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COAST AND GEODETIC SURVEY
R. S. PATTON, Director

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FIRST AND SECOND ORDER TRIANGULATION AND TRAVERSE IN MINNESOTA

(1927 DATUM)

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FIRST- AND SECOND-ORDER TRIANGULATION AND TRAVERSE IN MINNESOTA (1927 DATUM)

GENERAL STATEMENT

This publication contains the results of first-order triangulation and traverse in Minnesota executed by the United States Coast and Geodetic Survey, the United States Lake Survey, the Geodetic Survey of Canada, and the International Boundary Commission; and also the results of all second-order triangulation and traverse along the Mississippi River in Minnesota that has been executed by the United States Coast and Geodetic Survey, the United States Lake Survey, and the Mississippi River Commission. The geographic positions contained herein are on the North American datum of 1927, and those along the ninety-eighth meridian supersede the positions in Minnesota which appeared in Appendix No. 4—Report for 1911. The positions of the second-order stations along the Mississippi River supersede the second-order positions which appear in various publications of the Mississippi River Commission. The positions along the International Boundary included in this volume are the same as previously published.[1]

This volume is one of a series of publications, each of which will contain the geographic positions on the North American datum of 1927, and the descriptions and other data, of all first- and second-order triangulation of a State that may be available in final form at date of publication. It is expected that additional triangulation will be executed in Minnesota, and some work has recently been done, the final results for which are not yet available. Data for such work will be presented later, when available.

READJUSTMENT OF THE TRIANGULATION NET

The triangulation of the United States has been built up by continually adding new arcs to those already measured, and for many years in adjusting this triangulation the plan had to be followed of fitting the new arcs of triangulation to the old ones which had been previously adjusted. This method was the only one that could be followed until a comprehensive net had been built up and it led to no serious difficulty until the point was reached where the new arcs formed closed loops with the old arcs. It then developed that the last arc to close the loop received excessive corrections when adjusted to the previous triangulation because the entire error of closure of the loop had to be absorbed by it.

It was realized that the only way to overcome this difficulty was to adjust the entire network at one time. It was impracticable,

[1] Reestablishment of the boundary between the United States and Canada, northwesternmost point of Lake of the Woods to Lake Superior, Report of the International Boundary Commission, 1931.

however, to readjust the network each time a new arc was added or an additional loop was closed, as the time required to do so was too great, and if this were done, the geographic positions of the triangulation stations would be in a continual state of change, a condition very disturbing to those using the data.

In 1926 the triangulation net west of the ninety-eighth meridian had become so extended that it could serve as a framework for all future triangulation in that area, and it was found desirable to adjust this portion of the United States net in one piece. In preparation for this adjustment a method was devised, in 1924, at the office of the Coast and Geodetic Survey,[2] by means of which a large network of triangulation could be adjusted within a reasonable time and at a comparatively small cost. This method was applied first to the trangulation west of the ninety-eighth meridian involving 12,500 miles of arcs in 16 closed loops. Later it was applied to the eastern half of the net involving 13,000 miles of arcs forming 26 loops. The adjusted net of the country is now of such extent and strength that all new arcs hereafter can be fitted to it without having to disturb the old work and without causing excessive corrections to the new work.

ARCS INCLUDED IN THIS PUBLICATION

The triangulation included in this publication consists of seven first-order arcs and three second-order arcs. The first-order arcs are as follows: Ninety-eighth meridian, International Boundary triangulation and traverse (between Canada and Minnesota, executed by the Geodetic Survey of Canada, the International Boundary Commission, and the United States Coast and Geodetic Survey), from the ninety-eighth meridian to Royalton to Duluth, from Duluth to Keweenaw Point (executed by the United States Lake Survey), from the ninety-eighth meridian to Albert Lea to Fond du Lac, from Royalton to Albert Lea, and the Mississippi River from the Iowa-Minnesota boundary to St. Paul. The second-order arcs are as follows: St. Paul and vicinity, Mississippi River from the Iowa-Minnesota boundary to Aitkin and Bemidji (executed by the Mississippi River Commission), and the Superior National Forest.

The traverse included in this publication consists of one first-order line and one second-order line. The first-order line is from the ninety-eighth meridian arc along the forty-ninth parallel to the Lake of the Woods and is included in the International Boundary triangulation and traverse mentioned above. The second-order line (executed by the Mississippi River Commission) is from Aitkin to Bemidji.

The second-order arc along the Mississippi River is controlled by the first-order arcs along the same river. A general idea of the location of the first-order arcs which were included in the general readjustment of the first order triangulation in the eastern part of the United States may be obtained by referring to figure 10 near the back of this publication. Detailed sketches of both first- and second-order triangulation and traverse in Minnesota are shown in figures 13 to 30, inclusive, and the location of the triangulation included in each sketch is shown on the index sketch, figure 12.

[2] For a description of the method used see Special Publication No. 159.

FIGURE 1.—MONUMENT ALONG THE INTERNATIONAL BOUNDARY AS DAMAGED BY FROST.

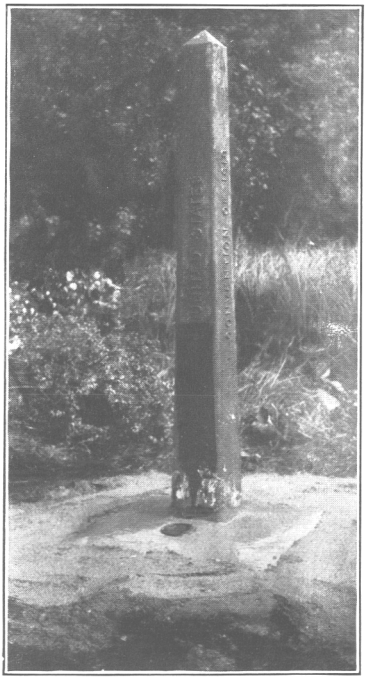

FIGURE 2.—SAME MONUMENT REPAIRED BY THE INTERNATIONAL BOUNDARY COMMISSION.

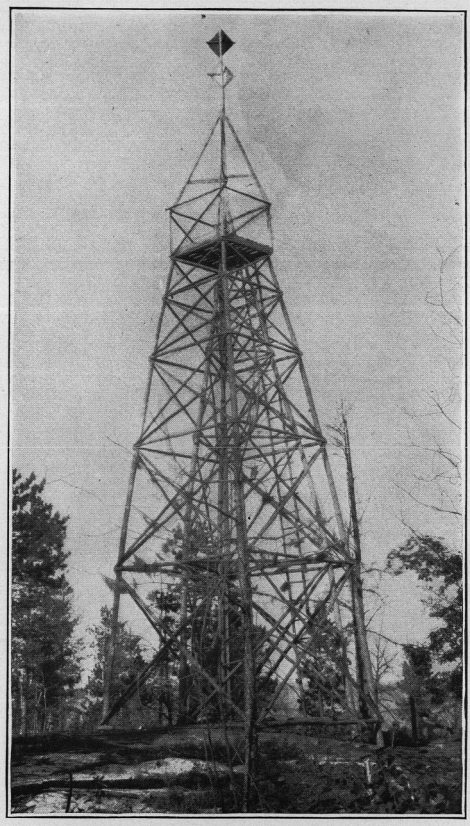

FIGURE 3.—TRIANGULATION TOWER OVER A STATION ON THE INTERNATIONAL BOUNDARY.

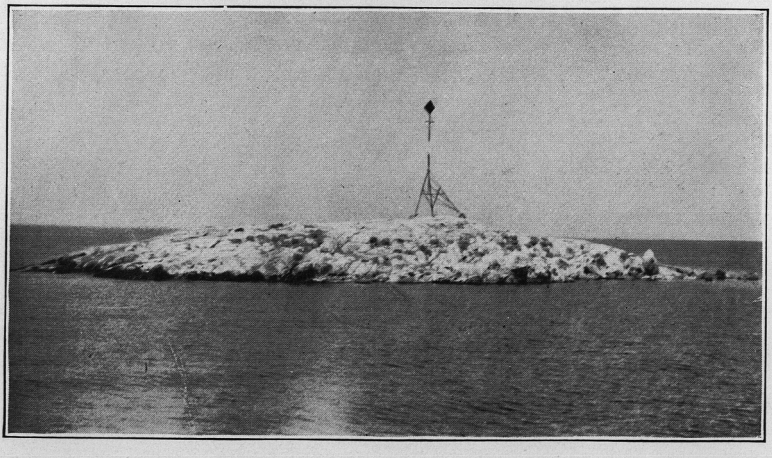

FIGURE 4.—TRIANGULATION STATION ON AN ISLAND IN THE LAKE OF THE WOODS.

Triangulation just over the boundary in adjoining States and Canada has been included in this publication in order that all data required for surveys in Minnesota, even near the boundaries, might be available in one volume.

STATEMENT OF ADJUSTMENTS

The first-order arc along the ninety-eighth meridian was adjusted as a part of the general readjustment of the first-order triangulation in the western part of the United States. The arcs from the ninety-eighth meridian to Royalton to Duluth, from the ninety-eighth meridian to Albert Lea to Fond du Lac, and from Royalton to Albert Lea were adjusted as a part of the general readjustment of the eastern part of the United States. The triangulation and traverse along the International Boundary were adjusted by the International Boundary Commission and the Coast and Geodetic Survey. The portion of the Mississippi River first-order triangulation extending northward from the Iowa-Minnesota boundary to St. Paul and the arc executed by the United States Lake Survey from Duluth to Keweenaw Point were afterwards adjusted to those arcs to which they were connected and which were fixed by the eastern adjustment. All the first-order adjustments were made under the direction of Dr. O. S. Adams.

After the completion of the adjustment of the first-order triangulation along the Mississippi River, the second-order stations of the Mississippi River Commission triangulation and of the Coast and Geodetic Survey, which were tied directly to the main scheme by triangulation of second-order accuracy, were adjusted separately. In those cases where the Mississippi River Commission stations were coincident with the first-order stations, their positions were of course fixed by the main-scheme adjustment. From the Iowa-Minnesota State line northward these adjustments provided a number of lines fixed in position, length, and azimuth to which the second-order triangulation could be adjusted. The traverse from Aitkin to Bemidji was adjusted by holding fixed the second-order triangulation of the Mississippi River Commission. Practically all the adjustments were made by the angle method, single chains of triangles being used. The second-order triangulation was adjusted under the direction of Leslie E. Shmidl. The descriptions were compiled under the direction of Hugh C. Mitchell. The sketches were prepared under the direction of Lt. R. L. Pfau.

NORTH AMERICAN DATUM OF 1927

In the readjustment of the triangulation in the western part of the United States the same Clarke spheroid of 1866 was used as a surface of reference, but only one station was held in position. The station Meades Ranch, in Kansas, was assigned the same position that it had in the original United States standard datum, later called the North American datum. This position of Meades Ranch is as follows:

$$\text{Latitude}=39°13'26''.686$$
$$\text{Longitude}=98°32'30''.506$$

This position was held in the new datum because it had been found to be best in accord with the country as a whole in the extensive in-

vestigation that was carried out at the time of the adoption of the original datum. If any are interested in the procedure followed in the establishment of this former datum, an account of it can be found in any one of the following publications, which contain triangulation and traverse data based on the datum in use prior to 1927: Special Publications Nos. 11, 13, 16, 17, 19, 24, 30, 31, 43, 46, 54, 62, 70, 74, 76, 78, 79, 86, 88, 101, and 114.

The orientation in the new adjustment is controlled by the various Laplace azimuths distributed throughout the network of arcs. The position of Meades Ranch, together with the Laplace azimuths included in the arcs, serve to define the North American datum of 1927. The date is appended to the name of the new datum to distinguish it from the old North American datum. A station is said to be on this North American datum of 1927 when it is rigidly adjusted to the scheme of the readjusted triangulation.

GENERAL DESCRIPTION OF TABLES OF GEOGRAPHIC POSITIONS AND SKETCHES

The tables of geographic position, on pages 19 to 137, also contain the distances between contiguous triangulation stations in meters and feet, the logarithms of the distances in meters, and the azimuths of the lines joining these stations. The distances are corrected for elevation above mean sea level, and the azimuths are referred to the true south. Anyone who wishes to obtain the actual distances between the triangulation stations should use the formula given on page 17 by which the true distance at the mean elevation of the stations can be derived from the distance at sea level. The descriptions of the stations, given on pages 247 to 373 are designed to enable the engineer to recover and identify the station mark after he has visited the general locality of the station. There will be times when the description, so far as witness and other marks are concerned, will have become out of date from changes by nature or by the work of man. Any engineer who may visit a station and find that the description does not truly represent the present conditions, or who finds the mark destroyed or mutilated, should report the facts to the Director of the Coast and Geodetic Survey, at Washington, D. C., in order that the files of this office may be kept up to date. The engineer should realize that the triangulation extended over the country by the Coast and Geodetic Survey is a public survey, made for the use of the people. The stations really belong to the States in which they are located, and the engineer who is so fortunate as to find one of these stations located near his work should help to perpetuate the monuments in order that they may be of continuous service and value to his locality. The Coast and Geodetic Survey officials will, from time to time, visit the stations established and will re-mark and redescribe them if necessary.

At most of the stations there are reference and witness marks that were established to assist in locating the station. The distance and azimuth from the station to each of these additional marks are usually given in the description of the station, and the measurements are supposed to be so carefully made, at least to the reference marks, that if the station mark becomes lost or destroyed the station can be relocated accurately enough for use in third-order and local surveys.

Near the back of this publication will be found a number of sketches which show graphically the approximate locations of the stations, especially with reference to State and county boundaries, and the lines over which the main-scheme observations were made. Stations shown in red were established by the Mississippi River Commission. It is suggested that if one should wish to learn whether there are triangulation stations in the vicinity of his work he should first consult the sketches. He can obtain from them the names of stations that may be of help to him; then he should turn to the index on page 387 of this volume, from which he can find the pages upon which the descriptions and geographic positions of the stations appear.

OTHER PUBLICATIONS OF VALUE TO THE ENGINEER

If an engineer wishes to compute geographic positions for the stations of any triangulation that he may execute, he should procure a copy of Coast and Geodetic Survey Special Publication No. 8 from the Superintendent of Documents, Washington, D. C. The cost of this publication is 25 cents. If he is interested in knowing the length in meters of the degrees, minutes, and seconds of latitude and longitude in the region in which he is working, he can obtain them from Special Publication No. 5, which can be purchased at a cost of 20 cents from the Superintendent of Documents. Condensed tables for the latitude of Minnesota are shown on pages 12 to 14.

While plane coordinates on a State-wide system are now available for all triangulation stations that are connected with the national control survey (see p. 14), there may arise occasions when the engineer is confronted with the survey of a limited area, such as a city, in which such control stations have not yet been established. He may wish to use plane coordinates in his survey, developing them from positions on a local geodetic survey based upon an independent datum. In such a case he should procure from the Superintendent of Documents Special Publication No. 71, Relation between Plane Rectangular Coordinates and Geographic Positions, which costs 15 cents. This publication also describes methods of transforming plane coordinates to spherical ones. When such a survey has been made, the engineer should remember that if it is later connected with the national control survey, it will be possible to transform the plane coordinates from the local to the State system by the use of methods described in Special Publication No. 194, Manual of Traverse Computation on the Lambert Grid, and Special Publication No. 195, Manual of Traverse Computation on the Transverse Mercator Grid.

The Coast and Geodetic Survey has issued a number of manuals on the various classes of its work. The ones that would be of value to an engineer in connection with triangulation, including base measurements, are Special Publication No. 120, Manual of First-Order Triangulation, cost 40 cents; Special Publication No. 145, Manual of Second- and Third-Order Triangulation and Traverse, cost 60 cents; and Special Publication No. 137, Manual of First-Order Traverse, cost 30 cents. An engineer, interested in the determination of azimuth to a high degree of accuracy, should procure a copy of Special Publication No. 14, Determination of Time, Longitude, Latitude, and Azimuth, cost 45 cents. If he is interested only in the determination of approximate azimuths, he should secure

a copy of Serial No. 166, Directions for Magnetic Measurements, cost 15 cents.

In computing his triangulation the engineer will find that Special Publication No. 138, Manual of Triangulation Computation and Adjustment, cost 50 cents, will be of great assistance to him.

The reader can secure from the Director of the United States Coast and Geodetic Survey, free of charge, several leaflets which describe geodetic surveying and which also show how triangulation can be used in connection with the boundary surveys of private and public property.

CLASSIFICATION OF TRIANGULATION

Triangulation is divided into different classes according to accuracy. Four classes of triangulation are now defined by the Federal Board of Surveys and Maps; viz, first, second, third, and fourth orders. The first three of these are, respectively, equal in accuracy to the classes primary, secondary, and tertiary as formerly defined and used by the Coast and Geodetic Survey.

The ultimate criterion applied in classifying the different grades of triangulation is the actual error in the length of any line. This is indicated by the discrepancy between the measured length of a base line and its length as computed through the triangulation from the last preceding base. In first-order triangulation such discrepancies must not exceed 1 part in 25,000, in second-order triangulation 1 part in 10,000, and in third-order triangulation 1 part in 5,000. Before making the comparison between the computed and measured lengths the adjustment of the triangulation should be carried to the point where the side and angle equations have been satisfied. It is also necessary to take into consideration the maximum actual error in the measurement of the base lines.

To secure the accuracy indicated above, certain standards are adopted for the field work, the most important one of which relates to the closing errors of the triangles or the discrepancy between the sum of the measured angles in a triangle and 180° plus the spherical excess of the triangle. In first-order triangulation the average closing error of the triangles must not be greatly in excess of 1 second, in second-order it should not be more than 3 seconds, and in third-order not more than about 5 seconds. The shape of the figures in the triangulation scheme, the frequency of bases, the size and type of instrument, and the number and kind of observations are all selected with due regard to the accuracy desired.

Under certain conditions the proportionate error in the length of a line as specified above may be found to be exceeded in any class of triangulation. Where two points are fairly close together as compared with the size of the triangulation scheme, the distance between those points may be in error in excess of that indicated by the class of triangulation of the scheme. The accuracy of the computed length of any line can be estimated by computing the ΣR_1 in accordance with the formula for the strength of figures as given in Coast and Geodetic Survey Special Publication No. 145. In any class of triangulation the subsidiary stations will be located with a less degree of accuracy than the main-scheme stations.

CHARACTERISTICS OF FIRST-ORDER TRIANGULATION

The triangulation contained in this volume is of the first and second order. First-order triangulation is done with such accuracy that the average closing error of the triangles is about 1 second or less. In order that the angles may have this high degree of accuracy, large theodolites are used. The theodolite, as is well known, is similar in its appearance to the surveyor's transit. The main differences are in the excellence of the workmanship, the accuracy of graduation of the circle, in having micrometer microscopes for reading this circle, and in having a telescope with a high resolving power. Observations are made either on heliotropes, by which the light of the sun is reflected toward the observer, or on electric signal lamps. The heliotrope, or lamp, and the theodolite must be centered directly over the station marks.

At certain intervals, depending upon the shape of the triangles, base lines are measured. A base is necessarily a side of one of the triangles. The ends of the base must be intervisible from the ground or from towers that may be erected over them. In the early years of the Coast and Geodetic Survey's existence the base lines were measured with metal bars, but near the beginning of the present century steel tape lines began to be used in the measurements. Since 1907 all of the bases of the Survey have been measured with invar tapes. The probable error of a measured base is about 1 part in 1,000,000 of its length. This accuracy meets all the requirements of engineering and science.

The azimuths of the triangulation depend upon what are called Laplace azimuths, or azimuths determined by observations on Polaris, which have been corrected for the deflection of the vertical at each Laplace station. These deflections are due to the attraction of mountain or plateau masses that are comparatively near the place at which the observations are made. The probable error of a Laplace azimuth is about ± 0.3 second.

If one is interested in the accuracy with which the triangulation of the Coast and Geodetic Survey is done and the reliability of the geographic positions which are given in this publication, he should refer to Special Publication No. 159, The Bowie Method of Triangulation Adjustment as Applied to the First-Order Net in the Western Part of the United States.

CHARACTERISTICS OF SECOND-ORDER TRIANGULATION

In second-order triangulation the same general principles apply as in first-order triangulation, but the details of the work will vary with the circumstances. The angles are nearly always determined with a smaller number of measures. The accuracy of second-order triangulation is represented by an average closing error of a triangle of not more than 3 seconds of arc.

Second-order triangulation has been used principally for three purposes: First, for the main scheme of an isolated region of moderate extent such as the Philippine Islands; second, to connect third-order with first-order triangulation when the latter lies at a considerable distance from the area requiring the detailed third-order control; and third, as the detailed control over areas of economic importance. The increasing demand for second-order horizontal control, under the last set of conditions, and the growing economic importance of the entire

coastal region of the United States, led the Director of the Coast and Geodetic Survey to decide, early in 1928, to make the entire coastal main-scheme triangulation of first- or second-order accuracy.

SECONDARY STATIONS

In addition to the stations which form the main network of triangles in Minnesota, a number of objects, such as church spires, and schoolhouse cupolas, were observed upon from stations of the main scheme. The geographic positions of these secondary stations have been computed and the data are included in the tables on pages 19 to 137. These stations are shown on the sketches and in the index, but only a few of them are given in the descriptions of stations, as in most cases the name of the object is all the description that is available. Ordinarily the name of the secondary station is sufficient for its accurate identification by the engineer who may wish to use it.

SECOND- AND THIRD-ORDER AZIMUTHS

In the readjustment of the old second- and third-order triangulation it was found that in a number of cases there were far too few fixed azimuths to hold the scheme to the required azimuth accuracy. Fortunately there were a number of old stations recovered and determined with first-order accuracy on the North American datum of 1927. Positions of these recovered stations were also available on the old data. A method was therefore devised by Leslie E. Shmidl, Associate Mathematician, U. S. Coast and Geodetic Survey, by which the old and new data for these stations could be used to obtain accurate azimuths. An example of this method is as follows:

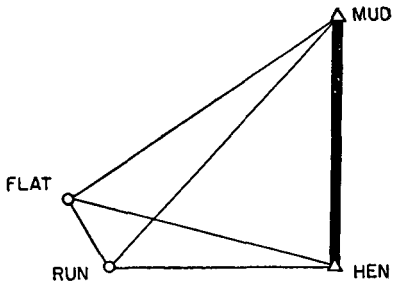

FIGURE 5.—Quadrilateral used as example for second- and third-order azimuths.

The geodetic positions of all the stations shown on figure 5 had been computed on an old, independent datum. Stations Mud and Hen were recovered when the first-order triangulation was observed and their geographic positions had been computed on the North American datum of 1927. An inverse-position computation was made between Mud and Hen, giving the length and azimuth of the line between them on the North American datum of 1927.

All of the angles of the quadrilateral Mud-Hen-Run-Flat were then determined by inverse computations between the positions as given on the old datum. The quadrilateral was then adjusted, holding fixed the computed length of the line Mud-Hen on the North American datum of 1927. (The length of any other line of the quadrilateral, if measured, should also be held.) The positions of the stations Run and Flat and the length and azimuth of the line connecting them as determined in this adjustment were then held in the adjustment of the old scheme of which they were a part.

For a detailed method of the adjustment of the quadrilateral and the computation of the inverse positions, see Coast and Geodetic Survey Special Publication No. 138 or Triangulation along the Mississippi River, Memphis to Vicksburg, published by the Corps of Engineers, United States Army.

USE OF HORIZONTAL CONTROL DATA

The plan or map for any extensive engineering project, whether or not map construction is the primary object, should have all of its parts properly correlated and should be on the same datum as adjacent surveys. Federal and State mapping organizations have long been aware of the necessity for having all surveys based upon a common datum, but local engineers and surveyors in this country have too often in the past been content, and in many cases compelled, to use a local datum for their surveys. The future economic disadvantage of such a system is now becoming recognized, with the result that city and county surveys are being more generally placed upon a permanent basis by connecting them to stations on the North American datum of 1927.

One other factor must be taken into consideration by the engineer of today. As the States develop industrially, they will undoubtedly follow the lead of one of the Eastern States, Massachusetts, which with splendid foresight has extended its triangulation control over the entire State for the purpose of defining property boundaries in terms of latitude and longitude. The advantage of such a system is well stated in the following extract from the report on the Maryland oyster survey:

> The difficulties of accurately locating and permanently defining the boundaries of a farmer's plantation on land, even with the aid of monuments, public roads, streams of water, and other points of reference, are often great, judging from the disputes frequently arising in connection with boundaries. * * *
>
> There is only one point on the earth's surface at the intersection of any one parallel of latitude and any one meridian of longitude, and therefore there can be no dispute as to the meaning of such a geographic definition of the location of a point, even though all the original triangulation station marks used in its determintion, together with the chart on which its position was originally plotted, have been totally destroyed.
>
> In the case of the destruction of an original triangulation station mark, or any other point defined by a geographic position, a competent geodetic engineer can reestablish its exact location by means of a new system of triangulation connecting with other distant triangulation marks which have not been destroyed.

New Jersey has recently legalized the definition of property boundaries in terms of the State system of plane coordinates which is based on the geodetic control net of the United States.

There are a number of instances where corporations owning large tracts of land have attempted to make surveys of their boundaries and of subdivisions of property by means of traverse. This method can be used if certain precautions are taken, but most of these corporations have found it advisable to use the method of triangulation for the determination of relative positions of their boundary monuments and of other points which lie within those boundaries. If the triangulation in question is connected with the triangulation system of the Coast and Geodetic Survey, then true geographic positions can be obtained as well as the relative ones.

In a section of the country covered by adequate geodetic control the data are available to the engineer for any of the following operations, in addition to their possible future use as a basis for cadastral surveys:

1. Extensive mapping.—The topographer needs as initial data for beginning a topographic survey the distance and direction between two points and the geographic position of one of them in latitude and

longitude. His local triangulation or traverse, based on this control, will prevent the accumulation of excessive errors as he carries on his mapping operations. In the event that the available first-order triangulation in that region has lines of too great length to join to conveniently, he can measure a base and azimuth at some place visible from a first- or second-order triangulation station and connect his base to the station by triangulation, thus obtaining proper geographic positions for his local surveys. On recent triangulation special azimuth marks have been set. (See p. 18.)

2. Boundary lines.—If it is desired to locate or to delimit accurately and permanently the boundaries of political subdivisions, such as States, counties, or cities, the methods indicated in the preceding paragraph may be followed. Whenever possible, a line of the adjusted triangulation or traverse should be used as a basis for local surveys rather than a point, since a line gives the three essentials of position, length, and direction.

3. Local intensive surveys.—The necessity for such surveys arises most frequently in connection with extensive improvements over a considerable area or as a basis for city planning, where the needs of a city are being anticipated for a number of years. Here the requirements are somewhat different from those in the two preceding operations, for it is often necessary to extend first- or second-order control in considerable detail over the entire area affected, third-order triangulation or traverse then being used to furnish additional points for the survey. Such a control survey should invariably be started from a line of adjusted triangulation or traverse.

While it may be noted in the preceding paragraphs that the azimuth and length of one line and the geographic position of one end of that line constitute the essential data for the complete utilization of old work as a basis for new work, there is always grave danger in depending upon this minimum of data. There may be failure to identify the true station mark, or the mark though genuine, may have been tampered with or otherwise disturbed in position. This will, of course, introduce an error into the new work based on these stations. It is the present practice in this survey unless unusual conditions render it unnecessary, to establish the integrity of the recovered points by using at least three old stations as a basis for new work, the third station serving as a check for the two stations on which the new work may actually depend.

In work where the area was of limited extent it was usually found desirable in the past to use a local system of plane coordinates, the origin being connected with some point of the first- or second-order triangulation or traverse scheme. This practice has now been superseded through the adoption of State-wide systems of plane coordinates, as described in Special Publication No. 193, Manual of Plane-Coordinate Computation, which may be secured from the Superintendent of Documents at a cost of 35 cents. Plane coordinates for triangulation stations in Minnesota, based upon a State-wide system consisting of three zones, will be found on pages 141 to 216 of this publication.

EXPLANATION OF TABLE FOR POLYCONIC MAP PROJECTION

The engineer or surveyor who makes use of the data in this publication may find it desirable to construct a map covering the territory he is surveying. He may wish to show on this map the meridians

and parallels so as to be able to plot the positions of the triangulation stations included in the area and show the details of his survey in the correct geographic positions. To enable him to do this with the least possible difficulty, the following table, reprinted in an abbreviated form from Coast and Geodetic Survey Special Publication No. 5, has been inserted. This table may also be used to interpret in terms of degrees, minutes, and seconds of arc any relatively short distance measured along a meridian or parallel. The method of using the table is described below.

To make a projection for a large-scale map (1 to 20,000 and larger), first draw a straight line for a central meridian and a construction line *ab* perpendicular thereto, each to be as central to the sheet as the selected interval of latitude and longitude will permit. (See fig. 6 below.) On the central meridian lay off, on the desired scale, the distances $m\ m_2$ and $m\ m_4$, using the length of 1 minute along the meridian for the latitude of m, as given in the table in the column headed "Arc of the meridian, 1′," and multiplying this length by the number of minutes for the interval between the central parallel and the extreme parallels. Through m_2 and m_4 draw straight lines *cd* and *ef*, parallel to the line *ab*. On the lines *ef*, *ab*, and *cd* lay off to the scale of the map the distances $m_4\ x_2$, $m\ x_2$, and $m_2\ x_2$ on both sides of the central meridian, taking the values from the column headed "Arc of the parallel, 1′," corresponding to the latitude of m_4, m, and m_2, respectively. The value of 1 minute as taken from the table must be multiplied by the number of minutes out from central meridian. Draw straight lines through the points thus determined for the extreme meridians—that is, through the x_2 points.

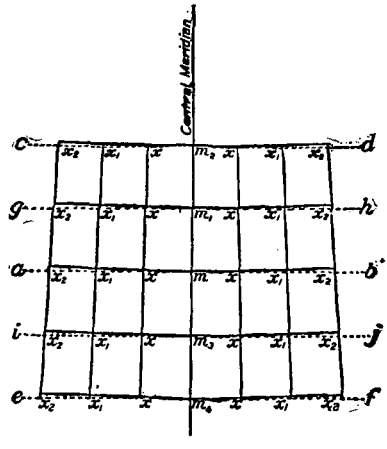

FIGURE 6.—Sketch showing construction of polyconic projection.

NOTE.—In this figure the angles made at the central meridian by the parallels are grossly exaggerated. In an actual projection the parallels appear practically as straight lines.

At the two points designated x_2 on the line *ab* lay off along the meridians the value of Y as given in the table under "Y coordinate of curvature," using as argument the interval in minutes between the central meridian and the extreme meridian. Draw straight lines from these points to the point m for the middle parallel, and from the points of intersection with the extreme meridians lay off distances along these meridians, above and below, equal to the distances $m\ m_2$ and $m\ m_4$ to locate points in the extreme parallels.

Subdivide each of the 3 meridians and 3 parallels already determined into parts corresponding with the projection interval and join the corresponding points of subdivision by straight lines to complete the projection.

The method outlined above may be used for all large-scale maps regardless of the number of meridians and parallels shown. For small-scale maps the method is somewhat more complicated, and it

becomes necessary to make use of Special Publication No. 5, which may be obtained for 20 cents from the Superintendent of Documents, Washington, D. C.

Polyconic map projection table

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y coordinate of curvature latitude 43°
	1″	1′	1″	1′		
° ′	*Meters*	*Meters*	*Meters*	*Meters*	° ′	*Meters*
43 00	22.651	1,359.1	30.859	1,851.52	0 01	0.1
05	22.620	1,357.2	30.859	1,851.55	03	1.2
10	22.590	1,355.4	30.860	1,851.58	05	3.4
15	22.559	1,353.5	30.860	1,851.61	07	6.6
20	22.528	1,351.7	30.861	1,851.63	10	13.5
25	22.497	1,349.8	30.861	1,851.66	15	30.3
30	22.466	1,348.0	30.861	1,851.69	20	53.9
35	22.435	1,346.1	30.862	1,851.72	25	84.3
40	22.404	1,344.3	30.862	1,851.74	30	121.3
45	22.373	1,342.4	30.863	1,851.77	40	215.7
50	22.342	1,340.5	30.863	1,851.80	50	337.0
55	22.311	1,338.7	30.864	1,851.82	1 00	485.3

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y coordinate of curvature latitude 44°
	1″	1′	1″	1′		
° ′	*Meters*	*Meters*	*Meters*	*Meters*	° ′	*Meters*
44 00	22.280	1,336.8	30.864	1,851.85	0 01	0.1
05	22.249	1,334.9	30.865	1,851.88	03	1.2
10	22.218	1,333.1	30.865	1,851.91	05	3.4
15	22.186	1,331.2	30.866	1,851.93	07	6.6
20	22.155	1,329.3	30.866	1,851.96	10	13.5
25	22.124	1,327.4	30.866	1,851.99	15	30.4
30	22.092	1,325.5	30.867	1,852.02	20	54.0
35	22.061	1,323.6	30.867	1,852.04	25	84.4
40	22.029	1,321.7	30.868	1,852.07	30	121.5
45	21.998	1,319.9	30.868	1,852.10	40	216.1
50	21.966	1,318.0	30.869	1,852.13	50	337.7
55	21.934	1,316.1	30.869	1,852.15	1 00	486.2

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y coordinate of curvature latitude 45°
	1″	1′	1″	1′		
° ′	*Meters*	*Meters*	*Meters*	*Meters*	° ′	*Meters*
45 00	21.903	1,314.2	30.870	1,852.18	0 01	0.1
05	21.871	1,312.2	30.870	1,852.21	03	1.2
10	21.839	1,310.3	30.871	1,852.24	05	3.4
15	21.807	1,308.4	30.871	1,852.26	07	6.6
20	21.775	1,306.5	30.872	1,852.29	10	13.5
25	21.743	1,304.6	30.872	1,852.32	15	30.4
30	21.711	1,302.7	30.872	1,852.35	20	54.1
35	21.679	1,300.7	30.873	1,852.37	25	84.5
40	21.647	1,298.8	30.873	1,852.40	30	121.6
45	21.615	1,296.9	30.874	1,852.43	40	216.2
50	21.583	1,295.0	30.874	1,852.46	50	337.9
55	21.550	1,293.0	30.875	1,852.48	1 00	486.5

Polyconic map projection table—Continued

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y coordinate of curvature latitude 46°
	1″	1′	1″	1′		
° ′	*Meters*	*Meters*	*Meters*	*Meters*	° ′	*Meters*
46 00	21.518	1,291.1	30.875	1,852.51	0 01	0.1
05	21.486	1,289.2	30.876	1,852.54	03	1.2
10	21.454	1,287.2	30.876	1,852.57	05	3.4
15	21.421	1,285.3	30.877	1,852.59	07	6.6
20	21.389	1,283.3	30.877	1,852.62	10	13.5
25	21.356	1,281.4	30.877	1,852.65	15	30.4
30	21.324	1,279.4	30.878	1,852.68	20	54.0
35	21.291	1,277.5	30.878	1,852.70	25	84.4
40	21.258	1,275.5	30.879	1,852.73	30	121.6
45	21.226	1,273.5	30.879	1,852.76	40	216.1
50	21.193	1,271.6	30.880	1,852.78	50	337.7
55	21.160	1,269.6	30.880	1,852.81	1 00	486.3

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y coordinate of curvature latitude 47°
	1″	1′	1″	1′		
° ′	*Meters*	*Meters*	*Meters*	*Meters*	° ′	*Meters*
47 00	21.127	1,267.6	30.881	1,852.84	0 01	0.1
05	21.094	1,265.7	30.881	1,852.87	03	1.2
10	21.062	1,263.7	30.882	1,852.89	05	3.4
15	21.029	1,261.7	30.882	1,852.92	07	6.6
20	20.996	1,259.7	30.882	1,852.95	10	13.5
25	20.962	1,257.7	30.883	1,852.98	15	30.3
30	20.929	1,255.8	30.883	1,853.00	20	53.9
35	20.896	1,253.8	30.884	1,853.03	25	84.3
40	20.863	1,251.8	30.884	1,853.06	30	121.4
45	20.830	1,249.8	30.885	1,853.09	40	215.7
50	20.797	1,247.8	30.885	1,853.11	50	337.1
55	20.763	1,245.8	30.886	1,853.14	1 00	485.4

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y coordinate of curvature latitude 48°
	1″	1′	1″	1′		
° ′	*Meters*	*Meters*	*Meters*	*Meters*	° ′	*Meters*
48 00	20.730	1,243.8	30.886	1,853.17	0 01	0.1
05	20.696	1,241.8	30.887	1,853.20	03	1.2
10	20.663	1,239.8	30.887	1,853.22	05	3.3
15	20.630	1,237.8	30.887	1,853.25	07	6.6
20	20.596	1,235.8	30.888	1,853.28	10	13.4
25	20.562	1,233.7	30.888	1,853.30	15	30.2
30	20.529	1,231.7	30.889	1,853.33	20	53.8
35	20.495	1,229.7	30.889	1,853.36	25	84.0
40	20.461	1,227.7	30.890	1,853.39	30	121.0
45	20.428	1,225.7	30.890	1,853.41	40	215.1
50	20.394	1,223.6	30.891	1,853.44	50	336.1
55	20.360	1,221.6	30.891	1,853.47	1 00	484.0

Polyconic map projection table—Continued

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y coordinate of curvature	
	1″	1′	1″	1′		Latitude 49°	Latitude 50°
° ′	*Meters*	*Meters*	*Meters*	*Meters*	° ′	*Meters*	*Meters*
49 00	20.326	1,219.6	30.892	1,853.50	0 01	0.1	0.1
05	20.292	1,217.5	30.892	1,853.52	03	1.2	1.2
10	20.258	1,215.5	30.892	1,853.55	05	3.3	3.3
15	20.224	1,213.5	30.893	1,853.58	07	6.6	6.5
20	20.190	1,211.4	30.893	1,853.60	10	13.4	13.3
25	20.156	1,209.4	30.894	1,853.63	15	30.1	30.0
30	20.122	1,207.3	30.894	1,853.66	20	53.5	53.3
35	20.088	1,205.3	30.895	1,853.69	25	83.7	83.2
40	20.053	1,203.2	30.895	1,853.71	30	120.5	119.8
45	20.019	1,201.2	30.896	1,853.74	40	214.2	213.0
50	19.985	1,199.1	30.896	1,853.77	50	334.7	332.8
55	19.950	1,197.0	30.897	1,853.79	1 00	481.9	479.3

PLANE-COORDINATE SYSTEMS

It has been the practice of the local cadastral surveyor and the engineer making surveys for public works or for projects of a private character to make the computations as if the region involved were a plane and the results would thus be based on a local plane-coordinate system. This is satisfactory when the work is limited to a very restricted area, but when extensions of the surveys are made to surrounding areas trouble is apt to arise. Two adjoining local systems can be coordinated only with a great deal of extra computation. It seemed advisable, therefore, to give study to the possibility of establishing plane-coordinate systems for more extended areas so as to provide the advantages of plane coordinates and at the same time to make possible a perfect coordination of the work of different engineers throughout the whole region for which one system is adequate.

As a result of these studies State-wide systems of plane coordinates were devised for the various States, many States being covered by a single system of plane coordinates, while for the larger States several systems were required. In order to keep to a minimum the errors of scale which arise from projecting from a curved surface onto a plane, it was necessary to establish three such systems or zones for Minnesota (see p. 138).

DIFFICULTIES IN USING SPHERICAL COORDINATES

The surface of the earth is not a plane but is very irregular. For purposes of mapping, an ideal surface is assumed that approaches very nearly to what it would be if the entire surface were covered with water. This assumed surface is not even a sphere, but is an ellipsoid of revolution of the form that approaches most nearly the sea-level surface. This spheroidal shape introduces complications in the calculations of survey work when it is extended over a large area. Geodetic surveying is such exact and extensive work that all computations arising in it have to take into consideration this assumed spheroidal shape which fits closely the actual shape of the earth. All geodetic stations on the earth have to be located by latitude and longitude; that is, each one is referred to a definite

place in the network of meridians and parallels that are assumed to cover the surface of the earth in a definite and standardized way. The latitude and longitude of a place on the curved surface of the earth thus corresponds in a general way to the x and y coordinates of a place on the usual system of plane coordinates which presupposes a flat surface. But the x and y coordinates of a local plane system have no relation to anything but the assumed origin and the assumed directions of the X and Y axes. Much has therefore been gained through the establishment of State-wide systems of plane coordinates (see pp. 138 to 141), which not only make unnecessary the further use of local independent systems, but which permit the establishment of a definite relationship, for points over a wide area, between plane coordinates on a single plane and geographic positions referred to the meridians and parallels of the earth.

USEFULNESS OF THE SYSTEMS

The establishment of a plane-coordinate system not only simplifies the use of control data but it gives a permanent general grid for large parts of a State. County boundaries, township boundaries, property boundaries, intersection of roads and streets, and any prominent features of a region can be accurately located with definite x and y coordinates. In the general system these plane coordinates can readily be transformed into latitude and longitude, and the point can thus be definitely located in the network of meridians and parallels that serve to locate points on the earth's surface. If the marker at such a point should in some way be destroyed, it could be definitely relocated on the ground from its relation to other marked points. This is a very important characteristic and one that should be given due consideration by all engineers and surveyors.

IMPORTANCE OF PLANE COORDINATES

The establishment of these general systems of plane coordinates are of the utmost importance to State, city, county, and private engineers. Such systems immediately make the general control network of the country easily available for actual use by the field surveyor. This should convince any who are interested in such matters that they constitute an important advance in the execution of local surveys.

If anyone is interested in plane-coordinate systems he should refer to Special Publication No. 193, Manual of Plane-Coordinate Computation, and Serial No. 562. The Coast and Geodetic Survey has also published two manuals on coordinate systems dealing particularly with traverse. They are Special Publication No. 194, Manual of Traverse Computation on the Lambert Grid, and Special Publication No. 195, Manual of Traverse Computation on the Transverse Mercator Grid.

CONVERSION TABLE

In a number of triangulation publications of this Bureau complete tables have been printed for the conversion of feet to meters and meters to feet. As these tables require 8 pages, it seemed advisable in the interests of economy to substitute for them the condensed table shown below. This table can be used readily for converting a

rather large number of one unit to the corresponding number in the other unit by simply taking the conversion value for each digit of the first number, moving the decimal point if necessary, and adding the values together. For example, to convert 24.6 feet to meters we take from the table the value in meters corresponding to 2 feet and move the decimal point one number to the right. We then take the value for 4 feet as given in the table, and next the value for 6 feet, and move the decimal point one number to the left. This gives, by rounding off the third decimal place, 6.096+1.219+0.183=7.498 meters.

Meters	Feet	Feet	Meters
1	3.280833	1	0.3048006
2	6.561667	2	0.6096012
3	9.842500	3	0.9144018
4	13.123333	4	1.2192024
5	16.404167	5	1.5240030
6	19.685000	6	1.8288037
7	22.965833	7	2.1336043
8	26.246667	8	2.4384049
9	29.527500	9	2.7432055
10	32.808333	10	3.0480061

EXPLANATION OF TABLES OF GEOGRAPHIC POSITIONS

In the tables of geographic positions the latitude and longitude of each point are given on the North American datum of 1927, and there are also given the length and azimuth of each line observed over, whether in one or both directions. No lengths and azimuths are repeated, and for a given line the length and azimuth will be found opposite the position of one or the other of the two stations involved.

To aid in the use of the tables, a column of the logarithms of the lengths in meters is given. It must be remembered that it is the logarithm which is derived first from the computation, the lengths given in the table being then derived from the corresponding logarithms. A final column gives these lengths reduced to feet, the reduction being made from the lengths in meters.

The rule usually followed in publications of this Office has been to give the latitudes and longitudes of the stations to thousandths of seconds for all points the positions of which are fixed by fully adjusted triangulation. Points the positions of which are given to hundredths of seconds only are marked by footnotes as being without check (not occupied and observed from two stations only) or checked by vertical angles only.

In the columns giving azimuths, distances, and logarithms of distances the accuracy is indicated to a certain extent by the number of decimal places given, it being understood that in each case some of the final figures are doubtful. In some cases there is very little doubt of the correctness of the second figure from the right, while in a few cases some doubt may exist as to the correctness of even the third figure from the right.

In the column headed "Seconds in meters" are given the linear equivalents of those parts of the latitudes and longitudes which are expressed in seconds of arc. These values are required by the draftsman in plotting the stations on charts and maps which are based upon geographic coordinates and have projection graticules showing even minutes of arc. In this publication only the first- and second-order

stations along the Mississippi River have the "Seconds in meters" column given. Should the engineer desire to construct a map of some other portion of the State and base it on a geographic projection such as is described on page 10, he may obtain the values for the "Seconds in meters" of his triangulation and traverse stations by computation, using the polyconic map projection table given on pages 12 to 14.

The tables may be conveniently consulted by using as finders the sketches and index at the end of this publication. In the fourth column of the index will be found for each point a reference to the page on which its description is given, in the fifth column the page on which the elevation of the station is given, and finally in the sixth column the figure number of the sketch on which it appears.

In the first column of the list of geographic positions is given the name of the station, with the date of its establishment. The organization establishing the station (other than this Bureau) is practically always indicated by affixing the initials of that organization to the name as a part thereof. For stations established by this Bureau no qualifying initials are used. This is true also of survey stations which have been placed by other organizations, but for which this Bureau was the first to determine geographic positions. The following initials have been used to represent the indicated organizations: M. R. C.—Mississippi River Commission; U. S. L. S.—United States Lake Survey; I. B. C.—International Boundary Commission; G.S. of C.—Geodetic Survey of Canada; U.S.G.S.—United States Geological Survey; and U. S. E.—Corps of Engineers, United States Army.

If the station is described but not marked the letter "d." is used; if marked and not described the letters "m. n. d." are used; and if described and marked the letters "d. m." are used. Other letters used in this column are "n. d.", not described; "r.", recovered; "r. d.", recovered and described; "r. d. m.", recovered, described, and marked; "l.", lost; and "p. l.", probably lost.

In this publication are also given the plane coordinates on State-wide systems of those triangulation stations for which the geographic positions are furnished. An explanation of those tables will be found on page 216, immediately preceding the tables.

EXPLANATION OF LENGTHS

The lengths as given in the tables are all reduced to sea level. If the actual length of a line on the ground reduced only to the horizontal is desired—that is, its length in its actual elevation on the surface of the earth—it may be obtained by adding to the sea-level length as given in meters the following correction,

$$\text{Cor.} = \frac{Sh_m}{6{,}370{,}000},$$

in which S is the length of the line in meters and h_m is the mean elevation of the two ends of the line in meters. The correction for the length in feet can also be found by the same formula if S is taken in feet, but h_m must still be kept in meters, since the denominator is the approximate length of the radius of the earth in meters.

AZIMUTH AND BACK AZIMUTH

The azimuth of a line of triangulation is its true direction reckoned clockwise from true south. The cardinal points of the compass on this system are as follows: South is 0° (or 360°), west 90°, north 180°, and east 270°.

Because of the convergence of the meridians, the azimuth and the back azimuth of a line do not differ by exactly 180°, the amount of the divergence varying with the latitude and the difference of longitude of the two ends of the line. To illustrate from the tables on page 51, the azimuth from Gull to Rail is 15°07′57″.83 while the back azimuth, or the azimuth from Rail to Gull is 195°04′18″.74.

The azimuths of the triangulation lines offer a very convenient and accurate means of testing the deflection of the magnetic needle on a surveyor's transit, and even the azimuth over such short distances as those between a station mark and its reference mark may be used for this purpose with fair accuracy, provided the distance is greater than 100 feet. On all recent triangulation, a special azimuth mark has been set for each station at a distance of not less than one-fourth mile. The azimuth of the line from the station to this mark has been very accurately determined and may be used as the starting azimuth for traverse lines and other local surveys.

GEOGRAPHIC POSITIONS

Ninety-eighth meridian arc

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Principal points	° ′ ″	° ′ ″	° ′ ″				
Boating (S. Dak.), 1903, r. 1935 (d. m.)	45 17 15.523 96 59 53.629	211 44 42		Reference mark.			
Preacher Hill (S. Dak.), 1903, r. 1935 (d. m.)	45 28 14.685 97 06 18.023	337 37 10.89	157 41 44.49	Boating	4.3424449	22,001.13	72,182.0
Brown Valley southeast base (S. Dak.), 1903, r. 1935 (d. m.).	45 32 38.563 96 50 47.593	22 40 22.38 68 07 34.94 200 25 20	202 33 53.48 247 56 31.23	Boating Preacher Hill Determan's red barn, south gable.	4.4895435 4.3380406	30,870.49 21,779.14	101,280.9 71,453.7
Drywood (S. Dak.), 1903, r. 1935 (d. m.)	45 37 50.600 97 08 47.058	292 16 08.58 349 40 48.42	112 28 59.66 169 42 34.82	Brown Valley southeast base Preacher Hill	4.4032169 4.2569963	25,305.62 18,071.59	83,023.5 59,289.9
Layden, 1903, r. 1935 (d. m.)	45 38 20.973 96 44 10.173	27 46 38.91 39 12 57.72 57 06 43.55 88 28 03.31 46 27 30	207 35 26.41 219 08 13.81 236 50 55.57 268 10 27.48	Boating Brown Valley southeast base Preacher Hill Drywood Reference mark.	4.6446123 4.1347089 4.5359152 4.5051771	44,117.64 13,636.69 34,349.09 32,002.00	144,742.6 44,739.7 112,693.6 104,993.2
Brown Valley northwest base (S. Dak.), 1903, r. 1935 (d. m.).	45 36 27.217 96 54 02.152	97 44 08.11 254 37 33.91 329 07 08.13 12 09 32.38 46 28 09.77 179 28 36	277 33 35.66 74 44 37.03 149 09 27.08 192 05 21.91 226 19 24.56	Drywood Layden Brown Valley southeast base Boating Preacher Hill Reference mark.	4.2865440 4.1237432 3.9150604 4.5607002 4.3433692	19,343.90 13,296.68 8,223.570 36,366.39 22,048.00	63,464.1 43,624.2 26,980.16 119,312.1 72,335.8
Enwiller (S. Dak.), 1904, r. 1935 (d. m.)	45 49 51.757 96 43 47.441	1 19 20.76 55 40 25.75	181 19 04.48 235 22 31.91	Layden Drywood	4.3290468 4.5947601	21,332.75 39,333.27	69,989.2 129,045.9
Oscarson, 1904, r. 1935 (d. m.)	45 53 13.553 96 31 39.338	30 33 49.68 59 36 07.23 68 26 12.02 134 40 08	210 24 51.73 239 09 31.25 248 17 29.51	Layden Drywood Enwiller Ball on spire at White Rock.	4.5048686 4.7477598 4.2278283	31,979.27 55,944.81 16,897.73	104,918.7 183,545.6 55,438.6

Ninety-eighth meridian arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance: Logarithm (meters)	Distance: Meters	Distance: Feet
Principal points—Continued	° ′ ″	° ′ ″	° ′ ″				
Hankinson (N. Dak.), 1904, r. 1934 (d. m.)	46 02 15.554	296 51 59.46	117 10 15.05	Oscarson	4.5662801	36,836.64	120,854.9
	96 57 03.350	323 10 23.53	143 19 55.42	Enwiller	4.4572733	28,659.81	94,028.1
		18 37 54.70	198 29 29.90	Drywood	4.6786204	47,711.21	156,532.5
		270 29 30		Reference mark.			
Foss, 1904, r. 1934 (d. m.)	46 06 06.298	358 53 00.56	178 53 16.07	Oscarson	4.3777275	23,863.14	78,291.0
	96 32 00.903	77 42 28.58	257 24 26.54	Hankinson	4.5193812	33,065.96	108,483.9
		43 27 21		Fairmount, municipal water tank.			
Bullis, 1904, r. 1935 (d. m.)	45 56 56.315	77 35 07.55	257 17 58.31	Oscarson	4.5001439	31,633.26	103,783.5
	96 07 46.549	118 38 26.63	298 21 00.01	Foss	4.5513602	35,592.64	116,773.5
		234 35 03		Schoolhouse (District 17), chimney.			
Western, 1904, r. 1935 (d. m.)	46 08 06.402	350 49 41.52	170 51 33.16	Bullis	4.3213130	20,956.22	68,753.9
	96 10 21.638	45 02 45.56	224 47 26.28	Oscarson	4.5902832	38,929.89	127,722.5
		82 33 30.82	262 17 54.34	Foss	4.4493783	28,143.51	92,334.2
		356 23 26		Reference mark.			
Wahpeton, 1904, r. 1934 (d. m.)	46 14 14.542	291 20 23.77	111 36 35.95	Western	4.4920423	31,048.62	101,865.3
	96 32 48.895	356 05 17.42	176 05 52.04	Foss	4.1792702	15,110.20	49,574.0
		54 43 48.77	234 26 20.10	Hankinson	4.5832853	38,307.63	125,680.9
		320 21 28		Azimuth mark.			
Fox, 1906, l. 1935 (d. m.)	46 16 56.543	324 00 00.37	144 06 40.02	Western	4.3057537	20,218.72	66,334.2
	96 19 35.274	73 40 52.43	253 31 19.04	Wahpeton	4.2484132	17,717.94	58,129.6
		80 29 53		Hans J. Haanson's house, east gable.			
Indian, 1906, r. 1935 (d. m.)	46 26 17.439	353 48 16.84	173 50 19.98	Western	4.5300010	33,884.49	111,169.4
	96 13 11.990	25 21 29.88	205 16 52.51	Fox	4.2823821	19,159.41	62,858.8
		48 33 07.09	228 18 55.69	Wahpeton	4.5268786	33,641.75	110,373.0
		266 11 39		Highest point of very large rock in corner of field.			
Meadows, 1906, r. 1935 (d. m.)	46 25 57.236	268 16 20.32	88 28 47.13	Indian	4.3426624	22,012.15	72,218.2
	96 30 22.646	320 16 33.21	140 24 21.70	Fox	4.3361777	21,685.91	71,147.9
		8 13 05.76	188 11 19.97	Wahpeton	4.3408683	21,921.40	71,920.5

Barnesville, 1906, l. 1935 (d. m.)	46 41 02.723	325 24 31.22	145 35 11.74	Indian	4.5207533	33,170.60	108,827.2
	96 27 54.123	6 28 13.98	186 26 26.14	Meadows	4.4492974	28,138.27	92,317.0
Tansem, 1906, r. 1935 (d. m.)	46 42 02.502	0 30 17.64	180 30 08.89	Indian	4.4651309	29,183.07	95,744.8
	96 12 59.943	36 47 36.46	216 34 59.27	Meadows	4.5701801	37,168.93	121,945.1
		84 32 28.60	264 21 37.92	Barnesville	4.2807880	19,089.21	62,628.5
Eglon, 1906, r. 1935 (d. m.)	46 50 21.721	349 24 34.42	169 26 13.27	Tansem	4.1954020	15,682.02	51,450.1
	96 15 15.606	43 04 36.01	222 55 23.42	Barnesville	4.3729496	23,602.04	77,434.4
		12 07 43		Windmill.			
Riverton, 1906, r. 1935 (d. m.)	46 50 04.011	267 52 18.32	88 01 02.82	Eglon	4.1832178	15,248.17	50,026.7
	96 27 14.685	309 15 32.51	129 25 55.26	Tansem	4.3701859	23,452.32	76,943.2
		2 52 14.21	182 51 45.48	Barnesville	4.2236398	16,735.54	54,906.5
		4 51 36		Reference mark.			
Keene, 1906, r. 1935 (d. m.)	47 00 49.774	326 39 30.03	146 46 49.58	Eglon	4.3654743	23,199.27	76,112.9
	96 25 17.337	7 06 31.87	187 05 06.15	Riverton	4.3030944	20,095.30	65,929.3
		203 09 12		Deserted house, chimney.			
Morken, 1906, r. 1935 (d. m.)	47 02 06.210	279 29 02.28	99 37 08.29	Keene	4.1530501	14,224.93	46,669.6
	96 36 21.602	332 31 35.73	152 38 15.30	Riverton	4.4000860	25,123.84	82,427.1
		139 19 23		Carlson's house, tall chimney.			
Syre, 1906, r. 1935 (d. m.)	47 11 56.596	7 53 33.98	187 50 22.61	Eglon	4.6060218	40,366.56	132,436.0
	96 10 54.023	41 33 50.61	221 23 18.13	Keene	4.4390883	27,484.53	90,172.2
		58 31 57		Reference mark.			
Borup, 1906, r. 1935 (d. m.)	47 11 01.344	265 50 12.08	86 04 12.60	Syre	4.3834454	24,179.39	79,328.5
	96 29 59.730	342 28 12.03	162 31 38.89	Keene	4.2967237	19,802.67	64,969.3
		26 00 52.96	205 56 13.17	Morken	4.2644082	18,382.65	60,310.4
Wicklow, 1906, r. 1935 (d. m.)	47 22 42.462	309 03 49.11	129 18 04.81	Syre	4.4992755	31,570.07	103,576.1
	96 30 18.583	358 56 58.83	178 57 12.69	Borup	4.3355723	21,655.70	71,048.7
		298 41 41		Jacob Hadler's house, chimney.			
Gary, 1906, r. 1935 (d. m.)	47 23 43.137	342 25 46.70	162 29 47.88	Syre	4.3595155	22,883.13	75,075.7
	96 16 22.208	36 13 12.91	216 03 12.21	Borup	4.4643431	29,130.17	95,571.2
		83 59 18.61	263 49 03.09	Wicklow	4.2465524	17,642.19	57,881.1
		288 16 16		Reference mark.			
Fertile, 1906, r. 1935 (d. m.)	47 31 34.507	349 32 53.37	169 34 27.72	Gar	4.1703319	14,802.39	48,564.2
	96 18 30.256	42 09 22.57	222 00 40.74	Wicklow	4.3451684	22,139.53	72,636.1
Beltrami, 1906, r. 1935 (d. m.)	47 31 41.015	270 26 37.29	90 38 59.89	Fertile	4.3234876	21,061.42	69,099.0
	96 35 17.037	301 43 14.94	121 57 11.11	Gary	4.4468126	27,977.74	91,796.3
		339 22 06.11	159 25 45.99	Wicklow	4.2496498	17,768.46	58,295.4
		89 30 32		Reference mark.			
Tilden, 1905, r. 1935 (d. m.)	47 42 13.150	355 15 19.38	175 16 17.18	Fertile	4.2964778	19,791.46	64,932.5
	96 19 48.512	44 54 02.55	224 42 36.70	Beltrami	4.4395879	27,516.16	90,275.9
		358 49 29		Reference mark.			

Ninety-eighth meridian arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″	° ′ ″	° ′ ″				
Andover, 1906, r. 1935 (d. m.)	47 43 02.103	274 00 46.17	94 13 11.68	Tilden	4.3235052	21,062.27	69,101.8
	96 36 36.298	313 00 28.48	133 13 50.75	Fertile	4.4923154	31,068.15	101,929.4
		355 29 35.04	175 30 33.59	Beltrami	4.3242778	21,099.77	69,224.8
		82 45 57		Reference mark.			
Ives, 1906, p. l. 1935 (d. m.)	47 56 14.419	340 25 37.26	160 31 05.53	Tilden	4.4404116	27,568.40	90,447.3
	96 27 11.501	25 42 05.37	205 35 06.78	Andover	4.4336800	27,144.39	89,056.2
		337 30 31		Dorothy, elevator.			
Shirley, 1906, r. 1935 (d. m.)	47 51 39.199	243 34 45.41	63 44 58.85	Ives	4.2824170	19,160.95	62,863.9
	96 40 58.271	303 20 59.31	123 36 39.69	Tilden	4.5009343	31,690.88	103,972.5
		341 07 18.02	161 10 32.06	Andover	4.2272622	16,875.72	55,366.4
Sherack, 1906, r. 1935 (d. m.)	48 01 16.962	293 36 19.74	113 49 01.89	Ives	4.3661829	23,237.15	76,237.2
	96 44 17.413	346 56 22.17	166 58 50.02	Shirley	4.2628549	18,317.03	60,095.1
Bray, 1906, r. 1935 (d. m.)	48 04 05.200	352 54 20.88	172 55 25.67	Ives	4.1659116	14,652.50	48,072.4
	96 28 38.689	33 44 03.52	213 34 54.20	Shirley	4.4421880	27,681.39	90,818.0
		75 08 02.21	254 56 24.11	Sherack	4.3037405	20,125.21	66,027.5
Warren, 1906, r. 1935 (d. m.)	48 13 27.828	312 12 37.00	132 24 05.02	Bray	4.4119231	25,818.03	84,704.7
	96 44 02.390	0 47 24.25	180 47 13.06	Sherack	4.3536514	22,576.23	74,068.8
Viking, 1906, r. 1935 (d. m.)	48 15 44.229	357 42 46.40	177 43 17.44	Bray	4.3346162	21,608.08	70,892.5
	96 29 20.341	34 47 17.96	214 36 09.82	Sherack	4.5129548	32,580.28	106,890.5
		77 03 24.17	256 52 26.18	Warren	4.2713754	18,679.94	61,285.8
		112 40 35		Windmill.			
Wright, 1906, l. 1935 (d. m.)	48 24 02.501	346 46 11.05	166 48 22.10	Viking	4.1989057	15,809.05	51,866.9
	96 32 15.769	36 40 27.35	216 31 39.66	Warren	4.3877260	24,418.89	80,114.3
		244 12 11		House, chimney.			
Argyle, 1906, r. 1935 (d. m.)	48 22 12.037	260 34 10.00	80 46 45.00	Wright	4.3233768	21,056.04	69,081.4
	96 49 05.620	296 00 20.50	116 15 05.76	Viking	4.4345666	27,199.86	89,238.2
		338 51 45.23	158 55 31.62	Warren	4.2394480	17,355.94	56,941.9
		184 59 02		House, east chimney.			
Stephen east base, 1906, r. 1935 (d. m.)	48 28 48.359	300 55 56.19	121 04 51.05	Wright	4.2340239	17,140.52	56,235.2
	96 44 10.573	26 23 21.90	206 19 41.18	Argyle	4.1355211	13,662.21	44,823.4
		359 12 10		Reference mark.			

Donaldson, 1907, r. 1935 (d. m.)	48 32 34.841	300 51 02.31	121 07 02.86	Wright	4.4877179	30,740.99	100,856.1
	96 53 38.844	300 53 48.43	121 00 54.11	Stephen east base	4.1335543	13,600.48	44,620.9
		343 42 13.35	163 45 37.84	Argyle	4.3018960	20,039.92	65,747.6
Stephen west base, 1905, r. 1935 (d. m.)	48 27 22.884	343 50 56.46	163 52 37.50	Argyle	3.9998006	9,995.41	32,793.3
	96 51 20.715	163 36 59.19	343 35 15.74	Donaldson	4.0019306	10,044.55	32,954.5
		253 19 08.01	73 24 30.00	Stephen east base	3.9648173	9,221.833	30,255.30
		284 36 51.30	104 51 07.87	Wright	4.3862779	24,337.61	79,847.6
		89 40 19		Reference mark.			
Deer, 1907, r. 1935 (d. m.)	48 34 39.810	339 13 29.19	159 18 01.00	Wright	4.3232409	21,049.46	69,059.8
	96 38 18.759	29 58 31.24	209 50 26.95	Argyle	4.4256378	126,646.36	87,422.3
		33 39 24.57	213 35 00.95	Stephen east base	4.1151680	13,036.71	42,771.3
		50 00 59.88	229 51 14.07	Stephen west base	4.3215592	20,968.11	168,792.9
		78 31 54.91	258 20 25.16	Donaldson	4.2845819	19,256.70	63,178.0
Jupiter, 1907, r. 1935 (d. m.)	48 42 47.480	329 35 26.96	149 40 50.59	Deer	4.2420142	17,458.79	57,279.4
	96 45 29.893	27 55 59.12	207 49 52.19	Donaldson	4.3306080	21,409.57	70,241.2
Skane, 1907, r. 1935 (d. m.)	48 42 13.109	266 44 11.29	86 55 56.82	Jupiter	4.2839072	19,226.81	63,080.0
	97 01 08.896	296 23 07.51	116 40 15.91	Deer	4.4962388	31,350.09	102,854.4
		332 39 37.45	152 45 15.16	Donaldson	4.3031976	20,100.07	65,945.0
Granville, 1907, r. 1935 (d. m.)	48 52 35.057	344 44 54.21	164 47 56.33	Jupiter	4.2744086	18,810.86	61,715.3
	96 49 31.953	36 35 26.76	216 26 42.45	Skane	4.3784997	23,905.60	78,430.3
Hallock, 1907, r. 1935 (d. m.)	48 47 45.809	220 42 53.66	40 47 37.92	Granville	4.0717059	11,795.22	38,698.2
	96 55 49.545	305 59 36.79	126 07 22.70	Jupiter	4.1946911	15,656.37	51,365.9
		32 26 21.60	212 22 21.50	Skane	4.0853921	12,172.85	39,937.1
Hill, 1907, l. 1935 (d. m.)	48 50 51.042	261 20 03.52	81 33 12.64	Granville	4.3343885	21,596.76	70,855.4
	97 06 59.747	292 38 28.38	112 46 52.82	Hallock	4.1708566	14,820.29	48,622.9
		335 50 36.23	155 55 00.12	Skane	4.2437720	17,529.60	57,511.7
States, 1907 (d. m.)	49 00 01.447	301 48 50.69	122 02 30.59	Granville	4.4162139	26,074.37	85,545.7
	97 07 39.343	357 16 53.86	177 17 23.71	Hill	4.2310043	17,021.75	55,845.5
Canada, 1907, r. 1935 (d. m.)	49 00 00.967	341 52 35.87	161 55 22.68	Granville	4.1611233	14,491.83	47,545.3
	96 53 13.184	44 48 47.25	224 38 24.16	Hill	4.3725893	23,910.54	78,446.5
		90 08 20.68	269 57 26.98	States	4.2456498	17,605.56	57,760.9
Ridgeville (G. S. of C.) (Canada), 1924 (d. m.)	49 04 26.944	319 32 31.36	139 36 51.54	Canada	4.0331360	10,792.85	35,409.5
	96 58 57.736	52 18 33.56	232 11 59.68	States	4.1270415	13,398.05	43,956.8
Humboldt (G. S. of C.), 1923, r. 1935 (d. m.)	48 50 51.431	177 16 14.10	357 15 44.06	States	4.2307043	17,010.00	55,807.0
	97 06 59.493	201 12 20.95	21 18 24.32	Ridgeville (G. S. of C.)	4.4318667	27,031.29	88,685.2
		224 39 05.29	44 49 28.19	Canada	4.3783677	23,898.34	78,406.5
Pembina (G. S. of C.) (N. Dak.), 1925 (d. m.)	48 57 49.854	241 26 19.75	61 40 21.12	Ridgeville (G. S. of C.)	4.4108446	25,753.99	84,494.5
	97 17 32.242	251 18 14.37	71 25 41.72	States	4.1045750	12,722.57	41,740.6
		315 01 20.49	135 09 17.35	Humboldt (G. S. of C.)	4.2612923	18,251.24	59,879.3

Ninety-eighth meridian arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″	° ′ ″	° ′ ″				
Letellier (G. S. of C.) (Canada), 1925 (d. m.)	49 07 07.424	282 50 31.37	103 03 54.36	Ridgeville (G. S. of C.)	4.3447059	22,115.96	72,558.8
	97 16 40.155	320 06 10.93	140 12 59.46	States	4.2339628	17,138.11	56,227.3
		3 31 11.68	183 30 32.35	Pembina (G. S. of C.)	4.2369602	17,256.80	56,616.7
Supplementary points							
Browns Valley, white spire, 1903, l. 1935 (d.) [1]	45 35 33.69	13 08 18	193 07 37	Brown Valley southeast base	3.744441	5,551.9	18,215
	96 49 49.42	106 48 48	286 45 47	Brown Valley northwest base	3.757484	5,721.2	18,770
Browns Valley, water tower, 1903, l. 1935 (d.)	45 35 40.104	12 15 44.8	192 15 04.7	Brown Valley southeast base	3.758566	5,735.4	18,817
	96 49 51.443	105 00 39.4	284 57 40.2	Brown Valley northwest base	3.750104	5,624.8	18,454
Browns Valley, large building, high spire, 1903 (d.)	45 35 34.236	13 46 44.5	193 46 00.7	Brown Valley southeast base	3.746951	5,584.1	18,321
	96 49 46.286	106 27 34.2	286 24 31.3	Brown Valley northwest base	3.762039	5,781.5	18,968
T. 124 N., R. 49 W., sec. 18, southeast corner, 1903 (d. m.).[1]	45 32 36.01	99 46 05	279 45 50	Brown Valley southeast base	2.666691	464.2	1,523
	96 50 26.51						
Beardsley, water tank, 1903, r. 1935 (n. d.)	45 33 30.633	81 17 33.1	261 11 49.6	Brown Valley southeast base	4.023699	10,560.9	34,649
	96 42 46.400	168 33 27.7	348 32 27.9	Layden	3.961219	9,145.7	30,006
Beardsley, square slender decorated spire, 1903, l. 1935 (d.).	45 33 12.938	84 19 57.9	264 14 09.0	Brown Valley southeast base	4.027583	10,655.7	34,960
	96 42 38.817	168 14 50.5	348 13 45.3	Layden	3.987395	9,713.9	31,870
Graceville, water tower, 1903, l. 1935 (d.)	45 34 09.012	108 25 09.7	288 12 14.7	Layden	4.393722	24,758.4	81,228
	96 26 05.569	168 29 22.6	348 25 23.6	Oscarson	4.557094	36,065.7	118,326
Graceville, Catholic Church, spire, 1903, r. 1935 (n. d.)	45 34 04.274	108 52 23.0	288 39 33.9	Layden	4.391539	24,634.2	80,821
	96 26 13.885	168 48 50.8	348 44 57.7	Oscarson	4.558392	36,173.6	118,680
T. 125 N., R. 48 W., sec. 17, west 1/4 corner, 1903, l. 1935 (d. m.) [1].	45 38 12.39	226 22 27	46 22 36	Layden	2.584390	384.1	1,260
	96 44 23.01						
Indian church, spire (S. Dak.), 1903 (d.)	45 37 25.011	345 43 27.2	165 44 41.3	BrownValley southeast base	3.960226	9,124.9	29,937
	96 52 31.312	47 48 52.8	227 47 47.9	Brown Valley northwest base	3.424330	2,656.6	8,716
T. 125 N., R. 52 W., sec. 10, northeast corner (S. Dak.), 1903, r. 1904 (d. m.).[1]	45 37 51.72	80 09 43	260 09 36	Drywood	2.305735	202.2	663
	97 08 37.86						
Large church, spire on west end (S. Dak.), 1904 (n. d.).	45 45 48.844	244 52 19.5	65 01 12.1	Enwiller	4.248221	17,710.1	58,104
	96 56 10.322	311 31 07.1	131 39 42.5	Layden	4.318703	20,830.7	68,342
T. 128 N., R. 49 W., sec. 36, east 1/4 corner (S. Dak.), 1903, l. 1935 (d. m.).[1]	45 49 38.60	178 28 06	358 28 05	Enwiller	2.609082	406.5	1,334
	96 43 46.94						
Swedish Lutheran Church, spire (2 miles east of station Enwiller) (S. Dak.), 1904, r. 1935 (d.)	45 49 39.875	10 00 23.8	189 58 21.6	Layden	4.328031	21,282.9	69,826
	96 41 19.418	96 33 52.6	276 32 06.5	Enwiller	3.507309	3,215.9	10,551
Church, very tall black spire (S. Dak.), 1904, r. 1935 (d.).	45 51 00.518	275 15 20.5	95 27 52.7	Enwiller	4.356515	22,725.6	74,559
	97 01 15.924	316 30 01.5	136 42 16.2	Layden	4.508845	32,273.4	105,884
Wheaton, water tank, 1904, l. 1921 (n. d.)	45 48 36.950	97 26 50.9	277 16 57.3	Enwiller	4.255684	18,017.1	59,111
	96 29 59.725	165 52 59.3	345 51 47.8	Oscarson	3.944791	8,806.2	28,892
Herman, water tower, 1904, r. 1935 (n. d.)	45 48 37.520	105 57 47.3	285 41 07.4	Oscarson	4.494892	31,253.0	102,536
	96 08 25.775	183 08 24.3	3 08 52.5	Bullis	4.188177	15,423.3	50,601
Hankinson, high school spire (N. Dak.), 1904 (n. d.)	46 04 10.079	262 38 46.1	82 54 35.6	Foss	4.455509	28,543.6	93,647
	96 53 58.898	48 17 36.8	228 15 24.0	Hankinson	3.725329	5,312.9	17,431
Hankinson, Catholic Church, spire (N. Dak.), 1904 (n. d.).[1]	46 04 12.20	262 48 18	83 04 11	Foss	4.457160	28,652.3	94,003
	96 54 04.39	46 54 27	226 52 19	Hankinson	3.721798	5,269.8	17,289
Schoolhouse chimney (1/3 mile north of station Hankinson) (N. Dak.), 1904 (n. d.).	46 02 32.366	234 52 09.4	55 09 30.1	Wahpeton	4.577622	37,811.3	124,053
	96 56 52.174	24 50 30.8	204 50 22.8	Hankinson	2.757406	572.0	1,877
T. 130 N., R. 50 W., sec. 28, southeast corner (N. Dak.), 1904 (d. m.) [1].	46 02 15.26	93 25 22	273 25 17	Hankinson	2.177470	150.5	494
	96 56 56.36						
Fairmount, Catholic Church, spire (N. Dak.), 1904 (n. d.).	46 03 24.930	226 47 18.6	46 50 16.6	Foss	3.862137	7,280.1	23,885
	96 36 07.937	342 56 27.3	162 59 40.5	Oscarson	4.295395	19,742.2	64,771
Fairmount, National Elevator (N. Dak.), 1904 (n. d.)	46 03 16.773	226 55 55.3	46 59 03.2	Foss	3.884725	7,668.8	25,160
	96 36 21.736	341 53 33.5	161 56 56.6	Oscarson	4.292071	19,591.6	64,277
Fairmount, tall east elevator (N. Dak.), 1904 (n. d.)	46 03 29.364	326 29 41.9	46 32 33.2	Foss	3.847668	7,041.5	23,102
	96 35 58.688	343 36 30.3	163 39 36.8	Oscarson	4.297017	19,816.0	65,013
Fairmount, elevator (N. Dak.), 1904 (n. d.)	46 03 29.425	227 22 06.5	47 25 03.1	Foss	3.854597	7,154.8	23,474
	96 36 05.980	343 10 28.9	163 13 40.7	Oscarson	4.298037	19,862.6	65,166
Blackmer, south elevator (N. Dak.), 1904 (n. d.) [1]	45 58 33.46	199 05 15	19 07 57	Foss	4.170172	14,796.9	48,546
	96 35 46.18	331 40 32	151 43 29	Oscarson	4.049911	11,217.9	36,804
Church, black spire (near Childs (Kutzer)), 1904, r. 1935 (d.).	46 01 20.401	179 40 58.5	359 40 54.1	Wahpeton	4.378446	23,902.6	78,420
	96 32 42.722	185 48 36.8	5 49 06.9	Foss	3.948065	8,872.9	29,111
Childs (Kutzer), tallest elevator, 1904, l. 1935 (n. d.)	46 03 57.097	177 19 05.7	357 18 35.6	Wahpeton	4.280697	19,085.2	62,615
	96 32 07.219	181 56 52.5	1 56 57.0	Foss	3.601134	3,991.5	13,095

[1] No check on this position.

