Sub-division of Townships 19 and 20, Ranges 9, 11 and 12. North boundary do 19, Ranges 9, 11 and 12. East do do 19 and 20, Range 12. South do do 18, Range 9. (All west of Principal Meridian.)
Doupe, Jos. ....	do	Sub-division of Township 7, Range 7. do part of Township 7, Range 8. East boundary of Township 7, Range 8. (All west of Principal Meridian.)
Grant, John. ....	do	Sub-division of Township 10, Range 8. North boundary do 10 do 8. (All east of Principal Meridian.)
Harris, J. W. ....	Port Arthur, Ont. ....	Part of outer 2 miles in the Parishes of St. John, St. James, St. Charles (north), Kildonan and St. Paul (west).
Johnston, J. ....	Hull, Que. ....	Sub-division of Township 16, Range 18. (West of Principal Meridian.) Sub-division of Townships 15 and 16, Ranges 6 and 7. do do 17, do 7 and 8. North boundary do 15, do 6 and 7. North do do 16, do 7. North do do 17, do 7. East do do 15, do 5. East do do 15 and 16, do 6 and 7. (All east of Principal Meridian.)



SCHEDULE (No. 5) showing Surveyors employed and Work performed by each, during the year 1874—*Concluded.*

Name.	Residence.	Description of Work performed.
Kennedy, L. ....	Toronto, Ont. ....	Sub-division of Township 1, Ranges 1 and 2. South boundary do 1, do 1 and 2. East do do 1, do 1. West do do 1, do 1. (All east of Principal Meridian.)
McPhillips, Geo. ....	Winnipeg, Man. ....	Sub-division of part of Township 11, Range 7. (West of Principal Meridian.) Part of the Parish of St. Agathe, 2 mile lines in Parishes of Headingly, St. Vital, Baie St. Paul, St. François Xavier.
Martin, A. F. ....	Emerson, Man. ....	River lots in the outer 2 mile limit in the Parishes of St. Norbert, St. Charles, St. Boniface, St. Vital and High Bluff.
Pearce, Wm. ....	Calgary, Alberta. ....	Sub-division of part of Townships 11 and 12, Range 4. South boundary of Township 11, Range 4. (All east of Principal Meridian.) Survey of the outer 2 miles in the Parishes of Headingly and St. François Xavier.
Reiffenstein, J. H. ....	Ottawa, Ont. ....	Sub-division of Townships 15, 16 and 17, Range 8. East boundary do 15, 16 and 17, do 8. East do do 17, do 7. North do do 15, 16 and 17, do 8. South do do 15, do 8. (All east of Principal Meridian.)
Reid, J. L. ....	Port Hope, Ont. ....	Sub-division of Townships 9 and 10, Ranges 11 and 12. North boundary do 9 and 10, do 11 and 12. North do do 20, do 17, 18, 19 and 20. East do do 9 and 10, do 12. East do do 19 and 20, do 19 and 21. South do do 19, do 19, 20 and 21. (All west of Principal Meridian.)
Russell, A. L. ....	Port Arthur, Ont. ....	South boundary of Township 7, Ranges 18 and 19. East do do 7 and 8, do 18. North do do 8, do 19, 20, 21 and 22. (All east of Principal Meridian.)
Sinclair, Duncan. ....	Winnipeg, Man. ....	Sub-division of Townships 5 and 6, Range 7. do do 6, do 8. East boundary do 5 and 6, do 7. North do do 5, do 7. (All east of Principal Meridian.) Survey of the rear widths of the Parishes of Kildonan, St. Paul, St. John, St. James, St. Charles and St. Boniface.
Vaughan, A. H. ....	Winnipeg, Man. ....	Sub-division of Township 9, Range 8. do do 17 and 18, do 1. do do 18, do 2. North boundary do 9, do 8. North do do 18, do 1 and 2. North do do 17, do 1. East and West boundary of Township 17 and 18, Range 1. (All east of Principal Meridian.) Survey of the 2 mile line in the Parishes of St. Andrews, St. Clements and St. Peter.
Wagner, Wm. ....	Ossowa, Man. ....	Sub-division of E½ of Township 17, Range 1. Part of North boundary of Township 17, Range 1. (All west of Principal Meridian.) Survey of part of settlements of Oak Point and St. Laurent. South boundary of Township 19, Range 5.

SCHEDULE (No. 6) showing Surveyors employed and Work performed by each, during the Year 1875.

Bayne, G. A. ....	Pictou, N S. ....	Sub-division of Township 7, Ranges 9 and 10. South boundary do 7 do 9 and 10. East do do 7 do 9 and 10. (All west of Principal Meridian.)
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SCHEDULE (No. 6) showing Surveyors employed and Work performed by each, during the year 1875—Continued.

Name.	Residence.	Description of Work performed.
Brown, C. P. . . . .	Winnipeg, Man. . . . .	Sub-division of Townships 9 and 10, Ranges 13, 14, 15 and 16. East boundary do 9 and 10 do 14 and 16. North do do 9 do 13, 14, 15 and 16. North do do 10 do 13 and 14. (All west of Principal Meridian).
Bray, Edgar. . . . .	Oakville, Ont. . . . .	South boundary Township 23, Ranges 17 and 18. North do 24 do 15, 16, 17 and 18. North do 22 do 17. East do 23 and 24 do 15 and 17. East do 23 to 28 do 19. (All west of Principal Meridian).
Doupe, Jos. . . . .	Winnipeg, Man. . . . .	East boundary Townships 21, 22, 23 and 24, Ranges 5 and 7. North do 24 do 5 to 9. East do 23 and 24 do 9. East do 10 do 15. (All west of Principal Meridian).
Eaton, W. C. . . . .	Winnipeg, Man. . . . .	Sub-division Township 21 and 22, Range 14. North boundary Township 21, Range 14. East do 21 and 22 do 14. (All west of Principal Meridian).
Forneri, C. C. . . . .		Sub-division Township 5 south, Ranges 28 to 31. do do 6 do do 30. North boundary do 6 do do 28, 29 and 30. East do do 5 do do 29. (All east of Principal Meridian).
Grant, John. . . . .	Winnipeg, Man. . . . .	Sub-division of Township 3 and 4, Range 7. East boundary do 3 and 4 do 7. North do do 3 do 7. (All east of Principal Meridian).
Hart, M. . . . .	St. Mary's, Ont. . . . .	Remeasurement of Township 18, Ranges 16 and 18. do north boundary Township 17, Ranges 16 and 18. do do do 18 do 18. (All west of Principal Meridian).
Hermon & Bolton. . . . .	Listowell, Ont. . . . .	South boundary of Township 23, Ranges 12, 13 and 14. North do 22 do 11 and 12. East do 25 to 29 do 15. East do 23 and 24 do 13. North do 24 do 13 and 14. North do 28 do 13 and 14. (All west of Principal Meridian).
Holmes, J. . . . .		Sub-division of Township 17, Range 20. North boundary do 17 do 20. (All west of Principal Meridian).
Harris, M. . . . .	Port Arthur, Ont. . . . .	Town plot of Selkirk.
Kennedy, L. . . . .	Toronto, Ont. . . . .	Sub-division of Township 1, Ranges 1 to 6. South boundary do 1 do 1 to 6. East do do 1 do 2 to 7. (All west of Principal Meridian).
Kingston, G. M. . . . .		Traverse of Big Island, Lake Winnipeg. North boundary of Township 22, Range 23 to 26. North do 20 do 23 to 26. East do 19 to 22 do 25 and 27. South do 19 do 23 to 26. (All west of Principal Meridian).
Martin, A. F. . . . .	Emerson, Man. . . . .	Sub-division of Township 1, Range 5, 6 and 7. do do 2 do 7. East boundary do 2 & 1 do 7. East do do 1 do 5 and 6. North do do 2 do 7. North do do 1 do 7. South do do 1 do 5, 6 and 7. (All east of Principal Meridian).
Miles, C. F. . . . .	Toronto, Ont. . . . .	Sub-division of Township 2, Range 20. do do 1, 2 and 3, Range 21. North boundary do 2, Range 21. East do do 2 do 21. (All east of the Principal Meridian).

SCHEDULE (No. 6) showing Surveyors employed and Work performed by each, during the year 1875—*Concluded.*

Name.	Residence.	Description of Work performed.
Miles, C. F. ....	Toronto, Ont.....	Traverse of White Fish District. do Sabaskong do (Lake of the Woods).
McPhillips, G ....	Winnipeg, Man...	Survey of part of the Parish of Portage La Prairie. Town plot of Gimli.
Ogilvie, Wm.....	Ottawa, Ont.....	Parish of Ste. Annie and Oak Point, and part of the Parishes of St. Norbert and St. Boniface. North boundary Township 22, Ranges 19, 20 and 21. North do do 20 do 21 and 22. East do do 21 and 22 do 21. East do do 19, 20, 21, 22 do 23. (All west of Principal Meridian).
Pearce, Wm.....	Calgary, Alberta..	South boundary Township 7, Ranges 11 to 17. North do do 8, do 11 to 18. North do do 10, do 17 to 22. East do do 9 and 10, Ranges 18 and 20. East do do 7, 8, 9 and 10, Ranges 12, 14 and 16. (All east of Principal Meridian.)
Russell, A. L.....	Port Arthur, Ont.	Sub-division of Township 1, Ranges 23 and 24. East boundary do 1, do 24. East do do 1 and 2 south, Range 24. (All east of Principal Meridian.)
Reid, J. L.....	Port Hope, Ont...	South boundary of Township 1, Ranges 25 to 28. South do do 2, South Ranges 21 to 26. East do do 1 and 2, do 22. East do do 5 South do 28. East do part do 6 South Range 28. East do do 1 to 6, Range 26. East do do 1 and 2, and 3, South Range 22. East do do 3 and 4 South Ranges 22, 24 and 26. East do do 5 South Ranges 26 and 30. North do do 5 do 25 to 31. Sub-division of Township 3 South Ranges 21 to 26. (All east of Principal Meridian.)
Sinclair, Duncan..	Winnipeg, Man...	Sub-division Townships 17 and 18, Ranges 21 and 22. East boundary Townships 17 and 18, Range 22. North do do 17, Ranges 21 and 22. (All west of Principal Meridian.)
Vaughan, A. H....	do	Survey of rear line of settlements, County of Lisgar, and part of the Parishes St. Andrews, St. Clements, and St. Peters. Outer two miles and four miles line, Parish of St. Andrews and St. Clements, west.
Wagner, Wm.....	Ossowa, Man.....	Rear lines of the Parishes of Poplar Point and Baie St Paul and north boundary of Township 17, Range 5, west of Principal Meridian.
Webb, A. C.....	Brighton, Ont...	North boundary Township 22, Ranges 27, 28 and 29. North do do 20 do 27 to 30. North do do 18 do 29 and 30. North do do 16 do 29 and 30. East do do 15 to 22, Range 29. East do do 15 to 18 do 31. South do do 15, Ranges 29 and 30. South do do 19 do 27 to 30. (All west of Principal Meridian.)

SCHEDULE (No. 7) showing Surveyors employed and Work performed by each, during the year 1876.

Beatty, W. ....	Delta, Ont. ....	Road Survey, Whitemouth to Gimli.
Doupe, Joseph....	Winnipeg, Man....	Sub-division of Township 23, Range 4. North boundary Township 23, Range 4. North do do 21 do 4. South do do 23 do 4. (All east of Principal Meridian.) Sub-division part of Township 7, Range 8, west of Principal Meridian.

SCHEDULE (No. 7) showing Surveyors employed and Work performed by each, during the year 1876—*Concluded*.

Name.	Residence.	Description of Work performed.
Forneri, C. C. ....		Sub-division Townships 4 and 5 South Range 27. do do 4 South Range 25. do do 4 and 5 South Range 26. do do 4 South Ranges 23 and 24. East boundary Township 4 South Ranges 24 and 25. East do do 4 do 23. East do do 3 do 21. East do do 5 do 27. North do do 4 do 22. Sub-division Township 3 South Range 22. (All East of Principal Meridian.)
Kennedy, L. ....	Toronto, Ont. ....	Sub-division Township 1, Ranges 7, 8 and 9. South boundary Township 1, Ranges 7, 8 and 9. East do do 1 do 7, 8, 9 and 10. (All west of Principal Meridian.)
McPhillips, Geo. .	Winnipeg, Man. .	Survey of villages of Sandy Bar and Rivertown. Subdivision Townships 21 and 22, Range 4. North boundary Township 21, Range 4. (All east of Principal Meridian.)
Martin, A. F. ....	Emerson, Man. .	Survey of Water Hen River Indian Reserve, St. Martin's Lake Indian Reserve, Fairford Mission Indian Reserve.
Pearce, Wm. ....	Calgary, Alb. ....	Survey of outer 2 miles in the Parishes of St. Andrews, St. Clements, St. Boniface, Kildonan, St. Paul.
Russell, A. L. ....	Port Arthur, Ont.	South boundary Township 29, Ranges 6, 7 and 8. East do do 29 to 32, Range 9. East do do 16 to 29 do 1. North do do 32, Ranges 9, 10 11. North do do 28 do 1 to 5. (All west second Initial Meridian.) North boundary Township 16, Ranges 31, 32 and 33. (West of Principal Meridian.)
Stewart, E. ....	Collingwood, Ont.	Sub-division Township 3 South Ranges 23, 24 and 25. do do 3 do 26. East boundary Township 3 do 23 and 25. Sub-division do 4 do 26. North boundary do 4 do 23, 24 and 26. (All east of Principal Meridian.)
Sinclair, Duncan..	Winnipeg, Man. .	Sub-division and extension of Indian Reserve at Brokenhead River.
Wagner, Wm. ....	Ossowa, Man. ....	Survey of Qu'Appelle River from 102nd Meridian.

SCHEDULE (No. 8) showing Surveyors employed and Work performed by each, during the year 1877.

Beatty, W. ....	Delta, Ont. ....	Sub-division of Township 24, Range 4. North boundary do 24 do 4. East do do 24 do 4. (All east of Principal Meridian.)
Bray, E. ....	Oakville, Ont. ....	Survey of highways in Manitoba.
Doupe, J. ....	Winnipeg, Man. .	Sub-division of Township 20, Range 3. Part of sub-division of Townships 19, 20 and 21, Range 4. North boundary of Township 20, Range 3. East do do 20 do 3. West do do 20 do 3. (All east of Principal Meridian.)
King, W. F. ....	Ottawa, Ont. ....	Survey of the 5th Initial Meridian, Townships 52, 53 and 54. North boundary of Township 52, Range 1, west of 5th Meridian. do do 52, 13 miles east from 5th Meridian, thence south 5 miles.
McPhillips, Geo. .	Winnipeg, Man. .	Survey of part of the Parish of Lorette. Sub-division of Township 19, Range 3. do do 19 and 20, Range 4. North boundaries Township 19, Range 3. North do do 19 and 20, Range 4. North do do 18, Range 4.

SCHEDULE (No. 8) showing Surveyors employed and Work performed by each, during the year 1877—*Concluded*.

Name.	Residence.	Description of Work performed.
McPhillips, Geo.	Winnipeg, Man.	East boundary of Township 19, Range 3. East do do 19 do 2. South do do 19 do 3. (All east of Principal Meridian.)
Pearce, Wm.	Calgary, Alb.	Traverse of portion of lake, and Winnipeg River. South boundary of Township 1, Range 8, 9 and 10. East do do 1 and 2, Range 10. (All east of Principal Meridian.)
Russell, A. L.	Port Arthur, Ont.	3rd Initial Meridian, Townships 43 to 47. North boundary of Township 46, Ranges 25, 26 and 27. South boundary of Township 47, Ranges 25, 26 and 27. East do do 47 and 48, Range 27. North do do 32, Ranges 11 to 16. East do do 33 to 36, Range 17. (All west of 2nd Initial Meridian.) North boundary of Township 46, Range 1, west of 3rd Meridian. South do do 47 do 1, do do North do do 36 do 17 to 3rd Meridian. 3rd Meridian, Township 37 to 42 inclusive. 2nd do do 30 to 34 do
Stewart, E.	Collingwood, Ont.	South boundary of Township 1, Ranges 10, 11 and 12. West do do 1 do 10, 11 and 12. Sub-division of Township 1, Ranges 10, 11 and 12. (All west of Principal Meridian.)

SCHEDULE (No. 9) showing Surveyors employed and Work performed by each, during the year 1878.

Aldous, M.	Winnipeg, Man.	Part of Prince Albert and St. Laurent settlements.
Chapman, C. F.	Preston, Ont.	Road survey from Headingly to western boundary of Manitoba.
Doupe, Jos.	Winnipeg, Man.	Part of the Parish of Ste. Agathe.
Dennis, J. S.	Aylmer, Que.	North boundary Township 36, Ranges 1 to 18. North do do 40 do 19 to 28. North do do 42 do 16, 17 and 18. East do do 37 to 42, Range 19. (All west of 3rd Initial Meridian.)
King, W. F.	Ottawa, Ont.	East boundary Tp. 46, Range 27, west of 2nd Initial Meridian. South do do 45, Ranges 1 to 4. North do do 46 do 1 to 3. (West of 3rd Initial Meridian.)
Nelson, J. C.	Aylmer, Que.	Survey of part of Old Man's River from Fort Macleod eastward.
Pearce, Wm.	Calgary, Alb.	Part of east boundary Township 10, Range 9. East boundary Townships 11, 12, 13 and 14, Range 9. East do do 13 to 17, Range 10. North do do 12, Range 9. North do do 17 do 9 and 10. North do do 12 do 10. (All east of Principal Meridian.)
Reid, J. L.	Port Hope, Ont.	Subdivision Townships 47 and 48, Range 24. Part of Township 47, Ranges 25, 26 and 28. Sub-division Township 48, Range 25. Sub-division part Township 47, Range 27. East boundary Township 48, Range 24. Part of east boundary Township 47, Range 28. East boundary Township 47, Range 27. South do do 48, do 24. West do do 47, do 27. (All west of 2nd Initial Meridian.)
Russell, A. L.	Port Arthur, Ont.	North boundary Township 46, Ranges 20 to 24. North do do 47 do 25 and 26. North do of Sections 19 to 24, Township 47, Range 27. South do Township 47, Ranges 20 to 24. East do do 47 do 26. East do do 46 and 47, Ranges 21 and 23.

SCHEDULE (No. 9) showing Surveyors employed and Work performed by each, during the year 1878—*Concluded*.

Name.	Residence.	Description of Work performed.
Russell, A. L. ....	Port Arthur, Ont.	Part of east boundary Township 48, Ranges 21, 24 and 26. East boundary Township 47, Range 24. East do do 46 and 47, Range 25. (All west of 2nd Initial Meridian.)
Rauscher, R. ....	Ottawa, Ont. ....	Sub-division Townships 45, 46 and 47, Range 1. North boundary Townships 45 and 47, Range 1. West do do 45, 46 and 47, Range 1. (All west of 3rd Initial Meridian.)
Sinclair, Dun. ....	Winnipeg, Man. ....	Sub-division of broken Township 45, Ranges 26 and 27. Sub-division do do 45 and 46, Range 28. Sub-division do do 46, Ranges 25 and 26. Sub-division Township 46, Range 27. North boundary Township 45, Ranges 26 and 28. North do do 45, do 27. East do do 45, do 27 and 28. East do do 46, do 26 and 28. (All west of 2nd Initial Meridian.)

SCHEDULE (No. 10) showing Surveyors employed and work performed by each during the Year 1879.

Aldous, M. ....	Winnipeg, Man. ....	North boundary Township 52, Ranges 1 to 19. North do do 54 do 19. East boundary do 53 and 54, Ranges 19 and 24. North boundary do 54, Ranges 20 to 23. North do do 52 do 24 to 27. North do do 52 do 19 to 23. (All west of 4th Initial Meridian.) Fourth Initial Meridian from north-east corner of Section 25, Township 51, to 14th Base Line. Also 8 $\frac{1}{2}$ Sections east from 4th Initial Meridian, starting from north-east corner Section 12, Township 52. 5th Initial Meridian, Townships 48 to 52 inclusive. 4th do do 41 to 51 do
Beatty, W. ....	Delta, Ont. ....	East boundary Townships 3 to 8, Range 17. North do 4 and 6 do 15 and 16. South do 3 and 7 do 15 and 16. Sub-division Townships 3 and 4 do 15 and 16. North boundary Township 3 do 16 East do 3 and 4 do 16 (All west of Principal Meridian.)
Bray, E. ....	Oakville, Ont. ....	Indian Reserves, Treaty No. 6.
Caddy & Hewson	Cobourg, Ont. ....	Sub-division Townships 7 and 8, Ranges 15, 16, 17 and 18. North boundary Township 7, Ranges 15, 16, 17, 18. East do 7 and 8, Ranges 16 and 18. (All west of Principal Meridian.)
Crawford W. ....	Winnipeg, Man. ....	Sub-division Townships 17 and 18, Ranges 25 and 26. East boundary Townships 17 and 18, Range 26. North do 17 do 26. South do 18 do 25. (All west of Principal Meridian.)
Dean, M. ....	Lindsay, Ont. ....	Sub-division Townships 1 and 2, Ranges 15 and 16. North boundary Township 1 do 15 and 16. East do 1 and 2, Range 16. (All west of Principal Meridian.)
Doupe & Drummond.	Winnipeg, Man. ....	Sub-division Township 17 and 18, Ranges 23 and 24. North boundary Township 17, Ranges 23 and 24. East do 17 and 18, Range 24. (All west of Principal Meridian.)
Forrest, A. G. ....	Ottawa, Ont. ....	Timber limits on Winnipeg River.
Hart, M. ....	St. Mary's, Ont. ....	Inspection of contract surveys.
King, W. F. ....	Ottawa, Ont. ....	Indian Reserves, Treaty No. 6. Astronomical section of special survey, North-West Territories.

SCHEDULE (No. 10) showing Surveyors employed and Work performed by each, during the year 1879—*Concluded.*

Name.	Residence.	Description of Work performed.
Kirk, J. G. ....	Stratford, Ont. ....	Sub-division Townships 1 and 2, Ranges 17 and 18. North boundary Township 1 do 17 and 18. East do 1 and 2, Range 18. (All west of Principal Meridian.)
Klotz, O. J. ....	Preston, Ont. ....	Sub-division Township 1 and 2, Ranges 19 and 20. North boundary Township 1 do 19 and 20. East do 1 and 2, Range 20. (All west of Principal Meridian.)
McArthur, J. J. ....	Aylmer, Que. ....	Sub-division Townships 5 and 6, Ranges 15 and 16. North boundary Township 5 do 15 and 16. East do 5 and 6, Range 16. (All west of Principal Meridian.)
McAree, J. ....	Toronto, Ont. ....	Sub-division Township 2, Range 21. Sub-division do 1 do 22. Sub-division part of Township 2 Range 22. North boundary do 1 do 22. East do do 1 and 2, Range 22. (All west of Principal Meridian.)
Miles, C. F. ....	do	Survey of Reserves under Indian Treaty No. 3.
Martin, F. A. ....	St. Andrews, Que. ....	Survey do do 2.
O'Hanly, J. L. P. ....	Ottawa, Ont. ....	South boundary Township 9, Ranges 17, 18, 19 and 20. East do 9 and 10, Range 21. East do 9 and 10 do 19. North do 10 do 17 and 18. (All west of Principal Meridian.)
Ogilvie, W. ....	do	Survey of Indian Reserves, Treaty No. 7.
Pearce, Wm. ....	Calgary, Alberta ..	South boundary of Township 1, Ranges 15 to 32. North do 2 do 15 to 32. East do 1 do 15. East do 1 and 2 do 17, 19, 21, 23, 25, 27, 29, 31, & 33. (All west of the Principal Meridian.)
Patrick, A. P. ....	Ottawa, Ont. ....	Timber explorations, Lake Winnipegosis.
Rainboth, G. C. ....	Aylmer, Que. ....	Surveys of Reserves under Indian Treaty No. 7.
Reid, J. L. ....	Port Hope, Ont. ....	Timber Limits on Lake Winnipegosis. Sub-division of Townships 42, 43 and 44, Range 1. Sub-division do 43 and 44 do 2 and 3. North boundary do 43 do 1, 2 and 3. North do do 42 do 2 and 3. East boundary do 43 and 44 do 2, 3 and 4. East do do 42 do 2. (All west of 3rd Initial Meridian.)
		Sub-division of part of Township 45, Range 22. (West of 2nd Initial Meridian.)
		Survey of portions of the north and south branches of Saskatchewan River.
Russell, A. L. ....	Port Arthur, Ont. ..	North boundary of Township 44, Range 17. (To the 3rd Initial Meridian.) East boundary of Township 37, Range 17. East do do 45 do 23 and 25. (All west of 2nd Initial Meridian.)
Simpson, G. A. ....	.....	Surveys of Reserves under Indian Treaty No. 6.
Stewart, Geo. ....	Winnipeg, Man. ....	Sub-division of Township 20, Ranges 19 and 20. South boundary do 20 do 19. East do do 20 do 20. (All west of the Principal Meridian.)
Stewart, E. ....	.....	Indian Reserves, Treaty No. 6.
Thomson, A. C. ....	.....	Sub-division of Township 19, Range 21. North boundary do 19 do 21. Part of south boundary of Township 19, Range 21. (All west of the Principal Meridian.)
Vaughan, A. H. ....	Selkirk, Man. ....	Surveys of Reserves under Indian Treaty No. 3.
Webb, A. C. ....	Brighton, Ont. ....	2nd Initial Meridian, Township 9 to 16, inclusive.
Wagner, Wm. ....	Winnipeg, Man. ....	Survey of Sioux Indian Reserve, Pipe Stone Creek.

SCHEDULE (No. 11) showing Surveyors employed and Work performed by each, during the year 1880.

Name.	Residence.	Description of Work performed.
Abrey, G. B. ....	Little Current, Ont.	Sub-division of Townships 9 and 10, Ranges 19 and 20. Sub-division do 15 and 16 do 31. East boundary do 9 and 10 do 20. East do do 16 do 32. North boundary do 9 do 19 and 20. North do do 10 do 19 and 20. North do do 15 do 31. (All west of the Principal Meridian)
Aldous, M. ....	Winnipeg, Man. ....	East boundaries of Townships 1 to 12, Range 25. North do do 4 do 25. North do do 12 do 25 to 29. (All west of the 4th Initial Meridian.)
Armstrong, F. W. ....	Orillia, Ont. ....	5th Initial Meridian from Township 13 to Township 48. Sub-division of Township 17, Ranges 27 and 28. North boundary do 17 do 27 and 28. East do do 17 do 28. (All west of Principal Meridian.)
Bolger, F. ....	Ottawa, Ont. ....	Part of sub-division of Township 21, Range 31. (West of Principal Meridian.) Sub-division of Townships 5 and 6, Ranges 21 and 22. Sub-division do 9 and 10 do 25 and 26. North boundary do 5 do 21 and 22. North do do 9 do 25 and 26. East boundary do 5 and 6 do 22. East do do 9 and 10 do 26. (All west of Principal Meridian.)
Brabazon, S. L. ....	Portage du Fort, Que.	Sub-division Township 5, Ranges 25 and 26. Sub-division do 6 do 26. Sub-division do 2 do 31 and 32. Sub-division do 1 do 32 and 31. North boundary Township 5 do 25 and 26. North do do 1 do 31 and 32. East do 5 and 6 do 26. East do do 1 do 32. Part east do 2 do 32. (All west of Principal Meridian.)
Bray, Edgar ....	Oakville, Ont. ....	East boundary Townships 19 to 22, Ranges 31 and 33. East do do 20 to 26 do 31. North do do 22 do 29 to 33. North do do 20 and 26 do 31, 32 and 33. North do do 24 do 31, 32 and 33. South do do 19 and 23 do 31, 32 and 33. (All west of Principal Meridian.)
Beatty, W. & D. ....	Delta, Ont. ....	Sub-division Townships 23 and 24, Ranges 27 and 28. North boundary do 23 do 27 and 28. East do do 23 and 24 do 28. (All west of Principal Meridian.)
Beatty, W. ....	Delta, Ont. ....	Sub-division Townships 17 and 18, Ranges 29 and 30. North boundary do 17 do 29 and 30. East do do 17 and 18 do 30. (All west of Principal Meridian.)
Breen, Thos. ....	L'Islet, Que. ....	Sub-division Townships 9 and 10, Range 18. North boundary do 9 do 18. East do do 9 and 10 do 18. (All west of Principal Meridian.)
Bemister, Geo. ....	Portage la Prairie, Man.	Sub-division Township 23, Range 2. Sub-division Townships 23 and 24, Range 1. (West of 2nd Initial Meridian.)
Cotton & McAre. ....	Ottawa, Ont. ....	Sub-division Townships 2, 7 and 8, Range 22. Sub-division do 5 and 6 do 17 and 18. Sub-division do 7 and 8 do 21. North boundary Township 5, Range 17 and 18. North do do 7 do 21 and 22. East do 5 and 6 do 18. East do do 7 and 8 do 22. (All west of Principal Meridian.)
Clementi, T. B. ....	Peterboro', Ont. ....	Sub-division Townships 19, 20 and 21, Ranges 1 and 2. (West of 2nd Initial Meridian.)



SCHEDULE (No. 11) showing Surveyors employed and Work performed by each, during the year 1880—*Continued.*

Name.	Residence.	Description of Work performed.
Caddy & Hewson.	Cobourg, Ont.....	Sub-division Townships 7 and 8, Ranges 17 and 18. North boundary do 7 do 17 and 18. East do do 7 and 8 do 18. (All west of Principal Meridian.)
Carbert, J. A.....	Orangeville, Ont....	Sub-division Township 1, Range 23. Sub-division Townships 1 and 2, Range 24. North boundary Township 1, Range 23 and 24. East do do 1 & 2 do 24. (All west of Principal Meridian.)
Doupe, Jos.....	Winnipeg, Man....	Sub-division Township 18, Range 20. Sub-division do 14, Ranges 29 and 30. Sub-division Townships 15 and 16, Ranges 27 and 28. North boundary Township 15, Ranges 27 and 28. East do 15 and 16 do 28. East do 14 do 30. East and south do 18 do 20. South do 14 do 29. (All west of Principal Meridian.)
Deville, E.....	Ottawa, Ont.....	South boundary of Township 27, Ranges 13 to 16. North do 30 do 13 to 16. East do 27 to 32 do 13. East do 27 to 30 do 17. (All west of 2nd Initial Meridian.)
Drummond, Thos..	Montreal, Que ..	North boundary of Township 23, Ranges 3 and 4. North do 25 do 5. North do 24 and 25 do 3 and 4. North do 23, 24 and 25 do 1 and 2. South do 25 do 5, 6, and 7. East do 23 to 26 do 3 and 4. East do 25 and 26 do 6. (All west of 2nd Initial Meridian.)
Evans & Bolger...	Belleville, Ont....	Sub-division of Townships 13 and 14, Ranges 27 and 28. Sub-division do 21 and 22 do 32 and 33. North boundary Township 13 do 27 and 28. North do 21 do 32 and 33. East do 13 and 14 do 28. East do 21 and 22 do 32. (All west of Principal Meridian.)
Forrest, A. G.....	Ottawa, Ont.....	Survey of timber limits on the Winnipeg River.
Garden, J. F.....	Toronto, Ont.....	Sub-division of Townships 5 and 6, Ranges 23 and 24. Sub-division do 1 and 2 do 29 and 30. North boundary Township 5 do 23 and 24. North do 1 do 29 and 30. East do 5 and 6 do 24. East do 5 do 23. East do 1 do 29 and 30. West do 2 do 29 and 30. (All west of Principal Meridian.)
Hart & Ryley.....	Ottawa, Ont.....	South boundary of Township 3, Ranges 25 and 26. North do 6 do 25 and 26. East do 3 do 25. East do 3, 4, 5 and 6, Range 27 (All west of Principal Meridian.)
Hart, M. ....	St. Mary's, Ont....	North boundary of Township 4, Ranges 19 to 34. North do 6 do 27 to 34. North do 1 do 33 and 34. South do 3 do 29 to 34. East do 4, 5 and 6, Range 25. East do 1 and 2 do 34. East do 3, 4, 5 and 6 do 29, 31 and 33. (All west of Principal Meridian.)
Hermon, R. W....	Listowell, Ont....	Sub-division of Townships 21 and 22, Ranges 29 and 30. Sub-division do 27 and 28 do 29 and 30. East boundary Townships 21 and 22 do 30. East do 27 and 28 do 30. North do 21 do 29 and 30. North do 27 do 29 and 30. (All west of Principal Meridian.)

SCHEDULE (No. 11) showing Surveyors employed and Work performed by each, during the year 1880—Continued.

Name.	Residence.	Description of Work performed.
Jephson, R. ....	Bracebridge, Ont..	Sub-division of Townships 1, 2 and 5, Range 27. Sub-division do 1, 2, 5 and 6 do 28. North boundary Townships 1 and 5 do 28. North & west do 5 do 27. West do 1 do 27. South do 2 do 27. East do 2 and 6 do 28. (All west of Principal Meridian.)
Klotz, O. J. ....	Preston, Ont. ....	East boundary of Townships 27 to 30, Range 14. East do 27 to 30 do 16. East do 27 to 30 do 15. North do 28 do 13 to 16. North do 27 and 29 do 13. North do 27 do 14 and 16. North do 29 do 14. Sub-division of Townships 27, 29 and 30 do 13. Sub-division do 28, 29 and 30 do 14. Sub-division do 27 and 28 do 16. (All west of 2nd Initial Meridian.)
King, W. F. ....	Ottawa, Ont. ....	Astronomical section of special survey, N. W. T.
Lendrum, R. ....	Riceville, Ont. ....	Sub-division of Townships 27 and 28, Range 2. Sub-division of Township 27, Range 1. (All west of 2nd Initial Meridian.)
Lett, C. A. ....	Emerson, Man. ....	Sub-division of Townships 19 and 20, Ranges 27 and 28. North boundary Township 19 do 27 and 28. East do 19 and 20 do 28. (All west of Principal Meridian.)
Lippé, A. W. ....	Acton, Que. ....	Sub-division of Townships 1 and 2, Ranges 25 and 26. North boundary Township 1 do 25 and 26. East do 1 and 2 do 26. (All west of Principal Meridian.)
Morris, J. ....	Perth, Ont. ....	Sub-division of Townships 3 and 4, Range 18. Sub-division of Township 4 do 17. South boundary Township 4 do 17. North do 3 do 18. East do 3 and 4 do 18. (All west of Principal Meridian.)
McArthur, J. ....	Aylmer, Que. ....	Sub-division Townships 3 and 4, Ranges 21 and 22. Sub-division do 3 and 4 do 27 and 28. North boundary Township 3 do 21 and 22. North do 3 do 27 and 28. Part of east boundary Townships 3 and 4, Range 22. East boundary Townships 3 and 4, Range 28. (All west of Principal Meridian.)
McPhillips, R. C. .	Winnipeg, Man. . .	Sub-division Townships 19 and 20, Ranges 31 and 32. North boundary Township 19 do 31 and 32. East do do 19 and 20, Range 32. (All west of Principal Meridian.)
McPhillips, Geo. .	do	Sub-division Townships 5 and 6, Ranges 19 and 20. Sub-division do 9 and 10 do 23 and 24. North boundary do 5, Ranges 19 and 20. East do do 5 and 6, Range 20. North do do 9, Ranges 23 and 24. East do do 9 and 10, Range 24. (All west of Principal Meridian.)
McAree, J. ....	Toronto, Ont. ....	Sub-division, Township 1, Range 21. North boundary Township 1 Range 21. (All west of Principal Meridian.)
McArthur, J. J. . .	Aylmer, Que. ....	Sub-division Townships 19 and 20, Ranges 29 and 30. Sub-division do 26, Range 31. North boundary do 19, do 29 and 30. East do Townships 19 and 20, Range 30. (All west of Principal Meridian.)
McLatchie, J. ....	Ottawa, Ont. ....	East boundary Townships 23 and 24, Ranges 27 and 29. South do do 23, Ranges 27 to 30. North do do 24 do 27 to 30. East do do 25 and 26, Ranges 27 and 29.

SCHEDULE (No. 11) showing Surveyors employed and Work performed by each, during the year 1880—Continued.

Name.	Residence.	Description of Work performed.
McLatchie, J. ....	Ottawa, Ont. ....	Seventh Correction Line, south side, across Ranges 27 and 28. Seventh Correction Line, north and south sides, across Ranges 29 and 30. South boundary Township 26, Ranges 31, 32 and 33. North do do 28 do 29 and 30. East do do 27 and 28, Ranges 29 and 31. East do do 29 and 30 do 31. North do do 28, Ranges 31, 32 and 33. South do do 31 do 31, 32, and 33. (All west of Principal Meridian.)
Miles, C. F. ....	Toronto, Ont. ....	North boundary Townships 19 and 20, Ranges 1, 2 and 3. North do do 21, Ranges 1, 2 and 3. East do do 19, 20, 21 and 22, Ranges 2 and 3. East do do 21 and 22, Range 4. (All west 2nd Initial Meridian.)
O'Keeffe, D. C. ....	Hamilton, Ont. ....	Sub-division Townships 25 and 26, Ranges 1, 2, 3 and 4. (West of 2nd Initial Meridian.)
Ogilvie, Wm. ....	Ottawa, Ont. ....	South boundary Township 23, Ranges 9 to 12. North do do 26 do 5 to 8. North do do 26 do 12 North do do 22 do 1 to 4. East do do 23 to 26, Ranges 5, 9 and 13. (All west of 2nd Initial Meridian.)
O'Hanly, J. L. P.	do	South boundary of Township 7, Ranges 17 to 23. East do do 7 and 8, Ranges 19, 21, 23 and 30. East do do 9 and 10 do 23, 25 and 30. East do do 7 to 10 do 32. East do do 11 to 14 do 32. North do do 8, Ranges 21 to 23. North do do 10 do 21 to 26. North do do 7 do 29 to 34. North do do 9 do 29 to 34. North do do 11 and 13, Ranges 31 and 32. North do do 11, Ranges 33 and 34. (All west of Principal Meridian.)
Pearce, Wm. ...	Winnipeg, Man. ...	East boundary of Township 30, Range 15. East do do 3, 4, 5, 6, 31, 32, 33, 34, Range 19. South do do 31, Ranges 15 to 18. East do do 40, 41, 42, 43, 46 and 47, Range 19. South do do 35, 39, Range 19. North do do 32, Range 18. North do do 36 do 19 and 20. North do do 4 do 17 and 18. North do do 44 do 20. East do do 3, 4, 5 and 6, Ranges 21 and 23. East do do 7, 8, 9 and 10 do 27, 29, 31 and 33 East do do 8, Range 26. North and east boundary of Township 7, Range 25. South boundary of Township 3, Ranges 17 to 24. North do do 6 do 17 to 24. North do do 10 do 27 to 34. South do do 7 do 24 to 34. South do do 1 do 33 and 34. North do do 8 do 24 to 34. North do do 2 do 33 and 34. (All west of Principal Meridian.) 2nd Meridian Township, 1 to 6. do do 37 and 38.

SCHEDULE (No. 11) showing Surveyors employed and Work performed by each, during the year 1880—Continued.

Name.	Residence.	Description of Work performed.
Pearce, Wm . . .	Winnipeg, Man. . .	Sub-division part of Township 1, Ranges 6 and 7. Sub-division do 2 do 8. South boundary do 1 do 1 to 8. North do do 1 do 5 to 8. North do do 2 do 1 to 8. East do do 1 and 2, Ranges 5 to 9. (All west of 2nd Initial Meridian.)
Ryley, G. U. . . . .	Ottawa, Ont. . . . .	South boundary Township 3, Ranges 27 and 28. (West of Principal Meridian.)
Reid, J. L. . . . .	Port Hope, Ont. . . . .	Sub-division of Townships 44 and 45, Range 21. Sub-division do 27 to 30 do 15. North boundary Township 45, Range 21. North do do 29 do 15. Part east boundary Township 44, Range 21. East and west boundary Township 45, Range 21. South boundary Township 28, Range 15. (All west of 2nd Initial Meridian.)
Rainboth, G. C. . . . .	Aylmer, Que. . . . .	North boundary Township 27, Ranges 1, 2, 3, 4 and 5. North do do 29 do 1, 2 and 3. East do do 27, 28 and 29, Range 4. East do do 27, 28, 29 and 30, Ranges 2 and 3. East do do 27, Range 6. (All west of 2nd Initial Meridian.)
Reiffenstein, J. H. . . . .	Ottawa, Ont. . . . .	Sub-division of Townships 21 and 22, Ranges 27 and 28. North boundary do 21, Ranges 27 and 28. East do do 21 and 22, Range 28. (All west of Principal Meridian.)
Russell, A. L. . . . .	Port Arthur, Ont. . . . .	North boundary Township 30, Ranges 1 to 12. North do do 34 do 13 to 23. North do do 26 do 1 to 4. South do do 31 do 1 to 12. South do do 35 do 13 to 23. South do do 27 do 1 to 4. East do do 27 to 30, Range 5. East do do 33 and 34, Ranges 9 and 13. East do do 35 and 36 do 21. (All west of 2nd Initial Meridian.)
Sinclair, Dun. . . . .	Winnipeg, Man. . . . .	Sub-division of Townships 3 and 4, Ranges 19 and 20. do do 3 and 4 do 25 and 26. North boundary do 3, Ranges 19 and 20. East do do 3 and 4, Range 20. North do do 3, Ranges 25 and 26. East do do 3 and 4, Range 26. (All west of Principal Meridian.)
Staunton & Jones. . . . .	Hamilton, Ont. . . . .	Sub-division of Township 17, Ranges 31 and 33. North boundary do 17 do 31 and 33. (All west of Principal Meridian.)
Stuart, Geo. . . . .	Winnipeg, Man. . . . .	Sub-division of Township 19, Ranges 19 and 20. North boundary do 19, Range 20. West do do 19 do 19. (All west of Principal Meridian.)
Snow, J. A. . . . .	Ottawa, Ont. . . . .	Sub-division of Township 19, Ranges 23, 24 and 25. do do 20 do 24 and 25. North boundary do 19 do 23, 24 and 25. East do do 20 do 24. West do do 19 do 23. (All west of Principal Meridian.)
Stewart, J. . . . .	Moosomin, Ass. . . . .	Sub-division of Townships 23 and 24, Ranges 31 and 32. do do 15 and 16 do 29 and 30. North boundary do 23, Ranges 31 and 32. East do do 23 and 24, Range 32. North do do 15, Ranges 29 and 30. East do do 15 and 16, Range 30. (All west of Principal Meridian.)
Thompson, W. T. . . . .	Cannington, Ont. . . . .	East boundary Townships 19 to 22, Ranges 5, 9 and 13. North do do 19A, Ranges 1 to 12. North do do 20 do 13. North do do 22 do 5 to 8. (All west of 2nd Initial Meridian.)

SCHEDULE (No. 11) showing Surveyors employed and Work performed by each, during the year 1880—*Concluded*.

Name.	Residence.	Description of Work Performed.
Thomson, A. C.		Sub-division of Townships 19 and 20, Range 22. do do 20, Range 21. West boundary do 20 do 21. South do do 19 and 20, Range 22. East do do 19, Range 22. (All west of Principal Meridian.)
Unwin, C.	Toronto, Ont.	Sub-division of Township 18, Range 16. South boundary do 18 do 16. (All west of Principal Meridian.)
Wagner, Wm.	Ossowa, Man.	Sub-division of Townships 7 and 8, Ranges 19 and 20. Sub do do 7 and 8 do 27 and 28. North boundary do 7, Ranges 19 and 20. East do do 7 and 8, Range 20. North do do 7, Ranges 27 and 28. East do do 7 and 8, Range 28. (All west of Principal Meridian.)
Webb, A. C.	Brighton, Ont.	South boundary Township 11, Ranges 26 to 34. South do do 15 do 31, 32 and 33. North do do 12 and 14, Ranges 27 to 34. North do do 18, Ranges 31, 32 and 33. East do do 13 to 18, Range 33. East do do 11 and 12 Ranges 27 and 33. East do do 11 to 14 do 29 and 31. (All west of Principal Meridian.)

SCHEDULE (No. 12) showing Surveyors employed and Work performed by each, during the Year 1881.

Aldous, M.	Winnipeg, Man.	East boundary, Townships 1 to 16, Range 25. East do do 5 to 8, do 29. North do do 4, 8, 12 and 16, Ranges 25 to 28. North do do 12 and 16, do 29 and 30. (All west of 4th Initial Meridian.) East boundary Townships 17 to 22, Range 3. East do do 23 do 4. East do do 24 do 5. North do do 16 and 20, Ranges 1 and 2. North do do 23, Range 4. North do do 24, Ranges 1 to 4. South do do 23, Range 3. (All west of 5th Initial Meridian.)
Armstrong, F. W.	Orillia, Ont.	Sub-division Townships 23 and 24, Range 29. do do 18, Ranges 27 and 28. do do 23, Range 30. do do 13 and 14, Ranges 31 and 32. North boundary Township 23, Ranges 29 and 30. West do do 24, Range 29. East do do 18, do 28. East do do 23 do 30. (All west of Principal Meridian.) North and west boundary Township 13 and 14, Ranges 9 and 10. (All west of 2nd Initial Meridian.)
Abrey, G. B.	Little Current, Ont.	Sub-division Townships 15 and 16, Ranges 32 and 33. do do 5 and 6 do 33 and 34. do do 3 and 4 do 33 and 34. do do 7 and 8 do 33 and 34. East boundary Township 15, Range 32. South do do 16, Ranges 32 and 33. South do do 6 do 33 and 34. North do do 3 do 33 and 34. West do do 5, Range 33. East do Townships 3, 4 and 6, Range 34. East do do 7 and 8, Range 34. (All west of Principal Meridian.)

