INSTRUCTIONS
TO THE
SURVEYORS GENERAL OF PUBLIC LANDS
OF
THE UNITED STATES.

FOR USE IN SURVEYING DISTRICTS ESTABLISHED IN AND SINCE THE YEAR 1850;

A MANUAL OF INSTRUCTIONS
TO REGULATE THE FIELD OPERATIONS OF DEPUTY SURVEYORS,

ILLUSTRATED BY DIAGRAMS.

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TO THE SURVEYORS GENERAL

PUBLIC LANDS OF THE UNITED STATES
FOR THE SURVEYING DISTRICTS ESTABLISHED IN AND SINCE THE YEAR 1850.

By the direction of the Commissioner of the General Land Office, the accompanying instructions are prescribed for your official government, including a Manual of Instructions to regulate the field operations of your deputy surveyors. The latter is a revision of the Manual of Surveying Instructions prepared for Ontario in 1851, (the edition of which is now exhausted,) and presents, in some respects, more copious illustrations, both in the specimen field notes and in the diagrams, than could be furnished amidst the pressure of the exigency under which the former had to be prepared. It will be observed, that, in the former edition, the township and section lines south of the base are made to start therefrom, and close on the first standard parallel south; whereas, under the present instructions, such lines are made to start from the first standard parallel south, and to close to the north on the base; and thus there will be closing corners and starting corners, both on the base and standard lines. Such modification is introduced for the sake of entire uniformity of method in new fields of survey, and will not, of course, affect any past operations under the original instructions.

The starting corners on the base lines and on the standards will, of course, be common to two townships or to two sections lying on and north of such lines; and the closing corners on such lines, from the south, should be carefully connected with the former by measurements to be noted in the field book.

Where corner can be had to perpetuate corner boundaries, such, for obvious reasons, should always be preferred for that purpose, and the dimensions of the stone, as herein prescribed, (on page 9,) are to be regarded as the minimum size; but in localities where it is found practical to obtain a stone of incorrect dimensions, it is always desirable to do so, particularly for town line corners, and especially for those on stone, marl, and standard lines; and to such purpose the deputy surveyor is to be specially instructed.

Prior to entering upon duty, the deputy surveyor is to make himself thoroughly acquainted with the official requirements in regard to field operations in all the details herein set forth, and to be apprised of the weighty moral and legal responsibilities under which he will act.
Unfaithfulness in the execution of the public surveys will be detected by special examinations of the work to be made for that purpose, and, when detected, will immediately subject the delinquent deputy and his bookmen to be sued by the district attorney of the United States, at the instance of the proper surveyor general—the institution of which suit will act at once as a lien upon any property owned by him or them at that time; and such delinquency, moreover, is an offence punishable by the statute, with all the pains and penalties of perjury, (see act of 1849, quoted on pages 19 and 20 hereof,) and will of necessity debar the offending deputy from future employment in like capacity. Hence, in the execution of contracts for surveying public lands, there is every incentive to fidelity that can address itself either to the moral sense, or to motives of private interest.

By order of the Commissioner:

JOHN M. MOORE,
Principal Clerk of Surveys.

GENERAL LAND OFFICE,
February 22, 1855.

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SYSTEM
of
RECTANGULAR SURVEYING.

1. The public lands of the United States are ordinarily surveyed into rectangular tracts, bounded by lines conforming to the cardinal points.

2. The public lands are laid off, in the first place, into bodies of land of six miles square, called Townships, containing as near as may be 23,040 acres. The townships are subdivided into thirty-six tracts called Sections, of a mile square, each containing as near as may be, 640 acres. Any number or series of contiguous townships, situated north or south of each other, constitute a Range.

The law requires that the lines of the public surveys shall be governed by the true meridian, and that the townships shall be six miles square,—two things involving in connection a mathematical impossibility—for, strictly to conform to the meridian, necessarily throws the township out of square, by reason of the convergence of meridians, and hence, by adhering to the true meridian, results the necessity of departing from the strict requirements of law, as respects the precise area of townships and the subdivisional parts thereof, the township assuming something of a trapezoidal form, which inequality develops itself more and more as such the higher the latitude of the surveys. It is doubtful in view of these circumstances that the law provides (see sec. 2 of the act of May 18, 1796) that the sections of a mile square shall contain the quantity of 640 acres, as nearly as may be; and, moreover, provides (see sec. 3 of the act of 16th May, 1800) in the following words: "And in all cases where the exterior lines of the townships, to be subdivided into sections or half sections, shall exceed, or shall not extend six miles, the excess or deficiency shall be specially noted, and added to or deducted from the western or northern range of sections or half sections in such township, according as the error may be in running the lines from east to west, or from south to north; the sections and half sections bounded on the northern and western lines of such townships shall be sold as containing only the quantity expressed in the returns and plat, respectively, and all others as containing the complete legal quantity."
The accompanying diagram, marked A, will serve to illustrate the method of running out the exterior lines of townships, as well as the north and south sides of the base line; and the order and mode of subdividing townships will be found illustrated in the accompanying specimen field notes, conforming with the township diagram B. The method here presented is designed to insure as full a compliance with all the requirements, meaning, and intent of the surveying laws as it is believed, is practicable.

The section lines are surveyed from south to north on true meridians, and from east to west, in order to throw the excesses or deficiencies in measurements on the north and west sides of the township, as required by law.

3. The townships are to bear numbers in respect to the base line either north or south of it; and the tiers of townships, called “Ranges,” will bear numbers in respect to the meridian line according to their relative position to it, either on the east or west.

4. The thirty-six sections into which a township is subdivided are numbered, commencing with number one at the northeast angle of the township, and proceeding west to number six, and thence proceeding east to number twelve, and so on, alternately, until the number thirty-six in the southeast angle.

5. Standard Parallels (usually called correction lines) are established at stated intervals to provide for or counteract the error that otherwise would result from the convergence of meridians, and also to arrest error arising from inaccuracies in measurements on meridian lines, which, however, must ever be studiously avoided. On the north of the principal base line it is proposed to have these standard lines run at distances of every four townships, or twenty-four miles, and on the south of the principal base, at distances of every five townships, or thirty miles.

OF MEASUREMENTS, CHAINING, AND MARKING.

1. Where uniformity in the variation of the needle is not found, the public surveys must be made with an instrument operating independently of the magnetic needle. Burt’s improved solar compass, or other instruments of equal utility, must be used in necessity in such cases; and it is deemed best that each instrument should be used under all circumstances. Where the needle can be relied on, however, the ordinary compass may be used in subdividing and measuring.

2. The township lines, and the subdivision lines, will usually be measured by a two-pole chain of thirty-three feet in length, consisting of fifty links, and each link being seven inches and ninety-two hundredths of an inch long. On uniform and level ground, however, the four-pole chain may be used. Your measurements will, however, always be represented according to the four-pole chain of one hundred links. The deputy surveyor must also have with him a measure of the standard chain, whereby to compare and adjust the chain in use, from day to day, with punctuality and carelessness; and must return such standard chain to the Surveyor General’s office for examination when his work is completed.