Ninety-eighth meridian arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
Nashua, west elevator, 1904, r. 1935 (d.)	46 02 11.385 96 18 30.191	45 44 20.4 112 40 56.4	225 34 53.2 292 31 12.6	Oscarson Foss	4.375831 4.275835	23,759.2 18,872.7	77,950 61,918
Nashua, east elevator, 1904, r. 1935 (n. d.)	46 02 11.385 96 18 26.897	45 51 30.9 112 36 00.9	225 42 01.3 292 26 14.7	Oscarson Foss	4.376758 4.277337	23,809.9 18,938.1	78,116 62,133
Nashua, white church, 1904, r. 1935 (d.)	46 02 08.969 96 18 27.003	45 59 01.9 112 48 39.6	225 49 32.4 292 38 53.5	Oscarson Foss	4.375781 4.277948	23,756.4 18,964.8	77,941 62,220
Western Post Office, church spire, 1904, r. 1935 (n. d.)	46 09 08.347 96 10 56.808	78 25 30.4 108 42 20.0	258 10 19.1 288 26 33.1	Foss Wahpeton	4.442711 4.472471	27,714.8 29,680.5	90,928 97,377
Campbell, church spire, 1904, r. 1935 (d.)	46 05 49.514 96 24 19.787	22 06 22.5 93 02 29.0	202 01 06.4 272 56 56.8	Oscarson Foss	4.401134 3.996430	25,184.5 9,918.1	82,626 32,540
Campbell, church, open belfry, 1904, r. 1935 (d.)	46 05 44.771 96 24 17.873	22 19 11.0 93 52 11.4	202 13 53.5 273 46 37.8	Oscarson Foss	4.399059 3.998609	25,064.5 9,968.0	82,232 32,703
Campbell, elevator no. 1 (Campbell Grain Co.'s elevator), 1904, r. 1935 (n. d.).	46 05 58.407 96 24 08.542	22 22 44.0 91 25 23.1	202 17 19.8 271 19 42.8	Oscarson Foss	4.407053 4.006417	25,530.1 10,148.9	83,760 33,297
Campbell, elevator no. 2 (Farmers' Elevator), 1904, r. 1935 (n. d.).	46 05 59.973 96 24 09.951	22 16 28.5 91 09 11.1	202 11 05.3 271 03 31.8	Oscarson Foss	4.407618 4.005074	25,563.4 10,117.5	83,869 33,194
Church spire (east of Doran), 1904, r. 1935 (n. d.)	46 10 38.324 96 24 32.769	48 55 03.3 122 09 57.6	228 49 40.2 302 03 59.5	Foss Wahpeton	4.106180 4.098902	12,769.7 12,557.5	41,895 41,199
T. 131 N., R. 44 W., sec. 26, north 1/4 corner, 1904, l. 1935 (d. m.) [1].	46 08 14.91 96 10 21.87	358 54 38	178 54 38	Western	2.419609	262.79	862.2
Foxhome, white elevator, 1906, r. 1935 (n. d.)	46 16 46.675 96 18 25.565	75 49 58.3 101 32 50.5	255 39 34.5 281 32 00.1	Wahpeton Fox	4.280531 3.182747	19,077.9 1,523.2	62,591 4,997
Foxhome, red elevator, 1906, r. 1935 (n. d.)	46 16 46.502 96 18 31.720	102 50 34.1 201 09 40.0	282 49 48.2 21 13 31.4	Fox Indian	3.144732 4.276638	1,395.5 18,907.7	4,578 62,033
Foxhome, schoolhouse cupola, 1906, r. 1935 (n. d.)	46 16 27.506 96 18 36.524	77 24 43.5 125 29 15.1	257 14 27.6 305 28 32.6	Wahpeton Fox	4.272136 3.188830	18,712.7 1,544.6	61,393 5,068
Watosco, lone elevator, 1906, l. 1935 (n. d.)	46 15 57.148 96 28 23.800	172 12 09.2 260 44 31.2	352 10 43.2 80 50 53.1	Meadows Fox	4.271898 4.059346	18,702.4 11,464.3	61,359 37,612
Everdell, broad elevator, 1906, l. 1935 (n. d.)	46 16 15.750 96 24 33.249	258 48 07.6 70 37 52.6	78 51 42.9 250 31 54.5	Fox Wahpeton	3.813113 4.051415	6,503.0 11,256.8	21,335 36,932
Everdell, slender elevator, 1906, r. 1935 (n. d.)	46 16 14.928 96 24 42.541	258 55 03.0 70 24 42.1	78 58 45.1 250 18 50.8	Fox Wahpeton	3.826279 4.043784	6,703.2 11,060.7	21,992 36,288
Breckenridge, hospital cupola, 1906, r. 1935 (n. d.)	46 15 33.607 96 35 17.965	198 07 38.7 307 22 56.5	18 11 12.4 127 24 44.2	Meadows Wahpeton	4.306744 3.604182	20,264.9 4,019.6	66,486 13,188
Breckenridge, courthouse cupola, 1906, l. 1935 (n. d.)	46 15 37.610 96 35 13.127	197 57 26.8 309 40 59.1	18 00 57.0 129 42 43.3	Meadows Wahpeton	4.303526 3.603744	20,115.3 4,015.5	65,995 13,174
Wahpeton, standpipe (N. Dak.), 1906, r. 1935 (n. d.)	46 15 59.298 96 35 55.977	265 05 24.3 308 53 23.4	85 17 13.0 128 55 38.5	Fox Wahpeton	4.323719 3.711795	21,072.6 5,149.9	69,136 16,896
Wahpeton, schoolhouse cupola (N. Dak.). 1904 (n. d.)	46 16 26.458 96 36 28.091	203 52 23.5 238 25 12.8	23 56 48.0 58 42 03.1	Meadows Indian	4.285070 4.543873	19,278.4 34,984.3	63,249 114,778
Fergus Falls, Northwestern College, tower, 1906, r. 1935 (n. d.).	46 16 33.157 96 04 03.033	318 26 39.3 92 09 56.1 147 00 34.2	138 32 20.5 271 58 42.3 326 53 56.8	Dalton Fox Indian	4.184088 4.300424 4.332893	15,278.8 19,972.1 21,522.5	50,127 65,525 70,612
Fergus Falls, asylum stack, 1906, r. 1935 (n. d.)	46 18 01.620 96 04 56.180	321 28 33.7 20 49 03.6 83 59 35.0 145 21 27.6	141 34 53.3 200 45 08.5 263 48 59.5 325 15 28.6	Dalton Western Fox Indian	4.257747 4.293529 4.277012 4.269972	18,102.8 19,657.5 18,924.0 18,619.7	59,392 64,493 62,086 61,088
Fergus Falls, courthouse cupola, 1906, l. 1935 (n. d.)	46 16 48.440 96 04 30.451	317 59 14.7 90 49 50.9 147 39 07.9	138 05 15.7 270 38 56.9 327 32 50.3	Dalton Fox Indian	4.204711 4.287195 4.318238	16,021.8 19,372.9 20,808.4	52,565 63,559 68,269
Carlisle, elevator, north gable, 1906, r. 1935 (n. d.) [1]	46 22 07.03 96 11 27.98	47 26 39 106 27 28	227 20 46 286 13 47	Fox Meadows	4.151131 4.402430	14,162.2 25,259.8	46,464 82,873
Church spire (6 miles north of station Fox), 1906, r. 1935 (n. d.).	46 22 10.313 96 19 59.125	228 41 43.8 356 58 59.0	48 46 38.7 176 59 16.3	Indian Fox	4.063327 3.986847	11,569.8 9,701.7	37,959 31,830
Church spire (8 miles northwest of Foxhome), 1906, r. 1935 (n. d.).	46 23 01.828 96 21 44.220	241 02 47.0 346 14 46.6	61 08 58.0 166 16 19.9	Indian Fox	4.096803 4.064878	12,496.9 11,611.2	41,000 38,094
Brushvale, low elevator, center, 1906, r. 1935 (n. d.) [1]	46 22 13.64 96 38 37.34	236 47 34 256 50 15	56 53 32 77 08 39	Meadows Indian	4.101163 4.524281	12,623.0 33,441.1	41,414 109,715
Brushvale, tall elevator, center, 1906, r. 1935 (n. d.) [1]	46 22 15.27 96 38 37.72	237 00 16 256 55 28	57 06 14 77 13 53	Meadows Indian	4.100453 4.524236	12,602.4 33,437.7	41,346 109,704
Oscar, church spire, 1906 (n. d.)	46 23 50.777 96 12 48.534	34 15 36.5 99 56 45.2	214 10 42.3 279 44 01.7	Fox Meadows	4.189433 4.358859	15,468.0 22,848.6	50,748 74,962

[1] No check on this position.

Ninety-eighth meridian arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
B. M. E 4, 1906, r. 1935 (d. m.) [1]	46 26 08.59 96 13 03.81	147 24 05	327 23 59	Indian	2.510913	324.275	1,063.89
Church (5 miles north of station Indian), 1906 (n. d.)	46 30 54.921 96 13 10.138	67 27 12.7 135 01 01.5	247 14 44.1 314 50 19.3	Meadows Barnesville	4.377820 4.424479	23,868.2 26,575.3	78,308 87,189
Lawndale, elevator, 1906, r. 1935 (n. d.)	46 33 19.005 96 21 33.496	320 32 37.3 39 39 11.2	140 38 41.0 219 32 47.4	Indian Meadows	4.226519 4.248061	16,846.9 17,703.6	55,272 58,083
Barnesville, tall elevator, 1906, r. 1935 (n. d.)	46 38 37.421 96 25 02.544	16 14 07.4 140 54 25.0	196 10 15.0 320 52 20.2	Meadows Barnesville	4.388173 3.762111	24,444.0 5,782.4	80,197 18,971
Barnesville, church spire, 1906, r. 1935 (n. d.)	46 39 22.115 96 25 11.874	132 01 40.0 252 15 59.0	311 59 42.0 72 24 51.5	Barnesville Tansem	3.666687 4.212869	4,641.8 16,325.6	15,229 53,562
Barnesville, standpipe, 1906, r. 1935 (n. d.)	46 39 16.304 96 25 13.155	133 51 28.4 251 41 53.9	313 49 31.3 71 50 47.3	Barnesville Tansem	3.676157 4.215030	4,744.1 16,407.0	15,565 53,829
Barnesville, stack, 1906, l. 1935 (n. d.)	46 39 04.813 96 25 16.413	137 22 36.7 250 36 32.7	317 20 42.0 70 45 28.5	Barnesville Tansem	3.694549 4.219773	4,949.4 16,587.2	16,238 54,420
Gray church spire (7 miles south of station Tansem), 1906, r. 1935 (n. d.).[1]	46 36 04.40 96 13 36.92	48 55 56 184 03 52	228 43 46 4 04 18	Meadows Tansem	4.454542 4.044761	28,480.1 11,085.6	93,438 36,370
White church spire (5 miles south of station Tansem), 1906, r. 1935 (n. d.).[1]	46 37 27.11 96 12 49.86	46 35 36 178 33 24	226 22 52 358 33 17	Meadows Tansem	4.490504 3.929753	30,938.8 8,506.5	101,505 27,908
T. 137 N., R. 44 W., sec. 2, southwest corner, 1906, l. 1935 (d. m.).[1]	46 42 10.70 96 12 55.94	18 33 24	198 33 21	Tansem	2.426310	266.876	875.58
Rollag, church spire, 1906, r. 1935 (n. d.) [1]	46 44 23.84 96 14 17.61	339 17 21 122 35 18	159 18 18 302 25 51	Tansem Riverton	3.668900 4.291043	4,665.5 19,545.3	15,307 64,125
Baker, church spire, 1906, r. 1935 (n. d.) [1]	46 43 08.44 96 34 15.38	274 10 08 295 34 08	94 25 37 115 38 46	Tansem Barnesville	4.434064 3.953366	27,168.4 8,981.9	89,135 29,468
Downer, northwest elevator, 1906, r. 1935 (n. d.)	46 45 08.489 96 29 01.880	193 58 42.6 241 01 07.3	14 00 00.7 61 11 09.6	Riverton Eglon	3.973337 4.301368	9,404.5 20,015.6	30,855 65,668
Downer, southeast elevator, 1906, r. 1935 (n. d.)	46 45 05.791 96 28 59.961	193 37 05.5 240 45 14.4	13 38 22.2 60 55 15.3	Riverton Eglon	3.976612 4.301475	9,475.7 20,020.5	31,088 65,684
Sabin, elevator, 1906, r. 1935 (n. d.) [1]	46 46 34.26 96 39 53.05	247 59 02 303 46 28	68 08 15 123 55 12	Riverton Barnesville	4.238945 4.264354	17,335.8 18,380.4	56,876 60,303
Church spire (2 miles east of station Eglon), 1906, r. 1935 (n. d.).	46 50 04.194 96 13 06.064	90 04 04.5 101 09 57.9	269 53 45.5 281 08 23.4	Riverton Eglon	4.254895 3.446854	17,984.4 2,798.0	59,004 9,180
Muskoda, elevator, 1906, r. 1935 (n. d.)	46 52 13.415 96 24 23.706	286 29 18.3 42 12 31.7	106 35 58.2 222 10 27.0	Eglon Riverton	4.083239 3.731861	12,112.6 5,393.4	39,739 17,695
T. 139 N., R. 46 W., sec. 23, south 1/4 corner, 1906 (d. m.).[1]	46 49 58.91 96 27 07.14	134 33 00	314 32 54	Riverton	2.351042	224.410	736.25
Glyndon, elevator, 1906, r. 1935 (n. d.) [1]	46 52 24.32 96 34 46.32	278 33 39 294 19 03	98 47 53 114 24 33	Eglon Riverton	4.399457 4.021316	25,087.5 10,503.1	82,308 34,459
Glyndon, church spire, 1906, r. 1935 (n. d.) [1]	46 52 27.63 96 34 35.54	278 52 27 295 21 26	99 06 33 115 26 48	Eglon Riverton	4.395803 4.014473	24,877.3 10,338.9	81,618 33,920
Fargo, Catholic Church, spire (N. Dak.), 1906, r. 1935 (n. d.).	46 52 56.387 96 47 17.176	242 13 23.9 281 40 52.7	62 29 28.3 101 55 30.1	Keene Riverton	4.498419 4.415350	31,507.9 26,022.6	103,372 85,376
Fargo, brewery cupola (N. Dak.), 1906, l. 1935 (n. d.) [1]	46 52 15.14 96 46 52.14	239 44 28 279 06 02	60 00 14 99 20 22	Keene Riverton	4.500543 4.402627	31,662.3 25,271.3	103,879 82,911
Fargo, large square tower (N. Dak.), 1906 (n. d.) [1]	46 52 36.36 96 47 00.01	240 55 26 280 29 29	61 11 18 100 43 54	Keene Riverton	4.498085 4.407359	31,483.6 25,548.1	103,292 83,819
Fargo, large round tower (N. Dak.), 1906 (n. d.) [1]	46 52 37.85 96 46 47.55	240 45 49 280 42 20	61 01 32 100 56 36	Keene Riverton	4.494569 4.403052	31,229.8 25,296.0	102,460 83,992
Church spire (8 miles northeast of Fargo), 1906, l. 1935 (n. d.) [1]	46 57 45.88 96 39 35.63	206 59 55 252 31 41	27 02 17 72 42 08	Morken Keene	3.955395 4.278880	9,023.9 19,005.5	29,606 62,354
Averill, elevator, 1906, r. 1935 (n. d.)	46 58 01.378 96 32 54.629	149 58 40.4 241 39 59.4	329 56 09.0 61 45 33.8	Morken Keene	3.941215 4.040344	8,734.0 10,973.5	28,655 36,002
Hitterdal, tall church spire, 1906 (n. d.) [1]	46 58 33.16 96 15 33.06	193 19 01 358 36 13	13 22 25 178 36 25	Syre Eglon	4.406531 4.181281	25,499.5 15,180.3	83,660 49,804
Hitterdal, elevator, 1906 (n. d.) [1]	46 58 43.06 96 15 26.59	193 10 31 359 08 20	13 13 50 179 08 28	Syre Eglon	4.400896 4.189858	25,170.7 15,483.1	82,581 50,797
Hitterdal, low church spire, 1906 (n. d.)[1]	46 58 28.54 96 15 28.24	193 01 21 358 58 46	13 04 42 178 58 56	Syre Eglon	4.406499 4.177117	25,615.3 15,035.5	84,040 49,329
Church spire (3 miles northeast of station Keene), 1906, r. 1935 (n. d.).	47 02 07.929 96 21 51.176	61 02 07.4 148 02 51.2	240 58 36.6 327 55 53.3	Keene Borup	3.697041 4.288429	4,977.8 19,428.0	16,331 63,740

[1] No check on this position.

218928°—38——3

Ninety-eighth meridian arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
T. 141 N., R. 47 W., sec. 10, southeast corner, 1906, l. 1935 (d. m.)[1]	47 02 06.64 96 36 20.21	65 21 38	245 21 37	Morken	1.508395	32.24	105.8
Felton, elevator, 1906 (n. d.)	47 04 44.214 96 30 24.231	318 08 45.5 57 08 10.5	138 12 30.1 237 03 48.9	Keene Morken	3.987442 3.953418	9,715.0 8,982.9	31,873 29,471
Felton, church spire, 1906, r. 1935 (n. d.)	47 04 43.948 96 30 04.660	319 59 02.5 58 33 31.8	140 02 32.8 238 28 55.9	Keene Morken	3.974890 3.969796	9,438.2 9,328.2	30,965 30,604
Felton, schoolhouse cupola, 1906, l. 1935 (n. d.)	47 04 44.241 96 30 02.343	320 14 51.9 58 40 04.4	140 18 20.5 238 35 26.8	Keene Morken	3.973766 3.971953	9,413.8 9,374.6	30,885 30,756
Borup, church spire, 1906, r. 1935 (n. d.)	47 10 49.714 96 30 04.940	26 12 03.9 196 59 10.1	206 07 27.9 16 59 13.9	Morken Borup	4.255559 2.574622	18,014.9 375.5	59,094 1,232
Borup, elevator (slender top), 1906 (n. d.)	47 10 50.107 96 30 24.814	340 41 25.5 24 58 26.5	160 45 10.7 204 54 05.1	Keene Morken	4.293148 4.251445	19,640.3 17,842.1	64,437 58,537
Borup, tall elevator, 1906, r. 1935 (n. d.)	47 10 51.912 96 30 24.920	340 44 16.5 24 53 31.7	160 48 01.8 204 49 10.4	Keene Morken	4.294326 4.252651	19,693.6 17,891.7	64,611 58,700
B. M. E 5, 1906, l. 1935 (d. m.)[1]	47 10 48.76 96 30 00.96	183 49 29	3 49 30	Borup	2.590643	389.622	1,278.28
Wheatville, red elevator (slender top), 1906, r. 1935 (n. d.)[1].	47 13 30.57 96 30 24.85	276 35 55 353 27 14	96 50 15 173 27 32	Syre Borup	4.394602 3.666397	24,808.6 4,638.7	81,393 15,219
Wheatville, yellow elevator, 1906, r. 1935 (n. d.)[1]	47 13 31.94 96 30 24.93	276 41 41 353 29 26	96 56 01 173 29 44	Syre Borup	4.394719 3.670316	24,815.3 4,680.8	81,415 15,357
Church spire (5 miles northeast of Borup), 1906, r. 1935 (n. d.).[1]	47 15 08.79 96 26 10.58	287 00 56 32 16 24	107 12 09 212 13 36	Syre Borup	4.304825 3.955961	20,175.5 9,035.7	66,192 29,645
Twin Valley, standpipe, 1906, r. 1935 (n. d.)	47 15 35.474 96 15 33.626	176 07 47.7 318 56 31.4	356 07 12.0 138 59 56.7	Gary Syre	4.178827 3.952321	15,094.8 8,960.3	49,524 29,397
Twin Valley, white church spire, 1906, r. 1935 (n. d.)	47 15 34.480 96 15 42.623	176 51 05.2 317 54 39.8	356 50 36.1 137 58 11.7	Gary Syre	4.179374 3.957265	15,113.8 9,062.9	49,586 29,734
Twin Valley, tall elevator (slender top), 1906, l. 1935 (n. d.).[1]	47 15 33.54 96 15 29.58	175 49 31 319 06 13	355 48 52 139 09 36	Gary Syre	4.180710 3.947402	15,160.4 8,859.4	49,739 29,066
Ada, standpipe, 1906, l. 1935 (n. d.)	47 18 04.855 96 31 00.005	240 21 23.6 354 27 27.6	60 32 09.2 174 28 11.9	Gary Borup	4.325933 4.118602	21,180.3 13,140.2	69,489 43,111
Ada, schoolhouse cupola, 1906, l. 1935 (n. d.)	47 17 51.503 96 30 41.701	238 52 02.6 293 34 20.2	59 02 34.7 113 48 52.3	Gary Syre	4.323400 4.435764	21,057.2 27,274.9	69,085 89,484
Ada, courthouse tower, 1906, r. 1935 (n. d.)	47 17 54.571 96 30 47.212	239 14 56.1 355 31 13.8	59 25 32.3 175 31 48.7	Gary Borup	4.324442 4.107219	21,107.8 12,800.3	69,251 41,996
Hadler, south elevator, 1906, r. 1935 (n. d.)	47 22 09.637 96 32 05.529	245 40 29.3 261 36 03.8	65 41 48.0 81 47 37.9	Wicklow Gary	3.391297 4.300960	2,462.1 19,996.8	8,078 65,606
Hadler, north elevator, 1906, r. 1935 (n. d.)	47 22 11.378 96 32 06.003	246 54 59.4 261 45 27.1	66 56 18.4 81 57 01.5	Wicklow Gary	3.389086 4.301005	2,449.5 19,998.8	8,036 65,613
B. M. K 5, 1906, r. 1935 (d. m.)[1]	47 22 33.37 96 30 41.53	239 44 49	59 45 06	Wicklow	2.746038	557.235	1,828.20
Gary, church spire, 1906, r. 1935 (n. d.)	47 22 16.178 96 16 01.159	92 40 16.9 170 39 57.7	272 29 46.0 350 39 42.1	Wicklow Gary	4.255424 3.434820	18,006.3 2,721.6	59,076 8,929
Gary, north elevator, 1906, r. 1935 (n. d.)	47 22 22.860 96 16 10.481	92 02 07.3 174 20 07.6	271 51 43.3 354 19 58.9	Wicklow Gary	4.250478 3.396432	17,802.4 2,491.3	58,407 8,174
Gary, south elevator, 1906, r. 1935 (n. d.)	47 22 12.259 96 16 10.206	93 05 12.0 174 52 31.4	272 54 47.8 354 52 22.5	Wicklow Gary	4.250975 3.449916	17,822.8 2,817.8	58,474 9,245
Lockhart, church spire, 1906, l. 1935 (n. d.)	47 25 30.990 96 32 14.661	161 32 27.2 334 55 28.5	341 30 12.8 154 56 54.0	Beltrami Wicklow	4.080943 3.759338	12,048.8 5,745.6	39,530 18,850
Lockhart, elevator, 1906, r. 1935 (n. d.)	47 26 24.905 96 32 54.522	163 01 12.9 334 32 02.7	342 59 27.8 154 33 57.5	Beltrami Wicklow	4.008952 3.881272	10,208.3 7,608.0	33,492 24,961
Flaming, elevator, 1906, l. 1935 (n. d.)	47 27 32.853 96 16 14.576	1 17 32.6 63 12 19.9	181 17 27.0 243 01 58.5	Gary Wicklow	3.851020 4.297431	7,096.1 19,834.9	23,281 65,075
Rindal, church spire, 1906, r. 1935 (n. d.)[1]	47 27 23.94 96 13 27.71	28 13 26 67 47 53	208 11 18 247 35 29	Gary Wicklow	3.888630 4.359910	7,738.0 22,903.9	25,387 75,144
Fertile, large elevator, 1906, r. 1935 (n. d.)[1]	47 32 12.43 96 16 55.48	59 25 58 87 42 05	239 24 48 267 28 33	Fertile Beltrami	3.362205 4.362880	2,302.5 23,061.1	7,554 75,660
Fertile, small elevator, 1906, r. 1935 (n. d.)[1]	47 32 16.74 96 16 54.23	57 00 31 87 22 28	236 59 21 267 08 54	Fertile Beltrami	3.379294 4.363480	2,394.9 23,093.0	7,857 75,764
Fertile, standpipe, 1906, r. 1935 (n. d.)	47 32 01.816 96 16 44.273	358 16 44.7 69 10 52.1	178 17 00.9 249 09 33.9	Gary Fertile	4.187740 3.375100	15,407.8 2,371.9	50,550 7,782

[1] No check on this position.

Ninety-eighth meridian arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
Beltrami, south elevator (slender top), 1906, r. 1935 (n. d.).	47 32 28.686 96 31 53.258	353 44 22.4 70 57 52.4	173 45 32.2 250 55 22.1	Wicklow Beltrami	4.260376 3.654106	18,212.8 4,509.3	59,753 14,794
Beltrami, north elevator, 1906, l. 1935 (d.)	47 32 34.731 96 31 53.311	353 47 58.2 68 44 54.1	173 49 08.0 248 42 23.8	Wicklow Beltrami	4.264781 3.660157	18,398.4 4,572.5	60,362 15,002
T. 147 N., R. 47 W., sec. 23, southeast corner, 1906, l. 1935 (d. m.).[1]	47 31 40.49 96 36 03.32	269 02 05	89 02 39	Beltrami	2.986005	968.290	3,176.80
Climax, tall elevator, 1906, r. 1935 (n. d.)[1]	47 36 26.90 96 48 54.59	231 31 57 297 14 24	51 41 03 117 24 28	Andover Beltrami	4.293444 4.284091	19,653.7 19,234.9	64,481 63,107
Russia, elevator, 1906, r. 1935 (n. d.)	47 37 31.998 96 33 35.576	11 04 42.9 159 43 28.2	191 03 28.0 339 41 14.6	Beltrami Andover	4.043171 4.036224	11,045.1 10,869.9	36,237 35,662
Melvin, elevator, 1906, r. 1935 (n. d.)	47 37 12.972 96 23 01.050	203 24 31.5 331 32 22.6	23 26 53.8 151 35 42.5	Tilden Fertile	4.004483 4.075070	10,103.8 11,886.9	33,149 38,999
Eldred, southwest low elevator, 1906, r. 1935 (n. d.)[1]	47 40 52.10 96 46 56.21	252 40 47 319 17 46	72 48 26 139 26 23	Andover Beltrami	4.131443 4.350765	13,534.5 22,426.7	44,404 73,578
Eldred, northeast tall elevator, 1906, r. 1935 (n. d.)[1]	47 40 55.84 96 46 47.51	252 55 21 319 50 33	73 02 53 139 59 03	Andover Beltrami	4.124731 4.350184	13,327.0 22,396.7	43,724 73,480
Kittson, elevator, 1906, l. 1935 (n. d.)	47 41 01.211 96 35 35.379	358 43 46.4 161 13 08.4	178 43 59.9 341 12 23.3	Beltrami Andover	4.238178 3.595921	17,305.3 3,943.9	56,776 12,939
T. 149 N., R. 44 W., sec. 19, southeast corner, 1906 (d. m.).[1]	47 42 07.84 96 19 49.34	185 58 48	5 58 49	Tilden	2.217186	164.887	540.97
T. 149 N., R. 46 W., sec. 18, southwest corner, 1906, l. 1935 (d. m.).[1]	47 43 00.55 96 36 35.65	164 19 32	344 19 32	Andover	1.696793	49.75	163.2
Crookston, standpipe, 1906, r. 1935 (n. d.)	47 46 26.971 96 36 36.549	359 57 09.7 150 34 39.8	179 57 09.9 330 31 25.8	Andover Shirley	3.801217 4.044306	6,327.3 11,074.0	20,759 36,332
Crookston, high school cupola, 1906, l. 1935 (n. d.)	47 46 32.235 96 36 12.074	4 26 54.6 147 54 05.1	184 26 36.7 327 50 33.0	Andover Shirley	3.813545 4.049024	6,509.5 11,195.0	21,357 36,729
Crookston, Catholic Church, spire, 1906, r. 1935 (n. d.)	47 46 14.729 96 36 25.035	2 15 35.1 150 27 55.0	182 15 26.8 330 24 32.5	Andover Shirley	3.774796 4.061497	5,953.8 11,521.2	19,533 37,799
Crookston, courthouse dome, 1906, r. 1935 (n. d.)	47 46 43.467 96 36 06.259	5 13 57.0 146 24 14.1	185 13 34.8 326 20 37.7	Andover Shirley	3.836662 4.040175	6,865.3 10,969.2	22,524 35,988
Crookston, brickyard chimney, 1906, l. 1935 (n. d.)	47 45 53.477 96 35 49.103	10 31 42.4 148 58 02.3	190 31 07.5 328 54 13.2	Andover Shirley	3.731055 4.095705	5,383.4 12,465.4	17,662 40,897
Euclid, school belfry, 1906, r. 1935 (n. d.)	47 58 23.822 96 38 26.801	14 08 28.5 126 22 44.1	194 06 36.1 306 18 23.7	Shirley Sherack	4.110142 3.955388	12,886.7 9,023.8	42,279 29,606
Euclid, tall brown elevator, 1906, r. 1935 (n. d.)	47 58 18.767 96 38 14.046	15 27 45.7 126 11 23.8	195 25 43.8 306 06 53.8	Shirley Sherack	4.107323 3.969854	12,803.3 9,329.4	42,005 30,608
Euclid, low red elevator, 1906, r. 1935 (n. d.)	47 58 21.386 96 38 15.590	15 13 44.3 125 54 09.3	195 11 43.6 305 49 40.5	Shirley Sherack	4.109676 3.966420	12,872.9 9,255.9	42,234 30,367
T. 153 N., R. 47 W., sec. 31, southeast corner, 1906 (d. m.).[1]	48 01 16.26 96 44 16.68	145 06 05	325 06 04	Sherack	1.421851	26.415	86.66
Sherack, tall elevator, 1906, r. 1935 (n. d.)	48 01 17.298 96 47 00.496	270 09 33.3 337 07 49.4	90 11 34.5 157 12 18.3	Sherack Shirley	3.528827 4.287198	3,379.3 19,373.0	11,087 63,560
Sherack, low elevator, 1906, r. 1935 (n. d.)[1]	48 01 09.97 96 46 59.76	256 32 09 266 18 32	76 45 48 86 20 33	Bray Sherack	4.369945 3.527784	23,439.3 3,371.2	76,900 11,060
B. M. D 6, 1906, l. 1935 (d. m.)[1]	48 01 15.91 96 44 27.46	261 05 18	81 05 25	Sherack	2.323520	210.630	691.04
Tabor, west church spire, 1906, r. 1935 (n. d.)[1]	48 04 43.75 96 52 10.59	211 53 16 303 02 45	31 59 20 123 08 37	Warren Sherack	4.280460 4.068076	19,074.8 11,697.0	62,581 38,376
Tabor, east church spire, 1906, r. 1935 (n. d.)[1]	48 04 43.70 96 51 36.00	210 01 50 305 03 41	30 07 28 125 09 07	Warren Sherack	4.272022 4.045438	18,707.8 11,102.9	61,377 36,427
Angus, tall elevator (low top), 1906, r. 1935 (n. d.)	48 04 46.068 96 42 03.800	23 12 21.6 171 21 50.4	203 10 42.3 351 20 22.0	Sherack Warren	3.846727 4.212211	7,026.3 16,300.9	23,052 53,481
Angus, tall elevator (tall top), 1906, r. 1935 (n. d.)	48 04 51.259 96 42 06.755	22 14 55.3 171 29 33.7	202 13 18.2 351 28 07.5	Sherack Warren	3.854341 4.207722	7,150.6 16,133.3	23,460 52,931
Brush Farm Elevator, 1906, r. 1935 (n. d.)	48 05 42.958 96 44 25.217	181 52 45.9 358 52 20.3	1 53 02.9 178 52 26.2	Warren Sherack	4.157342 3.914726	14,366.2 8,217.2	47,133 26.959
Lone elevator (3 miles north of Angus), 1906, r. 1935 (n. d.).	48 07 06.195 96 42 23.731	12 19 11.5 170 11 56.8	192 17 46.9 350 10 43.2	Sherack Warren	4.042981 4.077821	11,040.3 11,962.5	36,221 39,247

[1] No check on this position.

Ninety-eighth meridian arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
Roon, elevator, 1906, r. 1935 (n. d.)	48 09 01.938	184 50 24.9	4 50 50.0	Warren	3.916034	8,242.0	27,041
	96 44 36.084	236 35 34.2	56 46 57.0	Viking	4.354587	22,624.9	74,229
Warren, standpipe, 1906, r. 1935 (n. d.)	48 12 00.080	228 06 30.9	48 08 20.1	Warren	3.608548	4,060.2	13,321
	96 46 28.829	251 49 39.8	72 02 26.9	Viking	4.348804	22,325.6	73,247
Warren, courthouse tower, 1906, r. 1935 (n. d.)	48 11 43.733	218 21 48.7	38 23 20.6	Warren	3.612922	4,101.3	13,456
	96 46 05.718	250 11 53.3	70 24 23.1	Viking	4.343184	22,038.6	72,305
Warren, school cupola, 1906, r. 1935 (n. d.)	48 11 51.078	220 13 29.8	40 15 01.1	Warren	3.592696	3,914.7	12,843
	96 46 04.874	250 44 24.6	70 56 53.8	Viking	4.341362	21,946.3	72,002
T. 155 N., R. 47 W., sec. 19, southeast corner, 1906, l. 1935 (d. m.).[1]	48 13 27.32	267 45 32	87 45 47	Warren	2.608563	406.035	1,332.13
	96 44 22.05						
Radium, low east elevator, 1906, r. 1935 (n. d.)	48 13 40.376	87 36 00.6	267 30 32.7	Warren	3.958279	9,084.0	29,803
	96 36 42.655	247 12 37.5	67 18 07.5	Viking	3.995416	9,895.0	32,464
Radium, tall elevator, 1906, r. 1935 (n. d.)	48 13 40.035	87 39 28.2	267 34 01.5	Warren	3.956685	9,050.8	29,694
	96 36 44.247	247 13 38.7	67 19 09.9	Viking	3.996921	9,929.4	32,577
Radium, west elevator (large top), 1906, r. 1935 (n. d.)	48 13 39.350	87 46 28.5	267 41 04.2	Warren	3.953427	8,983.1	29,472
	96 36 47.487	247 15 47.8	67 21 21.4	Viking	3.999967	9,999.2	32,806
Viking, west elevator (slender top), 1906, r. 1935 (n. d.)	48 13 01.458	18 02 21.1	197 59 07.1	Bray	4.240973	17,417.0	57,142
	96 24 18.167	128 54 44.0	308 50 58.6	Viking	3.903602	8,009.4	26,278
Viking, east elevator (large top), 1906, r. 1935 (n. d.)	48 13 00.479	18 19 23.6	198 16 06.6	Bray	4.240883	17,413.4	57,130
	96 24 14.260	128 43 16.1	308 39 27.7	Viking	3.908015	8,091.2	26,546
Viking, low elevator, 1906, (n. d.)	48 13 01.066	18 09 18.3	198 06 03.1	Bray	4.240941	17,415.7	57,138
	96 24 16.570	128 49 55.8	308 46 09.2	Viking	3.905402	8,042.7	26,387
Woodward Farm Elevator, 1906 (n. d.) [1]	48 13 27.44	183 55 08	3 55 49	Argyle	4.210629	16,241.6	53,286
	96 49 59.56	269 52 14	89 56 40	Warren	3.867579	7,371.9	24,186
Luna, elevator, 1906, r. 1935 (n. d.)	48 15 15.369	172 00 27.1	351 59 21.5	Argyle	4.113827	12,996.5	42,639
	96 47 37.819	306 44 48.4	126 47 29.1	Warren	3.744224	5,549.1	18,206
Argyle, electric-light plant, smokestack, 1906, l. 1935 (n. d.).	48 19 56.554	178 06 58.8	358 06 53.8	Argyle	3.621909	4,187.1	13,737
	96 48 58.933	332 58 58.4	153 02 39.7	Warren	4.129495	13,474.0	44,206
Argyle, tallest elevator, 1906, r. 1935 (n. d.)	48 20 00.312	179 27 39.2	359 27 37.8	Argyle	3.609477	4,068.9	13,349
	96 49 03.760	332 49 52.1	152 53 37.0	Warren	4.134259	13,622.6	44,693
Argyle, tallest church spire, 1906, r. 1935 (n. d.)	48 20 01.528	187 19 55.7	7 20 14.5	Argyle	3.609000	4,064.4	13,335
	96 49 30.824	330 51 16.1	150 55 21.2	Warren	4.143600	13,918.7	45,665
B. M. O 6, 1906, r. 1935 (d. m.)[1]	48 22 24.70	0 26 38	180 26 38	Argyle	2.592288	391.100	1,283.13
	96 49 05.47						
Stephen, low church spire, 1906, r. 1935 (n. d.)	48 26 58.134	244 35 40.1	64 36 38.8	Stephen west base	3.251032	1,782.5	5,848
	96 52 39.080	333 33 42.4	153 36 22.0	Argyle	3.994202	9,867.4	32,373
Stephen, tall church spire, 1906, r. 1935 (n. d.)	48 27 03.373	249 41 15.7	69 42 15.0	Stephen west base	3.239758	1,736.8	5,698
	96 52 39.990	333 52 40.1	153 55 20.4	Argyle	4.000900	10,020.7	32,876
Stephen, school cupola, 1906, l. 1935 (n. d.)	48 27 00.639	247 57 35.4	67 58 37.2	Stephen west base	3.262874	1,831.8	6,010
	96 52 43.353	252 25 01.9	72 31 25.7	Stephen east base	4.043243	11,047.0	36,243
Stephen west base longitude station, 1907, r. 1908 (d. m.).[1]	48 27 22.92	82 56 52	262 56 52	Stephen west base	0.989895	9.77	32.1
	96 51 20.24						
B. M. T 6, 1906 (d. m.) [1]	48 27 22.03	226 30 28	46 30 29	Stephen west base	1.584444	38.410	126.02
	96 51 22.07						
Church spire (8 miles northwest of station Wright), 1906, r. 1935 (n. d.).	48 29 07.482	313 23 25.7	133 29 27.9	Wright	4.136731	13,700.3	44,948
	96 40 19.794	82 55 09.1	262 52 16.4	Stephen east base	3.679054	4,775.9	15,669
Church spire (5 miles northeast of station Stephen west base), 1906, r. 1935 (n. d.).	48 31 19.087	317 31 25.0	137 34 00.4	Stephen east base	3.800052	6,310.3	20,703
	96 47 38.067	107 34 53.8	287 30 23.4	Donaldson	3.890010	7,762.6	25,468
T. 158 N., R. 48 W., sec. 6, northeast corner, 1906, l. 1935 (d. m.).[1]	48 32 35.61	86 06 32	266 06 19	Donaldson	2.542701	348.90	1,144.7
	96 53 21.87						
Donaldson, church spire, 1906, l. 1935 (n. d.) [1]	48 34 20.72	311 26 51	131 33 55	Stephen east base	4.190089	15,491.3	50,824
	96 53 35.98	347 50 49	167 52 30	Stephen west base	4.120624	13,201.5	43,312
Donaldson, tall elevator, 1906, r. 1935 (n. d.)	48 34 25.847	311 12 40.7	131 19 54.5	Stephen east base	4.198763	15,803.9	51,850
	96 53 49.485	356 21 28.5	176 21 36.5	Donaldson	3.536032	3,435.8	11,272
Kennedy, school cupola, 1907, r. 1935 (n. d.)	48 38 21.448	354 33 42.5	174 34 19.8	Donaldson	4.031602	10,754.8	35,285
	96 54 28.536	131 10 58.5	311 05 57.8	Skane	4.036499	10,876.7	35,685
Kennedy, church spire, 1907, r. 1935 (n. d.)	48 38 20.762	233 00 09.7	53 07 01.9	Jupiter	4.137021	13,709.5	44,979
	96 54 25.524	354 52 46.4	174 53 21.4	Donaldson	4.030520	10,728.0	35,197
Church spire (7 miles northwest of station Deer), 1907, r. 1935 (n. d.).	48 39 35.752	164 07 32.0	344 06 30.1	Jupiter	3.789404	6,157.5	20,202
	96 44 07.503	321 57 43.3	142 02 04.9	Deer	4.064494	11,601.0	38,061

[1] No check on this position.

Ninety-eighth meridian arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
Church spire (9 miles northwest of station Deer), 1907, r. 1935 (n. d.).	48 39 33.183 96 46 46.535	194 37 45.0 311 00 51.9	14 38 42.6 131 07 12.9	Jupiter Deer	3.792634 4.139687	6,203.5 13,793.9	20,353 45,255
Church spire (3 miles south of station Skane), 1907, r. 1935 (n. d.).[1]	48 39 36.57 97 02 08.28	194 05 44 321 14 41	14 06 29 141 21 04	Skane Donaldson	3.697735 4.222519	4,985.8 16,692.4	16,358 54,765
T. 160 N., R. 49 W., sec. 8, northwest corner, 1907, l. 1935 (d. m.).[1]	48 42 13.82 97 01 09.51	330 07	150 07	Skane	1.402175	25.245	82.82
Halma, elevator, 1907, r. 1935 (n. d.) [1]	48 39 39.71 96 35 52.83	17 53 37 116 13 37	197 51 48 296 06 24	Deer Jupiter	3.988333 4.118939	9,734.9 13,150.4	31,939 43,144
Chatham, elevator, 1907, r. 1935 (n. d.) [1]	48 42 51.39 96 55 20.82	270 30 41 305 51 56	90 38 05 126 04 43	Jupiter Deer	4.082087 4.412480	12,080.6 25,851.2	39,634 84,813
Hallock, tall church spire, 1907, r. 1935 (n. d.)	48 46 22.532 96 56 36.321	35 53 23.1 200 21 33.7	215 49 58.2 20 22 08.9	Skane Hallock	3.978038 3.438379	9,506.9 2,744.0	31,191 9,003
Hallock, courthouse tower, 1907, r. 1935 (n. d.)	48 46 19.268 96 56 24.030	37 27 45.4 194 44 58.4	217 24 11.3 14 45 24.4	Skane Hallock	3.981181 3.441604	9,575.9 2,764.4	31,417 9,070
Hallock, standpipe, 1907, r. 1935 (n. d.)	48 46 12.957 96 56 28.198	37 46 25.6 195 22 40.5	217 42 54.6 15 23 09.6	Skane Hallock	3.971719 3.473458	9,369.6 2,974.8	30,740 9,760
Church spire (6 miles east-southeast of station Hallock), 1907, r. 1935 (n. d.).	48 45 37.721 96 49 16.548	318 36 24.9 116 17 26.3	138 39 15.3 296 12 30.7	Jupiter Hallock	3.845553 3.951633	7,007.3 8,946.1	22,990 29,351
Church spire (4 miles east of station Hallock), 1907, r. 1935 (n. d.).	48 48 13.885 96 50 17.992	82 43 49.2 186 37 57.5	262 39 39.7 6 38 32.1	Hallock Granville	3.833880 3.909675	6,821.5 8,122.2	22,380 26,648
Lancaster, tall elevator, 1907, r. 1935 (n. d.)	48 51 33.084 96 48 04.936	53 30 54.1 137 11 56.4	233 25 04.4 317 10 51.8	Hallock Granville	4.071646 3.416569	11,793.6 2,609.6	38,693 8,562
Lancaster, school cupola, 1907, l. 1935 (n. d.) [1]	48 51 21.42 96 48 10.72	348 17 57 143 57 44	168 19 58 323 56 43	Jupiter Granville	4.209826 3.449252	16,211.6 2,813.5	53,188 9,231
Northcote, tall elevator, 1907, l. 1935 (n. d.)	48 50 33.684 96 59 55.728	315 53 36.2 93 35 36.0	135 56 41.5 273 30 16.8	Hallock Hill	3.858471 3.937622	7,218.9 8,662.1	23,684 28,419
Northcote, church spire, 1907, r. 1935 (n. d.)	48 50 46.220 96 59 58.108	255 10 35.0 317 40 39.8	75 18 26.6 137 43 47.0	Granville Hallock	4.120508 3.877049	13,198.0 7,534.4	43,300 24,719
Joliette, tall church spire (N. Dak.), 1907 (n. d.)	48 49 04.473 97 13 33.090	247 38 48.5 257 21 56.4	67 43 44.6 77 40 01.5	Hill Granville	3.938074 4.478476	8,671.1 30,093.7	28,448 98,732
Joliette, tall elevator (N. Dak.), 1907 (n. d.)	48 49 14.842 97 13 38.775	249 53 50.0 258 00 25.0	69 58 50.4 78 18 34.3	Hill Granville	3.937680 4.479125	8,663.2 30,138.7	28,423 98,880
Northern Pacific Railway, tall elevator (N. Dak.), 1907 (n. d.).	48 52 30.414 97 13 41.795	269 34 12.5 290 29 36.6	89 52 24.7 110 34 39.4	Granville Hill	4.470458 3.942049	29,543.2 8,750.8	96,926 28,710
Humboldt, church spire, 1907, r. 1935 (n. d.)	48 55 17.156 97 05 41.641	10 57 48.8 164 45 44.0	190 56 50.1 344 44 15.4	Hill States	3.922887 3.959169	8,373.1 9,102.7	27,471 29,864
Humboldt, school cupola, 1907, r. 1935 (n. d.)	48 55 24.707 97 05 33.952	284 52 26.7 11 41 26.2	105 04 31.6 191 40 21.5	Granville Hill	4.307103 3.936141	20,281.6 8,632.6	66,541 28,322
Orleans, school cupola, 1907, r. 1935 (n. d.)	48 55 32.305 96 55 57.514	57 17 14.3 120 17 22.0	237 08 55.5 300 08 32.8	Hill States	4.205390 4.218026	16,046.9 16,520.6	52,647 54,201
Grampian, lone elevator, 1907, r. 1935 (n. d.)	48 57 43.465 97 03 27.410	251 09 10.7 18 46 12.4	71 16 54.1 198 43 32.4	Canada Hill	4.120313 4.128854	13,192.1 13,454.1	43,281 44,141
Pembina, square open tower (N. Dak.), 1907 (n. d.)	48 58 02.793 97 14 51.672	247 19 10.8 324 10 33.1	67 24 37.0 144 16 28.8	States Hill	3.978820 4.215872	9,524.0 16,438.9	31,247 53,933
St. Vincent Junction, elevator, 1907, r. 1935 (n. d.)	48 58 03.212 97 11 58.920	235 17 18.1 335 26 21.6	55 20 34.0 155 30 07.1	States Hill	3.807432 4.166566	6,418.5 14,674.6	21,058 48,145
St. Vincent, bell tower, 1907 (n. d.)	48 58 04.898 97 14 39.279	247 05 32.4 325 01 42.0	67 10 49.3 145 07 28.3	States Hill	3.966912 4.213409	9,266.4 16,345.6	30,402 53,627
St. Vincent, tower (round top), 1907 (n. d.)	48 58 10.445 97 14 37.136	247 58 26.7 325 29 42.0	68 03 41.9 145 35 26.7	States Hill	3.961927 4.216479	9,160.7 16,461.9	30,055 54,009
Emerson, tall church spire (Canada), 1907 (n. d.)	49 00 22.699 97 12 40.713	276 05 09.9 338 30 27.7	96 08 57.4 158 34 44.7	States Hill	3.789608 4.278163	6,160.4 18,974.2	20,211 62,251
Emerson, tower (flat top) (Canada), 1907 (n. d.)	49 00 20.506 97 12 49.474	275 18 12.8 337 55 50.9	95 22 06.9 158 00 14.5	States Hill	3.801459 4.278234	6,330.8 18,977.3	20,770 62,261
United States—Canada Boundary Monument No. 848, 1907, r. 1935 (d. m.).[1]	49 00 00.966 96 53 11.940	90 03 23.4	270 03 22.5	Canada	1.4029488	25.29	83.0
United States—Canada Boundary Monument No. 837, 1907, r. 1935 (d. m.).[1]	49 00 01.459 97 07 44.739	270 12 01.7	90 12 05.8	States	2.0401274	109.68	359.8
D. L. S. No. 44 (G. S. of C.) (Canada), 1925 (d. m.)	49 07 07.21 97 16 47.59	267 28 29.4	87 28 35.0	Letellier (G. S. of C.)	2.1784630	150.82	494.7
Letellier, elevator (G. S. of C.) (Canada), 1925 (d.)	49 08 06.67 97 18 12.82	314 14 25.3 357 31 11.6	134 15 35.4 177 31 42.3	Letellier (G. S. of C.) Pembina (G. S. of C.)	3.4187464 4.2804016	2,622.69 19,072.24	8,604.6 62,572.7

[1] No check on this position.

International Boundary triangulation and traverse

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance: Logarithm (meters)	Distance: Meters	Distance: Feet
Principal points	° ′ ″	° ′ ″	° ′ ″				
Tolstoi (G.S. of C.) (Canada), 1924 (d. m.)	49 04 25.533 96 48 30.513	90 15 43.1	270 07 49.2	Ridgeville (G.S. of C.)	4.1048353	12,730.20	41,765.7
Stuartburn (G.S. of C.) (Canada), 1924 (d. m.)	49 04 24.733 96 42 35.875	90 14 02.0	270 09 34.0	Tolstoi (G.S. of C.)	3.8572010	7,197.82	23,614.8
Vita (G.S. of C.) (Canada), 1924 (d. m.)	49 08 02.525 96 37 50.059	40 46 50.7	220 43 14.6	Stuartburn (G.S. of C.)	3.9484770	8,881.31	29,138.1
Read (G.S. of C.) (Canada), 1924 (d. m.)	49 08 00.821 96 32 17.113	90 28 54.4	270 24 42.6	Vita (G.S. of C.)	3.8292762	6,749.57	22,144.2
Ingram (G.S. of C.) (Canada), 1924 (d. m.)	49 08 01.032 96 29 30.529	89 54 25.3	269 52 19.3	Read (G.S. of C.)	3.5285237	3,376.94	11,079.2
Caliento (G.S. of C.) (Canada), 1924 (d. m.)	49 08 03.180 96 24 39.081	89 23 13.9	269 19 33.5	Ingram (G.S. of C.)	3.7714766	5,908.49	19,384.8
Menisino (G.S. of C.) (Canada), 1924 (d. m.)	49 05 06.889 96 08 24.433	105 30 19.8	285 18 03.0	Caliento (G.S. of C.)	4.3118334	20,503.76	67,269.4
Piney (G.S. of C.) (Canada), 1924 (d. m.)	49 04 43.539 96 05 30.460	101 33 56.4 104 56 52.9	281 31 44.9 284 42 24.6	Menisino (G.S. of C.) Caliento (G.S. of C.)	3.5567049 4.3820120	3,603.34 24,099.72	11,822.0 79,067.2
Fast (G.S. of C.) (Canada), 1924 (d. m.)	49 04 28.703 96 01 46.960	95 47 35.6	275 44 46.7	Piney (G.S. of C.)	3.6588706	4,559.01	14,957.4
McQuade (G.S. of C.) (Canada), 1924 (d. m.)	49 04 29.578 95 58 32.922	89 37 37.2	269 35 10.6	Fast (G.S. of C.)	3.5953017	3,938.24	12,920.7
Slow (G.S. of C.) (Canada), 1924 (d. m.)	49 03 34.010 95 54 41.916	110 07 51.5	290 04 57.0	McQuade (G.S. of C.)	3.6984032	4,993.48	16,382.8
Guilbault (G.S. of C.) (Canada), 1924 (d. m.)	49 02 48.698 95 53 12.432	103 23 56.6 115 37 35.9 127 37 13.9	283 14 39.1 295 33 33.8 307 36 06.3	Piney (G.S. of C.) McQuade (G.S. of C.) Slow (G.S. of C.)	4.1874269 3.8581882 3.3605173	15,396.67 7,214.20 2,293.60	50,513.9 23,668.6 7,524.9
South Junction (G.S. of C.) (Canada), 1924 (d. m.)	49 02 24.616 95 45 45.244	94 43 47.7	274 38 10.0	Guilbault (G.S. of C.)	3.9596189	9,112.11	29,895.3
Swamp (G.S. of C.) (Canada), 1924 (d. m.)	49 01 59.995 95 44 11.458	111 46 32.0	291 45 21.2	South Junction (G.S. of C.)	3.3119933	2,051.13	6,729.4
Tod (G.S. of C.) (Canada), 1924 (d. m.)	49 02 13.393 95 42 07.079	80 42 31.6	260 40 57.7	Swamp (G.S. of C.)	3.4082475	2,560.04	8,399.1
Soft (G.S. of C.) (Canada), 1924 (d. m.)	49 02 35.667 95 41 07.054	60 33 53.8	240 33 08.4	Tod (G.S. of C.)	3.1460958	1,399.90	4,592.8
Sprague (G.S. of C.) (Canada), 1924 (d. m.)	49 02 08.789 95 39 05.579	108 36 47.5	288 35 15.8	Soft (G.S. of C.)	3.4154971	2,603.14	8,540.5
Rita (G.S. of C.) (Canada), 1924 (d. m.)	49 01 46.898 95 34 23.969	96 46 18.7	276 42 46.1	Sprague (G.S. of C.)	3.7604323	5,760.13	18,898.0
Middleboro (G.S. of C.) (Canada), 1924 (d. m.)	49 01 07.731 95 26 24.160	97 07 32.5	277 01 30.3	Rita (G.S. of C.)	3.9922321	9,822.73	32,226.7
Muskeg (G.S. of C.) (Canada), 1924 (d. m.)	49 00 51.877 95 23 06.647	96 58 42.3	276 56 13.2	Middleboro (G.S. of C.)	3.6067169	4,043.12	13,264.8
Warroad north base (I. B. C.) (Boundary Monument 909 (I. B. C.)) (Minn.–Canada), 1912, r. 1934 (d. m.).	48 59 56.463 95 22 30.377	156 42 25.1 338 11 33	336 41 57.7	Muskeg (G. S. of C.) Azimuth mark.	3.2703966	1,863.79	6,114.8
Warroad south base (I. B. C.), 1912, r. 1934 (d. m.)	48 55 19.862 95 19 33.829	157 13 15.71 157 06 52	337 11 02.55	Warroad north base (I. B. C.) (Boundary Monument 909 (I. B. C.)). Azimuth mark.	3.9670168	9,268.657	30,408.92
Thunder (I. B. C.) (Canada), 1917, r. 1934 (d. m.)	49 00 29.631 95 14 46.326	31 27 35.65 83 50 54.94	211 23 58.78 263 45 04.70	Warroad south base (I. B. C.) Warroad north base (I. B. C.) (Boundary Monument 909 (I. B. C.)).	4.0497845 3.9771370	11,214.62 9,487.18	36,793.3 31,125.9
West Willow (I. B. C.), 1917 (d. m.)	48 53 44.637 95 09 35.166	103 37 43.55 126 08 34.18 153 11 31.40	283 30 12.36 305 58 49.59 333 07 36.74	Warroad south base (I. B. C.) Warroad north base (I. B. C.) (Boundary Monument 909 (I. B. C.)). Thunder (I. B. C.)	4.0983175 4.2903148 4.1467910	12,540.58 19,512.59 14,021.39	41,143.6 64,017.6 46,001.8
Stoney (I. B. C.), 1913, r. 1917 (d. m.)	49 09 03.604 95 07 56.980	4 01 47.04 27 39 41.26 46 27 16.55	184 00 32.91 207 34 31.95 226 16 16.64	West Willow (I. B. C.) Thunder (I. B. C.) Warroad north base (I. B. C.) (Boundary Monument 909 (I. B. C.)).	4.4542114 4.2533258 4.3890398	28,458.46 17,919.50 24,492.88	93,367.5 58,790.9 80,357.1
Miller (I. B. C.), 1917, r. 1921 (d. m.)	48 58 22.277 94 57 25.663	95 35 25.16 100 38 35.12 147 10 02.02	275 16 29.78 280 25 29.83 327 02 05.11	Warroad north base (I. B. C.) (Boundary Monument 909 (I. B. C.)). Thunder (I. B. C.) Stoney (I. B. C.)	4.4875860 4.3328291 4.3728362	30,731.66 21,519.35 23,595.88	100,825.5 70,601.4 77,414.1

International Boundary triangulation and traverse—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″	° ′ ″	° ′ ″				
Garden (I. B. C.), 1913, r. 1917 (d. m.)	49 11 09.213 94 52 46.906	13 27 30.55 78 12 34.23	193 23 59.92 258 01 05.64	Miller (I. B. C.) Stoney (I. B. C.)	4.3866454 4.2750760	24,358.21 18,839.79	79,915.2 61,810.2
Big (I. B C.) (Canada), 1913, r. 1921 (d. m.)	49 04 50.694 94 43 16.479	55 16 09.49 104 44 31.37 135 22 46.03	235 05 28.34 284 25 52.06 315 15 34.65	Miller (I. B. C.) Stoney (I. B. C.) Garden (I. B. C.)	4.3225060 4.4916828 4.2160444	21,013.87 31,022.93 16,445.40	68,943.0 101,781.1 53,954.6
Reference Monument 48 (I. B. C.), 1917 (d. m.)	48 52 35.786 94 41 37.713	119 06 53.65 174 57 17.21	298 54 59.04 354 56 02.70	Miller (I. B. C.) Big (I. B. C.)	4.3437407 4.3577645	22,066.87 22,791.06	72,397.7 74,773.7
Burton (I. B. C.) (Canada), 1913, r. 1921 (d. m.)	48 56 58.739 94 36 56.709	35 11 22.71 96 01 20.25 152 08 50.99	215 07 50.91 275 45 53.29 332 04 04.31	Reference Monument 48 (I. B. C.) Miller (I. B. C.) Big (I. B. C.)	3.9972016 4.4002290 4.2173732	9,935.77 25,132.11 16,495.79	32,597.6 82,454.3 54,119.9
War, 1923 (d. m.)	48 55 00.958 95 19 22.558	158 32 56.0	338 32 47.5	Warroad south base (I. B. C.)	2.7975608	627.42	2,058.5
Road, 1923 (d. m.)	48 53 41.891 95 18 46.629	163 19 38.4	343 19 11.3	War	3.4064905	2,549.71	8,365.2
Red, 1923 (d. m.)	48 52 34.156 95 16 37.123	128 25 47.5	308 24 09.9	Road	3.5272905	3,367.37	11,047.8
Full, 1923 (d. m.)	48 49 45.025 95 09 41.831	121 43 21.7	301 38 09.0	Red	3.9977564	9,948.47	32,639.3
Dout, 1923 (d. m.)	48 47 52.030 95 05 06.878	121 55 12.8	301 51 45.9	Full	3.8199956	6,606.87	21,676.0
Wet, eccentric, 1923 (d.)	48 47 18.465 95 02 42.422	109 23 24.0	289 21 35.3	Dout	3.4949024	3,125.38	10,253.9
Wet, 1923 (d. m.)	48 47 18.370 95 02 42.475	200 20 33	20 20 33	Wet, eccentric	0.49610	3.134	10.28
May, 1923 (d. m.)	48 46 33.237 94 59 23.415	108 59 54.3	288 57 24.6	Wet, eccentric	3.6330823	4,296.18	14,095.1
Spur, 1923 (d. m.)	48 45 24.821 94 54 29.592	109 26 03.6	289 22 22.6	May	3.8035587	6,361.49	20,871.0
Hen, eccentric, 1923 (d.)	48 44 35.504 94 50 55.848	109 15 23.2	289 12 42.5	Spur	3.6650570	4,624.42	15,172.0
Hen, 1923 (d. m.)	48 44 35.797 94 50 55.715	16 45 08	196 45 08	Hen, eccentric	0.97511	9.443	30.98
Ton, 1923 (d. m.)	48 43 43.516 94 47 10.364	109 14 21.8	289 11 32.3	Hen, eccentric	3.6883536	4,879.26	16,008.0
Bon, 1923 (d. m.)	48 43 09.102 94 44 41.775	109 18 28.6	289 16 37.0	Ton	3.5075296	3,217.58	10,556.3
Brush, 1923 (d. m.)	48 42 38.478 94 42 31.792	109 36 38.1	289 35 00.4	Bon	3.4503205	2,820.46	9,253.5
Baudette, 1923, r. 1935 (d. m.)	48 42 56.562 94 36 03.139	86 01 07.3	265 56 15.3	Brush	3.9011687	7,964.69	26,130.8
Toad (Canada), 1923, r. 1925 (d. m.)	48 43 22.032 94 35 03.519	57 09 35.9	237 08 51.1	Baudette	3.1615313	1,450.55	4,759.0
Gip (Canada), 1923 (d. m.)	48 43 22.040 94 31 54.173	90 00 58.5	269 58 36.2	Toad	3.5877098	3,869.99	12,696.8
Fritz (Canada), 1923 (d. m.)	48 43 22.071 94 30 33.578	89 58 28.8	269 57 28.2	Gip	3.2167622	1,647.26	5,404.4
Ray (Canada), 1923 (d. m.)	48 43 22.544 94 27 02.140	89 49 42.3	269 47 03.4	Fritz	3.6356386	4,321.54	14,178.3
Henri (Canada), 1923 (d. m.)	48 43 22.052 94 21 01.832	90 09 20.6	270 04 49.8	Ray	3.8671271	7,364.23	24,160.8
Reddy (Canada), 1923, r. 1925 (d. m.)	48 43 06.472 94 19 46.004	107 15 28.2	287 14 31.2	Henri	3.2102889	1,622.89	5,324.4
Myrtle (Canada), 1923, r. 1925 (d. m.)	48 42 17.954 94 15 46.644	107 03 14.1	287 00 14.3	Reddy	3.7090719	5,117.67	16,790.2
Delf (Canada), 1923, r. 1925 (d. m.)	48 41 23.778 94 11 19.709	107 04 20.7	287 01 00.2	Myrtle	3.7565833	5,709.31	18,731.3
Pipp (Canada), 1923 (d. m.)	48 40 01.278 94 04 40.565	107 22 30.8	287 17 31.0	Delf	3.9321494	8,553.61	28,063.0
Grace (Canada), 1923 (d. m.)	48 39 10.856 94 00 36.335	107 20 02.8	287 16 59.4	Pipp	3.7189174	5,235.01	17,175.2

International Boundary triangulation and traverse—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″	° ′ ″	° ′ ″				
Zip (Canada), 1923 (d. m.)	48 38 31.543 93 57 27.968	107 30 06.0	287 27 44.6	Grace	3.6066428	4,042.43	13,262.5
Rip (Canada), 1923 (d. m.)	48 38 24.282 93 56 06.995	97 42 50.5	277 41 49.7	Zip	3.2234385	1,672.78	5,488.1
Pat (Canada), 1923 (d. m.)	48 38 26.084 93 54 42.193	88 10 21.0	268 09 17.4	Rip	3.2397901	1,736.96	5,698.7
Rub (Canada), 1923 (d. m.)	48 38 12.139 93 53 17.314	103 55 52.9	283 54 49.2	Pat	3.2529300	1,790.32	5,873.7
Jesse (Canada), 1923 (d. m.)	48 38 04.492 93 52 35.272	105 20 58.1	285 20 26.5	Rub	2.9506480	892.58	2,928.4
Walt (Canada), 1923, r. 1925 (d. m.)	48 38 03.611 93 51 39.541	91 22 19.5	271 21 37.7	Jesse	3.0574338	1,141.39	3,744.7
Pine (Canada), 1923, r. 1925 (d. m.)	48 37 17.725 93 49 10.620	114 56 40.7	294 54 48.9	Walt	3.5266987	3,362.78	11,032.7
LaBelle (Canada), 1923 (d. m.)	48 37 05.975 93 44 57.066	94 01 28.6	273 58 18.3	Pine	3.7164656	5,205.54	17,078.5
Stone (Canada), 1923 (d. m.)	48 37 02.392 93 43 40.159	94 01 37.8	274 00 40.1	LaBelle	3.1983866	1,579.02	5,180.5
States (Canada), 1923 (d. m.)	48 36 51.412 93 39 55.679	94 14 32.1	274 11 43.7	Stone	3.6637293	4,610.30	15,125.6
Rob (Canada), 1923 (d. m.)	48 36 51.405 93 34 09.892	90 02 16.1	269 57 56.7	States	3.8501950	7,082.64	23,237.0
Pig (Canada), 1923 (d. m.)	48 36 50.863 93 32 33.546	90 29 43.5	270 28 31.2	Rob	3.2952370	1,973.50	6,474.7
Fort Frances west base eccentric (Canada), 1923 (d. m.)	48 36 51.050 93 31 16.116	89 47 56.4	269 46 58.3	Pig	3.2002947	1,585.97	5,203.3
Fort (Canada), 1923, r. 1925 (d. m.)	48 36 50.048 93 23 30.514	90 14 04.6	270 08 15.3	Fort Frances west base eccentric	3.9794051	9,536.85	31,288.8
Zero (Canada), 1923 (d. m.)	48 38 10.084 93 21 28.229	45 22 48.8	225 21 17.0	Fort	3.5464150	3,518.97	11,545.2
Lake, 1923, r. 1925 (d. m.)	48 37 39.667 93 15 04.983	96 52 03.6	276 47 16.0	Zero	3.8978033	7,903.21	25,929.1
Rainy Lake 14 (I. B. C.) (Raney) (Canada), 1913, r. 1925 (d. m.).	48 37 56.945 93 11 10.843	83 40 20.0	263 37 24.3	Lake	3.6834003	4,823.92	15,826.5
Rainy Lake 37 (I. B. C.) (Water) (Canada), 1913, r. 1925 (d. m.).	48 37 26.510 93 10 55.547	161 34 30.2	341 34 18.7	Rainy Lake 14 (I. B. C.) (Raney)	2.9960350	990.91	3,251.0
Roll (Canada), 1923, r. 1925 (d. m.)	48 37 43.525 93 05 48.589	85 15 08.4	265 11 18.0	Rainy Lake 37 (I. B. C.) (Water)	3.7998743	6,307.75	20,694.7
Sea (Canada), 1923, r. 1925 (d. m.)	48 36 32.507 92 56 25.469	100 49 42.0	280 42 39.5	Roll	4.0696650	11,739.92	38,516.7
Breaul, 1923, r. 1925 (d. m.)	48 35 33.380 92 53 51.609	120 06 12.7	300 04 17.3	Sea	3.5614793	3,643.17	11,952.6
Manitou (Canada), 1923, r. 1925 (d. m.)	48 34 39.081 92 48 57.957	105 36 12.2	285 32 32.0	Breaul	3.7957127	6,247.59	20,497.3
Boundary (I. B. C.) (Late) (Canada), 1914, r. 1925 (d. m.).	48 32 47.611 92 43 17.771	116 18 30.7	296 14 15.7	Manitou	3.8909056	7,778.68	25,520.6
Joy (Canada), 1923, r. 1925 (d. m.)	48 32 36.213 92 37 53.102	93 03 36.6	272 59 33.2	Boundary (I. B. C.) (Late)	3.8240260	6,668.47	21,878.1
Dog (Canada), 1923, r. 1925 (d. m.)	48 30 37.369 92 37 33.044	173 36 19.7	353 36 04.7	Joy	3.5674921	3,693.96	12,119.3
Bell (Canada), 1923 (d. m.)	48 29 58.358 92 37 44.722	191 14 57.4	11 15 06.1	Dog	3.0894172	1,228.62	4,030.9
Knox (Canada), 1923 (d. m.)	48 29 36.547 92 38 04.322	210 50 48.1	30 51 02.8	Bell	2.8947281	784.74	2,574.6
Nix (Canada), 1923 (d. m.)	48 29 41.675 92 38 32.562	285 16 32.6	105 16 53.8	Knox	2.7789128	601.05	1,971.9
Bat, 1923, r. 1925 (d. m.)	48 29 56.157 92 39 33.659	289 37 19.3	109 38 05.0	Nix	3.1244037	1,331.69	4,369.1
Doran (Canada), 1923, r. 1925 (d. m.)	48 29 45.082 92 39 41.424	204 59 08.9	24 59 14.8	Bat	2.5768322	377.43	1,238.3

International Boundary triangulation and traverse—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″	° ′ ″	° ′ ″				
Bees Kees, 1923, r. 1925 (d. m.)	48 29 47.743 92 42 01.603	271 37 17.5	91 39 02.4	Doran	3.4592560	2,879.10	9,445.8
Reference Monument 340 (I. B. C.) (Pluss), 1915, r. 1925 (d. m.).	48 28 59.492 92 42 09.738	186 23 37.6	6 23 43.7	Bees Kees	3.1760182	1,499.75	4,920.4
Harry, 1923, r. 1925 (d. m.)	48 27 42.260 92 42 40.780	194 57 37.3	14 58 00.6	Reference Monument 340 (I. B. C.) (Pluss).	3.3925799	2,469.33	8,101.5
Rye (Canada), 1923, r. 1925 (d. m.)	48 27 36.031 92 41 57.522	102 13 11.3	282 12 38.9	Harry	2.9587072	909.30	2,983.3
Deer (Canada), 1923, r. 1925 (d. m.)	48 26 14.358 92 39 17.611	127 31 48.9	307 29 49.2	Rye	3.6172924	4,142.78	13,591.8
Randolph, 1923, r. 1924 (d. m.)	48 25 19.721 92 38 58.568	166 56 32.66	346 56 18.41	Deer	3.2386638	1,732.46	5,683.9
Namakan west base (Canada), 1923, r. 1924 (d. m.)	48 26 31.974 92 37 03.376	46 42 24.91 78 51 24.99	226 40 58.73 258 49 44.55	Randolph Deer	3.5124031 3.4490289	3,253.89 2,812.09	10,675.5 9,226.0
Grassy, 1923, r. 1925 (d. m.)	48 25 56.425 92 35 02.649	76 52 03.28 113 52 56.47	256 49 06.79 293 51 26.14	Randolph Namakan west base	3.6972995 3.4335365	4,980.80 2,713.54	16,341.2 8,902.7
Portage, 1924 (d. m.)	48 24 21.670 92 32 50.158	103 21 16.46 127 44 05.22	283 16 40.91 307 40 55.79	Randolph Namakan west base	3.8912643 3.8182567	7,785.10 6,580.47	25,541.6 21,589.4
Namakan east base, 1923, r. 1924 (d. m.)	48 26 51.694 92 30 57.468	26 34 26.54 71 18 37.33 74 01 18.85 85 24 25.91	206 33 02.23 251 15 33.86 253 55 18.89 265 19 52.09	Portage Grassy Randolph Namakan west base	3.7144013 3.7259556 4.0123741 3.8776264	5,180.85 5,320.54 10,289.02 7,544.429	16,997.5 17,455.8 33,756.6 24,752.01
Tower (Canada), 1923, r. 1924 (d. m.)	48 28 37.114 92 29 37.116	26 42 53.29 26 53 27.08 53 27 22.94 62 12 11.61 67 11 10.97	206 40 28.84 206 52 26.94 233 23 19.30 242 05 11.44 247 05 36.95	Portage Namakan east base Grassy Randolph Namakan west base	3.9460406 3.5623882 3.9206029 4.1155901 3.9978225	8,831.62 3,650.80 8,329.19 13,049.39 9,949.99	28,975.1 11,977.7 27,326.7 42,812.9 32,644.3
Fish (I. B. C.) (Canada), 1915, r. 1924 (d. m.)	48 23 25.602 92 20 11.536	96 24 41.82 129 40 17.90	276 15 14.54 309 33 14.74	Portage Tower	4.1959155 4.1787242	15,700.57 15,091.22	51,511.0 49,511.8
Vermilion (I. B. C.) (Canada), 1915, r. 1924 (d. m.)	48 18 53.351 92 23 21.204	130 56 51.15 156 49 36.64 204 53 18.83	310 49 45.95 336 44 55.55 24 55 40.56	Portage Tower Fish (I. B. C.)	4.1901175 4.2926899 3.9671604	15,492.36 19,619.59 9,271.72	50,827.9 64,368.6 30,419.0
Center II (I. B. C.) (Canada), 1915, r. 1924 (d. m.)	48 20 49.633 92 18 23.500	59 40 16.62 155 14 07.44	239 36 34.24 335 12 46.69	Vermilion (I. B. C.) Fish (I. B. C.)	3.8516433 3.7247662	7,106.30 5,305.99	23,314.6 17,408.1
Loon, 1924 (d. m.)	48 17 54.111 92 13 52.423	98 55 55.86 134 10 51.24 142 42 59.73	278 48 51.14 314 07 28.77 322 38 16.47	Vermilion (I. B. C.) Center II (I. B. C.) Fish (I. B. C.)	4.0741845 3.8911529 4.1097675	11,862.73 7,783.11 12,875.60	38,919.6 25,535.1 42,242.7
Burnt (I. B. C.), 1915, r. 1924 (d. m.)	48 22 21.284 92 15 27.781	51 58 15.38 108 49 14.96 346 36 14.06	231 56 04.06 288 45 42.83 166 37 25.30	Center II (I. B. C.) Fish (I. B. C.) Loon	3.6621258 3.7901069 3.9285437	4,593.31 6,167.47 8,482.89	15,069.9 20,234.4 27,830.9
Granite, 1924 (d. m.)	48 18 46.092 92 09 44.079	72 36 26.63 133 14 16.66	252 33 21.19 313 09 59.86	Loon Burnt (I. B. C.)	3.7294588 3.9871931	5,363.63 9,709.42	17,597.2 31,855.0
Timber, 1924 (d. m.)	48 14 47.423 92 05 14.049	118 23 55.54 138 00 36.26 142 58 02.78	298 17 28.67 317 52 57.95 322 54 41.23	Loon Burnt (I. B. C.) Granite	4.0844092 4.2760025 3.9655798	12,145.33 18,880.02 9,238.04	39,846.8 61,942.2 30,308.5
Cedar (Canada), 1924 (d. m.)	48 21 54.273 92 04 17.091	5 05 35.79 49 14 03.36 93 31 42.44	185 04 53.26 229 09 59.07 273 23 21.13	Timber Granite Burnt (I. B. C.)	4.1217763 3.9491734 4.1407956	13,236.59 8,895.56 13,829.15	43,427.0 29,184.8 45,371.1
Shortiss (I. B. C.) (Canada), 1915, r. 1924 (d. m.)	48 17 00.978 91 56 29.058	69 11 50.61 101 17 25.05 133 15 56.95	249 05 18.85 281 07 31.48 313 10 07.37	Timber Granite Cedar	4.0639482 4.2228229 4.1215500	11,586.39 16,704.09 13,229.70	38,013.0 54,803.3 43,404.4
Falls (I. B. C.), 1915, r. 1924 (d. m.)	48 12 02.999 91 56 19.795	114 47 02.99 178 48 40.88	294 40 24.57 358 48 33.97	Timber Shortiss (I. B. C.)	4.0842324 3.9640611	12,140.38 9,205.79	39,830.6 30,202.7
Lister (I. B. C.), 1915, r. 1924 (d. m.)	48 10 58.466 91 54 22.843	117 48 50.52 129 32 32.77 166 55 05.12	297 40 44.95 309 31 05.60 346 53 30.98	Timber Falls (I. B. C.) Shortiss (I. B. C.)	4.1815560 3.4957714 4.0605466	15,189.94 3,131.64 11,495.99	49,835.7 10,274.4 37,716.4
Ark (Canada), 1924 (d. m.)	48 15 40.340 91 45 37.580	51 17 19.92 100 34 16.34	231 10 48.22 280 26 10.13	Lister (I. B. C.) Shortiss (I. B. C.)	4.1431676 4.1355388	13,904.89 13,662.77	45,619.6 44,825.3
Hargo (I. B. C.), 1913, r. 1924 (d. m.)	48 10 41.080 91 46 00.430	93 00 49.73 132 11 38.31 182 55 07.49	272 54 35.31 312 03 49.46 2 55 24.53	Lister (I. B. C.) Shortiss (I. B. C.) Ark	4.0167194 4.2428538 3.9663931	10,392.49 17,492.58 9,255.36	34,096.0 57,390.2 30,365.3
Glint (I. B. C.) (Canada), 1914, r. 1924 (d. m.)	48 12 04.678 91 38 52.983	73 44 29.08 128 37 26.95	253 39 10.48 308 32 25.19	Hargo (I. B. C.) Ark	3.9637052 4.0286234	9,198.25 10,681.28	30,177.9 35,043.5