SCHEDULE (No. 12) showing Surveyors employed and Work performed by each during the Year 1881—*Continued.*

Name.	Residence.	Description of Work performed.
Burnett, P. . . . .	Orillia, Ont. . . . .	Sub-division Township 4, Ranges 1 to 10. (West of 2nd Initial Meridian.)
Beatty, W. & D. . . . .	Delta, Ont. . . . .	Sub-division Townships 18 and 19A, Ranges 2, 5, 7 and 9. do do 19A, Ranges 1, 10, 3 and 4. do do 18 do 1, 6, 8 and 10. do do 19 do 26 and 33. do do 20 do 26 and 33. Part of sub-division Township 18, Ranges 3 and 4 North boundary Township 19A, Ranges 7, 9 and 10. North do do 19 do 26 and 33. (All west of 2nd Initial Meridian.)
Belanger, P. R. A. . . . .	L'Islet, Que . . . . .	Sub-division Townships 9 and 10, Ranges 29 and 30. do do 9, Ranges 33 and 34. East boundary do 9, Range 34. (All west of Principal Meridian.) North boundary Township 9, Ranges 4 and 5. (All west of 2nd Initial Meridian.)
Burchill & Davis. . . . .		Sub-division Township 15, Ranges 1 to 10. (All west of 2nd Initial Meridian.)
Burrows, J. J. . . . .	Ottawa, Ont . . . . .	Sub-division Township 24, Ranges 2 to 9. South boundary Township 24, Ranges 7 and 9. (All west of 2nd Initial Meridian.)
Breen, T. . . . .	L'Islet, Que. . . . .	Sub-division Township 9, Range 17. Sub-division Townships 9 and 10, Ranges 31 and 32. Sub-division Township 8, Range 31. North boundary Township 9, Range 17. (All west of Principal Meridian.)
Brodie, S. . . . .	Toronto, Ont. . . . .	Sub-division Township 7, Ranges 1 to 10.) (West of 2nd Initial Meridian.)
Brabazon, S. L. . . . .	Portage du Fort, Que.	Sub-division Township 16, Ranges 1 to 10. (West of 2nd Initial Meridian.)
Bray, Edgar . . . . .	Oakville, Ont. . . . .	North boundary Township 24, Ranges 13 to 29. East boundary Townships 23 to 26, Ranges 17, 21, 25 and 29. (All west of 2nd Initial Meridian.) North boundary Township 24, Ranges 1 to 5. East do Townships 23 to 26, Range 5. (All west of 3rd Initial Meridian.)
Carbert, J. . . . .	Orangeville, Ont. . . . .	Sub-division Township 3, Ranges 1 to 10. (West of 2nd Initial Meridian.) Sub-division Township 2, Range 23. (West of Principal Meridian.)
Caddy, E. C. . . . .	Cobourg, Ont. . . . .	Sub-division Townships 11 and 12, Ranges 29 and 30. North boundary Township 11, Ranges 29 and 30. East do Townships 11 and 12, Range 30. (All west of Principal Meridian.) Sub-division Township 12 Ranges 1 to 8. (West of 2nd Initial Meridian.)
Clementi & Hewson	Peterboro', Ont. . . . .	Subdivision Township 21, Ranges 13 to 18. Subdivision do 21 do 20 and 21. (All west of 2nd Initial Meridian.)
Cotton, A. F. . . . .	Ottawa, Ont. . . . .	East boundary Township 13, Ranges 1, 2 and 3. East do 13 do 6, 7 and 8. East do 13 and 16 Range 14. East do 14, Ranges 1, 2, 3 and 4. East do 14 do 6, 7 and 8. East do 14 do 14. North boundary Township 13, Ranges 1 to 8. North do 13, Range 13. North do 14, Ranges 2, 5, 6, 7, 8 and 13. North and west boundary Township 15, Range 13. South do do 15 do 5, 6 and 7. (All west of 2nd Initial Meridian.)

SCHEDULE (No. 12) showing Surveyors employed and Work performed by each, during the Year 1881—Continued.

Name.	Residence.	Description of Work performed.
Carre, H . . . . .	Brockville, Ont. . . . .	North boundary Township 21 and 22, Ranges 18 19, 20.
		North do 23 do 18, 19, 20.
		North do 21 and 22 do 17.
		North do 23 do 17.
		North do 25 do 13 to 16.
		North do 26 do 13 to 15.
		North do 27A do 13 to 15.
		East do 21, 22 and 23 do 18 to 20.
		East do 24 do 18 to 20.
		East do 25 do 13 to 16.
		East do 26 do 13 to 16.
		East do 27A do 13 to 15.
Dawson, E. C. . . . .	New Glasgow, N.S.	Subdivision Township 17, Ranges 1, 2, 6, 7, 8, 9 and 10. (All west of 2nd Initial Meridian.)
Drummond, T. . . . .	Montreal . . . . .	North boundary Township 23, 24, 25, Ranges 1, 2.
		East do do 23, 24, 25, 26, Range 2.
		East do do 23, Range 3. (All west of 2nd Initial Meridian.)
Deane, M . . . . .	Lindsay, Ont. . . . .	3rd Initial Meridian, Township 1 to 36.
		Subdivision Township 25, Ranges 29 and 30.
		North boundary Township 25, Ranges 29 and 30. East do do 25 do 30. (All west of Principal Meridian.)
Doupe, Jos. . . . .	Winnipeg, Man. . . . .	Subdivision Township 10, Range 17.
		Subdivision do 13 do 29 and 30.
		Subdivision do 11 do 31 and 32.
		North boundary Township 13, Range 30. East do do 13 do 30. (All west of Principal Meridian.)
Evans & Bolger. . . . .	Belleville, Ont. . . . .	Subdivision Township 7 and 8, Ranges 23 to 26.
		North boundary Township 7 do 23 and 24.
		North do do 7 do 26.
		East do do 7 and 8, Range 24.
		East do do 8 do 25. East do do 7 do 26. (All west of Principal Meridian.)
Forrest, A. G. . . . .		Survey of Manitoba Highway.
Fawcett, Thos. . . . .	Gravenhurst, Ont. . . . .	North boundary Township 5 and 6, Ranges 1 to 8 and 13 to 15.
		North do do 7 do 5 to 8 and 13 and 14.
		East do do 5 and 6 do 2, 3, 4, 6, 7 and 8.
		East do do 5 and 6 do 14 and 15.
		East do do 7 and 8 do 6 to 8 and 14 and 15. (All west of 2nd Initial Meridian.)
Garden, J. F . . . . .	Toronto, Ont. . . . .	East boundary Township 21 and 23, Ranges 13 to 16 and 22 and 23.
		East do do 22 do 13 to 16 and 22.
		East do do 24 do 13 to 16 and 22 to 24.
		North do do 21, 22 and 23 do 13 to 16.
		North do do 21 do 21 and 22.
		North do do 22 do 21.
		North do do 23 do 21, 22 and 23. (All west of 2nd Initial Meridian.)
Garon, L. J. . . . .		Subdivision of Township 10, Ranges 1 to 9. (All west of 2nd Initial Meridian.)
Gore, T. S. . . . .	Gore's Landing, O. . . . .	East boundary of Township 1, Ranges 2, 3, 4 and 10, 11 and 12.
		East do do 2 do 2 to 4 and 10 to 12.
		East do do 3 and 4, Ranges 1 to 4, 6 to 8.
		East do do 3 and 4, do 10 to 12.
		North do do 1 do 1 to 4 and 9 to 12.
		North do do 3 do 1 to 12. South do do 3 do 1 to 12. (All west of 2nd Initial Meridian.)
Hamel, A . . . . .	Emerson, Man. . . . .	Subdivision of Township 14, Ranges 1 to 5. (All west of 2nd Initial Meridian.)
Hart, M. . . . .	St. Mary, Ont. . . . .	East boundary Township 9 and 10, Ranges 1 to 4.
		North do do 9 and 10 do 1 to 4.
		South do do 11 do 1 to 4. (All west of 2nd Initial Meridian.)

SCHEDULE (No. 12) showing Surveyors employed and Work performed by each, during the year 1881—Continued.

Name.	Residence.	Description of Work performed.
Hill, John . . . . .	Rimouski, Que. . . . .	Subdivision Township 22, Ranges 1 and 2. Subdivision do 25, do 5 to 9. (All west of 2nd Initial Meridian.)
Kennedy, L . . . . .	Winnipeg, Man. . . . .	North boundary Township 19, 21, 22, 23, Ranges 1 and 2. East do do 19 to 24 do 2. East do do 23 and 24 do 3. South and west boundary Township 24 do 3. (All west of 5th Initial Meridian.)
Kains, Tom . . . . .	St. Thomas, Ont . . . . .	East boundary Township 17, Ranges 2, 3, 6, 7, 8, 14 to 16. East do 18 do 3, 4, 6, 7, 8, 14, 15 and 16. East do 19A do 3 to 8. East do 19 and 20, Ranges 13, 14 and 15. North do 17, Ranges 2, 5, 6, 7, 8, 13, 14, 15 and 16. North do 18 do 2 to 8 and 13 and 14. North do 19 do 13 and 14. (All west of 2nd Initial Meridian.)
Kerr, Henry . . . . .	Annapolis, N.S. . . . .	Subdivision Townships 3, 4, 5 and 6, Ranges 31 and 32. East boundary Townships 3, 4, 5 and 6, Range 32. South do 4 and 6, Range 32. North do 3 and 5 do 31. (All west of Principal Meridian.)
Klotz, O. J. . . . .	Preston, Ont. . . . .	East boundary Townships 7 to 10, Ranges 5, 9, 13, 17, 21 and 25. North do 8, Ranges 1 to 24. (All west of 2nd Initial Meridian.)
Miles, C. F. . . . .	Toronto, Ont. . . . .	East boundary Townships 19, 20 and parts of 21 and 22, Range 4. East do 19, 20, 21 and 22, Ranges 6, 7 and 8. East do 20, 21 and 22, Range 11. East do 20, 21 and 22 do 10. East do 19 do 10 and 11. Part east do 21 do 12. North do 19, 20 and 21 do 4, 5 and 8. North do 19 do 3 and 7. North do 19 do 9 and 10. North do 21 do 6. North do 19 and 20 do 6. North do 20 and 21 do 7, 9, 10 and 11. North do 20 do 12. (All west of 2nd Initial Meridian.)
Morris, J. . . . .	Perth, Ont. . . . .	Subdivision Township 1, Ranges 13 and 14. Subdivision do 3 and 4, Ranges 23 and 24. Subdivision do 3, Range 17. East boundary Township 1, Range 14. South do 1 do 13 and 14. North do 3 do 23 and 24. East do 3 and 4, Range 24. (All west of Principal Meridian.)
McKenna, J. . . . .	Dublin, Ont. . . . .	Subdivision Township 27, Ranges 3 to 7. (West of 2nd Initial Meridian.)
McAree, J. . . . .	Toronto, Ont. . . . .	Subdivision Township 11, Ranges 1 to 5. (West of 2nd Initial Meridian.)
McMillan, J. . . . .	London, Ont. . . . .	Subdivision Township 9, Ranges 1, 2, 5, 6 and 7. (West of 2nd Initial Meridian.)
McPhillips, R. C. . . . .	Winnipeg, Man. . . . .	Subdivision Township 19, Ranges 3, 4, 5, 6, 8, 9 and 10. (West of 2nd Initial Meridian.)
McArthur, J. J. . . . .	Aylmer, Que. . . . .	Subdivision Township 25, Range 31. Subdivision do 25 and 26, Ranges 32 and 33. North boundary Township 25, Range 31. North do 25 do 32 and 33. East do 25 do 32 and 33. East do 26 do 32 and 33. (All west of Principal Meridian.)
McArthur, J. . . . .	do . . . . .	Subdivision Townships 1 and 2, Ranges 33 and 34. Subdivision do 3 and 4 do 29 and 30. North boundary Township 3 do 29 and 30. East do 3 and 4, Range 30. (All west of Principal Meridian.)



SCHEDULE (No. 12) showing Surveyors employed and Work performed by each, during the year 1881—*Continued.*

Name.	Residence.	Description of Work performed.
McLatchie, J. ...	Ottawa, Ont. ....	Subdivision Township 9, Range 22. (East of Principal Meridian.) East boundary Townships 1 to 6, Ranges 9, 13, 17, 21, 25 and 27. East do 3 to 6 do 5 and 9. South do 1 do 9 to 30. North do 4 do 1 to 30. (All west of 2nd Initial Meridian.)
O'Hanly, J. L. P.	do .....	West boundary of Manitoba from Townships 29 to 36, Range 30, west of Principal Meridian.
O'Keefe, D. C. ...	Hamilton, Ont. ....	Subdivision Township 26, Ranges 29 and 30. East boundary Township 26, Range 30. (All west of Principal Meridian.) Subdivision Township 6, Ranges 1 to 10. (All west of 2nd Initial Meridian.)
Ogilvie, Wm. ....	Ottawa, Ont. ....	4th Initial Meridian from International Boundary to north of Township 40.
Pearce, Wm. ....	Calgary, Alberta. .	East boundary Township 15 to 18, Ranges 5, 9, 13, 17 and 21. East do 15 to 18 do 25 and 29. East do 17 to 20 do 22, 23 and 24. North do 16 do 1 to 30. North do 17 do 21 to 24. North do 18 and 19 do 21 to 24. South do 19 do 21 to 24. (All west of 2nd Initial Meridian.)
Poudrier, A. L. ....	.....	Subdivision Township 2, Ranges 1 to 6 and 8, all west of 2nd Initial Meridian.
Reid, J. L. ....	Port Hope, Ont. ...	Sub-division of Township 28, Range 13. Sub-division do 27 do 14. East boundary of Township 23, Ranges 6, 7, 8, 10 and 11. East do 24 do 6, 7, 8, 10 and 11. North do 23 do 5, 6 and 8. North do 24 do 9 to 12. East do 25 and 26, Ranges 10 and 11. (All west of 2nd Initial Meridian.)
Rainboth, G. C. ...	Aylmer, Que. ....	East boundary of Townships 27 and 30, Ranges 7 and 8. East do 28, Ranges 6 to 9. East do 29 do 6, 7 and 8. North do 27 and 29, Ranges 6, 7 and 8. (All west of 2nd Initial Meridian.)
Reiffenstein & Small.	Ottawa, Ont. ....	Sub-division of Township 26, Ranges 9 and 10. (West of 2nd Initial Meridian.)
Reiffenstein, J. ...	Ottawa, Ont. ....	Sub-division of Townships 21 and 22, Range 26. North boundary do 21, Range 26. East do 21 and 22, Range 26. (All west of Principal Meridian.) Sub-division of Township 26, Ranges 5, 6, 7 and 8. South boundary do 26 do 6. (All west of 2nd Initial Meridian.)
Ryley, G. U. ....	Ottawa, Ont. ....	East boundary of Townships 17, 18 and 19A, Range 2. East do 17 and 19A, Range 4. East do 17, Ranges 10, 11, 12, 18 and 19. East do 18 do 10, 11, 12 and 18. East do 19A do 10 to 13. East do 20 do 18. North do 17 and 18, Range 1. North do 17, Ranges 9 to 12 and 17 and 18. North do 18 do 9 to 12 and 17. North and west boundary of Township 19, Range 17. South boundary of Township 19, Range 17. South do 19A do 12. (All west of 2nd Initial Meridian.) 2nd Initial Meridian, Townships 17, 18, 19A.

SCHEDULE (No. 12) showing Surveyors employed and Work performed by each, during the year 1881— *Continued.*

Name.	Residence.	Description of Work performed.
Sing J. G. ....	Stratford, Ont. ....	East boundary of Township 9, Ranges 6 to 8. East do do 12 do 1 to 4 and 6 to 8 and 14 and 15. East do do 10 do 8. East do do 11 do 1 to 4 and 6 to 8 and 14 and 15. North do do 9 do 7 and 8. North do do 11 do 1 to 8 and 13 and 14. North do do 10 do 1, 5, 6, 7 and 8. (All west of 2nd Initial Meridian.)
Snow, J. A. ....	Ottawa, Ont. ....	Sub-division of Township 21, Ranges, 24 and 25. Sub-division do 20 do 23. North boundary of Township 21, Ranges 24 and 25. East do do 21 do 24. (All west of Principal Meridian.) Sub-division of Townships 25 and 26, Ranges 13 to 16. Sub-division do 27A, Ranges 13, 14 and 15. East boundary of Township 27A do 13. West do do 27A do 15. West do do 26 do 15 I. R. (All west of 2nd Initial Meridian.)
Staunton & Jones.	Hamilton, Ont. ...	Sub-division of Township 14, Ranges 33 and 34. Sub-division do 17 and 18, Ranges 32 and 33. Sub-division do 18, Range 31. Sub-division do 25 and 26, Range 27. Sub-division do 26, Range 28. East boundary of Township 14, Range 34. North and east boundary of Township 17, Range 32. North boundary of Township 25, Range 27. East do do 26 do 28. East do do 18 do 32. (All west of Principal Meridian.)
Stewart, J. ....	Banff, Alb. ....	Sub-division of Township 8, Ranges 1 to 10. (West of 2nd Initial Meridian.)
Sinclair & Francis.	Winnipeg, Man. ...	Sub-division of Township 1, Ranges 1 to 9. Sub-division do 1 and 2, Range 10. Sub-division do 2, Range 9. North boundary of Township 1, Ranges 9 and 10. East do do 1 do 10 and 11. (All west of 2nd Initial Meridian.)
Thomson, A. C. ....		East boundary of Townships 13 and 14, Range 12. East do do 15 and 16 do 1 to 4 and 6 to 8. East do do 15 and 16 do 10 to 12. North do do 13, Ranges 11 and 12. North do do 14 do 2 to 4 and 11 and 12. North do do 15 do 1 to 12. South do do 15 do 1. (All west of 2nd Initial Meridian.)
Thompson, W. T.	Cannington, Ont. ...	North boundary of Township 20, Ranges 13 to 29. East do do 19 to 22, Ranges 17, 21, 25 and 29. East do do 27 to 30 do 21, 25 and 29. North do do 28, Ranges 17 to 29. (All west of 2nd Initial Meridian.)
Traynor, I. ....	Dundalk, Ont. ...	Sub-division of Township 28, Ranges 3, 6 and 7. Part of sub-division of Township 28, Range 8. (West of 2nd Initial Meridian.)
Unwin, C. ....	Toronto, Ont. ....	Sub-division of Township 18, Range 18. South boundary do 18 do 18. (West of Principal Meridian.)
Webb, A. C. ....	Brighton, Ont. ....	North boundary of Township 12, Ranges 1 to 28. North do do 11 do 28. East do do 11 to 14 do 5, 9, 13, 17, 21 & 25. East do do 12 and 13 do 28. East do do 11 and 12 do 29. East do do 14 do 29. South do do 12 do 29 and 30. North do do 13 do 28. (All west of 2nd Initial Meridian.)

SCHEDULE (No. 12) showing Surveyors employed and Work performed by each, during the year 1881—*Concluded.*

Name.	Residence.	Description of Work performed.
Walsh, T. W. ....		Sub-division of Township 20, Ranges 3 to 7. (West of 2nd Initial Meridian.)
Warren, J. ....	Kincardine, Ont.	Sub-division of Township 5, Ranges 1 to 7. (West of 2nd Initial Meridian.)
Wilson, H. ....		Sub-division of Township 21, Ranges 3 to 10. Sub-division do 22 do 3. (All West of 2nd Initial Meridian.)
Wolff, C. E. ....	Ottawa, Ont. ....	North boundary of Township 5, Ranges 9, to 12, and 17 and 18. North do 7 do 1 to 4, and 9 to 12. East do 6 do 10, 11, 12 and 19. East do 5 do 10, 11, 12 and 19. East do 7 and 8 do 1 to 4, and 10, 11 & 12. East do 5 to 8 do 18. South do 6 do 9 to 12. South do 7 do 17. North do 8 do 17. (All west of 2nd Initial Meridian.)
Wilson, R. A. ....	Mount Forest, Ont.	Sub-division of Township 22, Ranges 4 to 10. (West of 2nd Initial Meridian.)
Wagner, Wm. ....	Ossowa, Man. ....	Sub-division of Townships 11 and 12, Range 28. Sub-division do 11 and 12 do 26 and 27. Sub-division do 11 do 25. North boundary do 11 do 26, 27 and 28. East do do 11 and 12 do 26 and 28. (All west of Principal Meridian.)
Wilkins, F. W. ....	Norwood, Ont. ....	Sub-division of Townships 5, 6, 7 and 8, Ranges 29 and 30. North boundary do 5 do 29 and 30. East do do 5 and 6 do 30. (All west of Principal Meridian.)

SCHEDULE (No. 13) showing Surveyors employed and Work performed by each, during the year 1882.

Abrey, G. B. . . .	Little Current, O.	Eleventh base line from the 3rd to the 4th I.M.; the 4th I.M. from the 14th to the 15th base line, and the 15th base line from the 4th I.M. westward.
Armstrong, F. W.	Orillia, Ont. ....	Township outlines, between the 3rd and 4th base lines, from Range 9 to 12 west of the 2nd I.M., and between the 4th and 5th base lines, west of the 4th I.M.
Ashe, W.A., D.T.S.	Quebec . . . . .	Tenth base line, from the 3rd to the 4th I.M.; reposting of the 4th I.M., from the 11th to the 14th base line, and the 14th base line west of the 4th I.M.
Bazette, Ed. ....	Orillia, Ont. ....	Townships 21 and 24, Range 19; Townships 22 and 23, Ranges 19 and 20; Township 25, Ranges 22 to 24 west of 2nd I.M.
Beatty, D. ....	Delta, Ont. ....	Townships 54 to 56, Range 22; Townships 56 and 57, Ranges 23 and 24, west of the 4th I.M. and Township outlines; also standard Meridians in Townships 55 to 57, between Ranges 24 and 25 and between Ranges 22 and 23 west of 4th I.M.
Beatty, W. ....	do . . . . .	Township 52, Ranges 23 to 27; Township 53, Ranges 25 to 27; Township 54, Range 26 west of 4th I.M. and Township outlines.
Bélanger, P. R. A.	L'Islet, Que. ....	Township outlines, between the 3rd and 4th base lines, Ranges 17 to 20 west of 2nd I.M.; between the 2nd and 3rd base lines, Ranges 17 and 18 west of 2nd I.M., and between the 4th and 5th base lines west of 4th I.M.
Bell, Wm. ....	Pembroke, Ont. ....	Township outlines, between the 6th and 7th base lines, Range 25 west of 2nd I.M. to the 3rd I.M., and between the 5th and 6th base lines west of the 4th I.M.
Bigger, C. A. ....	Plantagenet, Ont.	Eleventh base line, from the 3rd I.M. eastward across Ranges 29 and 28; the 12th base line from the Meridian between Ranges 3 and 4 west of 3rd I.M. across Ranges 4 and 5, and Township outlines, between the 10th and 11th base lines west of 2nd I.M.

SCHEDULE (No. 13) showing Surveyors employed and Work performed by each, during the year 1882—*Continued.*

Name.	Residence.	Description of Work performed.
Bignell, John . . . . .	Quebec . . . . .	Township outlines, between the 7th and 8th base lines, Ranges 25 to 28 west of 2nd I. M., and between the 5th and 6th base lines west of 4th I. M.
Bolton, Lewis . . . . .	Listowell, Ont. . . . .	Township outlines, between the 5th and 6th base lines in Range 16; between the 4th and 5th base lines, Range 21 to 24 west of 2nd I. M., and between the 5th and 6th base lines west of 3rd I. M.
Bourgeois, J. . . . .	Three Rivers, Que. . . . .	Townships 19 and 20, Ranges 11 and 12; Township 15, Range 18, and Township 14, Range 19 west of 2nd I. M.
Brabazon, S. L. . . . .	Portage du Fort, Q. . . . .	Township 6, Ranges 25 and 28; Township 7, Ranges 31 and 32 west of 1st P. M.; Township 9, Range 20; Township 10, Ranges 10 to 16, and Ranges 18 to 20; Township 11, Ranges 9, 10, 19, 20 and 22 west of 2nd I. M.
Bray, Edgar . . . . .	Oakville, Ont. . . . .	Sixth base line and Meridians transverse thereto, west of 3rd I. M.
Bray, H. F. . . . .	do . . . . .	Townships 33 to 36, Ranges 4 and 5 west of 3rd I. M. and Township outlines.
Brodie, S. . . . .	Toronto, Ont. . . . .	Township 23, Ranges 11 and 12; Township 24, Range 12 west of 2nd I. M.
Brunelle, F. E. . . . .	Three Rivers, Que. . . . .	Townships 19 and 20, Range 10; Townships 19a and 18, Range 11; Township 15, Range 19; Townships 14 and 15, Range 20 west of 2nd I. M.
Burnet, Peter . . . . .	Orillia, Ont. . . . .	Township 5, Ranges 7 to 12; Townships 10 and 11, Range 17; Township 11, Range 18; Townships 12 and 13, Range 19 west of 2nd I. M.
Burrows, J. J. . . . .	Ottawa, Ont. . . . .	Townships 25 and 26, Ranges 11 and 12; Township 28, Ranges 17 and 18 west of the 2nd I. M.
Byrne, Thos . . . . .	Sarnia, Ont. . . . .	Townships 33 to 36, Ranges 1 and 2, west of 3rd I. M. and Township outline.
Caddy, E. C. . . . .	Cobourg, Ont. . . . .	Townships 45 to 49, Range 23; Townships 46 to 49, Range 22, west of 2nd I. M. and Township outlines.
Carroll, Cyrus . . . . .	Port Elgin, Ont. . . . .	Township 41, Ranges 1 to 3; Townships 42 A, Range 1, Township 40, Range 5, west of 3rd I. M. and Township outlines.
Cavana, A. G. . . . .	Brechin, Ont. . . . .	Third I. M. from North Saskatchewan to 13th base line; 13th base line, westward across seven ranges, and 12th base line from 4th I. M., eastward.
Cotton, A. F. . . . .	Ottawa, Ont. . . . .	Township outlines between the 4th and 5th base lines, Ranges 17 to 20, west of 2nd I. M., between the 5th and 6th base lines, Range 29, west of 2nd I. M., to 3rd I. M. and between the 6th and 7th base lines, west of 4th I. M.
Dalton, J. J., D. T. S. . . . .	Yorkville, Ont. . . . .	Township 8, Range 32; Townships 10 and 11, Ranges 33 and 34; Township 12, Range 31, west of 1st P. M., and Township 12, Ranges 9 and 10, west of 2nd I. M.
D'Amours, J. W. . . . .	Quebec . . . . .	Township 18, Ranges 20 and 21; Townships 19 and 20, Ranges 19 to 24, west of 2nd I. M.
Deane, M. . . . .	Lindsay, Ont. . . . .	Settlement survey at Edmonton, on the River Saskatchewan.
Denny, H. C. . . . .	Ottawa, Ont. . . . .	Township outlines between the 7th and 8th base lines, from Range 25, west of 2nd I. M. to 3rd I. M. and between the 5th and 6th bases, west of 4th I. M.
Desjardins, C. . . . .	do . . . . .	Township outlines between 4th and 5th base lines, Ranges 17 to 20, west of 2nd I. M. and between 6th and 7th base lines, west of 4th I. M.
Desmeules, J. C. . . . .	Murray Bay, Que. . . . .	Ninth base line from 3rd I. M., eastward, and Township outlines between 8th and 9th base lines, west of 2nd I. M.
Doupe, Jos. . . . .	Winnipeg, Man. . . . .	Townships 49 to 53, Ranges 1 and 2, west of 4th I. M. and Township outlines.
Drummond, Thos. . . . .	Montreal, Que. . . . .	Sixth base line and meridians transverse thereto, west of 4th I. M.
Duburger, C. C. . . . .	Murray Bay, Que. . . . .	Township 17, Ranges 11 to 15; Townships 17 to 20, Ranges 25 to 27; Townships 18 and 19 A, Range 12; Township 24, Ranges 23 to 27; Township 24, Ranges 24 to 26, west of 2nd I. M.
Dudderidge, Jas. . . . .	Lachute, Que. . . . .	Township outlines between 4th and 5th base lines, from Range 29, west of 2nd I. M. to the 3rd I. M. and between the 5th and 6th base lines, west of 3rd I. M.
Dumais, H. . . . .	Chicoutimi, Que. . . . .	Reposting of the 2nd I. M., from 9th base line to the 8th correction line and 9th base line, westward across two ranges; also Townships 32 and 33, Range 3; Townships 31 and 32, Ranges 4 and 5, west of 2nd I. M. and Township outlines.

SCHEDULE (No. 13) showing Surveyors employed and Work performed by each, during the year 1882—*Continued.*

Name.	Residence.	Description of Work performed.
Dumais, P. T. C. . . .	Chicoutimi, Que. . . .	Township 11, Ranges 6 to 11; Township 12, Ranges 9 to 11; Township 13, Ranges 7 to 11; Township 14, Ranges 7 to 10, west of 2nd I.M.
Dupuis, Z. C. . . . .	Montmagny, Que. . . .	Townships 18 and 19, Range 13; Townships 18 to 21, Range 14; Township 22, Range 21; Townships 21 to 23, Range 22, and Townships 22 and 23, Range 23, west of 2nd I.M.
Ellis, H. D. . . . .	London, Ont. . . . .	Thirteenth base line, from meridian, between Ranges 24 A and 24 west of 2nd I.M., eastward across 24 A, 23 and 22; 12th base line, eastward; also Township outlines between the 12th and 13th base lines.
Fafard, Eug. . . . .	L'Islet, Que. . . . .	Township 5, Ranges 14 to 18; Township 6, Ranges 14 to 16; Township 11, Range 21; Township 12, Ranges 20 to 22; Township 13, Range 20, west of 2nd I.M.
Fawcett, T., D.T.S.	Gravenhurst, Ont.	Fifth base line and meridians transverse thereto, west of 3rd I.M.
Fitton, C. E. . . . .	Orillia, Ont. . . . .	Townships 22 to 24, Ranges 17 and 18; Township 26, Ranges 22 to 24, west of 2nd I.M.
Francis, J. J. . . . .	Sarnia, Ont. . . . .	Township 12, Ranges 32 to 34; Township 13, Ranges 33 and 34, west of 1st P.M.; Township 13, Range 1 and Township 16, Ranges 14 to 20, west of 2nd I.M.
Garden, J. F. . . . .	Toronto, Ont. . . . .	Township outlines, between 6th and 7th base lines, Ranges 21 to 24; between 7th and 8th base lines, Ranges 21 to 24, west of 2nd I.M.; and between 6th and 7th base lines, west of 3rd I.M.
Gauvreau, L. P. . . .	Quebec . . . . .	Townships 1 to 3, Ranges 11 and 12; Township 9, Range 18, west of 2nd I.M.
Gore, T. S. . . . .	Regina, N.W.T. . . . .	Township 17, Ranges 19 and 20, west of 2nd I.M.
Hamel, Alfred. . . . .	Emerson, Man. . . . .	Township 18, Ranges 4 to 8, and Range 18; Township 20, Ranges 8 and 18; Townships 22 to 24, Ranges 13 and 14, west of 2nd I.M.
Hart, Milner . . . . .	St. Marys, Ont. . . . .	Examination of contract surveys.
Henderson, E. D. . . .	Hemison, Que. . . . .	Townships 6 to 8, Ranges 11 and 12; Township 13, Ranges 17 and 18, west of 2nd I.M.
Hermon, R. W. . . . .	Rednersville, Ont.	Examination of contract surveys.
Hewson, T. R. . . . .	Peterboro', Ont. . . .	Township outlines, between the 6th and 7th base lines, Ranges 21 to 24, west of 2nd I.M.; between the 7th and 8th base lines, Ranges 21 to 24, west of 2nd I.M.; and between the 6th and 7th base lines, west of the 3rd I.M.
Hill, John . . . . .	Rimouski, Que. . . . .	Township 13, Ranges 23 to 25; Township 14, Ranges 24 and 26; Township 15, Ranges 23, 24, 26 and 27; Township 16, Ranges 21 to 27; Township 17, Ranges 16 to 18, and Ranges 25 to 27; Township 18, Range 17, and Ranges 25 to 27; Townships 19 and 20, Range 17, west of 2nd I.M.
Jones, F., & Co. . . .	Kenuptville, Ont. . . .	Townships 25 and 26, Ranges 1 to 7; Townships 27 and 28, Ranges 1 to 8, west of 3rd I.M. and Township outlines.
Kains, Tom . . . . .	St. Thomas, Ont. . . .	Seventh base line, westward from Range 4, west of 3rd I.M. and Meridians transverse thereto; also 13th base line, west of 4th I.M.
Kerr, Hugh. . . . .	Annapolis, N.S. . . . .	Townships 13 and 14, Range 23; Townships 14 and 15, Range 25; Townships 17 and 18, Ranges 22 to 24, west of 2nd I.M.
Kirk, J. A. . . . .	Stratford, Ont. . . . .	Townships 41, 42 and 44, Ranges 27 and 28, west of 2nd I.M. and Township outlines.
Klotz, O.J., D.T.S.	Preston, Ont. . . . .	Fifth base line and Meridians transverse thereto, west of 4th I.M.
Lawe, Henry . . . . .	Brandon, Man. . . . .	Township 8, Ranges 16 and 17, west of 2nd I.M.
Leber, Hector . . . . .	St. Wenceslas, Que. . .	Townships 19 to 22, Ranges 28 and 29; Township 23, Range 21; Township 24, Ranges 20 to 23; Township 25, Ranges 25 and 26, west of 2nd I.M.
Lemoine, C. E. . . . .	St. Boniface, Man. . . .	Township 23, Ranges 7 to 9, west of 2nd I.M.
Lendrum, R. W. . . . .	Riceville, Ont. . . . .	Townships 28 to 30, Ranges 1 and 2, west of 2nd I.M. and Township outlines.
Maddock, J. A. . . . .	Norwood, Ont. . . . .	Township outlines, between the 3rd and 4th base lines, Ranges 9 to 12, and between the 4th and 5th base lines, west of 4th I.M.
Magrath, C. A., D. T.S.	Williamstown, Man.	Fourth base line and Meridians transverse thereto, west of 4th I.M.; 15th base line, eastward from Meridian between Ranges 24 and 25, west of 4th I.M.; also outlines of Township 52, Ranges 23 to 25, west of 3rd I.M.
Michaud, J. Ls. . . .	Rimouski, Que. . . . .	Township 11, Ranges 12 to 16; Township 12, Range 12 and Ranges 15 to 18; Townships 21 and 22, Ranges 11 and 12, west of 2nd I.M.

SCHEDULE (No. 13) showing Surveyors employed and Work performed by each, during the Year 1882—Continued.

Name.	Residence.	Description of Work performed.
Miles, C. F. ....	Toronto, Ont. ....	Township outlines, between the 7th and 8th base lines, Ranges 17 to 20, west of 2nd I.M., and between the 6th and 7th base lines, west of 4th I.M.
Murphy, F. ....	Mount Forest, Ont.	Townships 45 and 46, Range 4; Township 45, Range 5, west of 3rd I.M. and Township outlines.
McArthur, J. ....	Aylmer, Que. ....	Township 23, Ranges 3 to 6; Townships 19 and 20, Ranges 15 and 16, west of 2nd I.M.
McArthur, J. J. ....	do ....	Township outlines, between the 3rd and 4th base lines, Ranges 21 to 24, and between the 4th and 5th base lines, west of 3rd I.M.
McKenna, J. J. ....	Perth, Ont. ....	Township 13, Ranges 2 to 6; Township 14, Ranges 6, 14 and 15; Township 15, Ranges 14 to 16, west of 2nd I.M.
McLean, J. K. ....	Mount Forest, Ont.	Township outlines, between 3rd and 4th base lines, Ranges 21 to 24 west of 2nd I.M., and between the 4th and 5th base lines west of 3rd I.M.
McMillan, J. A. ....	London, Ont. ....	Townships 16 to 18, Ranges 28 to 30, and Township 15, Range 28 west of 2nd I.M.
McVittie, A. W. ....	Barrie, Ont. ....	Township outlines, between the 7th and 8th base lines, Ranges 17 to 20 west of 2nd I.M., and between the 6th and 7th base lines west of 4th I.M.
Ogilvie, W. ....	Ottawa, Ont. ....	Seventh base line and Meridians transverse thereto west of 4th I.M.
O'Keeffe, D. C. ....	Hamilton, Ont. ....	Townships 29 to 32, Ranges 3 to 5; Townships 33 and 34, Range 3 west of 3rd I.M. and Township outlines.
Ord, L. R. ....	Ottawa, Ont. ....	Township outlines, between the 6th and 7th base lines, Range 25 west of 2nd I.M. to 3rd I.M., and between the 5th and 6th base lines west of 4th I.M.
Patrick, L. ....	Portage la Prairie, Man.	Township 48, Range 1; and Townships 45 to 48, Ranges 2 and 3 west of 3rd I.M., and Township outlines.
Proudfoot, H. B. ....	Ottawa, Ont. ....	Township outlines, between the 5th and 6th base lines, Ranges 13 to 16; between the 4th and 5th base lines, Ranges 21 to 24 west of 2nd I.M., and between the 5th and 6th base lines west of 3rd I.M.
Rainboth, E. J. ....	Aylmer, Que. ....	Township outlines, between the 5th and 6th base lines, Ranges 17 to 20; and Ranges 25 to 28 west of 2nd I.M.; also between the 6th and 7th base lines west of 3rd I.M.
Rainboth, G. C. ....	do ....	Township outlines, between the 5th and 6th base lines, Ranges 17 to 20; and Ranges 25 to 28 west of 2nd I.M.; also between the 6th and 7th base lines west of 3rd I.M.
Sheppard, C. G. ....	River David, Que..	Townships 5 to 8, Range 13; Townships 7 and 8, Ranges 14 and 15; Township 13, Ranges 14 to 16; Township 14, Ranges 16 to 18 west of 2nd I.M.
Simpson, G. A. ....	Ottawa, Ont. ....	Township 53, Ranges 23 and 24; Townships 54 and 55, Ranges 23 to 25; Townships 56 and 57, Range 25 west of 4th I.M., and Township outlines.
Sing, J. G. ....	Stratford, Ont. ....	Township outlines, between the 4th and 5th base lines, Ranges 14 to 16; between 3rd and 4th base lines, Ranges 13 to 16 west of 2nd I.M., and between the 4th and 5th base lines west of 3rd I.M.
Snow, J. A. ....	Ottawa, Ont. ....	Townships 22 to 24, Ranges 15 and 16; Township 25, Ranges 17 to 20; and Township 26, Ranges 18 and 19 west of 2nd I.M.
Starkey, S. M. ....	Queen's Co., N.B.	Townships 37 to 40, Ranges 1 and 2 west of 3rd I.M., and Township outlines.
Talbot, A. C. ....	Montmagny, Que.	Township outlines, between the 3rd and 5th base lines, Ranges 15 and 16 west of 2nd I.M.; also between the 4th and 5th base lines west of 3rd I.M.
Thompson, W. S., D.T.S.	Cannington, Ont..	Fourth base line west of 3rd I.M., and Meridians transverse thereto.
Traynor, Isaac ....	Dundalk, Ont. ....	Ninth base line, Ranges 9 to 14 west of 2nd I.M.; also Townships 32 and 33, Ranges 10 to 14 west of 2nd I.M., and Township outlines.
Vincent, F. ....	Murray Bay, Que..	Township 12, Ranges 13 and 14; Township 13, Ranges 12 and 13; Township 14, Ranges 11 to 13 and Ranges 21 to 23; Township 15, Ranges 21 and 22 west 2nd I.M.
Wagner, W. ....	Ossowa, Man. ....	Township 24, Ranges 30 and 33; Townships 27 and 28, Ranges 31 and 32; Townships 21 and 22, Range 31; Townships 20, 23, 24, 27 and 28 west of 1st P.M.
Warren, Jas. ....	Kincardine, Ont. ..	Townships 9 and 10, Ranges 27 and 28 west of 1st P.M.; Township 8, Range 18; Township 9, Ranges 9 to 19 west of 2nd I.M.

SCHEDULE (No. 13) showing Surveyors employed and Work performed by each, during the year 1882—*Concluded*.

Name.	Residence.	Description of Work performed.
Wilkins, Fred. W., D.T.S.	Norwood, Ont. ....	Township outlines, between the 4th and 5th base lines, Range 25 to 3rd I.M., and between the 5th and 6th base lines west of 3rd I.M.
Wilson, Hugh ....	Mount Forest, Ont.	Township 45 A and 45, Ranges 26 to 28; Township 46 A, Range 26 west of 2nd I.M., and Township outlines.
Wolf, C. E. ....	Ottawa, Ont. ....	Township outlines, between the 3rd and 4th base lines, Ranges 17 to 20; between the 2nd and 3rd base lines, Ranges 17 and 18 west of 2nd I.M., and between the 4th and 5th base lines west of 4th I.M.

SCHEDULE (No. 14) showing Surveyors employed and Work performed by each, during the year 1883.

Abrey, G. B. ....	Little Current, Ont.	11th Base Line, from 3rd to 4th Meridian; part of 4th Meridian, and 15th Base from 4th Meridian to Range 17.
Armstrong, F. W.	Orillia, Ont. ....	Meridian outlines between 1st and 5th Bases, west of 4th and 5th Meridians.
Ashe, W. A., D.T.S.	Quebec. ....	12th Base Line from Range 5, west of 3rd Meridian, to 4th Meridian; and parts of 13th and 14th Bases, east from 4th Meridian.
Aylen, Chas. P., D.T.S.	Aylmer, Que. ....	Townships 1, 2 and 3, Ranges 13, 14, 15 and 16; Township 4, Ranges 11 to 16, west of the 2nd Meridian.
Beatty, D. ....	Delta, Ont. ....	Townships 55, 56 and 57, Ranges 18, 19, 20 and 21; Townships 54 to 57, Range 22; Townships 56 and 57, Ranges 23 and 24; Township 50, Range 26; Township 51, Ranges 25 and 26, west of the 4th Meridian.
Beatty, W. ....	do. ....	Townships 45 and 46, Ranges 18, 19, 20, 21; Townships 49 and 50, Ranges 24 and 25; Township 51, Range 24, west of the 4th Meridian.
Belanger, P. R. A.	L'Islet, Que. ....	Meridian outlines west of the 3rd Meridian, between 7th and 8th Bases, and examination of contract surveys.
Bigger, C. A. ....	Plantagenet, Ont.	Examination of contract surveys.
Blake, F. L. ....	Toronto, Ont. ....	Townships 37, 38 and 39, Ranges 4 and 5; Township 33, Range 5; Townships 29 to 36, Range 6, west of the 3rd Meridian.
Bourgeault, A. ....	St. Jean Port Joli, Que.	Townships 15 and 16, Ranges 4 to 9; Township 9, Ranges 17 to 19; Township 10, Ranges 16 to 20, west of the 4th Meridian.
Bourgeois, John ..	Three Rivers, Que.	Townships 25 to 26, Ranges 12 to 16; Townships 23 and 24, Ranges 1 and 2; west of the 3rd Meridian; Townships 23 and 24, Range 29, west of the 2nd Meridian.
Brabazon, S. L. ....	Portage du Fort, Que.	Townships 15 to 18, Ranges 19 to 21; part of Township 8, Range 22; parts of Township 9, Ranges 22, 23 and 24; part of Township 8, Range 25; Township 10, Ranges 22, 23 and 24; Township 8, Range 26, west of the 4th Meridian.
Bray, Edgar ....	Oakville, Ont. ....	9th Base line from Range 5, west of the 3rd Meridian, to Range 5, west of 5th Meridian; also, meridian outlines near 5th Meridian.
Brownjohn, T. C.	Grimsbey, Ont. ....	Townships 13 and 14, Ranges 4 to 6, west of the 4th Meridian.
Brunelle, F. E. ....	Three Rivers, Que.	Townships 21 and 22, Ranges 3 to 8; Townships 25 and 26, Ranges 17 and 18; Township 26, Ranges 19 to 21; Township 25, Range 21, west of the 3rd Meridian.
Burke, Jos. ....	Winnipeg, Man. ....	Townships 23 and 24, Ranges 5 to 8; Township 25, Range 5 to 11; Township 26, Ranges 7 to 11, west of the 3rd Meridian.
Burnet, Peter. ....	Orillia, Ont. ....	Townships 23 and 24, Ranges 21 to 26, west of the 3rd Meridian.
Burrows, J. J. ....	Ottawa, Ont. ....	Township 22, Range 21; Townships 23 and 24, Ranges 19 to 21; Township 25, Ranges 16 to 22; Township 26, Ranges 16 to 21, west of the 4th Meridian.
Caddy, E. C. ....	Cobourg, Ont. ....	Townships 43 and 44, Ranges 19 to 22; Townships 45 to 49, Ranges 22 and 23, west of the 2nd Meridian.
Caddy, C. F. ....	Campbellford, Ont.	Townships 17 to 22, Ranges 1 and 2, west of the 3rd Meridian.
Casgrain, J. P. B.	Quebec. ....	Township 24, Range 25; part of Townships 25 and 26, Range 24; Township 23, Range 28; Townships 24 and 25, Ranges 27 and 28; Township 26, Ranges 25 to 29; Township 25, Range 29, west of the 2nd Meridian; Townships 23 to 26, Ranges 3 and 4, west of the 3rd Meridian.

