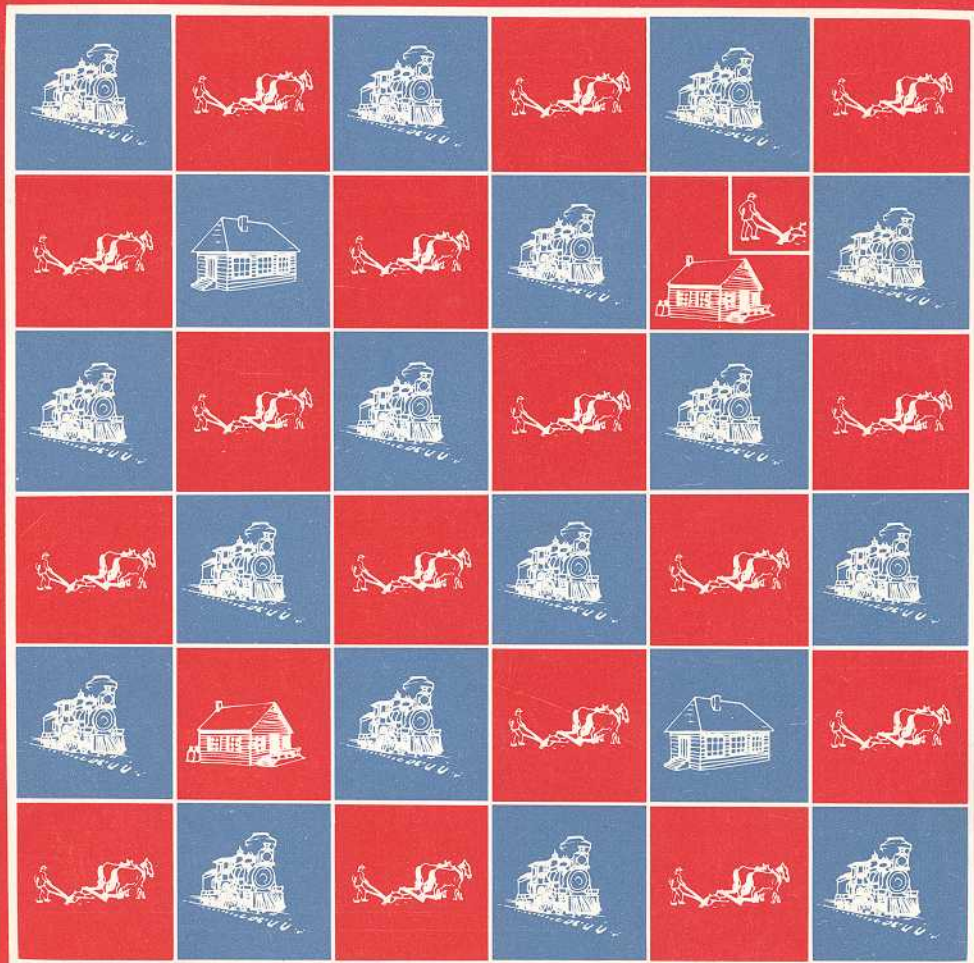


UNDERSTANDING WESTERN CANADA'S DOMINION LAND SURVEY SYSTEM

ROBERT B. McKERCHER - BERTRAM WOLFE



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**UNDERSTANDING WESTERN CANADA'S DOMINION
LAND SURVEY SYSTEM**

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SOURCES: Figure 3, page 2 and Figure 4, page 3, based on a map produced by the office of the Surveyor General of Canada, 1928. Figure 9, page 7 and Figure 13 page 9, based on map MCR 45 (sheet 1) produced by Energy, Mines and Resources, the Surveys and Mapping Branch, Ottawa, 1963. Figure 12, page 8, based on map 73H (Edition 2 ASE Series A 502), produced by Army Survey Establishment, R.C.E., Ottawa, 1966. Figure 15, page 12, based on grid map in *Atlas of Saskatchewan*, page 111, J. H. Richards and K. I. Fung, University of Saskatchewan, 1969. Figure 24, page 18 and Figure 26 page 20, based on map MCR 27 (Third Edition) produced by Energy, Mines and Resources, the Surveys and Mapping Branch, Ottawa, 1973. Figures 29 and 30, page 23, based on map MCR 3 (Third Edition) produced by Energy, Mines and Resources, the Surveys and Mapping Branch, Ottawa, 1973. Figure 31, page 24, based on Canada Lands Survey Records map 64854, 1978.

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Understanding Western Canada's Dominion Land Survey System

You cannot live in the West for very long without encountering such terms as "range," "township," "section," and "subdivision"—terms that appear in legal documents, agricultural reports and which you will find on roads signs throughout the province. Anyone who studies pioneering life and the development of the West will come across such terms again and again, in historical documents, records of land transactions, as well as verbatim reports. As most persons associated in any way with the rural life of the West will know, such terms are used to describe, in a very precise way, the location of land in the western provinces.

The western grid system of land description, known as the Dominion Land Survey (D.L.S.) system, is of undeniable value and utility. It allows one to pinpoint accurately the location of a parcel of land as small as 10 acres anywhere on the Dominion grid. With a sufficiently detailed map showing the grid and its subdivisions, anyone with an understanding of how the grid system works can identify and, if necessary, travel to a specified parcel of land.

Many westerners, particularly farmers and persons involved with rural communities, will already have a thorough working knowledge of the grid system; for these persons this publication may be useful as a reference. Primarily its purpose is to set down in one place the information that is

available in many different publications but which, to our knowledge, has not been presented in a single discussion. In attempting to cover the fundamentals of the system as a whole, we have of necessity been forced to omit certain details, and we have focussed on the Saskatchewan grid for a number of our introductory illustrations and explanations. For persons who may wish to study this topic in greater depth, we have provided a reading list on page 25.

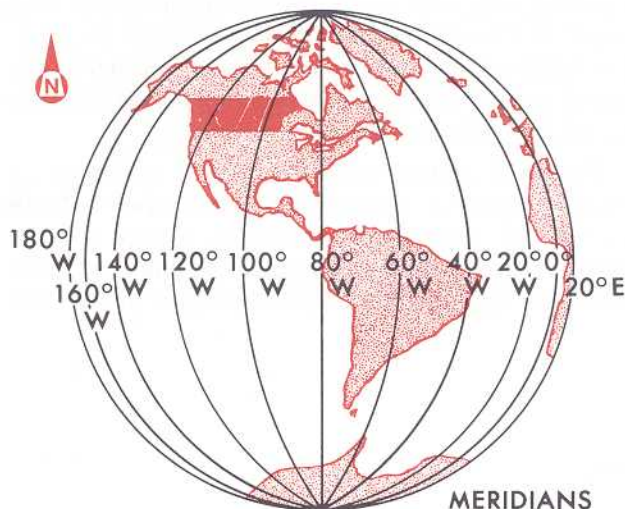


Figure 2 — Lines of longitude, or meridians.

INTRODUCING THE SURVEY SYSTEM

Some Necessary Fundamentals

As most readers will know, maps use a system of latitude and longitude lines to specify location. Lines of latitude, or **parallels**, are evenly spaced circles running parallel to the equator. Parallels are identified as being a certain number of degrees north or south of the equator (Figure 1). Lines of longitude, or **meridians**, are drawn so that they converge at the north and south poles of the globe (Figure 2). The meridian lines are also indicated in degrees, with the line that passes through Greenwich near London, England, labelled 0°. Meridian lines to the east of this line are labelled in degrees east longitude up to 180°; meridian lines to the west of the 0° line are labelled in degrees west longitude, also up to 180°. The 180° line, passing through the Fiji islands in the Pacific, is the international date line.

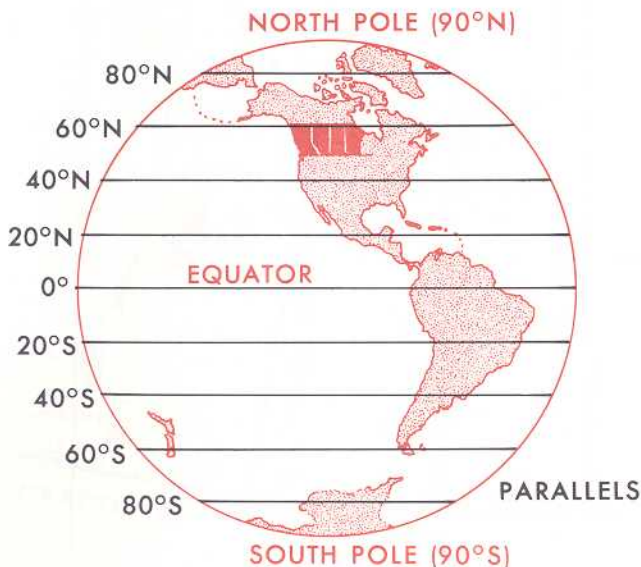


Figure 1 — Lines of latitude, or parallels.

The Beginnings

Early in the homestead period of western Canada, the Dominion Government decided to develop a grid system for land description in the West. It was thought that such a system would be more satisfactory than the county, township and concession system of eastern Canada, and more orderly and flexible than the farm name and field position descriptions of north-western Europe. The basic grid is formed by the intersection of **township lines** running east and west and **range lines** running north and south, and an attempt is made to space the lines so as to form squares of approximately equal area — a goal that in practice proved difficult to achieve, as we shall explain later.

The grid system required that a meridian be chosen, and this meridian was established in 1869 at $97^{\circ} 27' 28.4''$ west longitude (Figure 3). The events surrounding the choice of this particular meridian constitute a colorful chapter of western

history. Suffice to say here that it was chosen because it marked the western limit of settlement up to that date. Called the **prime, first, or Winnipeg meridian**, it passes just west of Winnipeg.

Having established their first meridian, the early surveyors proceeded to mark off their grid to the west and east of the meridian. In this section we will limit ourselves to describing the development of the grid that extends west of the first meridian. In laying out this grid, the surveyors began at the first meridian about 61 miles north of 49° north latitude (the 49th parallel) — see page 17. As the grid extended westward, the surveyors established new meridians at 102° , 106° , and 110° , 114° , 118° and 122° west longitude — respectively the **second, third, fourth, fifth, sixth, and seventh** meridians (Figure 3). There is also an **eighth** meridian in the system, the so-called coast meridian, at $122^{\circ} 45' 39.6''$, about 35 miles west of the seventh meridian, as measured along the 49th parallel. The coast meridian, not shown in Figure 3, is discussed on page 24.

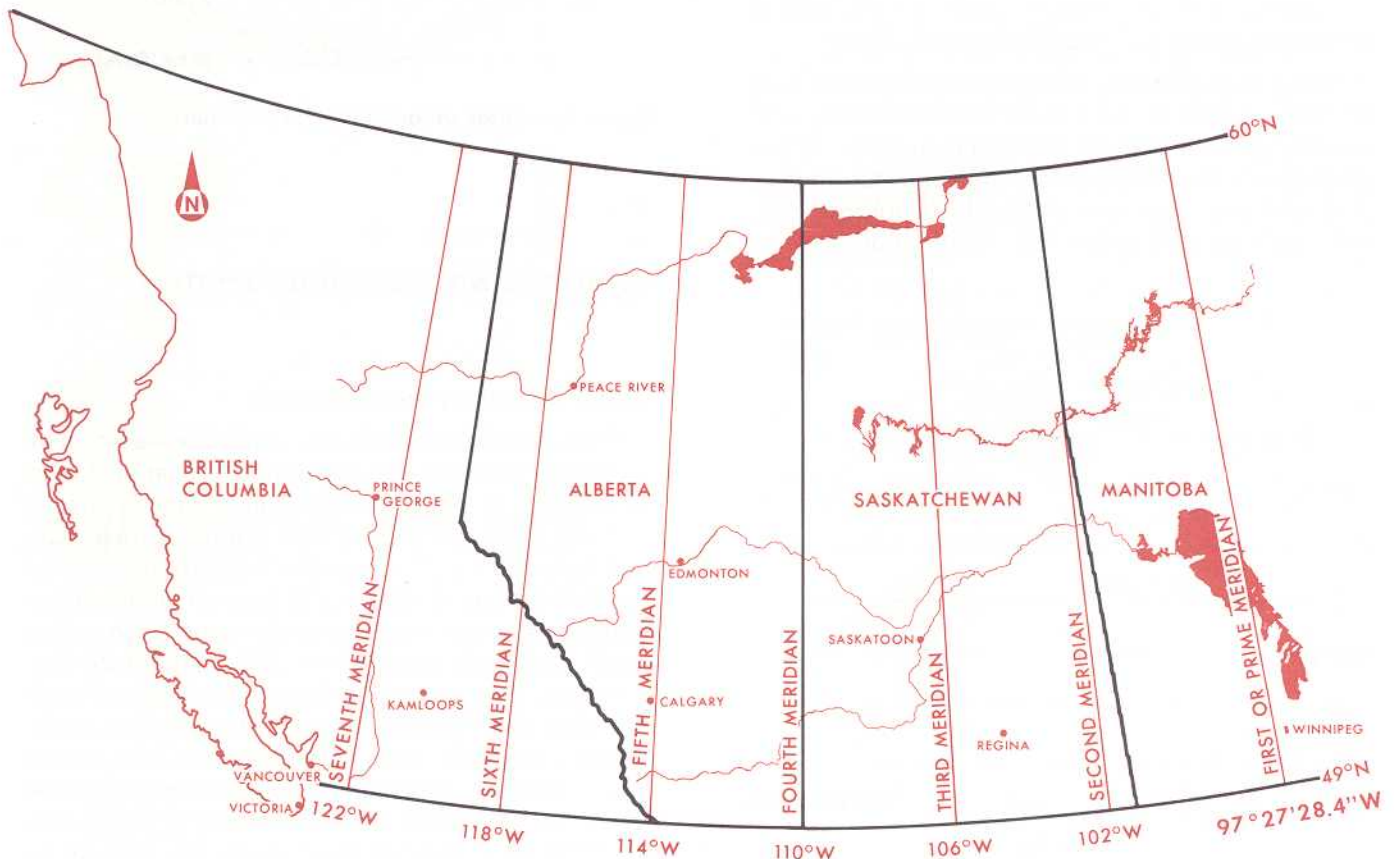


Figure 3 — In laying out the grid system, the Dominion surveyors established 7 key meridians as reference lines.