21828°—30——4

International Boundary triangulation and traverse—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance: Logarithm (meters)	Distance: Meters	Distance: Feet
Principal points—Continued	° ′ ″	° ′ ″	° ′ ″				
Beaver (Canada), 1924 (d. m.)	48 08 58.756	102 08 28.61	281 59 35.59	Hargo (I. B. C.)	4.1794819	15,117.57	49,598.2
	91 34 05.013	131 00 37.66	310 52 01.33	Ark	4.2771462	18,929.81	62,105.6
		134 00 59.71	313 57 25.12	Glint (I. B. C.)	3.9174379	8,268.71	27,128.3
Rock, 1924, r. 1934 (d. m.)	48 04 33.162	136 27 39.53	316 21 09.95	Hargo (I. B. C.)	4.1956327	15,690.35	51,477.4
	91 37 17.242	171 55 53.88	351 54 42.57	Glint (I. B. C.)	4.1487776	14,085.67	46,212.7
		205 50 23.32	25 52 46.42	Beaver	3.9598135	9,116.19	29,908.7
Canada (G. S. of C.) (Canada), 1917, r. 1924 (d. m.)	48 05 49.017	71 47 16.71	251 43 01.19	Rock	3.8740401	7,482.39	24,548.5
	91 31 33.873	151 56 33.06	331 54 40.52	Beaver	3.8222902	6,641.87	21,790.9
Found (I. B. C.), 1914, r. 1934 (d. m.)	48 00 51.105	125 28 06.73	305 22 20.47	Rock	4.0731230	11,833.77	38,824.6
	91 29 31.635	159 26 20.83	339 22 57.40	Beaver	4.2065443	16,089.57	52,787.2
		164 37 52.98	344 36 22.06	Canada (G. S. of C.)	3.9796961	9,543.25	31,309.8
Emily (I. B. C.) (Canada), 1914, r. 1924 (d. m.)	48 04 01.610	158 52 41.26	338 51 55.17	Canada (G. S. of C.)	3.5510251	3,556.52	11,668.3
	91 30 31.933	348 00 34.45	168 01 19.29	Found (I. B. C.)	3.7792424	6,015.09	19,734.5
Fang (I. B. C.), 1913, r. 1915 (d. m.)	48 01 41.335	74 07 44.89	254 04 29.48	Found (I. B. C.)	3.7530932	5,663.61	18,581.4
	91 25 08.768	122 56 58.42	302 52 58.08	Emily (I. B. C.)	3.9016181	7,972.93	26,157.9
		133 51 12.72	313 46 26.25	Canada (G. S. of C.)	4.0433578	11,049.89	36,252.8
Gone (I. B. C.) (Canada), 1915 (d. m.)	48 05 03.800	14 56 14.61	194 54 59.89	Found (I. B. C.)	3.9072723	8,077.41	26,500.6
	91 27 51.170	60 01 19.15	239 59 19.53	Emily (I. B. C.)	3.5845924	3,842.31	12,606.0
		331 42 47.22	151 44 48.01	Fang (I. B. C.)	3.8512780	7,100.32	23,295.0
Had (I. B. C.), 1913, r. 1915 (d. m.)	48 03 40.925	145 58 04.68	325 57 49.17	Emily (I. B. C.)	2.8870149	770.93	2,529.3
	91 30 11.093	228 31 03.36	48 32 47.46	Gone (I. B. C.)	3.5872019	3,865.47	12,682.0
Garb (I. B. C.) (Canada), 1913, r. 1915 (d. m.)	48 04 33.958	64 23 38.98	244 21 36.25	Had (I. B. C.)	3.5783817	3,787.754	12,426.99
	91 27 26.123	75 27 30.27	255 25 12.02	Emily (I. B. C.)	3.5992428	3,974.14	13,038.5
		114 21 21.40	294 18 17.02	Canada (G. S. of C.)	3.7502772	5,627.00	18,461.2
		150 38 48.94	330 38 30.30	Gone (I. B. C.)	3.0242835	1,057.51	3,469.5
Sunday (G. S. of C.) (Canada), 1916 (d. m.)	48 08 43.131	10 04 00.38	190 02 37.31	Fang (I. B. C.)	4.1215958	13,231.09	43,409.0
	91 23 17.142	28 02 11.62	207 57 32.97	Found (I. B. C.)	4.2177921	16,511.71	54,172.2
		46 00 52.31	225 55 28.66	Emily (I. B. C.)	4.0972735	12,510.47	41,044.8
		62 25 11.13	242 19 01.28	Canada (G. S. of C.)	4.0642915	11,595.55	38,043.1
Paddy (G. S. of C.) (Canada), 1915, r. 1917 (d. m.)	48 06 04.584	58 29 35.08	238 21 39.70	Fang (I. B. C.)	4.1911491	15,529.20	50,948.7
	91 14 29.737	114 14 01.22	294 07 28.52	Sunday (G. S. of C.)	4.0775815	11,955.88	39,225.2
Ewing (G. S. of C.), 1915 (d. m.)	48 02 48.894	80 37 51.35	260 30 20.45	Fang (I. B. C.)	4.1049457	12,733.44	41,776.3
	91 15 02.377	186 22 30.17	6 22 54.46	Paddy (G. S. of C.)	3.7840349	6,081.84	19,953.5
Trouble (G. S. of C.) (Canada), 1916 (d. m.)	48 09 58.293	76 45 29.54	256 39 35.30	Sunda y (G. S. of C.)	4.0042396	10,098.10	33,130.2
	91 15 21.630	351 32 24.80	171 33 03.45	Paddy (G. S. of C.)	3.8631947	7,297.85	23,943.0
		358 16 40.58	178 16 54.91	Ewing (G. S. of C.)	4.1228288	13,268.71	43,532.4
Saunders (G. S. of C.), 1916 (d. m.)	48 04 52.141	62 02 01.06	241 57 43.85	Ewing (G. S. of C.)	3.9089070	8,107.87	26,600.6
	91 09 16.618	109 04 59.89	289 01 06.87	Paddy (G. S. of C.)	3.8360036	6,854.94	22,489.9
		141 26 17.24	321 21 45.46	Trouble (G. S. of C.)	4.0827672	12,099.49	39,696.4
Dorothy (G. S. of C.) (Canada), 1916 (d. m.)	48 10 21.477	10 23 35.30	190 22 28.18	Saunders (G. S. of C.)	4.0145841	10,341.51	33,928.8
	91 07 46.480	46 27 33.94	226 22 33.62	Paddy (G. S. of C.)	4.0610581	11,509.54	37,760.9
		85 41 33.77	265 35 54.63	Trouble (G. S. of C.)	3.9745813	9,431.51	30,943.2
Poly (G. S. of C.), 1916 (d. m.)	48 05 09.235	87 30 13.70	267 23 08.34	Saunders (G. S. of C.)	4.0734427	11,842.48	38,853.2
	90 59 44.988	134 08 14.46	314 02 15.92	Dorothy (G. S. of C.)	4.1418071	13,861.40	45,476.9
Helga (G. S. of C.), 1916 (d. m.)	48 10 51.551	43 57 27.76	223 51 02.97	Saunders (G. S. of C.)	4.1877304	15,407.44	50,549.2
	91 00 39.900	84 01 37.44	263 56 19.55	Dorothy (G. S. of C.)	3.9475092	8,861.54	29,073.2
		353 51 54.60	173 52 35.49	Poly (G. S. of C.)	4.0266912	10,633.87	34,888.0
Paulsen (G. S. of C.), 1915, r. 1934 (d. m.)	48 05 28.541	87 00 04.13	266 53 22.32	Poly (G. S. of C.)	4.0488205	11,189.75	36,711.7
	90 50 45.043	129 06 37.17	308 59 14.17	Helga (G. S. of C.)	4.1996625	15,836.62	51,957.3
Mabel (I. B. C.), 1912, r. 1916 (d. m.)	48 10 43.114	40 36 09.87	220 30 52.00	Poly (G. S. of C.)	4.1326968	13,573.66	44,532.9
	90 52 38.138	91 32 59.57	271 27 00.55	Helga (G. S. of C.)	3.9980653	9,955.55	32,662.5
		346 27 23.81	166 28 48.03	Paulsen (G. S. of C.)	3.9997220	9,993.60	32,787.3
Vera (I. B. C.) (Canada), 1912, r. 1917 (d. m.)	48 14 08.350	7 53 40.08	187 52 16.96	Poly (G. S. of C.)	4.2255807	16,810.50	55,152.4
	90 57 53.423	29 30 12.05	209 28 07.93	Helga (G. S. of C.)	3.8440451	6,983.05	22,910.2
		314 12 26.37	134 16 21.43	Mabel (I. B. C.)	3.9583859	9,086.28	29,810.6
		331 05 07.10	151 10 26.26	Paulsen (G. S. of C.)	4.2632575	18,334.01	60,150.8
Stuart (G. S. of C.) (Canada), 1915 (d. m.)	48 15 22.117	7 27 37.52	187 26 11.07	Paulsen (G. S. of C.)	4.2669331	18,489.84	60,662.1
	90 48 49.028	28 46 55.93	208 44 05.09	Mabel (I. B. C.)	3.9925590	9,830.12	32,251.0
		78 35 19.97	258 28 33.85	Vera (I. B. C.)	4.0591966	11,460.32	37,599.4
Light (G. S. of C.) (Canada), 1915 (d. m.)	48 13 39.703	25 48 16.04	205 43 52.04	Paulsen (G. S. of C.)	4.2264863	16,845.59	55,267.6
	90 44 50.682	60 34 41.43	240 28 52.94	Mabel (I. B. C.)	4.0448024	11,086.70	36,373.6
		122 46 31.82	302 43 34.02	Stuart (G. S. of C.)	3.7669530	5,847.27	19,183.9
John (G. S. of C.) (Canada), 1915 (d. m.)	48 18 24.488	5 52 37.02	185 52 16.04	Stuart (G. S. of C.)	3.7530280	5,662.76	18,578.6
	90 48 20.918	7 05 37.13	187 03 49.69	Paulsen (G. S. of C.)	4.3829338	24,150.93	79,235.2
		333 44 24.05	153 47 00.94	Light (G. S. of C.)	3.9915259	9,806.77	32,174.4
Mowe (G. S. of C.) (Canada), 1915 (d. m.)	48 21 54.896	0 53 58.63	180 53 49.94	Light (G. S. of C.)	4.1846139	15,297.27	50,187.8
	90 44 39.044	13 57 46.01	193 53 13.04	Paulsen (G. S. of C.)	4.4967684	31,388.35	102,979.9
		35 08 01.93	215 05 16.17	John (G. S. of C.)	3.9000761	7,944.67	26,065.1

International Boundary triangulation and traverse—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″	° ′ ″	° ′ ″				
Gunflint (G. S. of C.) (Canada), 1915, r. 1917 (d. m.)	48 08 22.877	74 31 55.34	254 20 19.50	Paulsen (G. S. of C.)	4.3024977	20,067.70	65,838.8
	90 35 10.399	127 32 11.43	307 22 01.18	Stuart (G. S. of C.)	4.2282703	21,294.64	69,864.2
		129 17 18.86	309 10 06.38	Light (G. S. of C.)	4.1895963	15,473.77	50,766.9
		154 59 37.26	334 52 33.00	Mowe (G. S. of C.)	4.4423038	27,688.78	90,842.3
Addie (G. S. of C.) (Canada), 1914, r. 1917 (d. m.)	48 10 20.288	77 32 36.32	257 22 48.55	Gunflint (G. S. of C.)	4.2228421	16,704.83	54,805.8
	90 22 01.403	127 36 14.80	307 19 21.63	Mowe (G. S. of C.)	4.5474365	35,272.52	115,723.3
Greenwater (G. S. of C.) (Canada), 1914 (d. m.)	48 29 39.478	16 44 41.16	196 37 32.73	Gunflint (G. S. of C.)	4.6145242	41,164.63	135,054.3
	90 25 36.736	58 41 22.60	238 27 07.99	Mowe (G. S. of C.)	4.4396512	27,520.18	90,289.1
		352 54 59.78	172 57 40.64	Addie (G. S. of C.)	4.5572501	36,078.63	118,368.0
Echo (G. S. of C.) (Canada), 1913 (d. m.)	48 21 17.320	52 20 43.60	232 04 56.51	Addie (G. S. of C.)	4.5201095	33,121.46	108,666.0
	90 00 52.208	117 05 38.91	296 47 08.36	Greenwater (G. S. of C.)	4.5344832	34,236.02	112,322.7
Whitefish (G. S. of C.) (Canada), 1912, r. 1917 (d. m.)	48 09 40.036	92 24 31.67	272 05 30.84	Addie (G. S. of C.)	4.5005451	31,662.49	103,879.4
	89 56 30.258	165 56 38.45	345 53 23.00	Echo (G. S. of C.)	4.3464461	22,204.76	72,850.1
Devilfish (G. S. of C.), 1913, r. 1934 (d. m.)	47 58 48.840	137 34 44.73	317 23 00.85	Addie (G. S. of C.)	4.4620267	28,975.22	95,062.9
	90 06 15.367	189 04 28.65	9 08 29.44	Echo (G. S. of C.)	4.6251312	42,182.39	138,393.4
		210 59 49.23	31 07 04.53	Whitefish (G. S. of C.)	4.3706767	23,478.84	77,030.2
Pigeon (G. S. of C.), 1911, r. 1934 (d. m.)	47 58 33.851	91 07 47.41	270 51 54.99	Devilfish (G. S. of C.)	4.4247511	26,592.01	87,244.0
	89 44 53.317	145 01 59.27	324 53 20.78	Whitefish (G. S. of C.)	4.4002053	25,130.74	82,449.8
		154 54 09.06	334 42 14.62	Echo (G. S. of C.)	4.6678431	46,541.80	152,695.9
Blake (G. S. of C.) (Canada), 1913 (d. m.)	48 11 50.299	38 28 10.81	218 16 30.42	Pigeon (G. S. of C.)	4.4966149	31,377.25	102,943.5
	89 29 12.129	83 23 21.37	263 03 00.58	Whitefish (G. S. of C.)	4.5324843	34,078.80	111,806.9
		114 16 59.39	293 53 21.25	Echo (G. S. of C.)	4.6326016	42,914.26	140,794.5

Ninety-eighth meridian to Royalton to Duluth arc

Principal points							
Elbow, 1904, r. 1935 (d. m.)	46 00 53.268	64 10 29.52	244 02 06.06	Bullis	4.2240618	16,751.81	54,959.9
	95 56 06.447	126 07 44.60	305 57 28.65	Western	4.3565645	22,728.17	74,567.3
		7 15 48		E. J. Colemark's barn, west gable.			
Dalton, 1904, r. 1935 (d. m.)	46 10 22.595	359 42 42.83	179 42 45.79	Elbow	4.2449843	17,578.60	57,672.5
	95 56 10.556	31 04 23.28	210 56 02.10	Bullis	4.4630501	29,043.58	95,287.1
		77 07 07.18	256 56 53.37	Western	4.2727872	18,740.76	61,485.3
Leaf, 1904, r. 1935 (d. m.)	46 08 10.784	64 21 45.27	244 06 07.32	Elbow	4.4923948	31,073.83	101,948.1
	95 34 24.195	98 23 29.40	278 07 47.24	Dalton	4.4521857	28,326.03	92,933.0
		124 40 31		J. Christianson's barn, spire.			
Holmes, 1904, r. 1935 (d. m.)	45 51 10.707	126 20 08.00	306 06 29.02	Elbow	4.4834212	30,438.36	99,863.2
	95 37 06.646	145 25 58.14	325 12 15.11	Dalton	4.6359746	43,248.85	141,892.3
		186 19 03.84	6 21 00.69	Leaf	4.5009014	31,688.48	103,964.6
		287 10 29		Holmes City, Swedish Church, spire.			
Alexandria, 1904, r. 1934 (d. m.)	45 52 49.026	81 54 32.85	261 42 50.91	Holmes	4.3286435	21,312.95	69,924.2
	95 20 48.629	148 25 30.81	328 15 44.06	Leaf	4.5241885	33,434.02	109,691.4
		258 35 29		Azimuth mark (1934).			
Parker, 1904, r. 1935 (d. m.)	46 06 26.134	358 36 45.37	178 37 05.75	Alexandria	4.4020154	25,235.70	82,794.1
	95 21 16.963	35 58 20.95	215 46 58.03	Holmes	4.5426011	34,881.98	114,442.0
		100 54 03.77	280 44 36.32	Leaf	4.2357477	17,208.69	56,458.8
		206 01 02		New Parkers Prairie, open belfry, spire.			
Leslie, 1904, r. 1934 (d. m.)	45 59 52.240	58 04 18.49	237 52 41.61	Alexandria	4.3916502	24,640.54	80,841.5
	95 04 38.857	119 38 38.04	299 26 39.43	Parker	4.3920640	24,664.03	80,918.6
		87 05 15		Azimuth mark (1934).			
Osakis, 1904, r. 1934 (d. m.)	45 49 27.136	110 28 30.91	290 19 13.43	Alexandria	4.2524653	17,884.03	58,674.5
	95 07 51.698	151 13 15.83	331 03 36.91	Parker	4.5553713	35,922.89	117,857.0
		192 08 01.92	12 10 20.43	Leslie	4.2953985	19,742.34	64,771.3
Maple, 1904, r. 1935 (d. m.)	45 53 58.323	51 37 33.63	231 31 42.48	Osakis	4.1294541	13,472.68	44,201.6
	94 59 42.394	149 43 47.36	329 40 14.29	Leslie	4.1022961	12,655.99	41,522.2
Birch, 1904, r. 1935 (d. m.)	45 48 15.493	96 27 26.07	276 16 27.57	Osakis	4.2999328	19,949.54	65,451.1
	94 52 33.383	138 52 24.21	318 47 16.38	Maple	4.1480155	14,060.98	46,131.7
Long, 1904, r. 1935 (d. m.)	45 58 23.243	354 59 20.93	175 00 15.63	Birch	4.2749838	18,835.79	61,797.1
	94 53 49.571	42 56 08.08	222 51 54.55	Maple	4.0478894	11,165.79	36,633.1
		101 11 18.22	281 03 31.28	Leslie	4.1535928	14,242.71	46,728.0
		139 03 46		House of Vandyke and Vandyke, west gable.			

Ninety-eighth meridian to Royalton to Duluth arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance: Logarithm (meters)	Distance: Meters	Distance: Feet
Principal points—Continued	° ′ ″	° ′ ″	° ′ ″				
Lone, 1904, r. 1935 (d. m.)	46 02 24.412 94 43 59.347	22 57 38.27 59 40 25.01 83 15 32	202 51 28.97 239 33 20.38	Birch Long Gust. Nelson's house, east gable.	4.4541521 4.1679400	28,454.58 14,721.09	93,354.7 48,297.4
Eagle, 1904, r. 1935 (d. m.)	45 49 35.541 94 40 45.557	80 53 02.31 134 01 41.24 170 02 40.23 174 27 47	260 44 34.73 313 52 18.22 350 00 20.99	Birch Long Lone Burtrum, white church, red cone on spire.	4.1897784 4.3706121 4.3820726	15,480.26 23,475.35 24,103.08	50,788.2 77,018.7 79,078.2
Falls, 1904, l. 1935 (d. m.)	45 58 40.427 94 15 36.362	62 48 22.46 100 51 31.79	242 30 18.63 280 31 06.58	Eagle Lone	4.5637740 4.5715477	36,624.69 37,286.16	120,159.5 122,329.7
Brockway (Suintax (M. R. C.), 1898), 1904, r. 1935 (d. m.).	45 46 11.091 94 18 31.953	102 29 40.58 132 32 27.12 189 16 43.28	282 13 44.54 312 14 10.17 9 18 49.32	Eagle Lone Falls	4.4695945 4.6490965 4.3700179	29,484.55 44,575.53 23,443.25	96,733.9 146,244.9 76,913.4
Alberta, 1904, r. 1931 (d. m.)	45 48 14.562 94 06 50.559	75 56 48.64 149 39 11.57 201 36 57	255 48 25.91 329 32 54.03	Brockway (Suintax (M. R. C.)) Falls James McCullough's house, chimney.	4.1937591 4.3503122	15,622.81 22,403.31	51,255.8 73,501.5
Royalton north base, 1904, r. 1935 (d. m.)	45 48 55.798 94 14 57.789	42 18 42.76 92 15 26.48 177 21 58.00 276 51 06.22	222 16 09.24 271 56 56.48 357 20 30.30 96 56 55.58	Brockway (Suintax (M. R. C.)) Eagle Falls Alberta	3.8372247 4.5242005 4.2569423 4.0251815	6,874.24 33,434.94 18,069.34 10,596.97	22,553.2 109,694.5 59,282.5 34,766.9
Royalton south base, 1904, r. 1935 (d. m.)	45 44 08.073 94 12 04.784	114 27 00.25 157 11 50.13 75 41 43	294 22 22.91 337 09 46.16	Brockway (Suintax (M. R. C.)) Royalton north base Reference mark.	3.9633063 3.9839667	9,189.80 9,637.551	30,150.2 31,619.20
Johnson, 1904, r. 1935 (d. m.)	46 10 21.784 94 30 42.426	317 56 59.10 18 34 57.30 49 20 45.18 79 46 19	138 07 51.70 198 34 43.45 229 11 10.90	Falls Eagle Lone John Lagerquist's house, chimney.	4.4642049 4.6086092 4.3538627	29,120.91 40,607.78 22,587.21	95,540.9 133,227.4 74,104.9
Daggett, 1904, r. 1935 (d. m.)	46 10 19.450 94 11 14.614	14 37 59.83 90 16 54.72 160 53 51	194 34 51.31 270 02 52.23	Falls Johnson John Vogel's house, south gable.	4.3483758 4.3988282	22,303.64 25,051.18	73,174.5 82,188.7
Rail, 1904, r. 1935 (d. m.)	46 13 38.329 94 27 37.099	286 09 11.87 330 44 58.33 33 14 02.60 192 26 05	106 21 00.99 150 53 37.69 213 11 48.84	Daggett Falls Johnson Ridgley's house, west gable.	4.3412748 4.5017788 3.8605607	21,941.93 31,752.56 7,253.72	71,987.8 104,174.9 23,798.2
Gull, 1904, r. 1935 (d. m.)	46 26 35.693 94 22 34.243	334 10 33.36 15 07 57.83 173 14 28	154 18 44.77 195 04 18.74	Daggett Rail Schoolhouse (District no. 2), top of belfry.	4.5246326 4.3955242	33,468.22 24,861.32	109,803.7 81,565.8
Jones 1904, r. 1905 (d. m.)	46 23 48.978 94 04 11.935	19 56 35.01 58 02 55.75 102 26 46.90	199 51 29.50 237 45 59.65 282 13 28.37	Daggett Rail Gull	4.4246041 4.5500956 4.3819424	26,583.01 35,489.15 24,095.86	87,214.4 116,434.0 79,054.5
Brook, 1905, r. 1934 (d. m.)	46 40 49.300 93 55 56.633	18 34 13.47 52 24 00.98 39 52 58	198 28 13.96 232 04 40.92	Jones Gull Frank Richter's farmhouse, north gable.	4.5214832 4.6338961	33,226.39 43,042.37	109,010.2 141,214.8
Rabbit, 1905, r. 1934 (d. m.)	46 30 31.379 93 54 21.852	45 26 41.93 78 46 26.49 173 58 24.70 132 26 58	225 19 34.23 258 25 59.35 353 57 15.84	Jones Gull Brook Azimuth mark.	4.2477609 4.5662001 4.2830021	17,691.35 36,829.86 19,186.78	58,042.4 120,832.6 62,948.6
French, 1905, r. 1934 (d. m.)	46 37 48.553 93 32 16.679	64 34 14.00 100 36 59.99 359 22 50	244 18 11.65 280 19 47.35	Rabbit Brook Azimuth mark.	4.4953194 4.4871911	31,283.79 30,703.73	102,636.9 100,733.8
Bethlehem, 1905, r. 1934 (d. m.)	46 28 32.906 93 36 57.920	99 26 10.55 133 16 35.18 199 13 13.87 84 39 53	279 13 33.41 313 02 48.12 19 16 38.05	Rabbit Brook French Reference mark no. 3.	4.3533789 4.5216698 4.2594351	22,562.07 33,240.67 18,173.36	74,022.4 109,057.1 59,623.8
Rae, 1905, r. 1935 (d. m.)	46 31 57.139 93 23 44.326	69 38 24.01 134 53 58.11 168 30 20	249 28 48.32 314 47 45.96	Bethlehem French Jennison's barn, south gable.	4.2566677 4.1871448	18,057.92 15,386.67	59,245.0 50,481.1
Kimberly, 1905, r. 1935 (d. m.)	46 36 35.665 93 25 24.988	345 59 38.24 44 47 40.69 104 27 05.75 196 17 27	166 00 51.35 224 39 17.71 284 22 06.53	Rae Bethlehem French E. D. Turner's house, south gable.	3.9476080 4.3218205 3.9563560	8,863.56 20,980.72 9,043.90	29,079.9 68,834.2 29,671.5
Grindle, 1905, r. 1935 (d. m.)	46 33 27.871 93 16 59.035	72 03 55.05 118 20 42.61	251 59 00.84 298 14 35.09	Rae Kimberly	3.9580010 4.0875598	9,078.23 12,233.75	29,784.2 40,136.9
Gregor, 1905 (d. m.)	46 38 21.290 93 19 01.931	343 53 00.55 26 54 23.38 68 13 35.82	163 54 29.84 206 50 58.24 248 08 57.38	Grindle Rae Kimberly	3.9745295 4.1238062 3.9433915	9,430.39 13,298.61 8,777.92	30,939.5 43,630.5 28,798.9
Douglas, 1905, r. 1935 (d. m.)	46 36 45.286 93 08 18.024	61 15 41.79 102 16 32.90 276 20 56	241 09 23.33 282 08 44.85	Grindle Gregor Fred Burger's house, north gable.	4.1023349 4.1466170	12,657.12 14,015.77	41,525.9 45,983.4

Ninety-eighth meridian to Royalton to Duluth arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance: Logarithm (meters)	Distance: Meters	Distance: Feet
Principal points—Continued	° ′ ″	° ′ ″	° ′ ″				
Tamarack, 1905, r. 1935 (d. m.)	46 42 25.880 93 11 33.069	338 27 40.48 22 41 14.94 51 40 47.93 139 47 43	158 30 02.33 202 37 17.97 231 35 21.40	Douglas Grindle Gregor Dan McGary's house, east gable.	4.0532759 4.2553195 4.0852361	11,305.14 18,001.95 12,168.47	37,090.3 59,061.4 39,922.7
Wright, 1905, r. 1935 (d. m.)	46 44 12.628 93 03 07.014	25 36 19.75 72 59 57.90	205 32 33.50 252 53 49.48	Douglas Tamarack	4.1850805 4.0508072	15,313.71 11,241.06	50,241.7 36,880.0
Bachelor, 1905, r. 1935 (d. m.)	46 39 26.884 92 59 30.182	66 05 28.98 109 51 37.96 152 27 07.63 215 18 00	245 59 05.24 289 42 52.02 332 24 29.83	Douglas Tamarack Wright Grant Rice's house, chimney.	4.0894280 4.2129053 3.9979874	12,286.49 16,326.96 9,953.77	40,309.9 53,566.0 32,656.7
Island, 1905, r. 1935 (d. m.)	46 39 01.183 92 52 18.944	94 59 24.52 124 59 46.38 154 27 47	274 54 10.92 304 51 54.78	Bachelor Wright Mr. Photo's house, south gable.	3.9639698 4.2252040	9,203.86 16,795.93	30,196.3 55,104.6
Cromwell, 1905, r. 1935 (d. m.)	46 42 50.191 92 47 51.213	38 50 52.48 67 09 33.75 97 33 00.12 57 09 19	218 47 37.69 247 01 05.18 277 21 53.34	Island Bachelor Wright Two-story farmhouse, northwest gable.	3.9579142 4.2075240 4.2925486	9,076.41 16,125.90 19,613.21	29,778.2 52,906.4 64,347.7
Mahtowa, 1905, r. 1935 (d. m.)	46 36 27.226 92 39 59.125	106 52 56.65 139 43 28.94 318 47 59	286 43 58.86 319 37 45.59	Island Cromwell Mahtowa, Swedish Lutheran Church, spire.	4.2159173 4.1906313	16,440.59 15,510.70	53,938.8 50,888.0
Sawyer, 1905, r. 1935 (d. m.)	46 41 11.173 92 38 25.426	12 48 47.04 77 19 12.00 104 19 43.60 200 13 00	192 47 38.91 257 09 05.71 284 12 51.84	Mahtowa Island Cromwell Indian schoolhouse, chimney.	3.9538317 4.2592976 4.0935279	8,991.49 18,167.60 12,403.03	29,499.6 59,604.9 40,692.3
Atkinson, 1905, r. 1935 (d. m.)	46 35 29.630 92 34 51.000	105 12 12.76 156 38 09.86 212 18 42	285 08 28.88 336 35 33.96	Mahtowa Sawyer Presbyterian Church.	3.8322023 4.0603302	6,795.20 11,490.27	22,293.9 37,697.7
Cloquet, 1905, r. 1935 (d. m.)	46 45 09.207 92 28 21.140	24 53 08.15 42 41 43.37 60 15 35.03	204 48 24.55 222 33 15.56 240 08 15.10	Atkinson Mahtowa Sawyer	4.2949550 4.3405544 4.1699522	19,722.18 21,905.56 14,789.46	64,705.2 71,868.5 48,521.8
Annie, 1905, r. 1935 (d. m.)	46 42 28.344 92 15 55.699	61 56 36.27 107 29 54.99 130 59 01	241 42 50.71 287 20 52.21	Atkinson Cloquet Charles Hendrickson's house, south gable.	4.4375336 4.2198307	27,386.31 16,589.40	89,849.9 54,427.1
Carlton, 1905, r. 1935 (d. m.)	46 38 39.654 92 25 36.555	63 36 40.15 163 48 28.30 240 10 20.46 193 45 10	243 29 57.18 343 46 28.52 60 17 23.02	Atkinson Cloquet Annie Carlton, Presbyterian Church, spire.	4.1197777 4.0978454 4.1529855	13,175.82 12,526.95 14,222.81	43,227.7 41,098.8 46,662.7
Dedham (Wis.), 1905 (d. m.)	46 31 49.686 92 09 27.616	101 58 31.04 121 38 04.19 157 19 11.31 181 13 16	281 40 04.90 301 26 20.34 337 14 29.25	Atkinson Carlton Annie Great Northern Railway trestle.	4.5204935 4.3838651 4.3300028	33,150.76 24,202.77 21,379.76	108,762.1 79,405.3 70,143.4
Superior (Wis.), 1905, r. 1921 (d. m.)	46 38 52.580 92 05 06.379	23 05 41.93 115 50 08.23	203 02 32.15 295 42 15.84	Dedham Annie	4.1520812 4.1853921	14,193.23 15,324.70	46,565.6 50,277.8
Duluth, 1905, l. 1921 (d. m.)	46 45 29.796 92 10 06.393	332 30 44.01 358 07 51.09 52 57 53.77	152 34 22.37 178 08 19.29 232 53 39.42	Superior Dedham Annie	4.1405940 4.4037615 3.9682568	13,822.74 25,337.37 9,295.16	45,350.1 83,127.7 30,495.9
Mississippi River Commission (second order)							
Rice back base (M. R. C.), 1898, r. 1935 (d. m.)	45 43 12.490 94 11 25.312	120 55 00.5 153 33 32.7 156 36 01.9 212 27 20.8	300 49 55.0 333 33 04.5 336 33 29.8 32 30 37.8	Brockway (Suintax (M. R. C.), 1898). Royalton south base Royalton north base Alberta	4.031219 3.282519 4.062615 4.043588	10,745.3 1,916.5 11,550.9 11,055.7	35,254 6,288 37,897 36,272
Gottwalt (M. R. C.), 1898, r. 1904, p. l. 1935 (d. m.)	45 47 11.194 94 10 31.549	79 54 39.3 119 20 58.6 247 41 20.4	259 48 55.0 299 17 47.8 67 43 58.9	Brockway (Suintax (M. R. C.), 1898). Royalton north base Alberta	4.022976 3.819180 3.712502	10,543.3 6,594.5 5,158.2	34,591 21,635 16,923
Royalton (M. R. C.), 1898, r. 1935 (d. m.)	45 48 43.855 94 15 58.501	254 16 55.0 274 18 59.7 292 01 24.5 35 06 45.4	74 17 38.6 94 25 32.7 112 05 18.9 215 04 55.4	Royalton north base Alberta Gottwalt (M. R. C.) Brockway (Suintax (M. R. C.), 1898).	3.134069 4.074303 3.881862 3.760766	1,361.7 11,866.0 7,618.4 5,764.6	4,468 38,930 24,995 18,913
Skounter Hill (M. R. C.), 1898, r. 1935 (d. m.)	45 45 39.847 94 14 55.441	101 40 17.9 166 31 23.1 243 39 16.8 307 30 38.8	281 37 42.7 346 30 37.9 63 42 25.9 127 32 41.0	Brockway (Suintax (M. R. C.), 1898). Royalton (M. R. C.) Gottwalt (M. R. C.) Royalton south base	3.679157 3.766568 3.803525 3.667586	4,777.0 5,842.1 6,361.0 4,651.4	15,673 19,167 20,869 15,260
Swan Creek (M. R. C.), 1898, r. 1904 (d. m.)	45 56 39.640 94 24 02.693	304 54 35.3 320 34 32.7 339 46 46.1	125 06 56.2 140 41 03.9 159 50 43.4	Alberta Royalton north base Brockway (Suintax (M. R. C.), 1898).	4.434228 4.267753 4.315471	27,178.7 18,524.8 20,676.2	89,169 60,777 67,835

Ninety-eighth meridian to Royalton to Duluth arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Mississippi River Commission (second order)—Contd.	° ′ ″	° ′ ″	° ′ ″				
Gregory (M. R. C.), 1898, r. 1935 (d. m.)	45 55 33.547	309 18 24.7	129 27 34.1	Alberta	4.329614	21,360.6	70,081
	94 19 35.959	333 56 02.5	153 59 22.2	Royalton north base	4.135690	13,667.5	44,841
		355 26 47.3	175 27 33.2	Brockway (Suintax (M. R. C.), 1898).	4.241055	17,420.3	57,153
		109 34 37.8	289 31 26.1	Swan Creek (M. R. C.)	3.785182	6,097.9	20,006
Big Mound (M. R. C.), 1898, r. 1935 (d. m.)	46 13 52.256	82 11 50.8	262 10 05.3	Rail	3.499860	3,161.3	10,372
	94 25 10.950	188 04 34.0	8 06 27.4	Gull	4.376755	23,809.8	78,116
		290 02 27.6	110 12 31.3	Daggett	4.280964	19,097.0	62,654
Oleson (M. R. C.), 1898, r. 1904 (d. m.)	46 15 43.845	221 00 21.8	41 07 43.2	Jones	4.298160	19,868.3	65,185
	94 14 22.141	338 06 57.1	158 09 12.5	Daggett	4.033124	10,792.5	35,408
		77 15 35.2	257 06 01.0	Rail	4.242191	17,465.9	57,303
Supplementary points							
Hereford, elevator, 1904, r. 1935 (d.)	46 00 50.138	171 36 25.6	351 35 18.9	Western	4.134051	13,616.0	44,672
	96 08 49.055	349 26 12.2	169 26 57.2	Bullis	3.865908	7,343.6	24,093
		64 36 17.0	244 19 52.1	Oscarson	4.514631	32,706.3	107,304
Elbow Lake, water tower, 1904 (n. d.)	45 59 32.872	68 07 44.3	248 01 03.3	Bullis	4.112083	12,944.4	42,468
	95 58 28.803	105 53 07.8	285 28 59.2	Foss	4.652566	44,933.1	147,418
		230 57 54.8	50 59 37.2	Elbow	3.595778	3,942.6	12,935
Wendell, tallest elevator, 1904 (n. d.)	46 02 04.713	153 01 05.0	332 57 54.1	Western	4.098103	12,534.4	41,123
	96 05 56.707	279 47 52.2	99 54 56.9	Elbow	4.110114	12,885.9	42,276
		13 57 13.5	193 55 54.5	Bullis	3.991708	9,810.9	32,188
Wendell, railway water tank, 1904 (n. d.) [1]	46 02 03.13	279 38 07	99 45 09	Elbow	4.107544	12,809.8	42,027
	96 05 53.51	14 24 52	194 23 31	Bullis	3.990353	9,780.3	32,088
Wendell, west elevator, 1904 (n. d.)	46 02 05.459	153 10 32.8	333 07 23.6	Western	4.096597	12,491.0	40,981
	96 05 59.052	279 51 35.7	99 58 42.1	Elbow	4.111918	12,939.5	42,452
		13 38 07.2	193 36 49.9	Bullis	3.992166	9,821.2	32,222
Wendell, schoolhouse spire, 1904 (n. d.)	46 02 07.916	152 33 59.5	332 30 46.6	Western	4.096002	12,473.9	40,925
	96 05 53.912	280 16 43.4	100 23 46.1	Elbow	4.108699	12,844.0	42,139
		14 09 12.3	194 07 51.3	Bullis	3.996573	9,921.4	32,550
Wendell, church spire, 1904 (n. d.)	46 02 10.270	152 30 33.8	332 27 21.7	Western	4.093367	12,398.4	40,677
	96 05 55.021	280 34 39.4	100 41 42.9	Elbow	4.109935	12,880.6	42,259
		13 55 06.8	193 53 46.6	Bullis	3.999397	9,986.1	32,763
Dalton, astronomical station, 1904, l. 1935 (d. m.)	46 10 23.438	278 39 42.9	98 54 33.6	Leaf	4.428395	26,816.1	87,979
	95 54 59.223	4 41 46.3	184 40 57.9	Elbow	4.247078	17,663.5	57,951
		89 01 56.4	269 01 04.9	Dalton	3.184801	1,530.4	5,021
Church (5 miles west of Elbow Lake), 1905 (n. d.)	45 59 10.083	53 01 32.5	232 58 29.5	Bullis	3.836500	6,862.8	22,516
	96 03 31.990	204 30 25.7	24 35 43.6	Dalton	4.358470	22,828.1	74,895
		251 34 25.5	71 39 46.0	Elbow	4.004437	10,102.7	33,145
Church (6 miles southwest of Dalton), 1904 (n. d.)	46 05 38.391	349 15 00.8	169 15 56.6	Elbow	3.952325	8,960.4	29,398
	95 57 24.137	105 23 08.4	285 13 48.0	Western	4.238297	17,310.0	56,791
		190 11 48.0	10 12 41.0	Dalton	3.950173	8,916.1	29,252
Church spire (7 miles southwest of Dalton), 1904 (n. d.)	46 06 29.482	108 29 28.6	288 24 27.5	Western	3.975701	9,455.9	31,023
	96 03 23.873	232 13 14.8	52 18 27.3	Dalton	4.070420	11,760.3	38,584
		317 47 17.5	137 52 32.5	Elbow	4.146307	14,005.8	45,951
T. 129 N., R. 42 W., sec. 3, east ¼ corner, 1904 (n. d.) [1]	46 00 50.514	175 57 47	355 57 47	Elbow	1.930705	85.252	279.70
	95 56 06.168						
Evansville, water tower, 1904, r. 1935 (n. d.)	46 00 27.258	342 17 24.1	162 20 26.8	Holmes	4.256133	18,035.7	59,172
	95 41 20.941	92 30 08.3	272 19 31.2	Elbow	4.280296	19,067.6	62,558
		211 59 45.4	32 04 45.6	Leaf	4.227447	16,882.9	55,390
Evansville, Methodist Church, spire, 1904, r. 1935 (n. d.).	46 00 28.583	246 49 16.0	67 03 44.8	Parker	4.450035	28,186.1	92,474
	95 41 23.440	342 10 00.1	162 13 04.6	Holmes	4.257464	18,091.1	59,354
		92 23 08.6	272 12 33.3	Elbow	4.279031	19,012.1	62,376
Evansville, Catholic Church, spire, 1904, r. 1935 (n. d.)	46 00 28.297	246 59 42.3	67 14 19.2	Parker	4.453514	28,412.8	93,218
	95 41 34.717	341 25 37.6	161 28 50.2	Holmes	4.259080	18,158.5	59,575
		92 26 28.4	272 16 01.2	Elbow	4.273467	18,770.1	61,582
Alexandria, water tower, 1904, r. 1935 (n. d.)	45 53 04.042	79 28 17.1	259 17 55.8	Holmes	4.278657	18,995.8	62,322
	95 22 41.022	184 10 09.6	4 11 10.1	Parker	4.394989	24,830.7	81,465
		280 49 02.1	100 50 22.8	Alexandria	3.392266	2,467.6	8,096
Alexandria, Catholic Church, spire, 1904, r. 1935 (d.)	45 53 14.466	78 38 30.6	258 28 02.5	Holmes	4.284558	19,255.6	63,174
	95 22 31.632	183 45 12.9	3 46 06.6	Parker	4.389089	24,495.7	80,366
		289 27 52.2	109 29 06.2	Alexandria	3.372146	2,355.8	7,729
Alexandria, courthouse spire, 1904, r. 1935 (n. d.)	45 53 03.280	79 23 56.2	259 13 43.3	Holmes	4.272852	18,743.6	61,495
	95 22 52.715	184 44 32.3	4 45 41.2	Parker	4.395742	24,873.8	81,607
		279 19 36.4	99 21 05.5	Alexandria	3.433243	2,711.7	8,897
Osakis, water tower, 1904 (n. d.)	45 51 59.682	95 48 06.7	275 39 41.5	Alexandria	4.183399	15,254.5	50,047
	95 09 04.864	201 25 06.0	21 28 17.1	Leslie	4.195216	15,675.3	51,428
		341 27 38.9	161 28 31.4	Osakis	3.696124	4,967.3	16,297

[1] No check on this position.

Ninety-eighth meridian to Royalton to Duluth arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance: Logarithm (meters)	Distance: Meters	Distance: Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
Osakis, tall church spire, 1904 (n. d.)	45 51 58.462	203 00 08.6	23 03 36.0	Leslie	4.201253	15,894.7	52,148
	95 09 27.493	253 35 41.0	73 42 41.1	Maple	4.118871	13,148.3	43,137
		336 07 27.7	156 08 36.4	Osakis	3.708329	5,108.9	16,761
Osakis, low church spire, 1904 (n. d.)	45 51 57.882	201 20 28.6	21 23 39.7	Leslie	4.196639	15,726.8	51,597
	95 09 04.822	252 53 52.5	73 00 36.3	Maple	4.103298	12,685.2	41,618
		341 15 53.4	161 16 45.9	Osakis	3.691468	4,914.4	16,123
Gordon, church spire, 1904, r. 1935 (n. d.)	45 52 34.109	51 49 56.5	231 45 52.7	Osakis	3.970086	9,334.4	30,625
	95 02 11.726	231 03 48.8	51 05 36.1	Maple	3.616850	4,138.6	13,578
		302 33 05.7	122 40 00.6	Birch	4.170738	14,816.2	48,609
Long Bridge, church spire, 1904, r. 1935 (n. d.)	45 51 23.24	159 32 01	339 31 01	Maple	3.708491	5,110.8	16,768
	94 58 19.50	307 46 30	127 50 39	Birch	3.975691	9,455.6	31,022
Sauk Center, Catholic Church, spire, 1904, r. 1935 (d.)	45 44 14.642	124 21 19.4	304 13 30.1	Osakis	4.233628	17,124.9	56,184
	94 56 56.766	168 47 37.2	348 45 38.4	Maple	4.264156	18,372.0	60,275
		217 24 04.5	37 27 13.2	Birch	3.971452	9,363.8	30,721
Long Prairie, water tank, 1904 (n. d.)	45 58 26.896	5 13 31.9	185 12 34.5	Birch	4.277732	18,955.4	62,190
	94 51 13.435	88 05 38.1	268 03 45.9	Long	3.526759	3,363.2	11,034
		231 49 04.8	51 54 17.2	Lone	4.074619	11,874.6	38,959
Long Prairie, Catholic Church, spire, 1904 (n. d.)	45 58 26.177	4 15 26.5	184 14 39.8	Birch	4.276614	18,906.6	62,029
	94 51 28.385	88 18 24.5	268 16 43.0	Long	3.482997	3,040.9	9,977
		232 40 17.7	52 45 40.8	Lone	4.084313	12,142.6	39,838
Little Falls, Catholic Church, spire, 1904, r. 1935 (n. d.) [1]	45 58 38.32	269 28 21	89 32 33	Falls	3.878475	7,559.2	24,800
	94 21 27.50	350 39 46	170 41 52	Brockway (Suintax (M. R. C.), 1898).	4.368826	23,379.0	76,703
Little Falls, courthouse spire, 1904, r. 1935 (n. d.) [1]	45 58 31.89	350 05 59	170 08 11	Brockway (Suintax (M. R. C.), 1898).	4.365792	23,216.2	76,168
	94 21 36.69	56 20 45	236 07 00	Eagle	4.474097	29,791.8	97,742
Little Falls, high school spire, 1904, r. 1935 (d.) [1]	45 58 31.50	268 00 38	88 05 08	Falls	3.907974	8,090.5	26,544
	94 21 51.97	349 17 37	169 20 00	Brockway (Suintax (M. R. C.), 1898).	4.366671	23,263.3	76,323
Little Falls, Pine Tree Lumber Co., stack, 1904, l. 1935 (n. d.).[1]	45 58 57.08	273 35 05	93 39 36	Falls	3.910447	8,136.7	26,695
	94 21 53.60	349 33 37	169 36 02	Brockway (Suintax (M. R. C.), 1898).	4.381042	24,046.0	78,891
Royalton, old Catholic Church, cross, 1904 (n. d.) [1]	45 49 46.71	293 11 58	113 14 00	Royalton north base	3.600700	3,987.5	13,082
	94 17 47.55	8 12 05	188 11 33	Brockway (Suintax (M. R. C.), 1898).	3.827741	6,725.8	22,066
Catholic Church on ridge, tall spire, 1904 (n. d.)	45 42 05.645	160 30 48.6	340 29 19.7	Brockway (Suintax (M. R. C.), 1898).	3.905195	8,038.9	26,374
	94 16 27.845	188 43 43.7	8 44 48.3	Royalton north base	4.107607	12,811.7	42,033
		236 22 28.9	56 25 37.2	Royalton south base	3.834446	6,830.4	22,409
Rice, Catholic Church, spire, 1904, l. 1935 (n. d.)	45 45 13.444	103 48 01.9	283 44 01.0	Brockway (Suintax (M. R. C.), 1898).	3.873833	7,478.8	24,537
	94 12 55.820	159 00 56.4	338 59 29.0	Royalton north base	3.866475	7,353.2	24,125
		234 38 28.5	54 42 50.3	Alberta	3.985491	9,671.4	31,730
Rice, Protestant Church, 1904, l. 1935 (n. d.)	45 45 04.443	106 32 21.8	286 28 31.6	Brockway (Suintax (M. R. C.), 1898).	3.859843	7,241.7	23,759
	94 13 10.668	162 03 36.1	342 02 19.4	Royalton north base	3.875543	7,508.3	24,633
		234 24 21.7	54 28 54.2	Alberta	4.004066	10,094.1	33,117
Church (1 mile west of Alberta), 1904 (n. d.)	45 48 06.516	74 54 01.2	254 46 44.8	Brockway(Suintax (M. R. C.),1898).	4.134388	13,626.6	44,707
	94 08 23.078	100 09 41.4	280 04 58.4	Royalton north base	3.937391	8,657.5	28,404
		262 54 12.7	82 55 19.1	Alberta	3.303909	2,013.3	6,605
Buckman, Catholic Church, spire, 1904, r. 1935 (n. d.)	45 53 48.881	8 33 56.3	188 33 04.7	Alberta	4.018621	10,438.1	34,246
	94 05 38.564	53 11 06.8	233 04 25.5	Royalton north base	4.178430	15,081.0	49,478
		125 00 44.2	304 53 34.6	Falls	4.196235	15,712.1	51,549
Rich Prairie, Catholic Church, spire, 1904, r. 1935 (n. d.).	45 58 48.117	31 49 10.7	211 42 53.5	Royalton north base	4.332639	21,509.9	70,570
	94 06 12.488	34 22 49.3	214 13 58.5	Brockway(Suintax (M. R. C.),1898).	4.451713	28,295.2	92,832
		88 56 08.5	268 49 23.0	Falls	4.084236	12,140.5	39,831
Lake Alexander, tallest island, highest point, 1904 (n. d.).[1]	46 12 12.07	248 02 08	68 05 51	Rail	3.853108	7,130.3	23,393
	94 32 45.67	322 10 09	142 11 38	Johnson	3.634539	4,310.6	14,142
Brainerd, Brainerd Lumber Co., stack, 1905, l. 1935 (n. d.).	46 22 45.358	2 32 53.5	182 32 18.9	Daggett	4.362745	23,053.9	75,636
	94 10 26.833	114 40 13.6	294 31 26.7	Gull	4.232659	17,086.7	56,059
		256 11 01.5	76 15 32.9	Jones	3.916344	8,247.9	27,060
Brainerd, railroad shops, tallest stack, 1905, r. 1935 (d.)	46 21 30.014	123 00 25.6	302 52 11.8	Gull	4.239515	17,358.6	56,951
	94 11 12.281	232 07 36.1	52 19 48.3	Rabbit	4.436016	27,290.8	89,537
		244 25 35.9	64 30 40.2	Jones	3.998063	9,955.5	32,662
Brainerd, Catholic Church, spire, 1905, r. 1935 (d.) [1]	46 21 37.43	123 36 30	303 28 39	Gull	4.221862	16,667.2	54,682
	94 11 43.95	247 08 53	67 14 20	Jones	4.020325	10,479.1	34,380

[1] No check on this position.

Ninety-eighth meridian to Royalton to Duluth arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
Brainerd, other church spire, 1905 (n. d.) [1]	46 21 39.16	121 29 06	301 20 38	Gull	4.244695	17,566.9	57,634
	94 10 52.43	232 03 01	52 14 58	Rabbit	4.427852	26,782.6	87,869
Aitkin, water tower, 1904, l. 1935 (n. d.)	46 31 52.219	80 36 06.5	260 27 37.0	Rabbit	4.181072	15,173.0	49,780
	93 42 39.730	134 26 19.7	314 16 40.6	Brook	4.375128	23,720.7	77,824
		230 15 51.9	50 23 24.5	French	4.236417	17,235.2	56,546
Aitkin, high school, 1904, l. 1935 (n. d.)	46 32 01.843	79 27 53.6	259 19 25.7	Rabbit	4.181194	15,177.3	49,794
	93 42 41.978	134 00 08.5	313 50 31.0	Brook	4.370682	23,479.1	77,031
		231 07 59.4	51 15 33.6	French	4.232591	17,084.1	56,050
Aitkin, jail, 1904, l. 1935 (n. d.) [1]	46 31 57.91	80 05 54	259 57 17	Rabbit	4.188311	15,428.0	50,617
	93 42 28.99	230 13 46	50 21 10	French	4.229090	16,946.9	55,600
Bethlehem, church spire, 1905 (n. d.)	46 28 33.696	199 18 18.3	19 21 43.1	French	4.259041	18,156.9	59,570
	93 36 58.854	224 44 25.2	44 52 48.8	Kimberly	4.321751	20,977.4	68,823
		320 45 35.2	140 45 35.9	Bethlehem	1.498482	31.5	103
McGregor, Vandewater Sawmill, stack, 1905, l. 1935 (n. d.).	46 36 24.504	92 19 59.9	272 15 05.9	Kimberly	3.935310	8,616.1	28,268
	93 18 40.443	172 46 39.6	352 46 23.9	Gregor	3.560511	3,635.1	11,926
		338 23 33.3	158 24 46.9	Grindle	3.768339	5,866.0	19,245
McGregor, schoolhouse belfry, 1905, l. 1935 (n. d.)	46 36 23.753	92 25 19.0	272 20 16.8	Kimberly	3.947325	8,857.8	29,061
	93 18 29.122	169 07 00.4	349 06 36.5	Gregor	3.567720	3,695.9	12,126
		340 32 20.4	160 33 25.8	Grindle	3.760400	5,759.7	18,897
Peterson's (Wm.) house, chimney, 1905 (n. d.) [1]	46 34 40.52	130 55 38	310 53 28	Mahtowa	3.701692	5,031.4	16,507
	92 37 00.50	241 10 32	61 12 06	Atkinson	3.497838	3,146.6	10,323
Cloquet, Catholic Church, spire, 1905, l. 1935 (n. d.)	46 43 10.034	75 15 06.0	255 07 10.6	Sawyer	4.156993	14,354.7	47,095
	92 27 32.186	164 13 59.5	344 13 23.9	Cloquet	3.582510	3,823.9	12,546
		343 35 14.3	163 36 38.5	Carlton	3.939670	8,703.0	28,553
Cloquet, paper-mill stack, 1905, r. 1935 (n. d.)	46 43 30.437	133 29 22.0	313 27 31.6	Cloquet	3.646688	4,432.9	14,544
	92 25 49.614	278 34 58.6	98 42 10.9	Annie	4.105815	12,759.0	41,860
		358 13 42.0	178 13 51.5	Carlton	3.953438	8,983.3	29,473
Johnson's saw-mill, stack (½ mile southeast of Scanlon), 1905, l. 1935 (n. d.).	46 42 14.990	142 36 32.0	322 34 10.9	Cloquet	3.830773	6,772.9	22,221
	92 25 07.363	267 55 44.0	88 02 25.5	Annie	4.069158	11,726.2	38,472
		5 20 02.9	185 19 41.7	Carlton	3.824659	6,678.2	21,910
Scanlon, schoolhouse cupola, 1905, r. 1935 (d.) [2]	46 42 22.77	269 08 43	89 15 47	Annie	4.093336	12,397.6	40,674
	92 25 39.26	359 31 16	179 31 18	Carlton	3.838202	6,889.7	22,604
Scanlon, sawmill stack (southeast edge of town), 1905, l. 1935 (n. d.).[2]	46 42 15.92	268 08 05	88 15 02	Annie	4.085076	12,164.0	39,908
	92 25 28.03	1 33 19	181 33 13	Carlton	3.824809	6,680.5	21,918
Duluth, Union Match Co., water tank, 1904, r. 1935 (d.).	46 44 10.610	164 43 15.8	344 42 52.9	Duluth	3.403958	2,534.9	8,317
	92 09 34.917	248 54 35.5	68 58 08.4	Minnesota Point north base	3.822641	6,647.2	21,808
		329 48 52.9	149 52 08.4	Superior	4.055293	11,357.8	37,263
Duluth, Union Match Co., cupola, 1904, l. 1935 (n. d.)	46 44 11.127	165 28 23.6	345 28 02.0	Duluth	3.399592	2,509.5	8,233
	92 09 36.732	249 09 23.1	69 12 57.3	Minnesota Point north base	3.824614	6,677.5	21,908
		329 41 14.1	149 44 30.9	Superior	4.056561	11,391.0	37,372
Duluth & Superior Interstate Bridge, operator's tower, center of draw span, 1905, r. 1935 (n. d.).	46 44 58.310	100 32 06.7	280 29 06.8	Duluth	3.726746	5,330.2	17,487
	92 05 59.466	240 39 33.5	60 40 29.4	Minnesota Point north base	3.271688	1,869.3	6,133
		307 23 06.5	127 26 04.8	Minnesota Point south base	3.816028	6,546.8	21,479
Proctorknott, railway shops, water tank (Wis.), 1905, 1, 1935 (n. d.).[2]	46 44 41.75	251 16 47	71 19 17	Duluth	3.665364	4,627.7	15,183
	92 13 32.91	36 22 07	216 20 23	Annie	3.708843	5,115.0	16,781
West Duluth, Irving School, chimney, 1905, r. 1935 (n. d.).[1]	46 44 08.44	180 22 40	0 22 41	Duluth	3.400062	2,512.2	8,242
	92 10 07.17	326 43 58	146 47 37	Superior	4.066738	11,661.1	38,258
Superior, State Normal School, smaller and higher tower (Wis.), 1905, r. 1935 (n. d.).[1]	46 43 02.73	356 30 42	176 30 58	Superior	3.888668	7,738.7	25,389
	92 08 28.52	127 37 01	307 33 39	Duluth	3.871855	7,444.8	24,425
Superior, Elevator K, stack (Wis.), 1905, r. 1935 (n. d.)	46 42 44.620	153 48 13.8	333 46 48.6	Minnesota Point north base	3.749885	5,621.9	18,445
	92 02 45.743	262 05 23.4	82 06 00.6	Minnesota Point south base	3.040472	1,097.7	3,601
		22 39 28.0	202 37 45.7	Superior	3.890061	7,763.6	25,471
Superior, Elevator T, south gable (Wis.), 1905, r. 1935 (n. d.).[2]	46 42 26.58	341 52 22	161 53 36	Superior	3.842156	6,952.7	22,811
	92 06 48.10	143 21 53	323 19 28	Duluth	3.848329	7,052.3	23,137
Superior, St. Marys Hospital, spire (Wis.), 1905, r. 1935 (n. d.).[1]	46 43 33.05	194 30 59	14 31 31	Minnesota Point north base	3.564158	3,665.7	12,027
	92 05 25.98	357 14 41	177 14 55	Superior	3.938045	8,670.5	28,446
Superior, pierhead, Front Range Lighthouse (Wis.), 1905, r. 1935 (n. d.).[1]	46 42 32.32	107 24 29	287 23 31	Minnesota Point south base	3.249236	1,775.2	5,824
	92 00 34.81	114 21 39	294 14 43	Duluth	4.124375	13,316.0	43,688
Superior, pierhead, Rear Range Lighthouse (Wis.), 1905, r. 1935 (n. d.).[1]	46 42 22.62	116 20 36	296 13 55	Duluth	4.115632	13,050.6	42,817
	92 00 55.31	123 25 16	303 24 33	Minnesota Point south base	3.178316	1,507.7	4,947
Superior, Elevator S, Great Northern Railway, south gable (Wis.), 1905, r. 1935 (n. d.).	46 44 29.330	297 29 17.6	117 32 40.4	Minnesota Point south base	3.824246	6,671.8	21,889
	92 06 33.212	349 55 48.7	169 56 51.9	Superior	4.023701	10,560.9	34,649
		112 26 39.5	292 24 04.2	Duluth	3.689755	4,895.0	16,060
Boylston, Great Northern Railway, signal tower (Wis.), 1905 (n. d.).[1]	46 35 47.37	210 45 22	30 47 18	Superior	3.823222	6,656.1	21,838
	92 07 46.44	16 22 22	196 21 09	Dedham	3.883610	7,649.1	25,095

[1] No check on this position.

[2] Checked by vertical angles only.

Ninety-eighth meridian to Royalton to Duluth arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance: Logarithm (meters)	Distance: Meters	Distance: Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
Duluth, Brewing & Malting Co., dome, 1905, r. 1935 (n. d.).[2]	46 45 27.34	91 32 50	271 31 13	Duluth	3.452507	2,834.7	9,300
	92 07 52.87	269 42 22	89 44 41	Minnesota Point north base	3.605988	4,036.3	13,242
Duluth, church spire, 1905 (n. d.) [1]	46 47 15.91	328 29 06	148 30 16	Minnesota Point north base	3.592113	3,909.4	12,826
	92 06 18.97	354 19 39	174 20 32	Superior	4.193640	15,618.5	51,242
Duluth, house at head of West Fifth Avenue (chimney in center of 4-pitch roof), 1905 (n. d.).	46 47 14.514	321 22 34.0	141 24 04.3	Minnesota Point north base	3.624343	4,210.6	13,814
	92 06 46.526	352 10 33.5	172 11 46.5	Superior	4.194362	15,644.5	51,327
		52 41 34.3	232 39 08.7	Duluth	3.726952	5,332.8	17,496
Duluth, Elevator B, stack, 1905, r. 1935 (d.) [1]	46 46 19.48	307 51 44	127 52 54	Minnesota Point north base	3.413539	2,591.4	8,502
	92 06 19.08	72 22 37	252 19 52	Duluth	3.704285	5,061.6	16,606
Duluth, high school cupola, spire, 1905, r. 1935 (n. d.) [2]	46 47 20.62	334 46 48	154 47 44	Minnesota Point north base	3.584873	3,844.8	12,614
	92 05 59.88	355 51 08	175 51 47	Superior	4.196694	15,728.7	51,603
Duluth, Incline Pavilion, Weather Bureau, signal tower, 1905, r. 1935 (n. d.) [1]	46 47 08.04	318 03 04	138 04 39	Minnesota Point north base	3.618470	4,154.0	13,629
	92 06 53.53	351 31 44	171 33 02	Superior	4.189423	15,467.6	50,747
Duluth, Elevator H, stack, 1905, r. 1935 (d) [2]	46 45 56.85	292 44 02	112 45 15	Minnesota Point north base	3.363043	2,307.0	7,569
	92 06 22.94	80 01 53	259 59 10	Duluth	3.682585	4,814.9	15,797
Duluth, aerial bridge, southwest column of north pier, 1905, r. 1935 (n. d.)[1].	46 46 46.12	335 15 20	155 15 58	Minnesota Point north base	3.424408	2,657.1	8,718
	92 05 35.09	67 45 49	247 42 32	Duluth	3.793814	6,220.3	20,408
South Superior, Webster Chair Manufacturing Co., stack (Wis.), 1905, l. 1935 (n. d.).	46 40 17.725	108 45 43.7	288 38 55.8	Annie	4.099564	12,576.6	41,262
	92 06 35.101	155 02 59.3	335 00 25.6	Duluth	4.026541	10,630.2	34,876
		324 20 00.0	144 21 04.6	Superior	3.509992	3,235.9	10,616
South Superior, Bryant School, northeast corner of northwest chimney (Wis.), 1905, r. 1935 (n. d.).	46 39 59.515	110 01 22.3	289 54 09.1	Annie	4.129075	13,460.9	44,163
	92 06 00.313	152 53 23.4	332 50 24.3	Duluth	4.059189	11,460.1	37,599
		330 58 20.0	150 58 59.2	Superior	3.373593	2,363.7	7,755
South Superior, Billings School, belfry (Wis.), 1905, r. 1935 (n. d.).	46 39 29.182	16 17 08.9	196 14 47.6	Dedham	4.169679	14,780.2	48,491
	92 06 13.132	156 02 08.8	335 59 19.0	Duluth	4.085935	12,188.1	39,987
		308 31 22.0	128 32 10.5	Superior	3.258739	1,814.4	5,953
Superior, ore docks, Weather Bureau, signal tower (Wis.), 1905 (n. d.).	46 42 08.877	28 18 20.7	208 12 29.6	Dedham	4.336587	21,706.4	71,215
	92 01 24.657	37 53 13.7	217 50 32.4	Superior	3.885243	7,677.9	25,190
		153 09 20.2	333 08 58.4	Minnesota Point south base	3.148063	1,406.3	4,614
East Superior, Presbyterian Church, spire (Wis.), 1905, r. 1935 (n. d.).	46 42 29.956	18 18 16.7	198 17 00.8	Superior	3.849398	7,069.7	23,195
	92 03 21.968	122 55 57.4	302 51 02.9	Duluth	4.009710	10,226.1	33,550
		162 41 31.1	342 40 32.3	Minnesota Point north base	3.760252	5,757.7	18,890
East Superior, Lincoln School, flagstaff in center of tower (Wis.), 1905, l. 1935 (n. d.).	46 43 11.542	169 23 55.5	349 23 28.4	Minnesota Point north base	3.632039	4,285.9	14,061
	92 04 05.530	283 43 48.9	103 45 24.2	Minnesota Point south base	3.456933	2,863.7	9,395
		9 11 31.8	189 10 47.5	Superior	3.908503	8,100.3	26,576
Saunders, Great Northern Railway, water tank (Wis.), 1905, l. 1935 (n. d.).	46 38 18.059	17 16 18.9	197 14 11.8	Dedham	4.098900	12,557.4	41,199
	92 06 32.670	161 12 45.9	341 10 10.3	Duluth	4.148717	14,083.7	46,206
		239 50 28.7	59 51 31.4	Superior	3.326810	2,122.3	6,963
Itasca, Chicago, St. Paul, Minneapolis and Omaha Railway, elevator stack (Wis.), 1905, r. 1935 (n. d.).	46 41 30.089	48 22 06.4	228 18 59.3	Superior	3.864356	7,317.4	24,007
	92 00 49.193	122 05 06.1	301 58 20.4	Duluth	4.144789	13,956.9	45,790
		150 29 16.3	330 28 28.7	Minnesota Point south base	3.449976	2,818.2	9,246

Duluth to Keweenaw Point arc

Principal points							
Minnesota Point south base (U. S. L. S.), 1870, r. 1935 (d. m.).	46 42 49.509	29 08 51.25	209 06 31.69	Superior	3.9230004	8,375.30	27,478.0
	92 01 54.555	115 24 36.91	295 18 38.75	Duluth	4.0628051	11,555.94	37,913.1
Minnesota Point north base (U. S. L. S.), 1870, r. 1935 (d. m.).	46 45 27.966	323 52 16.82	143 54 19.25	Minnesota Point south base (U. S. L. S.).	3.7822355	6,056.692	19,871.00
	92 04 42.683						
		2 21 48.44	182 21 31.20	Superior	4.0870533	12,219.50	40,090.1
		90 30 15.21	270 26 19.40	Duluth	3.8369679	6,870.18	22,539.9
Lester River (U. S. L. S.), 1871 (d. m.)	46 51 55.181	11 27 35.06	191 25 37.85	Minnesota Point south base (U. S. L. S.).	4.2353219	17,191.82	56,403.5
	91 59 13.742						
		30 17 11.67	210 13 11.84	Minnesota Point north base (U. S. L. S.).	4.1412071	13,842.26	45,414.1
Oneota River (U. S. L. S.), 1870, r. 1871 (d. m.)	46 45 18.610	222 14 44.09	42 21 07.25	Lester River (U. S. L. S.)	4.2189691	16,556.52	54,319.2
	92 07 59.281	266 01 08.56	86 03 31.77	Minnesota Point north base (U. S. L. S.).	3.6214267	4,182.41	13,721.8
		300 41 48.94	120 46 14.52	Minnesota Point south base (U. S. L. S.).	3.9546815	9,009.10	29,557.4
Aminicon River (U. S. L. S.) (Wis.), 1871 (d. m.)	46 41 32.207	100 28 22.54	280 20 57.46	Minnesota Point south base (U. S. L. S.).	4.1208726	13,209.08	43,336.8
	91 51 43.015						
		113 48 50.98	293 39 23.33	Minnesota Point north base (U. S. L. S.).	4.2573537	18,086.47	59,338.7
		153 36 56.60	333 31 28.15	Lester River (U. S. L. S.)	4.3320832	21,482.42	70,480.2

[1] No check on this position.

[2] Checked by vertical angles only.

218328°—36——5

Duluth to Keweenaw Point arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″	° ′ ″	° ′ ″				
Buchanan (U. S. L. S.), 1871 (d. m.)	46 56 28.140	11 27 14.09	191 24 01.74	Aminicon River (U. S. L. S.)	4.4506434	28,225.61	92,603.5
	91 47 19.229	60 56 19.32	240 47 37.58	Lester River (U. S. L. S.)	4.2383816	17,313.37	56,802.3
Brule River (U. S. L. S.) (Wis.), 1871 (d. m.)	46 45 17.948	71 39 56.88	251 27 59.88	Aminicon River (U. S. L. S.)	4.3433007	22,044.52	72,324.4
	91 35 18.206	112 05 44.34	291 48 17.70	Lester River (U. S. L. S.)	4.5160733	32,815.07	107,660.8
		143 38 23.96	323 29 37.94	Buchanan (U. S. L. S.)	4.4103202	25,722.92	84,392.6
Burlington (U. S. L. S.), 1871 (d. m.)	47 01 49.527	352 28 31.43	172 30 50.55	Brule River (U. S. L. S.)	4.4897425	30,884.64	101,327.4
	91 38 28.766	48 32 05.47	228 25 37.60	Buchanan (U. S. L. S.)	4.1752861	14,972.22	49,121.4
Clay Banks (U. S. L. S.) (Wis.), 1871 (d. m.)	46 49 05.670	71 43 41.84	251 31 34.36	Brule River (U. S. L. S.)	4.3484916	22,309.59	73,194.0
	91 18 40.040	133 17 05.79	313 02 37.48	Burlington (U. S. L. S.)	4.5375760	34,480.69	113,125.4
Split Rock (U. S. L. S.), 1870, r. 1871 (d. m.)	47 11 16.096	352 03 25.99	172 06 43.74	Clay Banks (U. S. L. S.)	4.6178350	41,479.64	136,087.8
	91 23 10.422	47 59 31.37	227 48 18.54	Burlington (U. S. L. S.)	4.4165839	26,096.60	85,618.6
Detour (U. S. L. S.) (Wis.), 1870, r. 1908 (d. m.)	46 56 36.734	62 00 43.05	241 45 44.26	Clay Banks (U. S. L. S.)	4.4706995	29,559.67	96,980.3
	90 58 08.719	130 44 52.95	310 26 33.40	Split Rock (U. S. L. S.)	4.6204680	41,731.88	136,915.3
West Sawteeth (U. S. L. S.), 1870 (d. m.)	47 22 19.139	340 06 41.63	160 16 38.71	Detour (U. S. L. S.)	4.7043770	50,626.40	166,096.8
	91 11 43.036	35 16 27.54	215 08 02.53	Split Rock (U. S. L. S.)	4.3989728	25,059.52	82,216.1
Outer Island (U. S. L. S.) (Wis.), 1870 (d. m.)	47 04 17.148	70 42 24.35	250 19 13.09	Detour (U. S. L. S.)	4.6296263	42,621.26	139,833.2
	90 26 26.650	120 35 21.03	300 02 07.22	West Sawteeth (U. S. L. S.)	4.8208756	66,202.68	217,200.0
Farquhars Knob (U. S. L. S.), 1869, r. 1934 (d. m.)	47 52 40.248	20 55 51.67	200 35 55.20	Outer Island (U. S. L. S.)	4.9817507	95,885.00	314,582.7
	89 59 23.202	58 37 08.32	237 43 42.20	West Sawteeth (U. S. L. S.)	5.0279546	106,648.46	349,895.8
		143 06 56.68	323 01 50.73	Devilfish (G. S. of C.)	4.1535379	14,240.91	46,722.1
		186 28 23.96	6 30 32.52	Whitefish (G. S. of C.)	4.5010681	31,700.64	104,004.5
		238 44 43.27	58 55 28.98	Pigeon (G. S. of C.)	4.3243596	21,103.75	69,237.9
East Sawteeth (U. S. L. S.), 1870 (d. m.)	47 23 19.069	238 03 59.14	58 56 20.80	Farquhars Knob (U. S. L. S.)	5.0174686	104,104.29	341,548.8
	91 10 15.211	302 15 33.31	122 47 42.93	Outer Island (U. S. L. S.)	4.8167925	65,583.18	215,167.5
Porcupine Mountains (U. S. L. S.) (Mich.), 1869, r. 1870 (d. m.).	46 47 01.127	122 06 57.52	301 03 40.02	East Sawteeth (U. S. L.S .)	5.1085319	128,390.21	421,226.9
	89 43 50.263	170 56 51.57	350 45 25.56	Farquhars Knob (U. S. L. S.)	5.0906692	123,216.59	404,253.1
Wheal Kate (U. S. L. S.) (Mich.), 1869, r. 1934 (d. m.)	47 04 20.333	68 51 50.39	248 05 01.16	Porcupine Mountains (U. S. L. S.)	4.9417881	87,455.70	286,927.6
	88 39 44.669	132 19 04.90	311 20 23.04	Farquhars Knob (U. S. L. S.)	5.1280176	134,281.94	440,55.67
Isle Royale East (U. S. L. S.) (Mich.), 1869, r. 1906 (d. m.).	48 07 43.612	3 46 30.42	183 41 59.17	Wheal Kate (U. S. L. S.)	5.0708155	117,710.57	386,188.8
	88 33 37.364	75 52 22.97	254 48 38.57	Farquhars Knob (U. S. L. S.)	5.0423902	110,252.94	361,721.5
		79 35 13.16	258 42 12.84	Pigeon (G. S. of C.)	4.9550268	90,162.67	295,808.7
		96 39 15.97	275 57 51.39	Blake (G. S. of C.)	4.8409264	69,330.83	227,462.9
Supplementary points							
Outer Island latitude station (U. S. L. S.) (Wis.), 1870 (d. m.).[1]	47 04 17.50 90 26 26.49	17 16 42	197 16 42	Outer Island (U. S. L. S.)	1.052269	11.28	37.0
Farquhars Knob latitude station (U. S. L. S.), 1869 (d. m.).[1]	47 52 40.19 89 59 22.84	103 20 29	283 20 29	Farquhars Knob (U. S. L. S.)	0.892123	7.80	25.6
East Sawteeth latitude station (U. S. L. S.), 1870 (d. m.).[1]	47 23 19.52 91 10 15.50	336 35 22	156 35 23	East Sawteeth (U. S. L. S.)	1.184054	15.28	50.1
Porcupine Mountains latitude station (U. S. L. S.) (Mich.), 1870 (d. m.).[1]	46 47 01.57 89 43 50.06	17 52 52	197 52 52	Porcupine Mountains (U. S. L. S.)	1.158222	14.40	47.2
Wheal Kate latitude station (U. S. L. S.) (Mich.), 1866, r. 1870 (d. m.).[1]	47 04 20.65 88 39 43.32	70 50 29	250 50 29	Wheal Kate (U. S. L. S.)	1.477300	30.01	98.5
Isle Royale East, latitude station (U. S. L. S.) (Mich.), 1866, r. 1906 (d. m.).[1]	48 07 43.65 88 33 36.07	87 16 50	267 16 49	Isle Royale East (U. S. L. S.)	1.428380	26.82	88.0

Ninety-eighth meridian to Albert Lea to Fond du Lac arc

Principal points							
Baltic (S. Dak.), 1927, r. 1935 (d. m.)	43 46 53.395 96 40 03.898	35 48 12		Reference mark no. 1.			
Corson (S. Dak.), 1927, r. 1935 (d. m.)	43 37 38.106 96 30 52.326	144 16 30.52 153 01 51	324 10 09.42	Baltic Reference mark no. 2.	4.3247747	21,123.93	69,304.1
Post, 1927, r. 1935 (d. m.)	43 43 59.057 96 20 23.961	50 11 16.34 101 38 04.78 269 10 57	230 04 02.37 281 24 28.73	Corson Baltic Reference mark no. 1.	4.2633862 4.4303797	18,339.44 26,938.89	60,168.6 88,382.0
Luverne, 1927, r. 1928 (d. m.)	43 37 10.691 96 17 52.320	92 50 40.72 164 55 48.73 305 50 16	272 41 42.58 344 54 04.01	Corson Post Reference mark no. 1.	4.2432523 4.1157078	17,508.64 13,052.92	57,442.9 42,824.5
Hardwick, 1927, r. 1935 (d. m.)	43 47 22.067 96 16 07.326	7 06 43.07 42 31 19.43 88 33 36.36 115 36 54	187 05 30.53 222 28 21.93 268 17 02.31	Luverne Post Baltic Reference mark no. 1.	4.2790857 3.9293056 4.5069685	19,014.54 8,497.78 32,134.27	62,383.5 27,879.1 105,427.2

[1] No check on this position.