SCHEDULE (No. 14) showing Surveyors employed and Work performed by each, during the year 1883—*Continued.*

Name.	Residence.	Description of Work performed,
Cavana, A. G. . . . .	Brechin, Ont. . . . .	Meridian outlines, between 10th and 11th, and 11th and 12th Bases, west of 3rd Meridian.
Cotton, A. F. . . . .	Ottawa, Ont. . . . .	Meridian outlines, between 3rd and 4th Bases, west of 3rd Meridian.
Charbonneau, M. J. . . . .	St. Boniface, Man. . . . .	Townships 27 and 28, Ranges 23 to 29, west of the 2nd Meridian; Townships 26 and 27, Ranges 5 and 6; Townships 27 and 28, Ranges 7 and 8, west of the 3rd Meridian.
Cheesman, Thos. . . . .	Mitchell, Ont. . . . .	Township 17, Ranges 13 to 15; Township 18, Ranges 13 and 14; Townships 19 and 20, Ranges 13 to 15, west of the 4th Meridian.
Chipman, W. . . . .	Brockville, Ont. . . . .	Townships 13 and 14, Ranges 6 to 11, west of the 3rd Meridian; Township 9, Ranges 23 and 24, Townships 10 to 12, Ranges 24 and 25, west of the 3rd Meridian.
Crawford, N. . . . .	Winnipeg, Man. . . . .	Townships 15 to 18, Ranges 22 to 24, west of the 4th Meridian.
D'Amours, J. W. . . . .	Quebec. . . . .	Townships 13 to 16, Ranges 16 to 18; Townships 11 and 12, Ranges 20 to 23, west of the 4th Meridian.
Dawson, E. C. . . . .	New Glasgow, N.S. . . . .	Township 20, Range 18; Township 19, Ranges 19 to 24; Townships 21 and 22, Ranges 19 and 20, west of the 4th Meridian.
Deane, M. . . . .	Lindsay, Ont. . . . .	Survey of Settlement of St. Albert. Township outlines between the 13th and 14th Bases, west of the 4th Meridian.
Dechesne, L. M. . . . .	St. Roch, Que. . . . .	Townships 13 to 16, Ranges 3 to 5; Townships 9 to 12, Ranges 18 and 19, west of the 3rd Meridian.
Desjardins, C. . . . .	Ottawa, Ont. . . . .	Townships 13 and 14, Ranges 24 to 29, west of the 3rd Meridian; Township 9, Range 9; Townships 10 to 12, Ranges 9 and 10, and Township 12, Range 8, west of the 4th Meridian.
Doupe, J. . . . .	Winnipeg, Man. . . . .	Townships 37 to 40, Ranges 6 and 7, west of the 3rd Meridian; Townships 52 and 53, Range 3, west of the 4th Meridian.
Drummond, Thos. . . . .	Montreal, Que. . . . .	Part of 9th, 10th and 11th Bases, between 2nd and 3rd Meridians; and part of 13th Base, between 3rd and 4th Meridians; also, part of 3rd Initial Meridian.
DuBerger, C. C. . . . .	Murray Bay, Que. . . . .	Townships 15 and 16, Ranges 24 to 29, west of the 3rd Meridian; Townships 9 to 11, Ranges 5 and 6; Townships 11 and 12, Range 4, west of the 4th Meridian.
Dudderidge, Jas. . . . .	Lachute, Que. . . . .	Townships 21 and 22, Ranges 18 to 23; Townships 25 and 26, Range 29, west of the 3rd Meridian; Township 25, Range 1; Township 26, Ranges 1 and 2, west of the 4th Meridian.
Dufresne, J. I. . . . .	St. Thomas de Montmagny, Que. . . . .	Townships 17 and 18, Ranges 3 to 6; Townships 19 and 20, Ranges 5 and 6; Townships 13 and 14, Ranges 13 to 15, west of the 4th Meridian.
Dumais, H. . . . .	Chicoutimi, Que. . . . .	Sub-division of part of the Wa-wa-see-ca-pow Reserve; 9th Base Line from the 2nd Meridian to the western boundary of Range 8, and 2nd Meridian from the north boundary of Township 30, to the north boundary of Township 32; also, sub-division of Township 33, Range 3, west of the 2nd Meridian.
Dumais, P. T. C. . . . .	do . . . . .	Townships 11 to 13, Ranges 23 and 24; Township 13, Ranges 21, 22, 25 and 26; Townships 14 and 15, Range 24, west of the 2nd Meridian; Townships 9 to 12, Range 16 and 17, west of the 3rd Meridian.
Eaton, W. Case. . . . .	Winnipeg, Man. . . . .	Townships 41 to 44, Ranges 4 and 5, west of the 3rd Meridian.
Ellis, H. D. . . . .	London, Ont. . . . .	Meridian exteriors from the eastern boundary of Range 2, west of the 4th Meridian, to the western boundary of Range 18, between the 13th Base and the 13th Correction Line.
Fafard, Eug. . . . .	L'Islet, Que. . . . .	Townships 13, 14, 15 and 16, Ranges 15, 16 and 17; Townships 9, 10 and 11, Ranges 28, 29 and 30; Township 12, Ranges 29 and 30, west of the 3rd Meridian.
Fawcett, T., D. T. S. . . . .	Gravenhurst, Ont. . . . .	8th Base Line, from Range 8, west of 3rd Meridian to Range 9, west of 5th Meridian; 7th Base, from Range 4 to Range 8, west of 5th Meridian; 6th Base, from Range 2 to 6, west of the 5th Meridian; also Meridian outlines west of 5th and between said bases.
Fitton, C. E. . . . .	Orillia, Ont. . . . .	Township 26, Ranges 17 and 20; Township 27, Ranges 17 to 22; Township 28, Ranges 19 to 22, west of the 2nd Meridian; Township 27, Ranges 2, 3 and 4; Township 28, Ranges 2 and 3, west of the 3rd Meridian.
Foster, F. L. . . . .	Windsor, Ont. . . . .	Survey of Rat River Settlement.
Francis, John. . . . .	Winnipeg, Man. . . . .	Townships 9, 10, 11 and 12, Range 28; Townships 11, 12, 13, 14, 15 and 16, Range 27; Townships 13, 14, 15 and 16, Ranges 25 and 26; Township 14, Ranges 29 and 30; part of Townships 15 and 16; Range 30, west of the 4th Meridian.



SCHEDULE (No. 14) showing Surveyors employed and Work performed by each, during the year 1883—*Continued.*

Name.	Residence.	Description of Work performed.
Francis, J. J. . . . .	Sarnia, Ont. . . . .	Townships 22, 23 and 24, Ranges 22, 23 and 24; Township 25, Ranges 23 to 25; Township 26, Ranges 22 to 25; Townships 21 and 22, Ranges 25, 26 and 27, west of the 4th Meridian.
Garden, Jas. F. . . . .	Toronto, Ont. . . . .	Meridian outlines between 10th and 11th Bases, west of 3rd Meridian, also between 11th and 12th Bases, west of 4th Meridian.
Gilliland, T. B. . . . .	Eugenie, Ont. . . . .	Townships 6 and 7, Ranges 17 and 18; Township 7, Range 16; Townships 9 and 10, Ranges 21, 22 and 23, west of the 2nd Meridian; Township 11, Ranges 10 to 13; Township 12, Ranges 9 to 13, west of the 3rd Meridian.
Gosselin, P. . . . .	Quebec . . . . .	Townships, 17, 18, 19 and 20, Ranges 10, 11 and 12; Township 11, Range 19; Township 12, Ranges 18 and 19, west of the 4th Meridian.
Gosselin, N. . . . .	do . . . . .	Townships 17, 18, 19 and 20, Ranges 7, 8 and 9; Township 12, Range 17; Township 11, Ranges 17 and 18, west of the 4th Meridian.
Grondin, L. S. E. . . . .	Rimouski, Que. . . . .	Townships 11 and 12, Ranges 11, 12 and 13; Townships 10 and 12, Range 14, west of the 4th Meridian.
Hart, Milner. . . . .	St. Mary's, Ont. . . . .	Examination of contract surveys.
Henderson, E. D. . . . .	Hemmison, Que. . . . .	Townships 23 and 24, Ranges 18, 19 and 20; Township 25, Ranges 19 and 20, west of the 3rd Meridian.
Hermon, R. W. . . . .	Rednersville, Ont. . . . .	Examination of contract surveys.
Hewson, T. R. . . . .	Peterboro', Ont. . . . .	Meridian outlines between 6th and 8th bases, west of the 4th and 5th Meridians.
Jephson, R. J. . . . .	Bracebridge, Ont. . . . .	Townships 21, 22, 23, 24, Ranges 7, 8, 9; Townships 25 and 26, Range 8, west of the 4th Meridian.
Kains, Tom. . . . .	St. Thomas, Ont. . . . .	14th Base, from 5th Meridian to Range 4; 12th Base, from 5th to 4th Meridian; 10th Base, from 4th Meridian to Range 3, west of 5th Meridian; also Meridian outlines near 5th Meridian.
Kerr, Hugh. . . . .	Annapolis, N.S. . . . .	Townships 13, 14, 15, 16, Ranges 12, 13, 14; Township 9, Ranges 25 and 26; Townships 10 and 11, Range 26, west of the 3rd Meridian.
Kirk, J. A. . . . .	Stratford, Ont. . . . .	Townships 13 and 14, Range 28; Townships 15 and 16, Ranges 28 and 29; Townships 17 and 18, Ranges 28, 29, 30, west of the 4th Meridian; Townships 17 and 18, Range 1, west of the 5th Meridian; Townships 21 and 22, Range 2, west of the 5th Meridian.
Klotz, O. J. . . . .	Preston, Ont. . . . .	3rd Base from 4th Meridian to Range 20, west; and 2nd Base, from Range 24, west of the 4th Meridian, to the 3rd Initial Meridian.
Larue, C. E. . . . .	Quebec. . . . .	Townships, 23, 24, 25, 26, Ranges 28 and 29, west of the 4th Meridian; Township 23, Range 1; Township 24, Ranges 1, 2, 3, 4, west of the 5th Meridian.
Laurie, R. C. . . . .	Battleford, Saskatchewan.	Battleford Town Plot survey; Townships 39 and 40, Ranges, 9, 10, 11, west of the 3rd Meridian.
Leber, Charles. . . . .	St. Boniface, Man. . . . .	Townships 17 and 18, Ranges, 27, 28, 29, 30; Townships 19 and 20, Ranges, 27, 28, 29, west of the 3rd Meridian; Township 9, Ranges 10 to 14; Township 10, Ranges 11 to 13, west of the 4th Meridian.
Leber, Hector. . . . .	St. Wenceslas, Que. . . . .	Townships 37 and 38, Ranges 27, 28, 29; Townships 39 and 40, Ranges 27 and 28; Township 41, Range 27; Township 43, Ranges 27 and 28; Township 44, Range 27; Township 45, Ranges 26, 27, 28; Township 46, Range 26, west of the 2nd Meridian.
Leclerc, Charles. . . . .	St. Jean, Port Joli, Que. . . . .	Townships 9 and 10, Range 24; Townships 13 and 14, Ranges 29 and 30, west of the 2nd Meridian; Township 12, Range 1; Townships 13, 14, 15, 16, Ranges 1 and 2, west of the 3rd Meridian.
Legendre, J. B. O. . . . .	Somerset, Que. . . . .	Townships 19 and 20, Range 11; Townships 21, 22, 23, 24, Ranges 9, 10, 11, west of the 3rd Meridian.
Maddock, J. A. . . . .	Norwood, Ont. . . . .	Meridian outlines between 7th and 9th Bases, west of the 3rd Meridian.
Magrath, C. A., D.T.S. . . . .	Aylmer, Que. . . . .	Parts of 13th and 14th Bases, and the 12th Base, between 4th and 5th Initial Meridians.
Martin, A. F. . . . .	Emerson, Man. . . . .	Townships 15, 16, 17, 18, Ranges 21, 22, 23, west of the 3rd Meridian; Townships, 9, 10, 11, Ranges 7 and 8; Township 12, Ranges 6 and 7, west of the 4th Meridian.

SCHEDULE (No. 14) showing Surveyors employed and Work performed by each, during the year 1883—*Continued.*

Name.	Residence.	Description of Work performed.
Michaud, J. Ls...	Rimouski, Que...	Township 14, Range 16; Township 15, Ranges 26 and 27; Townships, 16, 17, 18, Ranges 25, 26 27, west of the 2nd Meridian; Townships 9, 10, 11, 12, Ranges 14 and 15, west of the 3rd Meridian.
Miles, C. F.....	Toronto, Ont.....	Meridian outlines between 7th and 8th Bases, west of the Initial Meridian.
Murphy, F.....	Mount Forest, Ont	Townships 45, 46, 47, 48, Ranges 4 and 5; Townships 47 and 48, Ranges 6 and 7, west of the 3rd Meridian.
McArthur, J. J...	Aylmer, Que.....	Meridian outlines, between 12th and 13th Bases, west of the 4th Meridian; also re-posting of 5th Meridian, from 11th Base to 14th Base.
McKenna, J. J....	Dublin, Ont.....	Townships 17 and 18, Ranges 9, 10, 11; Township 19, Ranges 9 and 10, west of the 3rd Meridian.
McLatchie, John..	Winnipeg, Man...	Townships 17, 18, 19, 20, Ranges 1, and 2; Townships 19 and 20, Ranges 3 and 4; Township 11, Range 14; Townships, 9, 10, 11, 12, Range 15; Township 9, Range 16; Townships 11 and 12, Range 16, west of the 4th Meridian.
McLean, J. K....	Mount Forest, Ont	Meridian outlines, between 11th and 14th Bases, west of the 3rd Meridian.
MacMartin, G. E.	St. Andrews, Que.	Townships 25 and 26, Ranges, 12, 13, 15; Townships 21, 22, 23, 24, Ranges 16, 17, 18, west of the 4th Meridian.
McPhillips, Geo...	Winnipeg, Man...	Township 20, Range 9, west of the 2nd Meridian, and scaling River Qu'Appelle, from the point where it intersects the 5th Correction Line in Township 19, Range 5, west of the 2nd Meridian, westward.
McPhillips, R. C..	do ..	Townships 23 and 24, Range 27; Townships 19, 20, 21, 22, Ranges 28 and 29, west of the 4th Meridian; Townships 17 and 18, Range 2; Townships 19 and 20, Ranges 1 and 2; Townships 21 and 22, Range 1, west of the 5th Meridian.
McVittie, A. W...	Barrie, Ont.....	Town plot, Fort MacLeod.
O'Dwyer, J. S....	Granby, Que.....	Townships 21, 22, 23, 24, 25, 26, Ranges 4, 5, 6; Townships 25 and 26, Range 7, west of the 4th Meridian.
Ogilvie, J. H....	Campbellford, Ont	Townships 17, 18, 19, 20, Ranges 15, 16, 17, west of the 3rd Meridian.
Ogilvie, Wm.....	Ottawa, Ont.....	5th Meridian from Edmonton to Athabasca River; 21st Base Line, from 6th Meridian, westward.
O'Keefe, D. C....	Hamilton, Ont....	Townships, 17, 18, 19, 20, 21, 22, Ranges 24, 25, 26, west of the 3rd Meridian.
Ord, L. R.....	Ottawa, Ont.....	Meridian outlines, between 11th and 12th Bases, west of the 4th Meridian.
Patrick, L.....	Portage la Prairie, Man.	Townships 45, 46, 47, 48, 49, Range 24; Townships 45, 46, 47, Range 25; Township 47, Range 20; Townships 48, 49, Ranges 20, 21, west of the 2nd Meridian.
Proudfoot, H. B..	Clinton, Ont. . . .	Meridian outlines, between 11th and 14th Bases, west of the 3rd Meridian.
Purvis, F.....	Eganville, Ont....	Townships 25 and 26, Ranges 9, 10, 11; Townships 21, 22, 23, 24, Ranges, 13, 14, 15, west of the 4th Meridian.
Rainboth, E. J. . .	Aylmer, Que.....	Townships 19 and 20, Ranges 3, 4, 5, 6, 7, 8; Township 20, Range 10; Township 9, Range 22; Townships 10, 11, 12, Ranges 22 and 23, west of the 3rd Meridian.
Rainboth, G. C...	do ..	Townships 17 and 18, Ranges 3, 4, 5, 6, 7, 8; Township 20, Range 9; Townships 9, 10, 11, 12, Ranges 20 and 21, west of the 3rd Meridian.
Reid, J. L.....	Prince Albert, Saskatchewan.	Township 15, Range 17; Township 17, Ranges 16, 17 and 18; Townships 18, 19, 20, Range 17; Township 15, Range 23; Township 16, Ranges, 21, 22, 23, 24; Township 49, Ranges 25 to 28; Township 48, Ranges 27 and 28, west of 2nd Meridian.
Reilly, W. R. . . .	Wardsville, Ont ..	Townships 19 and 20, Ranges 18, 19, 20, 21, 22, 23, west of the 3rd Meridian.
Robertson, H. . . .	Montmagny, Que.	Townships 15 and 16, Ranges 6, 7, 8, 9, 10 and 11; Townships 9, 10, 11, Range 27; Township 12, Ranges 26 to 28, west of the 3rd Meridian.
Ross, Geo.....	Beaverton, Ont....	Townships 17 and 19, Ranges 16 to 18; Township 18, Ranges 15 to 18; Township 20, Ranges 16, and 17; Townships 11 and 12, Ranges 24 and 25, west of the 4th Meridian.
Roy, G. P.....	Quebec.....	Townships 17, 18, 19, 20, Ranges 25, 26, 27; Townships 23 and 24, Ranges 25 and 26; Townships 25 and 26, Ranges 26 and 27, west of the 4th Meridian.

SCHEDULE (No. 14) showing Dominion Land Surveyors employed and Work accomplished by each, during the year 1883—*Concluded*.

Name.	Residence.	Description of Work performed.
Selby, H. W. ....	Toronto, Ont. ....	Townships 35, 36, 37, 38, 39, Range 3; Townships 40, Ranges 3 and 4; Township 37, Range 2; Townships 42 and 43, Ranges 2 and 3, west of the 3rd Meridian.
Sheppard, C. G. ...	River David, Que.	Townships 21, 22, 23, 24, Ranges 1, 2, 3; Township 25, Ranges 2 and 3; Township 26, Range 3, west of the 4th Meridian.
Simpson, Geo. A. ...	Ottawa, Ont. ....	Township 52, Range 18; Townships 53 and 54, Ranges 18, 19, 20, 21; Township 53, Range 22; Townships 55, 56, 57, Ranges 26 and 27; Townships 52, 53, 54, Range 28, west of the 4th Meridian.
Sing, J. G. ....	Stratford, Ont. ...	Meridian outlines, between 2nd and 4th Bases, west of the 4th Meridian.
Sirois, J. E. ....	Kamouraska, Que.	Townships 15, 16, 17, 18, Ranges 18, 19, 20, west of the 3rd Meridian; Townships 9 and 10, Ranges 1 and 2; Townships 11 and 12, Range 1, west of the 4th Meridian.
Snow, J. A. ....	Ottawa, Ont. ....	Townships 21, 22, 23, 24, Ranges 10, 11, 12, west of the 4th Meridian.
Snow, J. F. ....	do . . .	Townships 13 and 14, Ranges 19, 20, 21, 22, 23, 24; Townships 9 and 10, Ranges 25, 26, 27; Townships 11 and 12, Range 26, west of the 4th Meridian.
Starkey, S. M. ....	Starkey, P.O., Queen's Co., N.B.	Townships 21, 22, 23, 24, Ranges 12, 13, 14; Townships 25 and 26, Ranges 22, 23, 24, 25, west of the 3rd Meridian.
Staunton, F. H. L.	Hamilton, Ont. ....	Townships 15 and 16, Ranges 10, 12, 13, 14, 15, west of the 4th Meridian.
Stephens, H. H. ...	Owen Sound, Ont.	Townships 31, 32, Ranges 9, 10, 11, 12, 13; Township 33, Range 13, west of the 2nd Meridian.
Stewart, John. ...	Moosomin, Assiniboia.	Townships 21, 22, 23, 24, Ranges 15, 16, 17; Townships 25, 26, Ranges 26, 27, 28, west of the 3rd Meridian.
Talbot, A. C. ....	Montmagny, Que.	Meridian outlines, between 8th and 12th Bases, west of the 2nd Meridian.
Talbot, P. C. ....	do . . .	Townships 17, 18, 19, 20, Ranges 12, 13, 14, west of the 3rd Meridian.
Thompson, W. T., D. T. S.	Cannington, Ont..	Traverse from the 5th to the 6th Meridian; 6th Meridian, from the 20th to the 26th Base Line; 22nd Base Line, from the 6th Meridian to the boundary of British Columbia.
Towle, C. E. ....	Lennoxville, Ont..	Townships 13, 14, 15, 16, Ranges 1, 2, 3, west of the 4th Meridian.
Traynor, Isaac. ...	Dundalk, Ont. ....	Meridian outlines, between 8th and 12th Bases, west of 2nd Meridian.
Vincent, F. ....	Murray Bay, Que.	Townships 13 and 14, Ranges 18, 19, 20, 21, 22, 23, west of the 3rd Meridian; Townships 9 and 10, Ranges 3 and 4; Townships 11 and 12, Ranges 2 and 3, west of the 4th Meridian.
Wagner, Wm. ....	Ossowa, Man. ....	Big Island, Lake Manitoba. Townships 21, 22, 23, 24, Range 3, east of the 1st Meridian; Townships 19, 20, 21, Ranges 3 and 4, west of the 1st Meridian.
Warren, James. ...	Kincardine, Ont..	Townships 13 and 14, Ranges 7, 8, 9, 10, 11, 12; Township 9, Range 20; Townships 8, 9, 10, Range 21, west of the 4th Meridian.
Webb, A. C. ....	Brighton, Ont. ....	Examination of contract surveys.
Wheeler, A. O. ...	Collingwood, Ont..	Meridian outlines, between 1st and 3rd Bases, west of 2nd Meridian, and between 3rd and 4th Bases, west of 2nd and 3rd Meridians.
Wilkins, F. W., D.T.S.	Norwood, Ont. ....	Meridian outlines, between 8th Correction Line and 10th Base, west of the 3rd Meridian.
Wolff, C. E. ....	Ottawa, Ont. ....	Meridian outlines, between 1st and 5th Bases, west of the 4th and 5th Meridians.

SCHEDULE (No. 15) showing Dominion Land Surveyors employed and Work accomplished by each, during the year 1884.

Explorers.		
Ogilvie, Wm. ....	Ottawa, Ont. ....	Exploration of Peace and Athabasca Rivers.
Klotz, O. J., D.T.S.	Preston, Ont. ....	Exploration of Saskatchewan and Nelson Rivers.

SCHEDULE (No. 15) showing Dominion Land Surveyors employed and Work performed by each, during the year 1884—*Continued.*

Name.	Residence.	Description of Work performed.
<i>Outline Surveyors.</i>		
Bray, Edgar . . . . .	Oakville, Ont. . . . .	Meridian Township outlines between 4th Initial Meridian and Range 10, and between the 14th and 15th Base Lines.
Belanger, P. R. A. . . . .	L'Islet, Que. . . . .	Meridian Township outlines between 4th Initial Meridian and Range 8, and between the 12th Correction Line and the 14th Base Line; also Meridian outlines between the 12th and 13th Bases, and between Ranges 10 and 15 west of 3rd Initial Meridian.
Cotton, A. F. . . . .	Ottawa, Ont. . . . .	Meridian Township outlines between 13th and 16th Base Lines, and between Ranges 9 and 14, west of 4th Initial Meridian; also the 16th Base Line, from Range 10 to Range 14, inclusive.
Dufresne, J. I., D. T. S.	St. Thomas de Montmagny, Que.	Meridian Township outlines between 12th and 14th Base Lines, and between Range 9, west of the 3rd Initial Meridian, and the 4th Initial Meridian; also eastern boundaries of Townships 29, 30, 31 and 32 in Range 2, west of the 3rd Initial Meridian.
Fawcett, Thomas, D. T. S.	Gravenhurst, Ont.	Extension of the Township system, and establishment of corner monuments along the Bow River Valley and the C. P. R. line, from the Gap to the summit of the Kicking Horse Pass; also along the upper valley of the Cascade River, Devil's Head Creek and Devil's Head Lake; also sub-division of some sections on Cascade River for coal locations; also survey of the eastern boundaries of Townships 27 and 28, Range 2; Townships 29 and 30, Ranges 5 and 6; Townships 23, 24, 25 and 26, Ranges 6 and 7; and Townships 23, 24, 25 and 26, Range 8, all west of the 5th Initial Meridian.
Garden, James F.	Toronto, Ont. . . . .	Township outlines between 10th and 12th Base Lines, and between 4th Initial Meridian and Range 10.
Kains, Tom. . . . .	St. Thomas, Ont. . . . .	Meridian Township outlines between the 13th Base and Correction Line, and between Ranges 14 and 22, west of the 4th Initial Meridian; also a survey of the old settlement at Victoria, and connection of the settlement survey at Fort Saskatchewan with the Township system.
Miles, C. F. . . . .	Toronto, Ont. . . . .	Meridian Township outlines west of the 4th Meridian, between 10th and 12th Base Lines, from Range 20 to Range 27.
Magrath, C. A., D. T. S.	Aylmer, Que. . . . .	Meridian Township outlines west of 4th Initial Meridian, between the 14th and 16th Base Lines, and between Ranges 8 and 21; also, 16th Base Line from Range 15 to Range 20 inclusive.
McLean, J. K. . . . .	Mount Forest, Ont.	Meridian Township outlines between the 8th and 10th Base Lines, from Range 7 to Range 19, west of 4th Initial Meridian.
McArthur, J. J. . . . .	Aylmer, Que. . . . .	Meridian Township outlines between the 12th and 14th Base Lines, and between Range 22 west of the 4th Initial Meridian and the 5th Initial Meridian; also, Meridian outlines between the same Base Lines west of the 5th Initial Meridian.
Ord, L. R. . . . .	Toronto, Ont. . . . .	Meridian Township outlines between the 8th and 10th Base Lines, from Range 19 west of the 4th Initial Meridian to Range 4 west of the 5th Initial Meridian.
Wilkins, F. W., D. T. S.	Norwood, Ont. . . . .	Meridian Township outlines between the 8th and 10th Bases, from Range 19 west of the 3rd Meridian to Range 5 west of the 4th Meridian.
<i>Examiners of Survey Contracts.</i>		
Hermon, R. W. . . . .	Rednersville, Ont.	
Webb, A. C. . . . .	Brighton, Ont. . . . .	
<i>Road Surveyor.</i>		
Hart, Milner. . . . .	St. Mary's Ont. . . . .	Survey of trails in the District of Prince Albert.
<i>Sub-division Surveyors.</i>		
Aylen, C. P., D. T. S.	Aylmer, Que. . . . .	Townships 21 and 22 in Ranges 7, 8 and 9, west of the 4th Meridian.
Beatty, W. . . . .	Delta, Ont. . . . .	Townships 47 and 48 in Ranges 24 and 25, and Township 45 in Range 24, west of the 4th Meridian.

SCHEDULE (No. 15) showing Dominion Land Surveyors employed and Work accomplished by each, during the year 1884—*Continued.*

Name.	Residence.	Description of Work performed.
Bigger, C. A . . . .	Ottawa, Ont. . . . .	Township 9 in Range 17 ; Townships 9, 10 and 11 in Ranges 18 and 19 ; Township 12 in Range 19 ; and Townships 7 and 10 in Range 21, west of the 4th Meridian. Re-survey of Township 19 in Ranges 20, 21 and 22, west of the 4th Meridian ; also, examination of Calgary Town Plot Survey.
Boivin, E. . . . .	Chicoutimi, Que. . . . .	Township 7 in Ranges 25, 26 and 27, and Township 8 in Ranges 23, 24, 25 and 26, west of the 3rd Meridian ; also re-survey of Township 20 in Range 18, and Township 19 in Range 19, west of 4th Meridian ; also survey of east boundaries of Townships 5 and 6 in Ranges 25, 26, 27 and 28, west of the 3rd Meridian.
Bourgeault, A. . . .	St. Jean Port Joli, Que. . . . .	Township 7 in Range 29 ; Townships 8 in Ranges 27, 28, 29 and 30, west of the 3rd Meridian ; and Township 8 in Range 1, west of the 4th Meridian.
Bourgeois, John . .	Three Rivers, Que. . . . .	Township 25 in Ranges 19 and 20, and Townships 25 and 26 in Ranges 26, 27 and 28, west of the 3rd Meridian.
Brabazon, S. L. . . .	Portage du Fort. . . . .	Townships 25 and 26 in Range 29, west of the 4th Meridian ; Townships 25 and 26 in Ranges 1 and 2, and Township 26 in Range 3, west of the 5th Meridian.
Brunelle, F. E. . . .	Somerset, Que. . . . .	Townships 27 in Ranges 26 and 27, west of the 3rd Meridian.
Burke, Joseph. . . .	Winnipeg, Man. . . . .	Townships 47 and 48 in Ranges 25 and 26, and Township 48 in Ranges 27 and 28, west of the 3rd Meridian.
Burrows, J. J. . . .	Ottawa, Ont. . . . .	Township 27 in Range 2, and Townships 27 and 28 in Ranges 3 and 4, west of the 3rd Meridian.
Carre, Henry. . . . .	Brockville, Ont. . . . .	Township 49 in Range 28, and Township 50 in Ranges 25, 26, 27 and 28, west of the 3rd Meridian.
Crawford, W. . . . .	Winnipeg, Man. . . . .	Township 41 in Range 16 ; Townships 41 and 42 in Range 17, and Townships 43 in Ranges 17 and 18, west of the 4th Meridian.
Charbonneau, M. J. .	St. Boniface, Man. . . . .	Townships 36, 37, 38 and 39 in Ranges 26, 27 and 28, and Township 40 in Range 27, west of 4th Meridian ; and Townships 37 and 38 in Range 1, west of the 5th Meridian.
Deane, M. . . . .	Lindsay, Ont. . . . .	Townships 27 and 28 in Range 9, and Townships 29 and 30 in Ranges 8 and 9, west of the 3rd Meridian.
Dechesne, L. M. . . .	St. Roch, Que. . . . .	Townships 39 and 42 in Range 13, and Townships 40, 41, 42 and 43 in Range 14, west of the 3rd Meridian.
Doupe, Joseph. . . .	Winnipeg, Man. . . . .	Townships 18 and 19 in Ranges 7 and 8 ; and Township 18 in Range 9, east of the Principal Meridian.
Drummond, Thos., D.T.S.	Montreal, Que. . . . .	Township 45 in Ranges 16 and 17 ; Township 46 in Ranges 18 and 19 ; and Township 49 in Ranges 26 and 27, west of 3rd Meridian.
DuBerger, C. C. . . .	Murray Bay, Que. . . . .	Township 33 in Range 5 ; and Townships 32, 33 and 34 in Range 6, west of the 3rd Meridian.
Dumais, P. T. C. . . .	Ottawa, Ont. . . . .	Townships 41, 42, 43 and 44 in Range 15 ; and Townships 41 and 42 in Range 16, west of the 3rd Meridian.
Foster, F. L. . . . .	Windsor, Ont. . . . .	Township 41 in Range 7 ; and Townships 42 and 43 in Ranges 6 and 7 ; and traverses of Lakes in Townships 47 and 48 in Ranges 4 and 5, west of 3rd Meridian.
Freeman, N. R. . . .	Queen's Co., N.S. . . . .	Townships 43 and 44 in Ranges 24 and 25 ; and Township 44 in Range 22, west of the 4th Meridian.
Gore, T. S. . . . .	Regina, Assiniboia . . . . .	Townships 29 and 30 in Ranges 17, 18 and 19, west of the 2nd Meridian.
Gosselin, L. . . . .	Quebec . . . . .	Townships 27 and 28 in Ranges 27 and 28, west of the 4th Meridian ; Townships 27 and 28 in Range 1, and Township 28 in Range 2, west of the 5th Meridian.
Kerr, James. . . . .	Queen's Co., N.S. . . . .	Township 44 in Ranges 18 and 19 ; and Townships 43 and 44 in Range 23, west of the 4th Meridian.
Kirk, J. A. . . . .	Stratford, Ont. . . . .	Township 43 in Ranges 26, 27 and 28 ; and Township 44 in Ranges 27 and 28, west of the 4th Meridian.
Leclerc, C. F. . . . .	St. Jean Port Joli. . . . .	Township 45 in Range 20 ; and Townships 45 and 46 in Ranges 21 and 22, west of the 3rd Meridian.
Lucas, S. B. . . . .	Peace Hills, Alberta. . . . .	Townships 50 and 51 in Range 3 ; and Township 50 in Range 4, west of the 5th Meridian.
Lett, C. A. . . . .	Emerson, Man. . . . .	Townships 35, 36 and 37 in Range 9 ; and Township 37 in Ranges 10 and 11, west of the 3rd Meridian.
McArthur, James. . .	Aylmer, Que. . . . .	Townships 47, 48 and 49 in Ranges 23 and 24, west of the 3rd Meridian.
McLatchie, John. . .	Winnipeg, Man. . . . .	Townships 24, 25 and 26 in Range 17 ; Townships 24 and 25 in Range 19 ; and Township 25 in Range 20, west of the 1st Meridian.

SCHEDULE (No. 15) showing Dominion Land Surveyors employed and Work accomplished by each, during the year 1884—*Concluded.*

Name.	Residence.	Description of Work performed.
MacMartin, G. E.	St. Andrews, Que.	Townships 45, 46 and 47, in Ranges 27 and 28, west of the 3rd Meridian.
McPhillips, Geo.	Winnipeg, Man.	Townships 25 and 26, in Range 18; Townships 6, in Ranges 25 and 27, west of the 1st Meridian.
McPhillips, R. C.	do	Township 19 in Ranges 4, 5, 6 and 8; and Township 19a in Range 8, west of the 2nd Meridian.
Michaud, J. L.	Matane, Que.	Township 42 in Ranges 17 and 18; Townships 43 and 44 in Range 18, and Townships 44 and 45 in Range 19, west of the 3rd Meridian.
O'Dwyer, J. S.	Granby, Que.	Township 45 in Range 23, and Township 46 in Ranges 23, 24, 25 and 26, west of the 3rd Meridian.
Purvis, Frank	Eganville, Ont.	Townships 34, 35 and 36 in Range 7, and Townships 35, 36 and 37 in Range 8, west of the 3rd Meridian.
Reilly, W. R.	Wardsville, Ont.	Townships 51 and 52 in Ranges 25, 26, 27 and 28, west of the 3rd Meridian.
Robertson, H. H.	Montmagny, Que.	Township 39 in Range 12, and Townships 40 and 41 in Ranges 12 and 13, west of the 3rd Meridian.
Ross, George.	Beaverton, Ont.	Townships 21, 22 and 25 in Range 3, and Townships 25 and 26 in Range 4, west of the 5th Meridian.
Roy, G. P.	Quebec.	Townships 23 and 24 in Range 28; Townships 25 and 26 in Ranges 26 and 27, and Township 27 in Ranges 25 and 26, west of the 4th Meridian.
Selby, H. W.	Toronto, Ont.	Townships 44 and 45 in Ranges 6 and 7, west of the 3rd Meridian.
Snow, J. F.	Ottawa, Ont.	Township 7 in Ranges 1 and 2, and Townships 8 in Ranges 2, 3, 4 and 5, west of the 4th Meridian. Resurvey of Township 19 in Ranges 23 and 24, west of the 4th Meridian.
Stephens, H. H.	Owen Sound, Ont.	Township 31 in Range 6, 7 and 8, and Township 32 in Ranges 7 and 8, west of the 3rd Meridian.
Talbot, A. C.	Montmagny, Que.	Township 48, in Ranges 20, 21 and 22, and Township 49 in Ranges 21 and 22, west of the 3rd Meridian.
Towle, C. E.	Lennoxville, Ont.	Townships 31 and 32 in Range 9, and Townships 33 and 34 in Ranges 8 and 9, and Township 35 in Range 7, west of the 3rd Meridian.
Vincent, F.	Murray Bay, Que.	Townships 38 in Ranges 8, 9, 10 and 11, and Townships 39 in Ranges 8 and 9, and Townships 35 and 41 in Range 6 west of the 3rd Meridian.
Wagner, Wm.	Ossowa, Man.	Townships 18 in Ranges 1 and 2, and Townships 19 and 20 in Ranges 1, 2 and 3 west of the 1st Meridian.
Wheeler, A. O.	Ottawa, Ont.	Townships 31, 32 and 33 in Ranges 18 and 19, and Township 32 in Range 17; also, re-survey of east boundary of Township 32 in Range 19 west of 2nd Meridian.
<i>Town Plot Surveyors.</i>		
McVittie, A. W.	Calgary, Alberta.	Town plot, Calgary, Alberta.
McPhillips, Geo.	Winnipeg, Man.	Town do Point Douglas, Man.
Vaughan, J. W.	do	Town do Silver City, Alberta.

SCHEDULE (No. 16) showing Dominion Land Surveyors employed and Work accomplished by each during the year 1885.

Bourgeois, John	Three Rivers, Que.	Traverse of part of Bow, Belly and South Saskatchewan Rivers in Ranges 11, 12 and 13 west of the 4th Initial Meridian; traverse of railway line in Ranges 19 to 24 west of the 4th Initial Meridian; establishing boundaries of Sections 6 and 31 adjoining 2nd Base Line in Townships 4 and 5, Range 4, west of the 4th Initial Meridian.
Bélanger, P. R. A.	L'Islet, Que.	Survey of town plots of Silverton, Morley, Golden and Donald; also, sub-division at Banff Station.
DuBerger, C. C.	Murray Bay, Que.	Survey of trail from Moosomin to Moose Mountain; survey of Mission and Indian land at Fort Qu'Appelle.
Dufresne, J. I.	Montmagny, Que.	Survey of town lots at Whitemouth, Man.; survey at Rat River, Man.; alteration of boundary of Indian Reserve at Beren's River.
Drummond, Thos.	Montreal, Que.	Determination of latitudes and longitudes along the line of the Canadian Pacific Railway in British Columbia.

SCHEDULE (No. 16) showing Dominion Land Surveyors employed and Work accomplished by each, during the year 1885—*Continued.*

Name.	Residence.	Description of Work performed.
Doupé, Jos.....	Winnipeg, Man ..	Sub-division of Townships 18, in Ranges 6 and 7, Townships 18 in Ranges 8 and 9 east of the Principal Meridian.
Fawcett, Thos , D. T. S.	Gravenhurst, Ont.	Exploratory survey from Rat Portage to Cat Lake.
Klotz, O. J., D.T.S.	Preston, Ont.....	Determination of latitudes and longitudes along the line of the Canadian Pacific Railway in British Columbia.
Lucas, S. B. ....	Hull, Que .....	Sub-division of Township 50, in Ranges 3 and 4, and Township 51, in Range 3, west of the 5th Meridian.
McPhillips, Geo. .	Winnipeg, Man...	Sub-division of Township 18, Range 10, east of Principal Meridian.
McPhillips, R. C. .	do .....	do 10, Ranges 2, 3 and 4, west of the 2nd do
Ogilvie, Wm. ....	Ottawa, Ont.....	Survey of the Canadian Pacific Railway Line in British Columbia.
Reiffenstein, J. H. .	Victoria, B.C.....	Sub-division of townships in New Westminster District, B.C.
Wagner, Win. ....	Ossowa, Man.....	do 21, Ranges, 5, 6, 7, west of Principal Meridian.

SCHEDULE (No. 17) showing Dominion Land Surveyors employed and Work accomplished by each, during the year 1886.

Abrey, G. B. ....	Toronto, Ont.....	Sub-division of Township 23, in Ranges 8 and 9; Township 24, in Range 10, and Township 27, in Range 12, west of the 2nd Initial Meridian.
Boivin, E. ....	Bagotville, Que...	Sub-division of Township 51, in Range 24, and Township 53, in Ranges 26 and 27, west of the 3rd Initial Meridian.
Brabazon, A. J. . .	Portage du Fort, Que.	Sub-division of Townships 29, 32 and 33, in Range 16, and Township 31, in Range 17, west of the 2nd Initial Meridian.
Brunelle, F. E. . .	Somerset, Que . . .	Sub-division of Township 3, in Range 27, and Townships 4 and 5, in Range 28, west of the 2nd Initial Meridian, and outlines of Township 5, in Range 4, west of the 3rd Initial Meridian.
Bourgeois, John . .	Three Rivers, Que.	Sub-division of Townships 4 and 5, in Range 26, Townships, 4, 5, and 6, in Range 27, west of the 2nd Initial Meridian, and Township 4, in Range 3, west of the 3rd Initial Meridian.
Bray, Edgar . . . .	Oakville, Ont.....	Sub-division of Township 5, in Range 23; Township 6, in Ranges 21, 22 and 23, and Township 7, in Range 20; and outlines of Township 4, in Range 23, all west of the 4th Initial Meridian and Traverses of Belly, Bow and St. Mary's Rivers.
Bélanger, P. R. A. .	L'Islet, Que .....	Sub-division of Township 24, in Range 19; Townships 24 and 25, in Range 10; Townships 25 and 26, in Ranges 11, 12 and 13, and Townships 26 and 27, in Range 14 west of the 5th Initial Meridian.
Bigger, C. A. ....	Ottawa, Ont .....	Survey of trails from Red Deer River to Calgary and Macleod and from Macleod to Blackfoot Crossing.
Cotton, A. F. ....	Ottawa, Ont.....	Sub-division of Townships 3 and 4, in Ranges 28 and 29, west of the Coast Meridian; and Townships 12, 15, 24 and 27, New Westminster District.
Dumais, P. T. C. . .	Hull, Que .....	Sub-division of Townships 52 and 53, in Ranges 16 and 17, west of the 4th Initial Meridian.
Drewry, W. S. ....	Belleville, Ont....	Sub-division of Townships 50 and 51, in Range 23; Township 50 in Range 24, and Township 49, in Range 25, west of the 3rd Initial Meridian.
Dechesne, L. N. . .	St. Roch des Aulnets, Que.	Sub-division of Townships 21 and 22, in Ranges 27, 28 and 29, west of the 3rd Initial Meridian.
DuBerger, C. C. . .	Murray Bay, Que.	Sub-division of Townships 34, 35 and 36, in Range 1, west of the 5th Initial Meridian.
Dennis, J. S. ....	Aylmer, Que.....	Correction and inspection of surveys.
Doupe, Jos.....	Winnipeg, Man...	Correction and inspection of surveys.
Duffresne, J. I. . .	Montmagny, Que..	Survey of trails in the neighbourhood of Portage la Prairie, Totogon and Poplar Point.
Freeman, N. R....	Milton, N. S. ....	Sub-division of Townships 50 and 51, in Ranges 27 and 28, west of the 4th Initial Meridian.
Fitzgerald, J. W. .	Peterboro', Ont...	Sub-division of Townships 11, 12 and 13, in Ranges 9 and 10, and Townships 11 and 12, Range 11, east of the 1st Meridian.
Fawcett, Thos. . .	Gravenhurst, Ont.	Sub-divisions of parts of Township 17, in Ranges 12, 13 and 14; Townships 18 and 19, in Ranges 14 and 15; Townships 16, 17, 18 and 19, in Ranges 16, 17 and 18; Townships 19 and 20, in Range 19, and Township 20, in Ranges 20, 21 and 24, west of the Coast Meridian.

SCHEDULE (No. 17) showing Dominion Land Surveyors employed and Work accomplished by each, during the Year 1886—*Continued.*

Name.	Residence.	Description of Work performed.
Gosselin, L. . . . .	Quebec, Que. . . . .	Sub-division of Township 50, in Ranges 17 and 18, and Township 51, in Ranges 16 and 17, west of the 4th Initial Meridian.
Garden, James F. . . . .	Toronto, Ont. . . . .	Sub-division of parts of Townships 20 and 21, in Range 13; Townships 19 and 20, in Range 14; Township 20, in Range 15; Townships 21, 22 and 23, in Range 17; Townships 20 and 21, in Range 18; Township 21, in Range 19; Townships 21, in Ranges 20, 21 and 23, west of the Coast Meridian.
Green, T. D. . . . .	Ottawa, Ont. . . . .	Survey of trail from Fort Ellice to Moosomin, and from Fort Ellice to north-east corner of Township 20 in Range 22, west of the 2nd Initial Meridian. Also traverse of Jumping Creek.
Klotz, Otto J. . . . .	Preston, Ont. . . . .	Survey of Canadian Pacific Railway from summit of Rocky Mountain Range to Revelstoke on the Columbia River, and astronomical work in British Columbia and North-West Territories.
Laurie, R. C. . . . .	Battleford, Sask. . . . .	Survey of trail from Battleford to Swift Current.
Michaud, J. L. . . . .	Ste. Anne de Bellevue, Que. . . . .	Sub-division of Township 35 in Range 28, and Townships 31, 32, 33 and 34 in Ranges 28 and 29, west of the 4th Initial Meridian.
MacMartin, G. E. . . . .	St. Andrews, Que. . . . .	Sub-division of Townships 6 and 7 in Range 29, Townships 6 and 7 in Range 30, west of the 4th Initial Meridian.
McPhillips, Geo. . . . .	Winnipeg, Man. . . . .	Sub-division of Township 21 in Range 10, and Townships 22 and 23 in Range 11, west of the 1st Initial Meridian.
McAree, John . . . . .	Toronto, Ont. . . . .	Survey of trails in the neighbourhood of Kildonan and other points in Manitoba.
McLatchie, John. . . . .	Ottawa, Ont. . . . .	Survey of northerly trail from east boundary of Township 15 in Range 13, west of the 1st Initial Meridian to Fort Ellice.
McPhillips, R. C. . . . .	Winnipeg, Man. . . . .	Survey of four trails in the Province of Manitoba.
McArthur, J. J. . . . .	Aylmer, Que. . . . .	Topographical survey along the line of the Canadian Pacific Railway through the Rocky, Sellkirk and Gold ranges of mountains.
Macdougall, A. H. . . . .	Port Arthur, Ont. . . . .	Sub-divisions of Township 24 in Ranges 11 and 12, Townships 25 and 26 in Range 11, and part of Township 24 in Range 10, all west of Principal Meridian.
Ogilvie, Wm. . . . .	Ottawa, Ont. . . . .	Longitude determinations in British Columbia.
Rainboth, G. C. . . . .	Aylmer, Que. . . . .	Sub-division of Township 51 and 52 in Range 1, and Township 51 in Range 2, west of the 5th Initial Meridian.
Reid, J. L. . . . .	Port Hope, Ont. . . . .	Survey of trail from Troy to Prince Albert.
Robertson, H. H. . . . .	Montmagny, Que. . . . .	Sub-division of Townships 23 and 24 in Ranges 27, 28 and 29, west of the 3rd Initial Meridian.
Roy, George P. . . . .	Quebec, Que. . . . .	Survey of trail from Calgary to Edmonton.
Starkey, S. M. . . . .	Starkey, N.B. . . . .	Sub-division of Townships 59 in Ranges 1 and 2, west of the 5th Initial Meridian.
Sproat, A. . . . .	Prince Albert, Saskatchewan. . . . .	Correction survey in Townships 45, 46 and 47 in Range 4, and Township 46 in Range 5, west of the 3rd Initial Meridian.
Stewart, G. A. . . . .	Winnipeg, Man. . . . .	Survey of Hot Springs Reservation at Banff; traverses of Bow and Spray Rivers and laying out of town plots, roads, &c.
Webb, A. C. . . . .	Brighton, Ont. . . . .	Correction and inspection of surveys.
Wilkins, F. W. . . . .	Norwood, Ont. . . . .	Exploratory survey of Lake Winnipeg.
Wolff, C. E. . . . .	Ottawa, Ont. . . . .	Sub-division of Townships 7, 8 and 9 in Range 1, and Townships 6 and 7, in Range 2, west of the 5th Initial Meridian.

SCHEDULE (No. 18) showing Dominion Land Surveyors employed and Work accomplished by each, during the year 1887.