The Basic Grid

The grid consists of townships running east and west, and ranges running north and south (Figure 4). The term **township** in this context refers to the strip of land between consecutive township lines, which are placed approximately 6 miles apart. Townships are numbered 1, 2, 3, and so on to the north. Hence **township 1** refers to the 6-mile-wide strip of land that runs east and west and "sits" on the 49th parallel; **township 2** is the 6-mile-wide strip of land immediately north of township 1; and so on.

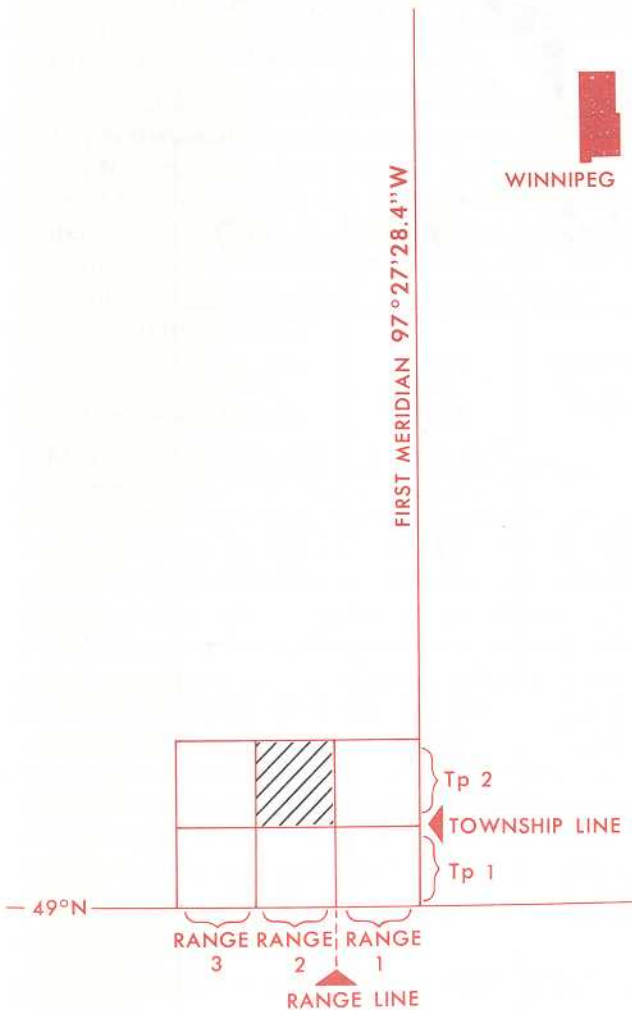


Figure 4 — A small portion of the basic grid west of the first meridian.

Similarly, **range** refers to the north-south running strip of land between consecutive range lines, which were also placed about 6 miles apart. The system for numbering ranges works this way. The

range immediately to the west of any meridian is range 1; the range to the west of range 1 is range 2, the range to the west of it range 3, and so on to the west until you reach the next meridian; to the west of it, of course, the range numbers begin again at 1. The first range to the east of the first meridian is range 1, the range to the east of it range 2, and so on. We suggest you now skip ahead to look at the grid maps of the provinces (Figures 15, 24, 26, 29 and 30), which show the numbering of the ranges in relation to the meridians. You may wish to begin in Manitoba at range 1, west of the first meridian (Figure 24) and follow the range numbers west along the 49th parallel.

The range and township lines present a grid of land packages, most of which are almost square and more or less 6 miles on a side. At this point some confusion is likely to arise, because each of these parcels of land is also called a **township**! To simplify matters somewhat, we will use the term **township**, written out in full, to refer to the parcel of land more or less 36 square miles in area formed by the intersection of range and township lines. To refer to the long strip of land between consecutive township lines we will use the abbreviation **tp** followed by a number to indicate its location, as explained above.

Identifying the Township

Say that we wish to identify a particular township within the total grid. The shaded township in Figure 4, for example, would be identified as tp 2 range 2, west of the first meridian. More commonly, this description would appear in shortened form as 2-2-W1. The grid system also allows us to identify smaller areas than a township, as we shall explain in the following two sections.

Getting Smaller and Smaller — Dividing the Township

With the information we have provided thus far, you should be able to locate, on the basis of its legal description, the position of any particular township in the Dominion survey grid; and, conversely, to provide a legal description of any specified township in the grid. But there is more to come. It is possible to identify areas significantly smaller than a township within this same grid system.

This section and the next will make a lot more sense if you refer as often as necessary to Figure 5 while you read. To illustrate areas within a typical township we have taken as an example a township

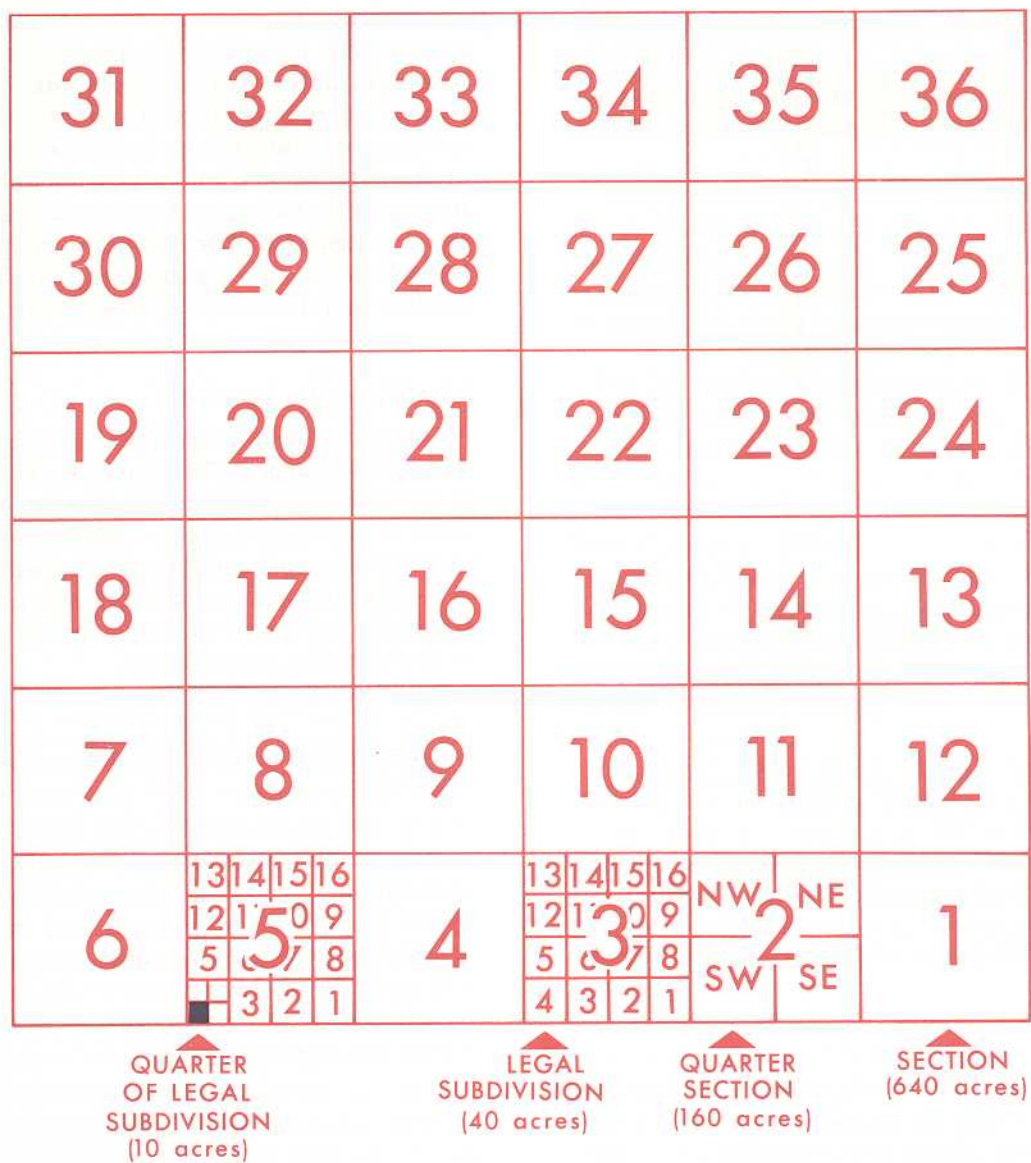
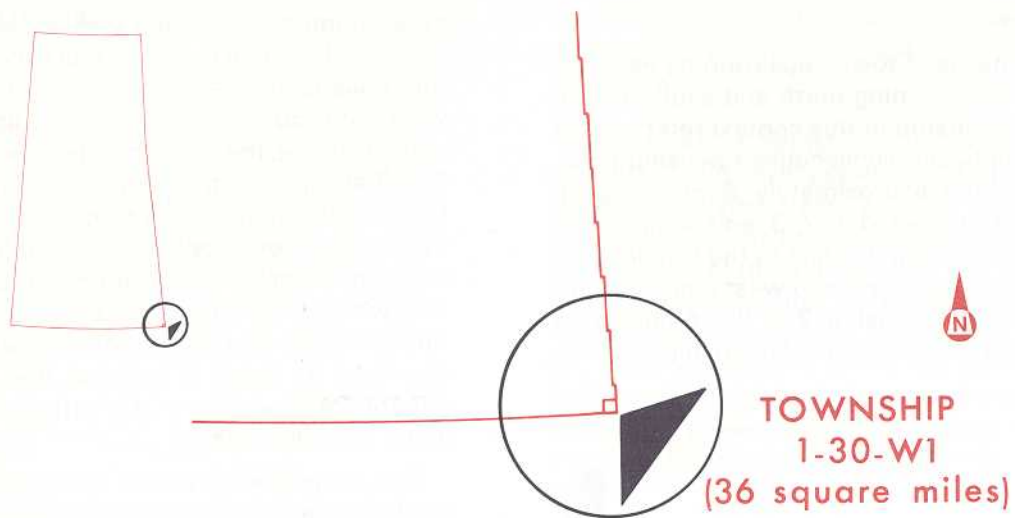


Figure 5 — The anatomy of a township (road allowances not shown).

located in the south-east corner of Saskatchewan —1-30-W1 — shown circled in the small-scale maps of Saskatchewan, Figure 5.

A township is divided into **sections**, each more or less 1 mile square and containing about 640 acres. Typically there are 36 sections to a township and these are numbered as shown, beginning with the section in the south-east corner of the township (some townships contain fewer than 36 sections — a matter which we shall take up later).

The sections are normally further divided into **quarter sections**. There are of course 4 to a section (the occurrence of partial sections will also be left till later to discuss). Each quarter section is about 160 acres and is described by its compass direction, e.g., south-west quarter. In the figure, section 2 is shown divided into quarter sections.

The sections may also be broken down into **legal subdivisions** of 40 acres each — a scheme that is normally employed near urban centres and is often used in describing the mining sites of mineral and oil deposits. There are 16 legal subdivisions in a section, numbered as shown in sections 3 and 5 in the figure.

Infrequently, legal subdivisions are further divided into **quarters**, described by compass direction. In the figure, the fourth legal subdivision in section 5 has been divided into quarters. Each of these small areas, the smallest that can be described in the grid system, is a quarter of a legal subdivision, and is 10 acres in area.

Identifying Areas Smaller Than the Township

As we have seen, any particular township in the grid can be described by providing 3 items of information in this order: tp number, range number, and meridian. It is also possible to describe any of the smaller parcels of land into which the township can be divided. Say for example that we wish to identify the 10-acre parcel of land that is shown in black in Figure 5. We can describe it as follows: the south-west quarter of legal subdivision 4 of section 5 in tp 1 range 30, west of the first meridian. Normally this would appear in shortened form as: SW of L.S.D. 4-5-1-30-W1. If we wished to describe the whole of the legal subdivision rather than its south-west quarter, we would write: L.S.D. 4-5-1-30-W1. We can also describe the section in which the legal subdivision is located: 5-1-30-W1. And a particular quarter of this section, say the north-west: NW5-1-30-W1.

A Complication Is Introduced — Correction Lines

As stated earlier, the meridians are converging lines that meet at the poles. Like the meridians, the range lines also converge as they run north from the 49th parallel. As a result, the top or northern border of any township must measure slightly less in distance than its base or southern border. For example, in the Saskatoon area, the townships are 123.5 feet less in length along the northern boundary than along the southern boundary. Taking any particular township, the township immediately to its north will therefore be slightly smaller in area. Since townships continue to decrease in area as you go farther north, if no attempt is made to correct for the difference, the northern townships will be significantly smaller in area than the southern ones (Figure 6a).