OF TALLY PINS.

3. You will use eleven tally pins made of steel, not exceeding fourteen inches in length, weighty enough towards the point to make them drop perpendicularly, and having a ring at the top, in which is to be fixed a piece of red cloth, or something else of conspicuous color, to make them readily seen when stuck in the ground.

PROCEDURE OF CHAINING.

4. In measuring lines with a two-pole chain, every five chains are called “a tally,” because at that distance the last of the ten tally pins with which the forward chainman set out will have been struck. He then cries “tally,” which cry is repeated by the other chainman, and each registers the distance by sliding a thimble, button, or ring of another, or something of the kind, on a belt worn for that purpose, or by some other convenient method. The kind chainman then comes up, and having counted in the presence of his fellow the tally pins which he has taken up, so that both may be assured that none of the pins have been lost, he then takes the forward end of the chain, and proceeds to set the pins. Thus the chainman alternately changes places, each placing the pins that he has taken up, so that one is forward in all the odd, and the other in all the even tallies. Such procedure, it is believed, tends to insure accuracy in measurement, facilitates the recollection of the distances to objects on the line, and renders a unit-tally almost impossible.

LEVELLING THE CHAIN AND PLACING THE PINS.

5. The length of every line you run is to be ascertained by precise horizontal measurement, as nearly approximating to an air line, as is pos-
sible in practice on the earth's surface. This all important object can only be attained by a rigid adherence to the three following observ-
ance:
1. Ever keep the chain stretched to its utmost degree of tension on uneven ground.
2. On uneven ground, keeping the chain not only stretched as aforesaid, but horizontally levelled. And when ascending and descending steep ground, hills, or mountains, the chain will have to be shortened to one-half its length, and sometimes more, in order accurately to obtain the true horizontal measure.
3. The careful planning of the tally pin, so as to attain precisely the spot where they should be stuck. The more uneven the surface, the greater the caution needed to set the pins.

MARKING LINES.

6. All lines on which are to be established the legal corner boundaries are to be marked after this method, viz: Those trees which may intercept your line must have two chops or notches cut on each side of them without any other marks whatever. These are called "sight trees," "line trees," or "station trees.

A sufficient number of other trees standing nearest to your line, on either side of these to be blazed on two sides diagonally, or quartering towards the line, in order to render the line conspicuous, and readily to be traced, the blazes to be opposite each other, coinciding in direction with the line where the tree stand very near it, and to approach nearer each other the further the line passes from the blazed trees. Due care must ever be taken to have these lines so well marked as to be readily followed.

OF TRIAL, OR RANDOM LINES,

the trees are not to be blazed, unless occasionally from indispensible necessity, and then it must be done so guardedly as to prevent the possibility of confounding the mark of the trial line with the true. But lashes and limbs of trees may be lopped, and stakes set on the trial, or random line, at every ten chains, to enable the surveyor on his return to follow and correct the trial line, and establish there from the true line.

To prevent confusion, the temporary stakes set on the trial, or random line, must be pulled up when the surveyor returns to establish the true line.

INSURERABLE OBJECTS ON LINE—WITNESS POINTS.

7. Under circumstances where your course is obstructed by impassable obstacles, such as ponds, swamps, marshes, lakes, rivers, creeks, &c, you will prolong the line across such obstacles by taking the necessary right angle offsets in a traverse or trigonometrical operation, until you regain the line on the opposite side. And in case a north and south, or a true east and west, line is required in advance of any such obstacles, you will prolong and mark the line back to the obstacle so passed, and state all the particulars in relation thereto in your field book. And at the intersection of lines with both margins of impassable obstacles, you will establish a Witness Point, for the purpose of perpetuating the intersections therewith, by setting a post, and giving it to your field book, the course and distance thence from to two trees on opposite sides of the line, each of which trees you will mark with a blaze and notch facing the post; but on the margins of navigable water courses, or navigable lakes, you will mark the trees with the proper letter of the fractional section, township, and range.

ED The best marking tools adapted to the purpose must be provided for marking neatly and distinctly all the letters and figures required to be made at corners; and the depot is to have always at hand the necessary implements for keeping his marking tools in order; for which purpose a rat-tail file and a small whetstone will be found indispensable.

ESTABLISHING CORNER BOUNDARIES.

To procure the faithful execution of this portion of a surveyor's duty is matter of the utmost importance. After a true course, and most exact measurements, the corner boundary is the consummation of the work, for which all the previous pains and expenditures have been incurred. If, therefore, the corner boundary be not perpetuated in a permanent and conspicuous manner, the great aim of the surveying service will not have been attained. A boundary corner, in a timbered country, is to be a tree, if one be found at the precise spot; and if not, a post is to be planted thereat; and the position of the corner post is to be indicated by trees adjacent, the angular bearings and distances of which from the corner are facts to be ascertained and registered in your field book. (See article, "Bearing trees")
In a region where stone abounds the corner boundary will be a small monument of stone along side of a single marked stone for a township corner, and a single stone for all other corners.

In a region where timber is not near, and stone not found, the corner will be a mound of earth, of prescribed size, varying to suit the case.

The following are the different points for perpetuating corners, viz:
1. For township boundaries, at intervals of every six miles.
2. For section boundaries, at intervals of every mile, or 80 chains.
3. For quarter section boundaries, at intervals of every half mile, or 40 chains. Exceptions, however, occur on east and west lines, as explained herein.

[The half quarter section boundary is not marked in the field, but is regarded by the law as a point intermediate between the half mile or quarter section corners. The act of 24th April, 1832, entitled "An act making further provision for the sale of the public lands," which act refers to the act of Congress passed on the 11th of February, 1805, entitled "An act concerning the mode of surveying the public lands of the United States," for the manner of ascertaining the corners and contents of half quarter sections.]

4. Meridian corner posts are planted at all those points where the township or section lines intersect the banks of such rivers, bayous, lakes, or islands as are by law directed to be meandered.

The courses and distances on meandered navigable streams govern the calculations wherefrom are ascertained the true areas of the tracts of land (sections, quarter sections, &c.) known to the law as fractional, and binding on such streams.

METHODS OF ESTABLISHING CORNERS BY MEANS OF POSTS.

Township, sectional, or mile corners, and quarter sectional or half mile corners, will be perpetuated by planting a post at the place of the corner, to be formed of the most durable wood of the forest at hand.