Ninety-eighth meridian to Albert Lea to Fond du Lac arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″	° ′ ″	° ′ ″				
Lismore, 1927, r. 1935 (d. m.)	43 45 40.835	58 30 28.65	238 17 19.35	Luverne	4.4777827	30,045.72	98,575.0
	95 58 49.672	97 46 03.03	277 34 05.14	Hardwick	4.3695028	23,415.46	76,822.2
		88 58 43		Reference mark no. 2.			
Adrian, 1927, r. 1934 (d. m.)	43 36 06.170	93 46 46.41	273 30 45.27	Luverne	4.4957114	31,312.04	102,729.6
	95 54 38.863	125 59 20.02	305 44 29.91	Hardwick	4.5515006	35,604.15	116,811.3
		162 26 53.09	342 23 59.87	Lismore	4.2696075	18,604.05	61,036.8
		88 41 27		Reference mark no. 2.			
Wilmont, 1927, r. 1934 (d. m.)	43 45 40.719	12 36 42.03	192 34 39.87	Adrian	4.2593353	18,169.18	59,610.1
	95 51 41.987	90 03 45.47	269 58 49.66	Lismore	3.9807760	9,567.00	31,387.7
		95 35 34.90	275 18 41.12	Hardwick	4.5174569	32,919.78	108,004.3
		299 32 47		Reference mark no. 2.			
Reading, 1927, r. 1934 (d. m.)	43 43 51.308	47 31 59.79	227 23 57.57	Adrian	4.3270484	21,234.81	69,667.9
	95 43 00.458	106 11 20.33	286 05 19.71	Wilmont	4.0845016	12,147.91	39,855.3
		261 36 58		Azimuth mark.			
Donner, 1927, r. 1934 (d. m.)	43 36 13.922	89 17 36.18	269 08 36.93	Adrian	4.2439948	17,538.60	57,541.2
	95 41 36.948	142 17 32.33	322 10 34.45	Wilmont	4.3449440	22,128.09	72,598.6
		172 27 28.48	352 26 30.82	Reading	4.1534942	14,239.48	46,717.4
		267 07 18		Azimuth mark.			
Kay, 1927, r. 1934 (d. m.)	43 41 55.425	69 00 15.11	248 46 14.35	Donner	4.4662761	29,260.12	95,997.6
	95 21 18.930	97 07 22.03	276 52 22.58	Reading	4.4676880	29,355.40	96,310.2
		180 01 23		Reference mark no. 2.			
Kluever, 1927 (d. m.)	43 34 21.189	98 07 13.89	277 54 34.51	Donner	4.3971049	24,951.97	81,863.3
	95 23 15.556	123 38 34.88	303 24 56.97	Reading	4.5031659	31,854.14	104,508.1
		190 33 08.47	10 34 28.95	Kay	4.1541319	14,260.41	46,786.0
		90 26 59		Reference mark no. 2.			
Tusa, 1927, r. 1934 (d. m.)	43 34 34.722	89 11 47.84	268 58 24.49	Kluever	4.4175538	26,154.95	85,810.0
	95 03 50.090	120 09 02.65	299 56 58.85	Kay	4.4339435	27,160.86	89,110.3
		312 39 19		Reference mark no. 1.			
Firence, 1927, r. 1934 (d. m.)	43 42 08.097	348 23 59.67	168 25 28.00	Tusa	4.1548284	14,283.30	46,861.1
	95 05 58.091	58 18 55.91	238 06 59.96	Kluever	4.4370801	27,357.73	89,756.2
		89 00 06.26	268 49 30.06	Kay	4.3143532	20,623.07	67,660.9
		347 46 52		Azimuth mark (1934).			

Jackson west base, 1927 (d. m.)	43 37 50.965	53 03 22.96	232 59 15.62	Tusa	4.0029780	10,068.81	33,034.1
	94 57 51.447	126 05 43.56	306 00 07.56	Firence	4.1298582	13,485.22	44,242.8
		273 26 38		Reference mark no. 2.			
Alpha, 1927, r. 1934 (d. m.)	43 35 16.391	84 29 54.98	264 23 08.90	Tusa	4.1231363	13,278.11	43,563.3
	94 54 01.049	128 24 00.32	308 15 45.43	Firence	4.3114771	20,486.94	67,214.2
		132 44 16.35	312 41 37.43	Jackson west base	3.8471008	7,032.35	23,072.0
		267 56 45		Reference mark no. 2.			
Motl, 1927, r. 1935 (d. m.)	43 43 04.120	2 15 18.36	182 15 00.86	Alpha	4.1597584	14,446.36	47,396.1
	94 53 35.711	30 40 57.55	210 38 00.94	Jackson west base	4.0505765	11,235.09	36,860.5
		84 07 56.24	263 59 23.25	Firence	4.2229860	16,710.37	54,823.9
		266 51 20		Reference mark no. 1.			
Jackson east base, 1927, r. 1935 (d. m.)	43 38 35.579	53 49 15.80	233 44 57.55	Alpha	4.0172385	10,404.91	34,136.8
	94 47 46.676	84 15 30.31	264 08 32.96	Jackson west base	4.1343689	13,626.016	44,704.69
		136 42 13.73	316 38 12.68	Motl	4.0566564	11,393.48	37,380.1
		250 38 35		Reference mark no. 2.			
Grupe, 1927, r. 1934 (d. m.)	43 35 17.739	89 58 55.97	269 47 51.12	Alpha	4.3351065	21,632.49	70,972.6
	94 37 56.766	114 50 02.29	294 43 15.36	Jackson east base	4.1634296	14,569.00	47,798.5
		124 27 52.44	304 17 04.30	Motl	4.4064278	25,493.40	83,639.6
		11 08 52		Azimuth mark.			
Senne, 1927, r. 1935 (d. m.)	43 44 13.361	358 31 31.59	178 31 44.69	Grupe	4.2184312	16,536.03	54,252.0
	94 38 15.734	50 51 54.11	230 45 19.73	Jackson east base	4.2174242	16,497.73	54,126.3
		84 09 47.85	263 59 11.94	Motl	4.3159998	20,701.40	67,917.8
		359 15 24		Reference mark no. 2.			
Fairmont, 1927 (d. m.)	43 38 57.286	65 36 13.66	245 28 35.38	Grupe	4.2138952	16,364.22	53,688.3
	94 26 52.448	122 34 57.65	302 27 05.64	Senne	4.2558006	18,146.82	59,536.7
		251 06 05		Reference mark no. 1.			
Wilbert, 1927 (d. m.)	43 34 22.250	97 35 08.32	277 28 30.30	Grupe	4.1161819	13,067.18	42,871.2
	94 28 19.382	192 55 36.03	12 56 36.00	Fairmont	3.9399771	8,709.18	28,573.4
		90 11 46		Reference mark no. 1.			
Granada, 1927 (d. m.)	43 44 18.844	38 39 43.20	218 35 38.57	Fairmont	4.1039199	12,703.40	41,677.7
	94 20 58.330	89 40 55.06	269 28 57.84	Senne	4.3657811	23,215.66	76,166.7
		347 55 11		Reference mark no. 2.			
Chain, 1927 (d. m.)	43 35 13.787	80 01 37.54	259 57 00.71	Wilbert	3.9613839	9,149.22	30,017.1
	94 21 37.812	134 23 03.50	314 19 26.45	Fairmont	3.9941669	9,866.59	32,370.6
		183 00 23.59	3 00 50.85	Granada	4.2264707	16,844.99	55,265.6
		270 27 53		Reference mark no. 1.			
Guckeen, 1927 (d. m.)	43 40 25.188	43 56 15.07	223 51 30.43	Chain	4.1250668	13,337.26	43,757.3
	94 14 45.297	130 50 35.14	310 46 17.39	Granada	4.0427523	11,034.49	36,202.3
		280 48 19		Reference mark no. 2.			

Ninety-eighth meridian to Albert Lea to Fond du Lac arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″	° ′ ″	° ′ ″				
Winnebago, 1927 (d. m.)	43 44 46.189	43 37 07.86	223 33 11.22	Guckeen	4.0461315	11,120.68	36,485.1
	94 09 02.840	43 49 42.49	223 41 01.21	Chain	4.3884177	24,457.82	80,242.0
		87 03 04.59	266 54 49.89	Granada	4.2049947	16,032.26	52,599.2
		89 39 06		Reference mark no. 2.			
Kennedy, 1927 (d. m.)	43 36 49.980	79 33 14.31	259 25 02.50	Chain	4.2113455	16,268.42	53,374.0
	94 09 44.663	134 36 59.42	314 33 31.93	Guckeen	3.9759500	9,461.28	31,040.9
		183 38 35.66	3 39 04.54	Winnebago	4.1681088	14,726.81	48,316.2
		2 09 15		Reference mark no. 1.			
Easton, 1927 (d. m.)	43 42 57.753	58 59 05.19	238 49 25.27	Kennedy	4.3419635	21,976.75	72,102.1
	93 55 44.730	100 41 18.53	280 32 06.82	Winnebago	4.2594244	18,172.91	59,622.3
		344 12 55		Reference mark no. 2.			
Frost, 1927 (d. m.)	43 35 25.535	98 04 53.79	277 55 23.78	Kennedy	4.2723106	18,720.21	61,417.9
	93 55 58.128	134 37 10.20	314 28 08.37	Winnebago	4.3921211	24,667.27	80,929.2
		181 13 52.11	1 14 01.36	Easton	4.1448769	13,959.73	45,799.5
		225 10 27		Reference mark no. 1.			
Walters, 1927 (d. m.)	43 34 40.499	94 33 43.73	274 24 39.41	Frost	4.2496362	17,767.91	58,293.6
	93 42 48.588	131 29 40.08	311 20 44.38	Easton	4.3654269	23,196.74	76,104.6
Shorty, 1927 (d. m.)	43 43 28.348	353 20 00.54	173 20 59.11	Walters	4.2148770	16,401.25	53,809.8
	93 44 13.447	86 34 28.11	266 26 30.34	Easton	4.1904111	15,502.84	50,862.2
		270 50 43		Reference mark no. 2.			
Wells, 1927 (d. m.)	43 42 51.489	13 33 03.59	193 31 11.24	Walters	4.1927343	15,585.99	51,135.0
	93 40 05.826	101 7 15.77	281 34 24.63	Shorty	3.7526995	5,658.48	18,564.5
		358 17 24		Reference mark no. 2.			
Kiester, 1926, r. 1928 (d. m.)	43 34 55.042	59 33 17.45	239 32 53.99	Walters	2.9472807	885.69	2,905.8
	93 42 14.557	92 59 40.59	272 50 12.79	Frost	4.2671782	18,500.28	60,696.3
		129 26 46.54	309 17 27.33	Easton	4.3708150	23,486.32	77,054.7
		170 27 53.17	350 26 31.10	Shorty	4.2058609	16,064.27	52,704.2
		191 05 17.96	11 06 46.82	Wells	4.1756456	14,984.62	49,162.0
		84 29 39		Reference mark no. 2.			
Schmidt, 1926, r. 1927 (d. m.)	43 38 25.420	71 11 08.74	251 01 25.29	Kiester	4.3020955	20,049.13	65,777.9
	93 28 08.687	117 08 36.38	297 00 21.13	Wells	4.2562691	18,041.35	59,190.7
		150 54 34		Reference mark no. 2.			
Sletten, 1926 (d. m.)	43 30 02.790	140 46 24.91	320 42 38.73	Kiester	4.0662636	11,648.33	38,216.2
	93 36 46.234	216 46 21.23	36 52 17.94	Schmidt	4.2873084	19,377.97	63,575.9
		6 26 26		Reference mark no. 2.			
Brua (Iowa), 1926, r. 1934 (d. m.)	43 28 08.706	106 48 35.73	286 42 37.73	Sletten	4.0866946	12,209.41	40,057.0
	93 28 05.997	123 25 43.46	303 15 59.08	Kiester	4.3581636	22,812.01	74,842.4
		179 49 06.47	359 49 04.62	Schmidt	4.2795065	19,032.97	62,444.0
Scarville (Iowa), 1926, r. 1934 (d. m.)	43 25 36.199	159 36 14.96	339 32 58.17	Kiester	4.2649016	18,403.55	60,379.0
	93 37 28.690	186 36 46.35	6 37 15.56	Sletten	3.9181626	8,282.52	27,173.6
		207 51 20.35	27 57 46.07	Schmidt	4.4291699	26,863.95	88,136.1
		249 32 30.49	69 38 57.45	Brua	4.1303200	13,499.57	44,289.8
		89 36 05		Reference mark no. 2.			
Freeborn, 1926, r. 1927 (d. m.)	43 44 57.982	356 18 42.05	176 19 06.12	Schmidt	4.0842392	12,140.57	39,831.2
	93 28 43.530	44 23 48.04	224 14 28.06	Kiester	4.4151165	26,008.57	85,329.8
		75 43 27.92	255 35 46.26	Wells	4.1975855	15,761.06	51,709.4
		42 01 53		Reference mark no. 2.			
Nelson, 1927 (d. m.)	43 45 32.441	43 22 37.74	223 16 14.24	Schmidt	4.2580560	18,115.74	59,434.7
	93 18 53.601	85 26 58.80	265 20 10.82	Freeborn	4.1219083	13,240.62	43,440.3
		154 06 02		Reference mark no. 2.			
Albert Lea west base, 1927, r. 1931 (d. m.)	43 39 40.670	83 38 41.05	263 28 07.64	Schmidt	4.3158698	20,695.21	67,897.5
	93 12 51.054	114 45 22.73	294 34 24.61	Freeborn	4.3704588	23,467.06	76,991.5
		143 15 05.49	323 10 54.97	Nelson	4.1321109	13,555.36	44,472.9
		180 11 41		Reference mark no. 1.			
Newry, 1927 (d. m.)	43 48 43.860	24 28 18.67	204 24 23.30	Albert Lea west base	4.2651539	18,414.25	60,414.1
	93 07 10.616	69 28 09.72	249 20 03.28	Nelson	4.2251131	16,792.41	55,093.1
		2 36 03		Reference mark no. 2.			
Albert Lea east base, 1927 (d. m.)	43 39 34.257	91 26 56.29	271 22 49.37	Albert Lea west base	3.9039810	8,016.430	26,300.57
	93 06 53.396	124 30 09.44	304 21 51.78	Nelson	4.2911441	19,549.88	64,139.9
		178 42 00.61	358 41 48.71	Newry	4.2295959	16,966.64	55,664.7
		114 44 01		Reference mark no. 2.			
Sargeant, 1927, r. 1935 (d. m.)	43 49 16.516	54 54 10.44	234 41 03.54	Albert Lea east base	4.4937326	31,169.70	102,262.6
	92 47 55.259	87 52 32.94	267 39 13.02	Newry	4.4122972	25,840.28	84,777.7
		283 22 58		Reference mark no. 1.			
Elkton, 1927, r. 1935 (d. m.)	43 40 04.172	88 37 47.17	268 19 54.50	Albert Lea east base	4.5418589	34,822.42	114,246.6
	92 40 59.757	114 40 37.94	294 22 31.86	Newry	4.5870107	38,637.65	126,763.7
		151 25 57.63	331 21 10.33	Sargeant	4.2881889	19,417.30	63,704.9
		106 55 31		Reference mark no. 2.			

Ninety-eighth meridian to Albert Lea to Fond du Lac arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance: Logarithm (meters)	Distance: Meters	Distance: Feet
Principal points—Continued	° ′ ″	° ′ ″	° ′ ″				
Stewart, 1927, r. 1935 (d. m.)	43 49 27.588	26 29 46.93	206 25 19.49	Elkton	4.2883190	19,423.12	63,724.0
	92 34 32.977	88 59 06.95	268 49 51.43	Sargeant	4.2536120	17,931.31	58,829.6
		121 50 15		Reference mark no. 2.			
Meadow, 1927, l. 1933 (d. m.)	43 41 01.637	82 51 10.10	262 43 57.76	Elkton	4.1503320	14,136.18	46,378.5
	92 30 33.695	123 20 32.97	303 08 32.68	Sargeant	4.4450087	27,861.77	91,409.8
		161 06 00.19	341 03 14.71	Stewart	4.2176736	16,507.21	54,157.4
		2 43 07		Reference mark no. 1.			
Anderson, 1927, r. 1935 (d. m.)	43 49 41.457	36 06 09.41	216 00 08.38	Meadow	4.2976205	19,843.60	65,103.5
	92 21 51.664	88 37 54.64	268 29 07.45	Stewart	4.2308819	17,016.96	55,829.8
		148 37 32		Reference mark no. 2.			
Wykoff, 1927, r. 1934 (d. m.)	43 40 59.144	90 19 38.95	270 10 41.29	Meadow	4.2414538	17,436.28	57,205.5
	92 17 35.236	124 40 18.01	304 28 34.18	Stewart	4.4417357	27,652.58	90,723.5
		160 26 07.80	340 23 10.46	Anderson	4.2332601	17,110.40	56,136.4
		221 59 49		Reference mark no. 1.			
Chatfield, 1927, r. 1935 (d. m.)	43 52 36.734	24 37 16.72	204 32 12.04	Wykoff	4.3742888	23,674.93	77,673.5
	92 10 14.874	70 53 59.08	250 45 56.34	Anderson	4.2168618	16,476.38	54,056.3
		344 33 15		Reference mark no. 2.			
Fountain, 1927, r. 1935 (d. m.)	43 44 37.284	65 08 01.93	245 00 34.80	Wykoff	4.2033891	15,973.10	52,405.1
	92 06 48.213	115 00 41.20	294 50 16.04	Anderson	4.3478366	22,275.97	73,083.7
		162 41 01.65	342 38 38.58	Chatfield	4.1903743	15,501.52	50,857.9
		40 27 56		Reference mark no. 1.			
Pilot, 1927, r. 1935 (d. m.)	43 50 16.781	45 08 47.42	225 03 21.97	Fountain	4.1715583	14,844.25	48,701.5
	91 58 57.917	106 00 35.17	285 52 46.13	Chatfield	4.1965548	15,723.70	51,586.8
		247 52 38		Reference mark no. 1.			
Highland, 1927, r. 1935 (d. m.)	43 40 59.205	109 12 51.90	289 02 52.99	Fountain	4.3125265	20,536.50	67,376.8
	91 52 21.541	131 59 32.43	311 47 09.80	Chatfield	4.5084229	32,242.07	105,780.9
		152 46 40.67	332 42 06.52	Pilot	4.2868698	19,358.42	63,511.7
		198 57 54		Reference mark no. 1.			
Hart, 1927, r. 1935 (d. m.)	43 54 13.139	25 59 09.19	205 53 00.32	Highland	4.4353217	27,247.19	89,393.5
	91 43 28.542	70 43 16.49	250 32 32.40	Pilot	4.3423501	21,996.32	72,166.3
		260 29 56		Reference mark no. 2.			
Bratsberg, 1927, r. 1935 (d. m.)	43 44 48.499	51 26 41.65	231 22 07.93	Highland	4.0547897	11,344.61	37,219.8
	91 45 45.460	119 50 21.48	299 41 13.06	Pilot	4.3098405	20,409.88	66,961.4
		189 56 39.92	9 58 14.73	Hart	4.2478052	17,693.15	58,048.3
		281 46 05		Reference mark no. 1.			
Ridgeway west base, 1927, r. 1935 (d. m.)	43 54 43.742	42 41 19.68	222 32 35.81	Bratsberg	4.3973121	24,963.88	81,902.3
	91 33 08.984	86 09 05.08	266 01 55.42	Hart	4.1416821	13,857.41	45,463.9
		198 45 19		Reference mark no. 1.			
Houston, 1927, r. 1935 (d. m.)	43 42 51.425	99 58 40.21	279 48 00.04	Bratsberg	4.3230247	21,038.98	69,025.4
	91 30 19.377	140 06 02.14	319 56 55.84	Hart	4.4386306	27,455.58	90,077.2
		170 13 59.39	350 12 01.97	Ridgeway west base	4.3484754	22,308.76	73,191.3
		96 52 25		Reference mark no. 2.			
Ridgeway east base, 1927, r. 1932 (d. m.)	43 55 16.594	13 13 05.90	193 10 18.85	Houston	4.3733156	23,621.94	77,499.6
	91 26 18.100	83 43 41.15	263 38 56.16	Ridgeway west base	3.9648843	9,223.257	30,259.97
		111 44 41		Reference mark no. 2.			
McDonald (M. R. C.), 1894, r. 1931 (d. m.)	43 45 26.650	74 36 47.94	254 27 52.87	Houston	4.2545639	17,970.66	58,958.7
	91 17 25.414	129 17 28.47	309 06 34.97	Ridgeway west base	4.4346262	27,203.59	89,250.4
		146 52 58.93	326 46 49.97	Ridgeway east base	4.3374922	21,751.65	71,363.5
Walden (Wis.), 1930, r. 1931 (d. m.)	43 55 55.654	24 49 35.53	204 44 57.52	McDonald (M. R. C.)	4.3300743	21,383.28	70,155.0
	91 10 44.075	86 46 43.05	266 35 55.08	Ridgeway east base	4.3195359	20,870.65	68,473.1
St. Joseph (Wis.), 1930, r. 1931 (d. m.)	43 46 51.736	82 00 33.47	261 51 00.67	McDonald (M. R. C.)	4.2719656	18,705.34	61,369.1
	91 03 37.379	117 16 26.23	297 00 43.54	Ridgeway east base	4.5334429	34,154.10	112,053.9
		150 27 30.10	330 22 34.46	Walden	4.2856356	19,303.48	63,331.5
		272 01 26		Reference mark no. 1.			
Ridgeway "A", 1927, r. 1935 (d. m.)	43 55 04.286	79 25 57.38	259 24 11.88	Ridgeway west base	3.5381510	3,452.638	11,327.53
	91 30 36.872						
Ridgeway "B", 1927, r. 1935 (d. m.)	43 55 22.517	69 51 30.52	249 50 42.84	Ridgeway "A"	3.2131461	1,633.601	5,359.57
	91 29 28.130						
Ridgeway "C", 1927, r. 1935 (d. m.)	43 55 30.140	278 30 22.84	98 31 49.63	Ridgeway east base	3.4506057	2,822.316	9,259.55
	91 28 23.216	80 46 43.60	260 45 58.57	Ridgeway "B"	3.1664688	1,467.131	4,813.41
Supplementary points							
Minnedoka (S. Dak.), 1927, r. 1935 (d. m.)	43 42 21.982	25 06 56.1	205 04 49.7	Corson	3.985507	9,671.8	31,732
	96 27 49.216	117 04 43.0	296 56 15.0	Baltic	4.266028	18,451.3	60,536
		261 14 50		Reference mark no. 1.			
Garretson, Congregational Church, short steeple (white building) (S. Dak.), 1927, r. 1935 (n. d.).[1]	43 42 49.24	285 43 31	105 45 03	Minnedoka	3.492892	3,110.9	10,206
	96 30 02.96	6 34 29	186 33 55	Corson	3.985243	9,665.9	31,712
West Palisades, Lutheran Church, spire, 1927, r. 1935 (n. d.).[1]	43 39 38.09	54 41 27	234 38 46	Corson	3.806396	6,403.2	21,008
	96 26 59.25	167 31 24	347 30 49	Minnedoka	3.714161	5,178.0	16,988

[1] No check on this position.

Ninety-eighth meridian to Albert Lea to Fond du Lac arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
Adrian, Catholic Church, spire, 1927 (n. d.)[1]	43 37 52.27	165 08 22	345 06 24	Lismore	4.175007	14,962.6	49,090
	95 55 58.12	331 30 04	151 30 59	Adrian	3.571214	3,725.8	12,224
Lismore, church, north steeple, 1927 (n. d.)[1]	43 44 51.77	257 38 56	77 42 30	Wilmont	3.850004	7,079.5	23,227
	95 56 51.15	349 38 04	169 39 36	Adrian	4.217212	16,489.7	54,100
Wilmont, white water tank, 1927 (n. d.)[1]	43 45 55.89	293 02 18	113 06 56	Reading	3.991650	9,809.6	32,184
	95 49 43.81	87 52 22	267 46 05	Lismore	4.087036	12,219.0	40,089
Wilmont, Catholic Church, spire, 1927 (n. d.)[1]	43 45 41.55	290 51 16	110 55 51	Reading	3.979596	9,541.0	31,302
	95 49 38.84	89 28 31	269 27 06	Wilmont	3.440097	2,754.8	9,038
Wilmont, Farmers Elevator, 1927 (n. d.)[1]	43 46 00.24	294 15 08	114 19 41	Reading	3.985571	9,673.2	31,736
	95 49 34.53	78 04 52	258 03 24	Wilmont	3.464490	2,914.0	9,560
Reading, grain elevator, 1927 (n. d.)[1]	43 42 15.08	174 25 47	354 25 38	Reading	3.474793	2,984.0	9,790
	95 42 47.52	351 55 06	171 55 54	Donner	4.051453	11,257.8	36,935
Worthington, courthouse spire, 1927 (n. d.)	43 37 10.605	245 40 08.7	65 50 09.9	Kay	4.330498	21,404.2	70,224
	95 35 49.891	287 05 57.5	107 14 37.7	Kluever	4.248211	17,709.7	58,103
		77 21 54.7	257 17 55.3	Donner	3.901834	7,976.9	26,171
Worthington, power plant smokestack, 1927 (n. d.)	43 37 04.997	245 25 23.1	65 35 29.2	Kay	4.334862	21,620.3	70,933
	95 35 56.970	286 24 56.5	106 33 41.6	Kluever	4.250708	17,811.8	58,438
		78 21 04.5	258 17 10.0	Donner	3.891277	7,785.3	25,542
Round Lake, water tank, 1927 (n. d.)	43 32 25.614	207 31 57.9	27 36 40.4	Kay	4.297512	19,838.6	65,087
	95 28 08.464	241 29 26.6	61 32 48.4	Kluever	3.873882	7,479.7	24,540
		262 55 12.4	83 11 57.3	Tusa	4.518177	32,974.4	108,184
Heron Lake, water tank (white top), 1927 (n. d.)[1]	43 47 35.82	12 40 58	192 38 08	Kluever	4.400283	25,135.2	82,464
	95 19 09.63	15 24 35	195 23 06	Kay	4.037292	10,896.6	35,750
Heron Lake, Catholic Church, north steeple, 1927 (n. d.).[1]	43 47 41.48	12 59 12	192 56 16	Kluever	4.403888	25,344.7	83,152
	95 19 01.74	16 02 55	196 01 20	Kay	4.045813	11,112.5	36,458
Lakefield, white water tank, 1927 (n. d.)[1]	43 40 51.67	55 47 23	235 38 19	Kluever	4.330271	21,393.0	70,187
	95 10 07.14	97 30 55	277 23 11	Kay	4.181081	15,173.3	49,781
Lakefield, church steeple, 1927 (n. d.)[1]	43 40 52.03	97 31 35	277 23 54	Kay	4.177985	15,065.6	49,428
	95 10 11.93	247 32 09	67 35 04	Firence	3.788916	6,150.6	20,179
Lakefield, steel water tank, 1927 (n. d.)	43 40 45.045	246 24 47.7	66 27 49.0	Firence	3.807012	6,412.3	21,038
	95 10 20.539	322 30 50.3	142 35 19.7	Tusa	4.158241	14,396.0	47,231
		98 26 34.8	278 19 00.0	Kay	4.173319	14,904.6	48,900
Sotowa (Iowa), 1927 (d. m.)	43 29 41.211	147 37 50.4	327 34 54.1	Tusa	4.030503	10,727.6	35,195
	94 59 34.128	188 39 32.8	8 40 43.5	Jackson west base	4.184390	15,289.4	50,162
		215 49 54.8	35 53 44.3	Alpha	4.105991	12,764.1	41,877
		89 50 39		Reference mark no. 1.			
Spirit Lake, steel water tank (Iowa), 1927 (n. d.)	43 25 20.079	190 01 40.0	10 03 12.8	Tusa	4.240133	17,383.3	57,032
	95 06 04.989	205 30 47.9	25 36 27.7	Jackson west base	4.409723	25,687.6	84,277
		221 23 53.4	41 32 11.8	Alpha	4.390215	24,559.2	80,575
Jackson, coal tipple, 1927 (n. d.)	43 37 46.664	307 28 40.6	127 31 46.5	Alpha	3.881822	7,617.7	24,992
	94 58 30.521	5 26 56.4	185 26 12.6	Sotowa	4.177531	15,049.8	49,376
		50 27 26.4	230 23 46.0	Tusa	3.968410	9,298.4	30,507
Jackson, smokestack, 1927 (n. d.)	43 37 45.426	306 28 16.9	126 31 28.1	Alpha	3.888347	7,733.0	25,371
	94 58 38.243	4 48 10.9	184 47 32.4	Sotowa	4.175984	14,996.3	49,200
		49 56 58.8	229 53 23.7	Tusa	3.960993	9,141.0	29,990
Jackson, steel water tank, 1927 (n. d.)[1]	43 37 15.18	244 15 00	64 16 10	Jackson west base	3.405314	2,542.8	8,343
	94 59 33.61	296 08 38	116 12 27	Alpha	3.919649	8,310.9	27,267
Alpha, concrete elevator, 1927 (n. d.)	43 38 16.537	22 38 57.6	202 37 46.3	Alpha	3.779875	6,023.9	19,763
	94 52 17.646	84 00 40.1	263 56 49.8	Jackson west base	3.876459	7,524.2	24,686
		168 51 41.9	348 50 48.1	Motl	3.956462	9,046.1	29,670
Alpha, belfry, flagpole on top, 1927 (n. d.)	43 38 26.150	167 45 58.3	347 45 00.9	Motl	3.943417	8,778.4	28,800
	94 52 12.614	267 10 45.7	87 13 49.2	Jackson east base	3.775810	5,967.7	19,579
		81 53 46.6	261 49 52.8	Jackson west base	3.884939	7,672.5	25,172
Dunnell, slender black church spire, 1927 (n. d.)[1]	43 33 38.33	171 03 43	351 02 58	Jackson east base	3.967853	9,286.5	30,467
	94 46 42.30	255 22 03	75 28 05	Grupe	4.085822	12,184.9	39,977
Sherburn, wooden water tank, 1927 (n. d.)	43 39 19.044	218 40 25.3	38 44 09.8	Senne	4.065942	11,639.7	38,188
	94 43 40.758	313 57 49.2	134 01 46.5	Grupe	4.030248	10,721.3	35,175
		76 20 39.4	256 17 49.7	Jackson east base	3.753750	5,672.2	18,610
Sherburn, small spire, 1927 (n. d.)[1]	43 39 18.35	314 14 29	134 18 23	Grupe	4.026825	10,637.1	34,899
	94 43 36.46	76 46 45	256 43 53	Jackson east base	3.760490	5,760.9	18,901
Welcome Lutheran Church, spire, 1927 (n. d.)[1]	43 39 56.52	7 40 20	187 39 45	Grupe	3.938597	8,681.5	28,483
	94 37 05.10	168 43 22	348 42 33	Senne	3.907566	8,082.9	26,519
Welcome, water tank, 1927 (n. d.)	43 40 02.776	7 18 42.3	187 18 07.6	Grupe	3.947868	8,868.9	29,097
	94 37 06.452	168 39 51.1	348 39 03.2	Senne	3.896954	7,887.8	25,879
		249 52 35.8	70 03 44.7	Granada	4.363101	23,072.8	75,698

[1] No check on this position.

Ninety-eighth meridian to Albert Lea to Fond du Lac arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
Fairmont, water tank, 1927 (n. d.)	43 39 35.893	121 10 25.0	301 03 07.2	Senne	4.219385	16,572.4	54,371
	94 27 42.112	225 57 26.4	46 02 05.4	Granada	4.099341	12,570.2	41,241
		316 56 52.8	136 57 27.1	Fairmont	3.212297	1,630.4	5,349
Fairmont, cannery smokestack, 1927 (n. d.)	43 39 16.434	222 48 35.1	42 53 02.2	Granada	4.104822	12,729.8	41,764
	94 27 24.908	262 49 13.2	82 57 57.8	Guckeen	4.234294	17,151.2	56,270
		313 51 51.9	133 55 51.4	Chain	4.033433	10,800.2	35,434
Fairmont, courthouse spire, 1927 (n. d.)	43 39 10.846	123 51 46.6	303 44 36.4	Senne	4.224835	16,781.7	55,058
	94 27 53.030	224 17 34.0	44 22 20.5	Granada	4.123493	13,289.0	43,599
		287 07 34.0	107 08 15.9	Fairmont	3.152508	1,420.7	4,661
Fairmont, Congregational Church, spire, 1927 (n. d.)	43 39 20.072	224 35 33.7	44 40 14.5	Granada	4.112512	12,957.2	42,510
	94 27 44.841	263 21 41.9	83 30 40.0	Guckeen	4.245046	17,581.1	57,681
		300 54 52.9	120 55 29.1	Fairmont	3.136276	1,368.6	4,490
Fairmont, Lutheran Church, spire, 1927 (n. d.)	43 38 49.217	221 38 29.8	41 43 09.2	Granada	4.134212	13,621.1	44,689
	94 27 42.785	257 32 49.4	77 33 24.2	Fairmont	3.062689	1,155.3	3,790
		309 03 21.5	129 07 33.3	Chain	4.023010	10,544.1	34,593
Fairmont, Light & Power Co., smokestack, 1927 (n. d.)	43 39 28.607	226 08 19.9	46 13 07.9	Granada	4.111822	12,936.7	42,443
	94 27 55.155	304 31 03.3	124 31 46.6	Fairmont	3.231873	1,705.6	5,596
		312 52 21.6	132 56 41.9	Chain	4.062618	11,551.0	37,897
Fairmont, square smokestack, 1927 (n. d.)	43 39 22.798	221 29 58.1	41 34 07.8	Granada	4.086564	12,205.7	40,045
	94 26 59.746	316 45 48.5	136 49 30.6	Chain	4.022977	10,543.3	34,591
		10 54 17.9	190 53 22.9	Wilbert	3.975243	9,445.9	30,990
Fairmont, Catholic Church, spire, 1927 (n. d.)[1]	43 39 07.28	289 02 24	109 02 52	Fairmont	2.975748	945.7	3,103
	94 27 32.34	312 09 34	132 13 39	Chain	4.030573	10,729.3	35,201
East Chain, small church spire, 1927 (n. d.)[1]	43 32 45.99	102 40 49	282 34 02	Wilbert	4.133326	13,593.3	44,597
	94 18 28.38	137 02 00	316 59 49	Chain	3.794859	6,235.3	20,457
East Chain, schoolhouse smokestack, 1927 (n. d.)[1]	43 32 35.02	104 07 45	284 00 59	Wilbert	4.133866	13,610.2	44,653
	94 18 31.20	139 29 47	319 27 39	Chain	3.809282	6,445.9	21,148
Black water tank (Iowa), 1927 (n. d.)[1]	43 23 49.27	182 04 52	2 05 14	Wilbert	4.291094	19,547.6	64,132
	94 28 51.02	204 41 50	24 46 49	Chain	4.366607	23,259.9	76,312
Winnebago, water tank, 1927 (n. d.)	43 45 50.650	328 18 42.8	148 19 20.8	Winnebago	3.368821	2,337.9	7,670
	94 09 57.726	32 40 56.0	212 37 37.2	Guckeen	4.076653	11,930.3	39,141
		79 12 39.9	259 05 03.0	Granada	4.177502	15,048.8	49,373
Winnebago, white church steeple, 1927 (n. d.)	43 46 04.923	327 06 56.7	147 07 45.3	Winnebago	3.461409	2,893.4	9,493
	94 10 13.051	30 11 30.1	210 08 21.9	Guckeen	4.083770	12,127.5	39,788
		77 17 04.0	257 09 37.7	Granada	4.170348	14,802.9	48,566
Blue Earth, water tank, 1927 (n. d.)	43 38 18.367	238 05 32.4	58 12 40.4	Easton	4.213272	16,340.8	53,611
	94 06 04.386	291 21 53.1	111 28 51.3	Frost	4.164461	14,603.6	47,912
		61 06 24.7	241 03 52.7	Kennedy	3.751417	5,641.8	18,510
Blue Earth, rigid building flagpole, 1927 (n. d.)	43 38 21.953	107 47 19.2	287 41 12.8	Guckeen	4.096347	12,483.8	40,957
	94 05 54.675	160 27 19.2	340 25 09.2	Winnebago	4.099852	12,585.0	41,289
		238 01 08.7	58 08 09.8	Easton	4.206757	16,097.4	52,813
Blue Earth, courthouse spire, 1927 (n. d.)	43 38 32.437	56 46 07.6	236 43 39.2	Kennedy	3.760932	5,766.8	18,920
	94 06 09.551	106 48 24.7	286 42 28.6	Guckeen	4.081679	12,069.2	39,597
		161 25 20.4	341 23 20.6	Winnebago	4.085299	12,170.2	39,928
Blue Earth, Catholic Church, spire, 1927 (n. d.)	43 38 14.328	59 52 34.1	239 50 16.2	Kennedy	3.714661	5,184.0	17,008
	94 06 24.708	109 50 54.2	289 45 08.6	Guckeen	4.076364	11,922.4	39,115
		163 41 37.4	343 39 48.1	Winnebago	4.100428	12,601.7	41,344
Guckeen, farmers grain elevator, 1927 (n. d.)[1]	43 39 07.74	145 07 04	325 06 13	Guckeen	3.464516	2,914.2	9,561
	94 13 30.90	309 57 03	129 59 39	Kennedy	3.820717	6,617.9	21,712
Easton, water tank, 1927 (n. d.)[1]	43 46 01.98	289 37 38	109 44 28	Shorty	4.148492	14,076.4	46,182
	93 54 05.80	21 17 00	201 15 52	Easton	3.785431	6,101.4	20,018
Easton, Catholic Church, spire, 1927 (n. d.)[1]	43 45 46.69	287 53 42	108 00 29	Shorty	4.141549	13,853.2	45,450
	93 54 02.42	23 42 56	203 41 46	Easton	3.755451	5,694.4	18,682
Wells, Farmers Elevator, 1927 (n. d.)[1]	43 44 38.94	306 59 46	127 02 01	Wells	3.741016	5,508.3	18,072
	93 43 22.34	27 42 12	207 41 37	Shorty	3.391030	2,460.5	8,072
Wells, Methodist Church, spire, 1927 (n. d.)[1]	43 44 39.72	304 35 31	124 38 01	Wells	3.769396	5,880.3	19,292
	93 43 42.06	17 41 32	197 41 10	Shorty	3.363973	2,311.9	7,585
Wells, smokestack, 1927 (n. d.)	43 44 47.237	308 19 00.8	128 21 20.3	Wells	3.760361	5,759.2	18,895
	93 43 27.669	22 49 25.6	202 48 53.9	Shorty	3.421850	2,641.5	8,666
		78 29 40.0	258 21 10.5	Easton	4.226297	16,838.3	55,244
Wells, Catholic Church, spire, 1927 (n. d.)	43 44 30.906	302 19 12.6	122 21 42.3	Wells	3.758572	5,735.5	18,817
	93 43 42.335	19 50 03.2	199 49 41.7	Shorty	3.312268	2,052.4	6,734
		79 59 12.0	259 50 52.7	Easton	4.215420	16,421.8	53,877
Wells, water tank, 1927 (n. d.)	43 44 16.410	299 37 16.6	119 39 38.9	Wells	3.724225	5,299.4	17,386
	93 43 31.609	32 15 56.4	212 15 27.5	Shorty	3.244071	1,754.2	5,755
		81 39 17.2	261 30 50.6	Easton	4.219777	16,587.4	54,420

[1] No check on this position.

Ninety-eighth meridian to Albert Lea to Fond du Lac arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
Wells, high school cupola, 1927 (n. d.)	43 44 33.161	302 43 16.3	122 45 47.0	Wells	3.763549	5,801.6	19,034
	93 43 43.855	356 07 17.3	176 07 55.4	Walters	4.263229	18,332.8	60,147
		18 19 16.5	198 18 56.0	Shorty	3.323685	2,107.1	6,913
Wells, coal chute, 1927 (n. d.)	43 44 50.948	269 17 46.8	89 28 09.6	Freeborn	4.304422	20,156.8	66,131
	93 43 44.381	353 44 47.0	173 45 49.0	Kiester	4.267192	18,500.9	60,698
		14 18 59.8	194 18 39.7	Shorty	3.420112	2,630.9	8,632
Walters, white church, gray steeple, 1927 (n. d.) [1]	43 37 49.19	159 18 49	339 16 47	Shorty	4.048828	11,189.9	36,712
	93 41 16.84	189 40 14	9 41 03	Wells	3.976097	9,464.5	31,051
Peckerall Lake, German Lutheran Church, steeple, 1926 (n. d.).[1]	43 31 29.87	51 00 46	230 59 04	Sletten	3.630458	4,270.3	14,010
	93 34 18.49	212 51 54	32 56 09	Schmidt	4.183964	15,274.4	50,113
Kiester, water tank, 1926 (n. d.)	43 32 20.098	187 26 37.4	7 26 56.6	Kiester	3.683276	4,822.5	15,822
	93 42 42.403	291 25 23.8	111 35 27.2	Brua	4.325553	21,161.8	69,428
		330 28 40.3	150 32 16.2	Scarville	4.155956	14,320.4	46,983
School cupola, 1926 (n. d.) [1]	43 31 44.28	309 21 19	129 25 27	Brua	4.020524	10,483.9	34,396
	93 34 06.64	48 52 07	228 50 17	Sletten	3.677633	4,760.3	15,618
Schoolhouse cupola (Iowa), 1926 (n. d.) [1]	43 28 42.28	117 15 39	297 13 20	Sletten	3.706819	5,091.2	16,703
	93 33 24.79	279 24 07	99 27 46	Brua	3.861134	7,263.3	23,830
Emmons, Norwegian Lutheran Church, steeple, 1926 (n. d.).	43 30 13.646	337 24 56.4	157 25 45.5	Brua	3.620740	4,175.8	13,700
	93 29 17.342	52 15 49.1	232 10 11.2	Scarville	4.145361	13,975.3	45,851
		88 08 25.5	268 03 16.6	Sletten	4.003898	10,090.2	33,104
Church steeple (Iowa), 1926 (n. d.) [1]	43 28 53.48	289 47 39	109 49 36	Brua	3.610375	4,077.3	13,377
	93 30 56.67	105 16 00	285 12 00	Sletten	3.910655	8,140.6	26,708
Lake Mills, standpipe (Iowa), 1926 (n. d.)	43 25 05.124	302 41 15.7	122 46 24.4	Joice	4.080141	12,026.5	39,457
	93 31 59.478	4 51 14.5	184 50 27.0	Pilot	4.265999	18,450.1	60,532
		97 24 36.7	277 20 50.5	Scarville	3.873175	7,467.5	24,500
Albert Lea, Interstate Power Co., smokestack, 1926 (n. d.).	43 38 42.919	22 37 48.9	202 33 38.9	Brua	4.326340	21,200.2	69,554
	93 22 03.086	51 04 36.6	230 54 27.9	Sletten	4.406588	25,502.8	83,670
		86 15 52.6	266 11 40.3	Schmidt	3.914456	8,212.1	26,943

Albert Lea, water works standpipe, 1927 (n. d.)	43 39 02.017	199 22 45.4	19 24 56.3	Nelson	4.106348	12,774.6	41,911
	93 22 03.089	264 26 19.8	84 32 40.9	Albert Lea west base	4.094389	12,427.7	40,773
		82 11 12.0	262 06 59.6	Schmidt	3.917579	8,271.4	27,137
Albert Lea Packing Co., water tank, 1927 (n. d.)	43 39 01.740	195 57 15.4	15 59 01.9	Nelson	4.098367	12,542.0	41,148
	93 21 27.709	264 01 32.9	84 07 29.5	Albert Lea west base	4.065939	11,639.6	38,188
		266 59 02.4	87 09 05.9	Albert Lea east base	4.292655	19,618.0	64,363
Albert Lea, Light & Power Co., smokestack, 1927 (n.d.).	43 38 42.926	142 16 14.8	322 11 38.0	Freeborn	4.165626	14,642.9	48,041
	93 22 03.041	198 32 04.8	18 34 15.7	Nelson	4.124880	13,331.5	43,738
		261 44 55.9	81 51 16.9	Albert Lea west base	4.096822	12,497.5	41,002
Albert Lea, courthouse spire, 1927 (n. d.)	43 38 46.780	198 51 56.9	18 54 09.1	Nelson	4.121623	13,231.9	43,412
	93 22 04.864	262 18 50.6	82 25 12.9	Albert Lea west base	4.097654	12,521.4	41,081
		265 48 34.2	85 59 03.4	Albert Lea east base	4.311290	20,478.1	67,185
Albert Lea, Gass Machine Co., water tank, 1927 (n. d.).	43 39 01.140	198 53 11.2	18 55 18.9	Nelson	4.106024	12,765.1	41,880
	93 21 58.311	264 15 58.2	84 22 16.0	Albert Lea west base	4.090743	12,323.8	40,432
		82 28 14.9	262 23 59.2	Schmidt	3.922928	8,373.9	27,473
Albert Lea, Luther College, spire, 1927 (n. d.)	43 38 27.433	89 37 55.8	269 33 25.2	Schmidt	3.943747	8,785.1	28,822
	93 21 36.752	195 32 52.7	15 34 45.4	Nelson	4.134052	13,616.1	44,672
		259 05 21.1	79 11 23.9	Albert Lea west base	4.079033	11,995.9	39,357
Albert Lea, Lutheran Church, steeple, 1927 (n. d.) [1]	43 38 58.09	82 45 05	262 41 02	Schmidt	3.900576	7,953.8	26,095
	93 22 16.67	200 27 55	20 30 15	Nelson	4.113687	12,992.3	42,626
Albert Lea Packing Co., smokestack, 1927 (n. d.) [1]	43 39 02.36	195 45 15	15 47 00	Nelson	4.097249	12,509.8	41,043
	93 21 25.43	267 01 56	87 11 58	Albert Lea east base	4.291505	19,566.1	64,193
Albert Lea, laundry smokestack, 1927 (n. d.)[1]	43 38 57.87	201 14 39	21 17 05	Nelson	4.116184	13,067.2	42,871
	93 22 25.26	264 05 00	84 11 36	Albert Lea west base	4.111760	12,934.8	42,437
West Freeborn, Lutheran Church, spire, 1927 (n. d.)[1]	43 44 58.37	265 22 24	85 29 10	Nelson	4.120438	13,195.9	43,294
	93 28 41.57	74 41 32	254 41 30	Freeborn	1.658104	45.5	149
Hayward, elevator, 1927 (n. d.)	43 39 02.139	209 02 13.0	29 07 21.3	Newry	4.312666	20,543.1	67,398
	93 14 36.743	243 19 41.2	63 20 54.2	Albert Lea west base	3.423263	2,650.1	8,695
		264 30 07.9	84 35 27.7	Albert Lea east base	4.018295	10,430.3	34,220
Armstrong, church steeple, ball on top, 1927 (n. d.)	43 42 01.960	168 36 37.4	348 35 57.0	Nelson	3.821293	6,626.6	21,741
	93 17 55.102	302 36 04.9	122 39 34.9	Albert Lea west base	3.907777	8,086.8	26,531
		64 07 52.8	244 00 49.0	Schmidt	4.184255	15,284.6	50,146
Austin, Catholic Church, spire, 1927, r. 1935 (d.)	43 40 11.940	83 57 19.9	263 51 44.1	Albert Lea east base	4.039819	10,960.2	35,959
	92 58 46.976	87 09 34.5	266 59 51.8	Albert Lea west base	4.277290	18,936.1	62,126
		144 32 51.1	324 27 02.9	Newry	4.287956	19,406.9	63,671
Austin, water tank, 1927, r. 1935 (n. d.)[1]	43 40 24.44	82 34 58	262 28 54	Albert Lea east base	4.076113	11,915.5	39,093
	92 58 06.07	219 42 36	39 49 38	Sargeant	4.329693	21,364.5	70,093

[1] No check on this position.

Ninety-eighth meridian to Albert Lea to Fond du Lac arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
Austin, packing co., smokestack, 1927, r. 1935 (d.)[1]	43 40 08.14	83 51 20	263 46 22	Albert Lea east base	3.986966	9,704.3	31,838
	92 59 42.79	147 50 56	327 45 46	Newry	4.274352	18,808.4	61,707
Mason, white belfry, red spire, 1927 (n. d.)[1]	43 47 48.01	19 11 28	199 08 45	Albert Lea east base	4.207718	16,133.1	52,930
	93 02 56.72	106 55 05	286 52 09	Newry	3.773159	5,931.4	19,460
Gray church spire, white belfry, 1927 (n. d.)[1]	43 47 24.30	48 54 23	228 45 51	Albert Lea east base	4.343197	22,039.3	72,307
	92 54 32.13	98 18 46	278 10 02	Newry	4.233816	17,132.3	56,208
Hayfield, water tank, 1927 (n. d.)	43 53 28.617	333 20 37.3	153 22 38.4	Sargeant	3.939756	8,704.7	28,559
	92 50 50.016	68 13 50.2	248 02 30.9	Newry	4.372907	23,599.7	77,427
		105 45 14.3	285 33 11.4	Bixby	4.382923	24,150.3	79,233
Grand Meadow, water tank, 1927 (n. d.)	43 42 22.139	178 27 01.2	358 26 50.2	Stewart	4.118443	13,135.4	43,095
	92 34 17.080	296 23 24.1	116 25 58.4	Meadow	3.747062	5,585.5	18,325
		64 45 54.8	244 41 16.7	Elkton	3.998842	9,973.4	32,721
Spring Valley, water tank, 1927, r. 1935 (n. d.)	43 41 07.485	187 19 36.6	7 20 39.7	Anderson	4.203945	15,993.6	52,472
	92 23 22.946	271 51 35.2	91 55 35.3	Wykoff	3.891663	7,792.3	25,565
		88 58 10.5	268 53 13.0	Meadow	3.984505	9,649.5	31,658
Spring Valley, schoolhouse spire, 1927, r. 1935 (n. d.)[1]	43 41 02.72	270 46 34	90 50 36	Wykoff	3.893112	7,818.3	25,651
	92 23 24.26	89 50 29	269 45 32	Meadow	3.983110	9,618.6	31,557
Spring Valley, Lutheran Church, spire, 1927, r. 1935 (d.)[1]	43 40 53.06	91 06 33	270 59 06	Meadow	4.160931	14,485.4	47,524
	92 19 47.09	266 20 58	86 22 29	Wykoff	3.471194	2,959.3	9,709
Spring Valley, Catholic Church, spire, 1927, r. 1935 (d.)[1]	43 41 00.34	90 16 46	270 11 51	Meadow	3.981313	9,578.8	31,426
	92 23 26.04	187 28 10	7 29 15	Anderson	4.210077	16,221.0	53,218
Stewartville, Catholic Church, spire, 1927, r. 1935 (n. d.)[1]	43 51 17.56	287 21 42	107 26 35	Anderson	3.996407	9,917.6	32,538
	92 28 55.30	65 48 29	245 44 35	Stewart	3.917624	8,272.3	27,140
Stewartville, city water tank, 1927, r. 1935 (n. d.)	43 51 15.360	286 29 51.9	106 34 54.5	Anderson	4.007763	10,180.4	33,400
	92 29 08.520	5 45 05.5	185 44 06.6	Meadow	4.279595	19,036.8	62,457
		65 22 53.5	245 19 08.8	Stewart	3.901741	7,975.2	26,165
Wykoff, water tank, 1927, r. 1935 (n. d.)	43 42 31.732	35 58 28.6	215 57 24.6	Wykoff	3.547840	3,530.5	11,583
	92 16 02.643	81 58 14.6	261 48 12.9	Meadow	4.294533	19,703.0	64,642
		149 33 08.2	329 29 06.8	Anderson	4.187223	15,389.4	50,490
Wykoff, Lutheran Church, spire, 1927, r. 1935 (n. d.)	43 42 15.050	38 48 05.0	218 47 06.9	Wykoff	3.477939	3,005.7	9,861
	92 16 11.149	83 23 34.0	263 13 38.2	Meadow	4.288887	19,448.5	63,807
		151 05 52.7	331 01 57.2	Anderson	4.197075	15,742.5	51,649
Fountain, Catholic Church, spire, 1927, r. 1935 (d.)[1]	43 44 23.12	255 32 53	75 33 46	Fountain	3.243669	1,752.5	5,750
	92 08 04.06	63 50 38	243 44 04	Wykoff	4.153907	14,253.0	46,762
Fountain, Lutheran Church, black spire, 1927 (n. d.)[1]	43 44 35.95	268 42 42	88 43 40	Fountain	3.266874	1,848.7	6,065
	92 08 10.81	62 09 05	242 02 35	Wykoff	4.155277	14,298.1	46,910
Norwegian Lutheran Church, spire, 1927 (n. d.)[1]	43 45 50.98	43 25 09	223 24 03	Fountain	3.495640	3,130.7	10,271
	92 05 12.05	151 38 34	331 35 04	Chatfield	4.153345	14,234.6	46,701
Canton, water tank, 1927 (n. d.)[1]	43 31 46.03	195 09 34	15 11 56	Highland	4.247710	17,689.3	58,036
	91 55 48.07	209 09 45	29 16 41	Bratsberg	4.442005	27,669.7	90,780
Arendahl, Lutheran Church, spire, 1927, r. 1935 (d.)	43 49 32.181	347 12 40.1	167 14 31.1	Highland	4.210416	16,233.6	53,260
	91 55 01.975	60 06 41.7	239 58 33.1	Fountain	4.260712	18,226.9	59,799
		104 39 23.9	284 36 40.5	Pilot	3.736268	5,448.4	17,875
Arendahl, spire, 1927, l. 1933 (n. d.)	43 49 31.163	343 06 09.4	163 08 37.6	Highland	4.217790	16,511.6	54,172
	91 55 55.809	58 11 31.3	238 03 59.9	Fountain	4.234969	17,177.9	56,358
		109 06 15.3	289 04 09.1	Pilot	3.634028	4,305.5	14,126
Lewiston, water tank, 1927 (n. d.)	43 59 00.588	307 11 24.3	127 17 27.5	Hart	4.166139	14,660.2	48,098
	91 52 11.875	341 47 50.7	161 52 18.5	Bratsberg	4.442132	27,677.8	90,806
		29 18 23.7	209 13 42.1	Pilot	4.267930	18,532.3	60,801
Spring Grove, church spire, 1927 (n. d.)[1]	43 33 40.62	153 23 06	333 17 47	Bratsberg	4.362939	23,064.2	75,670
	91 38 03.66	211 25 52	31 31 12	Houston	4.299545	19,931.7	65,393
Spring Grove, water tank, 1927 (n. d.)[1]	43 33 41.85	153 56 01	333 50 50	Bratsberg	4.360074	22,912.6	75,172
	91 38 15.48	212 07 57	32 13 25	Houston	4.301883	20,039.3	65,746
Caledonia, courthouse spire, 1927, r. 1935 (d.)[1]	43 37 57.42	120 37 27	300 26 23	Bratsberg	4.397471	24,973.0	81,932
	91 29 45.00	175 09 07	355 08 43	Houston	3.959338	9,106.2	29,876
Nodine, church spire, 1927, r. 1935 (n. d.)	43 54 16.756	172 39 36.0	352 39 28.6	Ridgeway east base	3.270000	1,862.1	6,109
	91 25 07.437	341 30 15.5	161 30 31.8	Nodine	3.221170	1,664.1	5,460
		95 06 01.8	275 01 09.5	Ridgeway west base	3.975127	9,443.4	30,982
St. Joseph, church spire (Wis.), 1930 (n. d.)	43 47 13.303	71 17 15.0	251 16 14.2	St. Joseph	3.316776	2,073.8	6,804
	91 02 09.541	144 34 10.2	324 28 13.7	Walden	4.296612	19,797.6	64,953
		187 25 57.0	7 27 20.3	Scafe	4.316492	20,724.9	67,995
Bangor, airway beacon (Wis.), 1930 (n. d.)[1]	43 54 10.29	102 09 38	282 01 46	Walden	4.190902	15,520.4	50,920
	90 59 23.88	172 29 45	352 29 13	Scafe	3.889143	7,747.2	25,417

[1] No check on this position.

21828°—36——6

Royalton to Albert Lea arc

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance: Logarithm (meters)	Distance: Meters	Distance: Feet
Principal points	° ′ ″	° ′ ″	° ′ ″				
Schumer, 1927, r. 1931 (d. m.)	45 42 06.823 94 16 24.415	159 55 42.45 227 28 22.28 16 24 56	339 54 11.11 47 35 13.35	Brockway (Suintax (M. R. C.) 1898). Alberta Reference mark no. 1.	3.9047042 4.2256947	8,029.79 16,814.92	26,344.4 55,166.9
Voight, 1927, r. 1935 (d. m.)	45 41 35.551 94 04 05.436	93 31 45.05 114 30 22.86 163 51 30.16 27 22 06	273 22 56.19 294 20 02.36 343 49 31.88	Schumer Brockway (Suintax (M. R. C.) 1898). Alberta Reference mark no. 1.	4.2045827 4.3133766 4.1080786	16,017.06 20,576.74 12,825.63	52,549.3 67,508.9 42,078.8
St. Cloud, 1927, r. 1935 (d. m.)	45 32 17.156 94 10 57.520	158 46 29.98 207 20 21.70 179 56 59	338 42 36.34 27 25 16.20	Schumer Voight Reference mark no. 1.	4.2907894 4.2881214	19,533.92 19,414.29	64,087.5 63,695.0
Duelm, 1927, r. 1935 (d. m.)	45 35 14.311 93 55 39.967	74 43 21.73 115 25 04.10 137 07 30.16 105 00 23	254 32 26.58 295 10 14.29 317 01 28.76	St. Cloud Schumer Voight Reference mark no. 1.	4.3146467 4.4743177 4.2061241	20,637.00 29,806.96 16,074.00	67,706.6 97,791.7 52,736.1
Enfield, 1927, r. 1935 (d. m.)	45 20 39.913 93 55 17.475	136 35 14.76 178 57 54.84 190 03 37	316 24 04.95 358 57 38.81	St. Cloud Duelm Reference mark no. 1.	4.4724274 4.4313486	29,677.51 26,999.06	97,367.0 88,579.4
Quick, 1927, r. 1934 (d. m.)	45 29 55.010 93 42 50.613	43 31 50.31 97 00 06.85 120 38 32.39 14 25 42	223 22 58.32 276 40 03.28 300 29 23.24	Enfield St. Cloud Duelm Azimuth mark.	4.3730608 4.5667312 4.2874550	23,608.09 36,874.93 19,384.52	77,454.2 120,980.5 63,597.4
Monticello, 1927, r. 1934 (d. m.)	45 16 49.640 93 46 08.976	120 48 21.46 190 04 18.73 6 38 16	300 41 51.49 10 06 39.94	Enfield Quick Reference mark no. 1.	4.1431068 4.3914087	13,902.95 24,626.84	45,613.3 80,796.6
Godfrey, 1927, r. 1934 (d. m.)	45 20 12.163 93 34 32.774	67 39 56.35 91 56 01.02 149 01 09.92 210 19 40	247 31 41.42 271 41 15.66 328 55 15.34	Monticello Enfield Quick Reference mark no. 1.	4.2149675 4.4331883 4.3221902	16,404.67 27,113.67 20,998.59	53,821.0 88,955.4 68,892.9
Esterly, 1927, r. 1935 (d. m.)	45 10 25.391 93 40 17.775	147 10 34.45 202 31 07.96 162 29 01	327 06 25.13 22 35 12.99	Monticello Godfrey Reference mark no. 1.	4.1498767 4.2925726	14,121.36 19,614.29	46,329.8 64,351.2
Dayton, 1927, r. 1931 (d. m.)	45 12 37.100 93 29 12.063	74 26 03.93 109 28 06.79 153 34 31.37 4 59 32	254 18 11.63 289 16 04.65 333 30 43.51	Esterly Monticello Godfrey Reference mark no. 1.	4.1786919 4.3712176 4.1956696	15,090.09 23,508.10 15,691.69	49,508.1 77,126.2 51,481.8
Hamel, 1927, r. 1935 (d. m.)	45 01 49.396 93 36 09.660	161 13 04.18 204 29 40.93 246 31 34	341 10 08.42 24 34 36.83	Esterly Dayton Reference mark no. 1.	4.2260145 4.3420192	16,827.30 21,979.57	55,207.6 72,111.3
Maxim, 1927 (d. m.)	45 03 11.763 93 27 33.890	77 21 25.36 128 47 35.90 173 00 06.42 273 55 34	257 15 20.39 308 38 34.68 352 58 56.84	Hamel Esterly Dayton Reference mark no. 2.	4.0633808 4.3304393 4.2451073	11,571.26 21,401.26 17,583.58	37,963.4 70,214.0 57,688.8
Hopkins, 1889, r. 1931 (d. m.)	44 55 11.332 93 27 34.648	137 29 13.90 180 03 50.79 343 25 56	317 23 09.89 0 03 51.32	Hamel Maxim Reference mark no. 2.	4.2222927 4.1711621	16,683.71 14,830.72	54,736.5 48,657.1
Excelsior, 1927, r. 1935 (d. m.)	44 52 38.304 93 35 00.929	174 56 44.92 206 34 04.46 244 12 09.20 236 14 08	354 55 56.36 26 39 20.37 64 17 24.21	Hamel Maxim Hopkins Reference mark.	4.2324494 4.3398799 4.0363022	17,078.49 21,871.57 10,871.82	56,031.7 71,757.0 35,668.6
Shakopee, 1927, r. 1935 (d. m.)	44 44 17.174 93 32 31.573	168 02 07.76 197 52 20.62 313 32 51	348 00 22.50 17 55 49.95	Excelsior Hopkins Azimuth mark.	4.1990299 4.3267535	15,813.57 21,220.40	51,881.7 69,620.6
Buck (Buck Hill, 1889), 1889, r. 1931 (d. m.)	44 43 23.817 93 17 13.615	94 45 04.36 126 13 15.50 148 03 58.04 17 07 20	274 34 18.32 306 00 43.42 327 56 40.27	Shakopee Excelsior Hopkins Reference mark no. 1.	4.3067813 4.4629756 4.4108083	20,266.62 29,038.59 25,751.84	66,491.4 95,270.8 84,487.5
Elko, 1927, r. 1935 (d. m.)	44 33 37.935 93 19 13.796	138 22 45.21 188 19 13.34 133 30 13	318 13 24.56 8 20 37.79	Shakopee Buck (Buck Hill, 1889) Reference mark no. 2.	4.4220483 4.2619229	26,427.02 18,277.76	86,702.6 59,966.3
Veseli, 1927, r. 1935 (d. m.)	44 31 27.742 93 28 59.299	168 52 32.50 215 04 12.65 252 40 19.40 2 05 12	348 50 03.37 35 12 28.36 72 47 10.09	Shakopee Buck (Buck Hill, 1889) Elko Reference mark no. 1.	4.3839425 4.4318363 4.1314893	24,207.08 27,029.39 13,535.97	79,419.4 88,678.9 44,409.3
Shields, 1927, r. 1931 (d. m.)	44 21 11.477 93 29 09.171	180 39 23.89 209 40 51.03 213 49 17	0 39 30.80 29 47 48.01	Veseli Elko Reference mark no. 1.	4.2792854 4.4238278	19,023.28 26,535.53	62,412.2 87,058.7
Faribault, 1927, r. 1931 (d. m.)	44 18 04.378 93 14 36.887	106 43 14.35 142 30 21.67 168 01 38.41 315 25 46	286 33 04.84 322 20 18.14 347 58 24.56	Shields Veseli Elko Reference mark no. 2.	4.3047453 4.4953856 4.4692245	20,171.83 31,288.56 29,459.44	66,180.4 102,652.6 96,651.5

Royalton to Albert Lea arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″	° ′ ″	° ′ ″				
Morris, 1927, r. 1931 (d. m.)	44 09 50.934	170 28 09.51	350 26 18.38	Shields	4.3283864	21,300.33	69,882.8
	93 26 29.930	226 01 37.01	46 09 54.41	Faribault	4.3416935	21,963.09	72,057.2
		39 50 22		Reference mark no. 2.			
Medford, 1927, r. 1931 (d. m.)	44 09 47.892	90 23 39.39	270 14 54.40	Morris	4.2238225	16,742.58	54,929.6
	93 13 56.409	136 16 03.99	316 05 26.98	Shields	4.4660244	29,243.17	95,942.0
		176 38 56.22	356 38 27.98	Faribault	4.1861247	15,350.58	50,362.7
		50 33 21		Reference mark no. 2.			
Meriden, 1927, r. 1935 (d. m.)	44 04 06.912	138 47 03.69	318 42 12.12	Morris	4.1499661	14,124.27	46,339.4
	93 19 31.074	215 13 55.99	35 17 48.96	Medford	4.1102395	12 889.60	42,288.6
		171 30 29		Reference mark no. 2.			
Hartle, 1927, r. 1935 (d. m.)	44 05 22.742	81 07 00.85	260 59 16.10	Meriden	4.1774819	13,048.11	49,370.3
	93 08 23.000	109 00 49.64	288 48 12.86	Morris	4.4072838	25,543.70	83,804.6
		137 51 47.39	317 47 55.26	Medford	4.0430405	11,041.82	36,226.4
		34 22 10		Reference mark no. 2.			
Bixby, 1927, r. 1935 (d. m.)	43 56 59.747	354 50 50.30	174 51 33.10	Newry	4.1865832	15,366.79	50,415.9
	93 08 12.365	34 05 13.22	213 57 48.95	Nelson	4.4081491	25,594.64	83,971.7
		131 09 14.13	311 01 22.58	Meriden	4.3023379	20,060.32	65,814.6
		179 07 36.72	359 07 29.33	Hartle	4.1910705	15,526.39	50,939.5
		90 37 37		Reference mark no. 1.			
Berlin, 1927, r. 1935 (d. m.)	43 55 04.282	183 56 57.67	3 57 33.76	Meriden	4.2249333	16,787.78	55,077.9
	93 20 23.030	219 58 24.60	40 06 44.82	Hartle	4.3967857	24,933.64	81,803.1
		257 35 42.28	77 44 09.24	Bixby	4.2222602	16,682.47	54,732.4
		303 29 20.50	123 38 29.61	Newry	4.3270734	21,236.03	69,671.9
		353 31 58.47	173 33 00.41	Nelson	4.2494832	17,761.64	58,273.0
		124 01 39		Reference mark no. 1.			
Supplementary points							
Pierz, Catholic Church, 1927 (n. d.)[1]	45 58 48.06	23 11 22	203 04 03	Schumer	4.526521	33,614.1	110,282
	94 06 12.58	34 22 46	214 13 55	Brockway (Suintax (M. R. C.) 1889).	4.451673	28,292.6	92,823
Pierz, highest grain elevator, 1927 (n. d.)[1]	45 57 35.10	23 04 48	202 58 03	Schumer	4.493322	31,140.2	102,166
	94 07 00.13	35 18 56	215 10 40	Brockway (Suintax (M. R. C.) 1889).	4.412608	25,858.8	84,838
Pierz, church building (dark top), 1927 (n. d.)[1]	45 58 47.11	23 56 45	203 49 10	Schumer	4.528598	33,775.2	110,811
	94 05 50.75	35 11 43	215 02 37	Brockway (Suintax (M. R. C.) 1889).	4.455405	28,536.8	93,624
Buckman, red wooden water tank, 1927 (n. d.)[1]	45 53 52.74	32 42 12	212 34 28	Schumer	4.412989	25,881.5	84,913
	94 05 38.04	49 36 09	229 26 54	Brockway (Suintax (M. R. C.) 1889).	4.341587	21,957.7	72,040
Royalton, water tank, 1927 (n. d.)	45 49 49.680	281 57 22.1	102 05 00.2	Alberta	4.149279	14,101.9	46,266
	94 17 29.438	311 12 15.0	131 21 51.0	Voight	4.364022	23,121.8	75,859
		354 22 40.7	174 23 27.2	Schumer	4.157127	14,359.1	47,110
Royalton, Catholic Church, spire, 1927 (n. d.)	45 49 58.534	283 01 18.4	103 08 57.1	Alberta	4.151631	14,178.5	46,517
	94 17 30.268	311 40 49.9	131 50 26.5	Voight	4.367657	23,316.2	76,497
		354 24 46.6	174 25 33.7	Schumer	4.165332	14,633.0	48,008
White church steeple (gray top), 1927 (n. d.)[1]	45 50 18.88	57 26 32	237 13 26	Schumer	4.449413	28,145.8	92,342
	93 58 07.84	73 58 50	253 44 12	Brockway (Suintax (M. R. C.) 1889).	4.439621	27,518.3	90,283
Rice, Powers Grain Elevator, 1927 (n. d.)[1]	45 45 06.14	298 56 08	119 02 36	Voight	4.127594	13,415.1	44,013
	94 13 08.05	106 01 06	285 57 14	Brockway (Suintax (M. R. C.) 1889).	3.862216	7,281.4	23,889
St. Stephens, Catholic Church, spire, 1927 (n. d.)	45 42 05.810	160 30 49.3	340 29 20.5	Brockway (Suintax (M. R. C.) 1889).	3.904905	8,033.5	26,357
	94 16 27.829						
		227 34 05.9	47 40 59.5	Alberta	4.227684	16,892.1	55,420
		273 15 15.9	93 24 07.3	Voight	4.206587	16,091.1	52,792
St. Joseph Catholic Church, south spire, 1927 (n. d.)	45 34 48.086	220 59 59.0	41 11 57.3	Alberta	4.519053	33,041.0	108,402
	94 23 34.387	243 27 45.2	63 41 40.9	Voight	4.451340	28,270.9	92,752
		285 46 19.5	105 55 19.9	St. Cloud	4.232076	17,063.8	55,983
St. Joseph Catholic Church, north spire, 1927 (n. d.)	45 34 48.541	221 00 57.6	41 12 55.9	Alberta	4.518916	33,030.6	108,368
	94 23 34.397	243 29 17.5	63 43 13.2	Voight	4.451246	28,264.8	92,732
		285 49 01.7	105 58 02.1	St. Cloud	4.232179	17,067.9	55,997
Foley, steel water tank, 1927, r. 1935 (n. d.)	45 39 53.646	320 03 20.9	140 11 49.5	Quick	4.381683	24,081.5	79,007
	93 54 42.728	8 11 15.0	188 10 34.1	Duelm	3.940150	8,712.6	28,585
		104 32 27.6	284 25 45.0	Voight	4.099616	12,578.1	41,267
St. Cloud, State Reformatory, concrete standpipe, 1927, r. 1935 (n. d.).	45 32 32.141	145 25 43.0	325 18 58.8	Schumer	4.333680	21,561.6	70,740
	94 06 58.871	251 09 05.9	71 17 10.7	Duelm	4.191756	15,550.9	51,020
		325 11 54.5	145 20 14.3	Enfield	4.427406	26,755.1	87,779

[1]No check on this position.