Bélanger, P. R. A. . . . .	L'Islet, Que. . . . .	Sub-division of Townships in the vicinity of the Columbia River, B.C.
Bray, Edgar . . . . .	Oakville, Ont. . . . .	Survey of block outlines between Lakes Winnipeg and Manitoba.
Brownlee, J. H. . . . .	Brandon, Man. . . . .	Survey of outlines near Lake Dauphin.
Beatty, Walter . . . . .	Delta, Ont. . . . .	Sub-division of Township 24, in Range 18, and part of Township 24 in Range 16, west of the Principal Meridian.
Boivin, E. . . . .	Bagotville, Que. . . . .	Sub-division of Township 51, in Range 24, Township 53, in Ranges 25, 26 and 27, west of the 3rd Initial Meridian.
Bigger, C. A. . . . .	Ottawa, Ont. . . . .	Sub-division of Townships 29, 30 and part of 31, in Range 4, west of the 5th Initial Meridian.
Brabazon, A. J. . . . .	Portage du Fort, Que. . . . .	Sub-division of Townships 29, 30 and 31, in Range 3, west of the 5th Initial Meridian.
Cotton, A. F. . . . .	Ottawa, Ont. . . . .	Sub-division of Townships in New Westminster District, B.C.



SCHEDULE (No. 18) showing Dominion Land Surveyors employed and Work accomplished by each, during the year 1887—*Concluded.*

Name.	Residence.	Description of Work performed.
Drewry, W. S. . . . .	Belleville, Ont. . . . .	Topographical survey of the Rocky Mountains.
Doupe, Joseph . . . . .	Winnipeg, Man. . . . .	Survey of Main Street, Winnipeg.
Dufresne, J. I., D. T.S. . . . .	Montmagny, Que. . . . .	Exploration survey, Lake Winnipegosis.
Dumais, P. T. C. . . . .	Hull, Que. . . . .	Sub-division of Township 14, in Range 10, and Township 13, in Range 11, east of the Principal Meridian.
Dennis, J.S., D.T.S. . . . .	Aylmer, Que. . . . .	Supervision of inspection and correction of surveys.
McAree, John, D. T.S. . . . .	Toronto, Ont. . . . .	Inspection and correction of surveys.
Driscoll, A. . . . .	Aylmer, Que. . . . .	do do
Du Tremblay, P.V. . . . .	Ste. Anne de la Pérade, Que. . . . .	(Sub-party) inspection and correction of surveys.
Brownjohn, T. C. . . . .	Granby, Ont. . . . .	Inspection and correction of surveys.
Kirk, J. A. . . . .	Stratford, Ont. . . . .	do do
Freeman, N. R. . . . .	Milton, N.S. . . . .	do do
Traynor, S. . . . .	Dundalk, Ont. . . . .	do do
Fawcett, Thos., D. T.S. . . . .	Gravenhurst, Ont. . . . .	Sub-division of Townships, Kamloops District, B.C., south of Thompson River.
Fitzgerald, J. W. . . . .	Peterboro', Ont. . . . .	Sub-division of Townships 13 and 14, in Range 11, east of the Principal Meridian.
Garden, Jas. F. . . . .	Vancouver, B.C. . . . .	Sub-division of Townships, Kamloops District, B.C., north of Thompson River.
Green, T. D. . . . .	Brantford, Ont. . . . .	Survey of trails, McLeod to Blackfoot Crossing, and the trail running along the Bow River, near Calgary.
Klotz, O.J., D.T.S. . . . .	Preston, Ont. . . . .	Longitude determinations.
Laurie, R. C. . . . .	Battleford, N.W.T. . . . .	Sub-division of Township 43, in Range 15, and Township 46, in Ranges 15 and 16, west of the 3rd Initial Meridian.
Miles, C. F. . . . .	Walkerton, Ont. . . . .	Survey of Mounted Police reserves.
McLatchie, John. . . . .	Ottawa, Ont. . . . .	Sub-division of Townships, Spellamacheen District, B.C.
McArthur, J. J. . . . .	Aylmer, Que. . . . .	Topographical survey of the Rocky Mountains.
McPhillips, R. C. . . . .	Winnipeg, Man. . . . .	Sub-divisions of fractional Townships 23 and 24, in Ranges 5 and 6; fractional Townships 15 and 16, in Range 5, east of the Principal Meridian.
MacMartin, G.E. . . . .	St. Andrew's, Que. . . . .	Sub-division of Townships 5 and 6, Range 25; Township 5, in Range 26; east $\frac{1}{2}$ Township 7, Range 25; south $\frac{1}{2}$ Township 4, Range 29, west of the 4th Initial Meridian; and parts of Townships 4, 5 and 6, in Range 1, west of the 5th Initial Meridian.
Ogilvie, W. . . . .	Ottawa, Ont. . . . .	Exploratory survey of Yukon River District.
Reid, J. Lestock. . . . .	Port Hope, Ont. . . . .	Survey of part of Qu'Appelle and Prince Albert Trail, &c.
Robertson, H. H. . . . .	St. Thomas, Que. . . . .	Survey of Ordnance lands.
Sproat, Alex. . . . .	Prince Albert, N.W.T. . . . .	Re-survey of Townships 45, 46 and 47, in Range 4, and Township 46, in Range 5, west of the 3rd Initial Meridian.
Small, W. A. . . . .	Oak Point, Man. . . . .	Survey of outlines near Lake Dauphin.
St. Cyr, Arthur. . . . .	Quebec, Que. . . . .	Survey of boundaries of Rocky Mountains Park.
Wilkins, F. W., D.T.S. . . . .	Norwood, Ont. . . . .	Survey of Methodist Mission reserves.
Woods, J. E. . . . .	Aylmer, Que. . . . .	Sub-division of Township 12, in Ranges 12 and 13, west of the Principal Meridian.

SCHEDULE (No. 19) showing Dominion Land Surveyors employed and Work performed by each, during the Year 1888.

Klotz, Otto J. . . . .	Preston, Ont. . . . .	Longitudes and latitudes of Edmonton and Fort Pitt.
Fawcett, Thos. . . . .	Gravenhurst, Ont. . . . .	Survey of part of Churchill River.
Ogilvie, Wm. . . . .	Ottawa, Ont. . . . .	Survey of Porcupine and Mackenzie Rivers. Approximate determination of Alaska boundary.
Cotton, A. F. . . . .	New Westminster. . . . .	Sub-division and other surveys in New Westminster District Posting sections along Canadian Pacific Railway, from New Westminster to Lytton.
Garden, Jas. F. . . . .	Vancouver, B.C. . . . .	Posting sections along Canadian Pacific Railway, from Lytton to Shuswap Lake.

SCHEDULE (No. 19) showing Dominion Land Surveyors employed and Work accomplished by each, during the year 1888—*Concluded.*

Name.	Residence.	Description of Work performed.
Dufresne, J. I . . . .	Montmagny, Que.	Posting sections along Canadian Pacific Railway, from Shuswap to Leancoil.
McLatchie, J. . . . .	Ottawa, Ont. . . . .	Sub-division surveys in Spellamcheen Valley.
McArthur, J. J. . . . .	Aylmer, Que. . . . .	Topographical survey in Bow River Valley, including the National Park.
Drewry, W. S. . . . .	Belleville, Ont. . . . .	Topographical survey in Crow's Nest Pass and vicinity.
Bourgeois, John . . . .	Three Rivers, Que.	Survey of trail, Carlton to Green Lake.
Brown, C. P. . . . .	Winnipeg, Man. . . . .	Survey of Westbourne Highway.
Reid, J. L. . . . .	Port Hope, Ont. . . . .	Survey of trail through Township 48, Range 24, and Township 49, Range 23, west of the 2nd Initial Meridian. Corrections to old surveys in Prince Albert District.
Green, T. D. . . . .	Ottawa, Ont. . . . .	Survey of trails between Calgary and Morleyville, north and south of the Bow River, respectively. Part of trail from Blackfoot Crossing to Calgary. Re-sub-division of Townships 3 and 4, in Ranges 31 and 32, west of Principal Meridian.
St. Cyr, A. . . . .	Quebec, Que. . . . .	Survey of part of outlines of Rocky Mountains Park of Canada; part of 7th Correction Line, west of the 5th Initial Meridian. Traverse of parts of Bow and Columbia Rivers, and part of sub-division of Township 24 in Range 9, Township 24 in Range 10, and Township 25 in Range 11, all west of the 5th Initial Meridian.
Brownlee, J. H. . . . .	Brandon, Man. . . . .	Sub-division of Township 22 in Range 6, and fractional Township 22 in Ranges 9 and 10, west of Principal Meridian.
Brabazon, A. J. . . . .	Portage du Fort, Que.	Sub-division of Township 27 in Range 5; parts of Township 26 in Range 5; Township 26 in Range 6, and Township 28 in Range 5, all west of the 5th Initial Meridian.
Bigger, C. A. . . . .	Ottawa, Ont. . . . .	Sub-division of Township 2 in Ranges 24 and 25; Township 4 in Range 23; part of fractional Township 5 in Range 23; and part of Township 3, Range 24, all west of the 4th Initial Meridian.
Drummond, Thos. . . . .	Kamloops, B. C. . . . .	Sub-division of Townships 30 and 31 in Ranges 25 and 26, and Township 30 in Range 27, all west of the 4th Initial Meridian.
Deane, M. . . . .	Lindsay, Ont. . . . .	Sub-division of Township 22 in Ranges 4 and 5, and Township 23 in Range 5, all west of Principal Meridian.
Freeman, N. R. . . . .	Milton, N.S. . . . .	Sub-division of Township 22 in Ranges 7 and 8, and fractional Township 21 in Ranges 7 and 8, all west of Principal Meridian.
Fitzgerald, J. W. . . . .	Peterboro', Ont. . . . .	Sub-division of Township 15 in Range 11, east of Principal Meridian.
Magrath, C. A. . . . .	Lethbridge, Alta. . . . .	Sub-division of Township 8 in Ranges 19 and 20; Township 6 in Range 20; west half of Township 6 in Range 21; Townships 5 and 7 in Range 22; and Township 6 in Range 19, all west of the 4th Initial Meridian.
McPhillips, R. C. . . . .	Winnipeg, Man. . . . .	Sub-division of fractional Township 25 in Ranges 5 and 6, and fractional Township 16 in Range 6, all east of Principal Meridian.
MacMartin, G. E. . . . .	St. Andrews, Que.	Sub-division of Township 2 in Range 26, Township 12 in Range 29, and fractional Townships 12 and 13 in Range 30, all west of the 4th Initial Meridian.
Talbot, A. C. . . . .	Montmagny, Que..	Sub-division of Townships 27 and 28 in Ranges 21 and 22, west of the 4th Initial Meridian.
Traynor, I. . . . .	Dundalk, Ont. . . . .	Sub-division of Township 21 in Ranges 3 and 4, west of Principal Meridian.
Vincent, F. . . . .	Fraserville, Que..	Sub-division of Township 27 in Ranges 23 and 24, Township 28 in Ranges 23, 24, 25 and 26, and Township 29 in Ranges 25 and 26, all west of the 4th Initial Meridian.
Wolf, C. E. . . . .	Ottawa, Ont. . . . .	Sub-division of Townships 29 in Ranges 23, 24 and 27, and Township 30 in Ranges 23 and 24, west of the 4th Initial Meridian.
Dennis, J. S. . . . .	Ottawa, Ont. . . . .	Inspection and correction Surveys.
Belanger, P. R. A. . . . .	L'Islet, Que. . . . .	Re-survey of 4th and 5th Initial Meridians.
Driscoll, A. . . . .	Aylmer, Que. . . . .	Correction of Surveys.
Vicars, John. . . . .	Cannington, Ont..	do do
Leclerc, Chas. . . . .	St. Jean Port Joli, Que.	do do
O'Keeffe, D. C. . . . .	Fort Ellice, Man..	do do

SCHEDULE (No. 20)—Trails surveyed up to 9th of January, 1889, giving names of Trails, names of Surveyors and Date of Survey.

Year.	Name of Trail.	Surveyed by.	Mileage.
1869	Prairie Section showing lines surveyed for the Red River Road.....	J. A. Snow.....	60.48
1869	Red River Road from the edge of the prairie to Whitemouth River and its projection to Birch River.....	do.....	43.30
1876-7	Colonization Road from White Mud River to the village of Gimli, Keewatin.....	Walter Beatty.....	29.22
1877	Map showing the location of the Great Highway between Winnipeg and Portage la Prairie, Man.....	Edgar Bray.....	57.18
1876	Colonization Road from the village of Gimli to the North boundary of Section 36, Township 14, Range 4, E.....	Walter Beatty.....	31.28
1877	Great Highway between Portage la Prairie and the western boundary of Manitoba.....	Edgar Bray.....	41.22
1877	Highway between Baie Saint Paul and Oak Point, Manitoba.....	do.....	36.84
1877	Highway between Winnipeg and Oak Point, Manitoba.....	do.....	53.66
1877	Great Highway between Winnipeg and the Northern boundary of the Parish of Saint Peters, Manitoba.....	do.....	28.99
1878	Road No. 8, Headingly to western boundary, Province of Manitoba.....	C. J. Chapman.....	107.07
1878	Road No. 1, Winnipeg to West Lynne, Province of Manitoba.....	do.....	67.34
1878	Road No. 7, Dawson Road, Province of Manitoba.....	do.....	22.28
1881	} Highway east side of Red River, Manitoba.....	A. G. Forrest.....	
1881		C. Desjardins.....	
1883		A. H. McDougall.....	
1883		J. A. Carbert.....	
1883		J. D. VanBuskirk.....	
1881	Road west and north of Gladstone.....	do.....	27.60
1881	Government Road at Westbourne.....	do.....	8.70
1884	Road along south branch of the Saskatchewan River to the northerly limit of Muskoday's Reserve.....	M. Hart.....	20.00
1884	Road from South Branch Road to Prince Albert <i>via</i> Island Lake.....	do.....	13.00
1884	Road from South Branch Road to Tait and Island Lake Road.....	do.....	
1884	Road from Prince Albert to Halero Settlement.....	do.....	13.00
1884	Part of Saskatchewan Forks and Carlton Trail from rear line of lots settlement of Prince Albert.....	do.....	22.00
1884	Road from Section 6, on South Branch Road through Indian Reserve to Prince Albert.....	do.....	12.00
1884	Saskatchewan Forks and Carlton Road through Prince Albert Settlement.....	do.....	70.00
1884	Road from Carlton Forks southerly to Batoche's crossing and from Duck Lake to Gabriel's crossing.....	do.....	
1885	Road from Moosomin to a point 5 miles south-west of Moose Mountain P. O.....	C. C. Duberger.....	43.00
1886	Road from Edmonton to Calgary (part of).....	C. A. Bigger.....	85.00
1886	Main Trail from Calgary to McLeod (part of).....	do.....	85.00
1886	Old Trail from Portage la Prairie and along west side of Assiniboine River.....	J. I. Dufresne.....	30.00
1886	Trail from Poplar Point to the shores of Lake Manitoba.....	J. I. Dufresne.....	16.00
1886	Old Trail through Totogan and along west side of Lake Manitoba.....	do.....	26.00
1886	Trail from Calf Mountain to east boundary of Section 20, Township 3, Range 8, west of 1st.....	do.....	6.00
1886	Old trail from Section 1, Township 12, Range 9 to Section 25, Township 11, Range 10, west of 1st.....	do.....	7.00
1886	Southern Qu'Appelle trail.....	T. D. Green.....	165.00
1886	Moosomin trail, Fort Ellice to Moosomin.....	do.....	24.00
1886	Battleford to Swift Current.....	R. C. Laurie.....	175.00
1886	Northerly trail from Portage la Prairie to Fort Ellice.....	John McLatchie.....	93.00
1886	Morris to International boundary.....	R. C. McPhillips.....	27.00
1886	St. Boniface to Emerson.....	do.....	69.00
1886	St. Norbert to Pomeroy.....	do.....	15.00
1886	St. Boniface to Ste. Anne.....	do.....	25.00
1886	Highway St. Clements to Broken Head.....	John McAree.....	15.00
1886	Highway across Parish of St. Charles and part of Headingly, south of the Assiniboine River.....	do.....	8.00
1886	Highway from Red River to Cook's Settlement.....	do.....	10.00
1886	Highway Kildonan to Stony Mountain.....	do.....	11.00
1886	Highway St. Boniface to East Selkirk.....	do.....	24.00
1886	Deviation of M. Hart's trail through Fractional Section 24, Township 48, Range 26, west of 2nd I. M.....	A. Sproat.....	0.50
1886	Part of trail from Calgary to Edmonton.....	G. P. Roy.....	90.00

SCHEDULE (No. 20) Trails surveyed up to 9th of January, 1889, giving Names of Trails, Names of Surveyors and Date of Survey—*Concluded.*

Year.	Name of Trail.	Surveyed by	Mileage.
1886..	Part of Troy and Prince Albert trail .....	J. L. Reid.....	157·00
1887..	Main Street in City of Winnipeg, as defined by City By-laws, No. 35 of 1875, and No. 57 of 1876. ....	J. Doupe.....	2·50
1887..	Fort Macleod to Blackfoot Crossing. ....	T. D. Green.....	78·00
1887..	Blackfoot Crossing to west boundary of I. R. ....	do.....	21·00
1887..	Parts of Bow River Bottom trail .....	do.....	33·00
1887..	Parts of Macleod and Calgary, Calgary and Morleyville, and Calgary and Blackfoot Crossing trails in Township 24, Range 1, west 5. ....	do.....	6·00
1887..	Trail between Medicine Hat and Dunmore. ....	J. A. Kirk.....	7·00
1887..	Carlton towards Prince Albert.....	J. L. Reid.....	.....
1887..	Carlton to Duck Lake.....	do.....	.....
1887..	From west limit of Lot 31, Prince Albert Settlement, to 3rd I. M. ....	do.....	6·00
1887..	Qu'Appelle and Wood Mountain .....	do.....	15·00
1887..	Troy and Prince Albert trail .....	do.....	.....
1887..	From Forks of Saskatchewan, westerly .....	do.....	.....
1888..	Part of trail from Forks to Prince Albert.....	do.....	4·00
1888..	Trail from Carrot River to Prince Albert .....	do.....	26·00
1888..	Road from Carlton to Green Lake .....	J. Bourgeois.....	120·00
1888..	North trail from Calgary to Morleyville. ....	T. D. Green.....	29·06
1888..	Blackfoot Crossing and Calgary trail from west boundary of Blackfoot Reserve.....	do.....	26·31
1888..	Part of Fort Macleod and Calgary trail .....	do.....	0·50
1888..	South trail from Morleyville to Calgary.....	do.....	40·40
1888..	(Deviation of) Highway through the Municipality of Westbourne to correspond with location of Manitoba and North Western Ry. ....	C. P. Brown.....	26·50

SCHEDULE (No. 21) of Reserves Surveyed at different points in Manitoba, Keewatin and the North-West Territories, for the Hudson's Bay Company.

Name of Reserve.	Location.	By Whom Surveyed.	Year.	Remarks.
Fort Edmonton	Saskatchewan	W. S. Gore	1873	Inside settlement survey.
Rocky Mountain House	do	do	1873	
Fort Victoria	do	do	1873	
St. Paul	do	do	1873	Surrendered.
Fort Pitt	do	do	1873	Shown on Township Plan.
Battle River	do	do	1873	Tp. 44, Ranges 16 and 17, 3rd Mer.
Fort Carlton	do	do	1874	Tp. 44 and 45, Range 4, 3rd Mer.
Fort Albert	do	do	1873	Tp. 48, Range 26, 2nd Meridian.
Lac la Biche	do	do	1873	
Fort Assiniboine	do	do	1873	
Lake Ste. Anne	do	do	1873	
Lac la Nonne	do	do	1873	
St. Albert	do	do	1873	Tp. 54, Range 25, 4th Meridian.
Pigeon Lake	do	do	1873	
Old White Mud Fort	Cumberland	do	1873	Tp. 51 do 3, 5th do
Cumberland House	do	do	1873	
Fort à la Corne	do	do	1873	Tp. 48 do 19 and 20, 3rd Mer.
Moose Woods	do	do	1873	Surrendered.
Moose Lake	do	do	1873	Tp. 54, Range 21, 1st Meridian.
Grand Rapids	do	do	1873	Tp. 48 do 15 do
Fort Pelly	Swan River	do	1873	Tp. 32 do 32 do
Fort Ellice	do	do	1873	Tp. 16 do 28 do
Fort Qu'Appelle	do	do	1873	Tp. 20 and 21, R. 13 and 14, 2nd M.
Coteau de Tondre	do	do	1873	Touchwood Hills, surrendered.
Shoal River	do	do	1873	On Swan Lake, Tp. 42, R. 24, 1st M.
Fairford Mission	do	do	1873	Tp. 30, Range 9, 1st Meridian.
Lower Fort Garry	Red River	A. H. Vaughan	1874	Stone Fort, St. Andrew's north.
Fort Alexander	Rainy River	C. F. Miles	1875	In Indian Reserve.
Fort Frances Reserves	do	do	{ 1874 1875 }	} Rainy River.
Rat Portage	do	do	1875	
Lake of the Woods	do	do	1875	At north-west angle.
Jackfish Creek	do	do	1875	Lake Winnipeg.
Hayfield Indian Portage	do	do	1875	do

SCHEDULE (No. 22) showing all Indian Reserves surveyed under instructions from the Surveyor General in Manitoba, Keewatin and the North-West Territories.

Name and Location of Reserve.	By whom Surveyed.	Year.
Ft. Alexander Reserve, Winnipeg River.	J. W. Harris, D.L.S.	1873
Crane River Reserve, Lake Manitoba	W. Wagner, D.L.S.	1874
do Ebb and Flow Lake.	do	1874
St. Peter's Reserve, Mouth of Red River.	(A. H. Vaughan, D.L.S.) (J. W. Harris, D.L.S.)	1873
Fairford River Reserve, Man.	W. Wagner, D.L.S.	1874
Lac Plat Reserve and North-West Angle River, Lake of the Woods.	G. A. Bayne, D.L.S.	1875
Paskonkin and the Bishop's wild lands reserve, Rainy River.	C. C. Forneri, D.L.S.	1876
Chief Manitobinas and Me-sho-tah Reserve, Rainy River.	do	1876
Kishe-ko-kaiks Reserve, Rainy River.	do	1876
Short Bear's Reserve, Townships 9 and 10, Range 8, west P. Meridian	J. L. Reid, D.L.S.	1876
Big Island and Sabaskon Bay, Lake of the Woods	C. F. Miles, D.L.S.	1876
Brokenhead Reserve (enlargement).	D. Sinclair, D.L.S.	1876
Town Plot, Thessalon River Reserve.	G. B. Abrey, D.L.S.	1876
Reserve for George Gordon's band at Little Touchwood Hills.	W. Wagner, D.L.S.	1875
Day Star's Reserve at Big Touchwood Hills, N.W.T.	do	1875
St. Martin's Lake Reserve, Man.	F. A. Martin, D.L.S.	1877
Water Hen River Reserve, Man.	do	1877
Reserve for Lean Man's Band, N.W.T.	Wm. Wagner, D.L.S.	1875
Fairford Mission Reserve, Man.	A. F. Martin, D.L.S.	1877
Ready Bow's Reserve, Big Touchwood Hills, N.W.T.	W. Wagner, D.L.S.	1875
Reserve for Gabriel Côté's Band on the Assiniboine River, Man.	do	1877
Way-way-see-cappo Reserve on the Birdtail Creek, Man.	do	1877
Norway House Reserve, Keewatin.	D. Sinclair, D.L.S.	1878
Moose Lake Reserve, Keewatin.	do	1878
Cross Lake Reserve, Keewatin.	do	1878
Grand Rapids Reserve, Saskatchewan River, Keewatin.	do	1878
Rossville Indian Village, Norway House Reserve, Keewatin.	do	1878
Chief Pabamacha's Reserve on the River "la Seine"	R. J. Ross, D.L.S.	1877
Sturgeon Falls Reserve on the River "la Seine"	do	1877
Reserve for Kebaguin's Band on the Kawawigamok River, Treaty 3.	do	1877
do for Chief Blackstone on Nequaquon Lake, and Nameukan River, Treaty 3.	do	1877
do for Chacachase's Band on Qu'Appelle River, N.W.T.	W. Wagner, D.L.S.	1876
do for Pasquak's Band, Upper Fishing Lake and Qu'Appelle, N.W.T.	do	1876
do for Okemis or Little Rosebud on Qu'Appelle River, N.W.T.	do	1876
do for Sakimay or Mosquito's Band on Qu'Appelle River and Crooked Lake, N.W.T.	do	1876
Reserve at Duck Bay, Lake Winnipegosis, Man.	Wm. Wagner, D.L.S.	1878
do for the Keys Band at Swan River, Man.	do	1877
do for White Bear's Band at Moose Mountain, Man.	do	1877
do for Chief Loud Voice, at Qu'Appelle River and Round Lake, N.W.T.	do	1876
do for Ka-kee-wis-ta-haw on Qu'Appelle River, N.W.T.	do	1876
do for Star Blankets Band, N.W.T.	do	1876
do for Chief Sou-sqne at Dog Creek, Lake Manitoba.	A. F. Martin, D.L.S.	1878
do at Black River, Lake Winnipeg.	J. L. P. O'Hanly, D.L.S.	1878
do at Dog's Head, do	do	1878
do at Poplar River do	do	1878
do at Beren's River do	do	1878
South Saskatchewan Reserve, with sketch of Bow and Belly Rivers, N.W.T.	A. P. Patrick, D.T.S.	1879
Reserve for Chief Oos-con-na-geist, or "Redgut," Little Otter Tail, Treaty 3.	A. J. Crickmore, D.L.S.	1878
Reserve No. 17, Chief Wah-shis-kince, at Clearwater Lake	do	1878
do No. 17, Chief Wah-shis-kince, Portion A., Rainy River.	do	1878
do No. 27, Portion B. at Little Wabigon Lake, Treaty 3.	do	1878
do No. 27, do A. do	do	1878
do No. 26, do C., Chief Oos-con-na-geist, Rainy Lake.	do	1878
do No. 26, do B. do	do	1878
Sioux Reserve, Pipestone Creek, Oak Lake, Manitoba.	Wm. Wagner, D.L.S.	1878
do for Chief Kish-i-konce, Swan River, do	do	1877
do at Fort à la Corne, N.W.T., for Chief James Smith.	M. Hart, D.L.S.	1878
do for Chief Mistowasis, at Snake Plain, N.W.T.	E. Bray, D.L.S.	1878
do for band of Chief Ata-ka-koop, on trail to Green Lake, N.W.T.	do	1878

SCHEDULE (No. 22) showing all Indian Reserves surveyed, &c.—*Concluded.*

Name and Location of Reserve.	By whom Surveyed.	Year.
Reserve at Sturgeon Lake, N.W.T., Chief Wm. Twatt	E. Stewart, D.L.S.	1878
do for band of Chief John Smith, "Muskoday," N.W.T.	do	1878
do do Chacastapasin, on South Saskatchewan, N.W.T.	do	1878
do do Chief Red Pheasant, Eagle Hills, N.W.T.	Geo. Simpson, D.L.S.	1880
do at Brokenhead River, Manitoba	J. W. Harris, D.L.S.	1873
do for Enoch's Band at mouth of Bird Tail Creek, Man.	Wm. Wagner, D.L.S.	1875
do for White Eagle's Band at Oak River, Man.	do	1875
do for Metis Band at Riding Mountain House, Man.	do	1875
do for Chief Oa-za-we-kwun, on the Assiniboine River, Man.	do	1873
do A, B, C, D and No. 1, at Rainy Lake, Treaty No. 3	E. C. Caddy, D.L.S.	1875
Reserves Nos. A1 and A2 at Lac des Milles Laes and Seine River	R. J. Ross, D.L.S.	1875
Blackfoot Reserves, Chief Crowfoot, Bow River	Wm. Ogilvie, D.L.S.	1878
Reserve for Yellow Quill's Band in Township 5, Range 11, west Principal Meridian, Man.	J. L. Reid, D.L.S.	1876
Reserves for bands of See-kas-kootch and Makaoo, near Fort Pitt, N. W. T.	G. A. Simpson, D.L.S.	1879
Reserve for band of Chief Mosquito, Eagle Hills, N.W.T.	do	1878
do for bands of Pus-kee-eh-kee-hee-win and Oo-noo-pow-o-hay-ooos at Frog Lake, N.W.T.	do	1879
do for Chief Chipwayan's son, near Fort Carlton, N.W.T.	do	1879
do at Crane River, Man.	Wm. Wagner, D.L.S.	1873
do 35H and 32C at Sabbaskang District, Lake of the Woods.	C. F. Miles, D.L.S.	1879
do 35C, Lake of the Woods.	do	1879
do 35B, Ohbahbikon Lake, Lake of the Woods.	do	1879
do 35F at Sabbaskang proper	do	1879
do 35D, Sabbaskang District	do	1879
do 31 and 35A, Nayangoshing	do	1879
do No. 30 or Agency Reserve	do	1879
do No. 31E, Big Island	do	1879
do No. 35G, Big Grassy River	do	1879
do No. 35E at Little Grassy River	do	1879
do No. 38A at Washagaines Bay	do	1880
do No. 32B at Black River	A. H. Vaughan, D.L.S.	1880
do No. 38C at Winnipeg River	do	1880
do Nos. 32, 33 and 34A at Lobstick and Whitefish Bays, Lake of the Woods.	do	1880
do 38B, Pine Portage, Lake of the Woods.	do	1880
do for band of Chief Beardy at Duck Lake, N.W.T.	J. L. Reid, D.L.S.	1880
do do Chief Alexis, Lake St. Anne, N.W.T.	G. A. Simpson, D.L.S.	1880
do do Chief Alexander, River L'Barre, N.W.T.	do	1880
do do Chief Michel Calahoo, Sturgeon River, N.W.T.	do	1880
Indian Farm, Assiniboine River, Manitoba.		
Reserve No. 2 on Roseau River, Man.	Plan compiled in D.L.O.	1882
do for Peigan Indians on Old Man's River, N.W.T.	A. P. Patrick, D.T.S.	1879
do for Stony Indians at Morleyville, Bow River, N.W.T.	do	1879
do for band of Poundmaker on Battle River, N.W.T.	G. A. Simpson, D.L.S.	1881
do do White Cap, South Saskatchewan River, N.W.T.	do	1881
do do One Arrow, Prince Albert District, N.W.T.	do	1881
do do Petty-quaw-ky, Battleford District, N.W.T.	do	1881
do do Flying Dust, Meadow Lake, N.W.T.	do	1881
do do Thunderchild and Moosomin, North Saskatchewan River, N.W.T.	do	1881





SCHEDULE (No. 24) of Correction Surveys performed up to the 31st of December, 1888.

Township.	Range.	Meridian.	By whom Performed.	Year.	Description of Work.
18	28	1	John McLatchie	1886	Traverse of lake and outlines of Section 24.
3	32	1	do	1886	Remeasurement of lines, &c.
21	9	2	G. B. Abrey	1886	Traverse of lake, &c.
22	9	2	do	1886	do
21	10	2	do	1886	do
22	10	2	do	1886	do
42	27	2	A. C. Webb	1886	Remeasurement of lines.
25	29	2	do	1886	Posts removed, &c.
26	29	2	do	1886	do
27	29	2	do	1886	do
46	19	3	Joseph Doupe	1886	North boundary re-surveyed.
48	28	2	do	1886	Resurvey of north-east portion of township.
49	28	2	do	1886	do portion of township.
45	21	2	do	1886	Traverse in south-west corner of township.
45	22	2	do	1886	do south-east do
47 A	25	2	do	1886	Traverse of South Saskatchewan River.
44	4	3	do	1886	Survey of Hudson Bay Company's Reserve.
45	4	3	do	1886	do do
50	25	3	do	1886	Resurvey of portion of east outline.
49	25	3	do	1886	do Section 24.
39	27	4	do	1886	Examination survey of part of township.
54	26	4	do	1886	Traverse in Section 31.
42	13	3	do	1886	Resurvey of north boundary.
42	14	3	do	1886	do do and some section lines.
43	14	3	do	1886	do north and south boundaries.
44	13	3	do	1886	do outline.
44	14	3	do	1886	do do
21	22	2	J. S. Dennis	1886	Traverse of Long Lake.
21	23	2	do	1886	do
8	1	3	do	1886	Posts moved.
16	13	3	do	1886	Position of Canadian Pacific Railway determined.
10	25	3	do	1886	Iron bar at north-west corner moved.
18	29	3	do	1886	Mound built.
19	27	3	do	1886	do moved.
18	3	4	do	1886	Position of South Saskatchewan River determined.
13	5	4	do	1886	do do do
12	7	4	do	1886	do do do
13	12	4	do	1886	do do do
10	12	4	do	1886	Iron bar at north-east corner corrected for error.
15	5	4	do	1886	Position of river determined.
17	5	4	do	1886	do do and river lot posts and mounds removed.
19	2	4	do	1886	Position of river determined and river lot posts and mounds removed.
19	3	4	do	1886	Resurvey of west outline.
19	4	4	do	1886	do east do
20	1	4	do	1886	Position of river determined.
22	1	4	do	1886	do do do
22	2	4	do	1886	do do do
22	4	4	do	1886	do do do
23	3	4	do	1886	do do do
4	30	4	do	1886	Part of second base line re-chained.
16	5	4	do	1886	River lot posts and mounds removed.
17	4	4	do	1886	do do do
23	7	4	do	1886	Survey of part of south boundary.
42	13	3	J. McAree	1887	Resurvey of certain section lines.
43	14	3	do	1887	do part of east and north outlines.
44	14	3	do	1887	do east and north outlines.
46	18	3	do	1887	do north outline.
43	19	3	do	1887	do part of east outline.
44	19	3	do	1887	do east outline.
48	25	3	do	1887	Substituting iron for wooden posts.
51	26	3	do	1887	Resurvey of correction line.
54	27	3	do	1887	do do
54	14	4	do	1887	do part of north outline.
51	17	4	do	1887	do Sections 5 and 8.

SCHEDULE (No. 24) of Correction Surveys performed, &c.—Continued.

Township.	Range.	Meridian.	By whom Performed.	Year.	Description of Work.
53	18	4	J. McAreë..	1887	Resurvey of east outline.
55	19	4	do	1887	do south outline.
55	18	4	do	1887	do do
46	21	4	do	1887	do east outline.
56	20	4	do	1887	do north outline.
45	24	4	do	1887	Substituting iron for wooden posts.
47	24	4	do	1887	do do
48	24	4	do	1887	do do
47	25	4	do	1887	do do
48	25	4	do	1887	do do
51	25	4	do	1887	Resurvey of north outline.
55	25	4	do	1887	do east do
56	25	4	do	1887	do part of east outline.
55	26	4	do	1887	do east outline.
56	26	4	do	1887	do do
39	27	4	do	1887	do Interior Meridian line.
31	28	4	do	1887	Measurement of closings.
36	28	4	do	1887	Position of Red Deer River determined.
50	28	4	do	1887	Resurvey of east boundary of Sections 3, 10, 15, 22, 27 and 34.
52	28	4	do	1887	do north outline.
34	1	5	do	1887	Checked closing on correction line.
35	1	5	do	1887	Checked position of $\frac{1}{4}$ section post on north boundary.
52	1	5	do	1887	Resurvey of certain section lines.
21	7	4	J. S. Dennis	1887	Interior lines re-chained.
22	7	4	do	1887	do re-measured.
21	8	4	do	1887	do re-chained.
22	8	4	do	1887	do re-measured.
21	9	4	do	1887	do re-chained.
21	12	4	do	1887	Position of river determined.
10	16	4	do	1887	Resurvey of north boundary.
11	16	4	do	1887	do south do
10	17	4	do	1887	do north do
11	17	4	do	1887	do south do
26	17	4	do	1887	Position of river determined.
26	21	4	do	1887	Resurvey of north boundary.
8	26	4	do	1887	do west outline.
22	26	4	do	1887	do north boundary.
23	26	4	do	1887	do south do
21	27	4	do	1887	East outline re-traced and re-measured.
22	27	4	do	1887	Resurvey of north boundary.
23	27	4	do	1887	do south do
20	28	4	do	1887	Wooden posts replaced by iron on north boundary.
30	28	4	do	1887	Iron bar and mound at north-east corner on correction line moved to correct position.
31	28	4	do	1887	Resurvey of south boundary.
20	29	4	do	1887	Wooden posts replaced by iron on north boundary.
22	29	4	do	1887	Resurvey of west boundary of Sections 20, 29 and 32.
23	29	4	do	1887	Position of Bow River determined.
4	30	4	do	1887	Resurvey of north boundary and part of west boundary.
5	30	4	do	1887	do west boundary, (5th Initial Meridian.)
6	30	4	do	1887	do do do and part of north boundary.
7	30	4	do	1887	Resurvey of west boundary, (5th Initial Meridian,) and part of south boundary.
8	30	4	do	1887	Resurvey of west boundary, (5th Initial Meridian.)
7	1	5	do	1887	do south boundary.
22	23	2	do	1887	Traverse of shore to Long Lake.
19	12	3	do	1887	River lot-posts and mounds removed.
19	15	3	do	1887	do do
19	16	3	do	1887	do do
19	17	3	do	1887	do do
20	8	3	do	1887	do do
20	9	3	do	1887	do do
20	10	3	do	1887	do do
20	12	3	do	1887	do do
20	13	3	do	1887	do do
20	14	3	do	1887	do do

SCHEDULE (No. 24) of Correction Surveys performed, &c.—*Continued.*

Township.	Range.	Meridian.	By whom Performed.	Year.	Description of Work.
20	15	3	J. S. Dennis.....	1887	River lot-posts and mounds removed.
20	16	3	do .....	1887	do do
21	17	3	do .....	1887	do do
21	7	3	do .....	1887	do do
21	8	3	do .....	1887	do do
21	9	3	do .....	1887	do do
21	17	3	do .....	1887	do do
21	18	3	do .....	1887	do do
22	7	3	do .....	1887	do do
22	8	3	do .....	1887	do do
22	18	3	do .....	1887	do do
22	19	3	do .....	1887	do do
23	7	3	do .....	1887	do do
23	19	3	do .....	1887	do do
23	20	3	do .....	1887	do do
23	21	3	do .....	1887	do do
23	22	3	do .....	1887	do do
23	23	3	do .....	1887	do do
23	24	3	do .....	1887	do do
23	25	3	do .....	1887	do do
23	26	3	do .....	1887	do do
24	5	3	do .....	1887	do do
24	6	3	do .....	1887	do do
24	7	3	do .....	1887	do do
24	21	3	do .....	1887	do do
24	22	3	do .....	1887	do do
24	23	3	do .....	1887	do do
24	24	3	do .....	1887	do do
25	5	3	do .....	1887	do do
25	6	3	do .....	1887	do do
26	6	3	do .....	1887	do do
26	7	3	do .....	1887	do do
27	7	3	do .....	1887	do do
28	7	3	do .....	1887	do do
28	8	3	do .....	1887	do do
8	21	4	do .....	1887	do do
9	21	4	do .....	1887	do do
9	24	4	do .....	1887	do do
9	27	4	do .....	1887	do do
10	16	4	do .....	1887	do do
10	17	4	do .....	1887	do do
10	20	4	do .....	1887	do do
10	25	4	do .....	1887	do do
12	5	4	do .....	1887	do do
12	6	4	do .....	1887	do do
12	7	4	do .....	1887	do do
12	12	4	do .....	1887	do do
13	6	4	do .....	1887	do do
13	7	4	do .....	1887	do do
13	8	4	do .....	1887	do do
13	14	4	do .....	1887	do do
14	13	4	do .....	1887	do do
13	5	4	do .....	1887	do do
13	12	4	do .....	1887	do do
13	13	4	do .....	1887	do do
14	5	4	do .....	1887	do do
14	14	4	do .....	1887	do do
14	15	4	do .....	1887	do do
14	16	4	do .....	1887	do do
15	5	4	do .....	1887	do do
15	15	4	do .....	1887	do do
15	16	4	do .....	1887	do do
16	5	4	do .....	1887	do do
16	16	4	do .....	1887	do do
17	3	4	do .....	1887	do do
17	4	4	do .....	1887	do do

## SCHEDULE (No. 24) of Correction Surveys performed, &amp;c.—Continued.

Township.	Range.	Meridian.	By whom Performed.	Year.	Description of Work.
17	5	4	J. S. Dennis.....	1887	River lot-posts and mounds removed.
17	16	4	do .....	1887	do do
17	17	4	do .....	1887	do do
17	18	4	do .....	1887	do do
18	18	4	do .....	1887	do do
19	18	4	do .....	1887	do do
21	25	4	do .....	1887	do do
21	26	4	do .....	1887	do do
21	27	4	do .....	1887	do do
21	28	4	do .....	1887	do do
22	1	4	do .....	1887	do do
22	2	4	do .....	1887	do do
22	3	4	do .....	1887	do do
22	4	4	do .....	1887	do do
22	5	4	do .....	1887	do do
22	6	4	do .....	1887	do do
22	15	4	do .....	1887	do do
22	25	4	do .....	1887	do do
22	28	4	do .....	1887	do do
22	29	4	do .....	1887	do do
23	1	4	do .....	1887	do do
23	2	4	do .....	1887	do do
23	3	4	do .....	1887	do do
23	4	4	do .....	1887	do do
23	7	4	do .....	1887	do do
23	8	4	do .....	1887	do do
23	15	4	do .....	1887	do do
23	29	4	do .....	1887	do do
24	29	4	do .....	1887	do do
37	28	4	do .....	1887	do do
45	19	4	do .....	1887	do do
45	20	4	do .....	1887	do do
45	22	4	do .....	1887	do do
45	23	4	do .....	1887	do do
46	22	4	do .....	1887	do do
50	26	4	do .....	1887	do do
51	26	4	do .....	1887	do do
23	14	4	do .....	1887	do do
46	20	4	do .....	1887	do do
46	21	4	do .....	1887	do do
22	1	5	do .....	1887	do do
23	1	5	do .....	1887	do do
24	1	5	do .....	1887	do do
24	2	5	do .....	1887	do do
8	22	4	do .....	1887	do do
8	24	4	do .....	1887	do do
8	25	4	do .....	1887	do do
9	22	4	do .....	1887	do do
9	23	4	do .....	1887	do do
9	25	4	do .....	1887	do do
9	26	4	do .....	1887	do do
11	11	4	do .....	1887	do do
11	12	4	do .....	1887	do do
11	13	4	do .....	1887	do do
12	8	4	do .....	1887	do do
12	10	4	do .....	1887	do do
12	11	4	do .....	1887	do do
12	13	4	do .....	1887	do do
13	9	4	do .....	1887	do do
13	10	4	do .....	1887	do do
22	10	4	do .....	1887	do do
22	12	4	do .....	1887	do do
22	14	4	do .....	1887	do do
26	1	2	J. J. Dalton.....	1887	Traverse of lake in section 7.
27	1	2	do .....	1887	Traverse of lake.
29	1	2	do .....	1887	Traverse of lake in sections 3, 4, 5, 7, 9 and 21.
26	2	2	do .....	1887	do 7, 12, 13 and 18.
23	3	2	do .....	1887	do 4 and 9.

## SCHEDULE (No. 24) of Correction Surveys performed, &amp;c.—Continued.

Township.	Range.	Meridian.	By whom Performed.	Year.	Description of Work.
24	14	4	J. S. Dennis	1887	Removal of river lot, posts and mound.
22	13	4	do	1887	do do
21	10	4	do	1887	do do
21	12	4	do	1887	do do
21	11	4	do	1887	do do
17	20	1	J. Vicars	1888	Lost corners re-established.
16	22	1	do signed by J.S.D.	1888	Verification of water area.
26	1	2	do	1888	do
27	1	2	do	1888	do
29	1	2	do	1888	do
26	2	2	do	1888	do
23	3	2	do	1888	do
18	8	2	do	1888	Resurvey of Meridian.
18	9	2	do	1888	Boundaries of certain sections remeasured.
19a	9	2	do	1888	Resurvey of east boundary.
19a	11	2	do	1888	Boundaries of certain sections remeasured.
21	13	2	do	1888	do do
3	27	2	do	1888	Resurvey of south boundary.
4	3	3	do	1888	Resurvey of east and west lines through township.
25	3	3	do	1888	Resurvey of east boundary.
6	17	1	A. Driscoll, Jun	1888	Verification of water areas.
11	17	1	do	1888	Resurvey in sections 2 and 3.
1	25	4	do	1888	Resurvey of east boundary.
2	25	4	do	1888	do
37	27	4	do	1888	Verifications of water areas.
38	27	4	do	1888	do
39	27	4	do	1888	do
1	28	4	do	1888	Survey of tie lines between International boundary and 5th Initial Meridian.
2	28	4	do	1888	Resurvey for tie line between International boundary and 5th Initial Meridian.
3	28	4	do	1888	do do
4	28	4	do	1888	do do
36	28	4	do	1888	Verification of water areas surveys.
37	28	4	do	1888	do do
38	28	4	do	1888	do do
4	29	4	do	1888	Certain boundaries resurveyed re tie between International boundary and 5th Initial Meridian.
4	30	4	do	1888	do do
30	3	5	do	1888	Resurvey of north boundary.
31	3	5	do	1888	do south do
30	4	5	do	1888	do north do
31	4	5	do	1888	do south and east boundaries.
28	6	5	do	1888	North boundary of section 31 remeasured.
21	1	4	C. F. Leclerc, sig. by J.S.D.	1888	River lot posts and mounds removed.
18	4	4	do	1888	Resurvey of east and north boundaries.
18	5	4	do	1888	do east boundary.
19	4	4	do	1888	do south do
19	5	4	do	1888	do east do
21	7	4	do	1888	Lakes and river traversed.
22	7	4	do	1888	do
21	8	4	do	1888	do
22	8	4	do	1888	do
21	9	4	do	1888	do
21	10	4	do	1888	River lot posts and mounds removed.
22	10	4	do	1888	do do
21	11	4	do	1888	do do
21	12	4	do	1888	do do
22	12	4	do	1888	do do
22	13	4	do	1888	do do
22	14	4	do	1888	do do
23	14	4	do	1888	do do
24	14	4	do	1888	do do
24	15	4	do	1888	do do
25	15	4	do	1888	do do
25	16	4	do	1888	do do
26	16	4	do	1888	do do

SCHEDULE (No. 24) of Correction Surveys performed, &c.—Continued.