The posts must be set in the earth by digging a hole to admit them to two feet deep, and must be very securely nailed in with earth, and also with stone, if any be found at hand. The portion of the post which protrudes above the earth must be squared off sufficiently smooth to admit of receiving the marks thereon, to be made with appropriate marking irons, indicating what it stands for. Thus the sides of township

*The subdivision of the half-quarter section into quarter-quarter sections is authorized by "An act supplementary to the several laws for the sale of the public lands," approved 3 April 1832.

corner posts should square at least four inches, (the post itself being five inches in diameter,) and must protrude two feet at least above the ground; the sides of section corner posts must square at least three inches, (the post itself being four inches in diameter,) and protrude two feet from the ground; and the quarter section corner posts and quarter corner posts must be three inches wide, presenting flattened surfaces, and protruding two feet from the ground.

Where a township post is a corner common to four townships, it is to be set in the earth diagonally, thus:

N
W
E
S

On each surface of the post is to be marked the number of the particular township, and its range, which it faces. Thus, if the post be a common boundary to four townships—say one and two, south of the base line, of range one, west of the meridian; also to townships one and two, south of the base line, of range two, west of the meridian, it is to be marked thus:

(R. 1 W.)
T. 1 S.
S. 31
W. 2

From N. to E. 1 S. from W. to S. 2 S.

These marks are not only to be distinctly but neatly cut into the wood, at least the eighth of an inch deep; and to make them yet more conspicuous to the eye of the anxious explorer, the deputy must apply to all of them a streak of red chalk.

Section or mile posts, being corners of sections, and where such are common to four sections, are to be set diagonally in the earth, (in the manner provided for township corner posts,) and on each side of the squared surfaces (made smooth, as aforesaid, to receive the marks) is to be marked the appropriate number of the particular one of the four sections, respectively, which such side faces; also on one side thereof are to be marked the numbers of its township and range; and to make such marks yet more conspicuous, in manner aforesaid, a streak of red chalk is to be applied.

In every township subdivided into thirty-six sections, there are twenty-five interior section corners, each of which will be common to four sections.

A quarter section, or half mile post, is to have no other mark on it than 1 S., to indicate what it stands for.
NOTCHING CORNER POSTS.

Township corner posts, common to four townships, are to be notched with six notches on each of the four angles of the squared part set to the cardinal points.

All mile posts on township lines must have as many notches on them, on two opposite angles thereof, as they are miles distant from the township corners, respectively. Each of the posts at the corners of sections in the interior of a township must indicate, by a number of notches on each of its four corners directed to the cardinal points, the corresponding number of miles that it stands from the outskirts of the township. The four sides of the post will indicate the number of the section they respectively face. Should a tree be found at the place of any corner, it will be marked and notched as aforesaid, and answer for the corner in lieu of a post, the kind of tree and its diameter being given in the field notes.

BEARING TREES.

The position of all corner posts, or corner trees, of whatever description, that may be established, is to be evidenced in the following manner, viz. From each post or tree the corner must be taken and the distances measured to two or more adjacent trees in opposite directions, as nearly as may be, and these are called “bearing trees.” Such are to be distinguished by a large smooth blaze, with a notch at its lower end, facing the corner, and in the blaze is to be marked the number of the range, township, and section; but at quarter section corners nothing but a § 8. need be marked. The letters T.T. (bearing tree) are also to be marked upon a smaller blaze directly under the large one, and as near the ground as practicable.

At all township corners, and at all quarter corners, on range or township lines, four bearing trees are to be marked in this manner, one in each of the adjoining sections.

At interior section corners-four trees, one to stand within each of the four sections to which such corner is common, are to be marked in manner aforesaid, if such can be found.

A tree supplying the place of a corner post is to be marked in the manner directed for posts; but if such tree should be a beech, or other smooth bark tree, the marks may be made on the bark, and the tree notched.

Four quarter section and quarter corners two bearing trees are to be marked, one within each of the adjoining sections.

Where the requisite number of “bearing trees” is not to be found at convenient and suitable distances, such as are found to be marked as herein directed; but in all such cases of deficiency in the number of bearing trees, unless, indeed, the boundary itself be a tree, a quadrangular trench, with sides of five feet, and with the angles to the cardinal points, must be spaced out outside the corner, as a center, and the earth carefully thrown on the inside, so as to form a range of earth, which will become covered with grass, and present a small square elevation, which in aftertime will serve to mark, unmistakably, the spot of the corner.

CORNER STONES.

Where it is deemed best to use stones for boundaries, in lieu of posts, you may, at any corner, insert embedded into the ground, to the depth of 7 or 8 inches, a stone, the number of cubic inches in which shall not be less than the number contained in a stone 14 inches long, 12 inches wide, and 3 inches thick—equal to 504 cubic inches—the edges of which must be cut jneck and south, on north and south lines, and east and west, on east and west lines; the dimensions of each stone to be given in the field notes at the time of establishing the corner. The kind of stone should also be stated.

MARKING CORNER STONES.

Stones at township corners, common to four townships, must have six notches, cut with a pick or chisel on each edge or side towards the cardinal points; and where used at section corners on the range and township lines, or as section corners in the interior of a township, they will also be notched, to correspond with the directions given for notching posts similarly situated.

Posts or stones at township corners on the base and standard lines, and which are common to two townships on the north side thereof, will have six notches on each of the west, north, and east sides or edges; and where such stones or posts are set for corners to two townships north of the base or standard, six notches will be cut on each of the west, south, and east sides or edges.

Stones, when used for quarter section corners, will have § 8 cut on them—on the west side on north and south lines, and on the north side on east and west lines.
MOUNDS.

Whenever bearing trees are not found, mounds of earth, or stone, are to be raised around posts on which the corners are to be marked in the manner aforesaid. Whenever a mound of earth is adopted, the same will present a conical shape; but at its base, on the earth's surface, a quadrangular trench will be dug; by the trench (here meant) is to be understood a space deep of earth thrown up from the four sides of the line, outside the trench, so as to form a continuous elevation along its outer edge. In mounds of earth, common to four townships or to four sections, they will present the angles of the quadrangular trench diagonally towards the cardinal points. In mounds, common only to two townships or two sections, the sides of the quadrangular trench will face the cardinal points. The sides of the quadrangular trench at the base of a township mound are to be six feet, the height of mound three feet.

At section, quarter section, and meander corners, the sides of the quadrangular trench at base of mounds are to be five feet, and the conical height two and a half feet.

Prior to piling up the earth to construct a mound, there is to be dug a square or circle of four feet of earth from the corner boundary point, and in the cavity so formed is to be deposited a soaked stone or a portion of charcoal, (the quantity thereof is to be noted in the field book) or in lieu of charcoal or marked stone, a charred stake is to be driven twelve inches down into each corner point, none of the same being always to be opened, and whichever is adopted, the fact is to be noted in the field book.