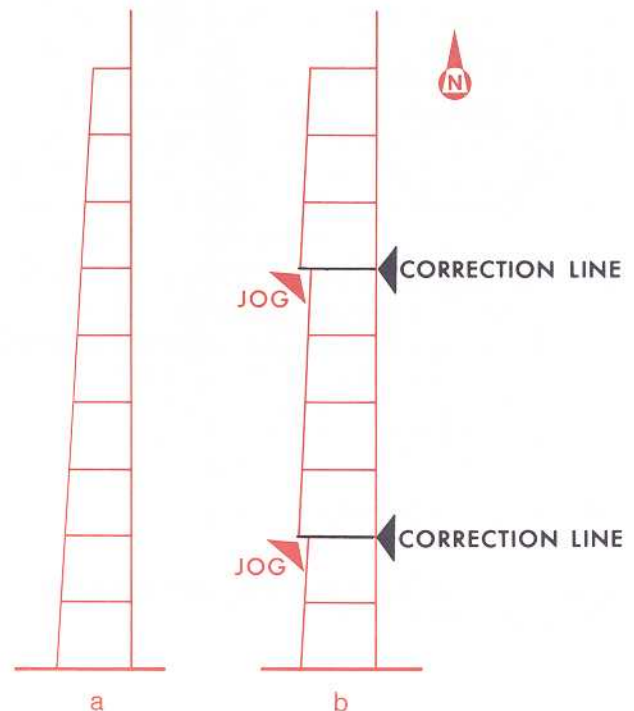


Figure 6 — A schematic illustration (not to scale) of: a) the effect of convergence on a vertical "row" of townships. b) compensating for convergence.

This, of course, was a situation that the surveyors wanted to avoid, since the whole intent of the grid system was to create parcels of land of approximately the same size. To reduce distortion caused by the converging range lines, the surveyors used the following method. The second township line north

of the 49th parallel and every fourth township line thereafter were established as **correction lines**. At each correction line, the range line is displaced a certain distance. This **jog**, as it is called, in effect increases the area of the townships north of each correction line, thereby compensating somewhat for convergence (Figure 6b).

The jogs in the range lines west of any meridian are accumulative. That is, if you follow a correction line west from any meridian, you will find that the jogs you first encounter are very small. The jogs increase as you move west from range line to range line.

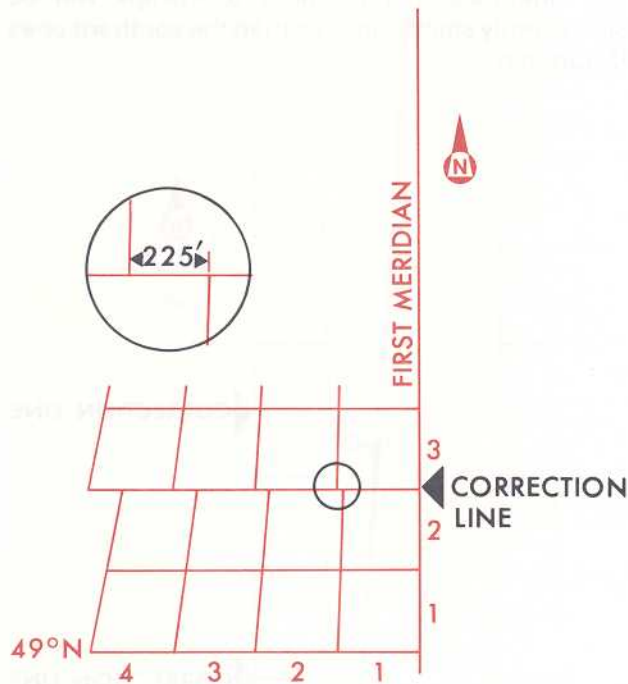


Figure 7 — Jogs increase as you move west from a meridian along a correction line.

Figure 7 shows some townships to the west of the first meridian along the first correction line. The scale of the figure has been greatly exaggerated so that you can see the jogs in the range lines. The jog in the range line immediately to the west of the first meridian at the first correction line actually amounts to about 225 feet — a feature that is only apparent on very detailed maps.

As noted above, the jogs increase as you travel west from the first (or any) meridian along a correction line. The jogs continue to increase until

you reach the second meridian. To the west of the second meridian, the jogs begin again at some very small value and increase as you proceed west along the correction line towards the third meridian. The same pattern is repeated for the remaining meridians to the west. This is shown in Figures 15, 24, and 26.

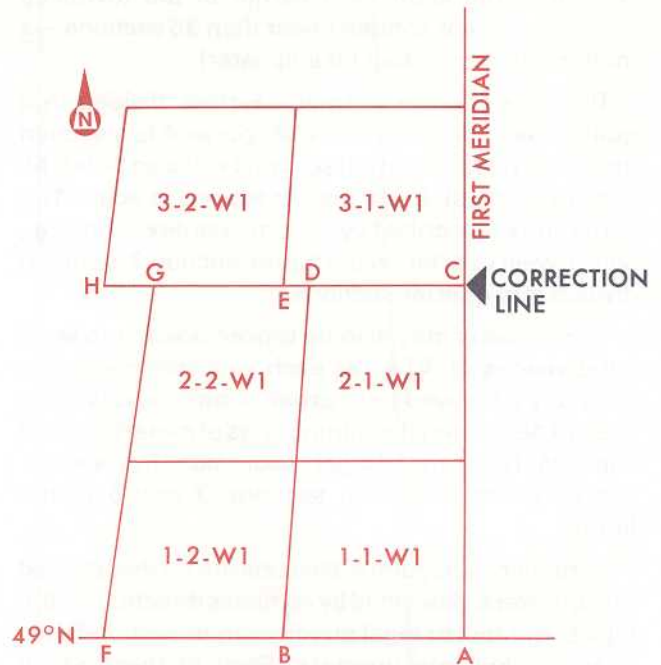


Figure 8 — The geometry of jogs.

In theory, the jogs should increase by *equal* increments as you travel west from any meridian along a correction line. The principle is illustrated in Figure 8. Assume that the base of 1-1-W1 (AB) is 6 miles; then the northern boundary of 2-1-W1 (CD) will be less than 6 miles, due to convergence. It can be calculated, taking convergence alone into account, that CD will be only 225 feet short of 6 miles. Thus, any line running true north *from this particular latitude* — 49°N — will converge by 225 feet in 12 miles. If CD is extended by 225 feet to point E, then the base of 3-1-W1 will be the desired 6 miles. This creates the jog DE of 225 feet.

Similarly, if the base of 1-2-W1 (BF) is 6 miles, then the northern boundary of 2-2-W1 (DG) will be 225 feet short of 6 miles — again because of convergence. What is even more important to grasp here is that the distance EG will be 450 feet short of 6 miles. Remember that DG is 225 feet short of 6

miles, and the distance DE (the jog) is 225 feet; therefore EG must be $225 + 225 = 450$ feet short of 6 miles. If EG is extended 450 feet to point H, the base of 3-2-W1 (EH) will be the desired 6 miles in length. This gives us the jog GH, 450 feet long.

At each successive range line to the west along the correction line, the jog should increase by 225 feet — in theory.

In practice, however, the surveyors often made small errors in measuring township and section boundaries. For example, due to errors of measurement, the northern boundary of 2-2-W1 (DG) might have turned out to be 235 feet short of 6 miles. In that case, the surveyors would have made the jog GH $225 + 235 = 460$ feet.

To summarize, then: If the early surveyors had corrected for convergence alone, the jogs would indeed have increased by fixed increments according to the principle illustrated in Figure 8. But, because the surveyors also corrected for measurement errors, the jogs do not increase by fixed increments the farther west you go along a correction line. The actual length of a particular jog cannot be determined on the basis of mathematics alone — you have to use a sufficiently detailed map, consult a registered land surveyor, or go out yourself and measure the jog.

The jogs in the range lines create an interesting feature in the survey system which is worth noting. The feature is evident for the range line immediately to the east of a meridian (with the exception of the first meridian). As each of these range lines pursues its northward course, it is displaced a distance to the west at each correction line. At a certain northward point, in crossing a correction line, the range line is displaced (jogs) so far to the west that it "disappears" — that is, it converges with the meridian. For example, as shown in Figure 9, the range line between ranges 29 and 30 west of the second meridian converges with the third meridian at the fourth correction line.

Before we leave the subject of jogs, we draw your attention to the fact that the range lines to the east of the first meridian jog to the east — in contrast to the range lines west of the first meridian, which all jog to the west. The jogs in the first range lines to the east of the first meridian are very small, the jogs becoming more pronounced the farther east you go along a correction line. (Refer to Figure 24.)

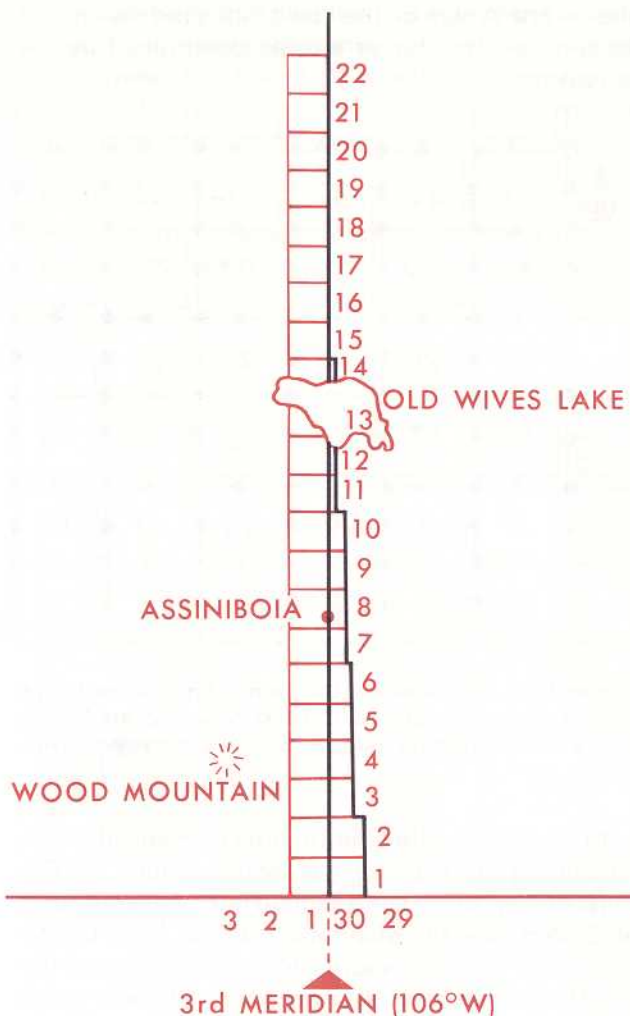


Figure 9 — The "disappearance" of a range line.

Monuments

Monuments are the markers placed during the original surveys. Usually 4 square pits 12-inches deep were dug; at a point midway between the 4 pits the marker, a stake or post, was planted, often in a small mound of earth. No pits were dug on rocky ground.

Markings on survey stakes or posts were always in Roman numerals, which could be easily cut in wood with a knife or hatchet, or marked on metal pegs with a chisel.

Sometimes it was not practical to place a marker on the required site. Some sites, for example, lay at the bottom of lakes or in dense bush where markers would not be visible. In such cases, the surveyors would place the marker as close to the correct site as possible. These "displaced" monuments consisted of a circular trench, mounded or not, with a stake in

the centre. A sign on the stake indicated the correct location of the marker site as determined by the surveyors.

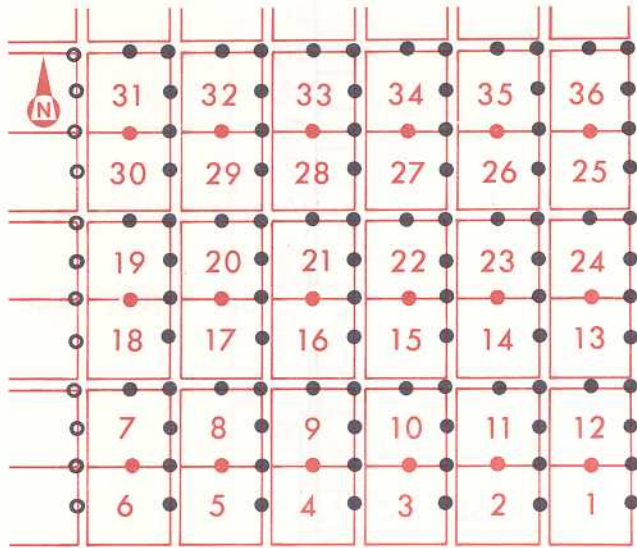


Figure 10 — Dots indicate locations of monuments in a typical township of the third survey. Colored dots indicate monuments placed in areas surveyed after 1915.

The location of the monuments in a typical township of the third survey is shown in Figure 10. The third survey, as we shall explain later, covered parts of Saskatchewan, Manitoba, Alberta, and British Columbia. The monuments were placed a) along the west limit of the road allowances on the north-south lines; b) along the south limit of road allowances on the east-west lines; and c) along the line between sections where there were no road allowances. They were placed so that they indicated the positions of the corners of adjoining townships, sections, and quarter sections.

There was one exception to the rule that monuments were placed only along the south limit of road allowances on the east-west lines. Where a road allowance between adjoining townships ran along a correction line, the markers were placed on **both** sides of the road, as indicated in Figure 11. This was

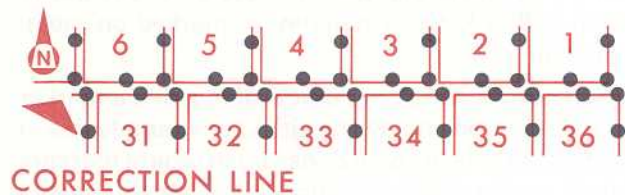


Figure 11 — When a road allowance between adjoining townships runs along a correction line, monuments are placed on both sides of the road.

done of course so that the markers would clearly indicate the displacement to the east or west along the correction line.

Most of the original monuments have been removed, though it was — and still is — illegal to do so. Any resurvey is now marked with a bright orange colored metal post, with an aluminum tab at the top.