Township.	Range.	Meridian.	By whom Performed.	Year.	Description of Work.
26	17	4	C. F. Leclerc signed by J. S. Dennis	1888	River lot posts and mounds removed.
19	19	4	do	1888	Resurvey of east boundary.
20	1	4	D. C. O'Keeffe signed by J. S. Dennis	1888	River lot posts and mounds on east side of river removed.
19	2	4	do	1888	River lot posts and mounds removed.
20	2	4	do	1888	do do
18	3	4	do	1888	do do
19	3	4	do	1888	River lot posts and mounds on east side of river removed.
18	4	4	do	1888	River lot posts and mounds removed.
*12	5	4	do	1888	Placing pits on Medicine Hat and Dunmore trail.
12	8	4	do	1888	River lot posts and mounds removed.
13	9	4	do	1888	do do
12	10	4	do	1888	do do
13	10	4	do	1888	do do
11	11	4	do	1888	do do
12	11	4	do	1888	do do
11	12	4	do	1888	do do
11	13	4	do	1888	do do
11	14	4	do	1888	do do
11	15	4	do	1888	do do
11	16	4	do	1888	do do
12	16	4	do	1888	do do
9	22	4	do	1888	do do
48	24	2	J. L. Reid	1888	North boundaries sections 32, 33, 34 and 35, and east boundaries of 35 and 36 resurveyed.
45a	26	2	do	1888	Posts and mounds of old system removed.
44	27	2	do	1888	Posts and mounds of erroneous survey removed.
45a	27	2	do	1888	Posts and mounds of old system removed.
45	27	2	do	1888	North boundary of section 6 resurveyed and posts on south boundary corrected.
45a	28	2	do	1888	Posts and mounds of old system removed.
45	28	2	do	1888	Posts on south boundary of Township corrected.
49	1	4	P. R. A. Belanger	1888	Resurvey of east boundary.
50	1	4	do	1888	do
51	1	4	do	1888	do
52	1	4	do	1888	do
53	1	4	do	1888	do
54	1	4	do	1888	do
55	1	4	do	1888	do
55	18	4	do	1888	Resurvey of north boundary.
55	20	4	do	1888	do
55	23	4	do	1888	Resurvey of 13th correction line.
55	24	4	do	1888	do
55	25	4	do	1888	do
25	1	5	do	1888	Resurvey of east boundary.
26	1	5	do	1888	do
27	1	5	do	1888	do
28	1	5	do	1888	do
29	1	5	do	1888	do
30	1	5	do	1888	do
31	1	5	do	1888	do
32	1	5	do	1888	do
33	1	5	do	1888	do
34	1	5	do	1888	do
35	1	5	do	1888	do
36	1	5	do	1888	do
37	1	5	do	1888	do
38	1	5	do	1888	do
39	1	5	do	1888	do
40	1	5	do	1888	do
41	1	5	do	1888	do
42	1	5	do	1888	do
43	1	5	do	1888	do

\* No plan.

SCHEDULE (No. 24) of Correction Surveys performed, &c.—*Concluded.*

Township.	Range.	Meridian.	By whom Performed.	Year.	Description of Work.
44	1	5	P. R. A. Belanger . . . . .	1888	Resurvey of east boundary.
45	1	5	do . . . . .	1888	do
46	1	5	do . . . . .	1888	do
47	1	5	do . . . . .	1888	do
48	1	5	do . . . . .	1888	do
49	1	5	do . . . . .	1888	do
50	1	5	do . . . . .	1888	do
51	1	5	do . . . . .	1888	do
52	1	5	do . . . . .	1888	do
40	2	5	do . . . . .	1888	do
45	27	2	C. F. Leclerc. . . . .	1888	Establishing river lots.
45	28	2	do . . . . .	1888	do
45	1	3	do . . . . .	1888	do
43	1	3	do . . . . .	1888	do
44	1	3	do . . . . .	1888	do
46 <i>a</i>	26	2	J. L. Reid . . . . .	1888	Posts and mounds of old system removed.
24	1	5	J. S. Dennis . . . . .	1888	Road survey in north $\frac{1}{2}$ section 22.
+23	1	5	do . . . . .	1888	Resurvey of east boundaries of sections 1 and 12.
46 <i>a</i>	25	2	J. L. Reid . . . . .	1888	Part of correction line.
42	27	2	do . . . . .	1888	Correction line.
24	10	5	A. Saint Cyr . . . . .	1888	Showing removal of posts.
27	19	5	J. I. Dufresne . . . . .	1888	Correction on south boundary sections 3 and 4.

† Only notes.

## SCHEDULE (No. 25) showing the acreage of Dominion Lands surveyed during each year from 1869 to 1888 inclusive.

Year.	Acres.	Number of Farms of 160 Acres.
1869 . . . . .	58,080	Area posted on block lines under 1st system; posts and mounds subsequently removed.
1870 . . . . .	None.	
1871 . . . . .	1,239,400	7,746
1872 . . . . .	3,552,771	22,240
1873-74 . . . . .	4,237,864	26,487
1875 . . . . .	665,000	4,156
1876 . . . . .	420,507	2,628
1877 . . . . .	231,691	1,448
1878 . . . . .	306,936	1,918
1879 . . . . .	1,130,482	7,066
1880 . . . . .	4,472,000	27,950
1881 . . . . .	9,147,000	50,919
1882 . . . . .	9,460,000	55,125
1883 . . . . .	27,000,000	168,750
1884 . . . . .	6,400,000	40,000
1885 . . . . .	1,379,010	8,620
1887 . . . . .	643,710	4,023
1888 . . . . .	1,131,840	7,074

SCHEDULE (No. 26) of Settlement, Town Plot and miscellaneous surveys performed in Manitoba, Keewatin, North-West Territories and British Columbia.

Description of Survey.	By whom Surveyed.	Year.
Parish of St. Peter's, Red River, Manitoba.	A. H. Vaughan.	1873
do St. Clement's do	do	1872-3
do St. Andrew's do	do	1872-3
do St. Paul's do	} Duncan Sinclair.	1871-2
do Kildonan do		
do St. John, Red and Assiniboine Rivers, Manitoba	} Duncan Sinclair and Geo. McPhillips.	1872-3
do St. James, Assiniboine River, Manitoba		
do St. Charles do	} Duncan Sinclair and G. McPhillips.	1872-3
do Headingly do		
do St. Francois Xavier do	Geo. McPhillips	1871
do Baie St. Paul do	Wm. Wagner	1874
do Poplar Point do	do	1874
do High Bluff do	Geo. McPhillips	1874-5
Oak Point Settlement, Manitoba.	Wm. Wagner.	1872-4
Parish of Portage la Prairie, Assiniboine River, Manitoba.	Geo. McPhillips	1874-5
do St. Boniface, Red River, Manitoba.	} Duncan Sinclair and G. McPhillips.	1872-3
do St. Vital do		
do St. Norbert do	Geo. McPhillips	1874
do Ste Agathe do	do	1875
do Lorette, River Seine, Manitoba.	{ F. A. Martin.	1873-4
Settlement of Ste Anne do	{ Geo. McPhillips.	1874-5
do do	do	1877
do do	do	1873
do do St. Laurent, Lake Manitoba, Manitoba.	W. Wagner.	1872-4
Selkirk town plot, Red River, Manitoba.	J. W. Harris.	1875
Gimli do Lake Winnipeg, Manitoba.	Geo. McPhillips	1875
Prince Albert settlement, North Saskatchewan River, N.-W.T.	} Mont. Aldous.	1878
St. Laurent do South do		
Battleford town plot, Battle River, N.-W.T.	A. G. Cavana	1882
Fort Saskatchewan settlement, North Saskatchewan River, N.-W.T.	M. Deane	1883
Edmonton settlement, North Saskatchewan River, N.-W.T.	do	1882
St. Albert settlement, Big Lake and Sturgeon River, N.-W.T.	do	1883
Fort Macleod town plot, Old Man's River, North-West Territories.	A. W. McVittie.	1883
Silver City town plot, Canadian Pacific Ry., Bow Pass, N. W. Territories.	} F. L. Foster	1883
Rat River settlement, Manitoba		
Oak Island do	do	1883
Silverton, Canadian Pacific Railway, Bow Pass, N.-W. Territories.	P. R. A. Belanger	1885
Donald town plot do Columbia River, British Columbia	do	1885
Golden town plot do do do	do	1885
Morleyville settlement, Bow River, North-West Territories.	do	1885
Calgary villa lots and boulevard, Calgary North-West Territories	do	1885
Grand Pointe settlement, Manitoba.	M. J. Charbonneau.	1884
St. Malo settlement, Manitoba	do	1884
Whitemouth town plot, Canadian Pacific Ry., Manitoba	J. I. Dufresne	1885
Rat River settlement, Manitoba.	do	1885
Donald town plot, Canadian Pacific Railway, British Columbia.	W. A. Ducker.	1887
Fort Saskatchewan settlement, North-West Territories.	Tom Kains.	1884
Victoria settlement.	do	1884
Extension to St. Albert settlement	J. J. McArthur.	1884
Calgary town plot.	A. W. McVittie.	1884
Manitoba House settlement.	A. H. McDougall.	1885
Banff town plot.	G. A. Stewart.	1886
Illicillewaet town plot.	P. R. A. Belanger	1887
Mounted Police reserves, North-West Territories	C. F. Miles	1887
Methodist mission reserves do	F. W. Wilkins.	1887
Canadian Pacific Ry. station grounds at Griffin Lake, British Columbia	— Poudrier.	1887
do do Palliser do	Jos. Doupe.	1888
Hudson Bay Company's land at Athabasca Landing, N. W. Territories.	J. A. Macmillan.	1888
School section, south half of 29, township 13, range 19—1st.	J. H. Brownlee	1887
Industrial school and R. C. mission grants, in township 21, range 13—2.	C. C. DuBerger.	1885
Part of section 11, township 12, range 8—1st.	Jno. De Cew.	1884
Reserve for Regina reservoir.	T. S. Gore.	1885
Hudson Bay Company's Islands, Moose River.	M. Aldous.	1883
Boundaries of the Rocky Mountains Park	A. St. Cyr.	1887
Survey of timber limits on Rainy Lake.	D. Sinclair.	1874



SCHEDULE (No. 26) of Settlement, Town Plot and miscellaneous Surveys—*Con.*

Description of Survey.	By whom Surveyed.	Year.
Survey of part of west coast of Lake Winnipeg	A. H. Vaughan	1875
Survey of outer two miles in St. Andrew's and St. Clement's	do	1875
do do St. Norbert, St. Vital, St. Boniface and St. Charles	F. A. Martin	1874
do do Parishes of St. François Xavier and Headingly	Wm. Pearce	1874
Survey of portion of Lake Manitoba	Wm. Wagner	1873
Traverse of part of shore line and islands, Lake of the Woods	A. L. Russell	1874
Survey of part of Red River and portion of coast line, Lake Winnipeg.	A. H. Vaughan	1873
White Mud River settlement	Wm. Wagner	1871
Survey of settlement along Red River, Dease's Farm to Pembina	L. J. D'Auteuil	1872
Survey of Red River from John Taits to Indian Reserve	D. S. Doucett	1872
Survey of Red River	D. S. Baudry	1872
Survey of shore line of Lake Manitoba and adjacent marshes, from provincial boundary to Manitoba House	Wm. Wagner	1873
Survey of timber limits on Lake of the Woods	L. Kennedy	1875
Traverse of part of Lake of the Woods, Sabbaskon district	C. F. Miles	1876
Survey of villages of Riverton and Sandy Bar, Manitoba	G. McPhillips	1876
Survey of outer two miles in Parishes of St. Andrew's, St. Clement's, St. Boniface, Kildonan and St. Paul	Wm. Pearce	1876
Survey of Qu'Appelle River to Upper Fishing Lake	Wm. Wagner	1876
Outer two miles in Parishes of Headingly, St. François Xavier and Baie St. Paul	G. McPhillips	1875
Traverse of Big Island, Lake Winnipeg	L. Kennedy	1875
Traverse of Steep Rock Island, Lake of the Woods	do	1875
Town plot of Gimli and parts adjacent to Icelandic settlement	G. McPhillips	1875
Survey of part of shore line, Lake of the Woods from Dog Point westward	Geo. A. Bayne	1875
Traverse of White Fish Bay, Lake of the Woods	C. F. Miles	1875
Survey of outer two miles in Parishes of St. John, St. James, St. Charles (north) and St. Paul (west)	J. W. Harris	1876
Survey of Penitentiary Reserve in Township 13, Range 3, east of Principal Meridian	Wm. Pearce	1877
Traverse of portion of Lake Winnipeg	do	1877
Survey of north side of Assiniboine River from Mission Farm, west	M. McFadden	1871
Resurvey of part of Parish of Ste. Agathe	Jos. Doupe	1873
Survey of timber limits north of Prince Albert	J. L. Reid	1879
do connecting astronomical station with Government House, Battleford	Wm. Ogilvie	1878
Traverse of part of Assiniboine and Souris Rivers	Caddy and Hewson	1880
Survey of claims and holdings at Battleford	J. L. Reid	1879
do of lakes in Township 1, Range 22, west of Principal Meridian	Jno. McAree	1879
Traverse of lakes in Townships 18 and 19, Ranges 19 and 20, west of Principal Meridian	G. A. Stewart	1879
Traverse of part of South Saskatchewan River	Hugh Wilson	1882
Survey of Old Man's River from Fort McLeod, east	J. C. Nelson	1878
do portion of North and South Saskatchewan Rivers	J. L. Reid	1878
Timber limit on Lake Winnipegosis and Water Hen Rivers	G. C. Rainboth	1878
do Winnipeg River	A. G. Forrest	1880
Survey of claims near 3rd crossing of Souris River	J. W. Vaughan	1879
Resurvey of part of International boundary at crossing of Kennebec Road	W. A. Ashe	1881
Resurvey, Battleford town plot	R. C. Laurie	1883
Traverse of part of Lake of the Woods	John McLatchie	1881
Survey of part of lot 35, Parish of St. John	G. McPhillips	1884
do Goose Island, Lake Winnipeg	do	1887
Traverse of part North Saskatchewan River	F. Vincent	1884
do St. Mary's, Belly and Little Bow Rivers	E. Bray	1886
Survey of C. P. R. line in Bow Pass of Rocky Mountains	Thos. Fawcett	1884

## SCHEDULE No. 27.

## LIST OF DOMINION LAND AND TOPOGRAPHICAL SURVEYORS.

These are corrected up to date of the last meeting of the Board of Examiners in August, 1891. Where the date of commission is given as 14th April, 1872, it indicates that such surveyor was a surveyor of Provincial Lands in one of the provinces of Canada before that date and became a Dominion Land Surveyor by operation of the Dominion Lands Act of 1872. In the other cases the date of commission issued by the Dominion Board of Examiners is given.

The lists have been prepared by Mr. P. B. Symes, Secretary of the Board of Examiners for Dominion Land and Topographical Surveyors from the lists of Provincial Surveyors furnished by the proper officers of the provinces, and from the records of the Dominion Board.

## LIST of Dominion Topographical Surveyors.

Name.	Date of Commission.	Name.	Date of Commission.
Aldous, Montague	May 15, 1878	King, Wm. Fred.	Nov. 21, 1876
Ashe, Wm. A.	Nov. 19, 1877	Klotz, Otto Julius.	do 19, 1877
Aylen, Chas. P.	May 20, 1878	Magrath, Chas. Alex.	Mar. 31, 1882
Dalton, John Joseph.	Nov. 17, 1881	McAree, John	May 15, 1884
Dennis, John Stoughton.	do 19, 1877	Patrick, Allen P.	Nov. 19, 1877
Deville, Edouard	do 19, 1877	Stewart, Louis B.	Feb. 23, 1887
Drummond, Thos.	April 2, 1883	Thompson, Wm. T.	Nov. 19, 1877
Dufresne, Joseph I.	do 2, 1883	White, Geo. M.	Feb. 21, 1889
Fawcett, Thos.	Nov. 19, 1877	Wilkins, Fred. W.	May 18, 1881
Galbraith, John.	do 19, 1877		

## LIST of Dominion Land Surveyors.

Name.	Date of Commission.	Name.	Date of Commission.
Abrey, Geo. B.	April 14, 1872	Battersby, Leslie Chas.	April 14, 1872
Addie, James.	do 14, 1872	Bayne, Geo. A.	do 14, 1872
Aldous, Montague.	May 15, 1878	Bazette, Edward.	Nov. 14, 1881
Allan, James.	April 14, 1872	Beasley, Geo. Hills.	Nov. 12, 1878
Ambrose, Chas.	do 14, 1872	Beatty, Walter.	April 14, 1872
Anderson, Jas.	do 14, 1872	Beatty, David	do 14, 1872
Arcand, Louis	do 14, 1872	Beaudry, J. A. U.	do 14, 1872
Armstrong, Francis W.	do 14, 1872	Belanger, Fred.	do 14, 1872
Ashe, Wm. A.	Nov. 19, 1877	Belanger, C. A.	do 14, 1872
Austin, Geo. Fred.	do 14, 1872	Belanger, P. R. A.	May 17, 1880
Austin, Wm. A.	do 14, 1872	Belanger, Jules.	April 14, 1872
Aylen, John.	May 29, 1885	Bell, Wm.	do 14, 1872
Aylen, Chas. P.	do 20, 1878	Bell, Andrew	do 14, 1872
Aylsworth, Chas. Fraser.	April 14, 1872	Belleau, Joseph A.	May 15, 1883
Aylsworth, Chas. Fraser, jun.	May 17, 1886	Bemister, Geo. Bartlett	June 11, 1878
Aylsworth, Wm. Robt.	April 14, 1872	Berlinguet, Thos.	Nov. 19, 1877
Aylsworth, John Sidney	do 14, 1872	Berryman, Edgar	April 14, 1872
Baikie, John Donald.	do 14, 1872	Bigger, Chas. Albert.	Mar. 30, 1882
Baillarge, Chas. P. F.	do 14, 1872	Biggs, J. M. M.	May 17, 1886
Baillarge, Geo. F.	do 14, 1872	Bignell, John	April 14, 1872
Ball, Jesse P.	do 14, 1872	Blaiklock, F. W.	do 14, 1872
Ball, Geo. A.	do 14, 1872	Blake, Frank Lever.	Mar. 28, 1882
Balzaretti, Antoine A.	May 15, 1883	Boisvert, F.	April 14, 1872
Barnard, Jas.	April 14, 1872	Boivin, Elzear.	Nov. 13, 1883
Barret, Wm.	do 14, 1872	Bolger, Thos. Oliver.	April 14, 1872
Barthelet, Gédéon.	do 14, 1872	Boiger, Francis.	do 14, 1872

## LIST of Dominion Land Surveyors—Continued.

Name.	Date of Commission.	Name.	Date of Commission.
Bolton, Jesse Nunne.....	April 14, 1872	Chipman, Willis.....	May 21, 1881
Bolton, Lewis.....	do 14, 1872	Cleaver, Jas.....	April 14, 1872
Booth, Chas. Ed.....	Mar. 30, 1883	Cleeve, Fred. Chas.....	do 14, 1872
Bouchette, Chas. J.....	April 14, 1872	Clements, Edgar.....	do 14, 1872
Boulton, Wm.....	do 14, 1872	Cleveland, Henry C.....	do 14, 1872
Boulton, Arthur.....	do 14, 1872	Cleveland, F. A.....	do 14, 1872
Boulton, Hen. Carew.....	do 14, 1872	Conger, John O.....	do 14, 1872
Bourgault, C. E.....	Feb. 21, 1888	Cooke, Richard P.....	do 14, 1872
Bourgeault, Armand.....	Mar. 29, 1883	Corey, Lindel.....	do 14, 1872
Bourgeois, John.....	do 30, 1882	Corey, Lindel.....	do 14, 1872
Bourgeois, Ben.....	May 13, 1886	Côte, Jos. Adelard.....	May 14, 1884
Bourget, Chas. Arthur.....	do 14, 1884	Côte, J. L.....	Mar. 21, 1890
Bourne, Robt.....	June 17, 1875	Cotton, Arthur F.....	May 11, 1880
Bowman, A. M.....	Feb. 16, 1888	Cozens, Jos.....	do 9, 1881
Boyce, Geo.....	April 14, 1872	Crawford, Wm.....	June 17, 1875
Brabazon, S. L.....	do 14, 1872	Crawford, Wm.....	April 12, 1883
Brabazon, Alfred Jas.....	May 12, 1882	Creswick, Henry.....	do 14, 1872
Brady, Jas.....	April 14, 1872	Crickmore, Arthur J.....	do 14, 1872
Bray, Edgar.....	do 14, 1872	Cromwell, Jos. M. O.....	do 14, 1872
Bray, Harry Freeman.....	Nov. 15, 1880	Crowe, Walter.....	do 14, 1872
Bray, Samuel.....	do 14, 1883	Daintry, John.....	do 14, 1872
Breen, Thos.....	April 14, 1872	Dalton, John Jos.....	do 17, 1879
Bristow, Arthur.....	do 14, 1872	Daly, Patrick.....	do 14, 1872
Brodie, Samuel.....	do 14, 1872	D'Amours, Jos. Wilfrid.....	May 10, 1882
Brown, David R.....	do 14, 1872	Daniell, John D.....	April 14, 1872
Brown, John Smith.....	Nov. 12, 1878	Davidson, Alex.....	do 14, 1872
Brown, David Benjamin.....	Feb. 13, 1890	Davidson, John.....	do 14, 1872
Browne, John O.....	April 14, 1872	Davies, Chas. Lennon.....	do 14, 1872
Brownlee, J. H.....	do 15, 1887	Deane, Michael.....	do 14, 1872
Bruce, Geo.....	do 14, 1872	Deans, W. J.....	May 13, 1886
Bruce, John S.....	do 14, 1872	DeCew, Edmund.....	April 14, 1872
Brunelle, Finlay E.....	Mar. 30, 1882	DeCew, John.....	do 14, 1872
Burchill, John.....	do 30, 1882	Dechesne, Ludger M.....	Mar. 28, 1883
Burke, Joseph W.....	April 14, 1872	DeCourval, Louis P.....	May 15, 1883
Burke, Wm.....	do 14, 1872	Demers, Jean M. A.....	do 10, 1882
Burke, Jos.....	Nov. 21, 1882	Denison, John.....	April 14, 1872
Burke, Wm. Robt.....	May 13, 1886	Dennehy, Thos. J.....	do 14, 1872
Burnet, Peter.....	April 14, 1872	Dennis, John Stoughton.....	Nov. 19, 1877
Burnet, Hugh.....	June 22, 1885	Denny, Herbert C.....	April 1, 1882
Burns, Robt. Taylor.....	April 14, 1872	Dery, Ignace Pierre.....	do 14, 1872
Burns, Thos.....	do 14, 1872	Desjardins, Cléophas.....	May 18, 1881
Burton, Richard G.....	do 14, 1872	Desmenles, Jean. Célestin.....	April 14, 1872
Burwell, H. M.....	Feb. 17, 1887	Deville, Edouard.....	Nov. 19, 1877
Butler, Matt. Jos.....	May 15, 1880	Dickson, Jas.....	April 14, 1872
Byrne, Thos.....	April 14, 1872	Dickson, H. G.....	Mar. 19, 1889
Caddy, Edward C.....	do 14, 1872	Dion, C. A.....	April 14, 1872
Caddy, Cyprian Fras.....	do 14, 1872	Dobbie, Thos. Wm.....	do 14, 1872
Caddy, John St. Vincent.....	do 14, 1872	Donnelly, Richard Holmes.....	do 14, 1872
Cadenhead, J. A.....	May 2, 1887	Dorval, Urgel.....	do 14, 1872
Caldwell, Thos.....	April 14, 1872	Doucet, Alfred J.....	do 14, 1872
Cambie, Henry John.....	do 14, 1872	Doupe, Jos.....	do 14, 1872
Campbell, David S.....	do 14, 1872	Doupe, J. L.....	Oct. 6, 1888
Carbert, Jos. Alfred.....	May 12, 1880	Drennan, Wm.....	April 14, 1872
Carre, Henry.....	April 14, 1872	Drewry, Wm. Stewart.....	Nov. 14, 1883
Carroll, Peter.....	do 14, 1872	Driscoll, Alfred.....	April 14, 1872
Carroll, Cyrus.....	do 14, 1872	Driscoll, Alfred, jun.....	Feb. 23, 1887
Casgrain, P. A. E.....	do 14, 1872	Drummond, Thos.....	June 24, 1878
Casgrain, J. P. B.....	May 18, 1881	Dubé, Octave A.....	April 14, 1872
Castle, Henry J.....	April 14, 1872	DuBerger, Cyprien Chas.....	Nov. 17, 1881
Cattanack, Angus.....	do 14, 1872	Duchesnay, Edmond Tachereau.....	do 15, 1880
Causley, John.....	May 20, 1884	Ducker, Wm. A.....	Mar. 30, 1883
Cavana, Allan Geo.....	Nov. 17, 1876	Dudderidge, Jas.....	do 31, 1882
Chadwick, Fred. J.....	April 14, 1872	Dufresne, Jos. Ibrahim.....	May 10, 1882
Chalmers, T. W.....	Nov. 7, 1888	Dufresne, L. A.....	Aug. 21, 1888
Chandler, Libert.....	April 14, 1872	Dumais, P. Horace.....	April 14, 1872
Chapman, Chas. F.....	do 14, 1872	Dumais, Paul T. C.....	Mar. 29, 1882
Cheesman, Thos.....	do 14, 1872	Dupuis, Zephirin C.....	do 29, 1882
Chevrotière, A. H. T. C. de la.....	do 14, 1872	Du Tremblay, Geop. B.....	Nov. 13, 1883

## LIST of Dominion Land Surveyors—Continued.

Name.	Date of Commission.	Name.	Date of Commission.
Du Tremblay, P. P. V.	April 14, 1872	Gore, Wm. Sinclair	April 14, 1872
Duval, Jos. Narcisse	do 14, 1872	Gore, Thos. Sinclair	do 19, 1879
Dyas, Thos. Waining	do 14, 1872	Gossage, Brooks Wright	do 14, 1872
Eaton, W. Case	do 14, 1872	Gosselin, Pierre	May 15, 1880
Edwards, Geo.	do 14, 1872	Gosselin, Louis	do 15, 1880
Edwards, Wm	do 14, 1872	Graddon, W. Urban	April 14, 1872
Edwards, John	do 14, 1872	Grain, Wm	do 14, 1872
Egan, Michael R.	do 14, 1872	Greene, Thos. Daniel	May 19, 1884
Ellis, Wm. Henry	do 14, 1872	Greene, N. H.	April 14, 1872
Ellis, Henry Disney	Mar. 30, 1882	Griffin, Patrick	do 14, 1872
Esten, Jas. Hutchinson	April 14, 1872	Grondin, Etienne	do 14, 1872
Evans, John Dunlop	do 14, 1872	Guerin, Thos.	do 14, 1872
Fafard, F. X.	May 17, 1886	Guy, Louis	do 14, 1872
Falls, Hugh	April 14, 1872	Hall, Hammond G.	do 14, 1872
Farnan, Felix	do 14, 1872	Hall, Jas	do 14, 1872
Fawcett, Thos.	Nov. 18, 1876	Hallen, Skeecker Wm	do 14, 1872
Featherston, Thos.	April 14, 1872	Hamel, A. Alfred	do 14, 1872
Fell, Zenas	do 14, 1872	Hamilton, Jas	do 14, 1872
Fessenden, Cortes	do 14, 1872	Hamilton, Robt.	do 14, 1872
Fitch, John Chas.	do 14, 1872	Hamilton, Lauchlan A.	do 17, 1879
Fitton, Chas. Edward	May 12, 1880	Hamlin, Latham Blacker	do 14, 1872
Fitzgerald, Jas. Wm	April 14, 1872	Hanning, Clement Geo.	do 14, 1872
Fitzpatrick, J. D. A.	Feb. 23, 1887	Harkin, Ed. Jos.	do 14, 1872
Fleuning, Sandford	April 14, 1872	Harley, Wm	do 14, 1872
Fletcher, Edward T.	do 14, 1872	Harris, John	do 14, 1872
Fletcher, Ormond	Nov. 12, 1884	Hart, Milner	do 14, 1872
Forbes, Chas. F. H.	April 14, 1872	Harwood, Hen. F.	do 14, 1872
Forgues, Chas. E.	Nov. 12, 1884	Haskins, Williams	do 14, 1872
Forlong, W. G.	May 17, 1886	Hawkins, Wm	do 14, 1872
Forrest, A. H. D.	April 14, 1872	Hayden, R. S. L.	do 14, 1872
Foster, Fred. Lucas	do 14, 1872	Hemming, Christopher D.	May 15, 1880
Fournier, O. B.	do 14, 1872	Henderson, E. D.	April 14, 1872
Fournier, Eric Servule	do 14, 1872	Henderson, Walter	Nov. 17, 1883
Fournier, J. B. P.	do 14, 1872	Henry, William	do 14, 1872
Fowle, Albert	do 14, 1872	Hermion, Royal Wilkerson	do 14, 1872
Fox, Edward	do 14, 1872	Hermion, Ernest Bolton	June 22, 1885
Francis, John	June 17, 1875	Hewson, Thomas Ringwood	Nov. 13, 1878
Francis, John J.	April 14, 1872	Hill, John	May 18, 1881
Franks, Cecil Bushe	Nov. 15, 1880	Hobson, Jos.	April 14, 1872
Fraser, Chas.	April 14, 1872	Holwell, W. J. S.	April 14, 1872
Frost, G. A.	do 14, 1872	Hood, Andrew	do 14, 1872
Gagnon, Antoine	do 14, 1872	Horsey, Henry Hodge	do 14, 1872
Gagnon, Gédeon	do 14, 1872	Howard, John G.	do 14, 1872
Gaitskell, W. Ewbank	do 14, 1872	Howitt, Alfred	do 14, 1872
Gaitskell Ed. Forbes	do 14, 1872	Hubbell, Ernest Wilson	May 19, 1884
Galbraith, Wm.	do 14, 1872	Hudson, Thomas B.	April 14, 1872
Galbraith, John	Nov. 19, 1877	Hughes, John	do 14, 1872
Galbraith, Wm.	May 16, 1883	Hughes, Thomas	do 14, 1872
Gallagher, Jeremiah	May 8, 1882	Hyndman, Patrick K.	do 14, 1872
Gamache, Jos.	April 14, 1872	Irwin, Henry	Feb. 17, 1887
Gamble, K.	May 13, 1886	Irwin, James N.	April 14, 1872
Garden, Jas. Ford	May 13, 1880	James, Silas	do 14, 1872
Gardner, Peter	April 14, 1872	Jephson, Richard Jermy	May 12, 1880
Gardiner, Ed.	do 14, 1872	Johnson, Hiram	April 14, 1872
Garon, Geo.	do 14, 1872	Johnson, B. G.	do 14, 1872
Garon, Louis Jos.	May 21, 1881	Johnston, John	do 14, 1872
Gauvreau, Louis Pierre	April 14, 1872	Johnson, George Bell	do 14, 1872
Gaviller, Maurice	do 14, 1872	Johnston, William O.	Mar. 29, 1883
Genest, Arthur Turcotte	Nov. 16, 1883	Johnson, Quintin	April 14, 1872
Geoffries, D. H.	April 14, 1872	Jones, Robert	do 14, 1872
Gibbons, Jas.	Feb. 12, 1891	Jones, Francis	do 14, 1872
Gibbs, Thos. F.	April 14, 1872	Jones, E. R.	do 14, 1872
Gibson, Peter Silas	do 14, 1872	Jones, John Henry	do 14, 1872
Gibson, Geo.	do 14, 1872	Jones, Thomas Henry	Nov. 12, 1878
Gibson, Jas. A.	do 14, 1872	Jones, Charles Albert	Mar. 31, 1882
Gill, Valentine	do 14, 1872	Kains, Tom	May 10, 1880
Gilliland, Thos.	do 14, 1872	Keefer, Thomas C.	April 14, 1872
Gilmour, Robt.	do 14, 1872	Kennedy, Lachlan	do 14, 1872

## LIST of Dominion Land Surveyors—Continued.

Name.	Date of Commission.	Name.	Date of Commission.
Kerr, Francis.	April 14, 1872	Miles, Chas. Falconer	April 14, 1872
Kertland, Edward Henry	do 14, 1872	Miller, Robert B.	May 11, 1880
King, Wm. Fred	Nov. 21, 1876	Miller, Fred. Fraser	do 12, 1885
Kingsford, William	April 14, 1872	Misner, Jacob	April 14, 1872
Kingston, George M.	June 17, 1875	Mitchell, Michael	do 14, 1872
Kirk, Joseph	April 14, 1872	Moffat, James	do 14, 1872
Kirk, John Albert	May 11, 1880	Molloy, John	do 14, 1872
Kirkpatrick, George B.	April 14, 1872	Montgomery	do 14, 1872
Klotz, Otto J.	Nov. 19, 1877	Moore, Robert M.	do 14, 1872
Knight, W. H.	April 14, 1872	Moore, J. H.	Feb. 13, 1890
Laberge, Elzear	Mar. 28, 1883	Morency, David Chas	April 19, 1879
Laird, James Stewart	April 14, 1872	Morin, Pierre Louis	do 14, 1872
Lalanne, Leon G.	do 14, 1872	Morris, John	do 14, 1872
Lapontjiere, Wm. H. L.	do 14, 1872	Morris, Alfred Edmund	Mar. 28, 1882
Laporte, Jeremie	do 14, 1872	Mountain, Geo. A.	May 13, 1882
Larue, E. F. X.	do 14, 1872	Mullarkey, John Patrick	do 14, 1884
LaRue, Charles, Eugene	Nov. 21, 1882	Murdock, Wm	April 14, 1872
Latimer, F. H.	do 13, 1885	Murphy, Francis	do 14, 1872
Laurie, Richard C.	April 27, 1883	McAree, John	do 14, 1872
Laurier, Carolus	do 14, 1872	McArthur, James	do 14, 1872
Lavergne, E. Elzear	do 14, 1872	McArthur, James Jos	do 17, 1879
Lavolette, Godfroi	do 14, 1872	McCallum, Duncan	do 14, 1872
Lawe, Henry	do 14, 1872	McCallum, Jas	do 14, 1872
Le Ber, Charles	do 14, 1872	McCallum, F. C.	do 14, 1872
Leclair, J. H.	do 14, 1872	McClary, Wm	do 14, 1872
Leclerc, Charles F.	May 10, 1882	McConnell, Wm	do 14, 1872
Leduc, Edward	April 14, 1872	McConnell, Edward	do 14, 1872
Lefrancois, N. V.	do 14, 1872	McConnell, B. D.	do 14, 1872
Lefrancois, P. O.	do 14, 1872	McConville, P. E.	do 14, 1872
Legendre, Jean Baptiste	do 14, 1872	McDermott, Michael	do 14, 1872
Legendre, J. B. O.	do 14, 1872	McDonald, Wm	do 14, 1872
Legendre, Hilarion	do 14, 1872	McDonald, John	do 14, 1872
Legendre, Felix	do 14, 1872	McDonald, Alexander	do 14, 1872
Legendre, Edward Hospice	do 14, 1872	McDonald, Wm. John	do 14, 1872
Lemoine, Louis D.	do 14, 1872	McDonell, John R.	do 14, 1872
Lemoine, Chas. Errol	Mar. 31, 1882	McDonnell, Robt.	April 14, 1872
Lendrum Robert Watt	May 15, 1880	McDonnell, Augustine	do 14, 1872
Leslie, Hamilton	April 14, 1872	McEvoy, Hen. Robertson	May 15, 1884
Lett, Charles Arthur	May 13, 1880	McFadden, Moses	April 14, 1872
Levesque, Pierre	April 14, 1872	McFarlane, John	do 14, 1872
Lewis, John B.	Nov. 14, 1883	McFee, Angus	do 19, 1879
Lillie, Henry	April 14, 1872	McGee, John Jos.	do 14, 1872
Lindsay, John	do 14, 1872	McGeorge, Wm. G.	do 14, 1872
Lippe, André Guillaume	do 14, 1872	McGrandle, Hugh	May 30, 1883
Lloyd, Geo. Andrew	do 14, 1872	McGuin, Sam. Owen	April 14, 1872
Lough, Matthew	do 14, 1872	McIntosh, Jas	do 14, 1872
Lowe, N. E.	do 14, 1872	McKay, Owen	Feb. 13, 1890
Lucas, Samuel B.	do 14, 1872	McKenna, John Jos	April 14, 1872
Lumsden, Hugh D.	do 14, 1872	McKenzie, John	Nov. 18, 1888
Lynn, Robert	do 14, 1872	McLaren, Peter	April 14, 1872
Lynn, John Goodenough	do 14, 1872	McLatchie, John	do 14, 1872
Macdougall, Allan H.	do 14, 1872	McLean, Jas. K.	do 1, 1882
MacLennan, Finlay Mal	do 12, 1883	MacLennan, Christopher	do 14, 1872
Macmartin, Geo. Erastus	Nov. 15, 1880	MacLennan, Roderick	do 14, 1872
Macmillan, Jas. A.	May 19, 1881	McLeod, H. Augustus F.	do 14, 1872
MacPherson, Duncan	do 14, 1884	McPhillips, Geo.	June 17, 1875
Maddock, Junius Arthur	Mar. 31, 1882	McPhillips, Robt. Chas	May 17, 1880
Magrath, Bolton	April 14, 1872	McVittie, Archibald H.	Mar. 30, 1882
Magrath, Chas. Alex.	Nov. 16, 1881	Napier, Wm. Hen. E.	April 14, 1872
Malcolm Sherman	April 14, 1872	Nash, Ephraim	do 14, 1872
Maltais, Jean	May 15, 1883	Nash, Thomas Webb	do 14, 1872
Marshall, James	April 14, 1872	Neilson, John	do 14, 1872
Martin, James W.	do 14, 1872	Nelson, John Chas	May 21, 1881
Martin, F. A.	do 14, 1872	Newman, John	April 14, 1872
Mercer, William	do 14, 1872	Newman, R. Morris	do 14, 1872
Michaud, C. E.	do 14, 1872	Niven, Alex.	do 14, 1872
Michaud, Alexis Thos	May 11, 1880	Northcote, Henry	do 14, 1872
Michaud, Jos. Louis	Mar. 29, 1882	Norton, Fred. Wm.	May 14, 1884

## LIST of Dominion Land Surveyors—Continued.

Name.	Date of Commission.	Name.	Date of Commission.
O'Beirne, Patrick	April 14, 1872	Ross, J. E.	Feb. 12, 1891
O'Brien, Sam.	do 14, 1872	Ross, Geo.	Nov. 21, 1882
O'Donnell, Hugh	Mar. 29, 1883	Roy, Geo. Peter	do 17, 1881
O'Dwyer, W. W.	April 14, 1872	Rubidge, Fred. P.	April 14, 1872
O'Dwyer, John Seabury	Nov. 16, 1882	Rubidge, T. S.	do 14, 1872
O'Flynn, Edward	April 14, 1872	Russell, Lindsay A.	do 14, 1872
Ogilvie, Wm.	do 14, 1872	Russell, Alex. Lord	do 14, 1872
Ogilvie, John Henry	May 11, 1880	Ryley, Geo. Urquhart	May 15, 1880
O'Hanley, John L. Power	April 14, 1872	Saint Cyr, A.	Feb. 17, 1887
O'Hanley, John Mitchell	Nov. 15, 1878	Saint Cyr, J. B.	do 17, 1887
O'Keefe, David C.	April 14, 1872	Sankey, Villiers	May 15, 1880
O'Mara, John	do 14, 1872	Saunders, Bryce J.	Nov. 16, 1884
O'Neil, John F.	do 14, 1872	Savage, Jos.	April 14, 1872
Ord, Lewis Redman	do 1, 1882	Scane, Thos.	do 14, 1872
Ostell, John	do 14, 1872	Seager, Edmund	do 14, 1872
Painchaud, Etienne A.	do 14, 1872	Selby, Hen. Walter	Nov. 15, 1882
Parent, Henri	do 14, 1872	Sewell, Alex.	April 14, 1872
Pariseau, Louis Stanislas	May 20, 1881	Sewell, Hen. De Quincy	May 16, 1885
Paterson, Jas. A.	April 1, 1882	Shaw, Claudius	April 14, 1872
Patrick, Allan Poyntz	Nov. 19, 1877	Shaw, Chas. A.	May 10, 1880
Patrick, Lorraine	May 18, 1881	Sheppard, H. C.	April 14, 1872
Patten, Thaddeus Jas	Mar. 29, 1883	Sheppard, Chas. G.	May 11, 1880
Pearce, Wm	May 10, 1880	Shortt, Laurence H.	April 14, 1872
Pelletier, Sam.	April 11, 1872	Shurthiff, Lemuel	do 14, 1872
Pelletier, Chas. C.	June 22, 1885	Simpson, Geo. Albert	do 14, 1872
Perceval, Wm.	April 14, 1872	Sing, Josiah Gershom	do 19, 1879
Perrault, H. Maurice	do 14, 1872	Sirois, Jos. E.	May 11, 1882
Perry, Aylsworth B.	do 14, 1872	Slattery, Jas.	April 14, 1872
Perry, Nathan Fellows	do 14, 1872	Small, Wolstan N.	May 11, 1880
Peters, Sam.	do 14, 1872	Smiley, Wm.	April 14, 1872
Peterson, Peter A.	April 14, 1872	Smith, Wm.	do 14, 1872
Peterson, Jos. S.	do 14, 1872	Smith, Henry	do 14, 1872
Pinhey, C. H.	Feb. 20, 1889	Smith, Christopher	do 14, 1872
Ponton, Archibald W.	May 18, 1881	Smith, Wm.	do 14, 1872
Poudrier, Alcide Lemay	do 21, 1881	Smith, John	do 14, 1872
Preston, Reuben	April 14, 1872	Speight, Thos.	Nov. 16, 1882
Prosser, Thos.	do 14, 1872	Sproatt, Chas.	April 14, 1872
Proudfoot, Hume Blake	Mar. 28, 1882	Sproule, Wm. J.	Nov. 15, 1882
Proulx, Jean Pierre	April 14, 1872	Spry, Wm.	April 14, 1872
Proulx, P. A.	do 14, 1872	Staunton, F. H. Lynch	do 14, 1872
Purvis, Frank	Nov. 16, 1882	Steward, John	May 11, 1880
Quinn, Thos. C.	April 14, 1872	Stewart, Geo. Alex.	April 14, 1872
Rainboth, Geo. C.	do 14, 1872	Stewart, Elihu	do 14, 1872
Rainboth, Edwd. Jos.	May 19, 1881	Stewart, Louis Beaufort	Nov. 22, 1882
Rankin, Chas.	April 14, 1872	Stewart, John D.	do 22, 1882
Rauscher, Rudolf	do 14, 1872	St. Pierre, J. E.	April 14, 1872
Reid, John	do 14, 1872	Strange, Henry	do 14, 1872
Reid, Jos. Hales	do 14, 1872	Strathern, John	do 20, 1887
Reid, John Lestock	do 14, 1872	Sullivan, John	do 14, 1872
Reifenstein, Jas. H.	May 11, 1880	Sullivan, Henry	do 14, 1872
Reilly, Wm. Robinson	Nov. 17, 1881	Swan, John	May 19, 1884
Richard, Jean Baptiste	April 14, 1872	Symmies, H. C.	April 14, 1872
Richard, Jos. François	May 13, 1882	Symmies, C. T.	Aug. 16, 1887
Richey, Josias	April 14, 1872	Taché, Eugène E.	April 14, 1872
Rielle, Jos	do 14, 1872	Talbot, Albert Chas.	May 13, 1880
Ritchie, J. F.	Jan. 7, 1889	Talbot, Pierre Cléophas	do 13, 1880
Rixtort, G. F.	April 14, 1872	Temple, Edmund Bonner	April 14, 1872
Roberts, Vaughan Maurice	May 17, 1886	Tétu, Francis A.	do 14, 1872
Robertson, Richd. G. M.	April 14, 1872	Tétu, Romuald	do 14, 1872
Robertson, Henry	do 14, 1872	Thompson, Edward Wm.	do 14, 1872
Robinson, Wm.	do 14, 1872	Thompson, Wm. T.	Nov. 19, 1877
Robinson, Orpheus	do 14, 1872	Thomson, Augustus C.	April 14, 1872
Robinson, Geo.	do 14, 1872	Tinling, —	do 14, 1872
Rogers, Richd. Birdsall	May 13, 1880	Tomkins, Wm. Graeme	do 14, 1872
Ronbough, W. R.	April 14, 1872	Towle, C. E.	do 14, 1872
Ronbough, Marshall B.	do 14, 1872	Tracey, Wm.	do 14, 1872
Roney, Jas.	do 14, 1872	Tracey, Thomas Henry	do 14, 1872
Ross, R. J.	do 14, 1872	Traynor, Isaac	Nov. 15, 1880

List of Dominion Land Surveyors—*Concluded.*

Name.	Date of Commission.	Name.	Date of Commission.
Tremblay, Thomas .....	Aug. 19, 1890	Warren, James.....	April 14, 1872
Tremblay, Jules .....	April 14, 1872	Weatherald, Thomas .....	do 14, 1872
Tremblay, Ovide .....	do 14, 1872	Webb, Edward.....	do 14, 1872
Tremblay, A. J. ....	Feb. 18, 1890	Webster, Daniel.....	do 14, 1872
Trewe, Charles Newland .....	April 14, 1872	Weekes, George .....	do 14, 1872
Tuffe, — .....	do 14, 1872	Wells, Oliver .....	do 14, 1872
Tuily, John .....	do 14, 1872	Wells, Alphonso .....	do 14, 1872
Turnbull, Thos.....	Mar. 29, 1882	Wells, Alex.....	do 14, 1872
Tyrrell, J. W.....	Feb. 16, 1887	Wells, Daniel W .....	do 14, 1872
Unwin, Chas. ....	April 14, 1872	West, James .....	do 14, 1872
Ussher, Edgeworth R. ....	do 14, 1872	Wheeler, Arthur Oliver .....	Nov. 21, 1882
VanNostrand, Arthur Jabez .....	Nov. 16, 1882	Wheelock, C. J. ....	April 14, 1872
Vansittart, John P.....	April 14, 1872	Whitcher, A. H. ....	do 14, 1872
Varnier, J. C. ....	do 14, 1872	White, George M.....	Feb. 21, 1888
Vaughan, A. H. ....	do 14, 1872	White, Joseph .....	April 14, 1872
Vaughan, Josephus W. ....	June 11, 1878	Wilkie, E. T. ....	Aug. 19, 1890
Verrault, Philippe .....	April 14, 1872	Wilkins, Fred. W.....	May 18, 1881
Verrault, Chas. A. ....	do 14, 1872	Wilkinson, Alex.....	April 14, 1872
Vicars, John R. O. ....	May 17, 1886	Williams, David .....	do 14, 1872
Vidal, Alex.....	April 14, 1872	Wilson, Robert Alex.....	June 11, 1878
Vincent, Ferdinand.....	Nov. 17, 1881	Wilson, Alfred.....	April 14, 1872
Vondenvelden, Wm .....	April 14, 1872	Wilson, Hugh.....	do 14, 1872
Wadsworth, Vernon B. ....	do 14, 1872	Winter, Henry .....	do 14, 1872
Wagner, Wm.....	do 14, 1872	Wood, Henry O.....	do 14, 1872
Walker, Alfred Paverley .....	Mar. 28, 1882	Woods, J. E. ....	Nov. 14, 1885
Wallace, Charles Hugh .....	Feb. 13, 1890	Wurtele, Arthur S. E .....	April 14, 1872
Walsh, Thos. W.....	April 14, 1872	Yarnold, William Edward .....	do 14, 1872
Ware, William .....	do 14, 1872	Young, Robert Evans.....	Nov. 22, 1882

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SECTION II.