When mounds are formed of earth, the spot from which the earth is taken is called the "pit," the centre of which ought to be, wherever practicable, at a uniform distance and in a uniform direction from the centre of the mound. There is to be a "pit" on each side of every mound, distant eighteen inches outside of the trench. The trench may be expected hereafter to be covered by tufts of grass, and thus to indicate the place of the mound, when the mound itself may have become obliterated by time or accident.

At meander corners the "pit" is to be directly on the line, eight links further from the water than the mound. Wherever necessity is found for deviating from these rules in respect to the "pit," the course and distance to each is to be stated in the field books.

Perpetuity in the mound is a great desideratum. In forming it with light alluvial soil the surveyor may find it necessary to make due allowance for the future setting of the earth, and thus making the mound more elevated than would be necessary in a more compact and tenacious soil, and increasing the base of it. In so doing, the relative proportions between the township mound and other mounds is to be preserved as nearly as may be.

This earth is to be pressed down with the plow during the process of piling it up. Mounds are to be covered with sod, grass side up, where soil is to be had; but, in forming a mound, so it is never to be brought up with the earth, because sod decays, and in the process of decomposing it will cause the mound to become porous, and therefore liable to premature destruction.

POSTS IN MOUNDS.

Must show above the top of the mound ten or twelve inches, and be notched and marked precisely as they would be for the same corner without the mound.

MOUND MEMORIALS.

Besides the charcoal, marked stone or charred stake, one or the other of which must be lodged in the earth at the point of the corner, the deputy surveyor is recommended to plant midway between each pit and the trench, seeds of some tree, (those of fruit trees adapted to the climate being always to be preferred,) so that, in course of time, should such take root, a small clump of trees may possibly hereafter note the place of the corner. The facts of planting such seed, and the kind thereof, are matters to be truthfully noted in the field book.

WITNESS MOUND TO TOWNSHIP OR SECTION CORNERS.

If a township or section corner, in a situation where bearing or witness trees are not found within a reasonable distance thereof, shall fall within a ravine, or in any other situation where the nature of the ground, or the circumstances of its locality, shall be such as may prevent, or prove unfavorable to, the erection of a mound, you will perceive such corner by selecting in the immediate vicinity thereof a suitable plot of ground as a site for a bearing or witness mound, and shall thereon a mound of earth in the same manner and conditioned in every respect, with charcoal, stone, or charred stake deposited beneath, as before directed; and measure and state in your field book the distance and course from the position of the true corner of the bearing or witness mound so placed and erected.
DOUBLE CORNERS.

Such corners are to be nowhere except on the line and standard lines, whereon are to appear both the corners which mark the intersections of the lines which close theron, and those from which the surveys start on the north. On these lines, and at the time of running the same, the township, section, and quarter section corners are to be planted, and each of these is a corner common to two, (whether township or section corners,) on the north side of the line, and must be so marked.

The corners which are established on the standard parallel, at the time of running it, are to be known as "standard corners," and in addition to all the ordinary marks, (as herein prescribed,) they will be marked with the letters S.C. Closing corners will be marked with the letters C.C. in addition to other marks.

The standard parallels are designed to be run in advance of the contiguous surveys on the south of them, but circumstances may exist which will impede or temporarily delay the due extension of the standard; and when, from uncontrollable causes, the contiguous townships must be surveyed in advance of the time of extending the standard, in any such event it will become the duty of the deputy who shall afterwards survey any such standard to plant thereon the double set of corners, to wit, the standard corners, to be marked S.C, and the closing ones which are to be marked C.C.; and to make such measurements as may be necessary to connect the closing corners and complete the uninfluenced mapping lines of such contiguous and prior surveys, on the principles herein set forth, under the different heads of "exterior or township lines," and of "diagram B."

You will recollect that the corners, whether township or section corners, which are common to two, (two townships or two sections,) are not to be planted diagonally like those which are common to four, but with the flat sides facing the cardinal points, and on which the marks and notices are made as usual. This, it will be perceived, will serve yet more fully to distinguish the standard parallels from all other lines.

THE MEANDERING OF NAVIGABLE STREAMS.

1. Standing with the face looking down stream, the bank on the left hand is termed the "left bank," and that on the right hand the "right hand." These terms are to be universally used to distinguish the two banks of river or stream.

2. Both banks of navigable rivers are to be measured by taking the courses and distances of their sinuosities, and the same are to be entered in the field book.

At those points where either the township or section lines intersect the banks of a navigable stream, river, or, where necessary, morass of earth or stone, are to be established at the time of running these lines. These are called "meander corners," and in meandering you are to commence at one of those corners on the township line, crossing the banks, and measuring the distance of each from your commencing corner to the next "meander corner," upon the same or another boundary of the same township, carefully noting your intersections with all intermediate meander corners. By the same method you are to meander the opposite bank of the same river.

The crossing distance between the meander corners on same line is to be ascertained by triangulation, in order that the river may be treated with entire accuracy. The particulars to be given in the field notes.

3. You are also to meander, in manner aforesaid, all lakes and deep ponds of the area of twenty-five acres and upwards; also navigable bays, shallow ponds, ready to be drained, or likely to dry up, and not to be considered.

You will notice all streams of water falling into the river, lake, or bayou you are measuring, stating the width of the same at their mouth, also all springs, noting the size thereof and depth, and whether the water be pure or mineral; also the bend and meander of all bayous, and all island, rapids, and bars are to be noticed, with intersections to their upper and lower points to establish their exact situation. You will also note the elevation of the banks of rivers and streams, the heights of falls and cascades, and the length of rapids.

4. The precise relative position of islands, in a township made fractional by the river in which the same are situated, is to be determined trigonometrically—sighting to a flag or other fixed object on the island, from a special and carefully measured base line, connected with the surveyed lines, on or near the river bank, you are to form connection between the meander corners on the river to points corresponding thereto, in direct line, on the bank of the island, and there establish the proper meander corners, and calculate the distances across.

5. In meandering lakes, ponds, or bayous, you are to commence at a meander corner upon the township line, and proceed as above directed for the banks of a navigable stream. But where a lake, pond, or bayou...
lies entirely within the township boundaries, you will commence at a
meander corner established in subdividing, and from thence take the
courses and distances of the entire margin of the same, noting the in-
tersection with all the meander corners previously established thereon.

0. To meander a pond lying entirely within the boundaries of a sec-
tion, you will run and measure two lines thereto from the nearest sec-
tion or quarter section corner on opposite sides of such pond, giving the
courses of such lines. At each of the points where such lines shall
intersect the margin of such pond, you will establish a witness point,
by driving a post in the ground, and taking bearings to any adjacent trees,
or, if necessary, raising a mound.

The relative position of these points being thus definitely fixed in the
section, the meandering will commence at one of them, and be continued
to the other, noting the intersection, and thence to the beginning. The
proceedings are to be fully entered in the field book.