Royalton to Albert Lea arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
St. Cloud, State Reformatory, smokestack, 1927, r. 1935 (n. d.).	45 32 35.251	145 23 57.9	325 17 15.4	Schumer	4.331474	21,452.3	70,381
	94 07 01.319	251 32 55.5	71 41 02.0	Duelm	4.192304	15,570.6	51,085
		325 13 18.7	145 21 40.2	Enfield	4.429175	26,864.3	88,137
St. Cloud, State Reformatory, flagpole, 1927, r. 1935 (n. d.).	45 32 30.90	85 09 28	265 06 45	St. Cloud	3.699288	5,003.7	16,416
	94 07 07.72	145 54 23	325 47 45	Schumer	4.332132	21,484.8	70,488
		251 14 37	71 22 49	Duelm	4.197144	15,745.0	51,657
St. Cloud, Old Folks Home, cupola, 1927, r. 1935 (n. d.)	45 32 22.012	87 57 54.6	267 55 37.1	St. Cloud	3.621406	4,182.2	13,721
	94 07 44.882	148 06 42.7	328 00 31.3	Schumer	4.327890	21,276.0	69,803
		195 31 33.1	15 34 09.8	Voight	4.248919	17,738.6	58,197
St. Cloud, Catholic Orphanage, cross on tower, 1927, r. 1935 (n. d.).	45 32 20.493	87 09 35.5	267 08 27.5	St. Cloud	3.316490	2,072.5	6,800
	94 09 22.116	153 13 43.9	333 08 42.0	Schumer	4.307122	20,282.5	66,544
		201 47 22.8	21 51 09.0	Voight	4.266207	18,458.9	60,561
St. Cloud, Stearns County Courthouse, dome, 1927, r. 1935 (n. d.).	45 33 38.405	32 35 45.0	212 34 52.3	St. Cloud	3.473788	2,977.1	9,767
	94 09 43.601	151 05 32.3	331 00 45.7	Schumer	4.253762	17,937.5	58,850
		206 24 24.6	26 28 26.1	Voight	4.216216	16,451.9	53,976
St. Cloud, Catholic Cathedral, tower, 1927, r. 1935 (n. d.).	45 33 48.762	29 56 56.9	209 56 03.4	St. Cloud	3.513718	3,263.8	10,708
	94 09 42.422	150 31 07.1	330 26 19.7	Schumer	4.247257	17,670.8	57,975
		206 49 48.8	26 53 49.5	Voight	4.208294	16,154.5	53,000
St. Cloud, St. Raphaels Hospital, chimney, 1927, r. 1935 (n. d.).	45 34 30.974	14 51 54.9	194 51 18.8	St. Cloud	3.630866	4,274.3	14,023
	94 10 06.981	149 53 15.7	329 48 45.8	Schumer	4.211529	16,275.3	53,397
		265 50 33.5	86 00 52.7	Duelm	4.275181	18,844.3	61,825
St. Cloud, tall white smokestack, 1927, r. 1935 (n. d.) [1]	45 34 01.55	149 23 20	329 18 27	Schumer	4.240928	17,415.2	57,136
	94 09 34.50	262 50 24	83 00 20	Duelm	4.260854	18,232.8	59,819
St. Cloud, Breen Hotel, chimney, 1927, r. 1935 (n. d.) [1]	45 33 39.14	32 51 52	212 50 58	St. Cloud	3.479010	3,013.1	9,885
	94 09 42.16	150 58 12	330 53 25	Schumer	4.253648	17,932.8	58,835
St. Cloud, city water works standpipe, 1927, r. 1935 (n. d.). [1]	45 33 41.70	27 14 01	207 13 17	St. Cloud	3.467653	2,935.3	9,630
	94 09 55.61	151 40 05	331 35 27	Schumer	4.248549	17,723.5	58,148
St. Cloud, power plant smokestack, 1927, r. 1935 (n. d.). [1]	45 32 42.76	70 55 45	250 54 30	St. Cloud	3.383422	2,417.8	7,932
	94 09 12.20	151 46 37	331 41 28	Schumer	4.296053	19,772.1	64,869
St. Cloud, Old Folks Home, water tank, 1927, r. 1935 (n. d.). [1]	45 32 21.08	315 26 22	135 41 45	Monticello	4.604970	40,268.9	132,116
	94 07 45.36	323 01 24	143 10 17	Enfield	4.432482	27,069.6	88,811
		88 21 18	268 19 02	St. Cloud	3.620252	4,171.1	13,685
Sauk Rapids, Catholic Church, 1927 (n. d.) [1]	45 34 55.32	267 35 19	87 43 11	Duelm	4.156119	14,325.8	47,001
	94 06 40.27	330 36 36	150 44 42	Enfield	4.481285	30,289.0	99,373
Sauk Rapids, water tank, 1927 (n. d.)	45 35 17.914	18 33 32.0	198 32 30.4	St. Cloud	3.769846	5,886.3	19,312
	94 09 31.170	144 42 33.9	324 37 38.4	Schumer	4.189615	15,474.4	50,769
		270 16 16.4	90 26 10.2	Duelm	4.255724	18,018.7	59,116
Princeton, steel water tank, 1927, r. 1935 (n. d.) [1]	45 34 04.16	53 55 05	233 49 18	Quick	4.115459	13,045.4	42,800
	93 34 45.02	94 40 32	274 25 36	Duelm	4.436083	27,295.0	89,550
Glendorado, black church spire (white belfry), 1927, r. 1935 (n. d.). [1]	45 34 59.09	321 02 49	141 06 59	Quick	4.081561	12,065.9	39,586
	93 48 39.99	92 59 45	272 54 45	Duelm	3.959830	9,116.5	29,910
Elk River, water tank (white roof), 1927, r. 1935 (n. d.).	45 18 21.980	29 21 53.3	209 17 24.2	Esterly	4.227261	16,875.7	55,366
	93 33 58.806	98 49 13.1	278 34 03.7	Enfield	4.449800	28,170.9	92,424
		167 43 58.9	347 43 34.7	Godfrey	3.541712	3,481.1	11,421
Elk River, creamery smokestack, 1927, r. 1935 (n. d.) [1]	45 18 07.48	81 38 31	261 29 42	Monticello	4.214544	16,388.7	53,769
	93 33 45.03	99 37 07	279 21 48	Enfield	4.455437	28,538.9	93,631
Maple Lake, Catholic Church, 1927, r. 1935 (n. d.) [1]	45 13 47.71	206 09 42	26 13 06	Enfield	4.151710	14,181.1	46,526
	94 00 04.67	252 47 16	72 57 09	Monticello	4.280311	19,068.3	62,560
Maple Lake, water tank, 1927, r. 1935 (n. d.)	45 13 47.878	157 38 36.6	337 30 54.3	St. Cloud	4.568738	37,045.7	121,541
	94 00 08.064	206 26 17.1	26 29 43.6	Enfield	4.152572	14,209.3	46,618
		252 52 02.7	73 01 58.6	Monticello	4.281885	19,137.5	62,787
Maple Lake, flagpole, 1927 (n. d.) [1]	45 13 48.68	205 59 01	26 02 23	Enfield	4.150031	14,126.4	46,346
	94 00 01.75	252 49 02	72 58 53	Monticello	4.278723	18,998.7	62,332
Buffalo, Catholic Church, 1927, r. 1935 (n. d.) [1]	45 10 33.32	216 16 08	36 20 46	Monticello	4.158855	14,416.3	47,297
	93 52 40.27	270 47 30	90 56 17	Esterly	4.209911	16,214.8	53,198
Buffalo, steel water tank, 1927, r. 1935 (n. d.) [1]	45 10 25.88	214 25 45	34 30 09	Monticello	4.157438	14,369.4	47,144
	93 52 21.73	269 59 01	90 07 34	Esterly	4.198887	15,808.4	51,865
St. Michaels, Catholic Church, clock on tower, 1927, r. 1935 (n. d.).	45 12 39.339	7 23 06.1	187 22 48.7	Esterly	3.620097	4,169.6	13,680
	93 39 53.231	133 21 19.3	313 16 52.5	Monticello	4.051659	11,263.1	36,952
		270 13 11.5	90 20 46.6	Dayton	4.145875	13,991.8	45,905
Rogers, white church, gray spire, 1927 r. 1935 (n. d.)	45 10 21.607	90 42 01.9	270 36 29.7	Esterly	4.009785	10,227.9	33,556
	93 32 29.421	123 54 08.0	303 44 26.2	Monticello	4.332870	21,521.4	70,608
		225 49 37.8	45 51 57.8	Dayton	3.778490	6,004.7	19,700
Dayton, St. John Catholic Church, spire, 1927 (n. d.)	45 14 32.762	328 21 57.7	148 23 09.3	Dayton	3.622555	4,193.3	13,758
	93 30 52.847	102 02 07.4	281 51 16.6	Monticello	4.309975	20,416.2	66,982
		155 26 30.8	335 23 54.6	Godfrey	4.061522	11,521.8	37,801

[1] No check on this position.

Royalton to Albert Lea arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
Dayton, water tank, 1927, r. 1935 (n. d.) [1]	45 14 01.16	103 35 26	283 23 40	Monticello	4.348148	22,291.9	73,136
	93 29 34.83	150 28 45	330 25 13	Godfrey	4.119449	13,165.9	43,195
Anoka, Catholic Church, gold cross on top, 1927, r. 1935 (n. d.).[1]	45 11 58.79	80 02 13	259 53 23	Esterly	4.218648	16,544.3	54,279
	93 27 51.55	150 10 19	330 05 34	Godfrey	4.244620	17,563.9	57,624
Anoka, black water tank, 1927, r. 1935 (n. d.) [1]	45 12 54.33	17 27 18	197 24 14	Maxim	4.275303	18,849.6	61,842
	93 23 15.50	86 07 26	266 03 13	Dayton	3.892024	7,798.7	25,586
Anoka, Congregational Church, gray spire, 1927, r. 1935 (n. d.).[1]	45 11 51.69	19 29 41	199 26 37	Maxim	4.231057	17,023.8	55,852
	93 23 14.26	100 12 44	280 08 30	Dayton	3.899473	7,933.6	26,029
Anoka, smokestack (west one of two), 1927 (n. d.) [1]	45 12 54.82	17 49 56	197 46 48	Maxim	4.276570	18,904.7	62,023
	93 23 09.33	86 04 59	266 00 42	Dayton	3.899502	7,934.2	26,031
Anoka, Pillsbury Mills, brick smokestack, 1927, r. 1935 (n. d.).[1]	45 11 56.81	18 41 30	198 38 32	Maxim	4.233206	17,108.3	56,129
	93 23 23.33	99 19 00	279 14 53	Dayton	3.887156	7,711.8	25,301
Loretto, large church steeple, 1927, r. 1935 (n. d.) [1]	45 03 13.44	270 09 17	90 16 40	Maxim	4.136131	13,681.4	44,886
	93 37 59.12	317 16 09	137 17 26	Hamel	3.547921	3,531.2	11,585
Waconia, water tank, 1927, r. 1935 (n. d.) [1]	44 51 02.11	259 02 58	79 11 14	Excelsior	4.196710	15,729.3	51,605
	93 46 44.50	303 36 32	123 46 33	Shakopee	4.352818	22,532.9	73,927
Waconia, church steeple, 1927, r. 1935 (n. d.) [1]	44 50 54.76	258 29 04	78 37 31	Excelsior	4.207026	16,107.4	52,846
	93 47 00.01	302 39 12	122 49 23	Shakopee	4.355913	22,694.1	74,456
Minneapolis, Hennepin Methodist Church, spire, 1927 (n. d.).[1]	44 57 59.70	359 58 06	179 58 06	Buck (Buck Hill, 1889)	4.431965	27,037.4	88,705
	93 17 14.30	125 26 07	305 18 49	Maxim	4.221163	16,640.4	54,594
St. Paul, Montgomery Ward, tower, 1927 (n. d.) [1]	44 57 16.31	21 20 39	201 15 18	Buck (Buck Hill, 1889)	4.440628	27,582.1	90,492
	93 09 37.45	80 49 43	260 37 02	Hopkins	4.378980	23,932.1	78,517
Hopkins, steel water tank, 1927, r. 1935 (n. d.) [1]	44 54 52.88	340 59 48	161 03 42	Buck (Buck Hill, 1889)	4.352032	22,492.2	73,793
	93 22 46.41	33 17 09	213 10 17	Shakopee	4.370315	23,459.3	76,966
New Market, St. Nicholas Catholic Church, spire, 1927 (n. d.).	44 34 21.284	63 07 25.3	243 01 50.1	Veseli	4.073005	11,830.6	38,814
	93 21 01.435	196 39 55.2	16 42 35.3	Buck (Buck Hill, 1889)	4.242618	17,483.1	57,359
		299 23 01.5	119 24 17.0	Elko	3.435562	2,726.2	8,944
New Market, water tank, 1927 (n. d.)	44 34 15.720	63 21 28.0	243 16 00.3	Veseli	4.062379	11,544.6	37,876
	93 21 12.021	197 13 40.3	17 16 27.9	Buck (Buck Hill, 1889)	4.248352	17,715.4	58,121
		294 04 30.8	114 05 53.8	Elko	3.456030	2,857.8	9,376
New Prague, International Flour Mill, steel tower, 1927 (n. d.).[1]	44 32 34.19	264 30 02	84 41 03	Elko	4.319688	20,878.0	68,497
	93 34 55.46	284 35 03	104 39 13	Veseli	3.909929	8,127.0	26,663
Montgomery, city water tank, 1927 (n. d.) [1]	44 26 25.61	220 05 26	40 09 35	Veseli	4.086233	12,196.4	40,014
	93 34 54.98	321 40 57	141 44 59	Shields	4.091755	12,352.5	40,526
Montgomery, Commander Flour Mill, water tank, 1927 (n. d.).[1]	44 26 35.26	220 35 09	40 39 15	Veseli	4.075326	11,893.9	39,022
	93 34 49.71	322 56 51	143 00 50	Shields	4.097499	12,517.0	41,066
Shieldsville, Catholic Church, black cross, 1927 (n. d.)	44 21 50.664	78 13 36.2	258 10 33.4	Shields	3.771988	5,915.5	19,408
	93 24 47.696	162 40 41.6	342 37 45.4	Veseli	4.270939	18,661.2	61,224
		297 14 24.4	117 21 31.3	Faribault	4.182666	15,228.8	49,963
Faribault, State Deaf and Dumb School, water tank, 1927 (n. d.).[1]	44 17 56.88	107 28 22	287 18 18	Shields	4.303152	20,098.0	65,938
	93 14 43.58	212 41 00	32 41 04	Faribault	2.439196	274.9	902
Faribault, Rice County Courthouse, spire, 1927 (n. d.)[1]	44 17 31.96	112 23 56	292 15 16	Shields	4.251291	17,835.7	58,516
	93 16 44.62	250 31 34	70 33 03	Faribault	3.477578	3,003.2	9,853
Faribault, water tank (white top), 1927 (n. d.)	44 16 53.642	350 03 36.6	170 04 48.9	Medford	4.125183	13,340.8	43,769
	93 15 40.050	47 56 04.4	227 48 31.1	Morris	4.288924	19,450.2	63,813
		114 00 41.6	293 51 16.3	Shields	4.292648	19,617.7	64,362
Faribault, white church steeple, 1927 (n. d.) [1]	44 17 52.82	44 04 54	223 57 22	Morris	4.315622	20,683.4	67,859
	93 15 42.32	109 00 31	288 51 08	Shields	4.276474	18,900.5	62,009
Faribault, State Feeble-minded Institution, dome, 1927 (n. d.).[1]	44 17 00.82	210 11 32	30 12 08	Faribault	3.355950	2,269.6	7,446
	93 15 28.38	351 18 19	171 19 23	Medford	4.130903	13,517.7	44,349
Faribault, square stone tower with open coping, 1927 (n. d.).[1]	44 17 13.27	213 38 22	33 38 55	Faribault	3.277573	1,894.8	6,217
	93 15 24.24	351 55 12	171 56 13	Medford	4.142526	13,884.4	45,552
Faribault, Deaf and Dumb Asylum, black standpipe, 1927 (n. d.).[1]	44 17 55.87	259 19 55	79 20 39	Faribault	3.152027	1,419.1	4,656
	93 15 39.80	351 19 40	171 20 52	Medford	4.182857	15,235.5	49,985
Faribault, St. Mary's School, spire with open columns in belfry, 1927 (n. d.).[1]	44 17 50.73	251 35 18	71 35 58	Faribault	3.125127	1,333.9	4,376
	93 15 33.98	351 43 22	171 44 31	Medford	4.177814	15,059.6	49,408
Owatonna, water tank, 1927, r. 1935 (n. d.)	44 04 52.370	80 40 02.8	260 35 37.0	Meriden	3.935413	8,618.1	28,275
	93 13 08.946	117 26 10.3	297 16 52.6	Morris	4.302161	20,052.2	65,788
		173 24 17.8	353 23 44.8	Medford	3.962944	9,182.1	30,125
Owatonna, Pillsbury Academy, tall gray spire, 1927, r. 1935 (n. d.).	44 04 58.007	79 27 35.9	259 23 11.9	Meriden	3.934082	8,591.8	28,188
	93 13 11.519	173 38 20.9	353 37 49.7	Medford	3.954376	9,002.8	29,537
		263 11 22.2	83 14 43.0	Hartle	3.810512	6,464.2	21,208

[1] No check on this position.

Royalton to Albert Lea arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
Owatonna, Catholic Church, steeple, 1927, r. 1935 (n. d.).	44 04 35.355	27 54 43.6	207 49 53.0	Berlin	4.299696	19,938.7	65,416
	93 13 24.687	175 49 15.6	355 48 53.5	Medford	3.985525	9,672.2	31,733
		257 40 41.9	77 44 11.8	Hartle	3.836941	6,869.8	22,539
Owatonna, State Orphanage, water tank (conical top), 1927, r. 1935 (n. d.).	44 05 21.606	23 00 45.7	202 56 33.8	Berlin	4.315870	20,695.2	67,898
	93 14 20.405	71 35 09.6	251 31 33.5	Meriden	3.862541	7,286.9	23,907
		183 42 42.0	3 42 58.7	Medford	3.915726	8,236.2	27,022
Owatonna, central heating plant, smokestack, 1927, r. 1935 (n. d.).	44 05 26.706	22 47 30.2	202 43 18.9	Berlin	4.318737	20,832.3	68,347
	93 14 21.320	70 21 58.0	250 18 22.5	Meriden	3.864448	7,318.9	24,012
		183 55 40.0	3 55 57.3	Medford	3.907437	8,080.5	26,511
Owatonna, light and power plant, tall smokestack, 1927, r. 1935 (n. d.).	44 05 01.174	25 33 59.5	205 29 25.2	Berlin	4.309965	20,415.7	66,981
	93 13 48.131	77 39 17.5	257 35 19.0	Meriden	3.892801	7,812.7	25,632
		178 48 32.7	358 48 27.0	Medford	3.947014	8,851.4	29,040
Owatonna, standpipe, 1927, r. 1935 (n. d.)	44 04 52.957	80 32 30.1	260 28 04.5	Meriden	3.935253	8,615.0	28,264
	93 13 09.225	117 23 53.8	297 14 36.3	Morris	4.301860	20,038.3	65,742
		261 45 27.8	81 48 46.9	Hartle	3.808480	6,434.0	21,109
Owatonna, Lutheran Church, gray spire (cross on top), 1927, r. 1935 (n. d.).[1]	44 04 35.36	333 38 50	153 42 27	Bixby	4.195590	15,688.8	51,472
	93 13 24.68	83 53 23	263 49 08	Meriden	3.913843	8,200.6	26,905
Owatonna, flagpole, 1927, r. 1935 (n. d.) [1]	44 05 24.89	71 45 56	251 42 08	Meriden	3.885290	7,678.7	25,193
	93 14 03.36	181 05 23	1 05 27	Medford	3.909504	8,119.0	26,637
Owatonna, Sacred Heart Catholic Church, cupola, 1927, r. 1935 (n. d.).[1]	44 04 36.67	258 43 15	78 46 58	Hartle	3.862749	7,290.4	23,919
	93 13 44.38	332 17 41	152 21 31	Bixby	4.202055	15,924.1	52,244
Owatonna, red belfry, 1927, r. 1935 (n. d.) [1]	44 05 19.72	72 29 41	252 25 58	Meriden	3.872652	7,458.5	24,470
	93 14 11.45	117 05 09	296 56 35	Morris	4.265508	18,429.3	60,463
Waseca, steel water tank, 1927 (n. d.)	44 04 29.300	208 04 37.8	28 07 23.8	Morris	4.051296	11,253.7	36,922
	93 30 28.319	272 38 29.3	92 46 06.5	Meriden	4.165606	14,642.2	48,039
		322 13 26.6	142 20 27.1	Berlin	4.343320	22,045.5	72,328
Waseca, tall smokestack, 1927 (n. d.)	44 04 47.230	210 10 55.7	30 13 46.6	Morris	4.035290	10,846.5	35,586
	93 30 35.359	247 13 41.4	67 25 16.9	Medford	4.381510	24,071.9	78,976
		274 44 52.0	94 52 34.1	Meriden	4.171264	14,834.2	48,669
Waseca, smokestack (center one of three), 1927 (n. d.) [1]	44 04 38.07	213 10 25	33 13 43	Morris	4.062217	11,540.3	37,862
	93 31 14.13	247 23 21	67 35 24	Medford	4.397538	24,976.9	81,945
Waseca, round smokestack, 1927 (n. d.) [1]	44 04 35.86	273 27 32	93 35 06	Meriden	4.162700	14,544.5	47,718
	93 30 23.44	322 46 05	142 53 02	Berlin	4.345178	22,140.0	72,638
Waseca, Catholic Church, steeple, 1927 (n. d.)	44 04 40.320	210 23 29.4	30 26 25.6	Morris	4.045991	11,117.1	36,473
	93 30 43.060	273 52 47.0	94 00 34.4	Meriden	4.175773	14,989.0	49,176
		322 05 30.2	142 12 40.9	Berlin	4.352478	22,515.3	73,869
Waseca, courthouse, 1927 (n. d.)	44 04 47.226	209 18 48.2	29 21 33.2	Morris	4.031524	10,752.9	35,278
	93 30 26.870	247 03 15.4	67 14 45.0	Medford	4.378360	23,897.9	78,405
		274 48 36.6	94 56 12.8	Meriden	4.165718	14,646.0	48,051
Bixby, cable elevator, 1927 (n. d.) [1]	43 56 40.38	6 53 40	186 52 45	Newry	4.170670	14,813.9	48,602
	93 05 51.05	100 45 19	280 43 41	Bixby	3.506162	3,207.5	10,523
Ellendale, square brick chimney, 1927 (n. d.) [1]	43 52 17.41	235 53 46	56 00 27	Bixby	4.192112	15,563.7	51,062
	93 17 50.29	294 41 57	114 49 20	Newry	4.196909	15,736.5	51,629
Ellendale, tall flagpole, 1927 (n. d.) [1]	43 52 18.01	235 54 58	56 01 38	Bixby	4.191413	15,538.6	50,980
	93 17 49.50	294 47 14	114 54 36	Newry	4.196679	15,728.2	51,602
Ellendale, white church (gray steeple), 1927 (n. d.) [1]	43 52 14.85	4 11 33	184 11 05	Nelson	4.095268	12,452.8	40,856
	93 18 12.90	150 57 54	330 56 24	Berlin	3.776828	5,981.7	19,625
Ellendale, grain elevator, 1927 (n. d.) [1]	43 52 24.39	5 52 51	185 52 10	Nelson	4.106575	12,781.3	41,933
	93 17 55.06	146 13 19	326 11 37	Berlin	3.773632	5,937.9	19,481
Blooming Prairie, mill, brick chimney, 1927 (n. d.) [1]	43 51 52.44	44 51 14	224 48 14	Newry	3.914171	8,206.7	26,925
	93 02 51.64	142 59 34	322 55 52	Bixby	4.074882	11,881.8	38,982
Blooming Prairie, school cupola, 1927, r. 1935 (n. d.) [1]	43 52 07.42	39 13 13	219 10 34	Newry	3.908863	8,107.1	26,598
	93 03 21.26	144 16 31	324 13 09	Bixby	4.045997	11,117.2	36,474
Blooming Prairie, wooden water tank, 1927, r. 1935 (n. d.).	43 52 00.798	40 20 11.7	220 17 31.8	Newry	3.901529	7,971.3	26,153
	93 03 19.763	104 01 25.9	283 49 36.5	Berlin	4.371645	23,531.2	77,202
		144 44 35.4	324 41 12.6	Bixby	4.053201	11,303.2	37,084

[1] No check on this position.

Iowa–Minnesota State line to St. Paul arc (Mississippi River)

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Principal points	° ′ ″		° ′ ″	° ′ ″				
Ferry (Wis.), 1931(d. m.)	43 22 11.317 91 05 48.690	349.3 1,096.3	164 40 40		Reference mark no. 2.			
Gruber (Iowa), 1931 (d. m.)	43 20 48.217 91 21 28.331	1,488.0 638.1	262 59 59.79 229 12 12	83 10 44.91	Ferry Reference mark no. 1.	4.3286750	21,314.49	69,929.3
Redmound (Wis.), 1931 (d. m.)	43 28 24.015 91 08 43.811	741.1 984.7	341 04 36.04 50 47 55.37 186 36 21	161 06 36.41 230 39 09.98	Ferry Gruber Reference mark no. 2.	4.0848541 4.3467548	12,157.78 22,220.55	39,887.6 72,901.9
Iasota (Iowa-Minn.), 1931 (d. m.)	43 30 02.818 91 22 15.649	87.0 351.6	279 24 40.86 356 26 13.00 73 09 22	99 33 59.57 176 26 45.53	Redmound Gruber Reference mark no. 1.	4.2670782 4.2342296	18,496.02 17,148.64	60,682.4 56,261.8
Kapanke (Wis.), 1931 (d. m.)	43 37 11.995 91 06 38.530	370.2 863.9	9 48 17.50 57 53 21.82 136 33 38.92 192 45 22.00 75 57 29	189 46 51.20 237 42 36.03 316 26 12.09 12 47 27.16	Redmound Iasota McDonald (M. R. C.) St. Joseph Reference mark no. 1.	4.2184121 4.3954261 4.3231804 4.2635495	16,535.30 24,855.71 21,046.52 18,346.34	54,249.6 81,547.4 69,050.1 60,191.3
White, 1931 (d. m.)	43 39 07.226 91 19 31.583	223.0 707.8	193 33 03.75 236 02 29.15 281 31 24.36 323 43 12.02 12 22 27.41 3 27 23	13 34 30.92 56 13 28.59 101 40 17.82 143 50 38.44 192 20 34.31	McDonald (M. R. C.) St. Joseph Kapanke Redmound Iasota Reference mark no. 2.	4.0808412 4.4103644 4.2477238 4.3910221 4.2355288	12,045.95 25,725.53 17,689.84 24,604.93 17,200.02	39,520.8 84,401.2 58,037.4 80,724.7 56,430.4
Robb (Wis.), 1931 (d. m.)	44 06 12.066 91 25 31.757	370.6 706.3	313 48 32.28 2 55 33.03 313 22 38	133 58 49.11 182 55 00.82	Walden Ridgeway east base Reference mark no. 1.	4.4383421 4.3065355	27,437.35 20,255.15	90,017.4 66,453.8
Witoka, 1931 (d. m.)	43 57 10.376 91 35 59.562	320.2 1,328.1	219 50 46.15 273 45 26.90 285 05 43.70 229 44 40	39 58 02.49 94 02 58.56 105 12 27.16	Robb Walden Ridgeway east base Reference mark no. 1.	4.3383139 4.5298974 4.1282635	21,792.84 33,876.41 13,435.80	71,498.7 111,142.9 44,080.6
Johnson (Wis.), 1931 (d. m.)	44 06 01.136 91 38 13.186	35.1 293.3	268 47 29.48 349 41 28.36 157 46 50	88 56 19.39 169 43 01.23	Robb Witoka Reference mark no. 2.	4.2288883 4.2214058	16,939.02 16,649.68	55,574.1 54,624.8
Gaulke, 1931 (d. m.)	44 02 53.964 91 48 00.474	1,665.5 10.6	246 05 42.93 258 21 27.37 303 21 52.46 278 07 27	66 12 31.44 78 37 05.56 123 30 13.25	Johnson Robb Witoka Reference mark no. 1.	4.1549852 4.4861106 4.2843591	14,288.45 30,627.43 19,246.83	46,878.0 100,483.5 63,145.6
Becker (Wis.), 1931 (d. m.)	44 13 18.921 91 47 03.359	584.0 74.6	318 51 57.35 3 46 16.84 28 44 00	138 58 06.71 183 45 37.07	Johnson Gaulke Reference mark no. 2.	4.2534940 4.2862541	17,926.44 19,330.99	58,813.7 63,421.8
Oak Ridge, 1931 (d. m.)	44 07 15.850 91 55 04.099	489.2 91.1	223 34 34.81 275 45 32.14 310 34 33.60 25 35 58	43 40 09.80 95 57 15.79 130 39 28.33	Becker Johnson Gaulke Reference mark no. 1.	4.1897822 4.3540957 4.0939943	15,480.40 22,599.34 12,416.36	50,788.6 74,144.7 40,736.0
Wautopa 2, 1931, r. 1934 (d. m.)	44 14 14.559 92 02 33.173	449.4 736.1	274 40 01.03 322 17 35.06 64 11 34	94 50 49.61 142 22 48.02	Becker Oak Ridge Reference mark no. 1.	4.3161306 4.2128674	20,707.64 16,325.53	67,938.3 53,561.3
Iberg (Wis.), 1931, r. 1934 (d .m.)	44 18 55.193 91 49 52.837	1,703.6 1,171.0	340 04 31.49 17 46 47.96 62 53 01.26 9 01 04	160 06 29.79 197 43 10.88 242 44 10.45	Becker Oak Ridge Wautopa 2 Reference mark no. 1.	4.0429284 4.3553440 4.2777540	11,038.97 22,664.39 18,956.32	36,217.0 74,358.1 62,192.5
Roemer (Wis.), 1931 (d. m.)	44 25 17.439 91 59 10.617	538.3 234.9	313 38 12.67 12 23 29.01 290 07 14	133 44 42.71 192 21 07.47	Iberg Wautopa 2 Reference mark no. 2.	4.2324924 4.3211191	17,080.18 20,946.87	56,037.2 68,723.2
Lange, 1931 (d. m.)	44 21 57.645 92 13 46.649	1,779.3 1,032.9	252 16 14.27 279 54 54.20 313 41 20.79 230 41 05	72 26 27.13 100 11 36.33 133 49 11.17	Roemer Iberg Wautopa 2 Reference mark no. 1.	4.3084724 4.5086311 4.3153036	20,345.69 32,257.53 20,668.24	66,750.8 105,831.6 67,809.1
Rask (Wis.), 1931 (d. m.)	44 32 54.295 92 12 20.416	1,675.9 450.7	308 51 39.29 5 22 54.49 0 23 02	129 00 52.72 185 21 54.09	Roemer Lange Reference mark no. 1.	4.3509829 4.3087373	22,437.94 20,358.10	73,615.1 66,791.5
Wabasha, 1892, r. 1931 (d. m.)	44 24 22.879 92 25 07.059	706.2 156.2	226 57 03.83 267 02 56.17 286 30 33.64 280 33 58	47 06 00.96 87 21 05.43 106 38 29.58	Rask Roemer Lange Reference mark no. 1.	4.3646911 4.5375279 4.1962857	23,157.47 34,476.87 15,713.96	75,975.8 113,112.9 51,554.9
Peterson (Wis.), 1931 (d. m.)	44 36 39.919 92 23 55.131	1,232.2 1,215.6	294 22 08.38 4 00 06.78	114 30 16.00 183 59 16.36	Rask Wabasha	4.2262117 4.3580420	16,834.95 22,805.63	55,232.7 74,821.5
Strusz, 1931 (d. m.)	44 28 15.874 92 32 21.031	490.0 464.8	215 37 24.01 251 55 39.75 306 48 13.00 138 59 11	35 43 18.86 72 09 41.42 126 53 16.85	Peterson Rask Wabasha Reference mark no. 1.	4.2822159 4.4452541 4.0789284	19,152.08 27,877.52 11,993.02	62,834.8 91,461.5 39,347.1
Svea (Wis.), 1931 (d. m.)	44 39 04.668 92 30 59.503	144.1 1,311.1	295 29 24.22 5 08 30.62 4 00 50	115 34 22.36 185 07 33.41	Peterson Strusz Reference mark no. 1.	4.0156346 4.3033507	10,366.56 20,107.16	34,011.0 65,968.2

Iowa–Minnesota State line to St. Paul arc (Mississippi River)—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance: Logarithm (meters)	Distance: Meters	Distance: Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
Lundell, 1931 (d. m.)	44 31 28.814	889.4	226 31 07.53	46 39 00.81	Svea	4.3111887	20,473.34	67,169.6
	92 42 13.678	302.1	248 16 56.38	68 29 47.30	Peterson	4.4162061	26,073.90	85,544.1
			294 24 02.10	114 30 57.48	Strusz	4.1578839	14,384.14	47,192.0
			245 19 55		Reference mark no. 1.			
Manion (Wis.), 1931 (d. m.)	44 42 27.847	859.6	299 44 16.80	119 50 06.62	Svea	4.1012306	12,624.98	41,420.5
	92 39 16.998	374.2	340 43 31.11	160 48 23.13	Strusz	4.4448712	27,852.95	91,380.9
			10 51 27.87	190 49 23.78	Lundell	4.3162296	20,712.36	67,953.8
			224 51 09		Reference mark no. 1.			
Hampton 2, 1931 (d. m.)	44 36 38.058	1,174.8	114 47 26.72	294 32 56.54	Buck (Buck Hill, 1889)	4.4772306	30,007.55	98,449.8
	92 56 35.764	788.6	244 38 29.98	64 50 40.12	Manion	4.4032096	25,305.19	83,022.1
			296 33 45.10	116 43 50.07	Lundell	4.3280514	21,283.91	69,829.0
			272 37 16		Reference mark no. 1.			
Prescott 2 (Wis.), 1931 (d. m.)	44 46 41.751	1,288.8	312 07 28.91	132 12 05.83	Manion	4.0673015	11,676.20	38,307.7
	92 45 50.395	1,108.0	350 21 39.84	170 24 12.14	Lundell	4.4560936	28,582.07	93,773.0
			37 23 26.97	217 15 53.06	Hampton 2	4.3698587	23,434.66	76,885.2
			81 47 38.84	261 25 33.01	Buck (Buck Hill, 1889)	4.6219426	41,873.83	137,381.1
			76 58 55		Reference mark no. 2.			
Wallace, 1892, r. 1931 (d. m.)	44 54 20.437	630.9	298 43 48.37	118 57 33.76	Prescott 2	4.4675927	29,348.96	96,289.0
	93 05 20.911	458.8	340 32 45.03	160 38 54.79	Hampton 2	4.5411858	34,768.49	114,069.6
			37 45 37.44	217 37 15.12	Buck (Buck Hill, 1889)	4.4084775	25,614.01	84,035.3
			93 12 16.73	272 56 35.07	Hopkins	4.4668482	29,298.69	96,124.1
			169 33 49		St. Paul, State capitol, gold ball on dome.			
Snelling, 1931 (d. m.)	44 55 03.611	111.5	282 18 04.23	102 21 20.49	Wallace	3.7953148	6,241.87	20,478.5
	93 09 58.895	1,291.8	23 53 42.29	203 48 35.86	Buck (Buck Hill, 1889)	4.3732621	23,619.03	77,490.1
			90 41 35.88	270 29 10.41	Hopkins	4.3646926	23,157.55	75,976.1
Mississippi River Commission (second order)								
Columbus (M. R. C.), (Iowa), 1894, r. 1931 (d. m.).	43 20 02.814	86.8	242 39 08.8	62 43 02.9	Ferry	3.936619	8,642.1	28,353
	91 11 29.634	667.6						
Genoa (M. R. C.), (Wis.), 1894, r. 1931 (d. m.)	43 35 23.383	721.6	50 31 13.4	230 25 05.5	Iasota	4.191543	15,543.3	50,995
	91 13 21.639	485.4	129 49 29.5	309 45 14.3	White	4.033212	10,794.7	35,416
Albin, 1931 (d. m.)	43 30 33.919	1,046.8	82 16 15.1	262 12 39.3	Iasota	3.851826	7,109.3	23,324
	91 17 02.078	46.7	208 57 43.3	29 00 15.2	Genoa (M. R. C.)	4.009125	10,212.3	33,505
			289 39 14.1	109 44 56.9	Redmound	4.075255	11,892.0	39,016
Lee Monument, eccentric (Iowa), 1931 (n. d.)	43 30 02.595	80.1	174 44 41.1	354 44 38.5	Albin	2.987126	970.8	3,185
	91 16 58.120	1,305.7	206 07 31.5	26 10 00.8	Genoa (M. R. C.)	4.042520	11,028.6	36,183
			285 16 12.0	105 21 52.2	Redmound	4.061332	11,516.8	37,785
Lee Monument (Iowa-Minn.), 1931 (d. m.) [1]	43 30 02.94	90.7	319 28	139 28	Lee Monument, eccentric	1.144263	13.94	45.7
	91 16 58.52	1,314.7						
Battle Ground (M. R. C.) (Wis.), 1894, r. 1931 (d. m.)	43 27 41.257	1,273.2	108 45 53.1	288 39 18.1	Iasota	4.134156	13,619.3	44,683
	91 12 41.654	936.4	127 08 32.8	307 05 36.4	Lee Monument, eccentric	3.859026	7,228.1	23,714
			132 20 36.6	312 17 37.5	Albin	3.898434	7,914.7	25,967
			176 24 03.8	356 23 36.4	Genoa (M. R. C.)	4.155038	14,290.2	46,884
			256 06 46.8	76 09 30.4	Redmound	3.740897	5,506.8	18,067
Nodine, 1927, r. 1932 (d. m.)	43 53 25.624	790.9	322 57 33.6	143 03 18.7	McDonald (M. R. C.)	4.267362	18,508.1	60,722
	91 25 43.786	977.3	17 29 51.0	197 26 40.2	Houston	4.312176	20,519.9	67,322
			103 40 58.6	283 35 49.9	Ridgeway west base	4.009614	10,223.8	33,543
			167 24 03.3	347 23 39.5	Ridgeway east base	3.545246	3,509.5	11,514
			268 20 58		Reference mark no. 2.			
Dresbach (M. R. C.), 1894, r. 1931 (d. m.)	43 52 33.922	1,047.0	343 46 36.0	163 48 34.8	McDonald (M. R. C.)	4.137756	13,732.7	45,055
	91 20 16.918	377.7	36 53 55.4	216 46 58.5	Houston	4.351477	22,463.5	73,699
			102 22 00.1	282 18 13.5	Nodine	3.873284	7,469.4	24,506
			103 09 49.2	283 00 53.9	Ridgeway west base	4.247776	17,692.0	58,045
			121 57 04.1	301 52 53.7	Ridgeway east base	3.977566	9,496.6	31,157
Root River (M. R. C.), 1894, r. 1931 (d. m.)	43 47 47.912	1,478.7	346 18 05.5	166 18 38.4	McDonald (M. R. C.)	3.651988	4,487.3	14,722
	91 18 12.916	288.8	162 35 16.0	342 33 50.1	Dresbach (M. R. C.)	3.966223	9,251.7	30,353
Grandfather (M. R. C.) (Wis.), 1894, r. 1931 (d. m.).	43 48 42.852	1,322.5	46 24 27.1	226 21 10.5	McDonald (M. R. C.)	3.943374	8,777.6	28,798
	91 12 41.236	921.7	77 08 59.6	257 05 10.0	Root River (M. R. C.)	3.881130	7,605.5	24,952
			125 03 32.6	304 58 16.9	Dresbach (M. R. C.)	4.094431	12,428.9	40,777
Trempealeau (M. R. C.) (Wis.), 1894, r. 1931 (d. m.).	44 00 59.651	1,841.1	354 47 37.7	174 48 07.7	Ridgeway east base	4.026612	10,631.9	34,881
	91 27 01.343	29.9	59 30 46.9	239 24 33.1	Witoka	4.143842	13,926.5	45,691
Gorder (M. R. C.) (Wis.), 1894, r. 1931 (d. m.)	44 04 34.451	1,063.3	294 55 55.2	115 03 19.4	Trempealeau (M. R. C.)	4.195646	15,690.8	51,479
	91 37 40.143	893.3	350 42 24.4	170 43 34.3	Witoka	4.142638	13,887.9	45,564
Minneiska (M. R. C.), 1895, r. 1931 (d. m.)	44 11 54.997	1,697.5	108 51 59.1	288 45 21.8	Wautopa 2	4.125775	13,359.0	43,829
	91 53 03.516	78.1	198 02 41.8	18 04 54.9	Iberg	4.134877	13,642.0	44,757
Schwitzer (M. R. C.) (Wis.), 1895, r. 1931 (d. m.)	44 17 42.314	1,306.1	352 30 35.6	172 31 19.9	Minneiska (M. R. C.)	4.033915	10,812.2	35,473
	91 54 06.987	154.9	60 18 58.6	240 13 05.3	Wautopa 2	4.111583	12,929.5	42,420
Nelson (M. R. C.) (Wis.), 1895, r. 1931 (d. m.)	44 25 05.990	184.9	330 45 25.4	150 49 27.1	Schwitzer (M. R. C.)	4.195613	15,689.6	51,475
	91 59 52.716	1,166.2	10 02 34.0	190 00 41.9	Wautopa 2	4.310034	20,419.0	66,991
			72 35 53.1	252 26 09.7	Lange	4.286709	19,351.2	63,488

[1] No check on this position.

Iowa–Minnesota State line to St. Paul arc (Mississippi River)—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance: Logarithm (meters)	Distance: Meters	Distance: Feet
Mississippi River Commission (second-order)—Continued	° ′ ″		° ′ ″	° ′ ″				
Danielson (M. R. C.) (Wis.), 1895, r. 1931 (d. m.)	44 31 45.679	1,410.0	36 29 32.3	216 24 12.3	Wabasha	4.230227	16,991.3	55,746
	92 17 30.388	671.0	71 52 07.7	251 41 43.4	Strusz	4.316275	20,714.5	67,961
			136 58 10.9	316 53 40.9	Peterson	4.094554	12,432.4	40,789
			252 46 22.3	72 49 59.7	Rask	3.855136	7,163.7	23,503
Red Wing (M. R. C.), 1895, r. 1931 (d. m.)	44 34 10.393	320.8	70 11 03.2	250 03 44.8	Lundell	4.166407	14,669.2	48,127
	92 31 48.732	1,075.3	186 48 36.1	6 49 10.7	Svea	3.961335	9,148.2	30,014
Diamond (M. R. C.) (Wis.), 1895, r. 1931 (d. m.)	44 40 08.643	266.8	316 01 21.9	136 07 01.3	Red Wing (M. R. C.)	4.186244	15,354.8	50,377
	92 39 51.918	1,143.6	335 37 23.5	155 42 40.0	Strusz	4.382850	24,146.3	79,220
			11 02 24.2	191 00 44.7	Lundell	4.213454	16,347.6	53,634
McNamara (M. R. C.), 1895, r. 1931 (d. m.)	44 42 53.108	1,639.3	204 53 40.3	24 55 25.2	Prescott 2	3.891074	7,781.7	25,530
	92 48 19.379	426.6	273 41 01.8	93 47 23.4	Manion	4.077894	11,964.5	39,254
			43 25 00.8	223 19 11.9	Hampton 2	4.202089	15,925.4	52,249
Red Rock (M. R. C.), 1895, r. 1931 (d. m.)	44 53 03.742	115.5	353 22 34.4	173 24 27.2	Hampton 2	4.486145	30,629.9	100,492
	92 59 15.993	351.0	53 01 14.8	232 48 35.4	Buck (Buck Hill, 1889)	4.472574	29,687.5	97,400
			106 30 26.7	286 26 09.1	Wallace	3.921680	8,349.9	27,395
Supplementary points								
Aviation beacon near Lee Monument (Iowa), 1931 (n. d.).[1]	43 29 47.07	1,452.6	281 37 41	101 44 01	Redmound	4.102450	12,660.5	41,537
	91 17 55.53	1,247.6	298 47 58	118 51 34	Battle Ground (M. R. C.)	3.905912	8,052.2	26,418
Caledonia, municipal standpipe, 1931, r. 1935 (n. d.).	43 38 07.223	222.9	262 14 08.1	82 21 09.5	White	4.140210	13,810.5	45,310
	91 29 42.201	946.0	326 07 20.1	146 12 27.8	Iasota	4.255215	17,997.6	59,047
			340 51 47.2	160 57 27.0	Gruber	4.530598	33,931.1	111,322
Caledonia, Catholic Church, spire, 1931, r. 1935 (n. d.).	43 37 57.499	1,774.5	261 06 33.9	81 13 40.4	White	4.146643	14,016.6	45,986
	91 29 49.534	1,110.4	325 08 43.3	145 13 56.1	Iasota	4.251460	17,842.7	58,539
			340 25 49.5	160 31 34.4	Gruber	4.527662	33,702.5	110,572
Dresbach, aviation beacon no. 23 (old no. 27), 1931 (n. d.).	43 52 43.047	1,328.6	244 36 12.9	64 41 42.7	Walden	4.142386	13,879.9	45,538
	91 20 06.126	136.8	296 02 45.7	116 14 10.4	St. Joseph	4.391104	24,609.6	80,740
			327 45 36.5	147 54 54.9	Kapanke	4.530760	33,943.8	111,364
Aviation beacon no. 24 (old no. 28) (Wis.), 1931 (n. d.).	44 00 37.373	1,153.5	191 25 59.4	11 27 04.7	Robb	4.022747	10,537.7	34,572
	91 27 05.673	126.4	291 34 38.3	111 45 59.8	Walden	4.371898	23,545.0	77,247
			61 49 08.1	241 42 57.3	Witoka	4.130510	13,505.5	44,309
Wilson, church spire, 1931 (n. d.)	43 57 59.537	1,837.5	134 33 19.5	314 28 31.2	Gaulke	4.112653	12,961.4	42,524
	91 41 05.599	124.8	194 27 56.0	14 29 55.9	Johnson	4.186167	15,352.1	50,368
			282 30 27.4	102 33 59.8	Witoka	3.844467	6,989.8	22,932
Aviation beacon no. 25A (old no. 29A), 1931 (n. d.).	44 03 19.540	603.1	229 36 00.4	49 39 03.8	Johnson	3.886466	7,699.6	25,261
	91 42 36.803	819.2	322 07 27.6	142 12 03.5	Witoka	4.159182	14,427.2	47,333
			83 46 44.6	263 42 59.5	Gaulke	3.860235	7,248.3	23,780
Aviation beacon no. 26 (old no. 30), 1931 (n. d.)	44 10 24.163	745.8	229 00 44.8	49 03 59.9	Becker	3.915308	8,228.3	26,996
	91 51 43.178	959.2	294 11 29.9	114 20 53.9	Johnson	4.295585	19,750.8	64,799
			340 21 40.2	160 24 15.2	Gaulke	4.168837	14,751.5	48,397
Cochrane, church spire (Wis.), 1931 (n. d.)	44 13 51.705	1,595.9	28 17 47.4	208 16 46.5	Minneiska (M. R. C.)	3.611805	4,090.8	13,421
	91 51 36.189	803.2	152 11 08.5	332 05 21.5	Nelson (M. R. C.)	4.371836	23,541.6	77,236
			154 50 39.1	334 48 53.8	Schwitzer (M. R. C.)	3.895680	7,864.7	25,803
Herold, Zion Church, spire (Wis.), 1931 (n. d.)	44 18 19.393	598.6	138 16 04.3	318 10 00.3	Roemer	4.238154	17,304.3	56,773
	91 50 29.926	663.3	216 38 33.8	36 38 59.7	Iberg	3.139006	1,377.2	4,518
			333 41 18.5	153 43 42.7	Becker	4.014704	10,344.4	33,938
Aviation beacon no. 27 (old no. 31) (Wis.), 1931 (n. d.).	44 19 19.912	614.6	100 51 07.9	280 37 37.9	Lange	4.417079	26,126.4	85,716
	91 54 27.840	616.9	103 06 37.4	282 45 11.3	Wabasha	4.621031	41,786.0	137,093
			146 04 34.2	326 00 47.0	Nelson (M. R. C.)	4.109856	12,878.2	42,251
Aviation beacon no. 28 (old no. 32B), 1931 (n. d.)	44 23 57.519	1,775.4	150 00 50.1	329 55 46.5	Rask	4.281878	19,137.2	62,786
	92 05 07.119	157.6	252 35 57.0	72 40 06.5	Roemer	3.917227	8,264.7	27,115
			294 39 17.8	114 49 57.0	Iberg	4.348199	22,294.6	73,145
Aviation beacon no. 29 (old no. 33), 1931 (n. d.)	44 25 38.117	1,176.5	197 31 32.0	17 33 47.0	Rask	4.149843	14,120.3	46,326
	92 15 33.043	730.9	271 35 12.2	91 46 39.9	Roemer	4.337286	21,741.3	71,330
			340 54 12.7	160 55 27.2	Lange	3.857394	7,201.0	23,625
Lund, Lutheran Church, spire (Wis.), 1931 (n. d.).	44 32 09.482	292.7	4 55 36.7	184 54 45.2	Lange	4.277728	18,955.2	62,189
	92 12 33.126	731.4	49 14 14.0	229 05 25.9	Wabasha	4.342929	22,025.7	72,263
			119 05 06.8	298 57 08.2	Peterson	4.235739	17,208.3	56,458
Aviation beacon no. 30 (old no. 34), 1931 (n. d.)	44 32 27.500	848.8	188 59 43.5	9 00 22.8	Peterson	3.897003	7,888.7	25,882
	92 24 51.069	1,127.5	1 21 17.9	181 21 06.7	Wabasha	4.175015	14,962.9	49,091
			52 02 21.6	231 57 06.2	Strusz	4.100864	12,614.3	41,385
Bay City, Tabor Church, spire (Wis.), 1931 (n. d.).	44 35 12.932	399.2	41 42 43.0	221 36 39.2	Strusz	4.236320	17,231.4	56,533
	92 23 42.302	933.1	126 37 19.0	306 32 11.9	Svea	4.079300	12,003.3	39,381
			173 59 11.0	353 59 02.0	Peterson	3.431361	2,700.0	8,858
Ellsworth, municipal water tank (Wis.), 1931 (n. d.).	44 43 51.348	1,585.0	332 52 09.3	152 55 46.8	Peterson	4.174924	14,959.7	49,080
	92 29 04.514	99.3	8 33 18.2	188 31 00.2	Strusz	4.465370	29,199.1	95,797
			15 58 43.5	195 57 22.6	Svea	3.963993	9,204.3	30,198

[1] No check on this position.

213528—26——7

Iowa–Minnesota State line to St. Paul arc (Mississippi River)—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″		° ′ ″	° ′ ″				
Ellsworth, courthouse dome (Wis.), 1931 (n. d.)	44 43 57.372	1,771.0	333 08 35.7	153 12 13.7	Peterson	4.179890	15,131.8	49,645
	92 29 05.149	113.3	8 28 26.6	188 26 09.1	Strusz	4.468066	29,381.0	96,394
			15 35 02.0	195 33 41.6	Svea	3.972180	9,379.5	30,773
Svea, church spire (Wis.), 1931 (n. d.)	44 38 02.396	74.0	126 55 22.5	306 49 33.9	Manion	4.135294	13,655.1	44,800
	92 31 01.102	24.3	181 03 00.0	1 03 01.1	Svea	3.283873	1,922.5	6,307
			342 47 21.8	162 51 30.1	Wabasha	4.422867	26,476.9	86,866
Aviation beacon no. 31B (old no. 35) (Wis.), 1931 (n. d.).	44 37 23.523	726.1	143 48 31.3	323 44 51.8	Manion	4.066112	11,644.3	38,203
	92 34 04.658	102.7	232 33 49.4	52 35 59.5	Svea	3.710813	5,138.2	16,858
			352 17 00.4	172 18 13.1	Strusz	4.231940	17,058.5	55,966
Welch, church spire, 1931 (n. d.)	44 36 01.292	39.9	251 24 51.9	71 33 50.7	Svea	4.250944	17,821.5	58,469
	92 43 46.549	1,026.6	346 17 45.4	166 18 50.6	Lundell	3.937356	8,656.8	28,402
			93 54 09.4	273 45 09.2	Hampton	4.230472	17,000.9	55,777
Vasa, church spire, 1931 (n. d.)	44 30 14.185	437.8	215 37 51.2	35 38 43.6	Lundell	3.452462	2,834.4	9,299
	92 43 28.454	628.6	225 11 13.9	45 19 59.5	Svea	4.366667	23,263.1	76,322
			245 11 36.1	65 25 19.3	Peterson	4.454873	28,501.8	93,510
Goodhue, water tank, 1931 (n. d.)	44 23 56.070	1,730.7	197 41 23.3	17 46 08.0	Svea	4.469000	29,444.2	96,602
	92 37 45.538	1,007.8	217 48 10.4	37 57 52.5	Peterson	4.475281	29,873.2	98,009
			221 47 46.3	41 51 33.5	Strusz	4.031889	10,761.9	35,308
Aviation beacon no. 32 (old no. 36) (Wis.), 1931 (n. d.).	44 43 50.497	1,558.7	164 40 10.4	344 39 24.0	Prescott 2	3.738902	5,481.5	17,984
	92 44 44.481	978.8	289 27 36.7	109 31 27.1	Manion	3.883427	7,645.9	25,085
			49 38 23.1	229 30 03.1	Hampton 2	4.313512	20,583.2	67,530
Hastings, Insane Asylum, water tank, 1931 (n. d.).	44 43 34.313	1,059.2	224 43 50.9	44 46 54.5	Prescott 2	3.911047	8,147.9	26,732
	92 50 11.202	246.5	278 02 43.4	98 10 23.7	Manion	4.162700	14,544.5	47,718
			297 19 10.2	117 20 28.9	McNamara (M. R. C)	3.442529	2,770.3	9,089
Aviation beacon no. 33 (old no. 37), 1931 (n. d.)	44 49 08.158	251.8	124 32 56.3	304 25 25.4	Wallace	4.231088	17,025.0	55,856
	92 54 41.734	916.9	291 06 13.1	111 12 27.5	Prescott 2	4.097686	12,522.4	41,084
			6 11 52.3	186 10 32.1	Hampton 2	4.367165	23,289.8	76,410
Hampton, municipal water tank, 1931 (n. d.)	44 36 37.764	1,165.7	118 41 01.4	298 28 47.2	Buck (Buck Hill, 1889)	4.418285	26,199.0	85,955
	92 59 49.255	1,086.1	224 39 02.3	44 48 52.4	Prescott 2	4.419033	26,244.2	86,103
			269 51 33.8	89 53 49.7	Hampton 2	3.630081	4,266.6	13,998

St. Paul and vicinity

Principal points									
Washburn Home, 1889 (d. m.)	44 54 47.377	1,462.5	273 06 20.0	93 14 22.8	Wallace	4.176846	15,026.1	49,298
	93 16 44.826	983.3	1 43 11.7	181 42 51.4	Buck (Buck Hill, 1889)	4.324490	21,110.1	69,259
			93 02 01.2	272 54 22.4	Hopkins	4.154503	14,272.6	46,826
Snelling Avenue south base, 1888, r. 1895 (d. m.)	44 55 00.696	21.5	281 24 56.6	101 28 14.2	Wallace	3.796848	6,263.9	20,551
	93 10 00.785	17.2	23 53 28.3	203 48 23.2	Buck (Buck Hill 1889)	4.371437	23,520.0	77,165
			87 23 01.0	267 18 15.7	Washburn Home	3.948027	8,872.1	29,108
			90 55 02.0	270 42 37.9	Hopkins	4.363938	23,117.3	75,844
Snelling Avenue north base, 1888 (d. m.)	44 59 43.325	1,337.4	328 25 14.8	148 28 32.1	Wallace	4.068055	11,696.5	38,374
	93 10 00.109	2.4	0 05 51.3	180 05 50.9	Snelling Avenue south base	3.940746	8,724.59	28,623.9
			17 30 57.5	197 25 51.8	Buck (Buck Hill, 1889)	4.501046	31,699.0	103,999
			44 11 55.2	224 07 09.3	Washburn Home	4.104976	12,734.3	41,779
			70 08 23.6	249 55 58.6	Hopkins	4.390791	24,591.8	80,682
Marcotta, 1888, r. 1895 (d. m.)	44 48 53.214	1,642.7	61 29 28.0	241 19 30.6	Buck (Buck Hill, 1889)	4.327291	21,246.7	69,707
	93 03 05.259	115.6	121 21 47.8	301 12 09.7	Washburn Home	4.323335	21,054.0	69,075
			141 14 07.8	321 09 14.7	Snelling Avenue south base	4.163063	14,556.7	47,758
			163 35 05.6	343 33 29.9	Wallace	4.022468	10,531.0	34,550
			213 02 32.2	33 05 13.9	Red Rock (M. R. C.)	3.965103	9,227.9	30,275
Ramsey, 1887 (m. n. d.)	44 59 20.099	620.5	10 08 28.9	190 06 37.7	Marcotta	4.293530	19,657.6	64,493
	93 00 27.736	607.6	34 49 13.2	214 45 46.1	Wallace	4.051693	11,264.0	36,955
			57 32 23.5	237 25 38.7	Snelling Avenue south base	4.173092	14,896.8	48,874
			68 38 18.7	248 26 48.4	Washburn Home	4.361994	23,014.1	75,505
			93 19 44.4	273 12 59.7	Snelling Avenue north base	4.098942	12,558.6	41,203
Wautopa, 1892 (d. m.)	44 14 14.537	448.7	240 12 19.4	60 18 12.5	Schwitzer (M. R. C.)	4.111459	12,925.8	42,407
	92 02 32.964	731.5	288 45 35.1	108 52 12.2	Minneiska (M. R. C.)	4.125625	13,354.4	43,814
Lake City, 1893 (d. m.)	44 22 34.127	1,053.4	247 52 01.4	67 58 06.7	Nelson (M. R. C.)	4.095823	12,468.8	40,908
	92 08 34.795	770.3	295 01 07.3	115 11 13.8	Schwitzer (M. R. C.)	4.326967	21,230.8	69,655
			332 29 10.6	152 33 23.4	Wautopa	4.240078	17,381.1	57,024
			98 47 11.4	278 35 37.3	Wabasha	4.346686	22,217.0	72,890
Maiden Rock (Wis.), 1892, r. 1931 (d. m.)	44 32 54.584	1,684.8	288 03 24.7	108 03 25.6	Rask	1.458653	28.75	94.3
	92 12 21.654	478.0	345 18 13.8	165 20 52.7	Lake City	4.296604	19,797.2	64,951
			47 02 16.0	226 53 19.8	Wabasha	4.364429	23,143.5	75,930
Maxville (Wis.), 1893 (d. m.)	44 32 25.891	799.2	38 23 16.0	218 15 38.6	Lake City	4.367038	23,283.0	76,388
	91 57 41.726	921.2	67 52 03.7	247 32 51.1	Wabasha	4.594425	39,302.9	128,946
			92 41 46.8	272 31 29.6	Maiden Rock	4.288806	19,444.9	63,795
Alma (Wis.), 1893 (d. m.)	44 21 23.388	721.9	54 32 25.9	234 22 42.2	Wautopa	4.357397	22,771.8	74,710
	91 48 37.127	822.2	94 49 23.2	274 35 25.7	Lake City	4.425032	26,609.2	87,300
			149 33 37.3	329 27 15.9	Maxville	4.375324	23,731.4	77,859

St. Paul and vicinity—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
Mound View, 1893 (n. d.)	45 05 31.417	969.8	311 52 10.1	131 59 02.6	Ramsey	4.234389	17,154.9	56,282
	93 10 10.876	237.8	342 55 28.9	162 58 53.8	Wallace	4.335754	21,664.8	71,079
			358 44 33.5	178 44 41.0	Snelling Avenue north base	4.031335	10,748.2	35,263
			23 29 55.0	203 25 16.4	Washburn Home	4.335916	21,672.8	71,105
			50 09 36.4	229 57 18.3	Hopkins	4.474435	29,815.0	97,818
Woodbury, 1893 (n. d.)	44 54 52.855	1,631.6	316 22 39.2	136 30 22.1	Prescott	4.320545	20,919.2	68,632
	92 56 46.788	1,026.3	36 50 58.8	216 46 31.8	Marcotta	4.141975	13,866.8	45,495
			84 58 47.3	264 52 44.3	Wallace	4.053942	11,322.5	37,147
			149 36 15.8	329 33 39.7	Ramsey	3.980747	9,566.4	31,386
Hampton, 1892 (d. m.)	44 36 37.653	1,162.2	114 48 30.6	294 34 00.3	Buck (Buck Hill, 1889)	4.477372	30,017.3	98,482
	92 56 35.539	783.6	159 20 26.8	339 15 52.6	Marcotta	4.385103	24,271.9	79,632
			217 14 12.0	37 21 45.8	Prescott	4.369992	23,441.9	76,909
Vasa, 1892 (d. m.)	44 31 28.896	891.9	116 41 53.4	296 31 48.5	Hampton	4.327856	21,274.3	69,797
	92 42 13.596	300.2	170 23 57.8	350 21 25.5	Prescott	4.456062	28,580.0	93,766
			299 59 31.9	120 11 31.0	Wabasha	4.418744	26,226.7	86,045
Ellsworth (Wis.), 1893 (d. m.)	44 42 46.151	1,424.6	351 23 18.1	171 26 01.6	Wabasha	4.537081	34,441.4	112,996
	92 29 00.117	2.6	40 00 03.6	219 50 46.2	Vasa	4.435515	27,259.3	89,433
			72 50 22.9	252 30 59.2	Hampton	4.582101	38,203.3	125,339
			108 13 06.1	288 01 14.9	Prescott	4.368934	23,384.8	76,722
			309 35 04.5	129 46 45.9	Maiden Rock	4.456333	28,597.8	93,825
Cannon Falls, 1893 (n. d.)	44 28 02.142	66.1	161 53 47.8	341 51 02.3	Hampton	4.223841	16,743.3	54,932
	92 52 39.594	875.2	194 35 23.3	14 40 10.8	Prescott	4.552885	35,717.8	117,184
			245 10 08.4	65 17 27.2	Vasa	4.182757	15,232.0	49,974
Prospect Park, 1887, r. 1898 (d. m.)	44 58 07.266	224.3	262 00 16.0	82 08 57.2	Ramsey	4.212468	16,310.5	53,512
	93 12 45.041	987.0	305 40 25.3	125 45 39.0	Wallace	4.078972	11,994.2	39,351
			327 58 00.8	147 59 56.8	Snelling Avenue south base	3.832031	6,792.5	22,285
			40 27 17.8	220 24 28.4	Washburn Home	3.908828	8,106.4	26,596
Snelling Tower, 1887 (n. d.)	44 55 00.694	21.4	87 23 01.7	267 18 16.5	Washburn Home	3.948033	8,872.2	29,108
	93 10 00.780	17.1	147 59 54.8	327 57 58.8	Prospect Park	3.832036	6,792.6	22,285
			237 25 37.2	57 32 22.1	Ramsey	4.173090	14,896.7	48,874
			281 24 56.3	101 28 13.9	Wallace	3.796839	6,263.8	20,550
University, 1887 (n. d.)	44 58 42.289	1,305.5	298 46 02.3	118 47 05.8	Prospect Park	3.351391	2,245.9	7,368
	93 14 14.877	326.0	320 49 05.1	140 52 04.6	Snelling Tower	3.945552	8,821.7	28,943
			24 24 03.0	204 22 17.1	Washburn Home	3.901019	7,961.9	26,122
St. Paul southeast base, 1887 (m. n. d.)	44 58 11.030	340.5	31 31 47.1	211 31 44.8	Prospect Park	2.134538	136.3	447
	93 12 41.788	915.7	115 19 34.8	295 18 29.0	University	3.353443	2,256.5	7,403
St. Paul northwest base, 1887 (m. n. d.)	44 58 46.639	1,439.7	299 26 30.4	119 27 33.2	St. Paul, southeast base	3.349415	2,235.71	7,335.0
	93 14 10.634	233.0	302 56 10.5	122 57 11.0	Prospect Park	3.349264	2,234.9	7,332
			34 41 58.2	214 41 55.2	University	2.213029	163.3	536
Mortensen, 1887 (n. d.)	44 58 05.744	177.3	187 02 50.5	7 02 55.0	University	3.055648	1,136.7	3,729
	93 14 21.242	465.5	268 42 51.9	88 43 59.9	Prospect Park	3.324022	2,108.7	6,918
Elevator B, 1887 (n. d.)	44 58 39.785	1,228.2	266 56 01.6	86 56 48.2	University	3.160842	1,448.2	4,751
	93 15 20.880	457.5	286 21 58.2	106 23 48.3	Prospect Park	3.551371	3,559.4	11,678
			308 47 47.9	128 48 30.0	Mortensen	3.224509	1,676.9	5,502
Supplementary points								
Minneapolis, W. D. Washburn, home, 1887 (n. d.).	44 57 37.31	1,151.8	216 56 25	36 57 12	Elevator B	3.382580	2,413.1	7,917
	93 16 27.07	593.3	252 19 53	72 21 22	Mortensen	3.461490	2,893.9	9,494
			259 13 06	79 15 43	Prospect Park	3.694872	4,953.0	16,250
Minneapolis, high school, 1887 (n. d.)	44 58 13.36	412.4	234 35 57	54 36 34	Elevator B	3.148626	1,408.1	4,620
	93 16 13.26	290.6	272 20 32	92 22 59	Prospect Park	3.659619	4,566.9	14,983
			275 27 45	95 29 04	Mortensen	3.392006	2,466.1	8,091
Minneapolis, Universalist Church, 1887 (n. d.)	44 58 28.34	874.9	260 28 26	80 29 49	University	3.415745	2,604.6	8,545
	93 16 12.11	265.3	278 08 21	98 10 48	Prospect Park	3.661248	4,584.0	15,039
			6 00 20	185 59 57	Washburn Home	3.836240	6,858.7	22,502
Minneapolis, Westminster Church, 1887 (n. d.)[1]	44 58 39.12	1,207.6	280 54 09	100 56 53	Prospect Park	3.714997	5,188.0	17,021
	93 16 37.50	821.7	1 17 10	181 17 05	Washburn Home	3.854641	7,155.5	23,476
Minneapolis, Camp and Walker Mill, 1887 (n. d.).	44 59 09.147	282.4	289 48 47.4	109 50 01.6	University	3.388243	2,444.8	8,021
	93 15 59.852	1,311.2	312 09 42.2	132 10 51.9	Mortensen	3.464687	2,915.3	9,565
			316 42 20.8	136 42 48.4	Elevator B	3.095252	1,245.2	4,085
Minneapolis, electric light mast, 1887 (n. d.)	44 59 01.408	43.5	284 28 28.9	104 29 42.6	University	3.372838	2,359.6	7,741
	93 15 59.150	1,295.9	308 31 06.2	128 31 33.3	Elevator B	3.030090	1,071.7	3,516
			308 41 00.8	128 42 10.0	Mortensen	3.439118	2,748.6	9,018
Minneapolis, suspension bridge, southeast pier, 1887 (n. d.).	44 59 08.575	264.7	292 15 05.0	112 16 08.9	University	3.330831	2,142.1	7,028
	93 15 45.360	993.7	316 27 07.6	136 28 07.0	Mortensen	3.427426	2,675.6	8,778
			328 53 14.9	149 53 32.2	Elevator B	3.016215	1,038.0	3,406
Minneapolis, suspension bridge, southwest pier, 1887 (n. d.).	44 59 05.199	160.5	288 06 59.0	108 08 08.7	University	3.356663	2,273.3	7,458
	93 15 53.488	1,171.8	293 23 59.3	113 26 12.5	Prospect Park	3.653193	4,499.8	14,763
			317 40 31.3	137 40 54.4	Elevator B	3.025757	1,061.1	3,481

[1] No check on this position.

St. Paul and vicinity—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″		° ′ ″	° ′ ″				
Minneapolis, gas house, 1887 (n. d.)	44 58 40.102	1,237.9	265 01 20.4	85 01 45.4	University	2.891263	778.5	2,554
	93 14 50.274	1,101.6	290 15 39.1	110 17 07.6	Prospect Park	3.466190	2,925.4	9,598
			329 02 28.6	149 02 49.1	Mortensen	3.092291	1,236.8	4,058
Minneapolis, Harvester Works, 1887 (n. d.)	44 57 08.82	272.3	36 57 08	216 55 22	Washburn Home	3.737391	5,462.5	17,922
	93 14 15.13	331.7	180 06 30	0 06 30	University	3.460217	2,885.5	9,467
			227 34 09	47 35 12	Prospect Park	3.427274	2,674.7	8,775
Minneapolis, schoolhouse, 1887 (n. d.)	44 56 55.574	1,715.5	151 34 51.4	231 33 55.3	Elevator B	3.563245	3,658.0	12,001
	93 14 01.426	31.3	168 39 50.2	348 39 36.2	Mortensen	3.344245	2,209.3	7,248
			217 06 01.7	37 06 55.7	Prospect Park	3.443270	2,775.0	9,104
East Minneapolis, exposition spire, 1887 (n. d.)	44 59 10.307	318.2	299 22 42.6	119 23 32.1	University	3.246161	1,762.6	5,783
	93 15 24.977	547.2	324 58 28.0	144 59 13.0	Mortensen	3.386247	2,433.6	7,984
			354 33 23.8	174 33 26.7	Elevator B	2.976103	946.5	3,105
East Minneapolis, University Avenue Methodist Episcopal Church, 1887 (n. d.)	44 59 11.854	365.9	301 32 05.8	121 33 50.6	Prospect Park	3.580984	3,810.5	12,502
	93 15 13.244	290.1	330 49 08.9	150 49 45.7	Mortensen	3.368715	2,337.3	7,668
			9 35 35.9	189 35 30.6	Elevator B	3.001729	1,004.0	3,294
East Minneapolis, Pillsbury A. Mill, 1887 (n. d.).	44 59 01.52	46.9	296 06 08	116 06 47	University	3.130142	1,349.4	4,427
	93 15 10.18	223.0	297 45 37	117 47 20	Prospect Park	3.555627	3,594.4	11,793
			328 04 55	148 05 30	Mortensen	3.307186	2,028.6	6,655
East Minneapolis, Olivet Baptist Church, 1887 (n. d.).	44 59 02.74	84.6	306 40 32	126 41 46	Prospect Park	3.457313	2,866.2	9,404
	93 14 29.94	656.0	353 49 00	173 49 06	Mortensen	3.247882	1,769.6	5,806
			57 35 47	237 35 11	Elevator B	3.121227	1,322.0	4,337
East Minneapolis, Coliseum, flagstaff, 1887 (n. d.).	44 58 48.923	1,510.3	300 44 58.2	120 46 07.9	Prospect Park	3.400437	2,514.4	8,249
	93 14 23.647	518.1	357 44 07.5	177 44 09.2	Mortensen	3.125141	1,334.0	4,377
			22 33 23.2	202 31 43.4	Washburn Home	3.907048	8,073.2	26,487
East Minneapolis, Elwell's Addition, church, 1887 (n. d.) [1].	44 59 20.19	623.3	325 33 35	145 34 25	Prospect Park	3.436068	2,729.4	8,955
	93 13 55.48	1,215.4	19 57 54	199 57 41	University	3.095107	1,244.8	4,084
East Minneapolis, Mechanical Arts Building, 1887 (n. d.).	44 58 39.950	1,233.3	298 07 01.7	118 08 02.6	Prospect Park	3.330475	2,140.3	7,022
	93 14 11.181	245.0	11 47 40.6	191 47 33.5	Mortensen	3.032895	1,078.7	3,539
			25 08 59.9	205 07 11.3	Washburn Home	3.899291	7,930.3	26,018
East Minneapolis, school, 1887 (n. d.)	44 58 27.71	855.4	298 31 27	118 32 05	Prospect Park	3.120935	1,321.1	4,334
	93 13 38.01	832.9	31 04 28	211 02 17	Washburn Home	3.899791	7,939.5	26,048
			54 25 06	234 24 36	Mortensen	3.066323	1,165.0	3,822
Fort Snelling, flagstaff, 1887 (n. d.) [1]	44 53 33.95	1,048.0	155 12 07	335 09 45	University	4.020636	10,486.6	34,405
	93 10 54.14	1,188.0	203 36 32	23 37 09	Snelling Tower	3.465732	2,922.3	9,588
St. Paul, house, with red roof, 1887 (n. d.) [1]	44 58 54.36	1,678.1	319 22 15	139 26 08	Wallace	4.046736	11,136.2	36,536
	93 10 51.45	1,127.3	351 14 28	171 15 03	Snelling Tower	3.863210	7,298.1	23,944
St. Paul, Exhibition Building, 1887 (n. d.)	44 58 45.614	1,408.1	322 10 33.9	142 13 58.5	Wallace	4.015325	10,359.2	33,987
	93 10 10.477	229.6	358 14 43.7	178 14 50.6	Snelling Tower	3.841760	6,946.4	22,790
			70 44 57.6	250 43 08.4	Prospect Park	3.554828	3,587.8	11,771
St. Paul, Merriam Park, 1887 (n. d.)	44 57 44.608	1,377.0	258 11 33.5	78 19 10.9	Ramsey	4.160850	14,482.7	47,515
	93 11 14.856	325.6	309 02 39.3	129 06 49.3	Wallace	3.999911	9,998.0	32,802
			52 56 11.1	232 52 18.1	Washburn Home	3.957640	9,070.7	29,759
St. Paul, Hamlin University, 1887 (n. d.)	44 57 57.121	1,763.3	1 28 15.9	181 28 11.4	Snelling Tower	3.736236	5,448.0	17,874
	93 09 54.404	1,192.3	56 58 48.4	236 53 58.6	Washburn Home	4.030887	10,737.1	35,227
			94 48 13.9	274 46 13.4	Prospect Park	3.574331	3,752.6	12,312
St. Paul, Northern Pacific Railway, shops, 1887 (n. d.).	44 58 21.496	663.6	325 30 33.7	145 33 18.3	Wallace	3.955488	9,025.8	29,612
	93 09 13.884	304.2	9 25 19.7	189 24 46.6	Snelling Tower	3.798188	6,283.3	20,614
			84 35 52.3	264 33 23.1	Prospect Park	3.667268	4,648.0	15,249
St. Paul, Reform School, 1887 (n. d.)	44 57 03.187	98.4	15 29 59.7	195 29 25.9	Snelling Tower	3.593717	3,923.9	12,874
	93 09 12.973	284.4	67 06 37.9	247 01 18.8	Washburn Home	4.031765	10,758.8	35,298
			113 04 26.6	293 01 56.8	Prospect Park	3.703417	5,051.5	16,573
St. Paul, Macalaster School, 1887 (n. d.)	44 56 19.195	592.5	300 25 54.3	120 29 15.0	Wallace	3.859242	7,231.7	23,726
	93 10 05.134	112.6	357 44 35.6	177 44 38.7	Snelling Tower	3.384740	2,425.2	7,957
			72 07 13.1	252 02 30.9	Washburn Home	3.964373	9,212.4	30,224
St. Paul, German Catholic Church, 1887 (n. d.)	44 56 51.199	1,580.5	350 47 22.3	170 47 47.6	Wallace	3.673448	4,714.6	15,468
	93 05 55.308	1,212.5	57 39 38.3	237 36 45.9	Snelling Tower	3.804321	6,372.7	20,908
			104 41 34.1	284 36 45.6	Prospect Park	3.967672	9,282.7	30,455
St. Paul, State House, 1887 (n. d.)	44 56 59.371	1,832.7	352 30 46.2	172 31 07.0	Wallace	3.694459	4,948.3	16,235
	93 05 50.302	1,102.7	56 19 16.8	236 16 19.9	Snelling Tower	3.819686	6,602.2	21,661
			103 01 26.4	282 56 33.4	Prospect Park	3.969824	9,328.8	30,606
St. Paul, customhouse, 1887 (n. d.) [1]	44 56 44.94	1,387.3	354 32 54	174 33 08	Wallace	3.651378	4,481.0	14,701
	93 05 40.32	884.0	60 37 39	240 34 35	Snelling Tower	3.816627	6,555.8	21,508
St. Paul, new county courthouse, 1887 (n. d.)	44 56 43.340	1,337.9	355 52 26.6	175 52 36.8	Wallace	3.645693	4,422.8	14,510
	93 05 35.416	776.5	61 27 25.4	241 24 18.0	Snelling Tower	3.821243	6,625.9	21,738
			234 18 15.0	54 21 52.5	Ramsey	3.919054	8,299.5	27,229
St. Paul, Globe Building, 1887 (n. d.)	44 56 43.285	1,336.2	356 49 20.1	176 49 28.0	Wallace	3.645070	4,416.4	14,489
	93 05 32.070	703.1	61 46 13.8	241 43 04.0	Snelling Tower	3.825400	6,689.6	21,947
			233 59 52.2	54 03 27.3	Ramsey	3.915983	8,241.1	27,038

[1] No check on this position.