Partial Sections and Acreage Anomalies

We have seen how converging meridians make it difficult to lay out the townships so that they are all the same size. Even with correction lines there are bound to be differences in area from one township to the next caused by the convergence effect. Other factors play a part in producing discrepancies in township and section areas.

Errors and Inconsistencies — In hilly or rough terrain, chaining measurements were often inaccurate; survey instruments could also be in error. When errors were discovered, an attempt was often made to average out the mistakes so that sections would be approximately the same size; but such attempts were not always completely successful. Furthermore, in some townships, certain quarter

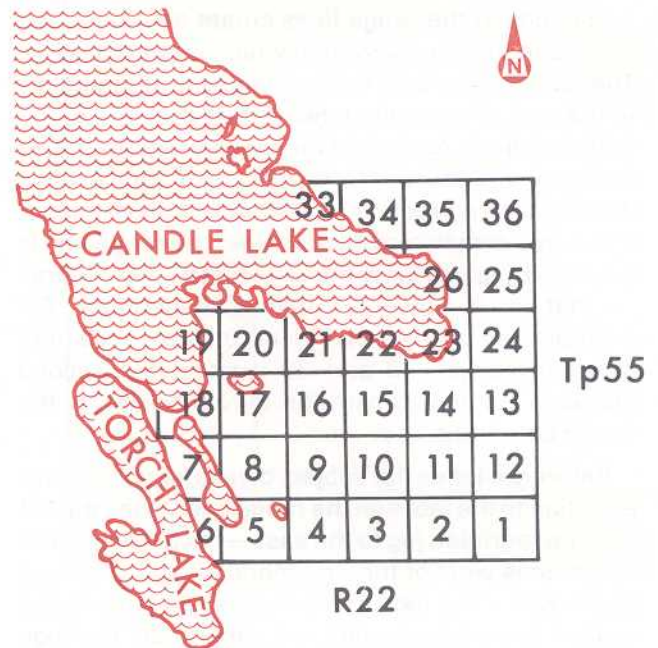


Figure 12 — Tp 55 range 22, west of the second meridian contains parts of Candle and Torch Lakes; the lakes create a number of partial sections in this township, and 3 sections are completely eliminated as dryland acreage.

sections had to be made smaller than others because of the method of survey used. (See page 14.)

Geographical Features — Townships that encroached on permanent bodies of water, either lakes or rivers, were short-changed in area. In Saskatchewan, tp 55 range 22, west of the second meridian, for example, contains parts of Candle Lake and Torch Lake (Figure 12). The lakes create a number of partial sections in this township, and 3 sections are completely eliminated as dryland acreage. Note that the numbering of the remaining sections is not affected.

Federal Lands, River Lots, Hudson's Bay Posts and Settlement Lots — There are a number of areas in the western provinces that are not part of the Dominion Land Survey system. Many of these areas were allocated and surveyed before the Dominion system was established. Their borders do not always coincide with the township grid, and they are generally not subdivided according to the township system.

Federal lands include Indian reserves, federal parks, and air weapons ranges. Indian reserves were established and marked on the basis of water shoreline, latitude and longitude. The Dominion surveys did not encroach on the reserves, so partial sections arose at the reserve boundaries — except, of course, where reserve boundaries happened to coincide with grid boundaries.

River lots were surveyed according to the old French plan consisting of long narrow tracts of land bordering on a navigable water course. River lots were established before the first Dominion surveys and were not resurveyed. Their outer boundaries intrude into sections.

Also established before the first Dominion land surveys were lands used or reserved for Hudson's Bay Company posts. Settlements on these lands were surveyed according to plans drawn up for the local sites.

In a number of areas, settlements — small towns and hamlets — were established within townships that had not yet been subdivided. Rather than subdividing the townships according to the Dominion system, the provincial surveyors chose a more practical option — that of marking out only the settled areas, using a settlement or group plan. For example, the St. Albert Settlement near Edmonton was subdivided in this way. Surveyors still occasionally mark out these settlement (or group) lots.

Meridians — As discussed earlier, certain range lines — those closest to each meridian (except the first) as you approach from the east — converge with the meridian. The townships along these range lines become successively smaller the farther north you go. (Refer to Figure 9.) The meridian slices *the western-most* sections into partial sections, and as you proceed farther north, whole sections are eliminated.

Larger Administrative Units

For administrative purposes, townships on the Prairies are grouped together into larger administrative units. In Saskatchewan, for example, these units are called rural municipalities, most of which contain 9 townships; in sparsely populated areas of the province, the municipalities are significantly larger (Figure 13). Manitoba has rural municipalities, as well as sparsely populated regions called local government districts. In Alberta, the typical administrative unit is called a municipal district, and there are other regions designated as improvement districts and special areas.

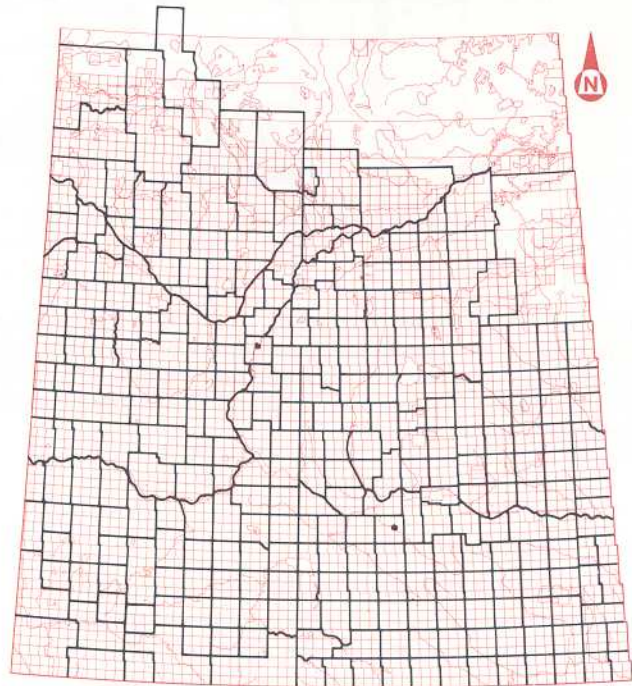


Figure 13 — Rural municipalities are shown outlined in black against Saskatchewan's grid.

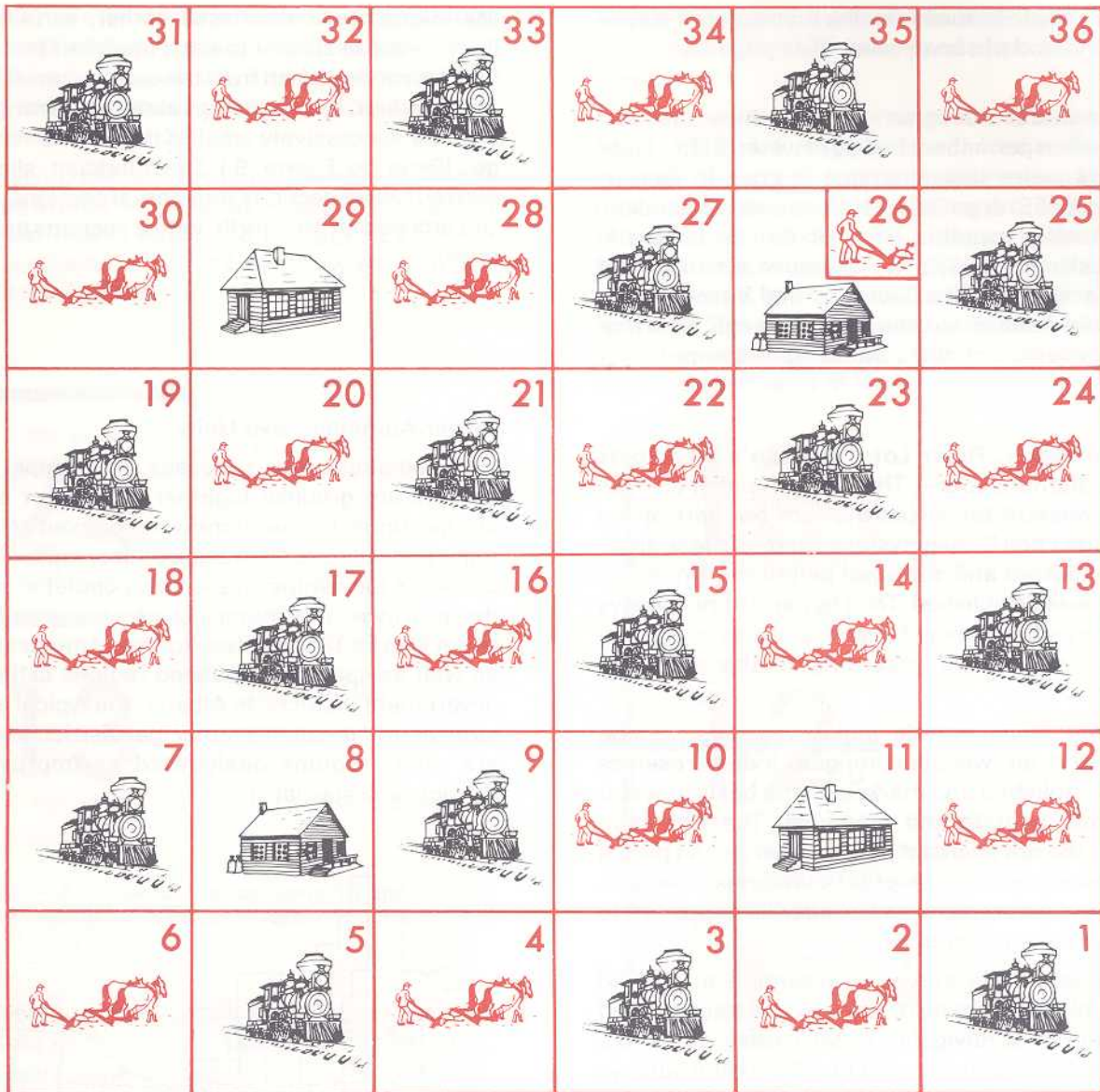


Figure 14 — In most townships, only 16 full sections of the 36 normally available were given over immediately to homesteaders. The remaining sections were set aside as land appropriations: sections 11 and 29 of every township were reserved as school lands. All other odd-numbered sections were reserved for selection as railway grants. The Hudson's Bay Company received section 8 and all of section 26 but the north-east quarter; in every fifth township, however, the Company got all of section 26.

Land Appropriations

When the early surveys of the Prairie provinces were conducted, the Dominion government set aside designated tracts of land for purposes other than immediate homesteading. As we have seen, certain areas were designated as Indian reserves, and river lots were similarly protected. Other appropriations were also made (Figure 14).

Sections 11 and 29 of every township were reserved as school lands. It was intended that the money raised in selling these sections would be used to finance the building of a school. In some cases the land was given over to a farmer in the area, who in return committed himself to building the school. Often the school itself was built in

sections 11 or 29, but other sections were sometimes chosen for the school sites. The schools had to be located so that they were within reasonable walking distance. The generally accepted rule was that no child should have to walk more than 4 miles to school.

Each rural school was located within a school district. The taxes from the settlers in the district paid the teacher's salary, and upkeep and administration of the school. Eventually these school districts were consolidated into larger areas called school units.

Railroad Lands — On the Prairies, all odd-numbered sections except 11 and 29 were reserved for selection as railway grants. In effect, these lands were made available to railway companies in partial payment for building railroads. Not all of the reserved sections were actually taken over by the railway companies. Some of the sections remained with the Crown and were later opened to homesteading.

In many cases, however, railway companies did receive the reserved lands in partial payment for constructing railroads. The main beneficiary was the CPR. The general understanding was that the CPR was entitled to all odd-numbered sections (except 11 and 29) in townships along the main line for a 24-mile distance on each side of the line. The CPR, however, rejected reserved sections seen as "not fairly fit for settlement." The CPR often negotiated with the Dominion government to obtain the equivalent acreage in land along its *branch lines* considered to be more agriculturally productive than the reserved sections, and therefore more valuable. Other railways obtained similar concessions.

The CPR eventually received over 26 million acres in main and branch line land grants. Other railways received land grants totalling almost 6 million acres.

The pattern of railway land grants varies considerably from one area to another. In some regions, where the reserved lands were seen as unproductive, significantly fewer than half the sections in townships flanking railway lands were actually taken over by railways. In areas seen as fertile, the railway grants were considerable. In one especially promising region of southern Alberta, encompassing about 135 townships, almost all of the land went to the railways with lines in the area.

Hudson's Bay Company Lands — By the original 1670 Charter, the Company had title to all the

property in the watershed of Hudson Bay. When the Company relinquished title to the Dominion on July 15, 1870, through the Deed of Surrender, it was paid £300,000. It retained ownership of lands used or reserved for Hudson's Bay Company posts. In addition, it received section 8 and all of section 26 but the north-east quarter in every township. In every fifth township, however, the Company received all of 26. The Company retained about one-twentieth of their former land holdings.

The lands were gradually sold by the Company. By 1984 only about 5,100 acres of these lands, all in Saskatchewan, remained under Company ownership. In that year the Company donated all of these parcels to the Saskatchewan Wildlife Association for use as habitat reserves.

The Surveys

There were 5 basic surveys followed by the Dominion over the years in western Canada. The surveys differed slightly in layout from one another. The third survey, which was implemented in 1881, is the most important. It covers far more land than all the other Dominion surveys taken together and is the method of survey still used today in Saskatchewan and Manitoba. The first survey, which was used from 1871 to 1879, covers part of southern Manitoba and also takes in a bordering strip of eastern Saskatchewan and 2 areas in central Saskatchewan. The second survey, 1880, is found in only some areas of Saskatchewan. And the fourth and fifth surveys are limited to some townships in British Columbia.