7. In taking the connection of an island with the main land, when
there is no meander corner in line, opposite thereto, to sight from, you
will measure a special base from the meander corner nearest to such
island, and from such base you will triangulate to some fixed point on the
shore of the island, ascertain the distance across, and there establish a
special meander corner, wherefrom you will commence to meander the
island.

The field notes of meanders will be set forth in the body of the field
book according to the data when the work is performed, as illustrated
in the specimen notes annexed. They are to state and describe particu-
larly the meander corner from which they commenced, each one with
which it closes, and to exhibit the meanders of such fractional sec-
tion separately, following, and composing a port of such notes, will be
given a description of the land, timber, depth of inundation to which
the bottom is subject, and the banks, current, and bottom of the stream
or body of water you are meandering.

9. No lines or marks of any description are to be made on the lines
meandered between the established corners, but the utmost care must
be taken to pass no object of topography, or change therein, without
giving a particular description thereof in its proper place in your mean-
der corner notes.

OF FIELD BOOKS.

The field notes afford the elements from which the plans and cal-
culations in relation to the public surveys are made. They are the same
wherefrom the description and evidence of locations and boundaries are
officially delineated and set forth. They therefore must be a faithful
and minute record of everything officially done and observed by
the surveyor and his assistants, pursuant to instructions, in relation
to running, measuring, and marking lines, establishing boundary corners,
and present, as far as possible, a full and complete topographical
description of the country surveyed, as to every matter of useful
information, or likely to gratify public curiosity.

There will be many separate and distinct field books of surveys, as
follows:

Field notes of the meridian and base lines, showing the establish-
ment of the township, section or mile, and quarter section or half mile
boundary corners thereto; with the crossings of streams, ravines, hills,
and mountains; characters of soil, timber, minerals, etc.

Field notes of the "standard parallels" or correction lines, will
show the establishment of the township, section, and quarter section
corners, besides exhibiting the topography of the country on line, as
required on the base and meridian lines.

Field notes of the exterior lines of townships, showing the estab-
lishment of corners on line, and the topography, as ascertained.

Field notes of the connections of townships into sections and quar-
ter sections.

The field notes must in all cases be taken precisely in the order in
which the work is done on the ground, and the date of each day's work
must follow immediately after the notes thereof. The position of the
noodle must always occupy a separate line preceding the notes of meas-
urements on line.

The exhibition of every mile of surveying, whether on township or
subdivisions, must be complete in itself, and be separated by a
black line drawn across the paper.

The description of the surface, soil, minerals, timber, undergrowth, etc.,
on each mile of line, is to follow the notes of survey of such line, and not
be mixed up with them.

Notations of words are allowable, except of such words as are
constantly occurring, such as "sea," for "section," "in line," for
"inches diameter," "ch.1. for "chains," "lk. for "links," "dist."
fur "distant," &c. Proper names must never be abbreviated, however
often their recurrence.

The nature of the subject-matter of the field book is to form its title
page, showing the State or Territory where such survey lies, by whom
surveyed, and the dates of commencement and completion of the work.
The second page is to contain the names and dates of assistants.
Whenever a new assistant is employed, or the duties of any one of them
are changed, such facts, with the reasons therefore, are to be stated in an
appropriate entry immediately preceding the notes taken under such
changed arrangements.

With the notes of the exterior lines of townships, the deputy is to submit a plot of the lines run, on a scale of two
inches to the mile, on which are to be noted all the objects of topography
on line necessary to illustrate the notes, viz: the distances on line at the
crossings of streams, so far as such can be noted on the paper, and the
direction of each by an arrow head pointing down stream; also the inter-
section of line by prairies, marshes, swamps, ravines, ponds, lakes, hills,
mountains, and all other matters indicated by the notes, to the fullest
extent practicable.

With the instructions for making subdivisions of surveys of townships
into sections, the deputy will be furnished by the Surveyor General with
a diagram of the exterior lines of the townships to be subdivided, (on
the above named scale,) upon which are carefully to be laid down the
measurements of each of the section lines on such boundaries wherein
he is to close, the magnetic variation of such mills, and the particular
description of each corner. P. in M. signifies post in mound. And on
such diagram the deputy who subdivides will make appropriate sketches of the various objects of topography as they occur on his lines, so as to
exhibit not only the points on line at which the same occur, but also
the direction and position of each between the lines, or within such sec-
tion, so that every object of topography may be properly completed or
connected in the showing.

These notes must be distinctly written out, in language precise and
clear, and their figures, letters, words, and meaning are always to be
unmistakable. No leaf is to be cut or mutilated, and none to be taken
out, whereby suspicion might be created that the missing leaf contained
matter which the deputy believed it to be his interest to conceal.

SUMMARY OF OBJECTS AND DATA REQUIRED TO BE NOTED.

1. The precise length of every line run, noting all necessary offsets
thereon, with the reason and mode thereof.

2. The kind and diameter of all "bearing trees," with the course and
distance of the same from their respective corners; and the precise
relative position of written corners to the true corners.

3. The kind of materials (earth or stone) of which mounds are con-
structed—the fact of their being conditioned according to instructions—
with the course and distance of the "pits," from the centre of the
mound, where necessity exists for deviating from the general rule.

4. Trees on line. The name, diameter, and distance on line to all
trees which it intersects.

5. Intersections by line of land objects. The distance at which the
line first intersects and then leaves every settler's claim and improve-
ment; prairie; river, creek, or other "bottom;" or swamp, marsh,
grace, and wind fall, with the course of the same at both points of inter-
section; also the distances at which you begin to ascend, arrive at the
top, begin to descend, and reach the foot of all remarkable hills and
ridges, with their courses, and estimated height, in feet, above the leve
land of the surrounding country, or above the bottom lands, ravines, or
waters near which they are situated.

6. Intersections by line of water objects. All rivers, creeks, and
smaller streams of water which the line crosses; the distance on line at
the points of intersection, and their widths on line. In cases of navig-
able streams, their widths will be ascertained between the meander cor-
ners, as set forth under the proper head.

7. The land's surface—whether level, rolling, broken, or hilly.

8. The soil—whether flat, second, or third rate.

9. Travels—the several kinds of timber and undergrowth, in the order
in which they predominate.

10. Bottoms lands—to be described as wet or dry, and if subject to
inundation, state to what depth.

11. Springs of water—whether fresh, saline, or mineral, with the
course of the stream flowing from them.

12. Lakes and ponds—describing their banks and giving their height,
and also the depth of water, and whether it be pure or stagnant.

13. Improvements. Towns and villages; Indian towns and wigwams;
houses or cabins; fields, or other improvements; sugar true groves,
sugar cane, mill scots, forges, and factories.
14. Soil, banks or beds; peat or turf grounds; minerals and ores; with particular description of the same as to quality and extent, and all diggings thereof; also salt springs and holes. All reliable information you can obtain respecting these objects, whether they be on your immediate line or not, is to appear in the general description to be given at the end of the notes.