St. Paul and vicinity—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance: Logarithm (meters)	Distance: Meters	Distance: Feet
Supplementary points—Continued	° ′ ″		° ′ ″	° ′ ″				
St. Paul, church spire, 1887 (n. d.)	44 58 17.224	531.7	248 02 30.8	68 05 06.3	Ramsey	3.715625	5,195.5	17,046
	93 04 07.694	168.6	12 23 38.8	192 22 47.1	Wallace	3.874115	7,483.7	24,553
			51 56 53.4	231 52 44.0	Snelling Tower	3.992777	9,835.1	32,267
Kellar, 1887 (n. d.)	44 57 34.691	1,070.9	15 32 32.8	195 31 39.1	Wallace	3.794060	6,223.9	20,420
	93 04 04.894	107.3	58 41 05.0	238 36 53.6	Snelling Tower	3.960812	9,137.2	29,978
			235 36 49.6	55 39 23.1	Ramsey	3.760769	5,764.6	18,913
Kellar, brown church spire, 1887 (n. d.)	44 57 36.77	1,135.1	17 07 46	197 06 46	Wallace	3.802204	6,341.7	20,806
	93 03 55.77	1,222.4	58 59 16	238 54 58	Snelling Tower	3.970415	9,341.5	30,648
			234 59 53	55 02 20	Ramsey	3.745362	5,563.7	18,254

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc

Principal points								
Heytmans (M. R. C.) (Iowa), 1894 (d. m.)	43 18 41.379	1,277.0	111 22 26.7	291 19 11.0	Columbus (M. R. C.)	3.839097	6,903.9	22,651
	91 06 44.248	997.2						
Ferryville (M. R. C.) (Wis.), 1894 (d. m.)	43 20 09.785	302.0	49 48 04.1	229 46 25.8	Heytmans (M. R. C.)	3.625904	4,225.8	13,864
	91 04 21.026	473.7						
Rush Creek (M. R. C.) (Wis.), 1894 (d. m.)	43 22 02.420	74.7	305 52 46.0	125 55 12.4	Ferryville (M. R. C.)	3.772907	5,928.0	19,449
	91 07 54.244	1,221.4	345 44 03.0	165 44 51.8	Heytmans (M. R. C.)	3.806278	6,401.4	21,002
			52 45 10.3	232 42 42.5	Columbus (M. R. C.)	3.785013	6,095.6	19,999
Wyburn (M. R. C.) (Wis.), 1894 (d. m.)	43 24 16.834	519.5	319 24 32.3	139 26 20.7	Rush Creek (M. R. C.)	3.737301	5,461.4	17,918
	91 10 32.067	721.5	9 23 36.8	189 22 57.3	Columbus (M. R. C.)	3.900130	7,945.7	26,069
			155 12 57.5	335 11 28.4	Battleground (M. R. C.)	3.841950	6,949.4	22,800
Cowles (M. R. C.) (Iowa), 1894 (d. m.)	43 23 48.803	1,506.1	203 20 51.7	23 22 26.4	Battleground (M. R. C.)	3.892894	7,814.4	25,638
	91 14 59.412	1,337.0	261 47 31.1	81 50 34.8	Wyburn (M. R. C.)	3.783760	6,078.0	19,941
			325 52 16.5	145 54 45.6	Columbus (M. R. C.)	3.925476	8,423.2	27,635
			235 31 02		DeSoto, spire.			
Kains (M. R. C.) (Iowa), 1894 (d. m.)	43 26 47.783	1,474.6	251 58 01.7	72 00 37.0	Battleground (M. R. C.)	3.727313	5,337.2	17,510
	91 16 27.404	616.2	340 16 33.1	160 17 33.6	Cowles (M. R. C.)	3.768451	5,867.5	19,250
DeSoto lower base (M. R. C.) (Iowa), 1894 (d. m.).	43 25 42.623	1,315.4	112 08 53.4	292 06 22.1	Kains (M. R. C.)	3.727442	5,338.8	17,516
	91 12 47.499	1,068.4	182 03 20.3	2 03 24.3	Battleground (M. R. C.)	3.563904	3,663.6	12,020
DeSoto upper base (M. R. C.) (Iowa), 1894 (d. m.).	43 26 32.171	992.8	212 59 13.6	32 59 55.9	Battleground (M. R. C.)	3.405177	2,542.0	8,340
	91 13 43.217	971.9	320 39 36.0	140 40 14.3	DeSoto lower base (M. R. C.)	3.296008	1,977.01	6,486.2
New Albin (M. R. C.), 1894 (d. m.)	43 30 46.291	1,428.6	209 38 09.4	29 40 38.9	Genoa (M. R. C.)	3.993022	9,840.6	32,295
	91 16 58.555	1,315.2	314 39 49.6	134 42 46.4	Battleground (M. R. C.)	3.909557	8,120.0	26,640
			354 33 50.2	174 34 11.6	Kains (M. R. C.)	3.868874	7,393.9	24,258
Elgar (M. R. C.), 1894 (d. m.)	43 32 10.994	339.3	356 23 35.0	176 23 51.1	Battleground (M. R. C.)	3.921217	8,341.0	27,365
	91 13 04.995	112.2	24 31 48.5	204 29 29.2	Kains (M. R. C.)	4.039917	10,962.7	35,967
			63 31 53.1	243 29 12.3	New Albin (M. R. C.)	3.767929	5,860.4	19,227
			176 24 05.5	356 23 54.1	Genoa (M. R. C.)	3.774460	5,949.2	19,518
Reno (M. R. C.), 1894 (d. m.)	43 35 06.479	200.0	263 28 47.2	83 31 08.0	Genoa (M. R. C.)	3.663523	4,608.1	15,118
	91 16 45.727	1,025.8	317 31 41.2	137 34 13.3	Elgar (M. R. C.)	3.865688	7,339.9	24,081
			2 03 17.7	182 03 08.9	New Albin (M. R. C.)	3.904986	8,035.0	26,361
Brown (M. R. C.), 1894 (d. m.)	43 37 34.821	1,074.6	314 30 00.7	134 32 07.6	Genoa (M. R. C.)	3.762344	5,785.5	18,981
	91 16 25.588	573.7	5 38 10.4	185 37 56.4	Reno (M. R. C.)	3.662792	4,600.4	15,093
			176 53 35		Church, tower.			
Stoddard (M. R. C.) (Wis.), 1894 (d. m.)	43 40 41.062	1,267.3	2 03 17.5	182 03 06.7	Genoa (M. R. C.)	3.991694	9,810.6	32,187
	91 13 05.958	133.5	37 54 48.8	217 52 31.0	Brown (M. R. C.)	3.862348	7,283.6	23,896
Brownsville (M. R. C.), 1894 (d. m.)	43 41 56.230	1,735.4	168 23 11.6	348 22 30.3	McDonald (M. R. C.)	3.821510	6,629.9	21,752
	91 16 25.754	576.7	297 23 05.9	117 25 23.9	Stoddard (M. R. C.)	3.702458	5,040.3	16,536
			359 58 24.5	179 58 24.6	Brown (M. R. C.)	3.906750	8,067.7	26,469
Calvert (M. R. C.) (Wis.), 1894 (d. m.)	43 45 15.803	487.7	6 04 09.9	186 03 42.1	Stoddard (M. R. C.)	3.930793	8,526.9	27,975
	91 12 25.709	575.1	41 07 15.2	221 04 29.3	Brownsville (M. R. C.)	3.912400	8,173.3	26,815
			92 53 13.1	272 49 45.8	McDonald (M. R. C.)	3.826927	6,713.2	22,025
			176 53 28.2	356 53 17.4	Grandfather (M. R. C.)	3.806149	6,399.5	20,996
Onalaska (M. R. C.) (Wis.), 1894 (d. m.)	43 54 15.500	478.4	358 54 06.6	178 54 12.7	Grandfather (M. R. C.)	4.011509	10,268.5	33,689
	91 12 50.041	1,116.7	72 35 42.9	252 30 33.0	Dresbach (M. R. C.)	4.019361	10,455.9	34,304
Holmen (M. R. C.) (Wis.), 1894 (d. m.)	43 58 40.608	1,253.3	331 33 40.1	151 35 57.9	Onalaska (M. R. C.)	3.968644	9,303.4	30,523
	91 16 08.577	191.2	26 06 21.1	206 03 28.8	Dresbach (M. R. C.)	4.100386	12,600.4	41,340
Dakota (M. R. C.), 1894 (d. m.)	43 56 26.927	831.1	245 53 05.2	65 57 52.7	Holmen (M. R. C.)	4.004926	10,114.1	33,183
	91 23 02.755	61.4	332 45 16.5	152 47 11.5	Dresbach (M. R. C.)	3.907823	8,087.7	26,534
Beardsley (M. R. C.) (Wis.), 1894 (d. m.)	44 00 36.568	1,128.6	297 18 46.3	117 22 22.1	Holmen (M. R. C.)	3.891654	7,792.1	25,565
	91 21 19.204	427.8	16 41 09.7	196 39 57.8	Dakota (M. R. C.)	3.905429	8,043.2	26,388
			95 22 25.4	275 18 27.6	Trempealeau (M. R. C.)	3.883914	7,654.4	25,113
Richmond (M. R. C.), 1894 (d. m.)	43 58 11.502	355.0	160 21 20.9	340 20 23.1	Trempealeau (M. R. C.)	3.741214	5,510.8	18,080
	91 25 38.170	850.9	232 10 06.2	52 13 06.1	Beardsley (M. R. C.)	3.863560	7,304.0	23,963
			312 57 04.1	132 58 52.0	Dakota (M. R. C.)	3.675371	4,735.6	15,537

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance: Logarithm (meters)	Distance: Meters	Distance: Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
Trempealeau east base=B. M. $\frac{23}{24}$ (M. R. C.) (Wis.), 1894 (d. m.).	43 59 23.630	729.3	40 49 02.4	220 48 02.5	Richmond (M. R. C.)	3.468526	2,941.2	9,650
	91 24 11.925	265.7	128 09 16.2	308 07 18.5	Trempealeau (M. R. C.)	3.681143	4,798.9	15,744
Trempealeau west base (M. R. C.) (Wis.), 1894 (d. m.).	43 59 26.040	803.7	272 40 15.3	92 41 04.9	Trempealeau east base (M. R. C.).	3.201970	1,592.10	5,223.4
	91 25 23.294	519.1	8 12 08.8	188 11 58.5	Richmond (M. R. C.)	3.366298	2,324.3	7,626
Chapin (M. R. C.) (Wis.), 1895 (d. m.)	44 04 18.580	573.5	332 08 12.4	152 10 05.5	Beardsley (M. R. C.)	3.889288	7,749.8	25,426
	91 24 01.795	39.9	33 05 02.1	213 02 57.3	Trempealeau (M. R. C.)	3.864893	7,326.4	24,037
Atwood (M. R. C.) (Wis.), 1895 (d. m.)	44 04 42.468	1,310.8	275 53 54.1	95 57 36.0	Chapin (M. R. C.)	3.853539	7,137.4	23,417
	91 29 20.831	463.5	335 41 06.8	155 42 43.8	Trempealeau (M. R. C.)	3.877700	7,545.7	24,756
Martin (M. R. C.), 1895 (d. m.)	44 01 23.225	716.8	144 45 56.4	324 43 46.1	Gorder (M. R. C.)	3.858987	7,227.5	23,712
	91 34 32.754	729.5	228 26 28.5	48 30 05.4	Atwood (M. R. C.)	3.967331	9,275.4	30,431
			274 05 44.0	94 10 57.7	Trempealeau (M. R. C.)	4.003480	10,080.5	33,072
Volker (M. R. C.) (Wis.), 1895 (d. m.)	44 04 36.482	1,126.0	268 26 44.5	88 30 21.6	Atwood (M. R. C.)	3.841736	6,946.0	22,789
	91 34 32.886	731.7	359 58 18.4	179 58 18.5	Martin (M. R. C.)	3.775593	5,964.8	19,570
			89 09 23.4	269 07 13.1	Gorder (M. R. C.)	3.619845	4,167.2	13,672
			346 56 42		Homer, church spire.			
Peterman (M. R. C.), 1895 (d. m.)	44 02 42.256	1,304.2	231 08 16.8	51 10 31.1	Gorder (M. R. C.)	3.742031	5,521.2	18,114
	91 40 53.347	1,187.7	286 01 13.3	106 05 37.9	Martin (M. R. C.)	3.945413	8,818.9	28,933
Haussinger (M. R. C.) (Wis.), 1895 (d. m.)	44 06 22.198	685.1	306 58 05.0	127 00 23.1	Gorder (M. R. C.)	3.742532	5,527.5	18,135
	91 40 58.616	1,303.6	359 00 36.4	179 00 40.1	Peterman (M. R. C.)	3.831833	6,789.4	22,275
Burley (M. R. C.), 1895 (d. m.)	44 06 29.900	922.9	272 03 25.1	92 06 49.4	Haussinger (M. R. C.)	3.815113	6,533.0	21,434
	91 45 52.171	1,160.3	316 32 58.8	136 36 26.7	Peterman (M. R. C.)	3.985590	9,673.6	31,737
Eder (M. R. C.) (Wis.), 1895 (d. m.)	44 08 38.077	1,175.2	321 07 17.3	141 09 03.2	Haussinger (M. R. C.)	3.731280	5,386.2	17,671
	91 43 30.624	680.6	38 30 53.0	218 29 14.5	Burley (M. R. C.)	3.703736	5,055.2	16,585
Whitman (M. R. C.), 1895, (d. m.)	44 09 21.363	659.4	132 32 52.3	312 30 10.1	Minneiska (M. R. C.)	3.846064	7,015.6	23,017
	91 49 10.763	239.2	279 59 24.0	100 03 20.9	Eder (M. R. C.)	3.885157	7,676.4	25,185
			320 08 42.9	140 11 01.2	Burley (M. R. C.)	3.838337	6,891.9	22,611

Klein (M. R. C.) (Wis.), 1895 (d. m.)	44 13 01.568	48.4	317 39 01.9	137 42 54.2	Eder (M. R. C.)	4.041337	10,998.6	36,085
	91 49 03.978	88.3	1 16 14.4	181 16 09.7	Whitman (M. R. C.)	3.832403	6,798.3	22,304
			68 53 57.2	248 51 10.2	Minneiska (M. R. C.)	3.755983	5,701.4	18,705
			142 13 39.2	322 10 07.7	Schwitzer (M. R. C.)	4.040087	10,967.0	35,981
Erding (M. R. C.), 1895 (d. m.)	44 14 32.047	989.2	221 56 50.4	41 59 36.6	Schwitzer (M. R. C.)	3.897564	7,898.9	25,915
	91 58 05.151	114.3	305 52 27.3	125 55 57.6	Minneiska (M. R. C.)	3.917298	8,266.0	27,119
			205 38 15		Alma, spire no. 2.			
Huber (M. R. C.), 1895 (d. m.)	44 20 52.792	1,629.5	191 26 58.0	11 27 48.1	Nelson (M. R. C.)	3.901685	7,974.2	26,162
	92 01 04.265	94.5	302 24 31.8	122 29 23.3	Schwitzer (M. R. C.)	4.039711	10,957.5	35,950
			341 18 47.6	161 20 52.7	Erding (M. R. C.)	4.093587	12,404.7	40,698
			290 42 40		Alma, schoolhouse.			
Beef Slough (M. R. C.) (Wis.), 1895 (d. m.)	44 22 22.654	699.2	334 17 20.5	154 19 31.7	Schwitzer (M. R. C.)	3.982377	9,602.3	31,504
	91 57 14.895	329.8	4 23 24.5	184 22 49.3	Erding (M. R. C.)	4.163410	14,568.3	47,796
			61 23 04.2	241 20 23.8	Huber (M. R. C.)	3.762479	5,787.3	18,987
			91 24 49.6	271 16 54.0	Lake City	4.177732	15,056.8	49,399
			145 18 04.2	325 16 13.8	Nelson (M. R. C.)	3.787694	6,133.3	20,122
Wabasha east base=B. M. $\frac{23}{24}$ (M. R. C.), 1895 (d. m.).	44 22 07.828	241.6	184 44 29.2	4 44 43.7	Nelson (M. R. C.)	3.741790	5,518.1	18,104
	92 00 13.333	295.2	263 22 32.3	83 24 37.1	Beef Slough (M. R. C.)	3.599576	3,977.2	13,049
			25 58 14.7	205 57 39.1	Huber (M. R. C.)	3.410969	2,576.1	8,452
Wabasha west base (M. R. C.), 1895 (d. m.)	44 22 51.820	1,599.5	205 55 54.6	25 56 58.3	Nelson (M. R. C.)	3.663261	4,605.3	15,109
	92 01 23.749	525.7	279 15 23.2	99 18 17.2	Beef Slough (M. R. C.)	3.746815	5,582.3	18,315
			311 02 58.7	131 03 47.9	Wabasha east base=B. M. $\frac{23}{24}$ (M. R. C.).	3.315424	2,067.40	6,782.8
			353 18 02.9	173 18 16.5	Huber (M. R. C.)	3.568108	3,699.2	12,136
Bottom (M. R. C.) (Wis.), 1895 (d. m.)	44 24 32.248	995.4	259 53 41.0	79 56 46.3	Nelson (M. R. C.)	3.774578	5,950.8	19,524
	92 04 17.532	387.9	308 51 02.6	128 53 04.1	Wabasha west base (M. R. C.)	3.693711	4,939.8	16,207
			327 42 12.9	147 44 28.0	Huber (M. R. C.)	3.903734	8,011.9	26,286
Chippewa (M. R. C.) (Wis.), 1895 (d. m.)	44 28 11.931	368.3	314 54 39.1	134 57 41.2	Nelson (M. R. C.)	3.909864	8,125.8	26,659
	92 04 12.840	283.8	0 52 38.1	180 52 34.8	Bottom (M. R. C.)	3.831336	6,781.7	22,250
			29 05 20.1	209 02 16.3	Lake City	4.076599	11,928.9	39,137
Guthrie (M. R. C.) (Wis.), 1895 (d. m.)	44 27 20.989	647.9	252 36 46.7	72 39 26.0	Chippewa (M. R. C.)	3.721694	5,268.6	17,285
	92 08 00.306	6.8	316 34 03.0	136 36 38.9	Bottom (M. R. C.)	3.855505	7,169.8	23,523
Knud (M. R. C.), 1895 (d. m.)	44 24 39.561	1,221.1	196 46 08.4	16 46 56.0	Guthrie (M. R. C.)	3.716354	5,204.2	17,074
	92 09 08.219	181.9	271 58 54.1	92 02 17.5	Bottom (M. R. C.)	3.808599	6,435.7	21,114
			185 29 57		Pepin, spire.			
Lakeport (M. R. C.) (Wis.), 1895 (d. m.)	44 26 52.203	1,611.4	256 41 17.3	76 43 16.4	Guthrie (M. R. C.)	3.586993	3,863.6	12,676
	92 10 50.364	1,113.6	331 05 54.8	151 07 06.3	Knud (M. R. C.)	3.669896	4,676.2	15,342
Loon (M. R. C.), 1895 (d. m.)	44 25 20.473	631.9	227 07 52.6	47 09 29.2	Lakeport (M. R. C.)	3.619399	4,162.9	13,658
	92 13 08.347	184.7	283 20 52.2	103 23 40.3	Knud (M. R. C.)	3.737236	5,460.5	17,915
Carlson (M. R. C.) (Wis.) 1895 (d. m.)	44 27 57.667	1,780.0	302 02 23.2	122 04 05.4	Lakeport (M. R. C.)	3.580625	3,807.4	12,491
	92 13 16.323	360.8	357 55 02.7	177 55 08.3	Loon (M. R. C.)	3.680212	4,855.3	15,929

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
Sugar Loaf (M. R. C.) 1895 (d. m.)	44 27 21.300	657.5	260 27 41.4	80 31 13.7	Carlson (M. R. C.)	3.832175	6,794.8	22,293
	92 18 19.459	430.2	298 25 48.3	118 29 26.1	Loon (M. R. C.)	3.893546	7,826.1	25,676
Moline (M. R. C.) (Wis.), 1895 (d. m.)	44 29 24.049	742.3	303 50 34.7	123 52 40.7	Carlson (M. R. C.)	3.679928	4,785.5	15,700
	92 16 16.132	356.5	35 44 39.8	215 43 13.4	Sugar Loaf (M. R. C.)	3.669085	4,667.5	15,313
			159 26 30.3	339 25 38.2	Danielson (M. R. C.)	3.669248	4,669.3	15,319
Girard (M. R. C.), 1895 (d. m.)	44 30 17.698	546.3	225 23 22.3	45 24 49.7	Danielson (M. R. C.)	3.587464	3,867.8	12,690
	92 19 35.086	774.8	290 37 26.9	110 39 46.4	Moline (M. R. C.)	3.671832	4,697.1	15,410
			342 55 42.4	162 56 35.4	Sugar Loaf (M. R. C.)	3.755538	5,695.6	18,686
Frontenac (M. R. C.), 1895 (d. m.)	44 32 16.121	497.6	280 24 46.3	100 27 28.3	Danielson (M. R. C.)	3.714989	5,187.9	17,021
	92 21 21.464	473.9	327 15 40.0	147 16 54.6	Girard (M. R. C.)	3.638010	4,345.2	14,256
Rush (M. R. C.) (Wis.), 1895 (d. m.)	44 34 22.373	690.6	325 54 46.9	145 56 30.9	Danielson (M. R. C.)	3.766347	5,839.1	19,157
	92 19 58.592	1,292.8	25 09 03.8	205 08 05.7	Frontenac (M. R. C.)	3.633968	4,304.9	14,124
Bowles (M. R. C.) (Wis.), 1895 (d. m.)	44 34 37.878	1,169.2	274 22 03.8	94 25 21.9	Rush (M. R. C.)	3.795526	6,244.9	20,488
	92 24 40.798	900.1	314 49 31.5	134 51 51.4	Frontenac (M. R. C.)	3.792736	6,204.9	20,357
Wacouta (M. R. C.), 1895 (d. m.)	44 32 28.171	869.6	179 26 49.3	359 26 48.1	Bowles (M. R. C.)	3.602483	4,003.9	13,136
	92 24 39.047	862.0	274 51 15.7	94 53 34.4	Frontenac (M. R. C.)	3.641268	4,377.9	14,363
Hoard (M. R. C.), 1895 (d. m.)	44 33 23.503	725.5	104 58 07.7	284 55 15.3	Red Wing (M. R. C.)	3.749151	5,612.4	18,413
	92 27 43.015	949.4	240 15 29.9	60 17 37.8	Bowles (M. R. C.)	3.665598	4,630.2	15,191
			292 47 35.9	112 49 45.0	Wacouta (M. R. C.)	3.643988	4,405.4	14,453
Webster (M. R. C.) (Wis.), 1895 (d. m.)	44 35 47.176	1,456.2	289 34 10.2	109 37 21.5	Bowles (M. R. C.)	3.804679	6,377.9	20,925
	92 29 13.177	290.6	335 49 55.5	155 50 58.8	Hoard (M. R. C.)	3.686684	4,860.5	15,946
			48 58 26.8	228 56 37.6	Red Wing (M. R. C.)	3.657996	4,549.8	14,927
Trenton (M. R. C.) (Wis.), 1895 (d. m.)	44 36 12.414	383.2	277 10 01.1	97 13 17.6	Webster (M. R. C.)	3.793852	6,220.9	20,410
	92 33 53.026	1,169.4	323 56 04.4	143 57 31.6	Red Wing (M. R. C.)	3.668272	4,658.8	15,285
Red Wing upper base (M. R. C.) (Wis.), 1895 (d. m.).	44 35 52.134	1,609.2	12 37 16.1	192 36 53.7	Red Wing (M. R. C.)	3.507614	3,218.2	10,558
	92 31 16.864	371.9	100 19 01.5	280 17 11.9	Trenton (M. R. C.)	3.544124	3,500.5	11,485
			101 32 31		Hogar, church.			
Red Wing lower base (M. R. C.) (Wis.), 1895 (d. m.).	44 35 12.026	371.2	43 04 17.1	223 03 20.5	Red Wing (M. R. C.)	3.415638	2,604.0	8,543
	92 30 28.142	620.8	139 02 41.5	319 02 07.3	Red Wing upper base (M. R. C.).	3.214685	1,639.40	5,378.6
Peterson (M. R. C.), 1895 (d. m.)	44 33 58.937	1,819.2	213 03 17.3	33 04 42.7	Trenton (M. R. C.)	3.691644	4,916.4	16,130
	92 35 54.623	1,205.4	266 14 50.5	86 17 43.0	Red Wing (M. R. C.)	3.735396	5,437.5	17,840
Cannon (M. R. C.), 1895 (d. m.)	44 35 37.508	1,157.8	257 08 22.8	77 10 53.3	Trenton (M. R. C.)	3.685619	4,848.6	15,907
	92 37 27.373	603.8	326 04 09.1	146 05 14.2	Peterson (M. R. C.)	3.564276	3,666.7	12,030
Mero=B. M. $\frac{24}{1}$ (M. R. C.) (Wis.), 1895 (d. m.).	44 38 03.373	104.1	316 32 03.8	136 33 47.2	Trenton (M. R. C.)	3.673754	4,718.0	15,479
	92 36 20.197	445.2	18 12 57.4	198 12 10.3	Cannon (M. R. C.)	3.675767	4,739.9	15,551
			129 40 27.4	309 47 58.6	Diamond (M. R. C.)	3.782431	6,059.4	19,880
Rosby (M. R. C.), 1895 (d. m.)	44 38 23.309	719.5	206 38 44.3	26 39 36.4	Diamond (M. R. C.)	3.560861	3,638.0	11,936
	92 41 05.984	131.9	275 33 07.2	95 36 28.0	Mero=B. M. $\frac{24}{1}$ (M. R. C.)	3.801324	6,328.8	20,764
			316 41 45.3	136 44 18.9	Cannon (M. R. C.)	3.846971	7,030.3	23,065
Yanz (M. R. C.), 1895 (d. m.)	44 40 21.297	657.4	137 13 00.3	317 10 41.8	McNamara (M. R. C.)	3.805293	6,386.9	20,954
	92 45 02.288	50.4	273 14 22.6	93 18 00.9	Diamond (M. R. C.)	3.835553	6,847.8	22,466
			304 57 00.6	124 59 46.7	Rosby (M. R. C.)	3.803040	6,353.9	20,846
Lucky (M. R. C.) (Wis.), 1895 (d. m.)	44 42 56.742	1,751.5	315 56 07.2	135 58 47.5	Diamond (M. R. C.)	3.858449	7,218.5	23,683
	92 43 39.820	876.4	20 44 11.3	200 43 13.3	Yanz (M. R. C.)	3.710148	5,130.4	16,832
			88 58 58.9	268 55 42.2	McNamara (M. R. C.)	3.789181	6,154.3	20,191
Prescott (Wis.), 1891 (d. m.)	44 46 41.756	1,288.9	337 31 14.6	157 32 46.5	Lucky (M. R. C.)	3.876002	7,516.3	24,660
	92 45 50.386	1,107.8	24 55 28.2	204 53 43.3	McNamara (M. R. C.)	3.891086	7,781.9	25,531
			100 12 58.7	280 00 49.5	Marcotta	4.363716	23,105.5	75,805
Crossing (M. R. C.), 1895 (d. m.)	44 45 32.700	1,009.4	254 25 34.8	74 29 40.3	Prescott	3.900736	7,956.8	26,105
	92 51 38.986	857.5	318 15 46.8	138 18 07.3	McNamara (M. R. C.)	3.819530	6,599.8	21,653
Hastings (M. R. C.), 1895 (d. m.)	44 42 50.166	1,548.5	187 17 24.0	7 17 44.6	Crossing (M. R. C.)	3.703982	5,058.0	16,594
	92 52 08.168	179.8	268 56 40.5	88 59 21.5	McNamara (M. R. C.)	3.702149	5,036.7	16,525
Simmons (M. R. C.), 1895 (d. m.)	44 44 31.712	978.9	239 25 02.2	59 26 44.2	Crossing (M. R. C.)	3.568397	3,701.7	12,145
	92 54 03.877	85.3	320 54 03.5	140 55 24.9	Hastings (M. R. C.)	3.606215	4,038.5	13,250
Daly (M. R. C.), 1895 (d. m.)	44 47 50.688	1,564.7	311 51 38.7	131 54 10.9	Crossing (M. R. C.)	3.804846	6,380.4	20,933
	92 55 15.039	330.6	345 41 57.8	165 42 47.9	Simmons (M. R. C.)	3.801972	6,338.3	20,795
			100 37 32.3	280 32 00.9	Marcotta	4.021703	10,512.4	34,489
			151 19 01.2	331 16 11.3	Red Rock (M. R. C.)	4.042095	11,017.8	36,148
Brown (M. R. C.) 1895 (d. m.)	44 44 58.562	1,807.7	143 47 28.1	323 44 38.1	Marcotta	3.953268	8,979.8	29,461
	92 59 03.842	84.5	223 24 54.2	43 27 35.4	Daly (M. R. C.)	3.864350	7,317.3	24,007
			277 07 45.4	97 11 16.6	Simmons (M. R. C.)	3.822877	6,650.8	21,820
Dayton (M. R. C.), 1895 (d. m.)	44 56 45.169	1,394.3	321 33 00.3	141 35 54.9	Red Rock (M. R. C.)	3.940765	8,725.0	28,625
	93 03 23.206	508.7	30 01 47.2	210 00 24.1	Wallace	3.712639	5,159.9	16,929
			69 44 20.7	249 39 39.9	Snelling Ave. south base	3.968285	9,295.8	30,498
			122 20 40.3	302 15 59.8	Snelling Ave. north base	4.012436	10,290.5	33,761

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
Mendota (M. R. C.), 1895 (d. m.)	44 52 41.936	1,294.5	181 27 08.8	1 27 12.3	Snelling Ave. south base	3.631929	4,284.8	14,058
	93 10 05.737	125.9	244 01 45.7	64 05 06.7	Wallace	3.842018	6,950.5	22,803
			307 21 36.7	127 26 33.2	Marcotta	4.065355	11,624.0	38,136
St. Paul front base (M. R. C.), 1895 (d. m.)	44 53 40.144	1,239.2	214 46 05.9	34 47 01.5	Snelling Ave. south base	3.481055	3,027.3	9,932
	93 11 19.491	427.7	317 58 48.1	137 59 40.2	Mendota (M. R. C.)	3.383518	2,418.3	7,934
Boshart (M. R. C.), 1895 (d. m.)	44 53 44.814	1,383.4	236 44 44.2	56 46 39.2	Snelling Ave. south base	3.630786	4,273.5	14,021
	93 12 43.714	959.2	274 27 08.0	94 28 07.4	St. Paul front base (M. R. C.)	3.268033	1,853.7	6,082
			299 13 38.6	119 15 30.1	Mendota (M. R. C.)	3.599146	3,973.3	13,036
			286 44 08		Mendota, spire.			
St. Paul back base (M. R. C.), 1895 (m.)	44 52 58.414	1,803.2	150 06 18.4	330 05 51.9	Boshart (M. R. C.)	3.218065	1,652.2	5,421
	93 12 06.185	135.7	218 29 47.9	38 30 20.8	St. Paul front base (M. R. C.)	3.216430	1,646.0	5,400
			280 52 47.1	100 54 12.1	Mendota (M. R. C.)	3.430087	2,692.1	8,832
Powder Horn (M. R. C.), 1898 (d. m.)	44 56 29.213	901.8	290 27 36.7	110 31 32.2	Snelling Ave. south base	3.892374	7,805.0	25,607
	93 15 34.175	749.3	323 36 11.2	143 38 11.6	Boshart (M. R. C.)	3.799577	6,303.4	20,680
			230 45 13.6	50 47 13.2	Prospect Park	3.679978	4,786.1	15,702
Guaranty Loan Tower (M. R. C.), 1898 (d. m.)	44 58 46.538	1,436.6	285 55 31.9	105 57 48.8	Prospect Park	3.644745	4,413.1	14,479
	93 15 58.691	1,285.9	352 46 25.5	172 46 42.8	Powder Horn (M. R. C.)	3.630741	4,273.1	14,019
Windom (M. R. C.), 1898 (d. m.)	45 00 51.558	1,591.6	342 00 26.7	162 01 19.8	Prospect Park	3.726904	5,332.2	17,494
	93 14 00.201	4.4	33 55 56.7	213 54 32.9	Guaranty Loan Tower (M. R. C.).	3.667531	4,640.1	15,258
Peck (M. R. C.), 1898 (d. m.)	45 01 13.356	412.3	279 13 45.8	99 15 59.3	Windom (M. R. C.)	3.621913	4,187.1	13,737
	93 17 08.942	195.8	341 14 26.8	161 15 16.5	Guaranty Loan Tower (M. R. C.).	3.679998	4,786.3	15,703
Mulcara (M. R. C.), 1898 (d. m.)	45 03 50.173	1,548.8	353 33 28.0	173 33 48.1	Windom (M. R. C.)	3.744202	5,548.8	18,205
	93 14 28.633	626.4	35 56 58.2	215 55 04.8	Peck (M. R. C.)	3.776608	5,978.7	19,615
Palmer (M. R. C.), 1898 (d. m.)	45 04 48.628	1,501.1	286 14 35.3	106 17 55.4	Mulcara (M. R. C.)	3.808920	6,440.5	21,130
	93 19 11.263	246.3	338 02 54.1	158 04 20.7	Peck (M. R. C.)	3.855174	7,164.3	23,505
Dunn (M. R. C.), 1898 (d. m.)	45 08 22.700	700.7	333 21 06.6	153 23 23.3	Mulcara (M. R. C.)	3.973647	9,411.2	30,877
	93 17 41.567	908.2	16 32 06.3	196 31 02.8	Palmer (M. R. C.)	3.838422	6,893.2	22,615
Kilmer (M. R. C.), 1898 (d. m.)	45 07 45.622	1,408.4	256 35 56.7	76 38 32.8	Dunn (M. R. C.)	3.694304	4,946.6	16,229
	93 21 21.798	476.4	332 24 30.8	152 26 03.3	Palmer (M. R. C.)	3.789880	6,164.2	20,224
Powell (M. R. C.), 1898 (d. m.)	45 10 06.752	208.4	317 10 06.1	137 11 42.7	Dunn (M. R. C.)	3.641385	4,379.1	14,367
	93 19 57.824	1,262.8	22 50 32.9	202 49 33.4	Kilmer (M. R. C.)	3.674605	4,727.2	15,509
Howard (M. R. C.), 1898 (d. m.)	45 09 51.198	1,580.5	264 22 51.3	84 25 30.4	Powell (M. R. C.)	3.692241	4,923.1	16,152
	93 23 42.177	921.1	321 38 19.4	141 39 57.9	Kilmer (M. R. C.)	3.693990	4,943.0	16,217
Carvel (M. R. C.), 1898 (d. m.)	45 13 05.230	161.5	315 12 38.0	135 15 35.6	Powell (M. R. C.)	3.889871	7,760.2	25,460
	93 24 08.168	178.2	354 35 11.3	174 35 29.7	Howard (M. R. C.)	3.779359	6,016.7	19,740
Johnson (M. R. C.), 1898 (d. m.)	45 12 28.615	883.4	254 50 22.4	74 52 38.3	Carvel (M. R. C.)	3.636224	4,327.4	14,197
	93 27 19.593	427.6	315 39 09.9	135 41 44.1	Howard (M. R. C.)	3.832062	6,793.0	22,287
Carpenter (M. R. C.), 1898 (d. m.)	45 14 47.647	1,470.9	310 21 20.3	130 23 21.3	Carvel (M. R. C.)	3.688518	4,881.1	16,014
	93 26 58.640	1,278.8	6 04 51.7	186 04 36.8	Johnson (M. R. C.)	3.635117	4,316.4	14,161
Diegel (M. R. C.), 1898 (d. m.)	45 13 42.425	1,309.7	247 08 28.7	67 11 04.3	Carpenter (M. R. C.)	3.714985	5,187.8	17,020
	93 30 37.840	825.5	297 45 34.6	117 47 55.3	Johnson (M. R. C.)	3.689226	4,889.1	16,040
Clark (M. R. C.), 1898 (d. m.)	45 16 04.255	131.4	300 17 48.6	120 20 00.3	Carpenter (M. R. C.)	3.670750	4,685.4	15,372
	93 30 04.142	90.3	9 31 51.0	189 31 27.1	Diegel (M. R. C.)	3.647353	4,439.7	14,566
Carrow (M. R. C.), 1898 (d. m.)	45 15 05.448	168.2	239 17 40.7	59 19 20.3	Clark (M. R. C.)	3.551055	3,556.8	11,669
	93 32 24.421	532.5	317 46 54.0	137 48 09.7	Diegel (M. R. C.)	3.539103	3,460.2	11,352
Castle (M. R. C.), 1898 (d. m.)	45 17 21.839	674.2	307 04 16.2	127 05 59.4	Clark (M. R. C.)	3.599007	3,972.0	13,031
	93 32 29.516	643.2	358 29 18.5	178 29 22.1	Carrow (M. R. C.)	3.624491	4,212.0	13,819
Fritz (M. R. C.), 1898 (d. m.)	45 16 52.661	1,625.7	254 55 10.0	74 56 59.1	Castle (M. R. C.)	3.539765	3,465.5	11,370
	93 35 03.064	66.8	313 43 30.7	133 45 23.4	Carrow (M. R. C.)	3.680074	4,787.1	15,706
Elk River (M. R. C.), 1898 (d. m.)	45 19 21.614	667.2	316 43 29.6	136 45 23.1	Castle (M. R. C.)	3.705635	5,077.3	16,658
	93 35 09.230	201.0	358 19 33.5	178 19 37.9	Fritz (M. R. C.)	3.662789	4,600.3	15,093
Davis Island (M. R. C.), 1898 (d. m.)	45 17 46.791	1,444.5	223 50 18.2	43 51 50.0	Elk River (M. R. C.)	3.608446	4,059.3	13,318
	93 37 18.322	399.2	299 32 12.1	119 33 48.3	Fritz (M. R. C.)	3.529986	3,388.3	11,116
Williams (M. R. C.), 1898 (d. m.)	45 18 56.550	1,745.8	262 14 39.6	82 17 45.7	Elk River (M. R. C.)	3.759860	5,752.5	18,873
	93 39 30.943	674.0	306 41 13.3	126 42 47.6	Davis Island (M. R. C.)	3.556729	3,603.5	11,822
Baker (M. R. C.), 1898 (d. m.)	45 17 45.951	1,418.6	210 50 23.8	30 51 06.2	Williams (M. R. C.)	3.404587	2,538.6	8,329
	93 40 30.688	668.7	269 37 36.8	89 39 53.5	Davis Island (M. R. C.)	3.622382	4,191.6	13,752
Varley (M. R. C.), 1898 (d. m.)	45 19 38.633	1,192.7	289 18 15.4	109 20 17.3	Williams (M. R. C.)	3.594018	3,926.6	12,883
	93 42 21.077	459.0	325 20 04.5	145 21 23.0	Baker (M. R. C.)	3.626224	4,228.9	13,874
Lambert (M. R. C.), 1898 (d. m.)	45 17 32.347	998.6	200 51 56.2	20 52 44.7	Varley (M. R. C.)	3.620388	4,172.4	13,689
	93 43 29.318	638.9	263 49 27.2	83 51 34.2	Baker (M. R. C.)	3.592727	3,915.0	12,844

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
Telephone (M. R. C.), 1898 (d. m.)	45 19 24.618	760.0	263 53 55.0	83 56 07.5	Varley (M. R. C.)	3.610967	4,082.9	13,395
	93 45 27.497	598.9	323 22 59.8	143 24 23.8	Lambert (M. R. C.)	3.635234	4,317.5	14,165
Monticello (M. R. C.), 1898 (d. m.)	45 18 08.673	267.7	240 28 20.2	60 30 35.4	Telephone (M. R. C.)	3.677598	4,759.9	15,616
	93 48 37.665	820.6	279 26 44.1	99 30 23.3	Lambert (M. R. C.)	3.833244	6,811.5	22,347
Monticello east base (M. R. C.), 1898 (d. m.)	45 18 14.413	444.9	175 08 40.9	355 08 34.9	Telephone (M. R. C.)	3.337487	2,175.1	7,136
	93 45 19.044	414.9	236 07 56.0	56 10 02.5	Varley (M. R. C.)	3.669098	4,667.6	15,314
Monticello west base (M. R. C.), 1898 (d. m.)	45 18 14.379	443.9	213 58 49.7	33 59 37.4	Telephone (M. R. C.)	3.417495	2,615.1	8,580
	93 46 34.609	754.0	269 57 21.6	89 58 15.3	Monticello east base (M. R. C.).	3.216509	1,646.30	5,401.2
Big Lake (M. R. C.), 1898 (d. m.)	45 20 05.149	159.0	306 40 30.9	126 41 25.7	Telephone (M. R. C.)	3,321091	2,094.6	6,872
	93 46 44.630	971.8	34 24 36.3	214 23 15.9	Monticello (M. R. C.)	3.639275	4,357.9	14,298
Shenton (M. R. C.), 1898 (d. m.)	45 21 17.001	524.9	296 52 57.7	116 55 20.6	Big Lake (M. R. C.)	3.690404	4,902.3	16,084
	93 50 05.440	118.4	341 47 30.3	161 48 32.7	Monticello (M. R. C.)	3.786761	6,120.1	20,079
Ackerman (M. R. C.), 1898 (d. m.)	45 21 31.764	980.6	274 25 50.8	94 29 02.0	Shenton (M. R. C.)	3.768239	5,864.6	19,241
	93 54 34.062	741.4	308 53 52.7	128 58 06.2	Monticello (M. R. C.)	3.999004	9,977.1	32,733
Becker (M. R. C.), 1898 (d. m.)	45 23 09.710	299.8	324 55 44.3	144 57 04.2	Shenton (M. R. C.)	3.628475	4,250.8	13,946
	93 51 57.651	1,254.2	48 23 49.1	228 21 57.8	Ackerman (M. R. C.)	3.658269	4,552.7	14,937
Parks (M. R. C.), 1898 (d. m.)	45 24 40.912	1,263.0	302 32 17.7	122 34 42.0	Becker (M. R. C.)	3.718662	5,231.9	17,165
	93 55 20.395	443.5	350 12 05.3	170 12 38.3	Ackerman (M. R. C.)	3.772741	5,925.7	19,441
River Bank (M. R. C.), 1898 (d. m.)	45 22 31.271	965.4	211 41 29.7	31 42 50.6	Parks (M. R. C.)	3.672486	4,704.2	15,434
	93 57 14.044	305.6	297 48 10.8	117 50 04.6	Ackerman (M. R. C.)	3.595114	3,936.5	12,915
Benson (M. R. C.), 1898 (d. m.)	45 23 43.902	1,355.3	254 25 40.8	74 29 08.0	Parks (M. R. C.)	3.817433	6,568.0	21,549
	94 00 11.350	246.9	300 09 06.9	120 11 13.1	River Bank (M. R. C.)	3.649501	4,461.7	14,638
Clear Lake (M. R. C.), 1898 (d. m.)	45 26 32.836	1,013.7	302 05 13.8	122 08 14.2	Parks (M. R. C.)	3.812922	6,500.1	21,326
	93 59 33.652	731.4	8 56 06.7	188 55 39.8	Benson (M. R. C.)	3.722580	5,279.3	17,321
Clearwater (M. R. C.), 1898 (d. m.)	45 25 54.208	1,673.5	257 17 25.2	77 20 18.9	Clear Lake (M. R. C.)	3.734830	5,430.4	17,816
	94 03 37.394	812.9	311 53 59.7	131 56 26.4	Benson (M. R. C.)	3.779691	6,021.3	19,755
Cater (M. R. C.), 1898 (d. m.)	45 28 57.487	1,774.7	324 41 36.8	144 43 20.5	Clear Lake (M. R. C.)	3.738084	5,471.2	17,950
	94 01 59.147	1,284.6	20 40 47.1	200 39 37.0	Clearwater (M. R. C.)	3.781576	6,047.5	19,841
St. Augusta (M. R. C.), 1898 (d. m.)	45 28 50.762	1,567.1	268 17 41.6	88 21 35.0	Cater (M. R. C.)	3.851969	7,111.6	23,332
	94 07 26.456	574.6	317 34 38.9	137 37 22.1	Clearwater (M. R. C.)	3.868121	7,381.1	24,216
Reformatory (M. R. C.), 1898 (d. m.)	45 32 25.176	777.3	315 36 19.5	135 39 45.6	Cater (M. R. C.)	3.952748	8,969.1	29,426
	94 06 48.066	1,042.8	7 10 44.7	187 10 17.3	St. Augusta (M. R. C.)	3.824238	6,671.7	21,889
North Star (M. R. C.), 1898 (d. m.)	45 32 17.160	529.8	267 21 30.4	87 24 28.5	Reformatory (M. R. C.)	3.734000	5,420.0	17,782
	94 10 57.620	1,250.1	324 14 55.8	144 17 26.4	St. Augusta (M. R. C.)	3.894841	7,849.5	25,753
Sauk Rapids (M. R. C.), 1898 (d. m.)	45 36 25.897	799.5	321 08 16.2	141 11 33.2	Reformatory (M. R. C.)	3.979578	9,540.7	31,301
	94 11 23.986	519.8	355 44 23.1	175 44 41.9	North Star (M. R. C.)	3.886517	7,700.5	25,264
Heinen (M. R. C.), 1898 (d. m.)	45 35 04.871	150.4	245 16 49.7	65 19 49.0	Sauk Rapids (M. R. C.)	3.777254	5,987.6	19,644
	94 15 34.976	758.2	310 41 36.3	130 44 54.3	North Star (M. R. C.)	3.899639	7,936.7	26,039
Gartner (M. R. C.), 1898 (d. m.)	45 37 37.742	1,165.2	298 21 44.5	118 23 59.9	Sauk Rapids (M. R. C.)	3.668976	4,666.3	15,309
	94 14 33.473	725.1	15 46 31.5	195 45 47.5	Heinen (M. R. C.)	3.690566	4,904.2	16,090
Watab (M. R. C.), 1898 (d. m.)	45 40 15.200	469.3	0 54 05.3	180 54 01.6	Sauk Rapids (M. R. C.)	3.850046	7,080.2	23,229
	94 11 18.844	407.9	40 56 34.5	220 54 15.3	Gartner (M. R. C.)	3.808466	6,433.8	21,108
Perry (M. R. C.), 1898 (d. m.)	45 41 39.489	1,219.2	172 55 25.2	352 54 54.7	Skounter Hill (M. R. C.)	3.873772	7,477.8	24,533
	94 14 12.814	277.2	304 38 05.8	124 40 10.3	Watab (M. R. C.)	3.660552	4,576.7	15,015
			3 25 52.7	183 25 37.9	Gartner (M. R. C.)	3.873723	7,476.9	24,530
Anderson (M. R. C.), 1898 (d. m.)	45 42 22.503	694.8	3 05 43.2	183 05 36.2	Watab (M. R. C.)	3.595057	3,936.0	12,913
	94 11 09.025	195.2	71 32 57.2	251 30 45.6	Perry (M. R. C.)	3.622423	4,192.0	13,753
			167 08 37.0	347 08 25 3	Rice back base (M. R. C.)	3.199473	1,583.0	5,194
Rice river base (M. R. C.), 1898 (d. m.)	45 43 13.092	404.2	270 36 15.5	90 37 13.0	Rice back base (M. R. C.)	3.239925	1,737.5	5,700
	94 12 45.649	987.2	306 45 44.8	126 46 54.0	Anderson (M. R. C.)	3.416477	2,609.0	8,560
			341 06 45.2	161 07 47.4	Watab (M. R. C.)	3.763755	5,804.4	19,043
			33 07 53.1	213 06 50.7	Perry (M. R. C.)	3.537889	3,450.6	11,321
Kipp (M. R. C.), 1898 (d. m.)	45 43 41.087	1,268.5	5 08 59.9	185 08 52.7	Anderson (M. R. C.)	3.386674	2,436.0	7,992
	94 10 58.917	1,274.0	32 53 04.4	212 52 45.5	Rice back base (M. R. C.)	3.021753	1,051.4	3,449
			48 11 10.5	228 08 51.7	Perry (M. R. C.)	3.750417	5,628.8	18,467
			69 28 48.0	249 27 31.6	Rice river base (M. R. C.)	3.391749	2,464.6	8,086
			125 40 05.3	305 37 15.9	Skounter Hill (M. R. C.)	3.798770	6,291.7	20,642
			185 12 25.8	5 12 45.4	Gottwalt (M. R. C.)	3.813830	6,513.7	21,370
North Prairie (M. R. C.), 1898 (d. m.)	45 47 24.764	764.6	250 12 31.8	70 16 17.5	Royalton (M. R. C.)	3.858707	7,222.8	23,697
	94 21 13.272	286.7	303 06 54.9	123 08 50.5	Brockway (Suintax (M. R. C.), 1898).	3.619260	4,161.6	13,654
Muncy (M. R. C.), 1898 (d. m.)	45 50 44.172	1,363.8	330 53 45.4	150 54 54.1	Royalton (M. R. C.)	3.628499	4,251.1	13,947
	94 17 34.269	739.5	37 32 41.0	217 30 03.9	North Prairie (M. R. C.)	3.890004	7,762.5	25,467
			163 38 41.9	343 37 14.5	Gregory (M. R. C.)	3.969026	9,311.6	30,550

21838°—36——8

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
Hay Creek (M. R. C.), 1898 (d. m.)	45 52 14.479	447.0	165 50 02.2	345 48 53.2	Swan Creek (M. R. C.)	3.926541	8,443.9	27,703
	94 22 26.756	577.1	210 54 26.8	30 56 29.4	Gregory (M. R. C.)	3.855194	7,164.6	23,506
			293 48 36.6	113 52 06.5	Muncy (M. R. C.)	3.838749	6,898.4	22,633
			349 56 15.5	169 57 08.2	North Prairie (M. R. C.)	3.958288	9,084.2	29,804
Hole-In-The-Day (M. R. C.), 1898 (d. m.)	46 00 02.495	77.0	353 46 37.1	173 47 07.3	Gregory (M. R. C.)	3.921837	8,352.9	27,404
	94 20 17.981	386.9	37 42 21.1	217 39 39.5	Swan Creek (M. R. C.)	3.898396	7,914.0	25,965
Little Elk (M. R. C.), 1898 (d. m.)	46 01 30.378	937.9	303 12 18.8	123 14 37.4	Hole-In-The-Day (M. R. C.)	3.694797	4,952.2	16,247
	94 23 30.544	656.9	4 24 40.8	184 24 17.7	Swan Creek (M. R. C.)	3.954396	9,003.2	29,538
Belle Prairie (M. R. C.), 1898 (d. m.)	46 03 19.840	612.6	17 20 39.5	197 19 35.9	Hole-In-The-Day (M. R. C.)	3.805027	6,383.0	20,942
	94 18 49.550	1,065.2	60 48 26.6	240 45 04.3	Little Elk (M. R. C.)	3.840301	6,923.1	22,714
Fish Lake (M. R. C.), 1898 (d. m.)	46 04 17.801	549.6	284 53 03.9	104 56 49.0	Belle Prairie (M. R. C.)	3.842143	6,952.5	22,810
	94 24 02.121	45.6	352 30 53.7	172 31 16.4	Little Elk (M. R. C.)	3.717141	5,213.6	17,105
Laforce (M. R. C.), 1898 (d. m.)	46 07 17.402	537.3	356 00 24.5	176 00 41.7	Belle Prairie (M. R. C.)	3.866446	7,352.7	24,123
	94 19 13.369	287.0	48 13 53.1	228 10 25.1	Fish Lake (M. R. C.)	3.920125	8,320.0	27,297
Fort Ripley (M. R. C.), 1898 (d. m.)	46 10 18.791	580.2	313 50 37.5	133 53 53.3	Laforce (M. R. C.)	3.907474	8,081.2	26,513
	94 23 44.822	961.5	1 54 37.6	181 54 25.2	Fish Lake (M. R. C.)	4.047354	11,152.0	36,588
			164 21 27.6	344 20 25.4	Big Mound (M. R. C.)	3.835361	6,844.8	22,457
Vallee (M. R. C.), 1898 (d. m.)	46 13 08.482	261.9	3 36 41.2	183 36 18.3	Laforce (M. R. C.)	4.035890	10,861.5	35,635
	94 18 41.504	889.6	51 10 32.8	231 06 53.9	Fort Ripley (M. R. C.)	3.921777	8,351.7	27,401
			99 14 15.9	279 09 34.7	Big Mound (M. R. C.)	3.927106	8,454.9	27,739
			229 10 14.5	49 13 21.9	Oleson (M. R. C.)	3.865757	7,341.0	24,085
Crow Wing (M. R. C.), 1898 (d. m.)	46 16 41.732	1,288.6	278 29 56.5	98 36 37.5	Oleson (M. R. C.)	4.079737	12,015.4	39,421
	94 23 37.016	792.5	316 05 51.2	136 09 24.6	Vallee (M. R. C.)	3.960655	9,133.9	29,967
			21 02 28.0	201 01 20.1	Big Mound (M. R. C.)	3.748678	5,606.3	18,393
Hardy (M. R. C.), 1898 (d. m.)	46 18 44.317	1,368.4	312 14 51.5	132 18 18.5	Oleson (M. R. C.)	3.918214	8,283.5	27,177
	94 19 08.456	180.9	56 39 45.9	236 36 31.8	Crow Wing (M. R. C.)	3.837741	6,882.4	22,580
Brainerd (M. R. C.), 1898 (d. m.)	46 23 23.880	737.3	19 08 12.3	199 05 25.9	Oleson (M. R. C.)	4.177052	15,033.2	49,321
	94 10 32.025	684.3	52 02 09.0	231 55 55.3	Hardy (M. R. C.)	4.146617	14,015.8	45,984
Mille Lac (M. R. C.), 1898 (d. m.)	46 19 17.168	530.1	50 40 02.9	230 35 31.8	Oleson (M. R. C.)	4.016355	10,383.8	34,068
	94 08 07.117	152.3	157 52 59.1	337 51 14.2	Brainerd (M. R. C.)	3.915063	8,223.6	26,980
Pegg (M. R. C.), 1898 (d. m.)	46 22 15.055	464.9	9 33 14.1	189 32 42.8	Mille Lac (M. R. C.)	3.745840	5,569.8	18,274
	94 07 23.905	510.9	117 52 49.2	297 50 33.0	Brainerd (M. R. C.)	3.657753	4,547.3	14,919
Brainerd south base (M. R. C.), 1898 (d. m.)	46 21 49.233	1,520.2	183 19 27.8	3 19 33.5	Brainerd (M. R. C.)	3.466476	2,927.4	9,604
	94 10 39.970	854.4	259 12 31.2	79 14 53.1	Pegg (M. R. C.)	3.630035	4,266.1	13,996
			325 08 23.7	145 10 14.3	Mille Lac (M. R. C.)	3.757477	5,721.1	18,770
Rice Lake (M. R. C.), 1898 (d. m.)	46 22 37.480	1,157.3	49 45 43.9	229 44 44.3	Brainerd south base (M. R. C.)	3.362822	2,305.8	7,565
	94 09 17.629	376.8	132 01 58.6	312 01 04.7	Brainerd (M. R. C.)	3.330435	2,140.1	7,021
Brainerd north base (M. R. C.), 1898 (d. m.)	46 22 42.503	1,312.4	274 50 59.3	94 52 01.1	Rice Lake (M. R. C.)	3.262766	1,831.3	6,008
	94 10 43.012	919.2	357 44 08.3	177 44 10.5	Brainerd south base (M. R. C.)	3.216456	1,646.10	5,400.6
Necessity (M. R. C.), 1898 (d. m.)	46 24 34.275	1,058.3	350 43 30.9	170 43 54.7	Pegg (M. R. C.)	3.639049	4,355.6	14,290
	94 07 56.748	1,212.1	56 46 49.1	236 44 56.7	Brainerd (M. R. C.)	3.598337	3,965.9	13,011
Parker (M. R. C.), 1898 (d. m.)	46 25 57.643	1,779.9	335 18 01.3	155 18 41.4	Necessity (M. R. C.)	3.452295	2,833.3	9,296
	94 08 52.178	1,114.0	24 11 52.8	204 10 40.5	Brainerd (M. R. C.)	3.716401	5,204.8	17,076
Snag (M. R. C.), 1898 (d. m.)	46 26 26.054	804.5	45 18 33.6	225 16 35.2	Necessity (M. R. C.)	3.690750	4,906.3	16,097
	94 05 13.448	287.1	79 22 55.3	259 20 16.8	Parker (M. R. C.)	3.676806	4,751.2	15,588
Cranberry (M. R. C.), 1898 (d. m.)	46 29 18.796	580.4	10 29 01.7	190 28 28.2	Snag (M. R. C.)	3.734348	5,424.4	17,797
	94 04 27.211	580.4	42 20 20.2	222 17 08.1	Parker (M. R. C.)	3.924241	8,399.3	27,557
Wixon (M. R. C.), 1898 (d. m.)	46 28 37.873	1,169.4	41 20 17.1	221 18 15.5	Snag (M. R. C.)	3.733971	5,419.6	17,781
	94 02 25.756	549.5	116 00 48.5	295 59 20.4	Cranberry (M. R. C.)	3.459756	2,882.4	9,457
Rabbit (M. R. C.), 1898 (d. m.)	46 29 59.883	1,849.1	0 14 46.9	180 14 46.5	Wixon (M. R. C.)	3.403524	2,532.4	8,308
	94 02 25.246	538.3	64 00 37.5	243 59 09.0	Cranberry (M. R. C.)	3.461489	2,893.9	9,494
Camp (M. R. C.), 1898 (d. m.)	46 31 45.971	1,419.5	311 42 55.8	131 45 00.8	Rabbit (M. R. C.)	3.692062	4,921.1	16,145
	94 05 17.515	373.3	346 42 58.9	166 43 35.4	Cranberry (M. R. C.)	3.669252	4,669.3	15,319
Mission (M. R. C.), 1898 (d. m.)	46 33 53.543	1,653.3	355 27 05.7	175 27 25.2	Rabbit (M. R. C.)	3.859601	7,237.7	23,746
	94 02 52.163	1,111.0	38 11 13.5	218 09 27.9	Camp (M. R. C.)	3.699897	5,010.7	16,439
Mud Lake (M. R. C.), 1898 (d. m.)	46 31 17.055	526.6	65 47 56.1	245 44 55.9	Rabbit (M. R. C.)	3.763965	5,807.2	19,052
	93 58 16.845	359.1	129 30 24.1	309 27 04.3	Mission (M. R. C.)	3.880813	7,600.0	24,934
Surre (M. R. C.), 1898 (d. m.)	46 33 17.584	543.0	38 46 05.3	218 44 23.5	Mud Lake (M. R. C.)	3.678735	4,772.4	15,657
	93 55 56.649	1,206.7	97 11 33.3	277 06 31.6	Mission (M. R. C.)	3.950360	8,919.9	29,265
Dahning (M. R. C.), 1898 (d. m.)	46 31 14.709	454.2	90 42 03.4	270 38 33.1	Mud Lake (M. R. C.)	3.790929	6,179.2	20,273
	93 53 26.973	575.0	139 57 51.0	319 56 02.4	Surre (M. R. C.)	3.695184	4,956.6	16,262
Kemres (M. R. C.), 1898 (d. m.)	46 34 23.094	713.1	19 59 41.9	199 58 29.8	Dahning (M. R. C.)	3.791670	6,189.7	20,307
	93 51 47.679	1,015.3	69 08 40.5	249 05 39.7	Surre (M. R. C.)	3.753998	5,675.4	18,620

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
Cedar Lake (M. R. C.), 1898 (d. m.)	46 31 07.159	221.1	92 06 44.4	272 03 06.1	Dahning (M. R. C.)	3.807347	6,417.2	21,054
	93 48 26.118	556.7	144 39 11.1	324 36 44.8	Kemres (M. R. C.)	3.870361	7,419.3	24,341
Pine Knoll (M. R. C.), 1898 (d. m.)	46 35 21.083	651.0	9 26 28.8	189 25 44.4	Cedar Lake (M. R. C.)	3.900272	7,948.3	26,077
	93 47 24.953	531.2	72 16 35.3	252 13 24.5	Kemres (M. R. C.)	3.768899	5,873.5	19,270
Aitkin (M. R. C.), 1898 (d. m.)	46 31 33.249	1,026.7	84 56 47.1	264 51 39.6	Cedar Lake (M. R. C.)	3.957567	9,069.2	29,755
	93 41 22.315	475.6	132 21 43.6	312 17 20.3	Pine Knoll (M. R. C.)	4.019036	10,448.1	34,278
Seeley (M. R. C.), 1898 (d. m.)	46 34 03.058	94.4	21 12 30.5	201 11 29.4	Aitkin (M. R. C.)	3.695624	4,961.6	16,278
	93 39 58.099	1,237.3	104 15 16.2	284 09 51.7	Pine Knoll (M. R. C.)	3.991896	9,815.1	32,202
Stewart (M. R. C.), 1898 (d. m.)	46 32 12.103	373.7	62 50 40.1	242 49 20.5	Aitkin (M. R. C.)	3.419575	2,627.7	8,621
	93 39 32.617	695.1	170 59 56.7	350 59 38.2	Seeley (M. R. C.)	3.540183	3,468.8	11,381
Aitkin upper base (M. R. C.), 1898 (d. m.)	46 32 39.644	1,224.1	304 36 45.4	124 37 27.3	Stewart (M. R. C.)	3.175193	1,496.9	4,911
	93 40 30.431	648.4	28 20 35.7	208 19 58.0	Aitkin (M. R. C.)	3.367223	2,329.3	7,642
Aitkin lower base (M. R. C.), 1898 (d. m.)	46 32 37.259	1,150.5	267 06 26.0	87 07 15.8	Aitkin upper base (M. R. C.)	3.165126	1,462.60	4,798.5
	93 41 38.990	830.8	349 48 23.4	169 48 35.5	Aitkin (M. R. C.)	3.302807	2,008.2	6,589
Gull Lake (M. R. C.), 1898 (d. m.)	46 26 35.574	1,098.5	290 55 29.8	111 04 12.9	Brainerd (M. R. C.)	4.217967	16,518.4	54,194
	94 22 34.133	728.6	343 10 14.9	163 12 43.8	Hardy (M. R. C.)	4.181859	15,200.5	49,870
Pelican Lake (M. R. C.), 1898 (d. m.)	46 32 29.484	910.4	351 17 12.9	171 18 40.5	Brainerd (M. R. C.)	4.231550	17,043.2	55,916
	94 12 32.859	700.2	49 37 21.5	229 30 05.4	Gull Lake (M. R. C.)	4.226547	16,847.9	55,275
Maple Hill (M. R. C.), 1898 (d. m.)	46 38 55.697	1,719.9	299 06 43.6	119 18 51.5	Pelican Lake (M. R. C.)	4.388006	24,434.7	80,166
	94 29 14.758	313.8	339 28 46.3	159 33 37.1	Gull Lake (M. R. C.)	4.387311	24,395.6	80,038
Indian Creek (M. R. C.), 1898 (d. m.)	46 45 42.270	1,305.3	354 21 11.1	174 22 33.7	Pelican Lake (M. R. C.)	4.390920	24,599.1	80,706
	94 14 26.458	561.5	56 27 13.3	236 16 26.7	Maple Hill (M. R. C.)	4.355358	22,665.1	74,360
Pine Mountain Lake (M. R. C.), 1898 (d. m.)	46 49 37.811	1,167.6	285 07 31.2	105 22 48.0	Indian Creek (M. R. C.)	4.441653	27,647.3	90,706
	94 35 24.154	511.9	338 22 57.7	158 27 26.7	Maple Hill (M. R. C.)	4.328840	21,322.6	69,956
Spider Lake (M. R. C.), 1898 (d. m.)	46 41 33.174	1,024.4	195 22 46.0	15 25 07.5	Pine Mountain Lake (M. R. C.).	4.190963	15,522.5	50,927
	94 38 38.383	815.6	292 02 02.4	112 08 52.4	Maple Hill (M. R. C.)	4.111601	12,930.1	42,422
Hubbard (M. R. C.), 1898 (d. m.)	46 50 24.066	743.2	273 13 10.8	93 27 13.9	Pine Mountain Lake (M. R. C.).	4.389875	24,540.0	80,512
	94 54 40.132	850.4	308 40 40.3	128 52 20.9	Spider Lake (M. R. C.)	4.417915	26,176.7	85,881
Chamberlin (M. R. C.), 1898 (d. m.)	46 55 47.178	1,456.9	313 58 06.7	134 04 53.5	Pine Mountain Lake (M. R. C.).	4.215168	16,412.2	53,846
	94 44 41.456	877.0	51 51 08.0	231 43 51.0	Hubbard (M. R. C.)	4.207674	16,131.5	52,925
Dorset (M. R. C.), 1898 (d. m.)	46 57 55.503	1,713.9	283 41 47.1	103 51 05.6	Chamberlin (M. R. C.)	4.221245	16,643.5	54,605
	94 57 25.827	546.0	345 51 43.8	165 53 44.8	Hubbard (M. R. C.)	4.157602	14,374.8	47,161
Mantrap (M. R. C.), 1898 (d. m.)	47 05 46.592	1,438.8	335 52 43.9	155 57 30.4	Chamberlin (M. R. C.)	4.306959	20,274.9	66,519
	94 51 13.122	276.7	28 26 58.6	208 22 25.9	Dorset (M. R. C.)	4.218531	16,539.8	54,264
Eagle Lake (M. R. C.), 1898 (d. m.)	47 00 37.447	1,156.4	243 46 00.8	63 57 15.4	Mantrap (M. R. C.)	4.335851	21,669.6	71,094
	95 06 34.806	735.2	293 15 49.8	113 22 31.2	Dorset (M. R. C.)	4.101509	12,633.1	41,447
Ockerson Heights (M. R. C.), 1898 (d. m.)	47 10 08.995	277.8	288 26 06.0	108 40 05.7	Mantrap (M. R. C.)	4.406020	25,469.5	83,561
	95 10 18.843	396.9	344 59 21.2	165 02 05.3	Eagle Lake (M. R. C.)	4.261778	18,271.7	59,946
School Craft (M. R. C.), 1898 (d. m.)	47 19 45.903	1,417.6	353 24 20.6	173 26 04.9	Mantrap (M. R. C.)	4.416496	26,091.3	85,601
	94 53 35.197	739.0	49 55 59.8	229 43 42.8	Ockerson Heights (M. R. C.)	4.441221	27,619.8	90,616
Prospect Hill P. B. M. (M. R. C.), 1898 (d. m.)	47 18 47.207	1,457.8	265 12 13.4	85 25 07.1	School Craft (M. R. C.)	4.345857	22,174.7	72,751
	95 11 07.582	159.2	356 19 48.0	176 20 23.8	Ockerson Heights (M. R. C.)	4.205102	16,036.2	52,612
Squaw Lake (M. R. C.), 1898 (d. m.)	47 14 12.245	378.2	212 27 22.2	32 30 31.1	Prospect Hill P. B. M. (M. R. C.).	4.002867	10,066.2	33,026
	95 15 24.780	521.2	319 21 58.8	139 25 43.3	Ockerson Heights (M. R. C.)	3.995374	9,894.0	32,461
Christensen (M. R. C.), 1898 (d. m.)	47 12 03.259	100.6	128 59 03.4	308 56 11.6	Squaw Lake (M. R. C.)	3.801739	6,334.9	20,784
	95 11 30.670	645.5	182 13 34.2	2 13 51.1	Prospect Hill P. B. M. (M. R. C.).	4.096359	12,484.1	40,958
Itasca P. B. M. (M. R. C.), 1898 (d. m.)	47 13 57.058	1,762.1	3 15 11.7	183 15 04.7	Christensen (M. R. C.)	3.546539	3,520.0	11,549
	95 11 21.180	445.5	95 15 15.1	275 12 16.3	Squaw Lake (M. R. C.)	3.711425	5,145.5	16,882
Itasca west base (M. R. C.), 1898 (d. m.)	47 13 02.944	90.9	227 53 48.2	47 54 52.7	Itasca P. B. M. (M. R. C.)	3.396705	2,492.9	8,179
	95 12 49.106	1,033.3	318 08 45.1	138 09 42.6	Christensen (M. R. C.)	3.393446	2,474.3	8,118
Itasca east base (M. R. C.), 1898 (d. m.)	47 12 56.348	1,740.1	13 55 34.9	193 55 20.7	Christensen (M. R. C.)	3.227660	1,689.1	5,542
	95 11 11.356	239.0	95 39 56.2	275 38 44.5	Itasca west base (M. R. C.)	3.315320	2,066.90	6,781.2
County Line P. B. M. (M. R. C.), 1898 (d. m.)	47 24 41.533	1,282.7	310 29 27.9	130 35 42.2	School Craft (M. R. C.)	4.147537	14,045.5	46,081
	95 02 03.919	82.2	46 14 58.0	226 08 18.0	Prospect Hill P. B. M. (M. R. C.).	4.198872	15,807.8	51,863
Marquette (M. R. C.), 1898 (d. m.)	47 26 30.291	935.5	354 47 24.2	174 48 04.1	School Craft (M. R. C.)	4.098308	12,540.3	41,143
	94 54 29.429	616.6	70 37 24.0	250 31 49.3	County Line P. B. M. (M. R. C.).	4.004333	10,100.3	33,137

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
Phillippi (M. R. C.), 1898 (d. m.)	47 29 02.573	79.5	313 02 11.8	133 05 08.9	Marquette (M. R. C.)	3.838090	6,888.0	22,598
	94 58 29.711	622.0	29 07 30.3	209 04 52.5	County Line P. B. M. (M. R. C.).	3.965043	9,226.6	30,271
Bemidji (M. R. C.), 1898 (d. m.)	47 27 47.266	1,459.7	48 47 06.6	228 45 31.2	Marquette (M. R. C.)	3.557148	3,607.0	11,834
	94 52 19.929	417.4	106 45 21.0	286 40 48.4	Phillippi (M. R. C.)	3.907676	8,084.9	26,525
Outlet (M. R. C.), 1898 (d. m.)	47 29 13.532	417.9	47 19 35.0	227 16 22.8	Marquette (M. R. C.)	3.871216	7,433.9	24,389
	94 50 08.573	179.5	88 12 13.1	268 06 03.7	Phillippi (M. R. C.)	4.021059	10,496.8	34,438
Supplementary points								
Lansing, cupola (round) (M. R. C.) (Iowa) 1894 (n. d.)	43 21 44.388	1,369.9	215 32 25.1	35 34 07.7	Wyburn (M. R. C.)	3.762132	5,782.7	18,972
	91 13 01.449	32.6	265 22 17.0	85 25 47.9	Rush Creek (M. R. C.)	3.841329	6,939.5	22,767
Lansing, cupola (square) (M. R. C.) (Iowa) 1894 (n. d.)	43 21 50.124	1,546.9	182 32 11.1	2 32 25.8	Battle Ground (M. R. C.)	4.035308	10,847.0	35,587
	91 13 03.007	67.7	266 50 46.5	86 54 18.5	Rush Creek (M. R. C.)	3.842765	6,962.5	22,843
De Soto, water tank (M. R. C.) (Wis.) 1894 (n. d.).	43 25 06.736	207.9	61 24 12.6	241 21 58.0	Cowles (M. R. C.)	3.700861	5,021.8	16,476
	91 11 43.487	978.3	116 03 19.9	296 00 04.7	Kains (M. R. C.)	3.851653	7,106.5	23,315
New Albin, spire (M. R. C.) (Iowa) 1894 (n. d.)	43 29 40.927	1,263.0	301 36 23.5	121 39 27.1	Battle Ground (M. R. C.)	3.847685	7,041.8	23,103
	91 17 08.429	189.4	336 50 02.6	156 53 55.5	Columbus (M. R. C.)	4.287827	19,401.1	63,652
			345 02 24.5	165 03 53.2	Cowles (M. R. C.)	4.051058	11,247.6	36,902
State Line (M. R. C.) (Iowa-Minn.) 1894 (n. d.)	43 30 02.934	90.5	179 58 08.9	359 58 08.9	New Albin (M. R. C.)	3.126477	1,338.1	4,390
	91 16 58.523	1,314.8	307 06 58.4	127 09 55.2	Battle Ground (M. R. C.)	3.859838	7,241.7	23,759
			353 22 21.9	173 22 43.3	Kains (M. R. C.)	3.782695	6,063.1	19,892
Genoa, spire (M. R. C.) (Wis.) 1894 (n. d.)	43 34 24.220	747.5	106 36 56.6	286 34 42.1	Reno (M. R. C.)	3.659525	4,565.9	14,980
	91 13 30.707	689.0	146 19 14.0	326 17 13.4	Brown (M. R. C.)	3.849431	7,070.2	23,196
			164 18 23.9	344 16 23.1	Brownsville (M. R. C.)	4.161110	14,491.4	47,544
Stoddard, water tank (M. R. C.) (Wis.) 1894 (n. d.).	43 39 45.227	1,395.8	46 37 11.3	226 35 00.2	Brown (M. R. C.)	3.767725	5,857.7	19,218
	91 13 15.689	351.5	133 32 23.5	313 30 12.2	Brownsville (M. R. C.)	3.768729	5,871.2	19,262
La Crosse, brewery cupola (M. R. C.) (Wis.) 1894 (n. d.).	43 47 35.659	1,100.5	43 09 27.8	223 07 32.4	McDonald (M. R. C.)	3.736932	5,456.7	17,903
	91 14 38.569	862.3	94 31 59.0	274 29 30.6	Root River (M. R. C.)	3.681874	4,807.0	15,771
			231 39 23.0	51 40 44.2	Grandfather (M. R. C.)	3.524220	3,343.6	10,970
La Crosse, St. Joseph Church, spire (M. R. C.) (Wis.) 1894 (n. d.).	43 48 41.314	1,275.1	269 04 15.4	89 05 47.2	Grandfather (M. R. C.)	3.472344	2,967.2	9,735
	91 14 53.977	1,206.4	332 23 19.2	152 25 01.8	Calvert (M. R. C.)	3.854727	7,156.9	23,481
			29 25 17.4	209 23 32.6	McDonald (M. R. C.)	3.838629	6,896.5	22,626
			69 40 59.5	249 38 41.7	Root River (M. R. C.)	3.676014	4,742.6	15,560
North La Crosse, spire (M. R. C.) (Wis.) 1894 (n. d.).	43 50 12.373	381.9	315 40 04.4	135 41 28.0	Grandfather (M. R. C.)	3.586790	3,861.8	12,670
	91 14 41.981	937.9	46 36 59.2	226 34 33.1	Root River (M. R. C.)	3.812147	6,488.5	21,288
Onalaska, spire (M. R. C.) (Wis.) 1894 (n. d.)	43 53 16.580	511.7	81 15 34.0	261 11 09.2	Dresbach (M. R. C.)	3.935907	8,627.9	28,307
	91 13 54.961	1,226.8	218 32 28.9	38 33 14.0	Onalaska (M. R. C.)	3.366452	2,325.2	7,629
Trempealeau, spire (M. R. C.) (Wis.) 1895 (n. d.).	44 00 19.212	593.0	327 33 53.4	147 36 15.2	Dakota (M. R. C.)	3.929037	8,492.5	27,862
	91 26 26.991	601.3	344 33 54.0	164 34 27.9	Richmond (M. R. C.)	3.611623	4,089.1	13,416
			148 29 22.8	328 28 59.3	Trempealeau (M. R. C.)	3.165555	1,464.0	4,803
Winona, Polish Church, spire (M. R. C.), 1895 (n. d.).	44 02 49.299	1,521.6	171 57 46.5	351 57 32.2	Gorder (M. R. C.)	3.515566	3,277.7	10,754
	91 37 19.548	435.2	305 33 36.0	125 35 32.0	Martin (M. R. C.)	3.659568	4,566.3	14,981
Minneiska, spire (M. R. C.), 1895 (n. d.)	44 11 56.812	1,753.5	145 58 49.8	325 52 57.7	Huber (M. R. C.)	4.300400	19,971.0	65,522
	91 52 39.817	884.1	169 43 43.8	349 42 43.0	Schwitzer (M. R. C.)	4.034952	10,838.1	35,558
Alma, Catholic Church, spire (M. R. C.) (Wis.), 1895 (n. d.).	44 19 18.907	583.6	25 58 31.6	205 56 15.8	Erding (M. R. C.)	3.993327	9,847.5	32,308
	91 54 50.775	1,125.1	109 20 14.2	289 15 53.2	Huber (M. R. C.)	3.942861	8,767.2	28,764
			150 38 28.2	330 36 47.4	Beef Slough (M. R. C.)	3.813460	6,508.2	21,352
Wabasha, church spire (M. R. C.), 1895 (n. d.)	44 22 53.918	1,664.2	214 38 56.3	34 40 25.4	Nelson (M. R. C.)	3.695144	4,956.1	16,260
	92 02 00.085	1.9	278 39 44.9	98 43 04.3	Beef Slough (M. R. C.)	3.805296	6,387.0	20,955
			341 42 02.3	161 42 41.2	Huber (M. R. C.)	3.595247	3,937.7	12,919
Reeds Landing, church spire (M. R. C.), 1895 (n. d.).	44 24 03.511	108.4	144 26 40.7	324 24 22.7	Guthrie (M. R. C.)	3.874724	7,494.2	24,587
	92 04 43.200	956.0	212 37 49.2	32 38 07.1	Bottom (M. R. C.)	3.022545	1,053.3	3,456
Reeds Landing, schoolhouse (M. R. C.), 1895 (n. d.).	44 24 04.552	140.5	144 37 23.8	324 35 07.5	Guthrie (M. R. C.)	3.871462	7,438.1	24,403
	92 04 45.529	1,007.6	215 55 39.0	35 55 58.6	Bottom (M. R. C.)	3.023568	1,055.8	3,464
Lake City, church spire (M. R. C.), 1895 (n. d.)	44 26 48.927	1,510.2	240 57 00.5	60 59 01.6	Carlson (M. R. C.)	3.640679	4,372.0	14,344
	92 16 09.224	204.0	269 08 49.5	89 12 32.8	Lakeport (M. R. C.)	3.848274	7,051.4	23,134
			304 17 44.3	124 19 51.0	Loon (M. R. C.)	3.685144	4,843.3	15,890
Lake City, water tower (M. R. C.), 1895 (n. d.)	44 26 44.190	1,364.0	239 50 47.6	59 52 51.3	Carlson (M. R. C.)	3.654889	4,517.4	14,821
	92 16 13.031	288.2	267 58 58.8	88 02 44.7	Lakeport (M. R. C.)	3.853649	7,139.2	23,423
			302 18 01.3	122 20 10.6	Loon (M. R. C.)	3.684253	4,833.4	15,858
Villa Maria Academy (M. R. C.), 1895 (n. d.)	44 30 49.361	1,523.6	236 57 47.7	56 59 12.6	Danielson (M. R. C.)	3.503746	3,189.7	10,465
	92 19 31.485	695.4	301 22 17.6	121 24 34.6	Moline (M. R. C.)	3.703773	5,055.6	16,587
			346 04 24.9	166 05 15.4	Sugar Loaf (M. R. C.)	3.820626	6,616.5	21,708
Red Wing, reform school (M. R. C.), 1895 (n. d.)	44 33 40.566	1,252.2	109 10 56.6	289 09 32.4	Red Wing (M. R. C.)	3.447724	2,803.7	9,198
	92 29 48.728	1,075.4	154 25 25.2	334 24 23.4	Red Wing upper base (M. R. C.)	3.653469	4,502.7	14,773
			191 20 41.7	11 21 06.7	Webster (M. R. C.)	3.600540	3,986.0	13,077