THEORY OF THE SYSTEM OF SURVEY

OF

DOMINION LANDS

WITH

GEODETTIC TABLES AND NOTES ON THEIR USE

BY

W. F. KING, B.A., D.T.S.,

CHIEF ASTRONOMER OF THE DEPARTMENT OF THE INTERIOR.

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## SECTION II.

### THEORY OF THE SYSTEM OF SURVEY OF DOMINION LANDS.

#### CHAPTER I.—GENERAL DESCRIPTION OF THE SYSTEM.

##### *Size of the Township.*

In the Dominion Lands surveys, the township contains thirty-six sections, each approximately one mile square, together with certain allowances for roads, and measures on each side six miles plus the road allowances.

##### *Governing Lines—Initial Meridians and Base Lines.*

The lines upon which the surveys are based are certain Principal or Initial Meridians which run from the International Boundary, or 49th parallel of latitude, northward indefinitely.

Along these meridians are placed the monuments marking the section and township corners in regular order northward from the boundary, from which also the townships are numbered.

There are also certain lines, called base lines, which run westward or eastward from the Initial Meridians, starting from them at distances apart of four townships; so that, the International Boundary Line being the first base line, the second base line lies between townships 4 and 5, the third between townships 8 and 9, and so on.

These base lines are surveyed as chords of the latitude circles which pass through their intersections with the Initial Meridian. The chords are one township (six miles together with the roads) in length, and hence an angle occurs on the base line at each township corner. Along the base lines, as on the Initial Meridians, the section and township corner monuments are placed at their regular distances.

##### *Meridian Boundaries.*

The eastern and western boundaries of townships are true meridians which start from the base line and are continued on each side thereof for two townships, when they encounter the meridians drawn in the same way from the next base line, but do not meet them exactly, since, on account of the convergence and divergence of meridians, the extremity of the line drawn south from the northerly base line passes to the west of that drawn north from the southerly base line.

##### *Correction Lines.*

Hence a "jog" occurs on that township line which lies midway between the base lines. This township line is called a correction line, for on it not only the jogs due to the system itself, but also all errors in survey, whether in the chainage or in the azimuth of the lines, are allowed to fall and are so prevented from accumulating to such an extent as to deform other townships except those on whose outlines they occur.

##### *Northern and Southern Boundaries of Townships.*

The northern and southern boundaries of townships are straight lines (or great circles of the sphere) joining the corresponding points on the east and west meridian boundaries.

##### *Form and Dimensions of Townships.*

Townships are therefore quadrilaterals, having their east and west sides true meridians, and in length equal to six "sections" (that is six miles together with the roads), and having their north and south sides inclined at equal angles to these meri-

dians, while the northern boundary is somewhat shorter than the southern boundary, these lengths varying from 480 chains plus the roads on the base line to about 180 links more on the next correction line south, and about 180 links less on the next one to the north. The angles of the township differ from  $90^\circ$  by about 4' only.

These are the theoretical dimensions and form of the township. Of course, the lengths of the lines and the magnitude of the angles may differ from theory from the effect of errors in surveying, but the closings on correction lines cut out these errors and prevent them from so accumulating as to materially deform the townships.

Townships are designated by their numbers counting north from the 49th parallel with the number of the "Range" in which they lie, these ranges being counted east or west from the Initial Meridian.

#### *Different Systems of Survey.*

Since the surveys in Manitoba and the Western Territories of Canada were initiated in 1870, changes have been made from time to time in the system, as regards the number and width of the road allowances, as well as in the manner of surveying townships and sections. There have thus been three systems of survey, generally called the first, second and third systems from their order in time.

#### *Distinctions between the Systems.*

In the first and second systems the roads are one and a half chains wide, and are placed between all sections on both north and south, and east and west lines.

In the third system, which covers the entire area of Manitoba and the Western Territories, except the comparatively small area previously surveyed under the first and second systems, the roads are only one chain wide, and are placed along each alternate east and west section line, and along each north and south line.

So the townships of the first and second systems are 489 chains each way, while those of the third system are 483 chains from north to south, and 486 from east to west (these widths being, as above explained, subject to increase or decrease from divergence or convergence of meridians).

The second system differs from the first in the manner of subdividing the township into sections. In the first system, the interior lines forming the eastern boundaries of sections are drawn parallel to the eastern boundary of the township, so that all the deficiency or surplus caused by convergence of meridians, is left in the tier of quarter sections adjoining the western boundary of the township.

In the second system the eastern boundaries of sections are true meridians.

In the third system also the interior lines are true meridians.

In all three systems the northern and southern boundaries of sections are straight lines connecting points on the eastern or western boundaries, which have been established by chainage.

In all the systems the sections in a township are designated by numbers from 1 to 36, beginning with 1 at the south-east corner of the township and counting west and east alternately across the township to 36 in the north-east corner.

#### *Position of Posts with regard to the Road Allowances.*

The posts for section corners are placed on the south and west sides of the road allowance, each section post governing the corner of four sections, except on correction lines, where posts stand on the north side of the road to mark the boundaries of sections on the north side of the road. Also on the lines between different systems of survey, posts are placed on both sides of the road allowance.

But, in general, the post marks the south or west side of a road allowance, or in other words, stands at the north-east corner of a section. The quantities given in the appended tables always refer, unless otherwise stated, to the northern and eastern boundaries of sections or townships.

#### *Fourth System of Survey.*

There is a fourth system of survey, which is in force in the Canadian Pacific Railway belt in British Columbia. This system is exactly similar to the third system, as to the manner of surveying townships, and the townships are of the same dimensions; but the roads are thrown into the sections, so that every section measures 80·50 chains from north to south, and 81 from east to west, subject to deficiency or surplus from converging or diverging meridians.

Thus in the fourth system the quarter section and section posts on a base line, beginning at the easterly corner of a township and going west, stand at distances 40·50, 40·50, 40·50, 40·50, &c., while in the third system they stand at 40, 41, 40, 41, &c., the only difference being in the position of the quarter section posts. On the meridian outline of a township, in the fourth system, beginning at the southerly corner and going north, the posts stand at 40·25, 40·25, 40·25, 40·25, &c., while in the third system they stand at 41, 40, 40, 40, &c. Here there is a difference in the position of the quarter section corners, and each alternate section corner. The greatest difference in the position of any post is 75 links. The tables made for the third system, therefore, answer for the fourth also, except the tables of latitudes and longitudes, which will require correction in cases where the highest degree of accuracy is desired.

#### *Fifth System of Survey.*

This system is applied to the survey of certain townships in the lower valley of the Fraser River in British Columbia. There are no roads. Each section is 80 chains square, and the townships, of 36 sections each, are based upon the 49th parallel and an Initial Meridian called the Coast Meridian.

#### *Advantages of the Dominion Lands System of Survey.*

Some of the advantages of the Dominion Lands system of survey (especially the third system) are these:—

The boundaries of townships are straight lines (that is, great circles or surveyors' transit lines), and the interior lines also are straight for the greatest possible distance. The straightness of lines greatly facilitates the picking up of a line and its re-establishment when some of the posts have been removed or destroyed.

Directions of analogous lines in two townships or two sections are the same, or nearly so. This simplifies the original survey and facilitates resurvey. Lines are also referred to the astronomic meridian, thereby avoiding the confusions and errors arising in many of the older settled parts of the Dominion from the use of the variable magnetic meridian.

The parcels of land are, as nearly as possible, equal in area and similar in form, and permit of a simple system of numbering, by which descriptions are facilitated. The parcels of land are also square, or nearly so—the shape most suitable, on the whole, for farms.

The surveys of different townships and different parts of the country are independent, or nearly so. Errors are cut out, and not carried forward throughout the system, and the survey of an isolated tract may be made without waiting for the complete survey of all the country intervening between it and the initial point of the system, and without fear of a gore or overlap, when the intermediate district is surveyed.

#### *Tables.*

Another result from the similarity of townships to each other is the simplicity of the tables giving the azimuths and lengths of lines. Such tables are indispensable in surveys to be made on a very large scale and by a great number of surveyors.

Tables of azimuths and lengths of lines were calculated by the writer, and published as an appendix in the Annual Report of the Minister of Interior for 1879. These tables were calculated for the first and second systems of survey.

In 1881 the change in the system of survey necessitated a recalculation, so that the tables might serve for the third system of survey. The new tables were printed in the Manual of Surveys issued by direction of the Minister of Interior in 1881 (a second edition in 1883).

Since the tracts of country set aside for the first and second systems have not yet been completely surveyed, it has been deemed advisable to reprint here the tables for the first and second systems along with those of the third system for the sake of ready reference. The tables in the appended collection have been carefully checked. Table I, the general geodetic table, not referring to any particular system of survey, has been carefully recomputed, and has been extended so as to cover the whole of Canada from its most southerly point, Point Pelee, in Lake Erie, in latitude  $42^{\circ}$ , to latitude  $70^{\circ}$ .

### *Limits of the Different Systems of Survey.*

The operation of the first system of survey is restricted to the area bounded as follows, viz. :—

To the south by the International Boundary Line; to the west by the Second Meridian as far as the eighth correction line; by said correction line as far as the meridian between Ranges 28 and 29 west of the Principal Meridian; by said meridian, between Ranges 28 and 29, as far as the seventh correction line; by said correction line as far as the meridian between Ranges 7 and 8, east of Principal Meridian; by said meridian, between Ranges 7 and 8, as far as the north boundary of Township 19; by the north boundary of Township 19, in Ranges 8, 9 and 10, east of the Principal Meridian as far as the meridian between Ranges 10 and 11, east of the Principal Meridian; by said meridian, between Ranges 10 and 11, as far as the third correction line; by said correction line as far as the eastern boundary of the Province of Manitoba; by said eastern boundary as far as the International Boundary Line.

Also Townships 44, R. 21; Tp. 45, R. 21, 22, 27, 28; Tps. 46 and 47, R. 25, 26, 27 and 28; Tp. 47, R. 24, and Tp. 48, R. 24, 25, 26 and 27, west of the Second Meridian.

Townships 42 to 47 inclusive, R. 1; and Tps. 43 and 44, R. 2 and 3, west of the Third Meridian.

The second system of survey is similar in all respects to the first system, except in regard to the deficiency or surplus from converging or diverging meridians which is distributed equally between all quarter sections as in the actual system.

The operation of the second system of survey is restricted to Tps. 1 and 2, R. 1 to 8 inclusive; Tps. 19 to 30, R. 1 to 12 inclusive; and Tps. 27 to 30, R. 13 to 16 inclusive; the above ranges being all west of the Second Meridian.

The fourth system includes the belt twenty miles on each side of the Canadian Pacific Railway, west of the summit of the Rocky Mountains.

The fifth system, as already stated, applies to a few townships only in southwestern British Columbia.

The third system is applied to all Dominion lands not included in the first, second, fourth and fifth systems.

## CHAPTER II.

### CONSTRUCTION AND USE OF THE TABLES.

#### TABLE I.

#### *Length of Arcs of Meridians, Parallel, &c., in Different Latitudes.*

According to Col. A. R. Clarke, R.E., in his "Comparison of Standards of Length" (1866), the spheroid of revolution most nearly approaching the form of the earth has for its major or equatorial semi-axis 20926062 feet, and for its minor or polar semi-axis 20855121 feet.

Representing the major and minor axis by  $a$  and  $b$  respectively, we have for the compression,  $C = \frac{a-b}{a} = \frac{1}{294.98}$ , and the eccentricity  $e$  is given by the formula

$$e^2 = \frac{a^2 - b^2}{a^2} = \frac{1}{148} \text{ nearly.}$$

The unit of measure in the Dominion Lands' surveys is the Gunter's, or sixty-six feet chain. The equatorial semi-axis in chains is  $317061.545 +$

Representing by  $\phi$  the geographical latitude of a place, or the angle which its vertical line makes with the plane of the equator, we have for the radius of curvature of the meridian

$$R = \frac{a(1-e^2)}{(1-e^2 \sin^2 \phi)^{\frac{3}{2}}},$$

for the length of the normal to the meridian terminated by the minor axis

$$N = \frac{a}{(1-e^2 \sin^2 \phi)^{\frac{1}{2}}},$$

and for the radius of the parallel of latitude  $\phi$

$$P = N \cos \phi.$$

The length in chains of one second of latitude is equal to  $R \sin 1''$ ; one second of the great circle perpendicular to the meridian is equal to  $N \sin 1''$ ; and one second of longitude is equal to  $P \sin 1''$ . The logarithms of these quantities are placed in the second, third and fourth columns of Table I. They have been calculated by means of the logarithmic expansions of  $R$  and  $N$ .

Thus putting  $n$  for  $\frac{a-b}{a+b}$  we have

$$\begin{aligned} \log (R \sin 1'') &= \log a + \log \sin 1'' - M \left( n + \frac{3n^2}{2} \right) \\ &\quad - 3M \left( n \cos 2\phi - \frac{n^2}{2} \cos 4\phi \right) + \&c. \end{aligned}$$

where  $M$  is the modulus of the common system of logarithms, and powers of  $n$  higher than the second are neglected as being insensible in the eighth decimal place.

Substituting the value of  $a$  in chains, as given above, and taking

$$n = \frac{a-b}{a+b} = \frac{1}{588.96}, \text{ we get}$$

$$\log (R \sin 1'') = 0.18597916 - 0.00221218 \cos 2\phi + 0.00000188 \cos 4\phi.$$

In calculating the two last terms by logarithms five places are sufficient.

For  $N \sin 1''$  we have

$$\begin{aligned} \log (N \sin 1'') &= \frac{1}{3} \log (R \sin 1'') + \frac{2}{3} \{ \log a + \log \sin 1'' + 2Mn \} \\ &= \frac{1}{3} \log (R \sin 1'') + 0.12546215. \end{aligned}$$

For  $P \sin 1''$ ;  $\log P \sin 1'' = \log (N \sin 1'') + \log \cos \phi$ .

The calculation has been made to eight places of decimals to ensure accuracy in the seventh place. In tabulating, the eighth figure has been dropped.

The calculation of the logarithms of  $R \sin 1''$  and  $N \sin 1''$  has also been made directly from the formulæ for  $R$  and  $N$ , by the use of a subsidiary angle.

Thus, finding an angle  $\psi$  such that  $\sin \psi = e \sin \phi$  we have

$$R \sin 1'' = a(1-e^2) \sec^3 \psi \sin 1''$$

$$N \sin 1'' = a \sec \psi \sin 1''.$$

Seven figure logarithms were used, and consequently the results could not be depended upon to the seventh figure, but they have been serviceable as a check upon the series computation.

$\log N \sin 1''$ ,  $\log P \sin 1''$  and  $\log R \sin 1''$  are given in the table for every  $10'$  of latitude from  $42^\circ$  to  $70^\circ$ . Their values for intermediate latitudes can be obtained by simple interpolation. Where, however,  $\log P \sin 1''$  is required with accuracy for an intermediate latitude, it is better first to obtain  $\log N \sin 1''$  for that latitude by interpolation from the table and then to add  $\log \cos \phi$ .

Under the heading "Chains in 1''" are given the natural numbers corresponding to the logarithms of  $R \sin 1''$  and  $P \sin 1''$ . These natural numbers are useful in reducing small differences of latitude and longitude to chains by simple multiplication, being preferable in many cases to the logarithms.

The converse operation of reducing short distances north and south or east and west to seconds of latitude or longitude may be performed by multiplying by the quantities in the two columns headed "seconds in one chain." These columns contain the reciprocals of the quantities in the columns "chains in one second."

In the last two columns of the table are given the lengths of one degree of latitude and longitude in English miles.

*Radius of Curvature of a Section of the Spheroid inclined at any angle to a Meridian.*

In some operations it is necessary to find the radius of curvature of the trace on the earth's surface of a "straight" or "transit" line making a given angle with the meridian.

Representing this radius of curvature by  $S$ , and  $\theta$  being the angle with the meridian, we have the formula

$$\frac{1}{S} = \frac{\cos^2 \theta}{R} + \frac{\sin^2 \theta}{N}$$

and introducing an auxiliary angle  $X$  determined by the formula

$$\tan X = \sqrt{\frac{R \sin 1''}{N \sin 1''}} \tan \theta, \text{ we have}$$

$$S \sin 1'' = N \sin 1'' \frac{\sin^2 X}{\sin^2 \theta}$$

a formula adapted for ready calculation by means of logarithms.

*Radius of Spherical Curvature.*

The mean of the values of  $S$  when  $\theta$  is given all possible values is  $\sqrt{NR}$ . This is the radius of curvature of the surface or the radius of the sphere to the surface at a given point. Its logarithm is readily found from Table I, being the arithmetical mean of the logarithms of  $N$  and  $R$ .

TABLE II.

*Corrections to Table I for Change in Elements of Figure of Earth.*

In Table I the data used are Clarke's 1866 values, viz.:—

$$a = 20926062 \text{ feet}$$

$$n = \frac{1}{588.96}$$

and all the following tables are based on Table I, and therefore on these values. Clarke's later values (Geodesy, 1888) are,

$$a = 20926202 \text{ feet.}$$

$$n = \frac{1}{585.93}$$

If, for any purpose, it is desired to use these values, Table I can be corrected by means of Table II, which has been computed thus:

Differentiating the formulæ,

$$\log R \sin 1'' = \log a + \log \sin 1'' - M \left( n + \frac{3}{2} n^2 \right) - 3 Mn \cos 2\phi + \frac{3}{2} Mn^2 \cos 4\phi$$

$$\log N \sin 1'' = \log a + \log \sin 1'' + M \left( n - \frac{n^2}{2} \right) - Mn \cos 2\phi + \frac{1}{2} Mn^2 \cos 4\phi$$

and putting  $\frac{1}{n} = p$ , we have.

$$d(\log R \sin 1'') = M \frac{da}{a} + Mn^2 dp + 3 Mn^2 \cos 2\phi dp$$

$$d(\log N \sin 1'') = M \frac{da}{a} - Mn^2 dp + Mn^2 \cos 2\phi dp$$

$M$  being the modulus of the common system of logarithms. Terms involving the cubes and higher powers of  $n$  are insensible and may be neglected.

To change Clarke's earlier to his later values, we have

$$da = +140 \text{ (feet)}$$

$$dp = -3.03$$

$$a = 20926062 \text{ (feet)}$$

$$n = \frac{1}{588.96}$$

$$\text{and } M = 0.43429448$$

$$\text{whence } d \log (R \sin 1'') = -0.0000089 - 0.0001138 \cos 2\phi$$

$$d \log (N \sin 1'') = +0.0000670 - 0.0000379 \cos 2\phi$$

These quantities are tabulated in Table II, with the proper signs of application to  $\log R \sin 1''$  and  $\log N \sin 1''$  in Table I.

TABLE III.

*Latitudes of Base and Correction Lines and Lengths of Arcs of Meridian, Parallel, &c. for First and Second Systems of Survey.*

This table is constructed for the first and second systems of survey only. It accordingly stops at the 13th Base, Township 48, north of which there are no surveys under these systems.

Each township measuring 489 chains each way, the 1st correction line is 978 chains north of the 49th parallel.

The latitude of the 1st correction line is therefore  $49^\circ + \frac{978}{R \sin 1''}$ .

Here  $R \sin 1''$  must be taken from Table I for the middle latitude between the 1st base and the 1st correction line. For accuracy it is therefore necessary to compute an approximate difference of latitude, using an approximate value of  $R \sin 1''$ . For instance  $R \sin 1''$  may be taken from the table for latitude  $49^\circ$ .

The approximate difference of latitude being thus determined, the middle latitude is found from it (this being a sufficiently close approximation), and the final  $R \sin 1''$  is taken from Table I for that latitude. Then dividing 978 by this we have a very close approximation to the difference of latitude between the base and the correction line.

From the latitude thus obtained of the 1st correction line, that of the 2nd base line is found by a similar process, and so on in succession as far as the table extends.

The table is checked by applying the same process to a longer distance than 978 chains. For example the latitude of the 6th base can be directly determined from that of the first by using 9,780 chains instead of 978. When long distances are thus taken, a second approximation to the middle latitude may become necessary.

The columns  $\log N \sin 1''$  and  $\log R \sin 1''$  are taken from Table I by interpolation, and  $\log P \sin 1''$  is found by adding  $\log \cos \phi$  to  $\log N \sin 1''$ .



The width of a township along a base line is 489 chains. The longitude corresponding to this length measured along the parallel of latitude is given in the column headed "Longitude covered by 489 chains westing," not only for the base lines but also for the correction lines.

The longitude for 489 chains, along a base line, is the longitude covered by one range of townships. Along a correction line it does not correspond to the longitude covered by a range, since the width of a township along a correction line is greater or less than 489 chains according as the township north or south of the correction line is considered. The tabulated quantity however for correction lines can be used to calculate the narrowing or widening of sections at the correction lines.

The township width 489 chains is measured along the base line which has such azimuth that its terminal point falls in the same latitude as its initial point.

Thus every township corner along a base line has the same latitude, and the base line is a succession of chords of the latitude circle.

The difference of longitude between one township corner and the next is given by the formula

$$d\lambda = \frac{486}{P \sin 1''}$$

It is assumed here that the chord of the arc of the latitude circle is equal to the arc. That the difference between the chord and the arc is inappreciable may be shown thus:

By spherical trigonometry

$$\sin \frac{\text{chord}}{2N} = \sin \frac{d\lambda}{2} \cos \phi$$

$$\begin{aligned} \text{whence chord} &\cong N \cos \phi d\lambda - N \cos \phi \sin^2 \phi \frac{d\lambda^3}{24} \\ &= \text{arc} - \text{arc} \times \frac{d\lambda^2}{24} \sin^2 \phi \end{aligned}$$

So that the difference between the chord and the arc is equal to

$$\text{arc} \times \frac{d\lambda^2}{24} \sin^2 \phi$$

$d\lambda$  being in a circular measure.

For a chord of 489 chains this amounts to less than one-hundredth of a link.

The chord always lies north of the arc. The distance between them is greatest at their middle points, amounting there to about 10 links. Hence, at the International boundary line, which is the first base line, since the actual territorial boundary is the curve, and the base line a series of chords, the road allowance which lies along the north side of this base is increased in width by 10 links at the middle of the chords.

The non-coincidence of the chord and arc also has the effect of increasing and decreasing the widths of roads on correction lines. This will be referred to again.

In the first column of Table III are given, for convenience, the numbers of the townships corresponding to the several base and correction lines. Thus the sixth base is the northern boundary of Township 20, and so on.

TABLE IV.

*Latitudes of Base and Correction Lines, &c., for 3rd and 4th Systems of Survey.*

This is exactly similar to Table III, except that it is made for the third system of survey, where the widths of townships are 486 instead of 489 chains, and their depths, in a north and south direction, 483 instead of 489 chains.

This table also applies, without change, to the fourth system (British Columbia).

In this table, as well as in Table III, the latitudes given are those of the line of posts on the south side of the road allowance. To get the latitude of the posts north

of the road on correction lines, the latitude of the correction line, as given in the table, must be corrected by adding the equivalent in latitude of the width of the road, *i.e.*, one chain and a-half for the first and second systems (Table III), and one chain for the third system (Table IV).

TABLE V.

*Chord Azimuths, &c., for Base Lines, First and Second Systems of Survey.*

The extremities of the township chord, as above stated, are in the same latitude. Hence the chord is equally inclined to the meridians passing through its terminal points, and its azimuth, east or west of north, is equal to the complement of half the change in azimuth, that is, of half the "convergence of meridians."

Let  $dA$  represent the change in azimuth or convergence of meridians,  $d\lambda$  the difference of longitude, and  $\phi$  the latitude.

Then, by spherical trigonometry,

$$\tan \frac{1}{2} dA = \tan \frac{1}{2} d\lambda \sin \phi,$$

whence, by expansion of the tangents in terms of the arcs,

$$dA = d\lambda \sin \phi + \frac{d\lambda^3}{12} \sin \phi \cos^2 \phi$$

or, if  $dA$  and  $d\lambda$  be expressed in seconds,

$$dA = d\lambda \sin \phi + \frac{d\lambda^3}{12} \sin \phi \cos^2 \phi \sin^2 1''.$$

The second term is inappreciable, amounting in latitude  $51^\circ$  to less than one ten-thousandth of a second.

$$\therefore dA = d\lambda \sin \phi.$$

The convergence or "deflection" ( $dA$ ), given in Table V, is thus calculated from the difference of longitude ( $d\lambda$ ) in Table III.

The "chord azimuth" is the complement of half the deflection.

The chord azimuth and the deflection are given in the table in degrees, minutes and seconds, as well as in decimals of a degree, for sexagesimally and decimally divided instruments respectively.

In the survey of a base line, the surveyor, when he arrives at a township corner, deflects his line to the north through an angle equal to the "deflection," and thus establishes in azimuth the chord across the next range of townships.

This deflection angle may be turned with the instrument, but more readily by the use of the "deflection offsets" in the table. The tabulated offset is the linear distance in inches between one of the chords and the prolongation of the other, at one chain from the township corner.

Their distance apart at any point is found by multiplying the tabulated offset by the distance, expressed in chains, of the point from the township corner.

For example, if the instrument is standing on the prolongation of the first chord at 5 chains past the corner, and the back picket be 15 chains on the other side of, that is, behind the corner, then the instrument must be moved north five times, and the back picket south fifteen times, the "deflection offset for one chain." The line of the instrument and picket is now in the correct bearing for the prolongation of the base line.

The angle is thus turned as accurately as a straight line can be produced with the instrument, and much more accurately than the angle can be measured with the graduated arc, while the setting of the instrument at the corner (which may be in low ground, unsuitable for accurate line production) is rendered unnecessary.

"Longitude covered by one range" in the seventh column is merely the longitude in the seventh column of Table III, reduced to time by dividing by 15. This gives the number of seconds which a watch will gain or lose on local time in being carried across a range. The gain or loss in travelling over any other distance along is proportional to the distance. The column is added for astronomical purposes, especially the determination of azimuth by observation of Polaris at any hour angle.

This Table V applies to the first and second systems of survey.

TABLE VI.

*Chord Azimuths, &c., for Base Lines, 3rd and 4th Systems of Survey.*

This table is exactly similar to Table V, but is made for the third system of survey.

The calculation is made by the same formulæ, changing only the width of the range, which is 486, instead of 489 chains, and using the latitudes of the base lines from Table IV, instead of those from Table III.

$$d\lambda = \frac{486}{P \sin 1''} \quad dA = d\lambda \sin \phi.$$

This table also applies to the fourth system.

TABLE VII.

*Chord Azimuths, Jogs, &c., for Correction Lines, 1st and 2nd Systems of Survey.*

This table gives quantities for correction lines similar to those given in Table III for base lines. This table applies to the first and second systems of survey.

The correction lines are posted on both sides of the road. The chord azimuths and deflections are given for the south side of the road, which is that side for which the latitudes of correction lines are given in Table III.

The calculation of the chord azimuth for correction lines is somewhat different from that for base lines.

For the base lines we have

$$d\lambda = \frac{489}{P \sin 1''}$$

$$\text{deflection} = d\lambda \sin \phi.$$

For the correction lines, one range is not 489 chains, but the distance between meridians which include 489 chains on the nearest base line.

Hence in the formulæ—

$$d\lambda = \frac{489}{P \sin 1''}$$

and deflection =  $d\lambda \sin \phi = \frac{489}{P \sin 1''} \sin \phi$ , we must take  $P \sin 1''$  for the next base

line south of the correction line, if the difference of longitude and the deflection for the south side of the correction line road are required; while for the north side of that road we must take  $P \sin 1''$  for the next base line north.  $\phi$ , of course, is the latitude of the correction line itself.

The length of one range on the correction line is  $d\lambda \times P \sin 1''$

If, then,  $P_1$  and  $P_2$  represent the radius of parallel for the base lines next north and south, respectively,  $P$  that for the correction line itself

$$d\lambda_1 = \frac{489}{P_1 \sin 1''}$$

$$d\lambda_2 = \frac{489}{P_2 \sin 1''}$$

and we have for the length of one range on the correction line

$$\text{North side} = \frac{489}{P_1 \sin 1''} \times P \sin 1''$$

$$\text{South side} = \frac{489}{P_2 \sin 1''} \times P \sin 1''$$

The values of these quantities are tabulated in the seventh and eighth columns of Table VII.

For extreme accuracy  $P \sin 1''$  for the north side of the road should be taken out for a latitude greater by 1.50 chains, or  $0''\cdot98$  greater than that tabulated in Table III; but the difference in the result would be almost inappreciable.

The difference of length of the township lines north and south of the correction line road gives the overlap or jog.

The jog for one range is given in the ninth column of the table. As this jog occurs in each range of townships, its value at any range is the product of the jog for one range by the number of ranges.

The excess of the length of the north side over, or the defect of the south side from 489 chains, is the linear divergence or convergence of the township lines. Since there are twelve half sections in a township side, the convergence or divergence for one-half section is one-twelfth of the convergence or divergence for the township, or one-twenty-fourth of the jog, the excess of the north side and the defect of the south side being very nearly, though not quite, equal.

This convergence or divergence for one half section is entered in the tenth column of the table. It is used in the second system, where the surplus or deficiency caused by the convergence of meridians is divided equally among all the quarter-sections. Hence, in surveying a correction line under the second system, the width of each quarter section (exclusive of the roads) is forty chains *plus* or *minus* this tabulated quantity. The surplus or deficiency on the township line midway between the base and the correction line is half of that on the correction line.

In the first system the whole of the surplus or deficiency is thrown into the western tier of quarter sections. This surplus or deficiency is the difference between 489 chains and the quantities in the seventh and eighth columns of Table VII. For example, on the north side of the road on the 1st correction line the surplus is 1.75 chains, and the westerly quarter section of the township is therefore 41.75, all the others being 40 chains.

It is to be observed that in all cases the whole divergence or convergence is applied to the section itself, and that the road allowance retains its width of 1 chain or  $1\frac{1}{2}$  chains, with the exception of the roads on correction lines, which are subject to a widening or narrowing as hereinafter explained.

TABLE VIII.

*Chord Azimuths, Jogs, &c., for Correction Lines, Third and Fourth Systems of Survey.*

This table gives for the third and fourth systems the same quantities as are given in Table VII for the first and second systems.

The surplus or deficiency is in all cases divided equally among all the quarter sections.

TABLE IX.

*Latitudes, and Widths in Chains, of Northern Boundaries of Sections in First and Second Systems of Survey.*

This table gives the latitudes in degrees and decimals of a degree for the northern boundaries of all sections in the first and second systems.

The sections numbered in the second column are those adjacent to the eastern boundary of the township. The latitudes of interior sections lying west of these are the same. Thus the northern boundaries of sections 14, 15, 16, 17 and 18 have the same latitude as the north boundary of 13, and so for the other east and west tiers of sections.

These latitudes are computed by converting the latitudes given in Table III into degrees and decimals, and interpolating for the intermediate lines.

The logarithmic secant and tangent of the latitude are given in the table for use in calculation of azimuth observations.

In the last column of the table are given the widths of the north boundaries of the quarter sections (in the second system of survey). These are calculated for the correction lines in the manner explained under Table VII, and for the intermediate lines by interpolation.

TABLE X.

*Latitudes and Widths in Chains of Northern Boundaries of Sections in Third and Fourth Systems of Survey.*

This table gives for the third system the same quantities as are given in Table IX for the first and second.

The table may also be applied to the fourth system by correcting the latitudes of the alternate section lines, viz., the north boundaries of sections 1, 13 and 25 in each township, by subtracting therefrom  $0^{\circ} \cdot 0001$ , the equivalent in arc of 50 links. The change in the logarithmic secant and tangent is inappreciable, as these logarithms are given to only five places of decimals. The widths of quarter sections in the last column must be increased by 50 links.

TABLE XI.

*To Reduce Chains to Decimals of a Township Side.*

This is a short table giving the equivalents of chained distances in terms of a township side, for township sides of the first and second systems (489 chains), for east and west lines of the third and fourth systems (486 chains) and for north and south lines of these last systems (483 chains). The table is useful in calculating the difference in azimuth of an east or west line between a township corner and any other point upon it, and for similar purposes.

TABLE XII.

*Correction to Widths of Roads on Correction Lines on Account of Curvature.*

The township corners on the north and south sides respectively of the road on correction lines lie on two circles of latitude, which are one and a-half chains apart in the first and second systems, and one chain apart in the third system. The township sides are chords of these circles, and therefore lie north of them.

Hence, since on account of the jog the township corners north and south of the road are not opposite to one another, the township side south of the road will pass the township corner north of the road at a distance less than the theoretical one chain; while the township side north of the road will pass the corner south of the road at a distance greater than one chain.

The correction to the width of the road on this account for various lengths of the jog, is given in the table. The width of the road at points other than the township corners, varies in proportion to the distance.

This table may be used where it is required to establish the posts on one side of a correction line, by offsets from the other side.

The calculation of the differences of width is made as described below for Table XIII, the difference being merely the offset from the township chord to the parallel.

In Table XII are also given corrections to the chord azimuths and deflection offsets on correction lines (given in Table VII), when the north side of the road allowance is surveyed instead of the south. The correction is small and of little importance in surveying, except in the case of the second system of survey, where the correction lines were surveyed instead of the base lines, as the basis of the townships, across four ranges before closing, and the azimuth was consequently of importance.

In the first system the correction line is surveyed across two ranges as a trial line, and afterwards corrected to the true line; and in the third system the correction line is only surveyed across one range at a time, and as a trial line. In these systems, therefore, the azimuth used in the survey is of little importance.

TABLE XIII.

*Difference of Latitude between Township Corners and Section and Quarter Section Corners.*

This table is used when it is required to find accurately the latitude of any point within a township, as when it is desired by connecting with an astronomically determined latitude point to find the error of the survey lines.

If  $A$  be the initial azimuth of the township chord,  $A^1$  its azimuth at a distance  $x$  from the corner of the township,  $\phi$  the latitude of the township corner,  $\phi^1$  the latitude of a point on the chord distant  $x$  from the corner.

Then by spherical trigonometry

$$\frac{\cos \phi^1}{\cos \phi} = \frac{\sin A}{\sin A^1}$$

whence

$$\tan \frac{\phi^1 - \phi}{2} \tan \frac{\phi^1 + \phi}{2} = \tan \frac{A^1 - A}{2} \cot \frac{A^1 + A}{2}$$

putting

$$\begin{aligned} A &= \frac{1}{2}(\pi - \theta) \\ A^1 &= \frac{1}{2}(\pi - \theta^1) \end{aligned}$$

where  $\theta$  and  $\theta^1$  are expressed in circular measure, and are very small, so that their cubes may be neglected. Also  $\phi^1 - \phi$  is very small, and  $\phi^1 + \phi$  is very nearly equal to  $2\phi$ .

$$\text{Then } \phi^1 - \phi = \frac{\theta - \theta^1}{2} \frac{\theta + \theta^1}{4} \cot \phi = \frac{\theta^2 - \theta_1^2}{8} \cot \phi$$

and  $\theta =$  convergence of meridians for one township chord ;

$$\therefore \theta = \frac{c}{N} \tan \phi, \text{ } c \text{ being the length of the chord,}$$

$$\text{and } \frac{\theta_1}{\theta} = \frac{c - 2x}{c}, \text{ whence } \theta^2 - \theta_1^2 = \frac{4(c - x)x}{c^2} \theta^2$$

Therefore

$$\phi^1 - \phi = \frac{(c - x)x}{2N^2} \tan \phi$$

or difference of latitude in chains =

$$R(\phi^1 - \phi) = \frac{R}{2N^2} x(c - x) \tan \phi$$

The computation has been made for the first system of survey, but may be used for any system without sensible error.

### CHAPTER III.

#### PROBLEMS CONNECTED WITH THE SYSTEM OF SURVEY.

##### *Correction for Height above Sea Level.*

The tables have been calculated from the dimensions of the earth surface at sea level.

The township sides are actually measured on surfaces elevated above sea level, and therefore the differences of latitude and longitude calculated from the tables are greater than those actually covered by the township sides.

Any measured distance may be reduced to sea level by subtracting the correction  $\frac{h}{r} x$ ,  $x$  being the distance,  $h$  the elevation above sea level, and  $r$  the radius of curvature of the line under consideration.

In general  $N$  (see Table I) can be used instead of  $r$ .

Base lines when the system of survey is exactly followed are established by direct measurement from the 49th parallel, northward along an initial meridian.

Hence the latitude of a base line should be less than that given in table by  $(\psi - 49^\circ) \frac{h}{R}$  where  $h$  is the mean elevation of the initial meridian between the 49th parallel and the base under consideration.

Many base lines, however, have been established, not by this direct measurement, but by the survey of township meridians exterior from other bases. If the actual latitudes of these base lines are required, account must be taken of the elevations of all the north and south lines through which the connection with the 49th parallel has been made. It is obvious, however, that the average elevation of the country above the sea will give a sufficiently accurate result, since the small errors due to difference of elevation are masked by errors of survey.

On the base lines the effect of elevation above sea level is to decrease the difference of longitude covered by one range, and this must be allowed for in establishing an initial meridian by means of chainage along a base line, or in estimating the accuracy of measurement of a base line by its closing on an initial meridian, since the initial meridians, except the first, have been placed on even degrees of longitude (every fourth degree).

The correction for elevation above sea level is, in latitude  $51^\circ$ , 0.00382 chains for one mile distance at an elevation of 1,000 feet, and varies directly as the elevation and distance. It changes somewhat with the latitude, but slightly, and the correction in any particular case may be taken as the same as that for latitude  $51^\circ$ . If extreme accuracy be required, the formula given above,  $\frac{h}{r} x$  may be used.

The error in the length of township chords of course involves an error in deflection angles and azimuths, but this is too small to be appreciable.

#### LATITUDES AND LONGITUDES OF POINTS IN THE SYSTEM.

By "points in the system" I mean the corners of specified sections, or points referred to them by connecting lines. In the latter case the lines, if short, may be reduced to latitude and longitude by means of "latitude and departure" from a traverse table, and by using Table XVIII.

Thus, the problem is reduced to the determination of the latitude and longitude of any section corner.

#### *Latitude.*

The latitude of the section corner can be at once found by interpolation from Table III or Table IV, according as the section is in the first, second or third system.

It must be remembered that in the first and second systems, the section posts on a meridian are 81.50 chains apart, and that in the third system they are alternately 81 and 80 chains.

The latitude can also be taken directly from Table IX or X to the fourth decimal place of degrees.

Since the section corners are presumed to be at distances of even sections from the north and south boundaries of the township, being established by survey from those boundaries, the latitude found as above must, when the section corner is not on the meridian outline of the township, be increased by the correction given by Table XIII.

In the first system the sections are not measured on meridians from the north or south boundary of the township, but on lines parallel to the eastern boundary of

the township. Hence theoretically the difference of latitude between the given corner and the township outline should be decreased in the ratio of cosine azimuth of the section line to unity; but this correction is practically insignificant. The correction for sea level may also be applied.

*Longitude, Third System,*

In the second and third systems the section lines are true meridians from the base line north and south two townships. Hence the longitude of a section corner is the same as that of the corresponding corner on the base line from which the township has been surveyed.

Then if  $d\lambda$  be the longitude covered by one range on that base line, and if  $n$  be the number of the range in which the section lies,  $m$  the number of sections lying between the given section and the eastern boundary of the township, the number of ranges which intervene between the initial meridian and the eastern boundary of the given section is  $n - 1 + \frac{m}{6}$ , and the difference in longitude between it and the

initial meridian is  $\left(n - 1 + \frac{m}{6}\right)d\lambda$ . This added to the longitude of the initial meridian gives the longitude of the eastern boundary of the section.

The longitude of the Principal or First Meridian is  $97^\circ 27' 08''.4$ ,

The longitudes of the Second, Third, Fourth, &c., Meridians are  $102^\circ, 106^\circ, 110^\circ, 114^\circ, \&c.$ , subject to certain errors of survey, which cannot be discussed at present.

The difference of longitude should be corrected for height above sea if precision is required. This can be done by multiplying it by  $\left(1 - \frac{h}{N}\right)$

For example:

The N.E. corner of Sec. 16, Tp. 23, R. 17, W. of the Fourth Meridian (third system of survey). Here  $n=17, m=3$ , and the township is surveyed from the 7th base, for which we find from Table IV  $d\lambda = 8' 22''\cdot411 = 502''\cdot411$ . Therefore longitude of the section line

$$= 110^\circ + (502''\cdot411 \times 16\frac{3}{8}) = 112^\circ 18' 09''\cdot78.$$

The corner is three sections, *i.e.*, 242 chains north of the 5th correction line, and its latitude is therefore (from Table IV)

$$50^\circ 34' 20''\cdot77 + 10' 23''\cdot88 \times \frac{242}{966} = 50^\circ 34' 20''\cdot77 + 157''\cdot55 = 50^\circ 36' 58\cdot32''.$$

*Longitude, First System.*

In the first system the procedure for the longitude is a little different. The section lines are drawn parallel to the east side of the township, so that the difference of longitude between the section line and the east boundary of the township is not the same as on the base line, but is equal to the actual distance from the boundary of the township divided by  $P \sin 1''$ ,  $P \sin''$  being taken from Table I for the actual latitude of the section post. Thus using the same notation as before

Diff. of longitude from initial meridian  $= (n - 1) d\lambda + \frac{81\cdot50 \times m}{P \sin 1''}$ ,  $d\lambda$  being taken from Table III (1st system) for the governing base line, or it may be calculated by the equivalent formula

$$\text{diff. of longitude} = \left(n - 1 + \frac{m}{6}\right) d\lambda + \frac{Q}{P \sin 1''}$$

where  $Q = 2 m (40 - w)$ ,  $w$  being the width of quarter sections as taken from the last column of Table IX.



*Longitude, Second and Fourth Systems.*

Longitudes in the 2nd system are calculated in the same way as those in the 3rd, taking  $d\lambda$  from Table III instead of Table IV. In the 4th system the process is the same, as for the 3rd system, and the same table is used—Table IV.

*Effect of Errors of Survey.*

An error in the latitude of the base line, or an error in the longitude of the initial meridian, of course increases or decreases by the amount of the error the latitude or longitude of the section corner. Similarly a chainage error on the base line affects the longitude directly. In the computation all known errors of this kind must be allowed for.

An error in the latitude of the base line also affects the longitude covered by 486 chains (or 489) chains measured along the base line, since 486 chains covers less longitude if the base line be moved north. The manner in which the effect of an error of this kind may be estimated will be best shown by an example.

Suppose the 6th base line (3rd system) to be placed 10 chains too far north, we find from Table IV

$$\begin{aligned} d\lambda, \text{ for 6th base line} &= 498\cdot662 \\ d\lambda \text{ for 6th correction line} &= 500\cdot527 \end{aligned}$$

The 6th correction line is two townships, *i.e.*, 966 chains north of the 6th base line, and the difference in  $d\lambda$  for these lines is  $1''\cdot865$ . Therefore,  $d\lambda$  for the actual position of the 6th base line, 10 chains north of its theoretical position, is

$$498''\cdot662 + 1''\cdot865 \times \frac{10}{966} = 498''\cdot681$$

The correction, in the case supposed, to  $d\lambda$  for one range is  $0''\cdot019$ , and in 29 ranges, (about the distance apart of two initial meridians) it amounts to  $0''\cdot019 \times 29 = 0''\cdot55$ , or 54 links.

GIVEN THE LATITUDE AND LONGITUDE OF A POINT, TO FIND ITS POSITION WITH REGARD TO THE SURVEY SYSTEM, *i.e.*, to find in what section it is, and the township and range, and its distance from the N. E. corner of the section.

*Second, Third and Fourth Systems.*

This is the converse of the preceding problem. The first step is to find, in the manner explained above, the latitude of the section line next north of the given latitude. The difference between these two latitudes is reduced to chains by Table I. This gives the distance ( $x$ ) in chains to be measured from the point to find the north boundary of the section.

The number of sections by which the section line is north of the southern boundary of the township in which it lies is to be noted. Call this number  $a$ , and the number of the township  $t$ .

We also know the number of the nearest base line, *i.e.* the base line on which depends the survey of township  $t$ . From table IV we take out  $d\lambda$  for this base line.

From the given longitude of the point subtract the longitude of the initial meridian. Divide the difference by  $d\lambda$ , with quotient  $n$  and remainder  $r$ . Divide  $r$  by  $\frac{d\lambda}{6}$  with quotient  $b$  and remainder  $s$ .  $S$  reduced from seconds of longitude to chains by Table I, with argument, latitude of the given point, gives the distance ( $y$ ) to be measured east from the point to find the eastern line of the section.

We now know that the given point is  $x$  chains south and  $y$  chains west of the north-east angle of some section in township No.  $t$  and range No.  $(n + 1)$  west of the initial meridian; and also that the northern boundary of the section is  $a$  sections north of the southern boundary of the township, and that the eastern boundary is  $b$  sections west of the eastern boundary of the township.

It is now easy by means of a skeleton township diagram to determine the numbers of the section; *e.g.* if  $a = 5$ ,  $b = 3$ , the section is 28.