Modifications of some of these basic surveys have been introduced from time to time. The most important survey modification was implemented in 1963 and affected only Alberta. The province decided to modify the third survey by increasing the width of the road allowances in all townships surveyed after that date. More complex modifications took place in Saskatchewan and Manitoba, but these affected only a small number of townships.

The 5 surveys and the modifications are described in detail in the text to come, and summarized in the chart on page 26.



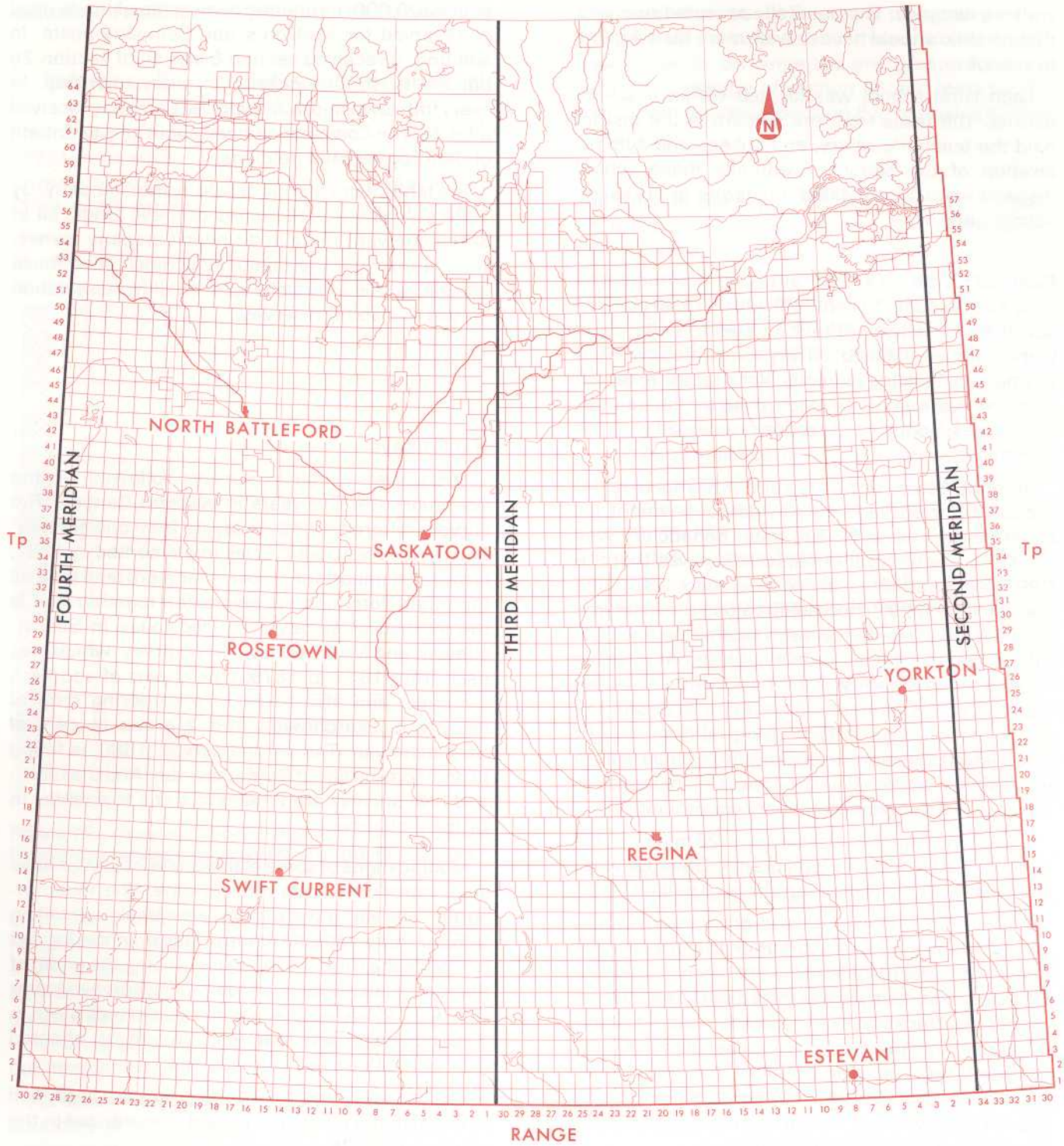


Figure 15 — The survey grid for Saskatchewan — the grid formed by the intersection of range and township lines.

SASKATCHEWAN

The Saskatchewan Grid

Most of the Saskatchewan grid is shown in Figure 15. The grid covers only the more settled parts of the province; its northern-most tp is number 72, near Canoe Lake (not shown). Like Manitoba and Alberta, Saskatchewan is defined in the north by 60° north latitude (not shown) and in the south by the 49th parallel. Saskatchewan's western boundary is 110° west longitude. Its eastern boundary is a little more difficult to describe, since it consists of the range line between ranges 29 and 30 (W1), which runs from the 49th parallel north until it converges with the meridian (102° west longitude) just south of the Churchill River. From this point the Saskatchewan boundary line follows the meridian northwards. The part of the boundary that follows the range line has a stepped appearance because of the jogs that occur at each point the range line crosses a correction line

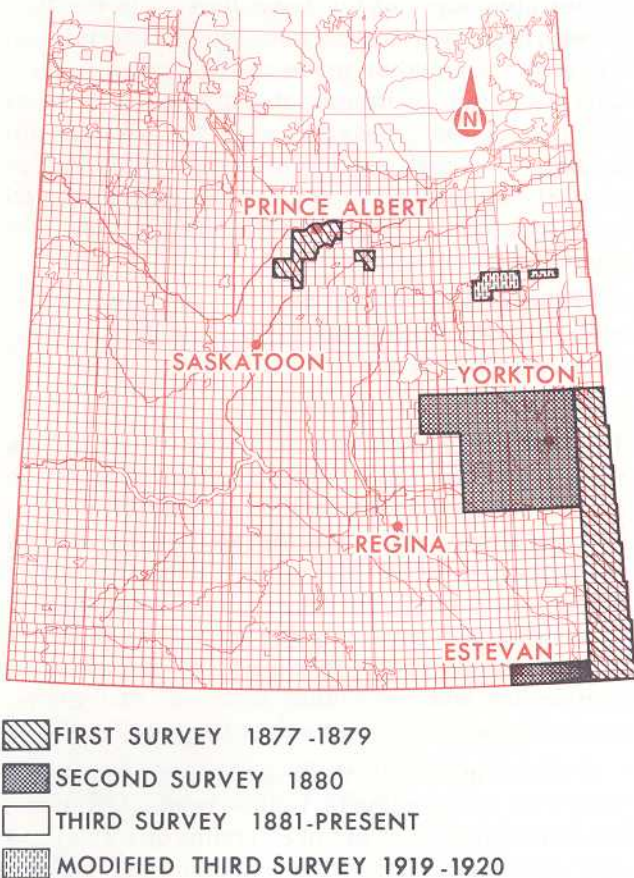


Figure 16 — Saskatchewan's surveys.

in its course northward. The section of the boundary that follows the meridian is, of course, straight. (Refer to Figure 3.)

The Saskatchewan Surveys

The First Survey — 1877 to 1879. As shown in Figure 16, this survey includes the long strip extending north along the east border of the province. The strip contains tps 1-30 ranges 30-34, west of the first meridian. The survey also covers some townships in central Saskatchewan: tp 44 range 21, tp 45 ranges 21-22 and 26-28, tp 46 ranges 25-28, tp 47 ranges 24-28, tp 48 ranges 24-26, and that part of tp 48 range 27 south of the North Saskatchewan River — all west of the second meridian; west of the third meridian the first survey covers tps 42-47 range 1 and tps 43-44 ranges 2-3.

In the first survey, road allowances are 99 feet or 1½ chains (1 chain = 66 feet) wide. Each township contains 6 road allowances running north and south and 6 running east and west, as shown in Figure 17. A township measures 489 chains along its base line and the same length along the eastern boundary (6 1½-chain road allowances, plus 6 sections, each 80 chains on a side).

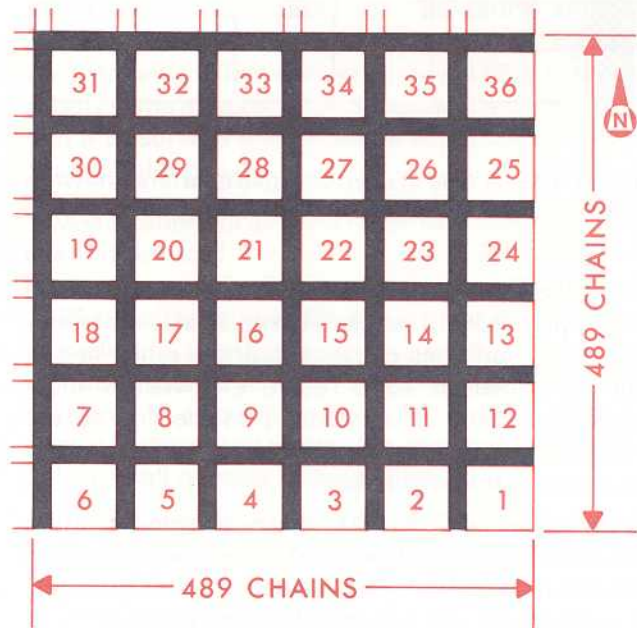


Figure 17 — Dimensions and general grid road layout for a typical township of the first and second surveys.

Another important feature of the first survey is that the north-south section lines were made *parallel* to the range line which marked the eastern boundary of each township (Figure 18). The western

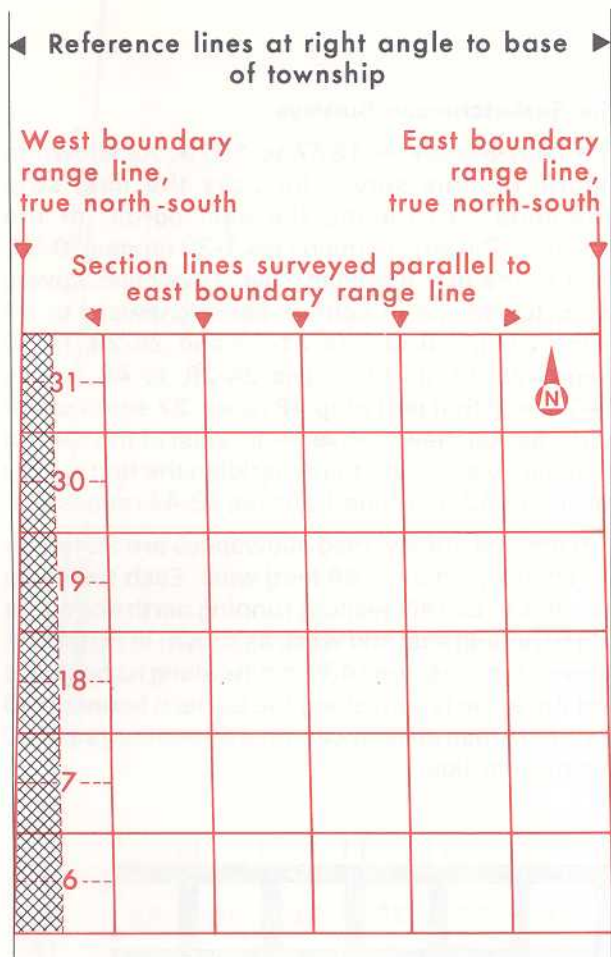


Figure 18 — A strip of shortchanged quarters (shown in hatching) characterizes townships of the first survey.

boundary of each township was, of course, also a range line. It could not be made parallel to the north-south section lines because, being a range line, it had to converge. As a result, the western-most quarter sections of a township in the first survey wound up with slightly less land than the other quarters in the township.

As shown in Figure 18, the converging western boundary (a range line) in effect shaves off a thin wedge of land from these western-most quarters. The figure greatly exaggerates the convergence of the range lines in order to illustrate this effect. (The "reference" lines drawn at right angles to the base of the township are not part of the survey; they are

included so that you can more readily see the convergence of the range lines.) In fact, the quarter sections affected lose only a small area, amounting to no more than about 7 acres in the quarters with the greatest losses. As illustrated in the figure, losses due to convergence are greatest for the north-west quarter of section 31 and least for the south-west quarter of section 6 in townships of the first survey.

The Second Survey — 1880. As shown in Figure 16, this survey covers 2 areas in Saskatchewan: a strip of land along the southern border of the province including tps 1-2 ranges 1-8, west of the second meridian, and an area to the north containing tps 19-30 ranges 1-12 and tps 27-30 ranges 13-16 — all west of the second meridian.

The townships were laid out according to the same scheme used for the first survey. But this time the surveyors tried to make all quarters roughly the same size rather than to shave off some land from the most western quarter sections to fit the area left over. Instead of running section lines parallel to the eastern boundary of the townships as in the first survey, they ran them true north-south. This way, all the sections could be made roughly equal in size. One minor but insurmountable drawback was that because of the convergence of the north-south section lines each section became slightly wedge shaped. In a typical section of a township surveyed by this method, the northern boundary is a few feet shorter than the southern one.

In all subsequent Dominion surveys, this method of running all north-south section lines true north-south was followed.

The Third Survey — 1881 to the present. This survey, as shown in Figure 16, covers most of the settled areas of Saskatchewan. It differs from the first and second surveys in that all road allowances are reduced to 1 chain (66 feet) in width (Figure 19). Further, each township in this survey contains only 3 road allowances running east and west rather than 6; these run along every second east-west section line and are 2 miles apart. Six road allowances run north and south, as in the first 2 surveys.

A township in the third survey measures 486 chains on its base line (6 1-chain road allowances, plus 6 sections, each about 80 chains on a side) and 483 chains along its eastern boundary (3 1-chain road allowances, plus 6 sections, each about 80 chains on a side).