15. Roads and trails, with their directions, whence and whither.

16. Rapids, cataracts, cascades, or falls of water, with the height of their fall in feet.

17. Precipices, caves, sink holes, ravines, stone quarries, ledges of rocks, with the kind of stone they afford.

18. Natural curiosities, interesting fossils, petrifications, organic remains, &c.; also all ancient works of art, such as mounds, fortifications, embankments, ditches, or objects of like nature.

19. The variation of the needle must be noted at all points or places on the lines where there is found any material change of variation, and the position of such points must be perfectly identified in the notes.

20. Besides the ordinary notes taken on line, (which must always be written down on the spot, leaving nothing to be supplied by memory,) the deputy will subjoin, at the conclusion of his book, such further description or information touching any matter or thing connected with the township (or other survey) which he may be able to afford, and may deem useful or necessary to be known—with a general description of the township in the aggregate, as respects the face of the country, its soil and geological features, timber, minerals, waters, &c.

**SWAMP LANDS.**

By the act of Congress approved September 28, 1850, swamp and overflowed lands "suit for cultivation," are granted to the State in which they are situated. In order clearly to define the quantity and locality of such lands, the field notes of surveys, in addition to the other objects of topography required to be noted, are to indicate the points at which you enter all lands which are evidently subject to such grant, and to show the distinctive character of the land so noted; whether it is a swamp or marsh, or otherwise subject to inundation to an extent that, without artificial means, would render it "suit for cultivation." The depth of inundation is to be stated, as determined from indications on the trees where timber exists; and its frequency is to be set forth as accurately as may be, either from your own knowledge of the general character of the stream which overflows, or from reliable information to be obtained from others. The words "suit for cultivation," are to be employed in addition to the usual phrasing in regard to entering or favoring such swamps, marshy, or overflowed lands. It may be that sometimes the margin of bottom, swamp, or marsh, in which such un-irrigated land exists, is not identical with the margin of the body of land "suit for cultivation," and in such cases a separate entry must be made for each opposite the marginal distance at which they respectively occur.

But in cases where lands are overflowed by artificial means, (say by dams for milling, logging, or for other purposes,) you are not officially to regard such overflow, but will continue your lines across the same without setting member posts, stating particularly in the notes the depth of the water, and how the overflow was caused.

**SPECIAL INSTRUCTION RESPECTING THE NOTING OF SETTLEER'S CLAIMS IN OREGON, WASHINGTON, AND NEW MEXICO.**

The law requires that such claims should be laid down temporarily on the township plats; in order to do which, it is indispensably necessary to obtain, to some extent, connections of these claims with the lines of survey. Under the head of "intersection by line of land objects," the deputy is required to note the points in line where it may be intersected by such claims; but, in addition thereto, there must be obtained at least one angle of each claim, with its course and distance either from the point of intersection, or from an established corner boundary, so that its connection with the regular survey will be legally determined. If the settler's dwelling or barn is visible from line, the bearings thereof should be carefully taken from two points noted on line, and set forth in the field notes.

**AFFIDAVIT TO FIELD NOTES.**

At the close of the notes and the general description is to follow an affidavit, a form for which is given, and to enable the deputy surveyor fully to understand and appreciate the responsibility under which he is acting, his attention is invited to the provisions of the second section of the act of Congress, approved August 6th, 1849, entitled "An Act to equalize the compensation of the surveyors general of the public lands of the United States, and for other purposes," and which is as follows:

"Sec. 2. That the surveyors general of the public lands of the United..."
States, in addition to the oath now authorized by law to be administered to deputies on their appointment to office, shall require each of their deputies, on the return of his surveys, to take and subscribe an oath of affirmation that such surveys have been faithfully and correctly executed according to law and the instructions of the surveyor general; and on satisfactory evidence being presented to any court of competent jurisdiction, that such surveys, or any part thereof, had not been thus executed, the deputy making such false oath or affirmation shall be deemed guilty of perjury, and shall suffer all the pains and penalties attached to that offence; and the district attorney of the United States for the time being, in whose district any such false, erroneous, or fraudulent surveys shall have been executed, shall, upon the application of the proper surveyor general, immediately institute suit upon the bond of such deputy; and the institution of such suit shall act as a lien upon any property owned or held by such deputy, or his sureties, at the time such suit was instituted.

Following the "general description" of the township to be "A list of the names of the individuals employed to assist in running, measuring and marking the lines and corners described in the foregoing field notes of township No. of the base line of range No. of the first Meridian, showing the respective capacities in which they

FORM OF OFFICIAL OATHS TO BE TAKEN PRIOR TO ENTERING UPON DUTY.

For a deputy surveyor.

I, A. B., having been appointed a deputy surveyor of the lands of the United States in ______, do solemnly swear (or affirm) that I will well and faithfully, and to the best of my skill and ability, execute the duties confided to me pursuant to a contract with C. D., surveyor general of public lands in ______, bearing date the ______ day of ______, 18_____, according to the laws of the United States and the instructions received from the said surveyor general.

To be sworn and subscribed before a justice of the peace, or other officer authorized to administer oaths.

For chairman.

I, E. F., do solemnly swear (or affirm) that I will faithfully execute the duties of chairmain; that I will level the chain upon uneven ground, and plumb the tally pins, whether by sticking or dropping the same; that I will report the true distance to all notable objects, and the true length of all lines that I assist in measuring, to the best of my skill and ability.

To be sworn and subscribed as above.

For flagman or axeman.

I, G. H., do solemnly swear (or affirm) that I will well and truly perform the duties of ______, according to instructions given me, and to the best of my skill and ability.

To be sworn and subscribed as above.

EXTREMES OR TOWNSHIP LINES.

The principal meridian, the base line, and the standard parallels having been first run, measured, and marked, and the corner boundaries therein established, according to instructions, the process of running, measuring, and marking the exterior lines of townships will be as follows:

Townships situated north of the base line, and west of the principal meridian.

Commence at No. 1, (see figures on diagram A) being the southwest corner of T. 1 N.-R. 1 W., as established on the base line; thence north, on a true meridian line, four hundred and eighty chains, establishing the section and quarter section corners thereof, as per instructions, to No. 2, thence east, on a random or trial line, setting temporary section and quarter section stakes, to No. 3, where measure and note the distance at which the line intersects the eastern boundary, north or south of the true or established corner. Run and measure westerly, on the true line, taking care to note all the land and water crossings, &c., as per instructions, to No. 4, which is identical with No. 2, establishing the section and quarter section permanent corners on said line. Should it happen, however, that such random line falls short, or overrun in length, or intersects the eastern boundary of the township at more than three chains and fifty links from the true corner thereof, as compared with the corresponding boundary on the south, (either of which would indicate an important error in the surveying,) the line must be retraced, even if found necessary to remeasure the meridional
boundaries of the township, especially the western boundary, so as to discover and correct the error; in doing which, the true corner must be established and marked, the false ones destroyed and obliterated, to prevent confusion in future; and all the facts must be distinctly set forth in the notes. Thence proceed in a similar manner from No. 4 to No. 5, No. 5 to No. 9, No. 6 to No. 7, and so on to No. 10, the south-west corner of T. 4 N., R. 3 W. Thence north, still on a true meridian line, establishing the mile and half-mile corners, until reaching the standard parallel or correction line; throwing the excess over, or deficiency under, four hundred and eighty chains, on the last half-mile, according to law, and at the intersection establishing the closing corner, the distance of which from the standard corner must be measured and noted as required by the instructions. But should it ever so happen that some impassable barrier will have prevented or delayed the extension of the standard parallel along and above the field of present survey, then the deputy will plant, in place, the corner for the township, subject to correction thereafter, should such parallel be extended.