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″		° ′ ″	° ′ ″				
Red Wing, water tank (M. R. C.), 1895 (n. d.)	44 33 42.114	1,299.9	95 05 34.6	275 02 28.4	Peterson (M. R. C.)	3.769340	5,879.5	19,290
	92 31 29.238	645.3	145 39 07.8	325 37 26.9	Trenton (M. R. C.)	3.749748	5,620.2	18,439
			153 46 00.4	333 45 46.7	Red Wing (M. R. C.)	2.988176	973.1	3,193
Red Wing, Catholic School (M. R. C.), 1895 (n. d.).	44 33 43.628	1,346.7	95 06 13.7	275 03 24.7	Peterson (M. R. C.)	3.727234	5,336.2	17,507
	92 31 53.764	1,186.5	150 12 14.1	330 10 50.4	Trenton (M. R. C.)	3.723692	5,292.9	17,365
			187 39 15.6	7 39 19.1	Red Wing (M. R. C.)	2.920942	833.6	2,735
Red Wing, convent spire (M. R. C.), 1895 (n. d.).	44 33 29.232	902.3	102 50 42.5	282 48 34.5	Peterson (M. R. C.)	3.615945	4,130.0	13,550
	92 32 52.152	1,151.0	165 04 36.6	345 03 53.9	Trenton (M. R. C.)	3.717084	5,213.0	17,103
			227 45 38.7	47 46 23.2	Red Wing (M. R. C.)	3.276515	1,890.2	6,201
Diamond Bluff, upper church (M. R. C.), 1895 (n. d.).	44 39 03.418	105.5	314 04 40.3	134 05 41.2	Mero=B. M. $\frac{245}{1}$ (M. R. C.)	3.425533	2,664.0	8,740
	92 37 47.024	1,036.2	356 05 55.5	176 06 09.3	Cannon (M. R. C.)	3.804187	6,370.7	20,901
			74 15 04.0	254 12 44.1	Rosby (M. R. C.)	3.658580	4,556.0	14,947
Diamond Bluff, lower church (M. R. C.), 1895 (n. d.).	44 38 49.955	1,542.0	316 48 49.9	136 49 32.9	Mero=B. M. $\frac{245}{1}$ (M. R. C.)	3.294873	1,971.8	6,469
	92 37 21.422	472.1	1 15 57.3	181 15 53.2	Cannon (M. R. C.)	3.773921	5,941.9	19,494
			80 35 08.2	260 32 30.4	Rosby (M. R. C.)	3.700424	5,016.8	16,459
Hasting, convent (M. R. C.), 1895 (n. d.)	44 44 31.891	984.4	89 56 24.3	269 54 14.8	Simmons (M. R. C.)	3.607013	4,045.9	13,274
	92 50 59.978	1,319.6	155 26 12.1	335 25 44.6	Crossing (M. R. C.)	3.314685	2,063.9	6,771
			310 46 19.9	130 48 12.9	McNamara (M. R. C.)	3.669108	4,667.8	15,314
Hastings, Catholic Church (M. R. C.), 1895 (n. d.).	44 44 24.576	758.6	93 06 15.7	273 04 05.0	Simmons (M. R. C.)	3.611919	4,091.8	13,425
	92 50 58.162	1,279.7	156 52 42.8	336 52 14.1	Crossing (M. R. C.)	3.359187	2,286.6	7,502
			308 55 26.6	128 57 18.4	McNamara (M. R. C.)	3.652476	4,492.4	14,739
Hastings, Baptist Church (M. R. C.), 1895 (n. d.).	44 44 17.228	531.8	96 40 06.5	276 38 03.8	Simmons (M. R. C.)	3.586601	3,860.1	12,664
	92 51 09.608	211.4	164 29 55.0	344 29 34.3	Crossing (M. R. C.)	3.383392	2,417.6	7,932
			304 42 39.8	124 44 39.6	McNamara (M. R. C.)	3.658785	4,558.1	14,954
Hastings, Congregational Church (M. R. C.), 1895, (n. d.).	44 44 24.621	760.0	93 17 00.1	273 14 57.4	Simmons (M. R. C.)	3.584566	3,842.1	12,605
	92 51 09.528	209.6	162 51 54.1	342 51 33.4	Crossing (M. R. C.)	3.342246	2,199.1	7,215
			307 00 55.6	127 02 55.4	McNamara (M. R. C.)	3.671210	4,690.4	15,388
Hastings, courthouse (M. R. C.), 1895 (n. d.)	44 44 33.733	1,041.3	158 13 19.1	338 12 55.8	Crossing (M. R. C.)	3.292290	1,960.2	6,431
	92 51 05.921	130.3	310 15 57.7	130 17 54.9	McNamara (M. R. C.)	3.681611	4,804.1	15,761
Hastings, Gardners Elevator (M. R. C.), 1895 (n. d.).	44 43 32.889	1,015.2	114 12 41.0	294 10 31.7	Simmons (M. R. C.)	3.646472	4,430.7	14,536
	92 51 00.201	4.4	167 00 42.2	347 00 14.9	Crossing (M. R. C.)	3.579268	3,795.5	12,452
			289 07 03.3	109 08 56.5	McNamara (M. R. C.)	3.573624	3,746.5	12,292
Prescott, white church (M. R. C.) (Wis.), 1895 (n. d.).	44 45 03.390	104.6	221 17 20.6	41 18 46.0	Prescott (M. R. C.)	3.606572	4,041.8	13,260
	92 47 51.686	1,137.0	305 10 29.8	125 13 27.0	Lucky (M. R. C.)	3.831367	6,782.1	22,251
			8 37 08.2	188 36 48.7	McNamara (M. R. C.)	3.609325	4,067.5	13,345
Prescott, schoolhouse (M. R. C.) (Wis.), 1895 (n. d.).	44 44 59.522	1,837.3	220 57 25.9	40 58 53.7	Prescott (M. R. C.)	3.621129	4,179.5	13,712
	92 47 54.991	1,209.7	303 59 39.7	124 02 39.3	Lucky (M. R. C.)	3.830860	6,774.2	22,225
			7 49 58.2	187 49 41.1	McNamara (M. R. C.)	3.595373	3,938.9	12,923
Prescott, Catholic Church (M. R. C.) (Wis.), 1895 (n. d.).	44 44 49.813	1,537.6	217 51 46.4	37 53 12.4	Prescott (M. R. C.)	3.641236	4,377.6	14,362
	92 47 52.588	1,156.9	9 17 46.3	189 17 27.4	McNamara (M. R. C.)	3.562341	3,650.4	11,976
			104 54 32.0	284 51 52.6	Crossing (M. R. C.)	3.712052	5,152.9	16,906
St. Paul, City Hall (M. R. C.), 1895 (n. d.)	44 56 43.353	1,338.3	268 52 44.5	88 54 17.8	Dayton (M. R. C.)	3.462063	2,897.8	9,507
	93 05 35.359	775.2	355 53 25.9	175 53 36.1	Wallace (M. R. C.)	3.645726	4,423.1	14,511
State Capitol (M. R. C.), 1895 (n. d.)	44 56 59.342	1,831.8	277 42 47.9	97 44 31.8	Dayton (M. R. C.)	3.512391	3,253.8	10,675
	93 05 50.282	1,102.3	352 30 59.3	172 31 20.1	Wallace (M. R. C.)	3.694376	4,947.4	16,232
Soldiers Home (M. R. C.), 1898 (n. d.)	44 54 43.047	1,328.8	258 58 20.1	78 59 50.2	Snelling Avenue south base	3.455051	2,851.4	9,355
	93 12 08.381	183.8	23 19 50.0	203 19 25.1	Boshart (M. R. C.)	3.291731	1,957.6	6,423
City Hall (M. R. C.), 1898 (n. d.)	44 58 39.482	1,218.8	160 54 20.9	340 53 27.8	Peck (M. R. C.)	3.701294	5,026.8	16,492
	93 15 53.838	1,179.6	211 23 35.1	31 24 55.5	Windom (M. R. C.)	3.679148	4,776.9	15,672
			283 29 51.7	103 32 05.2	Prospect Park (M. R. C.)	3.628890	4,254.9	13,960
			353 52 51.9	173 53 05.8	Powder Horn (M. R. C.)	3.606847	4,044.3	13,269
Soo Lines, shop chimney (M. R. C.), 1898 (n. d.).	45 01 12.685	391.6	90 26 29.2	270 24 59.8	Peck (M. R. C.)	3.441910	2,766.4	9,076
	93 15 02.598	56.9	188 41 24.5	8 41 48.5	Mulcara (M. R. C.)	3.691803	4,918.2	16,136
			295 30 41.3	115 31 25.4	Windom (M. R. C.)	3.180104	1,513.9	4,967
Exposition Building (M. R. C.), 1898 (n. d.)	44 59 10.314	318.4	149 03 58.9	329 02 45.4	Peck (M. R. C.)	3.646266	4,428.6	14,529
	93 15 24.968	547.0	154 38 48.2	334 36 08.1	Palmer (M. R. C.)	4.062918	11,558.9	37,923
			170 04 21.5	350 02 44.8	Dunn (M. R. C.)	4.238349	17,312.1	56,798
Anoka, Catholic spire (M. R. C.), 1898 (n. d.)	45 11 55.967	1,727.8	100 28 38.8	280 25 41.1	Johnson (M. R. C.)	3.744708	5,555.3	18,226
	93 23 09.278	202.5	148 59 52.7	328 59 10.9	Carvel (M. R. C.)	3.397019	2,494.7	8,185
			308 52 16.1	128 54 31.9	Powell (M. R. C.)	3.729989	5,370.2	17,619
Mill, flagstaff (M. R. C.), 1898 (n. d.)	45 11 56.205	1,735.1	306 52 12.9	126 54 39.1	Powell (M. R. C.)	3.750414	5,628.8	18,467
	93 23 24.022	524.3	5 51 58.6	185 51 45.7	Howard (M. R. C.)	3.588759	3,879.4	12,728
			138 31 17.5	318 28 45.1	Carpenter (M. R. C.)	3.849210	7,066.6	23,184
Anoka, courthouse (M. R. C.), 1898 (n. d.)	45 11 54.085	1,669.7	308 12 16.5	128 14 33.2	Powell (M. R. C.)	3.728779	5,355.2	17,570
	93 23 10.522	229.7	312 13 08.6	132 17 01.9	Dunn (M. R. C.)	3.987001	9,705.1	31,841
			342 47 16.2	162 48 33.3	Kilmer (M. R. C)	3.904680	8,029.3	26,343

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″		° ′ ″	° ′ ″				
Dayton, church spire (M. R. C.), 1898 (n. d.)	45 14 34.626	1,068.9	265 26 54.4	85 29 39.6	Carpenter (M. R. C.)	3.706810	5,091.1	16,703
	93 30 51.350	1,119.9	310 04 41.7	130 07 12.0	Johnson (M. R. C.)	3.781000	6,039.5	19,815
			349 38 09.3	169 38 18.9	Diegel (M. R. C.)	3.214367	1,638.2	5,375
Elk River, school (M. R. C.), 1898 (n. d.)	45 18 18.184	561.4	302 10 22.6	122 11 52.8	Castle (M. R. C.)	3.513958	3,265.6	10,714
	93 34 36.357	792.1	304 50 51.0	124 54 04.4	Clark (M. R. C.)	3.859202	7,231.1	23,724
			334 11 30.8	154 13 04.6	Carrow (M. R. C.)	3.820103	6,608.5	21,681
Big Lake, church cupola (M. R. C.), 1898 (n. d.)	45 19 54.436	1,680.5	280 28 03.1	100 29 40.1	Varley (M. R. C.)	3.480191	3,021.3	9,912
	93 44 37.502	816.6	285 26 51.1	105 30 30.0	Williams (M. R. C.)	3.840589	6,927.7	22,729
			341 31 44.2	161 32 32.7	Lambert (M. R. C.)	3.671138	4,689.6	15,386
Otsego, spire (M. R. C.), 1898 (n. d.)	45 17 24.063	742.8	127 51 32.0	307 49 32.1	Williams (M. R. C.)	3.667832	4,654.1	15,269
	93 36 42.248	920.7	131 45 19.7	311 44 54.1	Davis Island (M. R. C.)	3.022706	1,053.7	3,457
Monticello, Methodist Episcopal Church (M. R. C.), 1898 (n. d.).	45 18 17.705	546.6	237 48 46.4	57 50 33.6	Telephone (M. R. C.)	3.588772	3,879.5	12,728
	93 47 58.250	1,269.0	273 13 02.4	93 14 01.9	Monticello west base (M.R.C.)	3.261291	1,825.1	5,988
			283 24 47.9	103 27 59.1	Lambert (M. R. C.)	3.779928	6,024.6	19,766
Becker, church cupola (M. R. C.), 1898 (n. d.)	45 23 39.710	1,225.9	322 41 21.0	142 41 44.1	Becker (M. R. C.)	3.066107	1,164.4	3,820
	93 52 30.094	654.6	34 20 27.7	214 18 59.5	Ackerman (M. R. C.)	3.679706	4,783.1	15,693
			117 02 40.5	297 00 39.3	Parks (M. R. C.)	3.618873	4,157.9	13,641
Clear Lake, church (M. R. C.), 1898 (n. d.)	45 26 36.684	1,132.5	300 17 04.4	120 20 24.7	Parks (M. R. C.)	3.850123	7,081.5	23,233
	94 00 01.608	34.9	334 17 53.7	154 19 53.0	River Bank (M. R. C.)	3.924646	8,406.5	27,580
			2 16 30.0	182 16 23.0	Benson (M. R. C.)	3.727404	5,338.3	17,514
Clearwater, church belfry (M. R. C.), 1898 (n. d.).	45 25 10.383	320.5	150 45 39.1	330 45 14.3	Clearwater (M. R. C.)	3.190492	1,550.6	5,087
	94 03 02.552	55.5	240 42 22.6	60 44 51.5	Clear Lake (M. R. C.)	3.716486	5,205.8	17,079
			305 37 39.6	125 39 41.5	Benson (M. R. C.)	3.661000	4,581.4	15,031
Clearwater, church spire (M. R. C.), 1898 (n. d.)	45 25 20.140	621.8	143 16 17.3	323 15 51.6	Clearwater (M. R. C.)	3.118048	1,312.3	4,305
	94 03 01.290	28.0	308 46 51.0	128 48 52.0	Benson (M. R. C.)	3.675939	4,741.8	15,557
St. Augusta, spire (M. R. C.), 1898 (n. d.)	45 28 46.836	1,445.9	266 49 10.1	86 50 22.0	St. Augusta (M. R. C.)	3.340813	2,191.9	7,191
	94 09 07.222	156.9	267 55 55.3	88 01 00.6	Cater (M. R. C.)	3.968620	9,302.9	30,521
			306 36 12.6	126 40 07.7	Clearwater (M. R. C.)	3.950899	8,931.0	29,301

Hospital, water tank (M. R. C.), 1898 (n. d.)	45 32 22.011	679.5	265 27 34.8	85 28 15.3	Reformatory (M. R. C.)	3.091993	1,235.9	4,055
	94 07 44.854	973.2	310 02 36.2	130 06 42.8	Cater (M. R. C.)	3.991549	9,807.3	32,176
			356 29 38.3	176 29 51.4	St. Augusta (M. R. C.)	3.815178	6,534.0	21,437
Catholic Cathedral (M. R. C.), 1898 (n. d.)	45 33 32.913	1,016.1	341 10 14.6	161 11 52.1	St. Augusta (M. R. C.)	3.963905	9,202.5	30,192
	94 09 43.210	937.2	34 37 13.6	214 36 20.4	North Star (M. R. C.)	3.453571	2,841.7	9,323
			157 45 39.9	337 44 27.9	Sauk Rapids (M. R. C.)	3.761184	5,770.1	18,931
Catholic Church, spire (M. R. C.), 1898 (n. d.)	45 33 48.775	1,505.8	304 17 34.8	124 19 39.3	Reformatory (M. R. C.)	3.660749	4,578.8	15,022
	94 09 42.424	920.0	342 12 13.3	162 13 50.3	St. Augusta (M. R. C.)	3.985069	9,662.0	31,699
			29 58 45.1	209 57 51.4	North Star (M. R. C.)	3.513886	3,265.0	10,712
East St. Cloud, school (M. R. C.), 1898 (n. d.)	45 33 45.570	1,406.9	313 53 35.6	133 55 00.4	Reformatory (M. R. C.)	3.553778	3,579.1	11,742
	94 08 46.949	1,018.2	46 05 40.3	226 04 07.0	North Star (M. R. C.)	3.594946	3,935.0	12,910
Standpipe (M. R. C.), 1898 (n. d.)	45 33 41.713	1,287.8	27 16 10.2	207 15 25.9	North Star (M. R. C.)	3.467844	2,936.6	9,634
	94 09 55.607	1,206.0	109 16 01.2	289 11 58.9	Heinen (M. R. C.)	3.891736	7,793.6	25,570
			159 18 10.6	339 17 07.5	Sauk Rapids (M. R. C.)	3.733908	5,418.9	17,779
Sauk Rapids, school (M. R. C.), 1898 (n. d.)	45 35 28.572	882.1	84 26 10.6	264 22 04.6	Heinen (M. R. C.)	3.875130	7,501.2	24,610
	94 09 50.588	1,096.5	123 04 28.7	303 01 06.6	Gartner (M. R. C.)	3.864091	7,312.9	23,992
			131 10 23.9	311 09 17.2	Sauk Rapids (M. R. C.)	3.429557	2,688.8	8,822
Church spire (M. R. C.), 1898 (n. d.)	45 42 46.709	1,442.1	52 19 18.1	232 15 58.0	Watab (M. R. C.)	3.883548	7,648.0	25,092
	94 06 39.199	847.8	82 43 48.4	262 40 35.3	Anderson (M. R. C.)	3.769683	5,884.1	19,305
			106 40 01.1	286 36 55.2	Kipp (M. R. C.)	3.768067	5,862.3	19,233
			148 25 46.4	328 23 00.0	Gottwalt (M. R. C.)	3.981660	9,586.5	31,452
Rice, church spire (M. R. C.), 1898 (n. d.)	45 45 13.451	415.3	318 26 14.4	138 27 38.2	Kipp (M. R. C.)	3.580974	3,810.4	12,501
	94 12 55.827	1,206.6	14 09 11.8	194 08 16.7	Perry (M. R. C.)	3.833298	6,812.4	22,350
			107 30 32.7	287 29 07.1	Skounter Hill (M. R. C.)	3.433055	2,710.5	8,893
North Prairie, church (M. R. C.), 1898 (n. d.)	45 48 00.450	13.9	317 02 05.7	137 03 50.0	Suintax (M. R. C.)	3.663959	4,612.7	15,133
	94 20 57.450	1,240.7	17 13 58.9	197 13 47.6	North Prairie (M. R. C.)	3.062042	1,153.6	3,785
Royalton, school (M. R. C.), 1898 (n. d.)	45 49 56.004	1,729.1	46 23 30.5	226 20 47.8	North Prairie (M. R. C.)	3.830406	6,767.2	22,202
	94 17 24.418	527.0	123 26 44.1	303 23 08.6	Hay Creek (M. R. C.)	3.890046	7,763.3	25,470
			173 30 05.2	353 29 59.6	Muncy (M. R. C.)	3.175158	1,496.8	4,911
Courthouse (M. R. C.), 1898 (n. d.)	45 58 31.875	984.1	334 42 35.0	154 44 01.8	Gregory (M. R. C.)	3.784538	6,088.9	19,977
	94 21 36.681	789.7	42 14 01.0	222 12 16.0	Swan Creek (M. R. C.)	3.670161	4,679.1	15,351
			211 10 58.9	31 11 55.5	Hole-In-The-Day (M. R. C.)	3.514639	3,270.7	10,731
Schoolhouse flagstaff (M. R. C.), 1898 (n. d.)	45 58 38.327	1,183.3	337 09 15.1	157 10 35.3	Gregory (M. R. C.)	3.791704	6,190.2	20,309
	94 21 27.499	592.0	42 22 45.2	222 20 53.6	Swan Creek (M. R. C.)	3.695434	4,959.5	16,271
			209 55 28.5	29 56 18.5	Hole-In-The-Day (M. R. C.)	3.476924	2,998.6	9,838
Belle Prairie Station, church (M. R. C.), 1898 (n. d.).	46 02 02.412	74.5	0 03 40.8	180 03 40.7	Hole-In-The-Day (M. R. C.)	3.568492	3,702.5	12,147
	94 20 17.797	382.7	76 35 59.0	256 33 40.2	Little Elk (M. R. C.)	3.629586	4,261.7	13,982
			218 25 46.4	38 26 49.9	Belle Prairie (M. R. C.)	3.484596	3,052.1	10,013

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″		° ′ ″	° ′ ″				
Crow Wing, church (M. R. C.), 1898 (n. d.)	46 16 31.984	987.6	344 02 07.8	164 03 08.4	Vallee (M. R. C.)	3.815261	6,535.2	21,441
	94 20 05.369	115.0	53 02 00.9	232 58 20.2	Big Mound (M. R. C.)	3.913577	8,195.5	26,888
			93 49 16.3	273 46 43.4	Crow Wing (M. R. C.)	3.657197	4,541.5	14,900
Nit (M. R. C.), 1898 (m. n. d.)	46 17 11.941	368.7	308 25 49.9	128 31 08.9	Vallee (M. R. C.)	4.082145	12,082.2	39,640
	94 26 03.097	66.3	349 43 38.1	169 44 15.8	Big Mound (M. R. C.)	3.796986	6,265.9	20,557
Brainerd, Catholic Church (M. R. C.), 1898 (n. d.).	46 21 37.412	1,155.2	239 19 01.8	59 20 47.7	Rice Lake (M. R. C.)	3.560651	3,636.2	11,930
	94 11 43.953	939.6	255 03 08.5	75 03 54.8	Brainerd south base (M. R. C.)	3.150960	1,415.7	4,645
			258 09 49.6	78 12 57.8	Pegg (M. R. C.)	3.754274	5,679.0	18,632
Brainerd, high school (M. R. C.), 1898 (n. d.)	46 21 07.427	229.3	64 55 45.7	244 50 26.9	Hardy (M. R. C.)	4.017492	10,411.0	34,157
	94 11 47.730	1,020.5	201 00 06.3	21 01 01.1	Brainerd (M. R. C.)	3.654496	4,513.3	14,807
			18 18 54.9	198 17 03.3	Oleson (M. R. C.)	4.022155	10,523.4	34,526
Aitkin, water tank (M. R. C.), 1898 (n. d.)	46 31 52.366	1,617.0	241 42 32.6	61 44 05.1	Aitkin upper base (M. R. C.)	3.488756	3,081.5	10,110
	93 42 37.782	805.2	261 12 05.2	81 14 19.6	Stewart (M. R. C.)	3.601269	3,992.7	13,099
			290 08 47.0	110 09 41.8	Aitkin (M. R. C.)	3.233832	1,713.3	5,621
Aitkin, church spire (M. R. C.), 1898 (n. d.)	46 32 07.200	222.3	246 31 44.2	66 33 02.9	Aitkin upper base (M. R. C.)	3.400782	2,516.4	8,256
	93 42 18.766	399.9	311 03 47.7	131 04 28.7	Aitkin (M. R. C.)	3.202959	1,595.7	5,235
Bemidji, water tank (M. R. C.), 1898 (n. d.)	47 28 11.768	363.4	307 20 35.7	127 21 10.6	Bemidji (M. R. C.)	3.095988	1,247.3	4,092
	94 53 07.277	155.3	28 46 45.7	208 45 45.2	Marquette (M. R. C.)	3.553314	3,575.3	11,730
			103 06 58.9	283 03 01.2	Phillippi (M. R. C.)	3.840810	6,931.2	22,740
Bemidji, City Hall (M. R. C.), 1898 (n. d.)	47 28 18.372	567.3	320 44 38.5	140 45 06.2	Bemidji (M. R. C.)	3.093613	1,240.5	4,070
	94 52 57.410	1,224.8	30 00 50.9	209 59 43.2	Marquette (M. R. C.)	3.585960	3,854.4	12,646
			101 08 02.9	281 03 58.0	Phillippi (M. R. C.)	3.850673	7,090.4	23,262

Aitkin to Bemidji traverse

Principal points								
Swamp (M. R. C.) (n. d.)	46 33 59.045	1,823.2	24 06 18.4	204 05 28.1	Stewart (M. R. C.)	3.558400	3,617.43	11,868.2
	93 38 23.285	495.9	93 31 17.4	273 30 08.6	Seely (M. R. C.)	3.306014	2,023.08	6,637.4
Cut-off P. B. M. (M. R. C.), 1898 (d. m.)	46 35 12.950	399.9	331 44 06.8	151 44 48.6	Swamp (M. R. C.)	3.413444	2,590.86	8,500.2
	93 39 20.892	444.8	20 09 42.8	200 09 15.8	Seely (M. R. C.)	3.361533	2,298.97	7,542.5
△ 1 (M. R. C.) (n. d.)	46 35 45.310	1,399.1	348 13 17.5	168 13 24.6	Cut-off P. B. M. (M. R. C.)	3.008910	1,020.73	3,348.8
	93 39 30.679	653.0						
△ 2 (M. R. C.) (n. d.)	46 36 03.941	121.7	42 33 11.9	222 32 53.9	△ 1 (M. R. C.)	2.892608	780.92	2,562.1
	93 39 05.868	124.9						
△ 3 (M. R. C.) (n. d.)	46 36 56.204	1,735.5	351 45 20.2	171 45 28.2	△ 2 (M. R. C.)	3.212358	1,630.64	5,349.9
	93 39 16.854	358.6						
△ 4 (M. R. C.) (n. d.)	46 37 19.929	615.4	2 57 31.9	182 57 30.6	△ 3 (M. R. C.)	2.865443	733.57	2,406.7
	93 39 15.074	320.7						
△ 5 (M. R. C.) (n. d.)	46 37 58.709	1,812.9	39 55 02.9	219 54 28.7	△ 4 (M. R. C.)	3.193455	1,561.19	5,122.0
	93 38 27.988	595.3						
△ 6 (M. R. C.) (n. d.)	46 38 17.182	530.6	51 33 53.3	231 33 28.7	△ 5 (M. R. C.)	2.962629	917.55	3,010.3
	93 37 54.200	1,152.8						
△ 7 (M. R. C.) (n. d.)	46 38 27.096	836.7	55 26 34.7	235 26 19.5	△ 6 (M. R. C.)	2.732142	539.69	1,770.6
	93 37 33.303	708.3						
△ 8 (M. R. C.) (n. d.)	46 38 47.629	1,470.7	39 32 53.9	219 32 36.0	△ 7 (M. R. C.)	2.915002	822.25	2,697.6
	93 37 08.687	184.7						
△ 9 (M. R. C.) (n. d.)	46 39 11.784	363.9	13 05 27.6	193 05 21.7	△ 8 (M. R. C.)	2.884109	765.79	2,512.4
	93 37 00.531	11.3						
△ 10 (M. R. C.) (n. d.)	46 39 27.812	858.8	40 10 51.6	220 10 37.3	△ 9 (M. R. C.)	2.811422	647.77	2,125.2
	93 36 40.876	869.1						
△ 11 (M. R. C.) (n. d.)	46 39 52.916	1,634.0	341 41 40.0	161 41 48.8	△ 10 (M. R. C.)	2.911948	816.48	2,678.7
	93 36 52.937	1,125.4						
△ 12 (M. R. C.) (n. d.)	46 40 06.919	213.7	39 55 58.3	219 55 45.9	△ 11 (M. R. C.)	2.751186	563.88	1,850.0
	93 36 35.912	763.4						
△ 13 (M. R. C.) (n. d.)	46 40 40.990	1,265.7	33 13 39.3	213 13 15.7	△ 12 (M. R. C.)	3.099558	1,257.64	4,126.1
	93 36 03.493	74.2						
△ 14 (M. R. C.) (n. d.)	46 40 54.659	1,687.8	62 15 08.1	242 14 40.6	△ 13 (M. R. C.)	2.957351	906.46	2,973.9
	93 35 25.748	547.2						

Aitkin to Bemidji traverse—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
△ 15 (M. R. C.) (n. d.)	46 40 51.796 93 35 09.227	1,599.4 196.1	104 08 04.0	284 07 52.0	△ 14 (M. R. C.)	2.558801	362.08	1,187.9
△ 16 (M. R. C.) (n. d.)	46 41 03.271 93 34 37.721	101.0 801.6	62 06 51.7	242 06 28.8	△ 15 (M. R. C.)	2.879410	757.55	2,485.4
△ 17 (M. R. C.) (n. d.)	46 40 59.776 93 33 59.843	1,845.8 1,271.8	97 38 20.4	277 37 52.8	△ 16 (M. R. C.)	2.909650	812.18	2,664.6
△ 18 (M. R. C.) (n. d.)	46 41 20.986 93 33 08.656	648.0 183.9	58 57 08.6	238 56 31.4	△ 17 (M. R. C.)	3.103706	1,269.71	4,165.7
△ 19 (M. R. C.) (n. d.)	46 41 21.523 93 32 30.831	664.6 655.1	88 49 20.7	268 48 53.2	△ 18 (M. R. C.)	2.905222	803.94	2,637.6
△ 20 (M. R. C.) (n. d.)	46 41 38.796 93 31 39.395	1,198.0 837.0	63 59 31.9	243 58 54.5	△ 19 (M. R. C.)	3.084985	1,216.14	3,990.0
△ 21 (M. R. C.) (n. d.)	46 41 48.438 93 31 08.146	1,495.7 173.1	65 51 05.2	245 50 42.5	△ 20 (M. R. C.)	2.861922	727.65	2,387.3
△ Strand P. B. M. (M. R. C.), 1898 (d. m.)	46 41 45.570 93 30 30.702	1,407.2 652.3	96 21 20.1	276 20 52.8	△ 21 (M. R. C.)	2.903342	800.46	2,626.2
△ 22 (M. R. C.) (n. d.)	46 41 55.892 93 30 04.252	1,725.9 90.3	60 26 35.9	240 26 16.6	△ Strand P. B. M. (M. R. C.)	2.810269	646.05	2,119.6
△ 23 (M. R. C.) (n. d.)	46 42 09.050 93 29 30.529	279.5 648.6	60 26 42.8	240 26 18.3	△ 22 (M. R. C.)	2.915736	823.64	2,702.2
△ 24 (M. R. C.) (n. d.)	46 42 16.713 93 29 30.753	516.1 653.3	358 50 53.7	178 50 53.9	△ 23 (M. R. C.)	2.374136	236.67	776.5
△ 25 (M. R. C.) (n. d.)	46 42 34.983 93 29 09.632	1,080.2 204.6	38 29 45.0	218 29 29.6	△ 24 (M. R. C.)	2.857820	720.81	2,364.9
△ 26 (M. R. C.) (n. d.)	46 42 44.107 93 28 13.580	1,362.0 288.5	76 41 30.9	256 40 50.1	△ 25 (M. R. C.)	3.087597	1,223.48	4,014.0
△ 27 (M. R. C.) (n. d.)	46 42 52.055 93 28 02.139	1,607.4 45.4	44 42 56.7	224 42 48.4	△ 26 (M. R. C.)	2.538308	345.39	1,133.2
△Carlson P. B. M. (M. R. C.) 1898 (d. m.)	46 43 18.305 93 27 28.235	565.2 599.6	41 37 06.4	221 36 41.7	△27 (M. R. C.)	3.035116	1,084.22	3,557.1
△28 (M. R. C.) (n. d.)	46 43 33.188 93 27 20.446	1,024.8 434.2	19 47 39.7	199 47 34.0	△Carlson P. B. M. (M. R. C.)	2.688804	488.43	1,602.5
△29 (M. R. C.) (n. d.)	46 43 58.007 93 26 50.261	1,791.2 1,067.1	39 54 34.1	219 54 12.1	△28 (M. R. C.)	2.999604	999.09	3,277.8
△30 (M. R. C.) (n. d.)	46 44 01.478 93 26 36.307	45.6 770.9	70 06 38.9	250 06 28.7	△29 (M. R. C.)	2.498400	315.06	1,033.7
△31 (M. R. C.) (n. d.)	46 44 16.440 93 25 50.985	507.7 1,082.4	64 21 21.3	244 20 48.3	△30 (M. R. C.)	3.028331	1,067.41	3,502.0
△32 (M. R. C.) (n. d.)	46 44 30.909 93 25 17.008	954.4 361.1	58 13 42.8	238 13 18.1	△31 (M. R. C.)	2.928645	848.49	2,783.8
△33 (M. R. C.) (n. d.)	46 44 30.772 93 24 51.403	950.2 1,091.2	90 26 59.4	270 26 40.7	△32 (M. R. C.)	2.735264	543.58	1,783.4
△34 (M. R. C.) (n. d.)	46 44 45.149 93 24 23.885	1,394.2 507.0	52 46 09.5	232 45 49.5	△33 (M. R. C.)	2.865526	733.71	2,407.2
△35 (M. R. C.) (n. d.)	46 44 56.755 93 24 06.974	1,752.5 148.0	45 02 48.8	225 02 36.5	△34 (M. R. C.)	2.705219	507.25	1,664.2
△36 (M. R. C.) (n. d.)	46 45 26.789 93 23 53.488	827.2 1,135.1	17 09 10.6	197 09 00.8	△35 (M. R. C.)	2.987042	970.60	3,184.4
△37 (M. R. C.) (n. d.)	46 45 46.132 93 23 43.646	1,424.5 926.2	19 16 31.3	199 16 24.1	△36 (M. R. C.)	2.801236	632.76	2,076.0
△38 (M. R. C.) (n. d.)	46 45 59.545 93 23 27.014	1,838.7 573.2	40 26 09.5	220 25 57.4	△37 (M. R. C.)	2.735721	544.15	1,785.3
△39 (M. R. C.) (n. d.)	46 46 15.197 93 23 10.415	469.3 221.0	36 04 56.4	216 04 44.3	△38 (M. R. C.)	2.776737	598.05	1,962.1
△40 (M. R. C.) (n. d.)	46 46 30.278 93 22 47.835	935.0 1,014.9	45 48 48.7	225 48 32.2	△39 (M. R. C.)	2.824847	668.11	2,192.0
△41 (M. R. C.) (n. d.)	46 46 50.010 93 22 35.916	1,544.3 761.9	22 32 22.7	202 32 14.0	△40 (M. R. C.)	2.819343	659.69	2,164.3
△42 (M. R. C.) (n. d.)	46 47 32.677 93 22 22.412	1,009.1 475.3	12 16 01.8	192 15 52.0	△41 (M. R. C.)	3.129793	1,348.32	4,423.6

Aitkin to Bemidji traverse—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
△43 (M. R. C.) (n. d.)	46 47 44.970 93 22 19.445	1,388.7 412.4	9 24 39.5	189 24 37.3	△42 (M. R. C.)	2.585224	384.79	1,262.4
△44 (M. R. C.) (n. d.)	46 48 22.959 93 22 06.636	709.0 140.7	13 02 18.8	193 02 09.5	△43 (M. R. C.)	3.080673	1,204.13	3,950.5
△45 (M. R. C.) (n. d.)	46 48 49.746 93 21 57.137	1,536.2 1,211.3	13 41 03.3	193 40 56.4	△44 (M. R. C.)	2.930107	851.35	2,793.1
△46 (M. R. C.) (n. d.)	46 49 03.830 93 21 52.143	118.3 1,105.4	13 41 00.1	193 40 56.5	△45 (M. R. C.)	2.650893	447.60	1,468.5
△Big Lagoon P. B. M. (M. R. C.) 1898 (d. m.)	46 49 11.364 93 21 48.115	350.9 1,019.9	20 09 20.7	200 09 17.8	△46 (M. R. C.)	2.394138	247.82	813.1
△47 (M. R. C.) (n. d.)	46 49 21.091 93 21 47.798	651.3 1,013.2	1 16 57.8	181 16 57.6	△Big Lagoon P. B. M. (M.R.C.)	2.477782	300.46	985.8
△48 (M. R. C.) (n. d.)	46 49 40.086 93 21 34.166	1,237.8 724.1	26 13 33.0	206 13 23.1	△47 (M. R. C.)	2.815495	653.88	2,145.3
△49 (M. R. C.) (n. d.)	46 49 59.014 93 21 07.612	1,822.3 161.3	43 55 07.9	223 54 48.5	△48 (M. R. C.)	2.909226	811.38	2,662.0
△50 (M. R. C.) (n. d.)	46 50 13.489 93 21 05.042	416.5 106.8	6 56 53.8	186 56 51.9	△49 (M. R. C.)	2.653481	450.28	1,477.3
△51 (M. R. C.) (n. d.)	46 50 24.056 93 20 54.583	742.8 1,156.6	34 11 10.3	214 11 02.7	△50 (M. R. C.)	2.595988	394.45	1,294.1
△52 (M. R. C.) (n. d.)	46 50 35.838 93 20 59.523	1,106.7 1,261.2	343 56 55.2	163 56 58.8	△51 (M. R. C.)	2.578145	378.57	1,242.0
△53 (M. R. C.) (n. d.)	46 50 40.918 93 21 09.867	1,263.5 209.1	305 35 24.2	125 35 31.7	△52 (M. R. C.)	2.430610	269.53	884.3
△54 (M. R. C.) (n. d.)	46 50 45.334 93 21 18.935	1,399.9 401.2	305 21 45.7	125 21 52.3	△53 (M. R. C.)	2.372205	235.62	773.0
△55 (M. R. C.) (n. d.)	46 50 56.837 93 21 33.543	1,755.1 710.6	318 55 54.4	138 56 05.1	△54 (M. R. C.)	2.673139	471.13	1,545.7
△56 (M. R. C.) (n. d.)	46 51 05.848 93 21 41.982	180.6 889.4	327 16 41.5	147 16 47.7	△55 (M. R. C.)	2.519493	330.74	1,085.1
△57 (M. R. C.) (n. d.)	46 51 16.983 93 21 52.413	524.4 1,110.3	327 16 11.1	147 16 18.7	△56 (M. R. C.)	2.611443	408.74	1,341.0
△58 (M. R. C.) (n. d.)	46 51 35.868 93 22 02.303	1,107.6 48.8	340 14 14.6	160 14 21.8	△57 (M. R. C.)	2.792148	619.65	2,033.0
△59 (M. R. C.) (n. d.)	46 51 45.488 93 22 06.749	1,404.7 143.0	342 24 39.9	162 24 43.1	△58 (M. R. C.)	2.493650	311.64	1,022.4
△60 (M. R. C.) (n. d.)	46 52 09.653 93 22 13.544	298.1 286.8	349 04 58.6	169 05 03.6	△59 (M. R. C.)	2.880804	759.98	2,493.4
△61 (M. R. C.) (n. d.)	46 52 29.565 93 22 06.055	913.0 128.2	14 27 54.8	194 27 49.3	△60 (M. R. C.)	2.802777	635.00	2,083.3
△62 (M. R. C.) (n. d.)	46 52 42.207 93 22 01.255	1,303.4 26.6	14 35 38.2	194 35 34.7	△61 (M. R. C.)	2.605751	403.41	1,323.5
△63 (M. R. C.) (n. d.)	46 52 54.545 93 22 11.348	1,684.3 240.3	330 42 36.3	150 42 43.7	△62 (M. R. C.)	2.640330	436.85	1,433.2
△64 (M. R. C.) (n. d.)	46 53 11.596 93 22 07.257	358.1 153.6	9 20 31.7	189 20 28.7	△63 (M. R. C.)	2.727224	533.61	1,750.7
△65 (M. R. C.) (n. d.)	46 53 23.093 93 22 07.850	713.1 166.2	357 58 28.7	177 58 29.1	△64 (M. R. C.)	2.550552	355.26	1,165.5
△66 (M. R. C.) (n. d.)	46 53 29.941 93 21 55.801	924.6 1,181.3	50 20 38.4	230 20 29.6	△65 (M. R. C.)	2.520274	331.34	1,087.1
△67 (M. R. C.) (n. d.)	46 53 48.795 93 21 50.554	1,506.8 1,070.1	10 48 07.0	190 48 03.2	△66 (M. R. C.)	2.772852	592.72	1,944.6
△68 (M. R. C.) (n. d.)	46 54 13.404 93 21 36.537	413.9 773.3	21 19 41.0	201 19 30.8	△67 (M. R. C.)	2.911577	815.79	2,676.5
△69 (M. R. C.) (n. d)	46 54 20.508 93 20 54.395	633.3 1,151.3	76 11 10.0	256 10 39.2	△68 (M. R. C.)	2.963086	918.51	3,013.5
△70 (M. R. C.) (n. d.)	46 54 31.677 93 20 33.999	978.2 719.5	51 22 30.0	231 22 15.1	△69 (M. R. C.)	2.742356	552.53	1,812.8
△71 (M. R. C.) (n. d.)	46 54 42.642 93 20 10.482	1,316.8 221.8	55 46 23.3	235 46 06.1	△70 (M. R. C.)	2.779558	601.95	1,974.9

218228°—30——9

Aitkin to Bemidji traverse—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
△72 (M. R. C.) (n. d.)	46 55 07.402 93 19 38.014	228.6 804.3	41 56 42.6	221 56 18.9	△71 (M. R. C.)	3.011962	1,027.93	3,372.5
△73 (M. R. C.) (n. d.)	46 55 32.017 93 19 05.693	988.7 120.4	41 58 49.5	221 58 25.9	△72 (M. R. C.)	3.009646	1,022.46	3,354.5
△74 (M. R. C.) (n. d.)	46 55 45.763 93 18 50.406	1,413.2 1,066.3	37 18 16.7	217 18 05.5	△73 (M. R. C.)	2.727267	533.66	1,750.8
△75 (M. R. C.) (n. d.)	46 56 14.758 93 18 33.311	455.7 704.6	21 59 40.8	201 59 28.3	△74 (M. R. C.)	2.984817	965.64	3,168.1
△76 (M. R. C.) (n. d.)	46 56 40.913 93 18 06.298	1,263.4 133.2	35 16 40.8	215 16 21.1	△75 (M. R. C.)	2.995338	989.32	3,245.8
△77 (M. R. C.) (n. d.)	46 57 09.164 93 18 18.659	283.0 394.6	343 19 06.7	163 19 15.7	△76 (M. R. C.)	2.959385	910.72	2,987.9
△78 (M. R. C.) (n. d.)	46 57 35.131 93 18 14.314	1,084.8 302.6	6 32 11.4	186 32 08.2	△77 (M. R. C.)	2.906936	807.12	2,648.0
△79 (M. R. C.) (n. d.)	46 58 00.215 93 17 34.640	6.6 732.3	47 16 52.8	227 16 23.8	△78 (M. R. C.)	3.057570	1,141.75	3,745.9
△80 (M. R. C.) (n. d.)	46 58 20.444 93 17 40.983	631.3 866.4	347 53 09.2	167 53 13.8	△79 (M. R. C.)	2.805428	638.89	2,096.1
△81 (M. R. C.) (n. d.)	46 58 38.980 93 17 44.063	1,203.7 931.4	353 30 49.1	173 30 51.3	△80 (M. R. C.)	2.760486	576.08	1,890.0
△82 (M. R. C.) (n. d.)	46 58 56.716 93 17 47.035	1,751.4 994.1	353 27 36.6	173 27 38.8	△81 (M. R. C.)	2.741373	551.28	1,808.7
△83 (M. R. C.) (n. d.)	46 59 11.109 93 17 40.390	343.1 853.6	17 32 17.6	197 32 12.7	△82 (M. R. C.)	2.668497	466.12	1,529.3
△Fiessen P. B. M. (M. R. C.), 1898 (d. m.)	46 59 37.315 93 17 29.663	1,152.3 626.8	15 39 01.3	195 38 53.5	△83 (M. R. C.)	2.924497	840.42	2,757.3
△84 (M. R. C.) (n. d.)	46 59 53.242 93 17 29.479	1,644.2 622.8	0 27 11.5	180 27 11.4	△Fiessen P. B. M. (M. R. C.)	2.691827	491.84	1,613.6
△85 (M. R. C.) (n. d.)	47 00 13.715 93 17 36.789	423.5 777.2	346 16 15.7	166 16 21.0	△84 (M. R. C.)	2.813449	650.80	2,135.2
△86 (M. R. C.) (n. d.)	47 00 41.209 93 17 50.902	1,272.6 1,075.2	340 39 01.2	160 39 11.5	△85 (M. R. C.)	2.954174	899.86	2,952.3
△87 (M. R. C.) (n. d.)	47 00 57.944 93 18 29.135	1,789.4 615.4	302 36 45.5	122 37 13.5	△86 (M. R. C.)	2.981709	958.76	3,145.5
△88 (M. R. C.) (n. d.)	47 01 17.917 93 18 22.663	533.3 478.6	12 29 42.7	192 29 38.0	△87 (M. R. C.)	2.800549	631.76	2,072.7
△89 (M. R. C.) (n. d.)	47 01 38.249 93 18 56.990	1,181.2 1,203.5	310 53 36.6	130 54 01.7	△88 (M. R. C.)	2.981824	959.01	3,146.4
△90 (M. R. C.) (n. d.)	47 01 51.724 93 19 35.392	1,597.3 747.3	297 09 39.4	117 10 07.5	△89 (M. R. C.)	2.959718	911.42	2,990.2
△91 (M. R. C.) (n. d.)	47 02 14.798 93 20 11.645	457.0 245.9	312 56 47.3	132 57 13.8	△90 (M. R. C.)	3.019430	1,045.76	3,431.0
△92 (M. R. C.) (n. d.)	47 02 25.502 93 20 43.451	787.5 917.3	296 12 20.1	116 12 43.4	△91 (M. R. C.)	2.874159	748.44	2,455.5
△93 (M. R. C.) (n. d.)	47 02 45.747 93 21 04.702	1,412.7 99.3	324 20 08.2	144 20 23.8	△92 (M. R. C.)	2.886192	769.47	2,524.5
△94 (M. R. C.) (n. d.)	47 02 58.602 93 21 47.094	1,809.7 994.1	293 55 10.2	113 55 41.2	△93 (M. R. C.)	2.990756	978.94	3,211.7
△95 (M. R. C.) (n. d.)	47 03 04.815 93 22 17.001	148.7 358.8	286 54 07.1	106 54 29.0	△94 (M. R. C.)	2.819395	659.77	2,164.6
△96 (M. R. C.) (n. d.)	47 03 20.265 93 23 07.364	625.8 155.4	294 10 02.7	114 10 39.6	△95 (M. R. C.)	3.066376	1,165.13	3,822.6
△97 (M. R. C.) (n. d.)	47 03 35.590 93 23 26.672	1,099.1 562.9	319 16 03.8	139 16 17.9	△96 (M. R. C.)	2.795537	624.51	2,048.9
△Split Hand P. B. M. (M. R. C.), 1898 (d. m.)	47 03 54.953 93 23 23.271	1,697.0 491.1	6 50 44.8	186 50 42.3	△97 (M. R. C.)	2.779765	602.23	1,975.8
△98 (M. R. C.) (n. d.)	47 04 18.049 93 23 46.586	557.4 982.9	325 24 03.3	145 24 20.4	△Split Hand P. B. M. (M. R. C.).	2.937734	866.43	2,842.6
△99 (M. R. C.) (n. d.)	47 04 17.856 93 24 12.284	551.4 259.2	269 22 03.3	89 22 22.1	△98 (M. R. C.)	2.734183	542.23	1,779.0

Aitkin to Bemidji traverse—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
△100 (M. R. C.) (n. d.)	47 04 40.846 93 24 19.005	1,261.4 400.9	348 42 16.7	168 42 21.6	△99 (M. R. C.)	2.859721	723.97	2,375.2
△101 (M. R. C.) (n. d.)	47 05 01.776 93 24 26.012	54.8 548.7	347 07 00.4	167 07 05.5	△100 (M. R. C.)	2.821532	663.03	2,175.3
△102 (M. R. C.) (n. d.)	47 05 16.816 93 24 26.606	519.3 561.2	358 27 13.8	178 27 14.2	△101 (M. R. C.)	2.667098	464.62	1,524.3
△103 (M. R. C.) (n. d.)	47 05 39.000 93 24 32.044	1,204.4 675.8	350 29 44.2	170 29 48.2	△102 (M. R. C.)	2.841741	694.61	2,278.9
△104 (M. R. C.) (n. d.)	47 05 57.229 93 24 36.529	1,767.3 770.3	350 27 39.5	170 27 42.8	△103 (M. R. C.)	2.756497	570.82	1,872.8
△105 (M. R. C.) (n. d.)	47 06 26.391 93 24 41.647	815.0 878.1	353 09 57.8	173 10 01.6	△104 (M. R. C.)	2.957613	907.01	2,975.7
△106 (M. R. C.) (n. d.)	47 06 53.545 93 24 34.052	1,653.5 717.9	10 48 42.4	190 48 36.8	△105 (M. R. C.)	2.931314	853.72	2,800.9
△107 (M. R. C.) (n. d.)	47 07 10.119 93 24 24.947	312.5 525.9	20 33 30.2	200 33 23.5	△106 (M. R. C.)	2.737704	546.64	1,793.4
△108 (M. R. C.) (n. d.)	47 07 28.651 93 24 25.365	884.8 534.6	359 07 07.2	179 07 07.5	△107 (M. R. C.)	2.757668	572.36	1,877.8
△109 (M. R. C.) (n. d.)	47 07 41.871 93 24 26.693	1,293.0 562.6	356 04 35.5	176 04 36.5	△108 (M. R. C.)	2.611959	409.22	1,342.6
△110 (M. R. C.) (n. d.)	47 08 09.348 93 24 29.241	288.7 616.2	356 22 44.9	176 22 46.8	△109 (M. R. C.)	2.929535	850.23	2,789.5
△111 (M. R. C.) (n. d.)	47 08 42.774 93 24 43.470	1,320.9 915.9	343 48 05.1	163 48 15.5	△110 (M. R. C.)	3.031367	1,074.90	3,526.6
△Five Pines P. B. M. (M. R. C.), 1898 (d. m.)	47 08 58.206 93 25 30.902	1,797.5 651.0	295 29 26.5	115 30 01.3	△111 (M. R. C.)	3.044214	1,107.17	3,632.4
△112 (M. R. C.) (n. d.)	47 09 27.081 93 25 18.754	836.3 395.1	16 00 53.9	196 00 45.0	△Five Pines P. B. M. (M. R. C.).	2.967404	927.69	3,043.6
△113 (M. R. C.) (n. d.)	47 09 50.126 93 25 08.561	1,548.0 180.3	16 47 21.6	196 47 14.1	△112 (M. R. C.)	2.871193	743.35	2,438.8
Porcupine (M. R. C.), 1898 (d. m.)	47 10 08.648 93 26 12.578	267.1 264.9	292 58 55.5	112 59 42.5	△113 (M. R. C.)	3.165724	1,464.62	4,805.2
Blackberry B. M. (M. R. C.), 1898 (d. m.)	47 11 20.622 93 24 24.044	636.8 506.2	45 48 27.0	225 47 07.4	Porcupine (M. R. C.)	3.503515	3,187.98	10,459.2
Halfway (M. R. C.) (n. d.)	47 12 00.547 93 25 52.548	16.9 1,106.0	303 29 13.3	123 30 18.2	Blackberry B. M. (M. R. C.)	3.349098	2,234.08	7,329.6
La Prairie (M. R. C.), 1898 (d. m.)	47 13 04.104 93 28 13.318	126.7 280.2	303 30 42.1	123 32 25.4	Halfway (M. R. C.)	3.550680	3,553.69	11,659.1
Grand Rapids B. M. (M. R. C.), 1898 (d. m.)	47 14 04.665 93 31 16.733	144.1 352.0	295 50 24.4	115 52 39.0	La Prairie (M. R. C.)	3.632259	4,288.04	14,068.3
Race Track (M. R. C.), 1898 (d. m.)	47 13 49.931 93 31 27.888	1,542.0 586.7	207 16 46.2	27 16 54.4	Grand Rapids B. M. (M. R. C.).	2.709239	511.96	1,679.7
Courthouse (M. R. C.) (n. d.)	47 14 07.061 93 31 33.691	218.1 708.7	347 00 19.1	167 00 23.4	Race Track (M. R. C.)	2.734718	542.90	1,781.2
Grand Rapids (M. R. C.), 1898 (d. m.)	47 14 06.321 93 33 23.760	195.2 499.8	269 25 23.7	89 26 44.5	Courthouse (M. R. C.)	3.364615	2,315.34	7,596.2
Dam (M. R. C.) (n. d.)	47 15 04.244 93 35 06.671	131.1 140.3	309 33 43.5	129 34 59.1	Grand Rapids (M. R. C.)	3.448376	2,807.86	9,212.1
Pokegama (M. R. C.) (n. d.)	47 15 26.271 93 36 14.745	811.3 310.0	295 24 40.2	115 25 30.2	Dam (M. R. C.)	3.199974	1,584.80	5,199.5
Cohasset (M. R. C.) (n. d.)	47 15 46.837 93 37 18.358	1,446.4 386.0	295 23 46.0	115 24 32.7	Pokegama (M. R. C.)	3.170432	1,480.58	4,857.5
Littlefield (M. R. C.) (n. d.)	47 15 59.566 93 37 48.903	1,839.5 1,028.0	301 28 12.2	121 28 34.6	Cohasset (M. R. C.)	2.876733	752.89	2,470.1
Hull (M. R. C.) (n. d.)	47 16 46.673 93 39 45.150	1,441.4 948.9	300 45 24.0	120 46 49.4	Littlefield (M. R. C.)	3.453889	2,843.73	9,329.8
Summit (M. R. C.) (n. d.)	47 17 29.074 93 41 29.855	897.9 627.3	300 44 48.0	120 46 04.9	Hull (M. R. C.)	3.408319	2,560.47	8,400.5
Deer River (M. R. C.) 1898 (d. m.)	47 19 50.417 93 47 21.594	1,557.0 453.4	300 32 21.9	120 36 40.5	Summit (M. R. C.)	3.933548	8,581.20	28,153.5

Aitkin to Bemidji traverse—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
Old Road (M. R. C.), 1898 (d. m.)	47 20 20.229 93 48 33.121	624.7 695.3	301 30 15.9	121 31 08.5	Deer River (M. R. C.)	3.245875	1,761.47	5,779.1
Papoose (M. R. C.) (n. d.)	47 20 21.267 93 48 58.774	656.8 1,233.9	273 24 20.0	93 24 38.9	Old Road (M. R. C.)	2.731981	539.49	1,770.0
Squaw (M. R. C.) (n. d.)	47 20 14.819 93 50 16.701	457.6 350.6	263 03 06.4	83 04 03.7	Papoose (M. R. C.)	3.216969	1,648.04	5,406.9
Buck (M. R. C.) (n. d.)	47 20 03.685 93 52 30.817	113.8 647.0	263 01 25.6	83 03 04.2	Squaw (M. R. C.)	3.452801	2,836.62	9,306.5
Starke (M. R. C.), 1898 (d. m.)	47 19 59.812 93 53 17.323	1,847.1 363.7	263 00 38.1	83 01 12.3	Buck (M. R. C.)	2.992864	983.70	3,227.4
Wigwam B. M. (M. R. C.), 1898 (d. m.)	47 19 16.527 93 54 58.666	510.4 1,232.0	237 51 13.0	57 52 27.5	Starke (M. R. C.)	3.400197	2,513.03	8,244.8
Ball Club (M. R. C.) (n. d.)	47 19 17.353 93 55 28.888	535.9 606.6	272 17 52.4	92 18 14.6	Wigwam B. M. (M. R. C.)	2.802893	635.17	2,083.9
Tomahawk B. M. (M. R. C.), 1898 (d. m.)	47 19 21.548 93 56 19.729	665.4 414.3	276 54 46.0	96 55 23.4	Ball Club (M. R. C.)	3.031609	1,075.50	3,528.5
Mississip B. M. (M. R. C.), 1898 (d. m.)	47 19 31.927 93 58 25.414	986.0 533.7	276 54 41.0	96 56 13.4	Tomahawk B. M. (M. R. C.)	3.424666	2,658.68	8,722.7
Divide (M. R. C.), 1898 (d. m.)	47 19 46.012 94 01 16.053	1,420.9 337.1	276 54 16.1	96 56 21.6	Mississip B. M. (M. R. C.)	3.557430	3,609.36	11,841.7
Cranberry (M. R. C.) (n. d.)	47 19 51.945 94 02 28.285	1,604.2 593.9	276 52 51.2	96 53 44.3	Divide (M. R. C.)	3.184027	1,527.66	5,012.0
Nishka (M. R. C.) (n. d.)	47 20 05.073 94 05 08.443	156.7 177.3	276 51 30.1	96 53 27.9	Cranberry (M. R. C)	3.529814	3,386.99	11,112.1
Windego (M. R. C.) (n. d.)	47 20 18.648 94 07 54.802	575.9 1,150.5	276 49 39.8	96 51 42.1	Nishka (M. R. C.)	3.546254	3,517.66	11,540.9
Norway Grove (M. R. C.) 1898 (d. m.)	47 20 29.289 94 10 05.247	904.5 110.2	276 49 47.7	96 51 23.6	Windego (M. R. C.)	3.440604	2,758.06	9,048.7
Bena (M. R. C.) 1898 (d. m.)	47 20 43.343 94 12 57.962	1,338.6 1,216.7	276 48 32.6	96 50 39.6	Norway Grove (M. R. C.)	3.562464	3,651.44	11,979.8
Bigosh (M. R. C.) 1898 (d. m.)	47 20 49.442 94 13 54.906	1,526.9 1,152.5	278 56 57.1	98 57 39.0	Bena (M. R. C.)	3.082795	1,210.03	3,969.9
Portage (M. R. C.) 1898 (d. m.)	47 21 09.286 94 16 54.735	286.8 1,148.8	279 12 14.2	99 14 26.5	Bigosh (M. R. C.)	3.582502	3,823.86	12,545.4
Longsight (M. R. C.) (n. d.)	47 21 28.618 94 19 50.739	883.8 1,064.8	279 09 48.0	99 11 57.5	Portage (M. R. C.)	3.573070	3,741.71	12,275.9
Schley (M. R. C.) 1898 (d. m.)	47 21 37.365 94 21 10.828	1,153.9 227.2	279 07 20.9	99 08 19.8	Longsight (M. R. C.)	3.231028	1,702.27	5,584.9
Bug Nog (M. R. C.) (n. d.)	47 21 53.423 94 23 38.119	1,649.9 799.9	279 06 02.5	99 07 50.8	Schley (M. R. C.)	3.495583	3,130.28	10,269.9
Santiago (M. R. C.) (n. d.)	47 22 13.972 94 26 47.457	431.5 995.7	279 03 22.4	99 05 41.7	Bug Nog (M. R. C.)	3.604567	4,023.16	13,199.3
Cuba (M. R. C.) 1898 (d. m.)	47 22 14.996 94 29 23.902	463.1 501.5	270 32 10.3	90 34 05.4	Santiago (M. R. C.)	3.516203	3,282.49	10,769.3
Lamond (M. R. C.) 1898 (d. m.)	47 22 15.810 94 32 20.087	488.3 421.4	270 22 17.2	90 24 26.8	Cuba (M. R. C.)	3.567799	3,696.57	12,127.8
Pike Bay (M. R. C.) 1898 (d. m.)	47 22 25.923 94 32 50.051	800.6 1,050.0	296 24 59.1	116 25 21.1	Lamond (M. R. C.)	2.846312	701.96	2,303.0
Sand Pit (M. R. C.) (n. d.)	47 22 27.020 94 33 15.520	834.5 325.6	273 37 31.8	93 37 50.5	Pike Bay (M. R. C.)	2.728674	535.39	1,756.5
Chippewa (M. R. C.) 1898 (d. m.)	47 22 35.893 94 33 44.150	1,108.5 926.2	294 31 16.6	114 31 37.7	Sand Pit (M. R. C.)	2.819658	660.17	2,165.9
Depot (M. R. C.) (n. d.)	47 22 37.361 94 36 45.160	1,153.8 947.4	270 39 55.4	90 42 08.6	Chippewa (M. R. C.)	3.579504	3,797.55	12,459.1
Wye (M. R. C.) 1898 (d. m.)	47 22 37.486 94 37 14.596	1,157.7 306.2	270 21 14.7	90 21 36.4	Depot (M. R. C.)	2.790658	617.53	2,026.0
Spring (M. R. C.) 1898 (d. m.)	47 22 38.167 94 38 30.282	1,178.7 635.3	270 45 05.2	90 46 00.9	Wye (M. R. C.)	3.200824	1,587.90	5,209.6
Dump (M. R. C.) (n. d.)	47 22 39.138 94 40 41.444	1,208.7 869.4	270 36 39.2	90 38 15.7	Spring (M. R. C.)	3.439601	2,751.70	9,027.9

Aitkin to Bemidji traverse—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
Ferris (M. R. C.) (n. d.)	47 22 39.827 94 42 20.401	1,230.0 428.0	270 34 37.4	90 35 50.2	Dump (M. R. C.)	3.317234	2,076.03	6,811.1
Midge (M. R. C.) (n. d.)	47 22 40.269 94 43 26.652	1,243.6 559.1	270 33 22.6	90 34 11.4	Ferris (M. R. C.)	3.142978	1,389.88	4,560.0
Grace (M. R. C.) (n. d.)	47 22 56.120 94 44 27.555	1,733.2 578.0	290 57 34.8	110 58 19.6	Midge (M. R. C.)	3.136128	1,368.13	4,488.6
Bates (M. R. C.) (n. d.)	47 23 35.661 94 46 59.698	1,101.3 1,252.0	290 55 30.8	110 57 22.8	Grace (M. R. C.)	3.533608	3,416.71	11,209.7
Kirkpatrick (M. R. C.) (n. d.)	47 23 52.484 94 47 25.436	1,620.9 533.4	313 54 16.1	133 54 35.0	Bates (M. R. C.)	2.874583	749.17	2,457.9
Pillsbury (M. R. C.) (n. d.)	47 24 09.387 94 47 48.883	289.9 1,025.0	316 42 47.3	136 43 04.6	Kirkpatrick (M. R. C.)	2.855581	717.10	2,352.7
Rosby (M. R. C.) (n. d.)	47 24 49.997 94 48 45.190	1,544.1 947.3	316 43 35.9	136 44 17.3	Pillsbury (M. R. C.)	3.236124	1,722.36	5,650.8
Stone Point (M. R. C.) (n. d.)	47 25 11.160 94 49 10.848	344.7 227.4	320 32 41.4	140 33 00.3	Rosby (M. R. C.)	2.927585	846.42	2,777.0
Omega (M. R. C.) (n. d.)	47 26 12.465 94 50 25.212	385.0 528.3	320 31 54.6 140 37 51.1	140 32 49.4 320 36 26.6	Stone Point (M. R. C.) Bemidji (M. R. C.)	3.389566 3.578384	2,452.26 3,787.77	8,045.5 12,427.0
Supplementary points								
U. S. E. 202 B. M. (d. m.)	46 35 18.098 93 40 13.755	558.8 292.8	227 29 46.9	47 30 18.2	△1 (M. R. C.)	3.094729	1,243.74	4,080.5
Biggar P. B. M. (M. R. C.), 1898 (d. m.)	46 36 53.428 93 38 57.306	1,649.8 1,219.4	101 38 41.3	281 38 27.1	△3 (M. R. C.)	2.628061	424.68	1,393.3
Sutton P. B. M. (M. R. C.), 1898 (d. m.)	46 38 36.114 93 37 22.165	1,115.2 471.4	40 23 18.7	220 23 10.6	△7 (M. R. C.)	2.562982	365.58	1,199.4
U. S. E. 209 B. M. (d. m.)	46 39 42.118 93 36 41.043	1,300.6 872.6	359 32 16.9 142 49 28.2	179 32 17.0 322 49 19.5	△10 (M. R. C.) △11 (M. R. C.)	2.645204 2.621641	441.78 418.45	1,449.4 1,372.9
Waldeck P. B. M. (M. R. C.), 1898 (d. m.)	46 40 23.784 93 36 19.577	734.4 416.1	33 41 42.9	213 41 31.0	△12 (M. R. C.)	2.796508	625.90	2,053.5
Foulds P. B. M. (M. R. C.), 1898 (d. m.)	46 41 18.061 93 33 17.312	557.7 367.9	243 50 47.7	63 50 54.0	△18 (M. R. C.)	2.311550	204.90	672.2
School P. B. M. (M. R. C.), 1898 (d m.)	46 44 42.862 93 24 28.371	1,323.5 602.3	233 26 24.6	53 26 27.9	△34 (M. R. C.)	2.073869	118.54	388.9
Pat P. B. M. (M. R. C.), 1898 (d. m.)	46 46 16.972 93 23 03.748	524.1 79.5	68 49 29.3	248 49 24.4	△39 (M. R. C.)	2.181017	151.71	497.7
Midway P. B. M. (M. R. C.), 1898 (d. m.)	46 51 32.816 93 21 55.075	1,013.4 1,166.7	121 36 45.8	301 36 40.5	△58 (M. R. C.)	2.254749	179.78	589.8
Wells P. B. M. (M. R. C.), 1898 (d. m.)	46 53 32.217 93 21 51.953	994.9 1,099.8	49 12 58.5	229 12 55.7	△66 (M. R. C.)	2.031792	107.59	353.0
Stone P. B. M. (M. R. C.), 1898 (d. m.)	46 55 01.262 93 19 39.884	39.0 843.9	191 47 24.7	11 47 26.1	△72 (M. R. C.)	2.287081	193.68	635.4
Vicinity P. B. M. (M. R. C.), 1898 (d. m.)	47 01 40.280 93 18 47.792	1,243.9 1,009.2	72 06 09.7	252 06 03.0	△89 (M. R. C.)	2.309847	204.10	669.6
Slip P. B. M. (M. R. C.), 1898 (d. m.)	47 02 48.423 93 21 10.696	1,495.4 225.8	303 08 59.3	123 09 03.7	△93 (M. R. C.)	2.179316	151.12	495.8
Hamilton P. B. M. (M. R. C.), 1898 (d. m.)	47 06 12.220 93 24 39.161	377.4 825.8	353 09 45.8	173 09 47.7	△104 (M. R. C.)	2.668623	466.25	1,529.7
Strawberry P. B. M. (M. R. C.), 1898 (d. m.)	47 10 32.450 93 25 42.085	1,002.1 886.2	331 37 11.8 41 08 42.0	151 37 36.5 221 08 19.7	△ 113 (M. R. C.) Porcupine (M. R. C.)	3.171884 2.989467	1,485.55 976.04	4,873.8 3,202.2
Zwick (M. R. C.), 1898 (d. m.)	47 11 05.430 93 26 37.330	167.7 785.9	260 29 41.8 311 11 53.7 343 26 36.0	80 31 19.6 131 12 34.2 163 26 54.2	Blackberry B. M. (M. R. C.) Strawberry P. B. M. (M. R. C.) Porcupine (M. R. C.)	3.454096 3.189244 3.262298	2,845.09 1,546.12 1,829.35	9,334.3 5,072.6 6,001.8
Dam B. M. (M. R. C.), 1898 (d. m.)	47 15 04.495 93 35 07.118	138.8 149.7	309 33 43.2	129 33 43.5	Dam (M. R. C.)	1.086004	12.19	40.0
Cohasset B. M. (M. R. C.), 1898 (d. m.)	47 15 49.196 93 37 25.658	1,519.3 539.4	295 23 40.6	115 23 46.0	Cohasset (M. R. C.)	2.230142	169.88	557.3
Round House B. M. (M. R. C.), 1898 (d. m.)	47 19 22.215 93 47 25.822	686.0 542.3	185 49 09.8	5 49 12.9	Deer River (M. R. C.)	2.942241	875.47	2,872.3
Camp (M. R. C.) (n. d.)	47 19 47.296 93 47 25.468	1,460.6 534.8	220 09 20.1 0 33 00.1	40 09 22.9 180 32 59.8	Deer River (M. R. C.) Round House B. M. (M. R. C.)	2.100791 2.889076	126.12 774.60	413.8 2,541.3
△34 Fanbel (M. R. C.) (n. d.)	47 22 28.298 94 33 20.698	873.9 434.2	115 29 33.9 289 57 43.9	295 29 16.6 109 57 47.7	Chippewa (M. R. C.) Sand Pit (M. R. C.)	2.736439 2.062820	545.05 115.56	1,788.2 379.1

Aitkin to Bemidji traverse—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″		° ′ ″	° ′ ″				
Fanbel B. M. (M. R. C.) (B. M. 342 (U. S. E.)) (d. m.).	47 22 28.285 94 33 20.888	873.5 438.2	264 21 30.8	84 21 30.9	△34 Fanbel (M. R. C.)	0.602060	4.00	13.1
Hub (Chip) (M. R. C.) (n. d.)	47 22 36.228 94 33 44.144	1,118.8 926.1	0 41 16.6	180 41 16.6	Chippewa (M. R. C.)	1.015486	10.36	34.0
East Base (M. R. C.) (n. d.)	47 22 37.069 94 35 26.709	1,144.8 560.3	270 40 52.1	90 42 07.6	Hub (chip) (M. R. C.)	3.332802	2,151.80	7,059.7
West Base (M. R. C.) (n. d.)	47 22 37.233 94 35 47.047	1,149.9 987.0	270 40 37.1	90 40 52.1	East Base (M. R. C.)	2.630100	426.68	1,399.9
△35 Fanbel (M. R. C.) (n. d.)	47 22 18.861 94 35 41.475	582.5 870.1	168 21 31.2 208 50 56.2	348 21 27.1 28 51 07.1	West Base (M. R. C.) East Base (M. R. C.)	2.762886 2.807525	579.28 641.99	1,900.5 2,106.3
U. S. E. 347 B. M. (d. m.)	47 22 18.942 94 35 40.252	585.0 844.5	84 27 42.1	264 27 41.2	△35 Fanbel (M. R. C.)	1.411300	25.78	84.6
Cass Lake (M. R. C.), 1898 (d. m.)	47 22 46.661 94 36 45.601	1,441.0 956.6	65 01 27.8	245 01 06.5	Wye (M. R. C.)	2.826723	671.00	2,201.4
Wye P. B. M. (M. R. C.) 1898 (d. m.)	47 22 31.296 94 37 18.967	966.5 397.9	205 37 34.0	25 37 37.2	Wye (M. R. C.)	2.326408	212.04	695.7
Hub (M. R. C.) (n. d.)	47 22 40.039 94 43 26.782	1,236.5 561.8	200 58 19.5	20 58 19.6	Midge (M. R. C.)	0.881330	7.61	25.0
Check point (M. R. C.) (n. d.)	47 22 44.986 94 43 45.772	1,389.3 960.2	290 58 44.3	110 58 58.3	Hub (M. R. C.)	2.630081	426.66	1,399.8
Midge P. B. M. (M. R. C.) 1898 (d. m.)	47 22 45.680 94 43 45.562	1,410.7 955.8	11 36 14.5	191 36 14.3	Check point (M. R. C.)	1.340107	21.88	71.8
△1a (M. R. C.) (n. d.)	47 22 44.030 94 38 48.190	1,359.8 1,010.9	295 43 51.8	115 44 05.0	Spring (M. R. C.)	2.620169	417.03	1,368.2
△2a (M. R. C.) (n. d.)	47 23 02.776 94 38 48.993	85.7 1,027.7	358 20 03.2	178 20 03.8	△1a (M. R. C.)	2.762812	579.18	1,900.2
△3a (M. R. C.) (n. d.)	47 23 17.467 94 39 07.371	539.4 154.6	319 38 48.0	139 39 01.5	△2a (M. R. C.)	2.774775	595.35	1,953.2
△4a (M. R. C.) (n. d.)	47 23 37.019 94 39 08.021	1,143.3 168.2	358 42 26.5	178 42 27.0	△3a (M. R. C.)	2.781020	603.98	1,981.6
△5a (M. R. C.) (n. d.)	47 23 47.689 94 39 23.664	1,472.8 496.2	315 07 31.5	135 07 43.0	△4a (M. R. C.)	2.667427	464.97	1,525.5
△6a (M. R. C.) (n. d.)	47 23 54.773 94 39 38.634	1,691.6 810.2	304 52 25.7	124 52 36.7	△5a (M. R. C.)	2.582785	382.64	1,255.4
△7a (M. R. C.) (n. d.)	47 24 05.672 94 39 59.286	175.2 1,243.1	307 51 17.3	127 51 32.5	△6a (M. R. C.)	2.739163	548.48	1,799.5
△8a (M. R. C.) (n. d.)	47 24 20.814 94 40 09.864	642.8 206.8	334 37 25.3	154 37 33.1	△7a (M. R. C.)	2.713968	517.57	1,698.1
△9a (M. R. C.) (n. d.)	47 24 59.425 94 40 28.214	1,835.2 591.4	342 07 02.0	162 07 15.5	△8a (M. R. C.)	3.097928	1,252.93	4,110.7
△10a (M. R. C.) (n. d.)	47 25 12.263 94 40 34.956	378.7 732.7	340 22 56.2	160 23 01.2	△9a (M. R. C.)	2.624200	420.92	1,381.0
Wolf Lake (M. R. C.) 1898 (d. m.)	47 25 26.421 94 40 49.348	816.0 1,034.3	325 23 47.6	145 23 58.2	△10a (M. R. C.)	2.725269	531.21	1,742.8

Superior National Forest

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance: Logarithm (meters)	Distance: Meters	Distance: Feet
Principal points	° ′ ″	° ′ ″	° ′ ″				
Fernberg, 1934 (d. m.)	47 56 42.060	147 23 08.3	327 17 33.9	Rock	4.237629	17,283.4	56,704
	91 29 47.211	182 24 10.1	2 24 21.7	Found	3.886424	7,698.8	25,258
		239 35 01		Azimuth mark.			
Ely Lookout Tower, 1934 (d. m.)	47 53 23.028	221 12 04.8	41 22 56.2	Rock	4.440076	27,547.1	90,377
	91 51 53.859	257 16 57.9	77 33 22.5	Fernberg	4.450599	28,222.7	92,594
		159 44 39		Ely, water tank.			
Angleworm Lookout Tower, 1934 (d. m.)	48 05 07.981	272 56 57.1	93 09 02.7	Rock	4.305619	20,212.5	66,314
	91 53 32.422	354 37 39.3	174 38 52.5	Ely Lookout Tower	4.339828	21,868.9	71,748
Jack Pine, 1934 (d. m.)	47 43 49.212	127 24 41.7	307 10 53.2	Ely Lookout Tower	4.466090	29,247.6	95,957
	91 33 15.582	190 16 02.3	10 18 36.8	Fernberg	4.384886	24,259.7	79,592
Babbitt, 1934 (d. m.)	47 41 19.291	187 53 13.1	55 03.6	Ely Lookout Tower	4.353472	22,566.9	74,038
	91 54 22.922	259 55 44.2	80 11 21.7	Jack Pine	4.428486	26,821.7	87,998
Isabella, 1934 (d. m.)	47 36 15.029	105 01 23.4	284 40 28.4	Babbitt	4.564282	36,667.6	120,300
	91 26 04.738	147 23 32.1	327 18 13.6	Jack Pine	4.221676	16,660.0	54,659
		12 16 08		Azimuth mark.			
Wanless, 1934 (d. m.)	47 39 10.804	74 40 04.2	254 28 28.2	Isabella	4.309744	20,405.3	66,946
	91 10 22.610	106 51 25.7	286 34 30.4	Jack Pine	4.475584	29,894.0	98,077
		143 22 48.9	323 08 26.3	Fernberg	4.607626	40,516.0	132,926
Mount Weber, 1934 (d. m.)	47 29 04.301	195 38 30.8	15 43 02.1	Jack Pine	4.453102	28,385.9	93,129
	91 39 22.873	231 21 47.0	51 31 35.9	Isabella	4.329256	21,343.0	70,023
		331 16 19		Azimuth mark.			
Kelso Mountain, 1934 (d. m.)	47 55 09.183	31 35 11.2	211 24 25.9	Wanless	4.540503	34,713.9	113,891
	90 55 51.319	94 05 35.4	273 40 24.2	Fernberg	4.626919	42,356.4	138,964
Lundeen, 1934 (d. m.)	47 49 20.918	56 25 50.3	236 09 07.0	Wanless	4.530882	33,953.3	111,395
	90 47 46.954	136 56 56.3	316 50 57.1	Kelso Mountain	4.168250	14,731.6	48,332
Brule, 1934 (d. m.)	47 55 03.953	47 54 49.1	227 47 51.3	Lundeen	4.198368	15,789.5	51,803
	90 38 23.617	90 32 00.4	270 19 02.8	Kelso Mountain	4.337530	21,753.5	71,370
Paulsen (Gunflint) Fire Lookout Tower, 1934 (d. n. m.)	48 05 28.333	18 25 14.9	198 21 26.9	Kelso Mountain	4.304323	20,152.2	66,116
	90 50 44.611	125 39 29.0	305 39 28.7	Paulsen (G. S. of C.)	1.041984	11.015	36.14
		321 23 15.7	141 32 26.4	Brule	4.391884	24,653.8	80,885
Onion Mountain, 1934 (d. m.)	47 36 56.767	98 28 41.4	278 12 01.9	Wanless	4.455492	28,542.5	93,643
	90 47 49.820	180 08 54.6	0 08 56.7	Lundeen	4.361405	22,982.9	75,403
Trout Lake, 1934 (d. m.)	47 43 56.970	50 43 14.0	230 33 53.2	Onion Mountain	4.311002	20,464.5	67,141
	90 35 11.276	78 51 58.5	258 25 57.1	Wanless	4.652296	44,905.1	147,326
		122 31 56.5	302 22 36.9	Lundeen	4.270547	18,644.3	61,169
		169 01 45.2	348 59 22.7	Brule	4.321904	20,984.8	68,848
Pine Mountain, 1934 (d. m.)	47 53 42.597	47 10 10.4	226 58 37.8	Trout Lake	4.424182	26,557.2	87,130
	90 19 36.577	96 14 37.6	276 00 41.3	Brule	4.371810	23,540.2	77,231
		182 39 51		Azimuth mark.			
Gaskin, 1934 (d. m.)	47 58 44.273	61 55 23.0	241 47 47.7	Brule	4.159209	14,428.1	47,336
	90 28 10.496	311 05 07.0	131 11 28.5	Pine Mountain	4.151154	14,163.0	46,466
Bearskin, 1934 (d. m.)	48 03 41.306	31 29 33.2	211 26 11.8	Gaskin	4.031641	10,755.8	35,288
	90 23 39.564	344 43 52.5	164 46 53.0	Pine Mountain	4.282534	19,166.1	62,881
Eliason, 1934 (d. m.)	47 49 07.630	69 26 42.2	249 11 38.2	Trout Lake	4.434062	27,168.3	89,135
	90 14 50.427	145 01 17.1	324 57 45.0	Pine Mountain	4.015711	10,368.4	34,017
Devilfish Fire Lookout Tower, 1934 (d. n. m.)	47 58 48.862	30 49 34.4	210 43 12.5	Eliason	4.320011	20,893.5	68,548
	90 06 15.748	60 26 16.7	240 16 22.2	Pine Mountain	4.281585	19,124.3	62,744
		274 50 37.6	94 50 37.9	Devilfish (G. S. of C.)	0.899383	7.932	26.02
		323 00 24.9	143 05 31.1	Farquhars Knob	4.153699	14,246.2	46,739
Overbys, 1934 (d. m.)	47 49 25.447	138 41 05.8	318 36 56.5	Pine Mountain	4.024478	10,579.8	34,711
	90 14 00.315	208 57 34.1	29 03 18.8	Devilfish Fire Lookout Tower	4.298796	19,897.4	65,280
		251 38 58.7	71 49 48.9	Farquhars Knob	4.283341	19,201.8	62,998
Gabimichigami, 1934 (d. m.) [1]	48 03 30.44	256 43 57	76 53 15	Paulsen (Gunflint) Fire Lookout Tower.	4.202977	15,957.9	52,355
	91 03 15.19	329 13 27	149 18 57	Kelso Mountain	4.255535	18,010.9	59,091

[1] No check on this position.