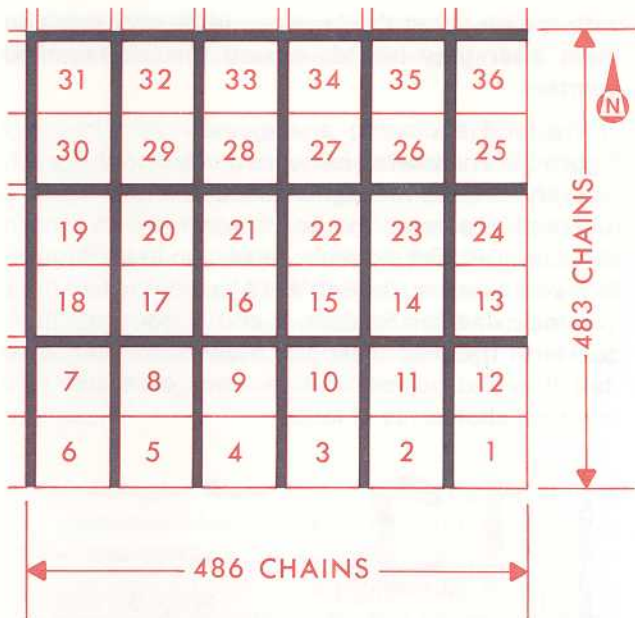


Figure 19 — Dimensions and general grid road layout for a typical township of the third survey.

Figure 20 is an aerial photograph of the north-east corner of a typical prairie township in the third survey. The view includes all of sections 25, 26, 35, and 36 (compare photo with Figure 19). A number of features make this aerial view of particular interest. Road allowances are clearly visible as white lines. The range and township lines are thus effectively



Figure 20 — An aerial photo of the north-east corner of a typical prairie township of the third survey.

displayed, as on a grid map. Where sections 26 and 35 meet there is a just barely discernable east-west line that indicates the boundary between adjoining fields in each section; the east-west division between sections 25 and 36 is also visible where adjoining fields meet. Another observation worthy of note is that the east-west road allowance at the northern limit of the township runs along a correction line. This is particularly evident in the upper left corner of the photograph, where the north-south road takes a jog to the west at the correction line. The north-south road that runs between the sections takes a similar jog to the west (top centre of photo). Finally, you will notice that some of the road allowances have not been developed. For example the east-west road towards the bottom of the photograph ends abruptly at the eastern limit of the township.

The Modified Third Survey — 1919 to 1920. Saskatchewan's modified third survey covers 14 townships in the eastern part of the province; tp 41 ranges 9-10, tp 42 ranges 6-10, and tp 43 ranges 2-4 and 6-9 — all west of the second meridian (Figure 16).

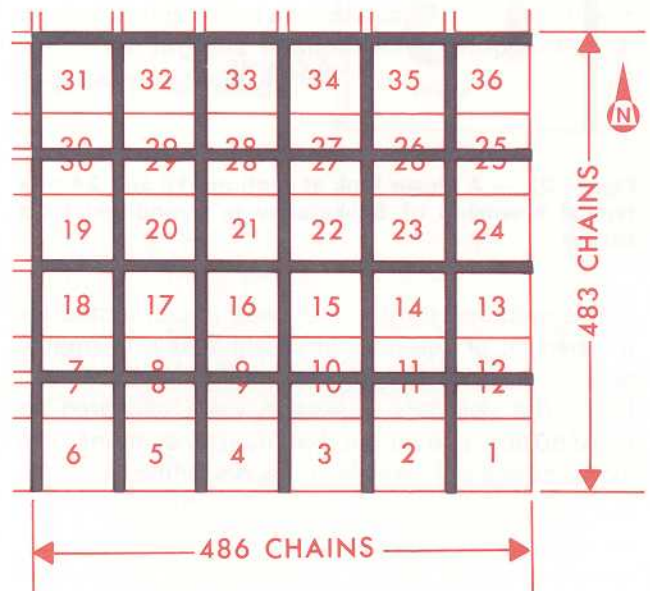


Figure 21 — Dimensions and general grid road layout for a typical township of Saskatchewan's modified third survey.

The surveyors modified the normal third survey by adding an extra east-west road allowance. As shown earlier (Figure 19), townships of the normal third survey contain 3 east-west road allowances; these are spaced 2 miles apart. Townships of the modified third survey, however, contain 4 east-west road allowances spaced at 1½-mile intervals (Figure 21).

To make room for the extra 1-chain road allowance in the modified third survey, surveyors took a half chain (33 feet) off the northern half of sections 13 to 18; they took the other half chain off the southern half of sections 19 to 24.

As a result, the half sections affected are each 4 acres less in area — 316 acres instead of the normal 320 acres. This is illustrated in Figure 22, which shows sections 13 and 24 of a township in the modified third survey.



Figure 22 — A closer look at sections 13 and 24 of a typical township of Saskatchewan's modified third survey.

The modified third survey was implemented for the benefit of veterans of World War I. Normally, settlers were given a quarter section (160 acres) to farm. The veterans, however, were allocated an extra 80 acres adjoining their quarter sections. The extra acreages were held in reserve for the veterans,

with the idea that the land would be accessible to them after they had developed their homestead quarters.

The land allocating arrangement is shown in Figure 23. The townships were divided so that each veteran received his quarter section along with his reserved 80 acres, either to the north or to the south of his quarter. For example, as shown in the Figure, land was reserved for Settlers A and B north of their quarters, and for Settlers C and D south of their quarters. The east-west grid roads were placed so that they did not cut the veterans off from their reserved allotments of land.

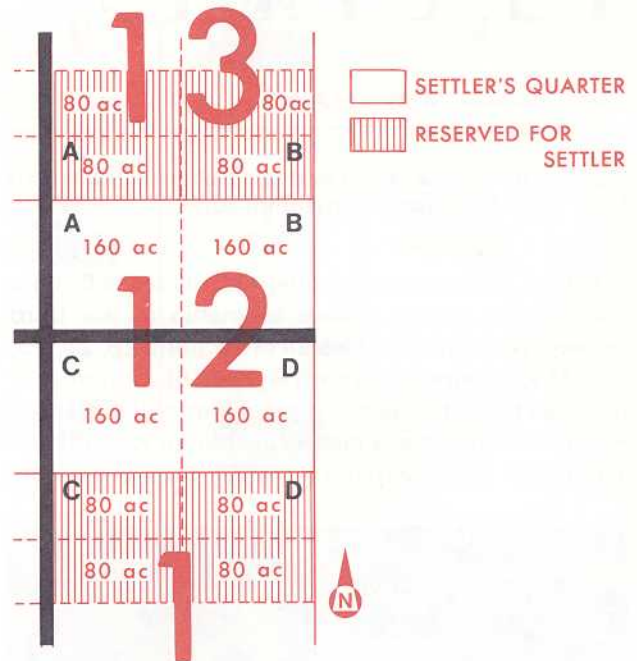


Figure 23 — Allocation of land to settlers in quarter sections of a typical township of Saskatchewan's modified third survey.



MANITOBA

The Manitoba Grid

The Manitoba grid covers most areas in the southern part of the province (Figure 24, page 18). The far north is largely unsurveyed, apart from a concentration of townships in the vicinity of The Pas and townships along the Canadian National Railway line that runs north-east from Turnberry.

The eastern boundary of Manitoba runs north along the eastern side of range 17 east of the first meridian; it runs north from the 49th parallel for about 267 miles, to a point just south of the Cobham River. The boundary then peels away from range 17 and strikes approximately north-east for about 76 miles to near the eastern extremity of Island Lake. Then it swings slightly northwards and runs directly some 282 miles to the point where 89° west longitude intersects with the shoreline of Hudson Bay, near the mouth of the Black Duck River. From here, the boundary follows the shoreline of Hudson Bay to 60° north latitude.

The Manitoba Surveys

The First and Third Surveys. The Dominion Land Survey was implemented on July 10, 1871. Some earlier survey work in Manitoba had been carried out in 1869, when the first meridian was established, but the work was discontinued because of the objections of the Metis and disputes about the ownership of the land involved. The first line surveyed in the Dominion Land Survey system was along the first meridian — the eastern boundary of section 36 in tp 10 range 1, west of the first meridian. The line was used as a reference, or “control,” to establish the survey grid in relation to the first meridian. In this part of the township, however, sections were not marked out because the area had been divided into river lots settled by the Metis prior to 1871.

In Manitoba, the first survey covers most of the southern part of the province. The first survey's general layout is described on page 13. The third survey (1881 to present) predominates north of the first survey. The layout of the third survey is described on page 14. The dividing line between the first and third surveys is shown in Figure 24 (broken line) and Figure 25 (solid line).

We can trace this dividing line from west to east across the province, beginning where the township line between tps 30 and 31 joins the western border of Manitoba. From this point, moving eastwards, we follow the northern boundary of tp 30 range 29, west of the first meridian. From the north-east corner of this township, the line moves due south along the range line between ranges 28 and 29 west of the first meridian. It goes to a point at the south-east corner of tp 27 range 29, west of the first meridian.

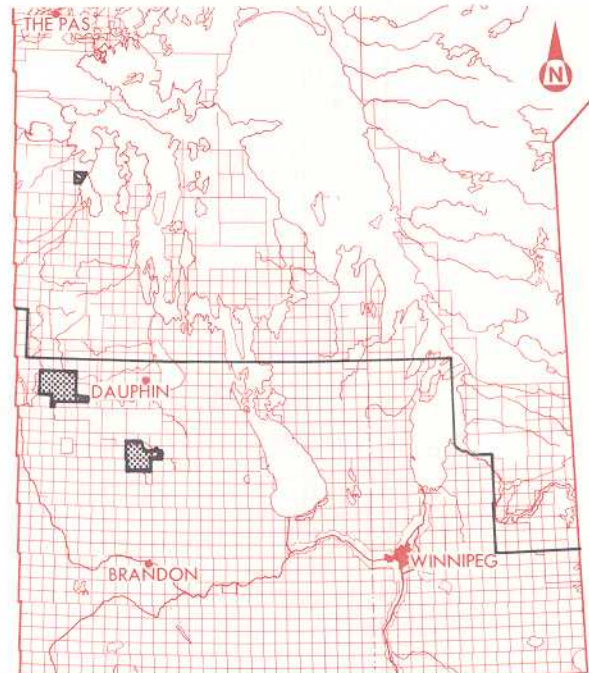


Figure 25 — Manitoba's surveys:

- All surveyed areas south of the survey division line are in the first survey (1871-1879), except the 2 shaded areas, which are in the modified first survey (1920-1921).
- All surveyed areas north of the survey division line are in the third survey (1881 to present), except the single township shown shaded, which is in Manitoba's modified third survey (1949).

The dividing line then begins its long journey due east along the township line between tps 26 and 27, crossing most of the settled part of the province. Just east of Deer Island in Lake Winnipeg, the line meets up with the range line between ranges 7 and 8, east of the first meridian. From this point it follows the range line south across Lake Winnipeg, reaching the east shore of the lake at Traverse Bay. It touches the shore at the north-east corner of tp 19 range 7, east of the first meridian.

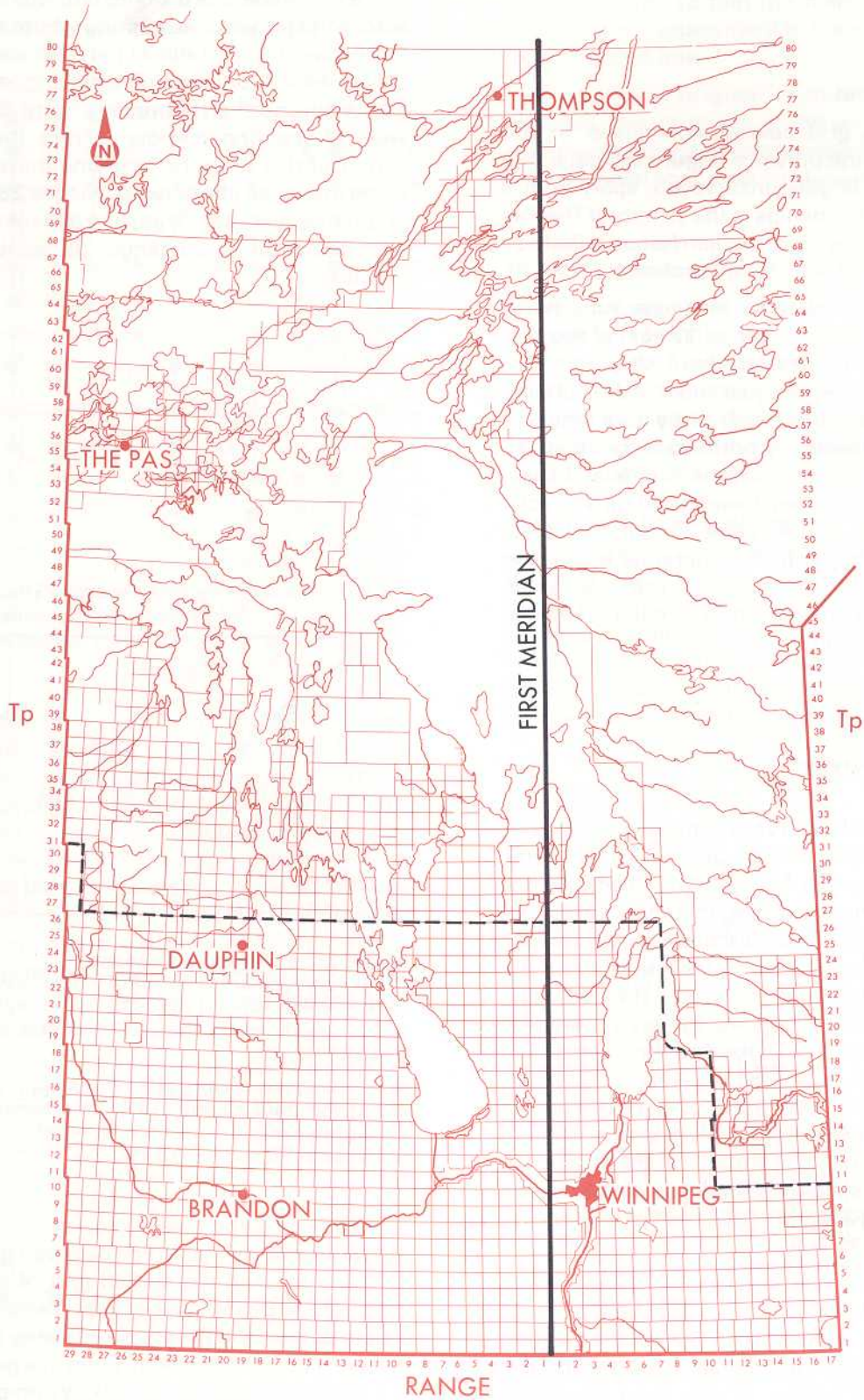


Figure 24 — Manitoba's survey grid.