Without a township diagram, the section number can be found from the formula

$$\text{No. of section} = \frac{1}{2} \left\{ 12a - 5 \pm (2b - 5) \right\}$$

The upper sign being taken when  $a$  is odd, and the lower when  $a$  is even. These two rules are comprised in the general formula

$$\text{No. of section} = \frac{1}{2} \left\{ (12a - 5) - (-1)^a (2b - 5) \right\}$$

The calculation for the second system is the same as above, using the proper tables for that system. It is also the same for the fourth system.

In this manner have been computed the positions of a great many section corners in British Columbia (fourth system of survey) with reference to points along the line of the Canadian Pacific Railway, the latitudes and longitudes of these points having been first determined by a traverse survey.

#### *First System of Survey.*

The procedure in this system is the same as above, except that the total difference of longitude from the eastern boundary of the township (instead of the nearest section line) must be reduced to chains, and from the chain distance must be subtracted the nearest multiple of 81·50.

#### FRACTIONAL TOWNSHIP OR RANGE BETWEEN PARTS OF THE COUNTRY SURVEYED UNDER DIFFERENT SYSTEMS OF SURVEY.

Townships of the first and second systems adjoin each other without overlap or deficiency, since the townships in these two systems are of the same dimensions. Similarly of the third and fourth systems.

But where townships surveyed under the latter systems abut on townships of the first or second system, a fractional township or range occurs. It is only necessary to consider the case of the third system abutting on the first or second, since the fourth does not occur in juxtaposition with these latter systems.

#### *Fractional Township.*

Townships of the third system are 6 chains shorter, measured north and south than the others. The townships in both cases are measured north from the 49th parallel, and hence the third system falls short of the other by 6 chains for each township, and the northern boundary of a township of the third system is therefore south of the northern boundary of the same township of the first or second system by 6 chains multiplied by the number of the township.

Thus the 5th correction line (Tp. 18), as surveyed under the third system, is  $6 \times 18 = 108$  chains south of its position under the second system. For twelve ranges west of the Second Meridian, the territory from the 5th correction line northward to the 8th correction line was surveyed under the second system, while the country south of the former line has been surveyed under the third system. There is therefore an additional township (measuring 108 chains from north to south) lying between Township 18 of the third system and Township 19 of the second system. (This fractional township is called Township 19A, and is subdivided according to the third system. See Manual of Surveys.)

#### *Fractional Range.*

Townships of the third system are 3 chains narrower (measured east and west along the base line) than those of the first and second systems. The overlap of the latter systems over the third, however, is not equal to 3 chains multiplied by the number of ranges, but exceeds this, since the widths are laid off along base lines which lie in different latitudes, and hence the convergence of meridians comes into play.

The readiest method of calculating this overlap is as follows:—

Let  $d\lambda_1$  be the longitude covered by one range of the base line in the first or second system as found from Table III.

Let  $d\lambda$  be the same quantity for the base line of the third system (from Table IV).

Then  $d\lambda_1 - d\lambda$  is the difference of the longitude between the exterior meridians of range one, as surveyed under the two systems.

The difference of longitude at the eastern boundary of the  $n$ th range will be

$$(n - 1) (d\lambda_1 - d\lambda)$$

This reduced to chains is

$$(n - 1) (d\lambda_1 - d\lambda) P \sin 1''$$

$P \sin 1''$  being taken from the proper table for the latitude of the base or section line on which the overlap is required.

*Example.*

The meridian outline between Ranges 12 and 13, west of the 2nd Meridian, from Township 19 to Township 22, inclusive, is the western boundary of a tract of country surveyed under the second system of survey. Required the width of Range 13, as surveyed under the third system, on the northern boundaries of Townships 19, 20, 21 and 22.

The base line on which this meridian outline is based, is the 6th base line, or northern boundary of Township 20.

From Table III,  $d\lambda_1 = 8' 21''\cdot972$

do IV,  $d\lambda = 8' 18''\cdot662$

$$\text{whence } d\lambda_1 - d\lambda = 3''\cdot310$$

and at the eastern boundary of the thirteenth range, the difference of longitude is  $3\cdot310 \times 12 = 39''\cdot72$ .

We have then for the northern boundary of Township 19 (third system):

Log.  $39\cdot72 = 1\cdot5990092$

Table IV, Log.  $P \sin 1'' = 9\cdot9896352$

1\cdot5886444

Nat. number = 38\cdot783

For the northern boundary of Township 20:

Log.  $39\cdot72 = 1\cdot5990092$

Log.  $P \sin 1'' = 9\cdot9888297$

1\cdot5878389

Nat. number = 38\cdot711

For the northern boundary of Township 21:

Log.  $39\cdot72 = 1\cdot5990092$

Log.  $P \sin 1'' = 9\cdot9880192$

1\cdot5870284

Nat. number = 38\cdot639

For the northern boundary of Township 22:

Log.  $39\cdot72 = 1\cdot5990092$

Log.  $P \sin 1'' = 9\cdot9872086$

1\cdot5862178

Nat. number = 38\cdot567

Hence the north boundaries of Townships 19, 20, 21 and 22, surveyed under the third system in Range 13, have their eastern tiers of section narrowed by 38\cdot783, 38\cdot711, 38\cdot639 and 38\cdot567, respectively.

Now, the full widths of these sections when regular is got from Table X, by multiplying the "width of quarter section" by 2.

Thus, the width of the eastern tier of sections in Range 13 are:

For Township 19,	80.15	—	38.78	=	41.37	chains.	
do	20,	80	—	38.71	=	41.29	do
do	21,	79.85	—	38.64	=	41.21	do
do	22,	79.70	—	38.57	=	41.13	do

These widths must be increased by one chain for road, if the widths from post to post are required.

For the township lines to the north of the correction line, viz.: 23, 24, 25 and 26, the width of Range 13 may be found in the same way, using the  $d\lambda$  from Tables III and IV for the seventh base instead of the sixth.

If the width of the section on the north side of the 6th correction line is required, that is, the south boundary of Township 23, it must be remembered that here, on account of the correction line being thrown south, from the less depth of the townships of the new system, the southern boundary of Township 23 of the third system, which is brought from the 7th base, intersects the second system south of the correction line, *i. e.* on a line brought from the 6th base.

Therefore we have

For the second system, Table III,	$d\lambda_1$	6th base	=	8' 21" .972
third do do IV,	$d\lambda$	7th do	=	8' 22" .411

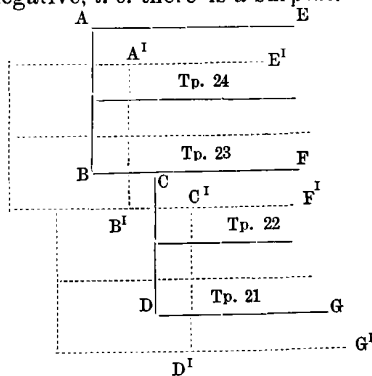
$$\therefore d\lambda_1 - d\lambda = \frac{\quad}{\quad} .439$$

$$\text{and for twelve ranges 12 } (d\lambda_1 - d\lambda) = \frac{\quad}{\quad} 5'' .268$$

With the difference of longitude  $5'' .268$  and the  $P \sin 1''$  for the 6th correction line, third system, we get the required jog.

It will be noticed that the overplus is negative, *i. e.* there is a surplus.

The heavy lines represent the second system, the dotted ones the third. The line  $A^1B^1$  is the one which we have just considered; it falls to the east of AB, but to the west of CD.



The lines in the figure are all township lines. Thus it will be seen that there is a small piece of land,  $B^1C$ , which is in fact a township of itself. Its designation would be Township 23 A, Range 12.

*Second Example.*

Required the depth, north and south, of Township 27, Range 19, west of the Principal Meridian.

The north boundary of Township 26 is the northern boundary of a tract of country surveyed under the first system.

Since each township of the third system is 6 chains shorter north and south than one of the first system, the northern boundary of Township 26 in the third system is  $6 \times 26 = 156$  chains south of the same boundary under the first system.

Therefore the distance from the north boundary of Township 26, first system, to the north-east angle of Section 12, Township 27, third system, is  $161 - 156 = 5$  chains.

Since 1.50 chains must be allowed for road 3.50 chains is the available width of the strip of land.

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 FRACTIONAL SECTIONS ADJOINING AN INITIAL MERIDIAN.
 

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The longitude of the Principal Meridian is	97° 27' 08".4
That of the 2nd Initial Meridian	102° 00' 00"
“ 3rd “	106° 00' 00"
“ 4th “	110° 00' 00"
“ 5th “	114° 00' 00"
“ 6th “	118° 00' 00"
“ 7th “	122° 00' 00"

These longitudes are subject to correction for errors of survey, of which it is intended to treat in a future paper.

For the present purpose we shall use the above longitudes.

The difference of longitude between the first meridian and the second is  $4^{\circ} 32' 51''.6 = 16371''.6$ , and between the others successively  $4^{\circ} = 14400''$ .

The width of the last range in seconds on a given base line is got by subtracting from  $16371''.6$  or  $14400$  the nearest integral multiple of  $d\lambda$  as given by Table III or IV (according to which system of survey is used). Thus for the width of the last range on the 5th base line between the 2nd and 3rd Initial Meridians (third system of survey) we have from Table IV  $d\lambda = 494''.988$  and we find, by dividing  $14400$  by  $494.988$ , a quotient  $29$  with remainder  $45.348$ . That is, the width of Range 30 on the 5th base, or the difference of longitude between the 3rd Initial Meridian and the meridian forming the eastern boundary of Townships 15, 16, 17 and 18, Range 30, west of the second Initial Meridian is  $45''.348$ . This can be converted into chains by multiplying by  $\log P \sin 1''$ , taken from Table IV for the section line whose length is required—whether the southern boundary of Township 15, or the northern boundary of Townships 15, 16, 17 or 18, or any of the intermediate section lines.

If the width of the last broken section be required, and if the remainder, after subtracting the integral multiple of  $d\lambda$  is greater than one sixth of  $d\lambda$ , integral multiples of  $\frac{1}{6} d\lambda$  (difference of longitude covered by one section on the base line) must be subtracted until the remainder is less than  $\frac{1}{6} d\lambda$ . This remainder may then be converted to chains by multiplying by  $P \sin 1''$  taken out of the Table for the latitude of the line under consideration. The reason for this is that the widths in seconds of longitude are the same for all sections from the base to the correction line (in the third system).

The result thus found should be corrected for the mean height of the base line above sea level, and also for any error in the positions of the 2nd and 3rd Meridians, relative to each other.

## CHAPTER IV.

## SOLUTIONS OF SOME PROBLEMS IN PRACTICAL GEODESY.

GIVEN THE LATITUDE AND LONGITUDE OF A POINT ON THE EARTH'S SURFACE, AND THE DISTANCE AND AZIMUTH THEREFROM OF A SECOND POINT, *required the latitude and longitude of the second point and the azimuth of the first point as seen from the second.*

The earth being considered a sphere, with radius equal to the normal at the place ( $N$ ), the distance ( $K$ ) may be reduced to arc by the formula

$$u'' = \frac{K}{N \sin 1''}$$

Then we have a spherical triangle formed by the two points and the north (or south) pole of the earth, the sides being the colatitudes of the points ( $90^{\circ} - \phi$  and  $90^{\circ} - \phi'$ ) and  $u''$ ; and the angles being the azimuths counted from the north of the points from one another, and the difference of longitude. Any three of these parts being given, the triangle may be solved by the usual formulæ of spheric trigonometry.

Since, however, the side  $u''$  is very small compared with the radius of the sphere, and therefore the triangle cannot be accurately solved without logarithms of many

decimal places, a more practical solution can be obtained by expanding the difference of latitude, &c., in series:—

We then have for distances not much exceeding 20 miles

$$\psi = \phi + u' \cos A - (u'' \sin A)^2 \sin 1'' \tan \phi$$

$$\lambda' = \lambda - (u'' \sin A) \sec \psi'$$

$$A' = 180^\circ + A + (u'' \sin A) \sec \psi' \sin \frac{1}{2} (\phi + \psi')$$

Where  $\phi$  and  $\lambda$  are the latitude and longitude respectively of the first point  
 $\psi'$  and  $\lambda'$  those of the second point

$A$  the azimuth of the second as seen from the first

$A'$  do do first do second

Longitudes being counted towards the west, and azimuths from the north through east from  $0^\circ$  to  $360^\circ$ .

*Correction for Spheroidal Figure.*

The above formulæ are derived on the assumption that the earth is a sphere. The solution for the spheroid can be obtained by applying a correction to the difference of latitude. There is no correction necessary, to the order of approximation of the formulæ given above, to either the difference of longitude or the difference of azimuth.

The spherical solution being made on a sphere whose radius is equal to the normal ( $N$ ) at the place, which is the radius of the great circle perpendicular to the meridian, while the latitude is measured along the meridian, whose radius of curvature is  $R$ , the difference of latitude found as above must be multiplied by  $\frac{N}{R} = 1 + e^2 \cos^2 \phi$  nearly, or in other words  $\psi' - \phi$  must be numerically increased by  $e^2 \cos^2 \phi (\psi' - \phi)$ .

The spheroidal formulæ then become

$$\psi' = \phi + u' \cos A - (u'' \sin A)^2 \sin 1'' \tan \phi + e^2 \cos^2 \phi \{ u' \cos A - (u'' \sin A)^2 \sin 1'' \tan \phi \}$$

$$\lambda' = \lambda - (u'' \sin A) \sec \psi'$$

$$A' = 180^\circ + A + (u'' \sin A) \sec \psi' \sin \frac{1}{2} (\phi + \psi')$$

The values of  $e^2 \cos^2 \phi$  for different latitudes, are:—

$\phi$	$e^2 \cos^2 \phi$	$\phi$	$e^2 \cos^2 \phi$	$\phi$	$e^2 \cos^2 \phi$	$\phi$	$e^2 \cos^2 \phi$	$\phi$	$e^2 \cos^2 \phi$
42	000376	48	000305	54	000235	60	000170	66	000113
43	365	49	293	55	224	61	160	67	104
44	353	50	282	56	213	62	150	68	096
45	341	51	270	57	202	63	140	69	088
46	329	52	258	58	191	64	131	70	080
47	317	53	247	59	181	65	122		

*More Accurate Formulæ for Long Distances.*

The above formulæ serve for distances not greater than say twenty miles. For longer distances, up to one hundred miles, the formulæ are (see "Lee's Table and Formulæ, Professional Papers of the United States' Engineers; and United States' Coast and Geodetic Survey, 1875," Appendix No. 19)—

$$\psi' - \phi = KB \cos A - K^2 C \sin^2 A - (\delta \phi)^2 D + K^2 h E \sin^2 A,$$

$$\lambda' - \lambda = \frac{K \sin A}{N' \sin 1'' \cos \psi'}$$

$$A' = 180^\circ + A - (\lambda' - \lambda) \frac{\sin \frac{1}{2} (\phi + \psi')}{\cos \frac{1}{2} (\psi' - \phi)} + (\lambda' - \lambda)^3 F$$

Where  $K$  = the distance

$$B = \frac{1}{R \sin 1''} \text{ for the latitude of the initial point,}$$

$$C = \frac{\tan \phi}{2 NR \sin 1''} \quad \text{do}$$

$$D = \frac{\frac{3}{2} e^2 \sin \phi \cos \phi \sin 1''}{(1 - e^2 \sin^2 \phi)^{\frac{3}{2}}} \quad \text{do}$$

$$E = \frac{1 + 3 \tan^2 \phi}{6 N^2} \quad \text{do}$$

$b = KB \cos A$ , or the first term of the expression for difference of latitude.

$\delta \phi$  is an approximate value of  $\psi' - \phi$ , computed from the first and second terms of the expression.

$N' \sin 1''$  is taken for the latitude of the terminal point.

$\log F$ , for latitude  $45^\circ = 7.840$ ; for latitude  $50^\circ = 7.792$ ; for latitude  $55^\circ = 7.723$ .

$$\log e^2 = 7.8305006$$

$$\log \sin 1'' = 4.6855749$$

The computation can be made by means of Table I, but more conveniently by means of the tables of the values of  $B$ ,  $C$ ,  $D$  and  $E$ , which are given in the United States Coast Survey Appendix above named.

It is to be noted that in the formulæ given in that appendix, the azimuth is counted from the south through west, while in those I have given for the shorter distances it is counted from north through east, conformably to the general practice in Dominion Land surveys. Hence as  $A$  is increased by  $180^\circ$ , the sign of  $\cos A$  and  $\sin A$  is changed.

#### *Formulæ in Terms of Rectangular Co-ordinates.*

Suppose the latitude and longitude ( $\phi$  and  $\lambda$ ) of one point to be known, and the second point to be referred to the first by rectangular co-ordinates,  $y$  in direction of the meridian and  $x$  perpendicular to it,  $y$  being positive when measured north from the first point, and  $x$  positive when measured west.

$$\text{Then } \psi' = \phi + \frac{y}{R \sin 1''} - \frac{1}{2} \sin 1'' \tan \psi' \left( \frac{x}{N \sin 1''} \right)^2 \frac{N \sin 1''}{R \sin 1''}$$

$$\lambda' = \lambda + \left( \frac{x}{N \sin 1''} \right) \sec \psi'$$

$$A' = 180^\circ + A - \left( \frac{x}{N \sin 1''} \right) \tan \psi'$$

The expression for  $\psi'$  contains  $\psi'$ , the quantity sought, in the last term. The value of  $\psi'$  to be used in computing this term is the approximate value of  $\psi'$  obtained from the first two terms  $\phi + \frac{y}{R \sin 1''}$ .

These formulæ may be used for differences of latitude and longitude on a traverse survey consisting of a number of short lines.

The co-ordinates with reference to the meridian of one of the points may be computed by summing the "latitudes and departures" taken from an ordinary traverse table for the several courses.

GIVEN THE LATITUDES AND LONGITUDES OF TWO POINTS, to find the length and direction of their joining line.

Let  $\phi$  and  $\phi'$  be the latitudes.

$\lambda$  and  $\lambda'$  be the longitudes.

Then  $(\psi' - \phi)$  multiplied by the factor  $e^2 \cos^2 \phi$  given in the table on page —, is the correction to the latitude to reduce it from the spheroid to the sphere. Half

of this correction is to be applied to each latitude, in such direction as to bring them nearer together.

We then have, calling these corrected latitudes  $l$  and  $l'$ , and  $(\psi' - \psi) e^2 \cos^2 \psi = \beta$

$$l = \psi + \frac{\beta}{2}$$

$$\tan A = \frac{-(\lambda' - \lambda) \cos e'}{l' - l - \frac{1}{2} \sin 1'' (\lambda' - \lambda)^2 \cos^2 l' \tan l}$$

$$l' = \psi' - \frac{\beta}{2}$$

$$K = - \frac{(\lambda' - \lambda) \cos l'}{\sin A} N \sin 1''$$

$$A' = 180^\circ + A - (\lambda' - \lambda) \sin \frac{l+l'}{2}$$

$N \sin 1''$  should be taken for the mean latitude  $\frac{\psi + \psi'}{2}$ ; so also  $e^2 \cos^2 \psi$ , although the difference in this latter will be inappreciable unless the difference of latitude is great.

KNOWING THE LATITUDES AND THE AZIMUTH of one point from the other, to find the distance.

Calculate  $\beta$  and  $l$  and  $l'$  as in the last case.

Find the auxiliary angles  $\theta$  and  $\theta - u$  from the equations

$$\tan \theta = - \frac{\tan l}{\cos A}$$

$$\sin (\theta - u) = \frac{\sin l'}{\sin l} \sin \theta$$

Whence  $u$  is known

then  $K = u N \sin 1''$ .

That value of  $\theta$  is to be taken which is less than  $90^\circ$ , *i. e.*, if  $\tan \theta$  be positive (when  $\cos A$  is negative)  $\theta$  will be a positive angle less than  $90^\circ$ . If  $\tan \theta$  be negative,  $\theta$  will be a negative angle. In the latter case the formula

$$\sin (\theta - u) = \frac{\sin l'}{\sin l} \sin \theta$$

becomes  $\sin (\theta + u) = \frac{\sin l'}{\sin l} \sin \theta$ .  $\theta$  in this last being taken positively.

GIVEN THE LATITUDE OF ONE POINT, THE AZIMUTH FROM THIS TO THE OTHER, AND THE DIFFERENCE OF LONGITUDE, to find the distance.

That is, given  $\psi$ ,  $\lambda' - \lambda$ , and  $A$  to find  $\psi'$ ,  $A'$  and  $K$ .

Let  $d\lambda$  be the difference of longitude. The auxiliary angle  $\theta$  is computed by the formula

$$\tan \theta = - \sin l \tan A.$$

$$\text{and } \tan a' = \frac{\tan \psi \sin (\theta - d\lambda)}{\sin \theta}$$

$$\beta = (a' - \psi) e^2 \cos^2 \frac{1}{2} (a' + \psi)$$

$$\psi' = a' + \beta, l = \psi + \frac{\beta}{2}, l' = \psi' - \frac{\beta}{2}$$

$$K = - d\lambda \frac{\cos l'}{\sin A} N \sin 1''.$$



## TRIGONOMETRICAL LEVELLING.

To find the elevation of one station above another by observation of the apparent altitude.

Let  $K$  represent the distance apart of the two stations,  $C$  the angle subtended by the arc joining the two stations at the earth's centre (*i. e.*, more properly at the centre of the curvature of the arc):

Let  $m$  = the coefficient of refraction.

$dh$  = difference of height of the two stations.

$S$  = radius of curvature of the arc joining the stations.

$E$  = measured angle of elevation.

$$\text{Then } C = \frac{K}{S \sin 1''}$$

$$dh = \frac{K \sin \{E + (\frac{1}{2} - m) C\}}{\cos \{E + (1 - m) C\}}$$

$S$ , the radius of curvature of the arc, is found from  $R$  and  $N$ , given the azimuth of the arc, in the manner explained under Table I, but for ordinary purposes

$N \sin 1''$  or  $R \sin 1''$  may be used instead of  $S \sin 1''$ .

$m$  varies in different places, being greater at the sea coast than in the interior. It runs from about .065 to about .080. Where accuracy is required it must be found by observation in the locality, by the method of reciprocal zenith distances, or otherwise.

¶ Taking its value at .070, the above formula becomes:

$$dh = \frac{K \sin (E + 0.43 C)}{\cos (E + 0.93 C)}$$

If the angle observed be an angle of depression instead of elevation, we have calling the observed angle  $D$ :

$$dh = \frac{-K \sin (D - 0.43 C)}{\cos (D - 0.93 C)}$$

APPENDIX—TABLES.

TABLE I.—Radii of Curvature of Meridians and Parallels, &c.

Latitude.	log N sin 1".	log P sin 1".	log R sin 1".	Chains in 1'.		Seconds in one Chain.		English Miles in a Degree.	
				Lat-itude.	Long-itude.	Lat-itude.	Long-itude.	Lat-itude.	Long-itude.
°						"	"		
42 00	0.1873775	0.0584510	0.1857461	1.5337	1.1441	0.6520	0.8741	69.02	51.48
42 10	3818	73144	7589	1.5338	1.1411	0.6520	0.8764	69.02	51.35
42 20	3860	61711	7717	1.5338	1.1381	0.6520	0.8787	69.02	51.21
42 30	3903	50212	7845	1.5339	1.1351	0.6520	0.8810	69.02	51.08
42 40	3946	38645	7973	1.5339	1.1320	0.6519	0.8834	69.03	50.94
42 50	3988	27009	8101	1.5339	1.1290	0.6519	0.8857	69.03	50.81
43 00	4031	15306	8230	1.5340	1.1260	0.6519	0.8881	69.03	50.67
43 10	4074	0.0503534	8358	1.5340	1.1229	0.6519	0.8905	69.03	50.53
43 20	4117	0.0491693	8487	1.5341	1.1199	0.6519	0.8930	69.03	50.39
43 30	4160	79782	8615	1.5341	1.1168	0.6518	0.8954	69.04	50.26
43 40	4203	67802	8744	1.5342	1.1137	0.6518	0.8979	69.04	50.12
43 50	4245	55750	8872	1.5342	1.1106	0.6518	0.9004	69.04	49.98
44 00	4288	43629	9001	1.5343	1.1075	0.6518	0.9029	69.04	49.84
44 10	4331	31437	9129	1.5343	1.1044	0.6518	0.9054	69.04	49.70
44 20	4374	19173	9258	1.5344	1.1013	0.6517	0.9080	69.05	49.56
44 30	4417	0.0406838	9387	1.5344	1.0982	0.6517	0.9106	69.05	49.42
44 40	4460	0.0394430	9515	1.5344	1.0951	0.6517	0.9132	69.05	49.28
44 50	4503	81949	9644	1.5345	1.0919	0.6517	0.9158	69.05	49.14
45 00	4546	69396	9773	1.5345	1.0888	0.6517	0.9185	69.05	49.00
45 10	4588	56768	0.1859901	1.5346	1.0856	0.6516	0.9211	69.06	48.85
45 20	4631	44067	0.1860030	1.5346	1.0824	0.6516	0.9238	69.06	48.71
45 30	4674	31292	0159	1.5347	1.0793	0.6516	0.9266	69.06	48.57
45 40	4717	18442	0288	1.5347	1.0761	0.6516	0.9293	69.06	48.42
45 50	4760	0.0305517	0416	1.5348	1.0729	0.6516	0.9321	69.06	48.28
46 00	4803	0.0292516	0545	1.5348	1.0697	0.6515	0.9349	69.07	48.14
46 10	4846	79439	0673	1.5349	1.0665	0.6515	0.9377	69.07	47.99
46 20	4889	66285	0802	1.5349	1.0632	0.6515	0.9405	69.07	47.85
46 30	4932	53054	0931	1.5349	1.0600	0.6515	0.9434	69.07	47.70
46 40	4974	39745	1059	1.5350	1.0568	0.6515	0.9463	69.07	47.55
46 50	5017	26358	1188	1.5350	1.0535	0.6515	0.9492	69.08	47.41
47 00	5060	0.0212893	1316	1.5351	1.0502	0.6514	0.9522	69.08	47.26
47 10	5103	0.0199349	1445	1.5351	1.0470	0.6514	0.9551	69.08	47.11
47 20	5146	85726	1573	1.5352	1.0437	0.6514	0.9581	69.08	46.97
47 30	5188	72021	1701	1.5352	1.0404	0.6514	0.9612	69.08	46.82
47 40	5231	58237	1829	1.5353	1.0371	0.6514	0.9642	69.09	46.67
47 50	5274	44372	1957	1.5353	1.0338	0.6513	0.9673	69.09	46.52
48 00	5316	30425	2085	1.5354	1.0305	0.6513	0.9704	69.09	46.37
48 10	5359	16396	2214	1.5354	1.0272	0.6513	0.9736	69.09	46.22
48 20	5402	0.0102285	2341	1.5354	1.0238	0.6513	0.9767	69.09	46.07
48 30	5444	0.0088090	2469	1.5355	1.0205	0.6513	0.9799	69.10	45.92
48 40	5487	73812	2598	1.5355	1.0171	0.6512	0.9831	69.10	45.77
48 50	5530	59449	2725	1.5356	1.0138	0.6512	0.9864	69.10	45.62
49 00	5572	45001	2852	1.5356	1.0104	0.6512	0.9897	69.10	45.47
49 10	5615	30469	2980	1.5357	1.0070	0.6512	0.9930	69.11	45.32
49 20	5657	15849	3106	1.5357	1.0037	0.6512	0.9964	69.11	45.16
49 30	5699	0.0001143	3234	1.5358	1.0003	0.6511	0.9998	69.11	45.01
49 40	5742	9.9986351	3361	1.5358	0.9969	0.6511	1.0031	69.11	44.86
49 50	5784	71470	3488	1.5358	0.9935	0.6511	1.0066	69.11	44.71
50 00	5826	56301	3615	1.5359	0.9900	0.6511	1.0101	69.12	44.55
50 10	5869	41444	3742	1.5359	0.9866	0.6511	1.0136	69.12	44.40
50 20	5911	26296	3870	1.5360	0.9832	0.6510	1.0171	69.12	44.24
50 30	5953	9.9911058	3995	1.5360	0.9797	0.6510	1.0207	69.12	44.09
50 40	5995	9.9895730	4122	1.5361	0.9763	0.6510	1.0243	69.12	43.93
50 50	6037	80309	4248	1.5361	0.9728	0.6510	1.0279	69.13	43.78
51 00	6079	64797	4374	1.5362	0.9693	0.6510	1.0316	69.13	43.62
51 10	6121	49192	4500	1.5362	0.9659	0.6510	1.0353	69.13	43.46
51 20	6163	33493	4626	1.5363	0.9624	0.6509	1.0391	69.13	43.31
51 30	6205	17701	4751	1.5363	0.9589	0.6509	1.0429	60.13	43.15
51 40	6247	9.9801813	4877	1.5363	0.9554	0.6509	1.0467	69.14	42.99
51 50	6289	9.9785830	5002	1.5364	0.9519	0.6509	1.0506	69.14	42.83
52 00	6330	69750	5127	1.5364	0.9484	0.6509	1.0544	69.14	42.68

APPENDIX—TABLES.

TABLE I.—Radii of Curvature of Meridians and Parallels, &c.

Latitude.	log N sin 1".	log P sin 1".	log R sin 1".	Chains in 1".		Seconds in one Chain.		English Miles in a Degree.	
				Lat-itude.	Long-itude.	Lat-itude.	Long-itude.	Lat-itude.	Long-itude.
°						"	"		
52 10	0.1876372	9.9753574	0.1865252	1.5365	0.9448	0.6508	1.0584	69.14	42.52
52 20	6413	37299	5376	1.5365	0.9413	0.6508	1.0624	69.14	42.36
52 30	6455	20926	5501	1.5366	0.9378	0.6508	1.0664	69.15	42.20
52 40	6496	9.9704454	5625	1.5366	0.9342	0.6508	1.0704	69.15	42.04
52 50	6538	9.9687882	5749	1.5366	0.9307	0.6508	1.0745	69.15	41.88
53 00	6579	71208	5873	1.5367	0.9271	0.6507	1.0786	69.15	41.72
53 10	6620	54435	5997	1.5367	0.9235	0.6507	1.0828	69.15	41.56
53 20	6661	37558	6120	1.5368	0.9199	0.6507	1.0870	69.16	41.40
53 30	6703	20579	6244	1.5368	0.9163	0.6507	1.0913	69.16	41.24
53 40	6744	9.9603495	6367	1.5369	0.9127	0.6507	1.0956	66.16	41.07
53 50	6785	9.9586307	6490	1.5369	0.9091	0.6507	1.0999	69.16	40.91
54 00	6825	69012	6612	1.5370	0.9055	0.6506	1.1043	69.16	40.75
54 10	6866	51612	6735	1.5370	0.9019	0.6506	1.1088	69.16	40.59
54 20	6907	34104	6857	1.5370	0.8983	0.6506	1.1132	69.17	40.42
54 30	6948	9.9516488	6979	1.5371	0.8946	0.6506	1.1178	69.17	40.26
54 40	6988	9.9498764	7101	1.5371	0.8910	0.6506	1.1223	69.17	40.09
54 50	7029	80928	7222	1.5372	0.8873	0.6505	1.1270	69.17	39.93
55 00	7069	62982	7343	1.5372	0.8837	0.6505	1.1316	69.17	39.77
55 10	7109	44924	7464	1.5373	0.8800	0.6505	1.1363	69.18	39.60
55 20	7150	26754	7585	1.5373	0.8763	0.6505	1.1411	69.18	39.44
55 30	7190	9.9408470	7705	1.5373	0.8727	0.6505	1.1459	69.18	39.27
55 40	7230	9.9390072	7825	1.5374	0.8690	0.6505	1.1508	69.18	39.10
55 50	7270	71557	7945	1.5374	0.8653	0.6504	1.1557	69.18	38.94
56 00	7310	52927	8065	1.5375	0.8616	0.6504	1.1607	69.19	38.77
56 10	7349	34177	8184	1.5375	0.8579	0.6504	1.1657	69.19	38.60
56 20	7389	9.9315310	8304	1.5376	0.8541	0.6504	1.1708	69.19	38.44
56 30	7429	9.9296324	8422	1.5376	0.8504	0.6504	1.1759	69.19	38.27
56 40	7468	77218	8541	1.5376	0.8467	0.6503	1.1811	69.19	38.10
56 50	7508	57987	8659	1.5377	0.8429	0.6503	1.1863	69.20	37.93
57 00	7547	38635	8777	1.5377	0.8392	0.6503	1.1916	69.20	37.76
57 10	7586	9.9219158	8894	1.5378	0.8354	0.6503	1.1970	60.20	37.59
57 20	7625	9.9199557	9012	1.5378	0.8317	0.6503	1.2024	69.20	37.43
57 30	7664	79829	9128	1.5378	0.8279	0.6503	1.2079	69.20	37.26
57 40	7703	59974	9245	1.5379	0.8241	0.6502	1.2134	69.20	37.09
57 50	7742	39991	9361	1.5379	0.8203	0.6502	1.2190	69.21	36.92
58 00	7780	9.9119877	9477	1.5380	0.8166	0.6502	1.2247	69.21	36.75
58 10	7819	9.9099633	9593	1.5380	0.8128	0.6502	1.2304	69.21	36.57
58 20	7858	79257	9709	1.5381	0.8090	0.6502	1.2362	69.21	36.40
58 30	7896	58747	9824	1.5381	0.8051	0.6502	1.2420	69.21	36.23
58 40	7934	38102	0.1869938	1.5381	0.8013	0.6501	1.2479	69.22	36.06
58 50	7972	17321	0.1870052	1.5382	0.7975	0.6501	1.2539	69.22	35.89
59 00	8010	9.8996403	0167	1.5382	0.7937	0.6501	1.2600	69.22	35.72
59 10	8048	75347	0280	1.5383	0.7898	0.6501	1.2661	69.22	35.54
59 20	8086	54150	0393	1.5383	0.7860	0.6501	1.2723	69.22	35.37
59 30	8123	32812	0506	1.5383	0.7821	0.6501	1.2786	69.23	35.20
59 40	8161	9.8911331	0619	1.5384	0.7783	0.6500	1.2849	69.23	35.02
59 50	8198	9.8889706	0731	1.5384	0.7744	0.6500	1.2913	69.23	34.85
60 00	8236	67936	0843	1.5385	0.7705	0.6500	1.2978	69.23	34.67
60 10	8273	46018	0955	1.5385	0.7667	0.6500	1.3044	69.23	34.50
60 20	8310	25952	1066	1.5385	0.7628	0.6500	1.3110	69.23	34.32
60 30	8347	9.8801735	1176	1.5386	0.7589	0.6500	1.3177	69.24	34.15
60 40	8384	9.8779367	1287	1.5386	0.7550	0.6499	1.3245	69.24	33.97
60 50	8420	56845	1397	1.5386	0.7511	0.6499	1.3314	69.24	33.80
61 00	8457	34169	1506	1.5387	0.7472	0.6499	1.3384	69.24	33.62
61 10	8493	9.8711336	1615	1.5387	0.7432	0.6499	1.3454	69.24	33.45
61 20	8529	9.8688345	1724	1.5388	0.7393	0.6499	1.3526	69.24	33.27
61 30	8565	65194	1832	1.5388	0.7354	0.6499	1.3598	69.25	33.09
61 40	8601	41882	1940	1.5388	0.7315	0.6498	1.3671	69.25	32.92
61 50	8637	9.8618406	2048	1.5389	0.7275	0.6498	1.3745	69.25	32.74
62 00	8673	9.8594766	2155	1.5389	0.7236	0.6498	1.3820	69.25	32.56
62 10	8708	70958	2261	1.5390	0.7196	0.6498	1.3896	69.25	32.38

APPENDIX—TABLES.

TABLE I.—Radii of Curvature of Meridians and Parallels, &c.—*Concluded.*

Latitude.	log N sin 1".	log P sin 1".	log R sin 1".	Chains in 1".		Seconds in one Chain.		English Miles in a Degree.	
				Latitude.	Longitude.	Latitude.	Longitude.	Latitude.	Longitude.
62 20	0.1873744	9.8546982	0.1872368	1.5390	0.7156	0.6498	1.3973	69.25	32.20
62 30	8779	9.8522835	2474	1.5390	0.7117	0.6498	1.4051	69.26	32.03
62 40	8814	9.8498516	2579	1.5391	0.7077	0.6497	1.4130	69.26	31.85
62 50	8849	74022	2684	1.5391	0.7037	0.6497	1.4210	69.26	31.67
63 00	8884	49352	2789	1.5391	0.6997	0.6497	1.4291	69.26	31.49
63 10	8919	9.8424503	2893	1.5392	0.6957	0.6497	1.4373	69.26	31.31
63 20	8954	9.8399475	2997	1.5392	0.6917	0.6497	1.4456	69.26	31.13
63 30	8988	74262	3099	1.5393	0.6877	0.6497	1.4540	69.27	30.95
63 40	9022	48866	3202	1.5393	0.6837	0.6497	1.4626	69.27	30.77
63 50	9056	9.8323288	3305	1.5393	0.6797	0.6496	1.4712	69.27	30.59
64 00	9090	9.8297512	3407	1.5394	0.6757	0.6496	1.4800	69.27	30.41
64 10	9124	71546	3508	1.5394	0.6717	0.6496	1.4888	69.27	30.23
64 20	9158	45389	3609	1.5394	0.6676	0.6496	1.4978	69.27	30.04
64 30	9191	9.8219035	3709	1.5395	0.6636	0.6496	1.5069	69.28	29.86
64 40	9224	9.8192482	2809	1.5395	0.6596	0.6496	1.5162	69.28	29.68
64 50	9258	65730	3909	1.5395	0.6555	0.6495	1.5256	69.28	29.50
65 00	9291	38774	4008	1.5396	0.6514	0.6495	1.5351	69.28	29.32
65 10	9323	9.8111610	4106	1.5396	0.6474	0.6495	1.5447	69.28	29.13
65 20	9356	9.8084240	4205	1.5396	0.6433	0.6495	1.5544	69.28	28.95
65 30	9389	56659	4302	1.5397	0.6392	0.6495	1.5644	69.29	28.77
65 40	9421	28862	4399	1.5397	0.6352	0.6495	1.5744	69.29	28.58
65 50	9453	9.8000850	4496	1.5397	0.6311	0.6494	1.5846	69.29	28.40
66 00	9485	9.7972618	4592	1.5398	0.6270	0.6494	1.5949	69.29	28.21
66 10	9517	44164	4688	1.5398	0.6229	0.6494	1.6054	69.29	28.03
66 20	9549	9.7915485	4783	1.5398	0.6188	0.6494	1.6160	69.29	27.85
66 30	9580	9.7886577	4877	1.5399	0.6147	0.6494	1.6268	69.29	27.66
66 40	9612	57439	4972	1.5399	0.6106	0.6494	1.6378	69.30	27.48
66 50	9643	9.7828065	5065	1.5399	0.6065	0.6494	1.6489	69.30	27.29
67 00	9674	9.7798454	5158	1.5400	0.6023	0.6494	1.6602	69.30	27.11
67 10	9705	68602	5250	1.5400	0.5982	0.6493	1.6716	69.30	26.92
67 20	9735	38506	5342	1.5400	0.5941	0.6493	1.6833	69.30	26.73
67 30	9766	9.7708163	5434	1.5401	0.5900	0.6493	1.6951	69.30	26.55
67 40	9796	9.7677568	5525	1.5401	0.5858	0.6493	1.7070	69.31	26.36
67 50	9826	46718	5615	1.5401	0.5817	0.6493	1.7192	69.31	26.17
68 00	9856	9.7615610	5705	1.5402	0.5775	0.6493	1.7316	69.31	25.99
68 10	9886	9.7584241	5795	1.5402	0.5734	0.6493	1.7441	69.31	25.80
68 20	9916	52605	5883	1.5402	0.5692	0.6492	1.7569	69.31	25.61
68 30	9945	9.7520699	5972	1.5403	0.5650	0.6492	1.7698	69.31	25.43
68 40	0.1879974	9.7488520	6059	1.5403	0.5609	0.6492	1.7830	69.31	25.24
68 50	0.1880004	50064	6147	1.5403	0.5567	0.6492	1.7964	69.31	25.05
69 00	0032	9.7423324	6233	1.5404	0.5525	0.6492	1.8100	69.32	24.86
69 10	0061	9.7390298	6319	1.5404	0.5483	0.6492	1.8238	69.32	24.67
69 20	0090	56983	6405	1.5404	0.5441	0.6492	1.8378	69.32	24.49
69 30	0118	9.7323371	6490	1.5405	0.5399	0.6492	1.8521	69.32	24.30
69 40	0146	9.7289460	6574	1.5405	0.5357	0.6491	1.8666	69.32	24.11
69 50	0174	55244	6658	1.5405	0.5315	0.6491	1.8814	69.32	23.92
70 00	0202	9.7220719	6741	1.5405	0.5273	0.6491	1.8964	69.32	23.73

TABLE II.

CORRECTIONS to be applied to the logarithms of  $R \sin 1''$  and  $N \sin 1''$  in Table I, for Clarke's later values of the dimensions of the earth.

Latitude.	$d(\log R \sin 1'')$ .	$d(\log N \sin 1'')$ .	Latitude.	$d(\log R \sin 1'')$ .	$d(\log N \sin 1'')$ .
42.....	-0.0000021	+0.0000063	56.....	+0.0000034	+0.0000081
43.....	17	64	57.....	37	82
44.....	13	66	58.....	41	84
45.....	09	67	59.....	45	85
46.....	05	68	60.....	48	86
47.....	-0.0000001	70	61.....	51	87
48.....	+0.0000003	71	62.....	55	88
49.....	07	72	63.....	58	89
50.....	11	74	64.....	61	90
51.....	15	75	65.....	64	91
52.....	19	76	66.....	67	93
53.....	23	77	67.....	70	93
54.....	26	79	68.....	73	94
55.....	30	80	69.....	76	95
			70.....	78	96

TABLE III.

LATITUDES, &c., of Base and Correction Lines. 1st and 2nd Systems of Surveys.

N <sub>o</sub> . of Town- ship.	Number of Line.	Latitude.	Log. N sin 1''.	Log. P sin 1''.	Log. R sin 1''.	Longitude covered by 489 Chains of westing.
0	1st Base.....	49 00 00.00	0.1875572	0.0045001	0.1862852	8 03.959
2	Correction.....	10 36.86	5618	0.0029573	2989	05.681
4	2nd Base.....	21 13.70	5662	0.0014047	3122	07.421
6	Correction.....	31 50.52	5707	9.9998425	3256	09.177
8	3rd Base.....	42 27.33	5751	9.9982704	3391	10.951
10	3rd Correction.....	49 53 04.12	0.1875797	9.9966886	0.1863527	8 12.743
12	4th Base.....	50 03 40.89	5842	9.9950968	3662	14.552
14	Correction.....	14 17.64	5887	9.9834951	3797	16.379
16	5th Base.....	24 54.37	5932	9.9918831	3931	18.225
18	Correction.....	35 31.08	5976	9.9902611	4064	20.089
20	6th Base.....	50 46 07.77	0.1876021	9.9886289	0.1864198	8 21.972
22	Correction.....	56 44.44	6065	9.9869863	4331	23.875
24	7th Base.....	51 07 21.09	6110	9.9853334	4466	25.796
26	Correction.....	17 57.72	6154	9.9836700	4599	27.737
28	8th Base.....	28 34.33	6199	9.9819961	4733	29.698
30	8th Correction.....	51 39 10.92	0.1876243	9.9803116	0.1864867	8 31.678
32	9th Base.....	49 47.49	6287	9.9786163	4998	33.680
34	Correction.....	52 00 24.04	6332	9.9769104	5131	35.701
36	10th Base.....	11 00.57	6376	9.9751934	5264	37.744
38	Correction.....	21 37.08	6420	9.9734637	5395	39.808
40	11th Base.....	52 32 13.57	0.1876464	9.9717267	0.1865529	8 41.894
42	Correction.....	42 50.04	6508	9.9699768	5661	44.001
44	12th Base.....	53 26.49	6552	9.9682156	5791	46.130
46	Correction.....	53 04 02.92	6595	9.9664429	5920	48.282
48	13th Base.....	14 39.33	6640	9.9646592	6055	50.456

TABLE IV.  
LATITUDES, &c., of Base and Correction Lines.  
(Third System of Survey.)