North of the base line, and east of the principal meridian.

Commence at No. 1, being the southeast corner of T. 3 N., R. 1 E., and proceed as with townships situated "north and west," except that the random or trial lines will be run and measured west, and the true lines east, throwing the excess over or deficiency under four hundred and eighty chains on the west end of the line, as required by law; whereas the surveyor will commence his measurement with the length of the deficit or excessive half section boundary on the west of the township; and that the remaining measurements will all be even miles and half-miles.

METHOD OF SUBDIVIDING.

1. The first mile, both of the south and east boundaries of each township you are required to subdivide, is to be carefully traced and measured before you enter upon the subdivision thereof. This will enable you to observe any changes that may have taken place in the mastic variation, as it existed at the time of running the township line, and will also enable you to compare your chaining with that upon the township lines.

2. Any discrepancy, arising either from a change in the magnetic variation or a difference in measurement, is to be carefully noted in the field notes.

3. After adjusting your compass to a variation which you have thus found will remove the eastern boundary of the township, you will commence at the corner to sections 25 and 30. The south boundary, and run a line due north, forty chains, to the quarter section corner which you are to establish between sections 25 and 30; continuing due north forty chains farther, you will establish the corner to sections 25, 26, 29 and 30.

4. From the section corner last named, run a random line, without lacing, due east, for corner of sections 25 and 30, in east boundary, and at forty chains from the starting point set a post for temporary quarter section corner. If you intersect exactly at the corner, you will place your random line back, and establish it as the true line; but if your random line intersects the said east boundary, either north or south of said corner, you will measure the distance of such intersection, from which you will calculate a course that will run a true line back to the corner from which your random started. You will establish the permanent quarter section corner at a point equidistant from the two terminations of the true line.

5. From the corner of sections 25, 26, 29, 30, run due north between sections 25 and 26, setting the quarter section post, as before, at forty chains, and at eighty chains establishing the corner of sections 25, 26, 29, and 30. Then run a random due east for the corner of sections 29 and 30 in east boundary; setting temporary quarter section post at forty chains; correcting back, and establishing permanent quarter section corner at the equidistant point on the true line, in the manner directed on the line between sections 25 and 30.

6. In this manner you will proceed with the survey of each successive section in the first tier, until you arrive at the northern boundary of the township, which you will run in running a random line between sections 21 and 22. If this random line should not intersect at the corner established for sections 21, 22, 25 and 30, upon the township line, you will set the distance that you fall east or west of the same, from which distance you will calculate a course that will run a true line south to the corner from which your random started. Where the closing corner is on the base or standard line, a deviation from the general rule is explained under the head of "Disunion Line."

7. The first tier of sections being thus laid out and surveyed, you will return to the south boundary of the township, and from the corner of sections 21 and 32 commence and survey the second tier of sections in the same manner that you pursued in the survey of the first, closing at the section corners on the first tier.
8. In like manner proceed with the survey of each successive tier of sections, until you arrive at the fifth tier; and from each section corner which you establish upon this tier, you are to run random lines to the corresponding corners established upon the range line forming the western boundary of the township; setting, as you proceed, each temporary quarter section post at forty chains from the interior section corner, so as to throw the excess or deficiency of measurement on the extreme tier of quarter sections contiguous to the township boundary; and, on returning, establish the true line, and establish thereon the permanent quarter section corners.

Quarter section corners, both upon north and south and upon east and west lines, are to be established at a point equidistant from the corresponding section corners, except upon the lines closing on the north and west boundaries of the township, and in those situations the quarter section corners will always be established at precisely forty chains to the north or west (as the case may be) of the respective section corners from which those lines respectively start, by which procedure the excess or deficiency in the measurements will be thrown, according to law, on the extreme tier of quarter sections.

Every north and south section line, except those terminating in the north boundary of the township, is to be eighty chains in length. The east and west section lines, except those terminating on the west boundary of the township, are to be within one hundred links of eighty chain in length; and the north and south boundaries of any one section, except in the extreme western tier, are to be within one hundred links of equal length. The meanders within each fractional section, or between any two meander points, or of a pond or island in the interior of a section, must close within one chain and fifty links.

Diagram A illustrates the mode of laying off township exterior north of the base line and east and west of the principal meridian, whether between the base and first standard, or between any two standards; and the same general principles will equally apply to township south of the base line and east and west of the meridian, and between any two standards south, where the distance between the base and first standard, and between the standards themselves, are five townships or thirty miles.

Diagram B indicates the mode of laying off a town section into sections and quarter sections, and the accompanying set of field notes (marked B) critically illustrate the mode and order of conducting the survey under every variety of circumstance shown by the topography on the diagram. In townships lying north or south of and contiguous to the base or to any standard parallel, the line between the northern tier of sections will be run north, and be made to close as true lines; quarter section corners will be set at forty chains, and section corners established at the intersection of such section lines with the base or standard, (as the case may be), and the distance is to be measured and entered in the field book to the nearest corner on such standard or base.

Diagram C illustrates the mode of marking town, streets, or stone corners boundaries for townships, sections, and quarter sections.

The mode and order of surveying the exterior boundaries of a township are illustrated by the specimen field notes marked A; and the mode and order of subdividing a township into sections and quarter sections are illustrated by the specimen field notes marked B. The attention of the deputy is particularly directed to these specimen, as indicating not only the method in which his work is to be conducted, but also the order, manner, language, etc., in which his field notes are required to be returned to the Surveyor General's office; and such specimen are to be deemed part of these instructions, and any departures from their details, without special authority, in cases where the circumstances are analogous in practice, will be regarded as a violation of his command and oath.