From here it follows the shoreline of Lake Winnipeg and the south-west bank of the Winnipeg River. Next, it joins the north boundary line of tp 18 range 9, east of the first meridian and runs due east to the north-east corner of tp 18 range 10, east of the first meridian. Then it runs south, following the range line between ranges 10 and 11, east of the first meridian.

The dividing line reaches its southern limit where it joins the township line between tps 10 and 11. It follows this township line east to the eastern border of Manitoba.

The Modified First Survey — 1920 to 1921. This survey covers 2 small areas of the province in the vicinity of Riding Mountain National Park (Figure 25). One area, near the north-west corner of the park, takes in those parts of tp 23 ranges 24-26 not in the park, tp 24 ranges 25-27, and tp 25 ranges 25-27 — all west of the first meridian.

The other area is off the southern boundary of Riding Mountain National Park, near Clear Lake. It contains tp 18 ranges 19-20, that part of tp 19 range 18 not in the park, tp 19 ranges 19-20, and those parts of tp 20 ranges 19-20 not in the park — all west of the first meridian.

The modified first survey differs from the first survey in the width of the road allowances. As discussed earlier, road allowances of the first survey are 99 feet or 1½ chains wide (page 13). Those of the modified first survey are 66 feet or 1 chain wide. The extra land obtained by narrowing the road allowances was added to each quarter section adjacent to

the road. Townships surveyed under the modified first system thus have somewhat more land available for agricultural development. It works out that quarter sections in townships in the modified first survey are about 4 acres larger than those in townships surveyed under the first survey.

The Modified Third Survey — 1949. This survey affects only a single township in Manitoba — tp 42 range 24, west of the first meridian, bordering on Swan Lake (Figure 25). As discussed earlier, the surveyors in Saskatchewan modified the normal third survey by adding a fourth east-west road (page 15). In Manitoba, the surveyors produced a different modification of the normal third survey.

Refer now to the layout of the normal third survey as shown in Figure 19. Manitoba's surveyors modified the normal third survey by adding 3 more east-west road allowances, to make a total of 6 east-west road allowances. In doing so, they reverted to the layout of the road allowances used for the first and second surveys (Figure 17), while maintaining the 1-chain road allowance width and the township dimensions of 486 by 483 chains characteristic of the third survey (Figure 19).

The extra road allowances in Manitoba's modified third survey reduced the amount of land available for agriculture in the township by about 144 acres. This loss was divided equally among the quarter sections, so that each quarter section in 42-24-W1 contains about 1 acre less than quarters in townships of the normal third survey.



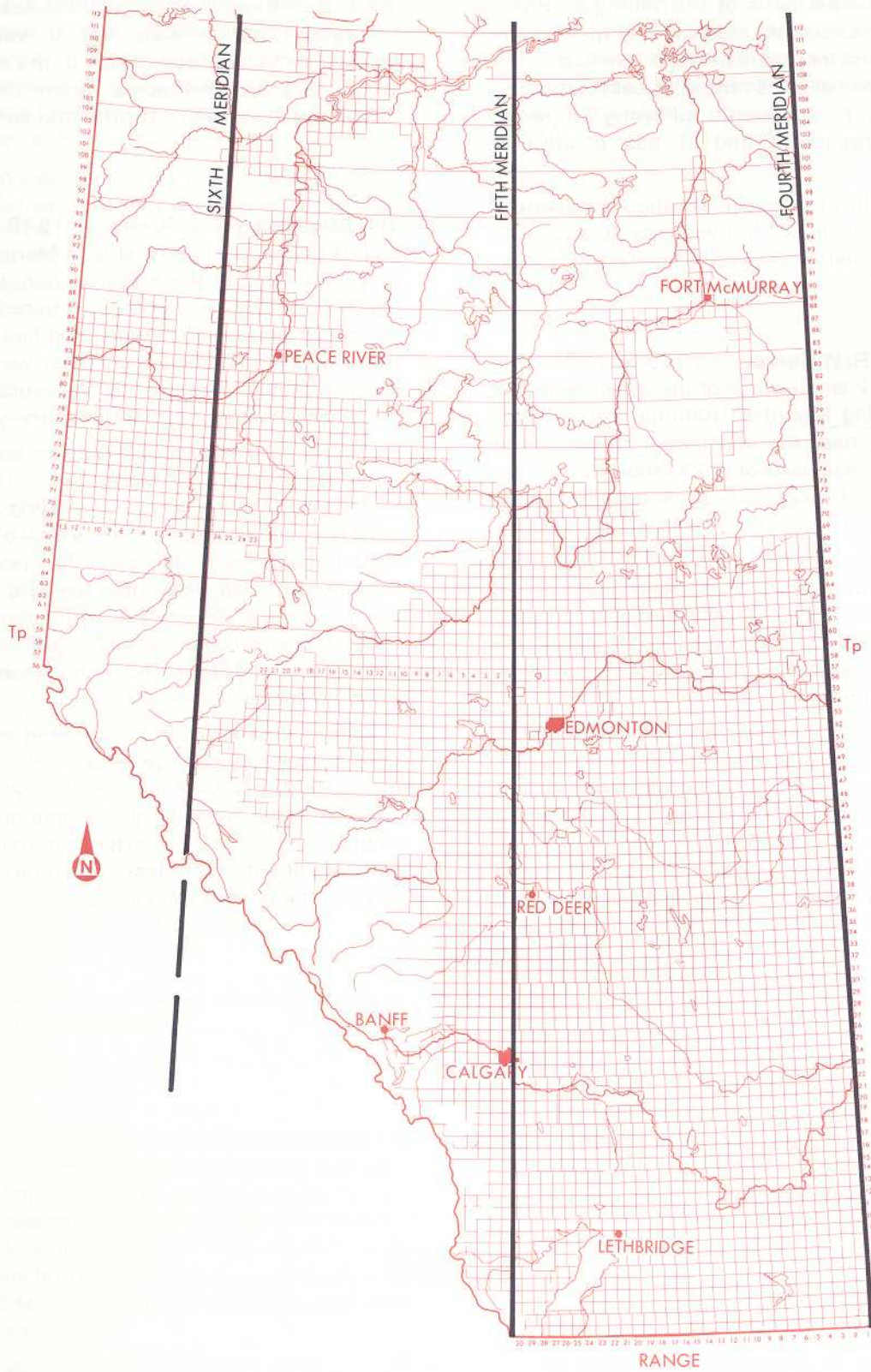


Figure 26 — Alberta's survey grid.

ALBERTA

The Alberta Grid

The survey covers most of southern Alberta, with the exception of some mountainous areas of the south-west consisting primarily of terrain unsuitable for agriculture and sparsely populated (Figure 26). In northern Alberta a large area of agricultural land in the vicinity of the Peace River has been surveyed. A string of townships follows the Peace River north to Fort Vermilion. There are also some townships along the Athabasca river and along the railway line north to Fort McMurray and beyond.

The western boundary of Alberta touches the 49th parallel at the south-east corner of Waterton Lakes National Park, just west of 114° west longitude. It follows an irregular route north, along the watershed of the Rockies, and intersects 120° west longitude at Willmore Wilderness Provincial Park. It then moves north along 120° west longitude until it joins 60° north latitude.

The Alberta Surveys

Most areas of the township grid in Alberta are in the third survey (1881 to present, page 14). In 1963 the province modified the third survey by increasing the width of the road allowances from 1 chain (66 feet) to 1½ chains (99 feet). The extra half chain is taken out of the land on the unposted side of the road allowances — refer to Figure 10. As a result, the north-west and south-east quarters of sections 1 to 6, 13 to 18, and 25 to 30 lose 2 acres each. In the same sections, the south-west quarters lose about 4 acres each. The modification has affected all townships surveyed since 1963, most of which are in the northern part of the province (Figure 27). About 2 new townships are added each year.

Townships in Alberta surveyed from 1963 to 1985 include:

West of the fourth meridian: tp 93 range 11.

West of the fifth meridian: tp 13 range 1; tp 11 range 2; tps 65-66, 77-80 range 8; tps 80, 109-110 range 9; tp 110 ranges 10-11; tp 104 range

14; tp 110 ranges 15-16; tps 102-103, 110 range 17; tps 65, 67-71, 102-104, 110 range 18; tps 72, 109-112 range 19; tp 100 range 20; tps 61-62, 68, 100 range 21; tps 61, 100, 102 range 22; tps 67, 88, 100 range 23; tps 101-102 range 25.

West of the sixth meridian: tps 71, 87, 101 range 1; tp 87 range 6; tps 81-82 range 7; tp 78 range 8; tps 79-80 range 9; tp 80 range 10; tp 85 range 13.

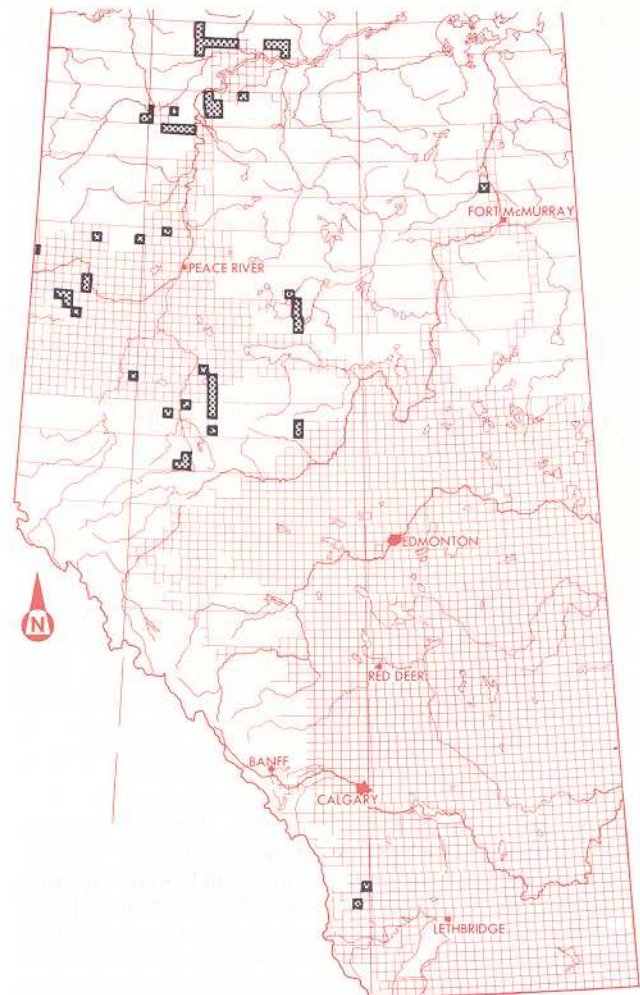


Figure 27 — Alberta's surveys. Shaded townships are in Alberta's modified third survey (1963 to present). All other townships are in the third survey (1881-1962).



BRITISH COLUMBIA

The Belt and Block Grids

The Dominion survey grid system, as we know it on the Prairies, was found to be unsuitable for use in most areas of British Columbia. The province consists largely of irregular and mountainous terrain that is impractical, and in some places impossible, to

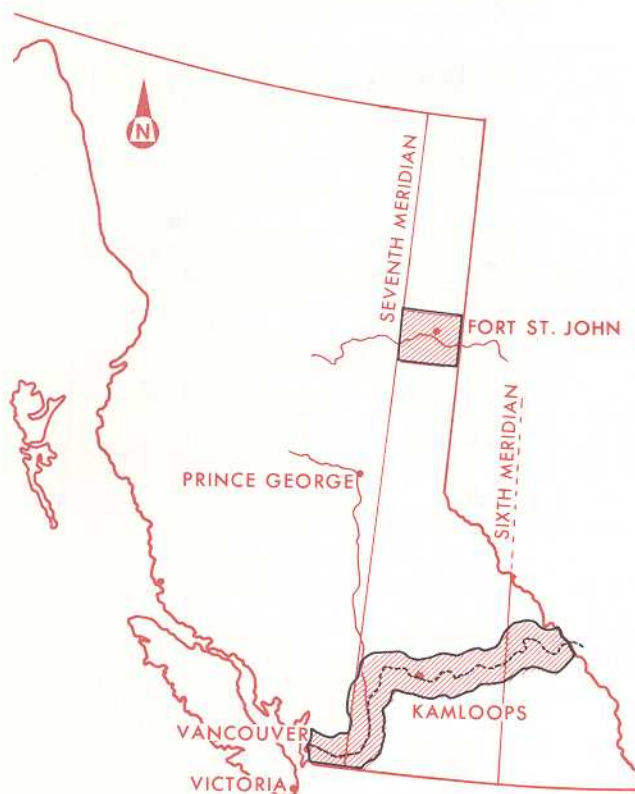


Figure 28 — In British Columbia, 2 areas (shown shaded) contain townships that are laid out and identified according to the general plan of the Dominion Land Survey system: in the north, a 3.5 million-acre tract known as the Peace River Block; and in the south, the Railway Belt, almost 11 million acres — 20 miles on each side of the CPR line from the B.C.-Alberta border near Field to the coast.

divide up into regular holdings of equal area. British Columbia developed its own systems of survey to accommodate the needs of its settlers and the mining and logging industries. Four different survey systems evolved over the years in British Columbia: blocks; district lots; sections and ranges; and township surveys. Some of these systems have elements in common with the Dominion Land Survey system,

but they are distinct enough to require separate study, and we will not deal with them in this publication.