Number of Township.	Name of Line.	Latitude.	Log. N sin 1".	Log. P sin 1".	Log. R sin 1".	Longitude covered by 486 Chains.
		° ' "				' "
0	1st Base .....	49 00 00	0 1875572	0 0045001	0 1862852	8 00 990
2	Correction .....	10 29 05	5617	0 0029764	2987	02 681
4	2nd Base .....	20 58 07	5661	0 0014431	3119	04 388
6	Correction .....	31 27 08	5705	9 9999003	3251	06 112
8	3rd Base .....	41 56 08	5749	9 9983480	3383	07 852
10	3rd Correction .....	52 25 05	5794	9 9967861	3518	09 610
12	4th Base .....	50 02 54	5838	9 9952143	3650	11 385
14	Correction .....	13 22 96	5883	9 9936329	3786	13 178
16	5th Base .....	23 51 88	5927	9 9920418	3918	14 988
18	Correction .....	34 20 77	5971	9 9904407	4050	16 816
20	6th Base .....	44 40 65	6015	9 9888297	4182	18 662
22	Correction .....	55 18 51	6059	9 9872086	4314	20 527
24	7th Base .....	51 05 47	6103	9 9855774	4446	22 411
26	Correction .....	16 16 17	6147	0 9839365	4578	24 313
28	8th Base .....	26 44 98	6191	9 9822842	4710	26 235
30	8th Correction .....	37 13 76	6235	9 9806224	4842	28 176
32	9th Base .....	47 42 53	6279	9 9789500	4974	30 136
34	Correction .....	58 11 26	6322	9 9772671	5109	32 117
36	10th Base .....	52 08 39	6366	9 9755737	5235	34 118
38	Correction .....	19 08 69	6409	9 9738694	5364	36 139
40	11th Base .....	29 37 37	6453	9 9721545	5496	38 181
42	Correction .....	40 06 04	6497	8 9704288	5628	40 245
44	12th Base .....	50 34 69	6540	9 9686921	5757	42 329
46	Correction .....	53 01 03	6582	9 9669442	5883	44 436
48	13th Base .....	11 31 92	6626	9 9651855	6015	46 564
50	13th Correction .....	22 00 52	6670	9 9634156	6147	48 714
52	14th Base .....	32 29 09	6712	9 9616342	6273	50 887
54	Correction .....	42 57 65	6756	9 9598417	6405	53 083
56	15th Base .....	53 26 19	6799	9 9580375	6534	55 302
58	Correction .....	54 03 54	6841	9 9562218	6660	57 545
60	16th Base .....	14 23 21	6884	9 9543945	6789	8 59 811
62	Correction .....	24 51 69	6927	9 9525554	6918	9 02 102
64	17th Base .....	35 20 15	6969	9 9507044	7044	04 417
66	Correction .....	45 48 59	7012	9 9488415	7173	06 758
68	18th Base .....	56 17 01	7054	9 9469665	7298	09 123
70	18th Correction .....	55 06 45	7096	9 9450792	7424	11 515
72	19th Base .....	17 13 82	7139	9 9431798	7553	13 932
74	Correction .....	27 42 20	7181	9 9412680	7679	16 376
76	20th Base .....	38 10 55	7223	9 9393437	7805	18 847
78	Correction .....	48 38 89	7264	9 9374066	7928	21 345
80	21st Base .....	59 07 20	7305	9 9354569	8051	23 871
82	Correction .....	56 09 35	7347	9 9334945	8177	26 424
84	22nd Base .....	20 03 77	7390	9 9315192	8306	29 006
86	Correction .....	30 32 03	7431	9 9295307	8429	31 618
88	23rd Base .....	41 00 28	7472	9 9275290	8552	34 258
90	23rd Correction .....	51 28 51	7513	9 9255140	8675	36 929
92	24th Base .....	57 01 56	7554	9 9234856	8798	39 630
94	Correction .....	12 24 89	7595	9 9214436	8921	42 362
96	25th Base .....	22 53 07	7637	9 9193880	9047	45 125
98	Correction .....	33 21 22	7678	9 9173186	9170	47 919
100	26th Base .....	43 49 36	7718	9 9152351	9290	50 747
102	Correction .....	54 17 48	7759	9 9131376	9413	53 607
104	27th Base .....	58 04 45	7799	9 9110259	9533	56 500

TABLE IV—*Concluded.*  
 LATITUDE, &c., of Base and Correction Lines—*Concluded.*  
 (Third System of Survey.)

Number of Township.	Name of Line.	Latitude.	Log. N sin 1".	Log. P sin 1".	Log. R sin 1".	Longitude covered by 486 Chains.
106	Correction .....	58 15 13.66	0.1877839	9.9088998	0.1869653	9 59.427
108	28th Base .....	25 41 73	7879	9.9067591	9773	10 02.389
110	28th Correction .....	36 09 78	7919	9.9046039	0.1869893	05.386
112	29th Base .....	46 37 81	7959	9.9024339	0.1870013	08.418
114	Correction .....	57 05 83	7999	9.9002490	0133	11.487
116	30th Base .....	59 07 33.83	8039	9.8980490	0253	14.593
118	Correction .....	18 01 81	8078	9.8958337	0370	17.735
120	31st Base .....	28 29 77	8117	9.8936029	0487	20.917
122	Correction .....	38 57 71	8157	9.8913568	0607	24.136
124	32nd Base .....	49 25 64	8196	9.8890948	0724	27.896
126	Correction .....	59 53 55	0.1878235	9.8868170	0.1870840	10 30.695

TABLE V.  
 CHORD AZIMUTHS, Deflections, Deflection Offsets, &c., for Base Lines.  
 (First and Second Systems of Survey.)

Number of Base Line.	Chord Azimuth.	Chord Azimuth.	Deflection.	Deflection.	Deflection Offset for 1 Chain Distance.	Longitude covered by 1 Range.	Number of Township.
	" "	" "	" "	" "	Inches.	s.	
1	89 56 57.4	89.9493	6 05.2	0.1014	1.402	32.3	0
2	55.1	.9486	09.8	.1027	1.420	32.5	4
3	52.8	.9480	14.5	.1040	1.438	32.7	8
4	50.4	.9473	19.2	.1053	1.456	33.0	12
5	48.0	.9467	24.0	.1067	1.474	33.2	16
6	89 56 45.6	89.9460	6 28.8	0.1080	1.493	33.5	20
7	43.1	.9453	33.8	.1094	1.512	33.7	24
8	40.6	.9446	38.8	.1108	1.531	34.0	28
9	38.1	.9439	43.8	.1122	1.551	34.2	32
10	35.5	.9432	49.0	.1136	1.570	34.5	36
11	89 56 32.9	89.9425	6 54.3	0.1151	1.591	38.8	40
12	30.2	.9417	59.6	.1165	1.611	35.1	44
13	27.5	.9410	7 05.0	.1180	1.632	35.4	48

TABLE VI.  
CHORD AZIMUTHS, Deflections, Deflection Offsets, &c., for Base Lines.

(Third System of Survey.)

Number of Base Line.	Chord Azimuth Sexagesimal.	Chord Azimuth Decimal.	Deflection Sexagesimal	Deflection Decimal.	Deflection Offset for 1 Chain Distance.	Longitude covered by 1 Range.	Number of Township.
	"	°	"	°	Inches.	s.	
1	89 56 58.5	89.9496	6 03.0	0.1008	1.394	32.1	0
2	56.3	.9490	07.5	.1021	1.411	32.3	4
3	54.0	.9483	12.0	.1033	1.429	32.5	8
4	51.7	.9477	16.6	.1046	1.447	32.8	12
5	49.4	.9471	21.3	.1059	1.465	33.0	16
6	47.0	.9464	26.1	.1072	1.483	33.2	20
7	44.6	.9457	30.9	.1086	1.501	33.5	24
8	42.1	.9450	35.8	.1099	1.520	33.7	28
9	39.6	.9443	40.8	.1113	1.539	34.0	32
10	37.1	.9436	45.9	.1127	1.558	34.3	36
11	34.5	.9429	51.0	.1142	1.578	34.5	40
12	31.9	.9422	56.2	.1156	1.598	34.8	44
13	29.3	.9415	7 01.5	.1171	1.619	35.1	48
14	26.6	.9407	06.9	.1186	1.639	35.4	52
15	23.8	.9399	12.4	.1201	1.660	35.7	56
16	21.0	.9392	18.0	.1217	1.682	36.0	60
17	18.2	.9384	23.7	.1232	1.704	36.3	64
18	15.3	.9376	29.4	.1248	1.726	36.6	68
19	12.4	.9368	35.3	.1265	1.749	36.9	72
20	09.4	.9359	41.3	.1281	1.772	37.3	76
21	06.3	.9351	47.4	.1298	1.795	37.6	80
22	03.2	.9342	53.6	.1316	1.819	37.9	84
23	00.1	.9335	59.8	.1333	1.843	38.3	88
24	89 55 56.9	.9325	8 06.3	.1351	1.867	38.6	92
25	53.6	.9316	12.8	.1369	1.892	39.0	96
26	50.3	.9306	19.5	.1387	1.918	39.4	100
27	46.8	.9297	26.3	.1406	1.944	39.8	104
28	43.4	.9287	33.3	.1426	1.971	40.2	108
29	39.9	.9277	40.3	.1445	2.000	40.6	112
30	36.2	.9267	47.6	.1465	2.026	41.0	116
31	32.6	.9257	54.9	.1486	2.054	41.4	120
32	28.8	.9247	9 02.4	.1507	2.083	41.8	124



TABLE VII.  
 CHORD AZIMUTHS, Deflections, Deflection Offsets, Jogs, &c., for Correction Lines.  
 (First and Second Systems of Survey.)

Number of Cor- rection Line.	Chord Azimuth.	Chord Azimuth.	Deflection.	Deflection.	Deflection Offset for one chain distance.	LENGTH OF ONE RANGE ON CORREC- TION LINE.		Jog.	Convergence or Divergence on half Section.	Number of Township.
						North side of Road.	South side of Road.			
	° ' "	° ' "	° ' "	° ' "	in inches	chains.	chains.	chains.	links.	
1	89 56 56·9	89 9491	6 06·2	0 1017	1 406	490 751	487 266	3 485	14 5	2
2	54 6	9485	10 8	1030	1 424	773	244	529	14 7	6
3	52 3	9479	15 5	1043	1 442	796	222	574	14 9	10
4	49 9	9472	20 2	1056	1 460	818	200	618	15 1	14
5	47 5	9465	25 0	1069	1 478	841	177	664	15 3	18
6	89 56 45 1	89 9459	6 29 8	0 1083	1 497	490 865	487 154	3 711	15 5	22
7	42 7	9452	34 7	1096	1 516	888	131	758	15 7	26
8	40 2	9445	39 7	1110	1 535	913	107	806	15 9	30
9	37 6	9438	44 8	1124	1 554	937	083	854	16 1	34
10	35 0	9430	50 0	1139	1 574	962	058	904	16 3	38
11	89 56 32 4	89 9423	6 55 2	0 1153	1 594	490 987	487 034	3 953	16 5	42
12	29 7	9416	7 00 6	1168	1 615	491 012	008	4 004	16 7	46

TABLE VIII.  
 CHORD AZIMUTAS, Deflections, Deflection Offsets, Jogs, &c., for Correction Lines.  
 (Third System of Survey.)

Number of Cor- tion Line.	Chord Azimuth Sexagesimal.	Chord Azimuth Decimal.	Deflection Sex- agesimal.	De- flection cimal.	Deflection Offset for one chain distance.	LENGTH OF ONE RANGE ON CORREC- TION LINE.		Jogs.	Convergence or Divergence on half section.	Number of Township.
						North side of Road.	South side of Road.			
						Inches.	chains.			
1	89 56 57.4	89.9493	7 05.2	0.1014	1.403	487.719	484.297	3.421	0.143	2
2	55.1	.9486	09.8	.1027	1.420	740	276	463	.144	6
3	52.9	.9480	14.3	.1040	1.438	762	255	507	.146	10
4	50.5	.9474	19.0	.1053	1.456	784	233	551	.148	14
5	48.2	.9467	23.7	.1066	1.474	806	212	594	.150	18
6	45.8	.9461	28.5	.1079	1.492	829	188	641	.152	22
7	43.3	.9454	33.4	.1093	1.510	852	167	685	.154	26
8	40.9	.9447	38.3	.1106	1.529	875	144	731	.155	30
9	38.3	.9440	43.4	.1120	1.548	899	120	779	.157	34
10	35.8	.9433	48.4	.1134	1.568	923	97	826	.159	38
11	33.2	.9426	53.6	.1149	1.588	947	72	875	.161	42
12	30.6	.9418	58.8	.1163	1.608	972	47	925	.164	46
13	27.9	.9411	7 04.2	.1178	1.629	487.997	484.024	3.973	.166	50
14	25.2	.9403	09.6	.1193	1.650	488.023	483.998	4.025	.168	54
15	22.4	.9396	15.2	.1209	1.671	049	972	077	.170	58
16	19.6	.9388	20.8	.1224	1.693	075	946	129	.172	62
17	16.7	.9380	26.6	.1241	1.715	102	919	183	.174	66
18	13.8	.9372	32.4	.1257	1.737	130	892	238	.177	70
19	10.9	.9364	38.3	.1273	1.760	158	865	293	.179	74
20	07.8	.9355	44.4	.1290	1.783	187	837	350	.181	78
21	04.8	.9337	50.5	.1307	1.807	215	809	406	.184	82
22	89 56 01.7	.9338	56.7	.1324	1.831	245	779	466	.186	86
23	89 55 58.5	.9329	8 03.0	.1342	1.855	275	750	525	.189	90
24	55.2	.9320	09.6	.1360	1.879	306	720	586	.191	94
25	51.9	.9311	16.2	.1378	1.905	338	690	648	.194	98
26	48.6	.9302	22.9	.1397	1.931	369	658	711	.196	102
27	45.1	.9292	29.8	.1416	1.957	402	627	775	.199	106
28	41.6	.9282	36.8	.1436	1.984	434	594	840	.202	110
29	38.0	.9272	44.0	.1456	2.012	469	561	908	.204	114
30	34.4	.9262	51.2	.1476	2.040	503	528	4.975	.207	118
31	30.7	.9252	58.6	.1496	2.068	538	493	5.045	.210	122
32	89 55 26.9	89.9241	9 06.2	.1517	2.097	488.574	483.458	5.116	.213	126

TABLE IX.

LATITUDE, with Logarithms of Secant and Tangent for the North Boundary of each Section, and the widths of Quarter Sections on such Boundaries.

(First and Second Systems of Survey.)

Township.	Section.	Latitude $\phi$ .	Sec $\phi$ .	Difference for 10 Chains.	Tan $\phi$ .	Difference for 10 Chains.	Quarter Section.
1	36	49° 0000	0 183 06		0 060 84		40 000
	1	0147	18		0 061 06		39 988
	12	0295	31		29		976
	13	0442	44		51		964
	24	0590	57		74		952
	25	0737	70		97		940
2	36	0885	83		0 062 20		928
	1	1032	96		42		915
	12	1180	0 184 09		64		903
	13	1327	22		87		891
	24	1475	35		0 063 09		879
	25	1622	48		32		867
3	36	1769	61		54		39 855 40 146
	1	1917	74		77		40 134
	12	2064	87		0 064 09		122
	13	2212	99		23		110
	24	2359	0 185 12		45		097
	25	2507	25		68		085
4	36	2654	38		90		073
	1	2802	51		0 065 13		061
	12	2949	64		35		048
	13	3097	78		58		036
	24	3244	90		81		024
	25	3391	0 186 03	0 000 02	0 066 04		012
5	36	3538	16		26		40 000
	1	3685	29		49		39 988
	12	3833	42		71		976
	13	3980	55		94		964
	24	4128	69		0 067 16		951
	25	4275	82		39		939
6	36	4422	94		61		927
	1	4569	0 187 07		84		915
	12	4717	21		0 068 07		902
	13	4864	34		29		890
	24	5012	47		52		878
	25	5159	59		74		866
7	36	5307	73		97		39 854 40 148
	1	5454	86		0 069 20		40 136
	12	5602	99		42		124
	13	5749	0 188 12		65		111
	24	5897	26		88		099
	25	6044	38		0 070 11		087
8	36	6191	51		33		074
	1	6338	64		56		062
	12	6486	78		78		050
	13	6633	91		0 071 01		037
	24	6781	0 189 04		24		025
	25	6928	18		46		013
	36	7076	31		69		40 000

TABLE IX—Continued.  
LATITUDE, with Logarithms of Secant and Tangent, &c.—Continued.

Township.	Section.	Latitude $\phi$ .	Sec $\phi$ .	Difference for 10 Chains.	Tan $\phi$ .	Difference for 10 Chains.	Quarter Section.
9	1	49° 7223	0 189 44		0 071 91		39 988
	12	7371	57		0 072 14		976
	13	7518	70				963
	24	7666	83				951
	25	7813	96				939
	36	7960	0 190 09		0 073 05		926
10	1	8107	23				914
	12	8255	36				902
	13	8402	49				889
	24	8550	62				877
	25	8697	76		0 074 19		865
	36	8845	89		41		39 852 40 150
11	1	8992	0 191 02				40 138
	12	9140	16				125
	13	9287	29		0 075 09		113
	24	9435	42				100
	25	9582	55				088
	36	9729	69				075
12	1	49 9876	82				40 063
	12	50 0024	95		0 076 23		050
	13	0171	0 192 08				038
	24	0319	22				025
	25	0466	35				013
	36	0614	49		0 077 13		40 000
13	1	0761	62	0 000 02			39 988
	12	0908	76				975
	13	1056	89				963
	24	1203	0 193 02		0 078 03		950
	25	1351	16				938
	36	1498	29				925
14	1	1645	42				913
	12	1793	55				900
	13	1940	69		0 079 17		888
	24	2087	83				875
	25	2235	96				863
	36	2382	0 194 09				39 850 40 152
15	1	2530	23		0 080 08		40 139
	12	2677	36				127
	13	2824	49				114
	24	2972	63				101
	25	3119	77				089
	36	3266	90		0 081 22		076
16	1	3414	0 195 03				063
	12	3561	17				051
	13	3709	31				038
	24	3856	44		0 082 13		025
	25	4003	57				013
	36	4151	71				40 000
17	1	4298	85				39 987
	12	4446	98		0 083 04		975
	13	4593	0 196 11				962
	24	4741	25				949
	25	4888	39				937
	36	5035	52				924

TABLE IX—Continued.  
LATITUDE, with Logarithms of Secant and Tangent, &c.—Continued.

Township.	Section.	Latitude $\phi$ .	Sec $\phi$ .	Difference for 10 Chains.	Tan $\phi$ .	Difference for 10 Chains.	Quarter Section.
18	1	50° 5182	0·196 66		0·084 17		39·911
	12	5330	80		40		899
	13	5477	93		63		886
	24	5625	0·197 06		86		873
	25	5772	20		0·085 09		861
	36	5920	34		32		{ 39·848 40·153
19	1	6067	47		54		40·140
	12	6214	61		77		128
	13	6362	75		0·086 00		115
	24	6509	88		22		102
	25	6656	0·198 02		45		089
	36	6804	15		68		077
20	1	6951	29		91		064
	12	7098	43		0·087 14		051
	13	7246	56		37		038
	24	7393	70		60		026
	25	7540	84		82		013
	36	7688	97		0·088 05		40·000
21	1	7835	0·199 11		28		39·987
	12	7983	25		50		974
	13	8130	39		73		961
	24	8278	52		96		949
	25	8425	65		0·089 19		936
	36	8572	79		42		923
22	1	8719	93	0·000 02	65	0·000 03	910
	12	8867	0·200 07		88		898
	13	9014	21		0·090 10		885
	24	9162	35		33		872
	25	9309	48		56		859
	36	9457	62		79		{ 39·846 40·155
23	1	9604	75		0·091 02		40·142
	12	9751	89		25		129
	13	9899	0·201 03		48		116
	24	51 0046	17		70		103
	25	0193	31		93		090
	36	0341	45		0·092 16		073
24	1	0488	59		39		065
	12	0635	72		62		052
	13	0783	86		84		039
	24	0930	0·202 00		0·093 07		026
	25	1077	14		30		013
	36	1225	28		53		40·000
25	1	1372	42		76		39·987
	12	1520	56		99		974
	13	1667	69		0·094 22		961
	24	1815	83		44		948
	25	1962	97		67		935
	36	2109	0·203 11		90		922
26	1	2256	25		0·095 13		909
	12	2404	39		36		896
	13	2551	53		59		883
	24	2699	67		82		870
	25	2846	81		0·096 04		857
	36	2994	95		28		{ 39·844 40·157

TABLE IX—Continued.  
LATITUDE, with Logarithms of Secant and Tangent, &c.—Continued.

Township.	Section.	Latitude $\phi$	Sec $\phi$ .	Difference for 10 Chains.	Tan $\phi$ .	Difference for 10 Chains.	Quarter Section.
27	1	51° 3141	0·204 09		0·096 51		40·144
	12	3288	23		73		131
	13	3436	36		96		118
	24	3583	50		0·097 19		105
	25	3730	64		42		092
	36	3878	78		65		078
28	1	4025	92		88		065
	12	4172	0·205 06		0·098 11		052
	13	4320	20	0·000 02	34	0·000 03	039
	24	4467	34		57		026
	25	4614	48		79		013
	36	4762	62		0·099 02		40·000
29	1	4909	76		25		39·987
	12	5056	90		48		974
	13	5204	0·206 04		71		961
	24	5351	19		94		947
	25	5498	33		0·100 17		934
	36	5646	47		40		921
30	1	5793	61		63		908
	12	5940	75		86		894
	13	6088	89		0·101 09		881
	24	6235	0·207 03		32		868
	25	6382	17		54		855
	36	51·6530	0·207 31		0·101 78		30·842
41	36	52·6255	0·216 79		0·116 99		39·918
42	1	6402	94		0·117 22		904
	12	6549	0·217 09		45		891
	13	6697	24		69		877
	24	6844	38		92		863
	25	6991	53		0·118 15		850
	36	7139	68		38		39·836 40·166
43	1	7286	82		61		152
	12	7433	96		84		138
	13	7581	0·218 11		0·119 08		124
	24	7728	26		30		111
	25	7875	40		54		097
	36	8023	55		77		083
44	1	8170	70		0·120 00		069
	12	8317	85		24		056
	13	8465	0·219 00		46		042
	24	8612	14		70		028
	25	8759	29		93		014
	36	8907	44		0·121 16		40·000
45	1	9054	58		40		39·986
	12	9201	73		62		972
	13	9349	88		86	0·000 03	958
	24	9496	0·220 03		0·122 09		945
	25	9643	18	0·000 02	32	0·000 03	931
	36	9791	33		56		917
46	1	9938	48		79		903
	12	53·0085	63		0·123 02		890
	13	0233	77		25		876
	24	0380	92		49		862

TABLE IX—*Concluded.*

LATITUDE, with Logarithms of Secant and Tangent, &c.—*Concluded.*

Township.	Section.	Latitude $\phi$ .	Sec $\phi$ .	Difference for 10 Chains.	Tan $\phi$ .	Difference for 10 Chains.	Quarter Section.
47	25	53° 0527	0 221 07		0 123 71		848
	36	0675	21		95		39 834
	1	0822	36				40 168
	12	0969	51		0 124 19		40 154
	13	1117	66		41		140
	24	1264	81		65		126
	25	1411	96		88		112
48	36	1559	0 222 11		0 125 12		098
	1	1706	26		34		084
	12	1853	41		58		070
	13	2001	56		81		056
	24	2148	71		0 126 04		042
	25	2295	86		28		028
	36	2443	0 223 00		51		014
					74		40 000

TABLE X.

LATITUDE, with Logarithms of Secant and Tangent for the north boundary of each Section, and width of Quarter Sections on such boundaries.

(Third System of Survey.)

Township.	Section.	Latitude $\phi$ .	Sec $\phi$ .	Difference for 10 Chains.	Tan $\phi$ .	Difference for 10 Chains.	Quarter Section.
1	36	49° 0000	0 183 06		0 060 84		40 000
	1	0147	19		0 061 06		39 988
	12	0291	31		28		976
	13	0438	44		51		964
	24	0582	57		73		953
	25	0729	69		95		941
	36	0874	82		0 062 17		929
2	1	1020	95	0 000 02	40	0 000 03	917
	12	1165	0 184 08		62		905
	13	1311	20		85		893
	24	1456	33		0 063 07		882
	25	1603	46		29		870
	36	1747	59		51		39 858
							40 143
3	1	1894	71		71		131
	12	2039	84		96		119
	13	2185	97		0 064 18		107
	24	2330	0 185 10		41		095
	25	2476	23		63		084
	36	2621	35		85		072
4	1	2768	48		0 065 08		060
	12	2912	61		30		048

TABLE X—Continued.

LATITUDE, with Logarithms of Secant and Tangent for each Section, and width of Quarter Sections—Continued.

Township.	Section.	Latitude $\phi$ .	Sec $\phi$ .	Difference for 10 Chains.	Tan $\phi$ .	Difference for 10 Chains.	Quarter Section.	
5	13	49° 3059	0·185	74	0·065	52	40·036	
	24	3203		87		74	024	
	25	3350	0·186	00		97	012	
	36	3495		12	0·066	19	000	
	1	3641		25		42	39·988	
	12	3786		38		64	976	
	13	3932		51		86	964	
	24	4077		64	0·067	08	952	
	25	4224		77		31	940	
	36	4368		90		53	928	
	6	1	4515	0·187	03		76	916
		12	4659		15		98	904
13		4806		28	0·068	20	892	
24		4951		41		43	880	
25		5097		54		65	868	
36		5242		67		87	39·858 40·145	
7	1	5388		80	0·069	10	133	
	12	5533		93		32	121	
	13	5680	0·188	06		54	109	
	24	5824		19		77	097	
	25	5971		32		99	085	
	36	6115		45	0·070	21	073	
8	1	6262		58		44	060	
	12	6407		71		66	048	
	13	6553		84		89	036	
	24	6698		97	0·071	11	024	
	25	6844	0·189	10		33	012	
	36	6989		23		56	000	
9	1	7136		36		78	39·988	
	12	7280		49	0·072	00	976	
	13	7427		62		23	964	
	24	7571		75		45	951	
	25	7718		88		68	939	
	36	7863	0·190	01		90	927	
10	1	8009		14	0·073	12	915	
	12	8154		27		35	903	
	13	8300		40		57	891	
	24	8445		53		79	879	
	25	8592		66	0·074	02	867	
	36	8736		79		24	39·855 40·147	
11	1	8883		93		47	135	
	12	9027	0·191	06		69	122	
	13	9174		19		92	110	
	24	9319		32	0·075	14	098	
	25	9465		45		36	086	
	36	9610		58		59	073	
12	1	9756		71		81	061	
	12	9901		84	0·076	03	050	
	13	50° 0047		88		26	037	
	24	0192	0·192	11		48	024	



TABLE X—Continued.  
 LATITUDE, with Logarithms of Secant and Tangent for each Section, and width of Quarter Sections—Continued.

Township.	Section.	Latitude $\phi$ .	Sec $\phi$ .	Difference for 10 Chains.	Tan $\phi$ .	Difference for 10 Chains.	Quarter Section.
13	25	50° 0339	0 192 24		0 076 71		40 012
	36	0483	37		93		000
	1	0630	50		0 077 16		39 988
	12	0775	63		38		975
	13	0921	77		60		963
	24	1066	90		83		951
14	25	1212	0 193 03		0 078 05		939
	36	1357	16		28		926
	1	1503	29		50		914
	12	1648	43		72		902
	13	1795	56		95		890
	24	1939	69		0 079 17		877
15	25	2086	82		40		865
	36	2230	96		62		{ 39 853 40 149
	1	2377	0 194 09		85		137
	12	2522	22		0 080 07		124
	13	2668	35		30		112
	24	2813	49		52		099
16	25	2959	62		75		087
	36	3104	75		97		074
	1	3250	89		0 081 20		062
	12	3395	0 195 02		42		050
	13	3542	15		64		037
	24	3686	28		87		025
17	25	3833	42		0 082 09		012
	36	3977	55	0 000 02	32	0 000 03	000
	1	4124	69		54		39 988
	12	4269	82		77		975
	13	4415	95		99		963
	24	4560	0 196 09		0 083 22		950
18	25	4706	22		44		940
	36	4851	35		67		925
	1	4997	49		89		913
	12	5142	62		0 084 12		901
	13	5289	76		34		888
	24	5433	89		56		876
19	25	5580	0 197 02		79		863
	36	5724	16		0 085 01		{ 39 851 40 150
	1	5871	29		24		138
	12	6016	43		46		125
	13	6162	56		69		113
	24	6307	69		91		100
20	25	6453	83		0 086 14		088
	36	6598	96		36		075
	1	6744	0 198 10		59		063
	12	6889	23		81		050
	13	7035	37		0 087 04		038
	24	7180	50		27		025
21	25	7327	64		49		013
	36	7471	77		72		000
	1	7618	91		94		39 987
	12	7762	0 199 04		0 088 17		975

TABLE X—Continued.  
LATITUDE, with Logarithms of Secant and Tangent for each Section and width of Quarter Sections—Continued.

Township.	Section.	Latitude $\phi$ .	Sec $\phi$ .	Difference for 10 Chains.	Tan $\phi$ .	Difference for 10 Chains.	Quarter-Section.
	13	50° 7909	0 199 18		0 088 39		39 962
	24	8054	31		950		
	25	8200	45		937		
	36	8345	58		925		
22	1	8491	72	0 000 02	29	0 000 03	912
	12	8636	85		899		
	13	8782	99		887		
	24	8927	0 200 13		874		
	25	9073	26		862		
	36	9218	40		849		
23	1	9365	53	0 000 02	65	0 000 03	140
	12	9509	67		127		
	13	9656	81		114		
	24	9800	0 201 08		102		
	25	9747	94		089		
	36	51° 0091	21		076		
24	1	0238	35	0 000 02	0 092 00	0 000 03	064
	12	0383	49		051		
	13	0529	63		038		
	24	0674	76		025		
	25	0820	90		013		
	36	0965	0 202 03		000		
25	1	1111	17	0 000 02	35	0 000 03	39 987
	12	1256	31		975		
	13	1402	44		962		
	24	1547	58		949		
	25	1694	72		936		
	36	1838	86		924		
26	1	1985	99	0 000 02	71	0 000 03	911
	12	2129	0 203 13		898		
	13	2276	27		885		
	24	2420	40		873		
	25	2567	54		860		
	36	2712	68		847		
27	1	2858	82	0 000 02	0 096 07	0 000 03	141
	12	3003	95		129		
	13	3149	0 204 09		116		
	24	3294	23		103		
	25	3440	37		090		
	36	3585	51		077		
28	1	3731	64	0 000 02	42	0 000 03	064
	12	3876	78		051		
	13	4023	92		039		
	24	4167	0 205 06		026		
	25	4314	20		013		
	36	4458	33		000		
29	1	4605	47	0 000 02	78	0 000 03	39 987
	12	4749	61		974		
	13	4896	75		962		
	24	5040	89		949		
	25	5187	0 206 03		936		
	36	5332	17		923		

TABLE X—Continued.

LATITUDE, with Logarithms of Secant and Tangent for each Section, and width of Quarter Sections—Continued.

Township.	Section.	Latitude $\phi$ .	Sec $\phi$ .	Difference for 10 Chains.	Tan $\phi$ .	Difference for 10 Chains.	Quarter Section.
30	1	51° 5478	0.206 81	0.000 02	0.100 14	0.000 03	910
	12	5263	44		36		897
	13	5769	58		59		884
	24	5914	72		82		39.871
	25	6060	86		0.101 05		858
	36	6205	0.207 00		27		{ 39.846 40.156
31	1	6351	14		50		143
	12	6496	28		72		130
	13	6642	42		95		117
	24	6787	56		0.102 18		104
	25	6934	70		41		091
	36	7078	84		63		078
32	1	7225	99		86		065
	12	7369	0.208 12		0.103 08		052
	13	7516	26		31		039
	24	7660	40		54		026
	25	7807	54		77		013
	36	7951	68		99		000
33	1	8098	82	0.104 22	39.987		
	12	8243	96	45	974		
	13	8389	0.209 10	68	961		
	24	8534	24	90	943		
	25	8680	38	0.105 13	935		
	36	8825	52	35	922		
34	1	8971	66	58	909		
	12	9116	80	81	896		
	13	9262	94	0.106 04	883		
	24	9407	0.210 08	26	869		
	25	9553	22	49	856		
	36	9698	36	72	{ 39.843 40.158		
35	1	9844	51	95	145		
	12	9989	65	0.107 17	132		
	13	52° 0135	79	40	119		
	24	0280	93	63	106		
	25	0427	0.211 07	86	092		
	36	0571	21	0.108 08	079		
36	1	0718	36	31	066		
	12	0862	50	54	053		
	13	1009	64	77	040		
	24	1153	78	99	026		
	25	1300	92	0.109 22	013		
	36	1444	0.212 06	45	000		
37	1	1591	21	68	39.987		
	12	1735	35	90	974		
	13	1882	49	0.110 13	960		
	24	2027	63	36	947		
	25	2173	77	59	934		
	36	2318	92	81	921		
38	1	2464	0.213 06	0.111 04	907		
	12	2609	20	27	894		
	13	2755	34	50	881		
	24	2900	49	73	868		

TABLE X—Continued.

LATITUDE, with Logarithms of Secant and Tangent for each Section, and width of Quarter Sections—Continued.

Township.	Section.	Latitude $\phi$ .	Sec $\phi$ .	Difference for 10 Chains.	Tan $\phi$ .	Difference for 10 Chains.	Quarter Section.
	25	52° 3046	0 213 63		0 211 96		855
	36	3191	77		0 112 18		{ 39 841 40 160
39	1	5337	92	0 000 02	41	0 000 03	147
	12	3482	0 214 06		64		134
	13	3628	20		87		120
	24	3773	34		0 113 09		107
	25	3919	49		32		093
	36	4064	63		55		080
40	1	4210	77		78		067
	12	4355	92		0 114 01		053
	13	4501	0 215 06		24		040
	24	4646	20		46		027
	25	4794	35		69		013
	36	4937	49		92		000
41	1	5084	64		0 115 15		39 987
	12	5228	78		38		973
	13	5375	92		61		960
	24	5519	0 216 07		83		946
	25	5666	21		0 116 06		933
	36	5810	35		29		920
42	1	5957	50		52		906
	12	6101	64		75		893
	13	6248	79		98		879
	24	6392	93		0 117 21		866
	25	6539	0 217 08		44		853
	36	6683	22		66		{ 39 839 40 162
43	1	6830	37		89		149
	12	6974	51		0 118 12		135
	13	7121	66		35		122
	24	7266	80		58		108
	25	7412	95		81		095
	36	7557	0 218 09		0 119 04		081
44	1	7703	24		27		068
	12	7848	38		49		054
	13	7994	53		73		041
	24	8139	67		95		027
	25	8285	82		0 120 18		014
	36	8430	96	0 000 02	41	0 000 03	000
45	1	8576	0 219 11		64		39 986
	12	8721	25	0 000 02	87		973
	13	8867	40		0 121 10		950
	24	9012	55		33		946
	25	9158	69		56		932
	36	9303	84		79		919
46	1	9449	98		0 122 02		905
	12	9594	0 220 13		25		891
	13	9740	28		48		878
	24	9885	42		70		864
	25	53° 0031	57		93		851
	36	0176	71		0 123 16		{ 39 837 40 164

TABLE X—Continued.

LATITUDE, with Logarithms of Secant and Tangent for each Section, and width of Quarter Sections—Continued.

Township.	Section.	Latitude $\phi$ .	Sec $\phi$ .	Difference for 10 Chains.	Tan $\phi$ .	Difference for 10 Chains.	Quarter Section.
47	1	53° 0321	0 220 86		0 123 39		40 151
	12	0467	0 221 01		62		137
	13	0612	15		85		123
	24	0758	30		0 124 08		110
	25	0903	45		31		096
	36	1049	59		54		082
48	1	1195	74		77		068
	12	1340	89		0 125 00		055
	13	1486	0 222 04		23		041
	24	1631	18		46		027
	25	1777	33		69		014
	36	1922	48		92		000
49	1	2068	63		0 126 15		39 986
	12	2213	77		38		972
	13	2359	92		61		958
	24	2504	0 223 07		84		945
	25	2650	22		0 127 07		931
	36	2795	36		30		917
50	1	2941	51		53		903
	12	3086	66		76		889
	13	3233	81		99		875
	24	3377	96		0 128 22		861
	25	3524	0 224 10		45		848
	36	3668	25	0 000 02	68	0 000 03	{ 39 834 40 166
51	1	3815	40		91		153
	12	3959	55		0 129 14		139
	13	4106	70		37		125
	24	4250	85		60		111
	25	4397	0 225 00		83		097
	36	4541	14		0 130 06		083
52	1	4688	29		30		069
	12	4832	44		53		055
	13	4979	59		76		042
	24	5123	74		99		028
	25	5270	89		0 131 23		014
	36	5414	0 226 04		45		000
53	1	5561	19		68		39 986
	12	5705	34		91		972
	13	5852	49		0 132 14		958
	24	5996	63		37		944
	25	6143	79		60		930
	36	6287	93		83		917
54	1	6434	0 227 08		0 133 07		903
	12	6578	23		30		890
	13	6725	38		53		875
	24	6869	53		76		861
	25	7016	68		99		847
	36	7160	83		0 134 22		{ 39 834 40 169
55	1	7307	99		45		155
	12	7451	0 228 13		68		140
	13	7598	29		91		126
	24	7742	44		0 135 14		112

TABLE X—Continued.

LATITUDE, with Logarithms of Secant and Tangent for each Section, and width of Quarter Sections—Continued.

Township.	Section	Latitude $\phi$ .	Sec $\phi$ .	Difference for 10 Chains.	Tan $\phi$ .	Difference for 10 Chains.	Quarter Section.
	25	53° 7889	0·228 59		0·135 38		40·098
	36	8033	74		61		084
56	1	8180	89		84		070
	12	8324	0·229 04		0·136 07		056
	13	8471	19	0·000 02	30	0·000 03	042
	24	8615	34		53		028
	25	8762	49		77		014
	36	8906	64		0·137 00		000
57	1	9052	79		23		39·986
	12	9197	95		46		972
	13	9343	0·230 10		69		958
	24	9488	25		92		944
	25	9634	40		0·138 16		930
	36	9779	55		39		915
58	1	9925	70		62		901
	12	54° 0070	85		85		887
	13	0216	0·231 01		0·139 08		873
	24	0361	16		31		859
	25	0507	31		55		845
	36	0652	46		78		{ 39·831 40·171
59	1	0798	62		0·140 01		157
	12	0943	77		24		142
	13	1089	92		48		128
	24	1234	0·232 07		71		114
	25	1380	23		94		100
60	36	1525	38		0·141 17		085
	1	1671	53		41		071
	12	1816	68		64		057
	13	1962	84		87		043
	24	2107	99		0·142 10		028
	25	2253	0·233 14		34		014
	36	2398	29		57		000
61	1	2544	45		80		39·986
	12	2689	60		0·143 03		971
	13	2835	76		27		957
	24	2980	91		50		943
	25	3126	0·234 06		73		929
	36	3271	21		96		914
62	1	3417	37		0·144 20		900
	12	3562	52		43		886
	13	3708	68		66		872
	24	3853	83		89		857
	25	3999	98		0·145 13		843
	36	4144	0·235 14		36		{ 39·829 40·173
63	1	4290	29		59		159
	12	4435	45		83		144
	13	4581	60		0·146 06		130
	24	4725	75		29		115
	25	4872	91		53		101
	36	5016	0·236 06		76		086
64	1	5163	22		99		072
	12	5307	37		0·147 22		058

TABLE X—Continued.

LATITUDE, with Logarithms of Secant and Tangent for each Section, and width of Quarter Sections—Continued.

Township.	Section.	Latitude $\phi$ .	Sec $\phi$ .	Difference for 10 Chains.	Tan $\phi$ .	Difference for 10 Chains.	Quarter Section.
	13	54° 5454	0 236 53		0 147 46		40 043
	24	5598	68		69		029
	25	5745	84		93		014
	36	5889	99		0 148 16		000
65	1	6036	0 237 15		39		986
	12	6180	30		63		971
	13	6327	46		86		957
	24	6471	61		0 149 09		942
	25	6618	77		33		928
	36	6762	92		56		913
66	1	6909	0 238 08		80		899
	12	7053	24		0 150 03		884
	13	7199	39		26		870
	24	7344	55		50		855
	25	7490	70		73		841
	36	7635	86		96		{ 39 827 40 175
67	1	7781	0 239 02		0 151 20		161
	12	7926	17		43		146
	13	8072	33		67		131
	24	8217	49		90		117
	25	8363	64		0 152 13		102
	36	8508	80		37		088
68	1	8654	96		60		073
	12	8799	0 240 11	0 000 02	84	0 000 03	058
	13	8945	27		0 153 07		044
	24	9090	43		31		029
	25	9236	58		54		015
	36	9381	74		77		000
69	1	9527	90		0 154 01		39 985
	12	9672	0 241 05		24		971
	13	9818	21		48		956
	24	9962	37		71		941
	25	55° 0109	53		95		927
	36	0253	68		0 155 18		912
70	1	0400	84		42		898
	12	0544	0 242 00		65		883
	13	0691	16		89		868
	24	0835	31		0 156 12		854
	25	0982	47		36		839
	36	1126	63		59		{ 39 824 40 177
71	1	1274	79		83		163
	12	1417	95		0 157 06		148
	13	1563	0 243 11		30		133
	24	1708	26		53		118
	25	1854	42		77		104
	36	1999	58		0 158 00		089
72	1	2145	74		24		40 074
	12	2290	90		47		059
	13	2436	0 244 06		71		044
	24	2581	22		94		030
	25	2727	38		0 159 18		015
	36	2872	53		41		000

TABLE X—Continued.

LATITUDE, with Logarithms of Secant and Tangent for each Section, and width of Quarter Sections—Continued.

Township.	Section.	Latitude $\phi$ .	Sec $\phi$ .	Difference for 10 Chains.	Tan $\phi$ .	Difference for 10 Chains.	Quarter Section.
73	1	55° 3018	0.244 69		0.159 65		39.985
	12	3163	85		89		970
	13	3309	0.245 01		0.160 12		956
	24	3454	17		36		941
	25	3600	33		59		926
	36	3744	49		83		911
74	1	3891	65		0.161 07		896
	12	4035	81		30		881
	13	4182	97		54		867
	24	4326	0.246 13		77		852
	25	4473	29		0.162 01		837
	36	4617	45		24		{ 39.822 40.180
75	1	4764	61		48		165
	12	4908	77		72		150
	13	5054	93		95		135
	24	5199	0.247 09		0.163 19		120
	25	5345	25		43		105
	36	5490	41		66		090
76	1	5636	57		90		075
	12	5781	73		0.164 13		060
	13	5927	90		37		045
	24	6072	0.248 06		61		030
	25	6218	22		85		015
	36	6363	38		0.165 08		000
77	1	6509	54	0.000 02	32	0.000 03	39.985
	12	6654	70		55		970
	13	6800	86		79		955
	24	6944	0.249 02		0.166 03		940
	25	7091	19		27		925
	36	7235	35		50		910
78	1	7382	51		74		895
	12	7526	67		98		880
	13	7672	83		0.167 21		865
	24	7817	0.250 00		45		850
	25	7963	16		69		835
	36	8108	32		92		{ 39.820 40.182
79	1	8254	48		0.168 16		167
	12	8399	64		40		152
	13	8545	81		64		137
	24	8690	97		87		122
	25	8836	0.251 13		0.169 11		106
	36	8981	30		35		091
80	1	9127	46		59		076
	12	9272	62		82		061
	13	9418	79		0.170 06		046
	24	9562	95		30		030
	25	9709	0.252 11		54		015
	36	9853	27		77		000
81	1	56° 0000	44		0.171 01		39.985
	12	0144	60		25		970
	13	0291	77		49		954
	24	0435	93		72		939



TABLE X—*Concluded.*

LATITUDE, with Logarithms of Secant and Tangent for each Section, and width of Quarter Sections—*Concluded.*

Township.	Section.	Latitude $\phi$ .	Sec $\phi$ .	Difference for 10 Chains.	Tan $\phi$ .	Difference for 10 Chains.	Quarter Section.
82	25	56° 0581	0 253 09		0 171 96		39 924
	36	0726	26		0 172 20		909
	1	0872	42		44		893
	12	1017	58		68		878
	13	1163	75		92		863
	24	1308	91		0 173 15		848
	25	1454	0 254 08		39		833
	36	1599	24		63		39 817
							40 185

TABLE XI.

To Convert Chains into Decimals of a Township Side.

Chains.	Equivalent Decimal of a Township Side.			Chains.	Equivalent Decimal of a Township Side.		
	Side = 489°.	Side = 486°.	Side = 483°.		Side = 489°.	Side = 486°.	Side = 483°.
1	0 00204	0 00206	0 00207	30	0 06135	0 06173	0 06211
2	00409	00412	00414	40	08180	08230	08282
3	00613	00617	00621	50	10225	10288	10352
4	00818	00823	00828	60	12270	12346	12422
5	01022	01029	01035	70	14315	14403	14493
6	01227	01235	01242	80	16360	16461	16563
7	01431	01440	01449	90	18405	18519	18634
8	01636	01646	01656	100	20450	20576	20704
9	01840	01852	01863	200	40900	41152	41408
10	02045	02058	02070	300	61350	61728	62112
20	04090	04115	04141	400	81800	82305	82816

TABLE XII.

CORRECTIONS to be applied to the tabular quantities in Table No. VII when the north side of the road allowance on Correction Lines is run instead of the south; also correction to road allowance on account of curvature.

Number of Correction Line.	Correction to Chord Azimuth	Correction to Deflection Offset (for one chain distance).	Correction to width of road allowance on account of curvature.									
			jog = 30 chs.	jog = 40 chs.	jog = 50 chs.	jog = 60 chs.	jog = 70 chs.	jog = 80 chs.	jog = 90 chs.	jog = 100 chs.	jog = 110 chs.	jog = 120 chs.
		inches.	lks.	lks.	lks.	lks.	lks.	lks.	lks.	lks.	lks.	lks.
1st . . .	-1.3	+0.010	2.5	3.2	3.9	4.6	5.2	5.8	6.4	7.0	7.5	7.9
11th . . .	-1.7	+0.013	2.8	3.7	4.5	5.2	6.0	6.7	7.3	7.9	8.5	8.9
21st . . . .	-2.2	+0.017	3.2	4.2	5.2	6.0	6.9	7.7	8.4	9.1	9.8	10.4
31st . . . . .	-2.9	+0.022	3.7	4.8	5.9	6.9	7.9	8.8	9.6	10.4	11.2	11.9

TABLE XIII.

SHOWING the difference of Latitude between Township Corners and Section and Quarter Section Posts on a Township Chord.

Number of Line.	d $\phi$ For $\frac{1}{2}$ sec. from Corner.	d $\phi$ For 1 sec. from Corner.	d $\phi$ For $1\frac{1}{2}$ sec. from Corner.	d $\phi$ For 2 secs. from Corner.	d $\phi$ For $2\frac{1}{2}$ secs. from Corner.	d $\phi$ For 3 secs. from Corner.
	"	"	"	"	"	"
1st Base . . . . .	0.02 lks.	0.04 lks.	0.05 lks.	0.06 lks.	0.07 lks.	0.07 lks.
do . . . . .	3.2 "	5.9 "	8.0 "	9.5 "	10.3 "	10.8 "
11th Base . . . . .	0.02 lks.	0.04 lks.	0.06 lks.	0.07 lks.	0.08 lks.	0.08 lks.
do . . . . .	3.6 "	6.7 "	9.1 "	10.8 "	11.8 "	12.1 "
21st Base . . . . .	0.03 lks.	0.05 lks.	0.07 lks.	0.08 lks.	0.09 lks.	0.09 lks.
do . . . . .	4.2 "	7.7 "	10.3 "	12.3 "	13.3 "	13.8 "
31st Base . . . . .	0.03 lks.	0.06 lks.	0.08 lks.	0.09 lks.	0.10 lks.	0.11 lks.
do . . . . .	4.8 "	8.8 "	12.0 "	14.4 "	15.6 "	16.2 "