The subdivisions of fractional sections into forty acre lots, (as near as may be) are to be so laid down on the official township plan in red lines, as to admit of giving to each a specific designation, if possible, according to its relative position in the fractional section, as per examples afforded by diagram B, as well as by a number, in all cases where the lot cannot properly be designated as a quarter-quarter. Those fractional subdivision lots which are not susceptible of being described according to relative local position, are to be numbered in regular series; No. 1 being (wherever practicable, and as a general rule) either the northeastern or the most easterly fractional lot, and proceeding from east to west and from west to east, alternately, to the end of the series; but such general rule is departed from under circumstances given as examples in fractional sections 4, 7, 10, and 30, where No. 1 is the interior lot of the northern and western tiers of the quarter sections to which there is a corresponding No. 2 given to the exterior lot, and the series of num-

A-4.
8. In like manner proceed with the survey of each successive tier of sections, until you arrive at the sixth tier; and, from each section corner which you establish upon this tier, you are to run random lines to the corresponding corners established upon the range line forming the western boundary of the township; setting, as you proceed, each temporary quarter section post at forty chains from the interior section corner, so as to throw the excess or deficiency of measurement on the extreme tier of quarter sections contiguous to the township boundary; and, on returning, establish the true line, and establish thereon the permanent quarter section corner.

Quarter section corners, both upon north and south and upon east and west lines, are to be established at a point equidistant from the corresponding section corners, except upon the lines closing on the north and west boundaries of the township, and in those situations the quarter section corners will always be established at precisely forty chains to the north or west (as the case may be) of the respective section corners from which those lines respectively start, by which procedure the excess or deficiency in the measurements will be thrown, according to law, on the extreme tier of quarter sections.

Every north and south section line, except those terminating in the north boundary of the township, is to be eighty chains in length. The east and west section lines, except those terminating on the west boundary of the township, are to be within one hundred links of eighty chains in length; and the north and south boundaries of any one section, except in the extreme western tier, are to be within one hundred links of equal length. The townships within each fractional section, or between any two meander posts, or of a pond or island in the interior of a section, must close within one chain and fifty links.

Diagram A illustrates the mode of laying off township exterior north of the base line and east and west of the principal meridian, whether between the base and first standard, or between any two standards, and the same general principles will equally apply to townships south of the base line and east and west of the meridian, and between any two standards north, where the distances between the base and first standard, and between the standards themselves, are five townships or thirty miles.

Diagram B indicates the mode of laying off a township into sections and quarter sections, and the accompanying set of field notes (marked B) critically illustrate the mode and order of conducting the survey under every variety of circumstances shown by the topography on the diagram. In townships lying south of and contiguous to the base or to any standard parallel, the lines between the northern tier of sections will be run north, and be made to close as true lines; quarter section corners will be set at forty chains, and section corners established at the intersection of each section lines with the base or standard, (as the case may be), and the distance is to be measured and entered in the field book to the nearest corner on such standard or base.

Diagram C illustrates the mode of making mound, stake, or stone corner boundaries for township sections, and quarter sections.

The mode and order of surveying the exterior boundaries of a township are illustrated by the specimen field notes marked A; and the mode and order of subdividing a township into sections and quarter sections are illustrated by the specimen field notes marked B. The attention of the deputy is particularly directed to these specimen, as indicating not only the method in which his work is to be conducted, but also the order, manner, language, etc., in which his field notes are required to be returned to the Surveyor General’s office; and such specimen are to be deemed part of these instructions, and any departure from their details, without special authority, in cases where the circumstances are analogous in practice, will be regarded as a violation of his orders and oath.

The subdivisions of fractional sections into forty acre lots, (as near as may be), are to be so laid down on the official township plats in red lines, as to admit of giving to each a specific designation, if possible, according to its relative position in the fractional section, as per examples afforded by diagram B, as well as by number, in all cases where the lot cannot properly be designated as a quarter-quarter. Those fractional subdivision lots which are not susceptible of being described according to relative local position, are to be numbered in regular series; No. 1 being (whenever practicable, and as a general rule) either the northeastern or the most westerly fractional lot, and proceeding from east to west and from west to east, alternately, to the end of the series; but such general rule is departed from under circumstances given as examples in fractional sections 4, 17, 10 and 30, where No. 1 is the interior lot of the northern and western tiers of the quarter sections to which there is a corresponding No. 2 given to the exterior lot, and the series of num-

A—4
hers is in continuation of the letter. The lots in the extreme northern and western tiers of quarter sections, containing either more or less than the regular quantity, are always to be numbered as per example. Interior lots in such extreme tiers are to be twenty chains wide, and the excess or deficiency of measurement is always to be thrown on the exterior lots; elsewhere, the assumed subdivisional corner will always be a point equidistant from the established corners.

The official township plat to be returned to the General Land Office is to show on its face, on the right hand margin, the meanders of navigable streams, islands, and lakes. Such details are wanted in the adjustment of the surveying accounts, but may be omitted in the copy of the township plat to be furnished to the district land office by the surveyor general. A suitable margin for binding is to be preserved on the left hand side of each plat. Each plat is to be certified, with a notation, according to the forms appended to "diagram II," and is to show the area of public land, of private surveys, and of water, with the aggregate area as shown on the diagram.

Each township plat is to be prepared in triplicate: one for the General Land Office, one for the district office, and the third to be retained as the record in the office of the Surveyor General.

The original field books, each bearing the written approval of the Surveyor General, are to be substantially bound into volumes of suitable size, and retained in the surveyor general's office, and certified transcripts of such field books (to be of such size) are to be prepared and forwarded, from time to time, to the General Land Office.

With the copy of each township plat furnished to a district land office, the surveyor general is required by law to furnish descriptive notes as to the characters and quality of the soil and timber found on and in the vicinity of each surveyed line, and giving a description of each corner boundary. Printed blank forms for such notes will be furnished by the General Land Office. The forms provide eighteen spaces for meander corners, which, in most cases, will be sufficient; but when the number shall exceed eighteen, the residue will have to be inserted on the face of the township plat, to be furnished to the register of the district land office.

There is shown a series of meander corners on diagram II, viz: from No. 1 to No. 22, on the river and islands; 23 to 28 being on Island Lake; 29 and 30 on Clear Lake; and 31 and 32 on lake in section 26.

There is also a distinct series of numbers, 1 to 7, to designate corners D. Reed's private survey, and to fractional sections, made and surveyed thereby, and the same series is continued from 8 to 14 inclusive, to designate corners to S. William's private survey, and to fractional sections made and surveyed thereby. These are numbers on the plat merely for the purpose of ready reference to the descriptions of such corners to be furnished to the registers.

The letters on "diagram B," at the "corners" on the township boundaries, are referred to in the descriptive notes to be furnished to the district land office, but are not required to be inserted on the official plat to be returned to the General Land Office.

The following chapter, on the subject of the variation of the magnetic needle, is extracted from the revised edition of the work on surveying by Charles Davies, L. L. D., a graduate of the Military Academy at West Point. The work itself will be a valuable acquisition to the surveyor; and his attention is particularly invited to the following chapter, which sets forth the modes by which the variation may be ascertained.