In 2 areas of British Columbia, however, the Dominion Land Survey system is used as a means of legally identifying tracts of land. These areas lie within the regions known as the Railway Belt and the Peace River Block (Figure 28). They were held in trust by the Dominion Government from 1883 to 1930. It was intended that the lands of the Belt and the Block would be given to the Canadian Pacific Railway as a subsidy to complete the railway to the west coast. However, the Dominion gave most of the Belt and Block lands back to British Columbia in 1930.

While it held on to the lands of the Belt and the Block, the Dominion government planned that the areas would be surveyed according to the Dominion Land Survey system used on the Prairies.

In fact, very few areas of the Belt were ever actually surveyed as the Dominion had planned. The mountainous terrain was not suited to such a system and, in any case, many regions were uninhabited and some were uninhabitable.

The Dominion land surveyors did, however, develop a "theoretical" survey grid for the Belt. That is, they determined the positions of range and township lines on maps by mathematical projection following the Dominion rules for township layout. On modern-day, detailed maps, such as the Federal Topographic Series, these lines are drawn with a high degree of accuracy and are useful as general guides in delineating and describing the boundaries of land within the Belt. Survey lines located in this manner are indicated by broken lines (Figure 29).

In a few areas of the Belt, usually near larger towns and cities, surveyors have placed monuments along crucial township boundaries to avert land-ownership disputes and to assist municipalities in planning. Such on-site surveyed township boundaries within the Belt are indicated by solid lines—for example, the township boundaries in the vicinity of Kamloops (Figure 29).

Like the Railway Belt grid, the Peace River Block grid consists of both surveyed (solid lines) and unsurveyed "theoretical" townships (broken lines). About half of the Block has been surveyed in the Dominion system (Figure 30).

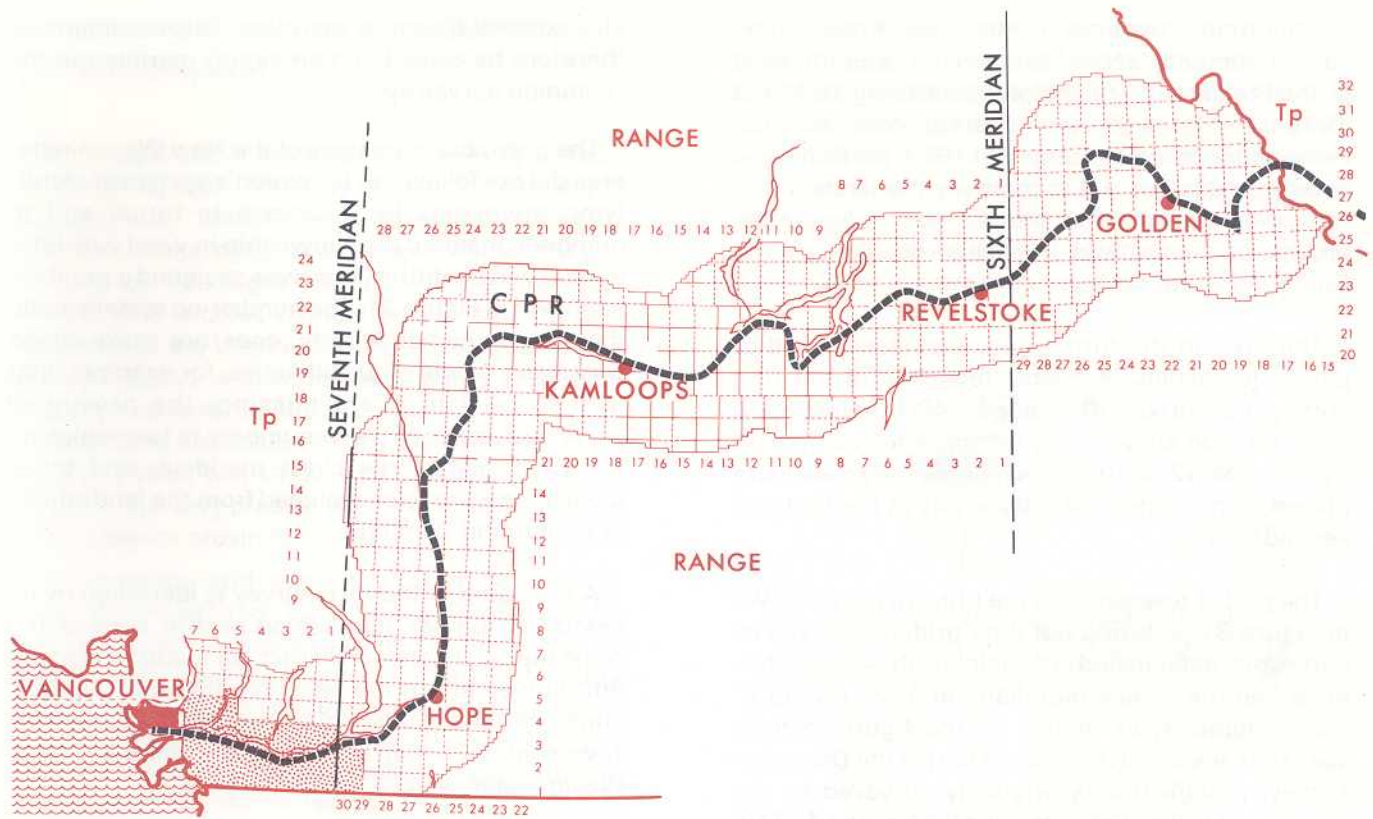


Figure 29 — The Railway Belt grid. The shaded area in the south (New Westminster) contains townships of the Dominion's fifth survey — the only townships in the Dominion Land Survey system not identified by reference to range and tp numbers. (See Figure 31.)

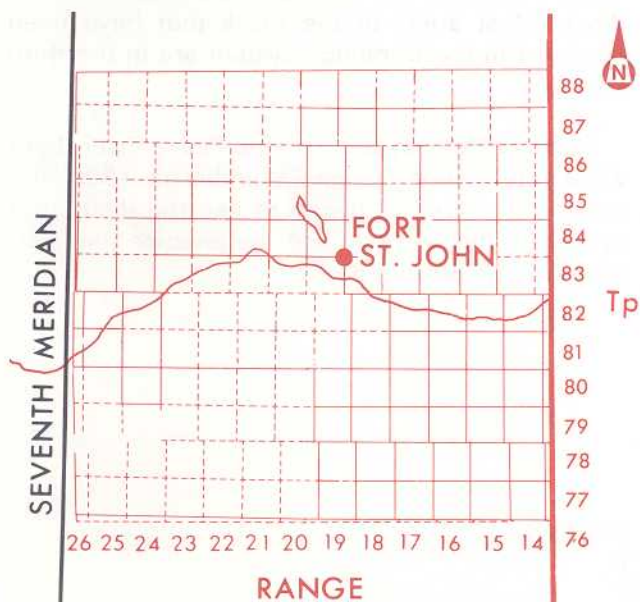


Figure 30 — The Peace River Block grid.

Surveys of the Belt and Block

Dominion government survey manuals specified that surveyors were to use the fourth survey in the Railway Belt; townships of the fourth survey were to measure 486 by 483 chains — the same dimensions as those of the third survey. However, roads were not to be located along section lines; instead, each quarter section of 160 acres was to be given an additional 3 acres for roads to be constructed according to the requirements of the areas surveyed — a practical approach, considering the rugged terrain of the region.

As noted earlier, most areas of the Belt were not actually surveyed — so the existence of the fourth system is largely a theoretical one.

This is not the case, however, with townships in the so-called fifth survey of the Railway Belt. To understand this survey, we must again touch briefly on the history of the province of British Columbia. As we have noted, the Railway Belt passed into the hands of the Dominion in 1883. A region in the southern part of the Belt had already been surveyed

by this time. This area, in the lower Fraser River valley near today's New Westminster, was surveyed by the Province of British Columbia during 1874 and 1875 (see Figure 29, shaded area). When the Belt came under Dominion control in 1883, the Dominion surveyors decided not to resurvey the lands of the New Westminster area; instead, they adopted the provincial survey and it became known as the Dominion's fifth survey.

The area in the fifth survey includes 27 full or partial townships. A typical township of the fifth survey measured 480 chains by 480 chains; there were no road allowances, except in townships 12, 40, 41, and 42. In these townships the roads were placed along section boundaries as in the first and second surveys.

The grid of townships in the fifth survey is shown in Figure 31. In laying out their grid, the provincial surveyors established as their north-south reference line the "coast meridian" at $122^{\circ} 45' 39.6''$ west longitude, as shown in the figure. Strictly speaking, the coast meridian is part of the Dominion survey, though it was originally surveyed by the Province of British Columbia. In adopting the 1874-5 provincial survey as its "fifth survey," the Dominion

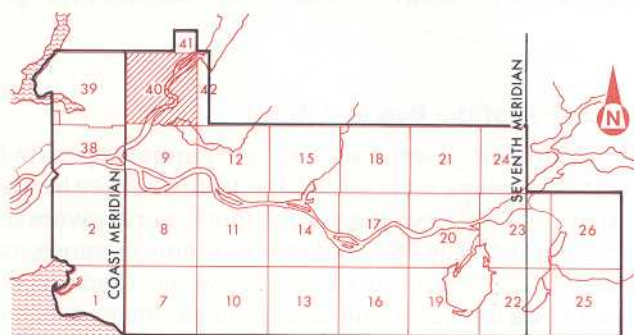


Figure 31 — Townships of the Dominion's fifth survey, in the New Westminster area of British Columbia.

also adopted the coast meridian. This meridian can therefore be considered an eighth meridian in the Dominion survey system.

The provincial surveyors of the New Westminster area did not follow the Dominion's system of identifying townships by reference to range and township numbers. Instead, each township in what was later to be called the fifth survey was assigned a number, as shown in Figure 31. The numbering system itself, though somewhat orderly, does not make much sense as a whole. You will notice, for example, that townships 3 to 6 are missing; the provincial surveyors assigned those numbers to townships on the west side of the coast meridian, and these townships were later excluded from the lands given in trust to the Dominion.

A township of the fifth survey is identified by its township number, its position east or west of the coast meridian, and its district (all townships of the fifth survey are in the New Westminster District). Thus, the shaded township in Figure 31 is known as Township 40, east of the coast meridian, New Westminster District.

Four townships in the fifth survey in the Railway Belt lie west of the coast meridian — townships 1, 2, 38, and 39.

In the Peace River Block, the survey grid consists of townships drawn to the dimensions of 486 by 483 chains. The survey manuals specified that surveyors could use either the third or fourth survey in the Block. Most areas of the Block that have been surveyed in the Dominion system are in the third survey.

After the Railway Belt and the Peace River Block were returned to British Columbia in 1930, the provincial surveyors began to use the district lot system in these areas, and the practice has continued to the present day.



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DOMINION LAND SURVEYS

SURVEY DATES	LOCATION	TOWNSHIP DIMENSIONS (Chains)	NO. OF ROAD ALLOWANCES		WIDTH OF ROAD ALLOWANCE (Chains)	PAGE REFERENCES	
			E-W	N-S			
First	1871-1879	Manitoba	489 X 489	6	6	1½	17
	1877-1879	Saskatchewan					13
Second	1880	Saskatchewan	489 X 489	6	6	1½	14
Third	1881 to present	Manitoba	486 X 483	3	6	1	17
		Saskatchewan					14
		Alberta					21
		British Columbia					24
Fourth	1889 to present	British Columbia	486 X 483	*	*	*	23
Fifth	1874-1875	British Columbia	480 X 480	*	*	*	23

*See text

MODIFICATIONS OF THE DOMINION SURVEYS

First	1920-1921	Manitoba	489 X 489	6	6	1	19
Third	1919-1920	Saskatchewan	486 X 483	4	6	1	15
Third	1949	Manitoba	486 x 483	6	6	1	19
Third	1963 to present	Alberta	486 X 483	3	6	1½	21

IMPERIAL ⇄ METRIC CONVERSION CHART*

IMPERIAL TO METRIC			METRIC TO IMPERIAL		
Imperial	Multiply by	Metric	Metric	Multiply by	Imperial
foot	0.305	metre	metre	3.28	foot
chain	20.13	metre	metre	0.049	chain
mile	1.6	kilometre	kilometre	0.62	mile
acre	0.4047	hectare	hectare	2.47	acre

* Example: to convert feet to metres, multiply by 0.305; to convert metres to feet multiply by 3.28

Other useful equivalencies (approximate areas)

- township: 23,040 acres = 9,324 hectares
- section: 640 acres = 259 hectares
- quarter section: 160 acres = 65 hectares
- legal subdivision: 40 acres = 16 hectares
- quarter of legal subdivision: 10 acres = 4 hectares