EXPLANATION OF TABLES OF PLANE COORDINATES

In order to meet the various demands imposed upon it by engineering and surveying operations, a plane-coordinate system must satisfy the conditions which naturally accompany the requirements for accurate computations and exact results. The preservation of angles is one important factor to be considered; another factor of utmost importance is the elimination of variations of scale. Since variations of scale are inevitable, it becomes of utmost importance to select a projection which will give definite scale values in certain directions; so that such scale values may be tabulated, and, when utmost accuracy is desired, may be used to eliminate the distortions of scale which result from the projection of spheroidal coordinates onto a plane.

These various requirements pointed very definitely to the adoption of one of the conformal projections. After due consideration, it was decided to employ the Lambert conformal projection with two standard parallels in States with greatest extent in an east-west direction and the transverse Mercator projection where the greatest extent was in a north-south direction. Such a rule, however, could be applied only in those States which were of such limited extent in one of these directions that the entire State could be included in a single zone. It therefore became necessary to divide the larger States into a number of zones, using the projection in each which would satisfy the requirements of accuracy indicated by limiting scale error, and at the same time keep to a minimum the number of zones required.

For these reasons the Lambert conformal projection with three zones was adopted for Minnesota. (See fig. 7.) It will be noticed that the junction lines between adjacent zones follow the county boundary lines; and therefore all stations in any county are included in the same zone. Since, however, some surveys will extend across these artificial boundaries, the coordinates of stations which lie within what may be termed the borderland of two contiguous zones are given on both systems. With these data, in extending a survey a short distance beyond a boundary, the engineer will not have to go from one system of coordinates to the other. Care must always be taken, however, to use in direct combination only coordinates which are given on the same system. Where it is necessary to go from one system to another, suitable directions for so doing will be found in Special Publication No. 193.

The geodetic positions in this publication have been reduced to plane coordinates which are given in the following tables. These coordinates are based upon the Lambert conformal projection. Coordinate tables for Minnesota (see p. 218) have been computed by this Bureau as a basis for computing the coordinates. These tables are divided into three zones, as shown by figure 7, page 139. The purpose in view in supplying these coordinates has been to provide for computations of surveys by the usual methods of plane surveying in which the convergence of the meridians is not considered. A State-wide application can now be made of principles ordinarily confined in common practice to very restricted areas.

In the table, the x and y coordinates are given in feet to two decimal places. This is one place farther than geodetic positions justify, but it was thought desirable to accept the positions as if they were correct

to 3 decimal places, and carry 2 decimal places in the coordinates for use in adjusting traverses between fixed points.

The plane coordinates are in all essential features merely the plane representation of the spheroidal coordinates given in the tables of geodetic positions. For definite instructions regarding the use of plane

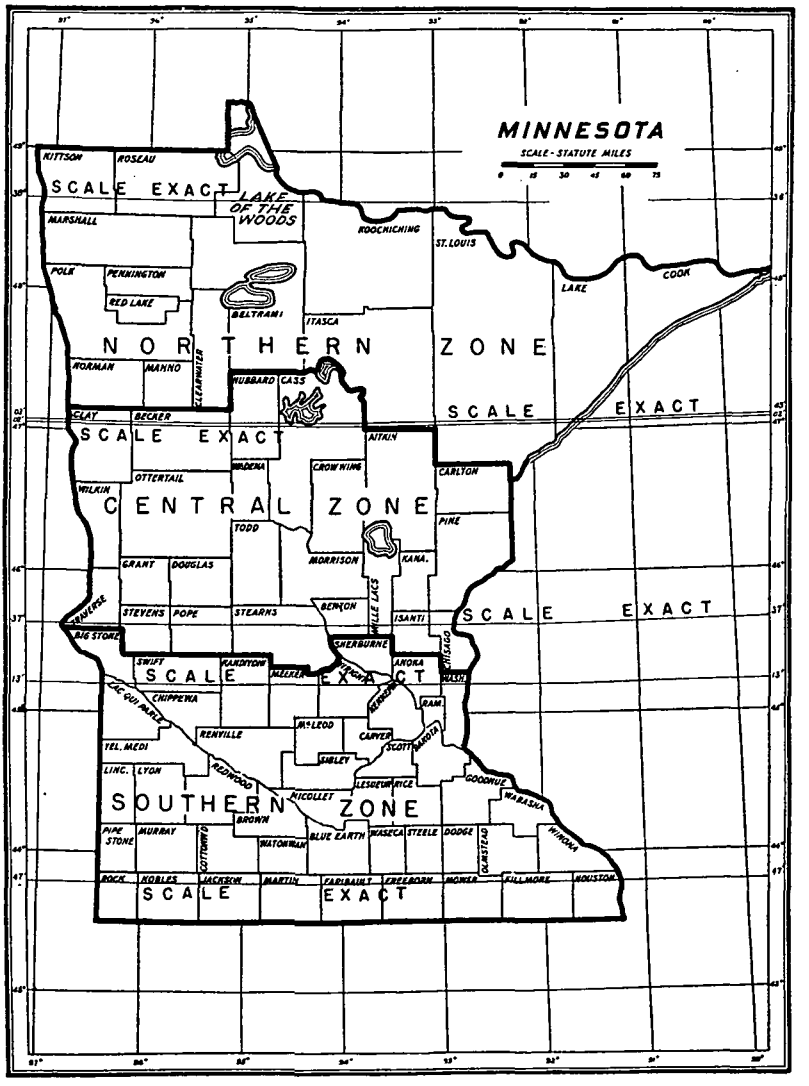

FIGURE 7.—Map of Minnesota with grid system outline.

coordinates, reference should be made to the following special publications of this Bureau: No. 193, Manual of Plane-Coordinate Computation; No. 194, Manual of Traverse Computation on the Lambert Grid; and No. 195, Manual of Traverse Computation on the Transverse Mercator Grid.

A few stations, for which geodetic positions are given in this publication, lie so far outside the State that plane coordinates were not computed for them on the grid of this State. If it becomes necessary to use any of these as control for local surveys, their coordinates should be obtained from the Coast and Geodetic Survey on the grid of the State in which they lie. Computations of traverses tied to them would then have to be made by passing from one grid to the other. The method of accomplishing this is given in Special Publication No. 193. It is not thought that this necessity will arise very often, but when it does occur, the method of handling it is not very complicated and the necessary computations can easily be made.

EXPLANATION OF PLANE LENGTHS

These tables of plane coordinates do not give lengths of lines, but any such length can be computed from the differences of coordinates just as is done in ordinary plane surveying. The resulting length is affected by the distortion due to the reduction of the actual curved surface of the earth to a plane. It must be corrected for the scale of the grid at that point to reduce it to the sea-level length listed in the geographic-position tables. Should it be desired to obtain the actual ground-level length, a further correction must be applied as described on page 17 for lines of triangulation.

EXPLANATION OF PLANE OR GRID AZIMUTHS

The plane or grid azimuths given in the tables of plane-coordinate positions are based upon the central meridian of the proper system and they, therefore, differ from the geodetic azimuths which appear in the lists of geographic positions and the descriptions. The back azimuth differs from the forward azimuth by exactly 180°, hence it is necessary to list the azimuth of each line in only one direction.

Many of the azimuths listed are to special azimuth marks located at comparatively short distances from the stations. These marks have been placed at such positions as to be visible from the ground at the stations, and thus are readily available as starting azimuths for local surveys such as traverses. Since 1927, it has been the custom to place these azimuth marks at most of the first-order stations established by this Bureau.

The plane azimuth from a triangulation station to an azimuth mark or other triangulation station may be computed in two ways; first, by means of the formula

$$\text{Geodetic azimuth} - \text{grid azimuth} = +\theta - \frac{x_2 - x_1}{2\rho_0^2 \sin 1''}\left(y_1 - y_0 + \frac{y_2 - y_1}{3}\right),$$

in which θ is the mapping angle obtained from Table II of the plane-coordinate projection tables (pages 218 to 233), x_1, x_2, y_1, and y_2 are the coordinates of the stations, and $\frac{1}{2\rho_0^2 \sin 1''}$ and y_0 are obtained from the table of constants, page 218, for the zone in which the stations are located; and second, by means of the usual plane-surveying method using the formula

$$\text{Tangent grid azimuth} = \frac{\Delta x}{\Delta y},$$

in which Δx and Δy are the respective differences of the x and y coordinates of the two stations.

Since the second term of the first formula is negligible for distances up to approximately one mile, the mapping angle, θ, may be applied directly to the geodetic azimuth to obtain the grid azimuth. The first formula, using only the θ angle, will give more consistent results for azimuths over short distances than the second formula. This is due to the fact that there are not sufficient significant figures in the differences of the x and y coordinates to make the second formula sufficiently exact.

Inconsistencies between plane azimuths, as computed from the two formulas, may also arise when the coordinates of the azimuth mark are derived from a "no check" (see p. 16) geodetic position. This results from discarding the third decimal place of the seconds of latitude and longitude and thus using only hundredths of seconds for computing the plane-coordinate position.

Since these inconsistencies diminish as the distance between the station and the azimuth mark increases, the second formula has been used to compute the plane azimuths of such lines as are of sufficient length to make the differences negligible. In other words, when the distance between the station and the azimuth mark is such that both formulas give practically the same result, and when the coordinates of both station and azimuth mark are known, the second (or tangent) formula has been used.

The first formula has been used to compute the plane azimuths to all azimuth marks whose coordinates were not known, and also to stations whose coordinates were derived from "no check" geodetic positions and to other azimuth marks whose coordinates were known but which did not give consistent results when computed by means of the second formula.

In the tables of plane-coordinate positions, the plane azimuths between stations for which coordinates were available but which were computed by means of the first formula are marked by footnote (*).

PLANE COORDINATES

SOUTHERN ZONE

Ninety-eighth meridian arc

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points	*Feet*	° ′ ″	
Boating (S. Dak.), 1903, r. 1935 (d. m.)	1,228,435.86 848,110.59	213 50 48	Reference mark.
Preacher Hill (S. Dak.), 1903, r. 1935 (d. m.).	1,203,506.60 915,854.21		
Brown Valley southeast base (S. Dak.), 1903, r. 1935 (d. m.).	1,270,707.27 940,154.01	202 25 03 281 45 33*	Determan's red barn, south gable. T. 124 N., R. 49 W., sec. 18, southeast corner.
Drywood (S. Dak.), 1903, r. 1935 (d. m.)	1,195,137.27 974,555.76		
Layden, 1903, r. 1935 (d. m.)	1,300,140.60 973,854.70	48 22 34 48 17 40*	Reference mark. T. 125 N., R. 48 W., sec. 17, west ¼ corner.
Brown Valley northwest base (S. Dak.), 1903, r. 1935 (d. m.).	1,257,688.55 963,788.51	181 30 35	Reference mark.
Enwiller (S. Dak.), 1904, r. 1935 (d. m.)	1,304,091.75 1,043,743.11	0 22 53*	T. 128 N., R. 49 W., sec. 36, east ¼ corner.

* This azimuth has been computed by means of the θ correction. (See p. 140.)

21828°—36——10

Ninety-eighth meridian arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Supplementary points	*Feet*		
Browns Valley, white spire, 1903, l. 1935 (d.).[1]	1,275,459.77 957,739.67		
Browns Valley, water tower, 1903 (d.)	1,275,338.48 958,394.00		
Browns Valley, large building, high spire, 1903 (d.).	1,275,684.45 957,787.23		
T. 124 N., R. 49 W., sec. 18, southeast corner, 1903 (d. m.).[1]	1,272,198.11 939,843.36		
Beardsley, water tank, 1903, r. 1935 (n. d.)	1,305,114.60 944,261.11		
Beardsley, square slender decorated spire, 1903, l. 1935 (d.).	1,305,594.50 942,451.73		
Graceville, water tower, 1903, l. 1935 (d.)	1,376,417.85 945,904.83		
Graceville, Catholic Church, spire, 1903, r. 1935 (n. d.).	1,375,812.12 945,442.72		
T. 125 N., R. 48 W., sec. 17, west ¼ corner, 1903 l. 1935 (d. m.).[1]	1,299,199.73 973,016.26		
Indian, church spire (S. Dak.), 1903 (d.)	1,264,349.39 969,411.31		
T. 125 N., R. 52 W., sec. 10, northeast corner (S. Dak.), 1903, r. 1904 (d. m.).[1]	1,195,794.89 974,643.98		
Large church, spire on west end (S. Dak.), 1904 (n. d.).	1,250,624.33 1,020,972.44		
T. 128 N., R. 49 W., sec. 36, east ¼ corner (S. Dak.), 1903, l. 1935 (d. m.).[1]	1,304,082.72 1,042,409.70		
Swedish Lutheran Church, spire (2 miles east of station Enwiller) (S. Dak.), 1904, r. 1935 (d.).	1,314,530.27 1,042,192.56		
Church, very tall, black spire (S. Dak.), 1904, r. 1935 (d.).	1,230,135.36 1,053,316.46		
Wheaton, water tank, 1904, l. 1921 (n. d.)	1,362,453.75 1,034,292.79		

Ninety-eighth meridian to Albert Lea to Fond du Lac arc

Principal points	*Feet*	°	′	″	
Baltic (S. Dak.), 1927, r. 1934 (d. m.)	1,295,533.42 296,383.84	37	40	24	Reference mark no. 1.
Corson (S. Dak.), 1927, r. 1934 (d. m.)	1,334,249.91 238,901.12	154	47	36	Reference mark no. 2.
Post, 1927, r. 1935 (d. m.)	1,381,553.77 276,087.02	270	49	22	Reference mark no. 1.
Luverne, 1927, r. 1928 (d. m.)	1,391,521.32 234,437.60	307	26	54	Reference mark no. 1.
Hardwick, 1927, r. 1935 (d. m.)	1,400,960.19 296,104.05	117	12	19	Reference mark no. 1.
Lismore, 1927, r. 1935 (d. m.)	1,476,803.55 283,878.51	90	22	00	Reference mark no. 2.
Adrian, 1927, r. 1934 (d. m.)	1,493,845.16 225,267.48	90 152	01 51	49 21*	Reference mark no. 2. Adrian, Catholic Church, spire.

[1] No check on this position.
* This azimuth has been computed by means of the θ correction. (See p. 140.)

Ninety-eighth meridian to Albert Lea to Fond du Lac arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued			
	Feet	° ′ ″	
Wilmont, 1927, r. 1934 (d. m.)	1,508,182.47 283,129.18	300 51 05	Reference mark no. 2.
Reading, 1927, r. 1934 (d. m.)	1,546,215.75 271,215.33	262 49 10	Azimuth mark.
Donner, 1927, r. 1934 (d. m.)	1,551,386.88 224,783.79	268 18 31	Azimuth mark.
Kay, 1927, r. 1934 (d. m.)	1,641,572.64 257,687.29	180 58 23	Reference mark no. 2.
Kluever, 1927 (d. m.)	1,632,224.84 211,842.93	91 25 20 62 31 11.7	Reference mark no. 2. Round Lake, water tank.
Tusa, 1927, r. 1934 (d. m.)	1,718,039.24 211,926.46	313 24 04	Reference mark no. 1.
Firence, 1927, r. 1934 (d. m.)	1,709,234.17 257,954.55	348 33 06	Azimuth mark (1934).
Jackson west base, 1927 (d. m.)	1,744,674.68 231,468.64	274 07 11 64 56 44*	Reference mark no. 2. Jackson, steel water tank.
Alpha, 1927, r. 1934 (d. m.)	1,761,447.39 215,624.53	268 34 37 203 15 37.2	Reference mark no. 2. Alpha, concrete elevator.
Motl, 1927, r. 1935 (d. m.)	1,763,829.82 262,962.18	267 28 54	Reference mark no. 1.
Jackson east base, 1927, r. 1935 (d. m.)	1,789,198.11 235,506.89	251 12 04	Reference mark no. 2.
Grupe, 1927, r. 1934 (d. m.)	1,832,421.34 215,095.60	11 35 28	Azimuth mark.
Senne, 1927, r. 1935 (d. m.)	1,831,448.37 269,340.36	359 42 13	Reference mark no. 2.
Fairmont, 1927 (d. m.)	1,881,438.91 237,002.93	251 24 55	Reference mark no. 1.
Wilbert, 1927 (d. m.)	1,874,886.01 209,189.90	90 31 37 186 00 57.0	Reference mark no. 1. Fairmont, Lutheran Church, spire.
Granada, 1927 (d. m.)	1,907,615.77 269,435.60	348 09 53	Reference mark no. 2.
Chain, 1927 (d. m.)	1,904,473.68 214,257.81	270 43 03 317 14 58*	Reference mark no. 1. East Chain, small church spire.
Guckeen, 1927 (d. m.)	1,934,931.88 245,676.69	280 58 40 325 16 33*	Reference mark no. 2. Guckeen, farmers' grain elevator.
Winnebago, 1927 (d. m.)	1,960,150.71 272,043.69	89 45 26 147 14 04.8	Reference mark no. 2. Winnebago, white church steeple.
Kennedy, 1927 (d. m.)	1,956,984.74 223,830.17	2 16 05 241 10 41.1	Reference mark no. 1. Blue Earth, water tank.
Easton, 1927 (d. m.)	2,018,748.62 261,035.21	344 09 56	Reference mark no. 2.
Frost, 1927 (d. m.)	2,017,802.23 215,244.06	225 07 38	Reference mark no. 1.
Walters, 1927 (d. m.)	2,075,929.67 210,809.55		
Shorty, 1927 (d. m.)	2,069,510.69 264,236.81	270 39 39 199 38 36.9	Reference mark no. 2. Wells, Catholic Church, spire.
Wells, 1927 (d. m.)	2,087,709.94 260,570.77	358 03 27 119 25 43.0	Reference mark no. 2. Wells, water tank.

* This azimuth has been computed by means of the θ correction. (See p. 140.)

Ninety-eighth meridian to Albert Lea to Fond du Lac arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
Kiester, 1926, r. 1928 (d. m.)	2,078,429.60 212,291.06	84 17 12	Reference mark no. 2.
Schmidt, 1926, r. 1927 (d. m.)	2,140,556.89 233,907.91	150 32 14	Reference mark no. 2.
Sletten, 1926 (d. m.)	2,102,738.17 182,799.46	6 10 09	Reference mark no. 2.
Brua (Iowa), 1926, r. 1934 (d. m.)	2,141,160.88 171,463.20	109 27 15* 157 03 25.7	Church steeple. Emmons, Norwegian Lutheran Church, steeple.
Scarville (Iowa), 1926, r. 1934 (d. m.)	2,099,732.61 155,790.34	89 20 18	Reference mark no. 2.
Freeborn, 1926, r. 1927 (d. m.)	2,137,741.13 273,640.21	41 39 58	Reference mark no. 2.
Nelson, 1927 (d. m.)	2,181,014.38 277,448.82	153 37 13	Reference mark no. 2.
Albert Lea west base, 1927, r. 1931 (d. m.)	2,207,964.13 242,070.67	179 38 38	Reference mark no. 1.
Newry, 1927 (d. m.)	2,232,397.45 297,324.14	1 59 01	Reference mark no. 2.
Albert Lea east base, 1927 (d. m.)	2,234,262.69 241,690.08	114 06 47	Reference mark no. 2.
Sargeant, 1927, r. 1935 (d. m.)	2,317,060.99 301,709.13	282 32 27	Reference mark no. 1.
Elkton, 1927, r. 1935 (d. m.)	2,348,421.17 246,257.08	106 00 08	Reference mark no. 2.
Stewart, 1927, r. 1935 (d. m.)	2,375,853.91 303,774.65	120 50 21	Reference mark no. 2.
Meadow, 1927, l. 1933 (d. m.)	2,394,327.56 252,865.06	1 40 26	Reference mark no. 1.
Anderson, 1927, r. 1935 (d. m.)	2,431,629.48 306,223.24	147 28 45	Reference mark no. 2.
Wykoff, 1927, r. 1934 (d. m.)	2,451,527.88 253,731.46	220 48 02	Reference mark no. 1.
Chatfield, 1927, r. 1935 (d. m.)	2,482,300.71 325,049.17	343 16 19	Reference mark no. 2.
Fountain, 1927, r. 1935 (d. m.)	2,498,554.46 276,858.78	39 08 35	Reference mark no. 1.
Pilot, 1927, r. 1935 (d. m.)	2,532,221.75 312,048.90	246 27 48	Reference mark no. 1.
Highland, 1927, r. 1935 (d. m.)	2,562,734.02 256,346.24	197 28 26	Reference mark no. 1.
Hart, 1927, r. 1935 (d. m.)	2,599,650.85 337,760.72	258 54 14	Reference mark no. 2.
Bratsberg, 1927, r. 1935 (d. m.)	2,591,195.05 280,332.11	280 11 59	Reference mark no. 1.
Ridgeway west base, 1927, r. 1935 (d. m.)	2,644,899.38 342,168.30	197 02 23	Reference mark no. 1.
Houston, 1927, r. 1935 (d. m.)	2,659,510.31 270,450.53	95 07 30	Reference mark no. 2.
Ridgeway east base, 1927, r. 1932 (d. m.)	2,674,859.11 346,414.57	109 56 57	Reference mark no. 2.
McDonald (M. R. C.), 1894, r. 1931 (d. m.)	2,715,806.95 287,968.74		

* This azimuth has been computed by means of the θ correction. (See p. 140.)

Ninety-eighth meridian to Albert Lea to Fond du Lac arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
Walden (Wis.), 1930, r. 1931 (d. m.)	2,743,048.75 352,617.72		
St. Joseph (Wis.), 1930, r. 1931 (d. m.)	2,776,234.54 298,678.29	269 57 48	Reference mark no. 1.
Ridgeway "A", 1927, r. 1935 (d. m.)	2,655,966.05 344,583.77		
Ridgeway "B", 1927, r. 1935 (d. m.)	2,660,938.71 346,582.73		
Ridgeway "C", 1927, r. 1935 (d. m.)	2,665,663.66 347,500.55		
Supplementary points			
Minnedoka (S. Dak.), 1927, r. 1935 (d. m.)	1,348,578.75 267,222.46	262 58 27	Reference mark no. 1.
Garretson, Congregational Church, short steeple (white building) (S. Dak.), 1927, r. 1935 (n. d.).[1]	1,338,843.08 270,279.52		
West Palisades, Lutheran Church, spire, 1927, r. 1935 (n. d.).[1]	1,351,750.24 250,524.40		
Adrian, Catholic Church, spire, 1927 (n. d.).[1]	1,488,268.43 236,145.01		
Lismore, church, north steeple, 1927 (n. d.).[1]	1,485,381.02 278,702.80		
Wilmont, white water tank, 1927 (n. d.) [1]	1,516,887.67 284,469.20		
Wilmont, Catholic Church, spire, 1927 (n. d.).[1]	1,517,219.84 283,009.38		
Wilmont, Farmers' Elevator, 1927 (n. d.) [1]	1,517,578.35 284,894.32		
Reading, grain elevator, 1927 (n. d.) [1]	1,546,961.35 261,453.80		
Worthington, courthouse spire, 1927 (n. d.).	1,577,032.11 230,008.25		
Worthington, power plant smokestack, 1927 (n. d.).	1,576,500.33 229,450.60		
Round Lake, water tank, 1927 (n. d.)	1,610,452.76 200,518.72		
Heron Lake, water tank (white top), 1927 (n. d.).[1]	1,651,627.03 291,994.63		
Heron Lake, Catholic Church, north steeple, 1927 (n. d.).[1]	1,652,214.92 292,558.33		
Lakefield, white water tank, 1927 (n. d.) [1]	1,690,829.33 250,470.39		
Lakefield, church steeple, 1927 (n. d.) [1]	1,690,477.86 250,511.88		
Lakefield, steel water tank, 1927 (n. d.)	1,689,835.11 249,813.73		
Sotowa (Iowa), 1927 (d. m.)	1,736,520.54 181,971.18	90 32 24	Reference mark no. 1.
Spirit Lake, steel water tank (Iowa), 1927 (n. d.).	1,707,352.24 155,900.62		
Jackson, coal tipple, 1927 (n. d.)	1,741,795.72 231,067.25		
Jackson, smokestack, 1927 (n. d.)	1,741,226.28 230,948.69		

[1] No check on this position.

Ninety-eighth meridian to Albert Lea to Fond du Lac arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
Jackson, steel water tank, 1927 (n. d.) [1]	1,737,116.94 227,935.35		
Alpha, concrete elevator, 1927 (n. d.)	1,769,252.40 233,782.15		
Alpha, belfry, flagpole on top, 1927 (n. d.)	1,769,632.82 234,751.53		
Dunnell, slender, black church spire, 1927 (n. d.).[1]	1,793,645.25 205,363.93		
Sherburn, wooden water tank, 1927 (n. d.)	1,807,320.45 239,739.25		
Sherburn, small spire, 1927 (n. d.) [1]	1,807,635.81 239,666.17		
Welcome, Lutheran Church, spire, 1927 (n. d.).[1]	1,836,437.54 243,294.36		
Welcome, water tank, 1927 (n. d.)	1,836,342.94 243,928.55		
Fairmont, water tank, 1927 (n. d.)	1,877,809.30 240,932.42		
Fairmont, cannery, smokestack, 1927 (n. d.).	1,879,063.03 238,954.98		
Fairmont, courthouse spire, 1927 (n. d.)	1,876,992.25 238,400.83		
Fairmont, Congregational Church, spire, 1927 (n. d.).	1,877,599.61 239,331.59		
Fairmont, Lutheran Church, spire, 1927 (n. d.).	1,877,733.12 236,206.49		
Fairmont, Light & Power Co.; smokestack, 1927 (n. d.).	1,876,846.25 240,200.11		
Fairmont, square smokestack, 1927 (n. d.)	1,880,916.53 239,589.11		
Fairmont, Catholic Church, spire, 1927 (n. d.).[1]	1,878,511.42 238,031.15		
East Chain, small church spire, 1927 (n. d.).[1]	1,918,360.52 199,235.29		
East Chain, schoolhouse, smokestack, 1927 (n. d.).[1]	1,918,148.61 198,125.28		
Black water tank (Iowa), 1927 (n. d.) [1]	1,872,179.72 145,109.67		
Winnebago, water tank, 1927 (n. d.)	1,956,134.85 278,578.58		
Winnebago, white church steeple, 1927 (n. d.).	1,955,013.21 280,026.13		
Blue Earth, water tank, 1927 (n. d.)	1,973,202.19 232,753.87		
Blue Earth, rigid building flagpole, 1927 (n. d.).	1,973,916.80 233,116.11		
Blue Earth, courthouse spire, 1927 (n. d.)	1,972,824.13 234,179.03		
Blue Earth, Catholic Church, spire, 1927 (n. d.).	1,971,707.13 232,346.79		
Guckeen, Farmers' Grain Elevator, 1927 (n. d.).[1]	1,940,378.32 237,818.80		
Easton, water tank, 1927 (n. d.) [1]	2,025,992.20 279,696.91		

[1] No check on this position.

Ninety-eighth meridian to Albert Lea to Fond du Lac arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
Easton, Catholic Church, spire, 1927 (n. d.).[1]	2,026,242.12 278,149.00		
Wells, Farmers Elevator, 1927 (n. d.) [1]	2,073,239.52 271,397.08		
Wells, Methodist Church, spire, 1927 (n. d.).[1]	2,071,791.59 271,471.20		
Wells, smokestack, 1927 (n. d.)	2,072,845.47 272,235.87		
Wells, Catholic Church, spire, 1927 (n. d.)	2,071,774.36 270,578.66		
Wells, water tank, 1927 (n. d.)	2,072,566.73 269,113.49		
Wells, high school cupola, 1927 (n. d.)	2,071,662.01 270,806.63		
Wells, coal chute, 1927 (n. d.)	2,071,617.43 272,607.54		
Walters, white church, gray steeple, 1927 (n. d.).[1]	2,082,610.95 229,940.55		
Peckerall Lake, German Lutheran Church, steeple, 1926 (n. d.).[1]	2,113,582.48 191,671.25		
Kiester, water tank, 1926 (n. d.)	2,076,435.12 196,594.52		
School cupola, 1926 (n. d.) [1]	2,114,447.91 193,134.96		
Schoolhouse cupola (Iowa), 1926 (n. d.) [1]	2,117,631.20 174,722.64		
Emmons, Norwegian Lutheran Church, steeple, 1926 (n. d.).	2,135,819.93 184,080.66		
Church steeple (Iowa), 1926 (n. d.) [1]	2,128,546.76 175,918.68		
Lake Mills, standpipe (Iowa), 1926 (n. d.)	2,124,047.63 152,768.91		
Albert Lea, Interstate Power Co., smokestack, 1926 (n. d.).	2,167,428.78 235,871.08		
Albert Lea, water works standpipe, 1927 (n. d.).	2,167,413.60 237,804.83		
Albert Lea Packing Co., water tank, 1927 (n. d.).	2,170,015.15 237,797.07		
Albert Lea Light & Power Co., smokestack, 1927 (n. d.).	2,167,432.09 235,871.82		
Albert Lea, courthouse spire, 1927 (n. d.)	2,167,295.03 236,261.01		
Albert Lea, Gass Machine Co., water tank, 1927 (n. d.).	2,167,765.60 237,718.75		
Albert Lea, Luther College, spire, 1927 (n. d.).	2,169,377.45 234,318.13		
Albert Lea, Lutheran Church, steeple, 1927 (n. d.).[1]	2,166,418.11 237,399.50		
Albert Lea Packing Co., smokestack, 1927 (n. d.).[1]	2,170,182.22 237,861.17		
Albert Lea, laundry smokestack, 1927 (n. d.).[1]	2,165,786.70 237,372.38		

[1] No check on this position.

Ninety-eighth meridian to Albert Lea to Fond du Lac arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued			
	Feet		
West Freeborn, Lutheran Church, spire, 1927 (n. d.).[1]	2, 137, 884. 75 273, 680. 42		
Hayward, elevator, 1927 (n.d.)	2, 200, 230. 96 238, 096. 00		
Armstrong, church steeple, ball on top, 1927 (n. d.).	2, 185, 490. 51 256, 173. 42		
Austin, Catholic Church, spire, 1927, r. 1935 (d.).	2, 269, 972. 42 245, 922. 23		
Austin, water tank, 1927, r. 1935(d.) [1]	2, 272, 962. 94 247, 225. 58		
Austin, packing company, smokestack, 1927, r. 1935 (d.).[1]	2, 265, 874. 95 245, 486. 67		
Mason, white belfry, red spire, 1927 (n. d.).[1]	2, 251, 079. 55 291, 877. 91		
Gray church spire, white belfry, 1927 (n. d.).[1]	2, 288, 118. 54 289, 939. 58		
Hayfield, water tank, 1927 (n. d.)	2, 303, 889. 87 327, 048. 90		
Grand Meadow, water tank, 1927 (n. d.)	2, 377, 772. 02 260, 722. 09		
Spring Valley, water tank, 1927, r. 1935 (d.)	2, 425, 964. 32 254, 057. 46		
Spring Valley, schoolhouse spire, 1927, r. 1935 (n. d.).[1]	2, 425, 877. 28 253, 573. 16		
Spring Valley, Lutheran Church, spire, 1927, r. 1935 (d.).[1]	2, 441, 852. 97 252, 915. 41		
Spring Valley, Catholic Church, spire, 1927, r. 1935 (d.).[1]	2, 425, 751. 24 253, 329. 64		
Stewartville, Catholic Church, spire, 1927, r. 1935 (d.).[1]	2, 400, 398. 94 315, 353. 57		
Stewartville, city water tank, 1927, r. 1935 (d.).	2, 399, 434. 55 315, 112. 88		
Wykoff, water tank, 1927, r. 1935 (d.)	2, 458, 132. 06 263, 247. 68		
Wykoff, Lutheran Church, spire, 1927, r. 1935 (d.).	2, 457, 543. 15 261, 545. 66		
Fountain, Catholic Church, spire, 1927, r. 1935 (d.)[1]	2, 493, 020. 58 275, 297. 17		
Fountain, Lutheran Church, black spire, 1927 (d.)[1]	2, 492, 495. 53 276, 584. 65		
Norwegian Lutheran Church, spire, 1927 (n. d.)[1]	2, 505, 437. 43 284, 483. 00		
Canton, water tank, 1927 (n. d.)[1]	2, 548, 980. 09 199, 961. 41		
Arendahl, Lutheran Church, spire, 1927, r. 1935 (d.)	2, 549, 624. 78 307, 967. 99		
Arendahl, spire, 1927, l. 1933 (d.)	2, 545, 682. 05 307, 764. 75		
Lewiston, water tank, 1927 (n. d.)	2, 560, 591. 18 365, 824. 48		
Spring Grove, church spire, 1927 (n. d.)[1]	2, 627, 038. 38 213, 687. 20		

[1] No check on this position.

Ninety-eighth meridian to Albert Lea to Fond du Lac arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
Spring Grove, water tank, 1927 (n. d.)[1]	2, 626, 164. 74 213, 786. 53		
Caledonia, courthouse spire, 1927, r. 1935 (d.)[1]	2, 662, 945. 92 240, 771. 62		
Nodine, church spire, 1927, r. 1935 (d.)[1]	2, 675, 829. 23 340, 383. 06		
St. Joseph, church spire (Wis.), 1930 (n.d.)	2, 782, 595. 47 301, 093. 30		
Bangor, airway beacon (Wis.), 1930 (n. d.)[1]	2, 793, 185. 55 343, 731. 20		

Royalton to Albert Lea arc

Principal points	*Feet*	° ′ ″	
Schumer, 1927, r. 1931 (d. m.)	1, 930, 120. 45 985, 136. 78	16 36 26	Reference mark no. 1.
Voight, 1927, r. 1935 (d. m.)	1, 982, 574. 84 981, 859. 16	27 24 58	Reference mark no. 1.
St. Cloud, 1927, r. 1935 (d. m.)	1, 953, 191. 86 925, 338. 36	180 04 40 212 42 33. 8	Reference mark no. 1. St. Cloud, Stearns County Courthouse, dome.
Duelm, 1927, r. 1935 (d. m.)	2, 018, 495. 62 943, 239. 68	104 57 21	Reference mark no. 1.
Enfield, 1927, r. 1935 (d. m.)	2, 020, 180. 47 854, 670. 58	190 00 19	Reference mark no. 1.
Quick, 1927 (d. m.)	2, 073, 331. 22 911, 015. 54	14 13 40	Azimuth mark.
Monticello, 1927 (d. m.)	2, 059, 424. 98 831, 421. 31	6 28 34	Reference mark no. 1.
Godfrey, 1927 (d. m.)	2, 109, 102. 28 852, 133. 27	210 01 50 347 25 43. 8	Reference mark no. 1. Elk River, water tank (white roof).
Esterly, 1927, r. 1935 (d. m.)	2, 084, 694. 94 792, 589. 78	162 15 12	Reference mark no. 1.
Dayton, 1927, r. 1931 (d. m.)	2, 132, 302. 46 806, 174. 71	4 37 57	Reference mark no. 1.
Hamel, 1927, r. 1935 (d. m.)	2, 102, 723. 85 740, 410. 44	246 14 51	Reference mark no. 1.
Maxim, 1927 (d. m.)	2, 139, 709. 68 748, 964. 53	273 32 50	Reference mark no. 2.
Hopkins, 1889, r. 1931 (d. m.)	2, 139, 976. 90 700, 310. 14	343 03 12	Reference mark no. 2.
Excelsior, 1927, r. 1935 (d. m.)	2, 107, 944. 22 684, 625. 11	235 56 37	Reference mark.
Shakopee, 1927, r. 1935 (d. m.)	2, 118, 983. 13 633, 934. 77	313 13 36	Azimuth mark.
Buck (Buck Hill, 1889), 1889, r. 1931 (d. m.).	2, 185, 286. 90 629, 006. 22	16 37 21	Reference mark no. 1.
Elko, 1927, r. 1935 (d. m.)	2, 177, 103. 49 569, 605. 43	133 01 38 118 55 42. 4	Reference mark no. 2. New Market, St. Nicholas Catholic Church, spire.
Veseli, 1927, r. 1935 (d. m.)	2, 134, 797. 49 556, 111. 87	1 43 28	Reference mark no. 1.

[1] No check on this position.

Royalton to Albert Lea arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
Shields, 1927, r. 1931 (d. m.)	2, 134, 474. 81 493, 705. 33	213 27 40	Reference mark no. 1.
Faribault, 1927, r. 1935 (d. m.)	2, 198, 025. 74 475, 253. 27	314 53 57 32 09 15*	Reference mark no. 2. Faribault, State Deaf and Dumb School, water tank.
Morris, 1927, r. 1931 (d. m.)	2, 146, 515. 23 424, 872. 40	39 26 53	Reference mark no. 2.
Medford, 1927, r. 1931 (d. m.)	2, 201, 441. 34 425, 009. 88	50 01 04	Do.
Meriden, 1927, r. 1935 (d. m.)	2, 177, 332. 79 390, 269. 29	171 02 06 249 49 59. 2	Do. Owatonna, central heating plant, smokestack.
Hartle, 1927, r. 1935 (d. m.)	2, 226, 025. 61 398, 405. 11	33 45 59	Reference mark no. 2.
Bixby, 1927, r. 1935 (d. m.)	2, 227, 339. 59 347, 484. 68	90 01 19 280 07 23*	Reference mark no. 1. Bixby, cable elevator.
Berlin, 1927, r. 1935 (d. m.)	2, 173, 983. 44 335, 295. 41	123 33 53	Reference mark no. 1.
Supplementary points			
Pierz, Catholic Church, 1927 (n. d.)[1]	1, 973, 680. 48 1, 086, 475. 35		
Pierz, highest grain elevator, 1927 (n. d.)[1]	1, 970, 310. 93 1, 079, 087. 48		
Pierz, church building (dark top), 1927 (n. d.).[1]	1, 975, 222. 46 1, 086, 377. 20		
Buckman, red wooden water tank, 1927 (n. d.).[1]	1, 976, 086. 06 1, 056, 550. 79		
Royalton, water tank, 1927 (n. d.)	1, 925, 671. 99 1, 032, 044. 02		
Royalton, Catholic Church, spire, 1927 (n. d.).	1, 925, 616. 41 1, 032, 941. 25		
White church steeple (gray top), 1927 (n. d.).[1]	2, 007, 942. 78 1, 034, 871. 34		
Rice, Powers Grain Elevator, 1927 (n. d.).[1]	1, 944, 108. 20 1, 003, 260. 76		
St. Joseph Catholic Church, south spire, 1927 (n. d.).	1, 899, 385. 11 940, 816. 74		
St. Stephens, Catholic Church, spire, 1927 (n. d.).	1, 993, 766. 33 255, 845. 68		
St. Joseph Catholic Church, north spire, 1927 (n. d.)	1, 899, 384. 62 940, 862. 83		
Foley, steel water tank, 1927, r. 1935 (n. d.)	2, 022, 536. 41 971, 540. 64		
St. Cloud, State Reformatory, concrete standpipe, 1927, r. 1935 (n. d.).	1, 970, 183. 18 926, 825. 22		
St. Cloud, State Reformatory, smokestack, 1927, r. 1935 (n. d.).	1, 970, 009. 37 927, 140. 50		
St. Cloud, State Reformatory, flagpole, 1927, r. 1935 (n. d.).	1, 969, 553. 08 926, 700. 42		
St. Cloud, Old Folks Home, cupola, 1927, r. 1935 (n. d.).	1, 966, 906. 32 925, 804. 11		
St. Cloud, Catholic Orphanage, cross on tower, 1927, r. 1935 (n. d.).	1, 959, 984. 21 925, 662. 32		

[1] No check on this position.
* This azimuth has been computed by means of the θ correction. (See p. 140.)

Royalton to Albert Lea arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
St. Cloud, Stearns County Courthouse, dome, 1927, r. 1935 (n. d.).	1,958,470.39 933,557.55		
St. Cloud, Catholic Cathedral, tower, 1927, r. 1935 (n. d.).	1,958,556.36 934,606.52		
St. Cloud, St. Raphaels Hospital, chimney, 1927, r. 1935 (n. d.).	1,956,817.63 938,886.05		
St. Cloud, tall white smokestack, 1927, r. 1935 (n. d.).[1]	1,959,122.61 935,900.80		
St. Cloud, Breen Hotel, chimney, 1927, r. 1935 (n. d.).[1]	1,958,573.08 933,631.80		
St. Cloud, city waterworks standpipe, 1927, r. 1935 (n. d.).[1]	1,957,616.50 933,893.03		
St. Cloud, power plant smokestack, 1927, r. 1935 (n. d.).[1]	1,960,694.34 927,916.55		
St. Cloud, Old Folks Home, water tank, 1927, r. 1935 (n. d.).[1]	1,966,872.14 925,709.75		
Sauk Rapids, Catholic Church, 1927 (n. d.).[1]	1,971,526.99 941,327.09		
Sauk Rapids, water tank, 1927 (n. d.)	1,959,374.56 943,635.92		
Princeton, steel water tank, 1927, r. 1935 (n. d.).[1]	2,107,793.59 936,402.76		
Glendorado, black church spire (white belfry), 1927, r. 1935 (n. d.).[1]	2,048,371.27 941,745.52		
Elk River, water tank (white roof), 1927, r. 1935 (n. d.).	2,111,588.08 840,986.10		
Elk River, creamery smokestack, 1927, r. 1935 (n. d.).[1]	2,112,580.58 839,522.72		
Maple Lake, Catholic Church, 1927, r. 1935 (n. d.).[1]	1,999,665.77 812,910.85		
Maple Lake, water tank, 1927, r. 1935 (n. d.).	1,999,422.85 812,927.87		
Maple Lake, flagpole, 1927 (n. d.).[1]	1,999,874.75 813,009.09		
Buffalo, Catholic Church, 1927, r. 1935 (n. d.).[1]	2,031,501.25 793,246.25		
Buffalo, steel water tank, 1927, r. 1935 (n. d.).[1]	2,032,830.59 792,494.74		
St. Michaels, Catholic Church, clock on tower, 1927, r. 1935 (n. d.).	2,086,397.63 806,163.22		
Rogers, white church, gray spire, 1927, r. 1935 (n. d.).	2,118,249.81 792,368.04		
Dayton, St. John Catholic Church, spire, 1927 (n. d.).	2,125,017.40 817,844.98		
Dayton, water tank, 1927, r. 1935 (n. d.)[1]	2,130,619.68 814,678.17		
Anoka, Catholic Church, gold cross on top, 1927, r. 1935 (n. d.).[1]	2,138,092.11 802,331.67		
Anoka, black water tank, 1927, r. 1935 (n. d.).[1]	2,157,816.96 808,095.51		
Anoka, Congregational Church, gray spire, 1927, r. 1935 (n. d.).[1]	2,157,953.29 801,752.06		

[1] No check on this position.

Royalton to Albert Lea arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
Anoka, smokestack (west one of two), 1927 (n. d.).[1]	2, 158, 258. 28 808, 148. 45		
Anoka, Pillsbury Mills, brick smokestack, 1927, r. 1935 (n. d.).[1]	2, 157, 299. 93 802, 265. 75		
Lorettó, large church steeple, 1927, r. 1935 (n. d.).[1]	2, 094, 824. 52 748, 885. 22		
Waconia, water tank, 1927, r. 1935 (n. d.)[1]	2, 057, 308. 40 674, 686. 06		
Waconia, church steeple, 1927, r. 1935 (n. d.).	2, 056, 193. 04 673, 938. 74		
Minneapolis, Hennepin Methodist Church, spire, 1927 (n. d.).[1]	2, 184, 464. 10 717, 702. 65		
St. Paul, Montgomery Ward, tower, 1927 (n. d.).[1]	2, 217, 353. 95 713, 620. 52		
Hopkins, steel water tank, 1927, r. 1935 (n. d.).[1]	2, 160, 730. 73 698, 588. 80		
New Market, St. Nicholas Catholic Church, spire, 1927 (n. d.).	2, 169, 275. 79 573, 931. 57		
New Market, water tank, 1927 (n. d.)	2, 168, 513. 99 573, 362. 08		
New Prague, International Flour Mill, steel tower, 1927 (n. d.).[1]	2, 108, 961. 44 562, 692. 90		
Montgomery, city water tank, 1927 (n. d.).[1]	2, 109, 187. 09 525, 370. 68		
Montgomery, Commander Flour Mill, water tank, 1927 (n. d.).[1]	2, 109, 564. 40 526, 349. 80		
Shieldsville, Catholic Church, black cross, 1927 (n. d.).	2, 153, 443. 88 497, 801. 19		
Faribault, State Deaf & Dumb School, water tank, 1927 (n. d.).[1]	2, 197, 546. 04 474, 489. 56		
Faribault, Rice County Courthouse, spire, 1927 (n. d.).[1]	2, 188, 766. 14 471, 886. 87		
Faribault, water tank (white top), 1927 (n. d.).	2, 193, 497. 36 468, 048. 94		
Faribault, white church steeple, 1927 (n. d.).[1]	2, 193, 278. 12 474, 039. 46		
Faribault, State Feeble-minded Institution, dome, 1927 (n. d.).[1]	2, 194, 339. 68 468, 783. 43		
Faribault, square stone tower with open coping, 1927 (n. d.).[1]	2, 194, 629. 35 470, 046. 78		
Faribault, Deaf & Dumb Asylum, black standpipe, 1927 (n. d.).[1]	2, 193, 458. 59 474, 349. 95		
Faribault, St. Mary's School, spire with open columns in belfry, 1927 (n. d.).[1]	2, 193, 886. 54 473, 833. 34		
Owatonna, water tank, 1927, r. 1935 (n. d.).	2, 205, 186. 70 395, 120. 39		
Owatonna, Pillsbury Academy, tall gray spire, 1927, r. 1935 (n. d.).	2, 204, 993. 45 395, 689. 36		
Owatonna, Catholic Church, steeple, 1927, r. 1935 (n. d.).	2, 204, 054. 12 393, 386. 64		
Owatonna, State Orphanage, water tank (conical top), 1927, r. 1935 (n. d.).	2, 199, 943. 31 398, 031. 41		

[1] No check on this position.

Royalton to Albert Lea arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
Owatonna, central heating plant, smokestack, 1927, r. 1935 (n. d.).	2,199.871.72 398,547.18		
Owatonna, light & power plant, tall smokestack, 1927, r. 1935 (n. d.).	2,202,318.16 395,984.69		
Owatonna, standpipe, 1927, r. 1935 (n. d.)	2,205,165.77 395,179.63		
Owatonna, Lutheran Church, gray spire (cross on top), 1927, r. 1935 (n. d.).[1]	2,204,054.63 393,387.16		
Owatonna, flagpole, 1927, r. 1935 (n. d.)[1]	2,201,184.15 398,375.54		
Owatonna, Sacred Heart Catholi Church, cupola, 1927, r. 1935 (n. d.).[1]	2,202,615.34 393,506.18		
Owatonna, red belfry, 1927, r. 1935 (n. d.)[1]	2,200,598.64 397,846.54		
Waseca, steel water tank, 1927 (n. d.)	2,129,335.21 392,193.70		
Waseca, tall smokestack, 1927 (n. d.)	2,128,810.40 394,006.11		
Waseca, smokestack (center one of three), 1927 (n. d.).[1]	2,125,985.77 393,061.83		
Waseca, round smokestack, 1927 (n. d.)[1]	2,129,687.37 392,860.08		
Waseca, Catholic Church, steeple, 1927 (n. d.).	2,128,252.44 393,303.08		
Waseca, courthouse, 1927 (n. d.)	2,129,430.05 394,009.44		
Bixby, cable elevator, 1927 (n. d.)[1]	2,237,698.75 345,635.43		
Ellendale, square brick chimney, 1927 (n. d.).[1]	2,185,308.29 318,492.42		
Ellendale, tall flagpole, 1927 (n. d.)[1]	2,185,365.65 318,553.67		
Ellendale, white church (gray steeple), 1927 (n. d.).[1]	2,183,654.30 318,219.04		
Ellendale, grain elevator, 1927 (n. d.)[1]	2,184,952.83 319,196.16		
Blooming Prairie, mill, brick chimney, 1927 (n. d.).[1]	2,251,163.78 316,630.62		
Blooming Prairie, school cupola, 1927, r. 1935 (n. d.).[1]	2,248,976.38 318,122.17		
Blooming Prairie, wooden water tank, 1927, r. 1935 (n. d.).	2,249,093.78 317,452.96		

Iowa-Minnesota State line to St. Paul arc (Mississippi River)

		° ′ ″	
Principal points			
Ferry (Wis.), 1931 (d. m.)	2,771,929.78 148,524.19	162 38 34	Reference mark no. 2.
Gruber (Iowa), 1931 (d. m.)	2,702,825.56 137,759.73	227 21 05	Reference mark no. 1.
Redmound (Wis.), 1931 (d. m.)	2,757,683.12 185,784.98	184 36 18	Reference mark no. 2.

[1] No check on this position.

Iowa-Minnesota State line to St. Paul arc (Mississippi River)—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
Iasota (Iowa-Minn.), 1931 (d. m.)	2,697,524.56 193,776.75	71 18 48	Reference mark no. 1.
Kapanke (Wis.), 1931 (d. m.)	2,765,027.20 239,538.43	73 55 58	Reference mark no. 1.
White, 1931 (d. m.)	2,707,808.63 249,265.11	1 34 54	Reference mark no. 2.
Robb (Wis.), 1931 (d. m.)	2,676,159.54 412,852.84	311 34 22	Reference mark no. 1.
Witoka, 1931 (d. m.)	2,631,982.09 356,639.29	228 03 44	Do.
Johnson (Wis.), 1931 (d. m.)	2,620,657.90 410,074.93	156 07 27 47 59 42.2	Reference mark no. 2. Aviation beacon no. 25A (old no. 29A).
Gaulke, 1931 (d m.)	2,578,330.03 389,933.48	276 34 56 36 20 27.9	Reference mark no. 1. Lewiston, water tank.
Becker (Wis.), 1931 (d. m.)	2,580,784.78 453,304.13	27 10 49	Reference mark no. 2.
Oak Ridge, 1931 (d. m.)	2,546,725.94 415,632.29	24 08 24	Reference mark no. 1.
Wautopa 2, 1931 (d. m.)	2,512,963.27 457,208.12	62 49 15	Do.
Iberg (Wis.), 1931 (d. m.)	2,567,544.64 487,011.47	156 09 24 35 07 47*	Reference mark no. 3. Herold, Zion Church, spire.
Roemer (Wis.), 1931 (d. m.)	2,526,051.71 524,668.38	288 42 33	Reference mark no. 2.
Lange, 1931 (d. m.)	2,462,931.17 502,970.62	229 26 38	Reference mark no. 1.
Rask (Wis.), 1931 (d. m.)	2,467,734.28 569,584.03	359 07 34	Do.
Wabasha, 1892, r. 1931 (d. m.)	2,413,231.35 516,660.96	279 27 27	Do.
Peterson (Wis.), 1931 (d. m.)	2,416,989.70 591,382.15	352 51 39.5	Bay City, Tabor Church spire.
Strusz, 1931 (d. m.)	2,381,312.66 539,664.19	137 57 45	Reference mark no. 1.
Svea (Wis.), 1931 (d. m.)	2,386,031.14 605,458.40	2 58 27 0 00 37.9	Reference mark no. 1. Svea, church spire.
Lundell, 1931 (d. m.)	2,338,035.57 558,474.43	244 25 24 34 44 15.1	Reference mark no. 1. Vasa, church spire.
Manion (Wis.), 1931 (d. m.)	2,349,735.15 625,408.34	223 54 34	Reference mark no. 1.
Hampton 2, 1931 (d. m.)	2,275,183.79 588,887.88	271 52 49	Do
Prescott 2 (Wis.), 1931 (d. m.)	2,320,939.66 650,668.87	76 06 56 343 47 25.1	Reference mark no. 2. Aviation beacon no. 32 (old no. 36).
Wallace, 1892, r. 1931 (d. m.)	2,235,999.60 696,008.14	168 55 31	St. Paul, State Capitol, gold ball on dome.
Snelling, 1931 (d. m.)	2,215,948.92 700,166.72		

* This azimuth has been computed by means of the θ correction.* (See p. 140.)

Iowa-Minnesota State line to St. Paul arc (Mississippi River)—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Mississippi River Commission (second order)	*Feet*	° ′ ″	
Columbus (M. R. C.) (Iowa), 1894, r. 1931 (d. m.).	2,747,204.85 134,639.75		
Genoa (M. R. C.) (Wis.), 1894, r. 1931 (d. m.).	2,735,763.80 227,519.32		
Albin, 1931 (d. m.)	2,720,521.81 197,679.83		
Lee Monument, eccentric (Iowa), 1931 (n. d.).	2,720,918.78 194,519.45		
Lee Monument (Iowa-Minn.), 1931 (d. m.).	2,720,888.15 194,553.39		
Battle Ground (M. R. C.) (Wis.), 1894, r. 1931 (d. m.).	2,740,301.04 180,852.56		
Nodine, 1927, r. 1931 (d. m.)	2,677,722.76 335,262.57	266 32 50	Reference mark no. 2.
Dresbach (M. R. C.), 1894, r. 1931 (d. m.)	2,701,817.56 330,796.27		
Root River (M. R. C.), 1894, r. 1931 (d. m.).	2,711,850.70 302,149.37		
Grandfather (M. R. C.) (Wis.), 1894, r. 1931 (d. m.).	2,735,974.81 308,525.21		
Trempealeau (M. R. C.) (Wis.), 1894, r. 1931 (d. m.).	2,670,612.32 381,035.39		
Gorder (M. R. C.) (Wis.), 1894, r. 1931 (d. m.).	2,623,322.73 401,371.02	69 03 58.2	Aviation beacon no. 25A (old no. 29A).
Minneiska (M. R. C.), 1895, r. 1931 (d. m.).	2,554,787.41 444,114.26	206 47 47.1	Cochrane, church spire.
Schwitzer (M. R. C.) (Wis.), 1895, r. 1931 (d. m.).	2,549,262.62 479,152.10	333 20 40.0	Do.
Nelson (M. R. C.) (Wis.), 1895, r. 1931 (d. m.).	2,523,025.80 523,434.36	33 16 12.7	Wabasha, church spire (M. R. C.).
Danielson (M. R. C.) (Wis.), 1895, r. 1931 (d. m.).	2,445,437.95 562,156.49	262 23 11.5	Lund, Lutheran Church, spire.
Red Wing (M. R. C.), 1895, r. 1931 (d. m.)	2,383,008.86 575,599.59	152 17 08.2	Aviation beacon no. 31B (old no. 35).
Diamond (M. R. C.) (Wis.), 1895, r. 1931 (d. m.).	2,347,443.95 611,272.33	33 11 52.3	Welch, church spire.
McNamara (M. R. C.), 1895, r. 1931 (d. m.).	2,310,532.94 627,357.64	116 30 14.6	Hastings, insane asylum, water tank.
Red Rock (M. R. C.), 1895, r. 1931 (d. m.)	2,262,358.05 688,550.71		
Supplementary points			
Aviation beacon near Lee Monument (Iowa), 1931 (n. d.).[1]	2,716,741.18 192,808.03		
Caledonia, municipal standpipe, 1931, r. 1935 (n. d.).	2,663,121.28 241,770.09		
Caledonia, Catholic Church, spire, 1931, r. 1935 (n. d.).	2,662,612.36 240,769.40		
Dresbach, aviation beacon no. 23 (old no. 27), 1931 (n. d.).	2,702,577.51 331,745.50		
Aviation beacon no. 24 (old no. 28) (Wis.), 1931 (n. d.).	2,670,366.37 378,770.83		

[1] No check on this position.

Iowa-Minnesota State line to St. Paul arc (Mississippi River)—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
Wilson, church spire, 1931 (n. d.)	2,609,462.96 360,969.54		
Aviation beacon no. 25A (old no. 29A), 1931 (n. d.).	2,601,887.78 393,171.30		
Aviation beacon no. 26 (old no. 30), 1931 (n. d.).	2,560,878.46 435,072.07		
Cochrane, church spire (Wis.), 1931 (n. d.)	2,560,837.55 456,093.36		
Herold, Zion Church, spire (Wis.), 1931 (n. d.).	2,564,944.77 483,316.33		
Aviation beacon no. 27 (old no. 31) (Wis.), 1931 (n. d.).	2,547,493.58 488,992.62		
Aviation beacon no. 28 (old no. 32B), 1931 (n. d.).	2,500,376.53 515,956.27		
Aviation beacon no. 29 (old no. 33), 1931 (n. d.).	2,454,728.96 525,124.52		
Lund, Lutheran Church, spire (Wis.), 1931 (n. d.).	2,466,913.51 565,027.08		
Aviation beacon no. 30 (old no. 34), 1931 (n. d.).	2,413,439.88 565,747.41		
Bay City, Tabor Church, spire (Wis.), 1931 (n. d.).	2,418,090.47 582,593.46		
Ellsworth, municipal water tank (Wis.), 1931 (n. d.).	2,393,803.87 634,636.65		
Ellsworth, courthouse dome (Wis.), 1931 (n. d.).	2,393,746.73 635,245.72		
Svea, church spire (Wis.), 1931 (n. d.)	2,386,029.98 599,151.41		
Aviation beacon no. 31B (old no. 35) (Wis.), 1931 (n. d.).	2,372,828.27 594,978.93		
Welch, church spire, 1931 (n. d.)	2,330,879.61 585,957.30		
Vasa, church spire, 1931 (n. d.)	2,332,737.04 550,833.08		
Goodhue, water tank, 1931 (n. d.)	2,358,227.00 512,952.53		
Aviation beacon no. 32 (old no. 36) (Wis.), 1931 (n. d.).	2,325,959.62 633,400.95		
Hastings, insane asylum, water tank, 1931 (n. d.).	2,302,399.75 631,413.42		
Aviation beacon no. 33 (old no. 37), 1931 (n. d.).	2,282,420.43 664,949.03		
Hampton, municipal water tank, 1931 (n. d.).	2,261,188.49 588,681.76		

St. Paul and vicinity

Principal points		° ′ ″	
Washburn Home, 1889 (d. m.)	2,186,754.87 698,245.00	185 29 38*	Minneapolis, Univeralist Church.
Snelling Avenue south base, 1888, r. 1895 (d. m.)	2,215,815.93 699,870.15		
Snelling Avenue north base, 1888 (d. m.)	2,215,572.79 728,491.80		

* This azimuth has been computed by means of the θ correction. (See p. 140.)

St. Paul and vicinity—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
Marcotta, 1888, r. 1895 (d. m.)	2,246,146.70 662,983.57		
Ramsey, 1887 (m. n. d.)	2,256,730.34 726,599.08		
Wautopa, 1892 (d. m.)	2,512,978.53 457,206.26		
Lake City, 1893 (d. m.)	2,485,495.10 507,166.40		
Maiden Rock (Wis.), 1892, r. 1931 (d. m.)	2,467,644.01 569,611.32		
Maxville (Wis.), 1893 (d. m.)	2,531,418.97 568,200.29		
Alma (Wis.), 1893 (d. m.)	2,572,645.17 502,158.87		
Mound View, 1893 (n. d.)	2,214,441.02 763,735.38		
Woodbury, 1893 (n. d.)	2,272,957.36 699,735.52		
Hampton, 1892 (d. m.)	2,275,200.60 588,847.07		
Vasa, 1892 (d. m.)	2,338,041.38 558,482.83		
Ellsworth (Wis.), 1893 (d. m.)	2,394,243.72 628,041.42		
Cannon Falls, 1893 (n. d.)	2,292,983.66 536,877.74		
Prospect Park, 1887, r. 1898 (d. m.)	2,203,814.84 718,646.49		
Snelling Tower, 1887 (n. d.)	2,215,816.30 699,869.94	237 01 43.3	St. Paul, German Catholic Church.
University, 1887 (n. d.)	2,197,323.34 722,132.01	214 09 51*	St. Paul northwest base.
St. Paul southeast base, 1887 (m. n. d.)	2,204,045.03 719,029.92		
St. Paul northwest base, 1887 (m. n. d.)	2,197,624.20 722,575.37	34 09 51*	University.
Mortensen, 1887 (n. d.)	2,196,900.27 718,426.86	173 17 06*	East Minneapolis, Olivet Baptist Church.
Elevator B, 1887 (n. d.)	2,192,581.38 721,834.70	237 03 53*	East Minneapolis, Olivet Baptist Church.
Supplementary points			
Minneapolis, W. D. Washburn, home, 1887 (n. d.).	2,187,879.80 715,465.12		
Minneapolis, high school, 1887 (n. d.)	2,188,840.17 719,124.71		
Minneapolis, Universalist Church, 1887 (n. d.).	2,188,909.30 720,642.46		
Minneapolis, Westminster Church, 1887 (n. d.).[1]	2,187,074.50 721,717.93		
Minneapolis, Camp and Walker Mill, 1887 (n. d.).	2,189,753.39 724,782.85		

* This azimuth has been computed by means of the θ correction. (See p. 140.)

[1] No check on this position.

St. Paul and vicinity—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
Minneapolis, electric light mast, 1887 (n. d.).	2,189,810.87 723,999.58		
Minneapolis, suspension bridge, southeast pier, 1887 (n. d.).	2,190,795.45 724,734.30		
Minneapolis, suspension bridge, southwest pier, 1887 (n. d.).	2,190,214.36 724,387.15		
Minneapolis, gas house, 1887 (n. d.)	2,194,781.07 721,886.95		
Minneapolis, Harvester Works, 1887 (n. d.).	2,197,393.45 712,666.35		
Minneapolis, schoolhouse, 1887 (n. d.)	2,198,391.50 711,334.16		
East Minneapolis, exposition spire, 1887 (n. d.).	2,192,258.79 724,922.97		
East Minneapolis, University Avenue Methodist Episcopal Church, 1887 (n. d.).	2,193,100.61 725,087.31		
East Minneapolis, Pillsbury A. Mill, 1887 (n. d.).	2,193,330.39 724,042.81		
East Minneapolis, Olivet Baptist Church, 1887 (n. d.).	2,196,221.40 724,192.99		
East Minneapolis, Coliseum, flagstaff, 1887 (n. d.).	2,196,686.71 722,797.95		
East Minneapolis, Elwell's Addition, church, 1887 (n. d.).[1]	2,198,681.51 725,983.26		
East Minneapolis, Mechanical Arts Building, 1887 (n. d.).	2,197,591.21 721,897.62		
East Minneapolis, school, 1887 (n. d.)	2,199,987.26 720,680.49		
Fort Snelling, flagstaff, 1887 (n. d.)[1]	2,212,064.71 691,046.93		
St. Paul, house with red roof, 1887 (n. d.).[1]	2,211,933.23 723,495.88		
St. Paul, Exhibition Building, 1887 (n. d.)	2,214,887.15 722,639.90		
St. Paul, Merriam Park, 1887 (n. d.)	2,210,321.15 716,415.42		
St. Paul, Hamlin University, 1887 (n. d.)	2,216,092.59 717,740.87		
St. Paul, Northern Pacific Railway, shops, 1887 (n. d.).	2,218,980.20 720,239.23		
St. Paul, Reform School, 1887 (n. d.)	2,219,127.80 712,309.75		
St. Paul, Macalaster School, 1887 (n. d.)	2,215,422.09 707,816.29		
St. Paul, German Catholic Church, 1887 (n. d.).	2,233,355.77 711,247.72		
St. Paul, State House, 1887 (n. d.)	2,233,706.64 712,079.25		
St. Paul, customhouse, 1887 (n. d.) [1]	2,234,440.67 710,625.82		
St. Paul, new county courthouse, 1887 (n. d.).	2,234,795.15 710,467.70		

[1] No check on this position.

St. Paul and vicinity—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*	° ′ ″	
St. Paul, Globe Building, 1887 (n. d.)	2, 235, 035. 85 710, 464. 80		
St. Paul, church spire, 1887 (n. d.)	2, 240, 995. 71 720, 045. 91		
Kellar, 1887 (n. d.)	2, 241, 246. 10 715, 741. 04		
Kellar, brown church spire, 1887 (n. d.)	2, 241, 899. 72 715, 959. 06		

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc

Principal points			
Heytmans (M. R. C.) (Iowa), 1894 (d. m.)	2, 768, 578. 84 127, 133. 53		
Ferryville (M. R. C.) (Wis.), 1894 (d. m.)	2, 778, 842. 51 136, 456. 55		
Rush Creek (M. R. C.) (Wis.), 1894 (d. m.).	2, 762, 691. 86 147, 296. 45		
Wyburn (M. R. C.) (Wis.), 1894 (d. m.)	2, 750, 569. 04 160, 493. 21		
Cowles (M. R. C.) (Iowa), 1894 (d. m.)	2, 730, 937. 39 156, 983. 47	233 35 22	De Soto, spire
Kains (M. R. C.) (Iowa), 1894 (d. m.)	2, 723, 839. 35 174, 879. 29		
DeSoto lower base (M. R. C.) (Iowa), 1894 (d. m.).	2, 740, 279. 61 168, 832. 02		
DeSoto upper base (M. R. C.) (Iowa), 1894 (d. m.).	2, 735, 999. 81 173, 706. 57		
New Albin (M. R. C.), 1894 (d. m.)	2, 720, 739. 69 198, 940. 54		
Elgar (M. R. C.), 1894 (d. m.)	2, 737, 651. 01 208, 091. 33		
Reno (M. R. C.), 1894 (d. m.)	2, 720, 807. 85 225, 303. 54		
Brown (M. R. C.), 1894 (d. m.)	2, 721, 788. 56 240, 365. 33	174 58 56	Church tower.
Stoddard (M. R. C.) (Wis.), 1894 (d. m.)	2, 735, 822. 87 259, 707. 27		
Brownsville (M. R. C.), 1894 (d. m.)	2, 720, 893. 74 266, 819. 72		
Calvert (M. R. C.) (Wis.), 1894 (d. m.)	2, 737, 828. 86 287, 611. 26		
Onalaska (M. R. C.) (Wis.), 1894 (d. m.)	2, 734, 181. 73 342, 166. 30		
Holmen (M. R. C.) (Wis.), 1894 (d. m.)	2, 718, 757. 92 368, 504. 73		
Dakota (M. R. C.), 1894 (d. m.)	2, 688, 921. 77 353, 985. 30		
Beardsley (M. R. C.) (Wis.), 1894 (d. m.)	2, 695, 676. 77 379, 493. 53		
Richmond (M. R. C.), 1894 (d. m.)	2, 677, 222. 91 364, 208. 09		

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued.	*Feet*	° ′ ″	
Trempealeau east base=B. M. 221/1 (M. R. C.) (Wis.), 1894 (d. m.).	2,683,295.04 371,707.21		
Trempealeau west base (M. R. C.) (Wis.), 1894 (d. m.).	2,678,072.39 371,786.04		
Chapin (M. R. C.) (Wis.), 1895 (d. m.)	2,683,085.64 401,581.22		
Atwood (M. R. C.) (Wis.), 1895 (d. m.)	2,659,731.35 403,270.95		
Martin (M. R. C.), 1895 (d. m.)	2,637,570.41 382,417.95		
Volker (M. R. C.) (Wis.), 1895 (d. m.)	2,636,980.52 301,977.57	345 14 45	Homer, church spire.
Peterman (M. R. C.), 1895 (d. m.)	2,609,546.81 389,610.50		
Haussinger (M. R. C.) (Wis.), 1895 (d. m.).	2,608,530.93 411,861.23		
Burley (M. R. C.), 1895 (d. m.)	2,587,099.25 412,044.44		
Eder (M. R. C.) (Wis.), 1895 (d. m.)	2,597,061.51 425,303.09		
Whitman (M. R. C.), 1895 (d. m.)	2,572,152.16 429,008.76		
Klein (M. R. C.) (Wis.), 1895 (d. m.)	2,572,051.43 451,311.37		
Erding (M. R. C.), 1895 (d. m.)	2,532,425.58 459,454.45	204 12 48	Alma, spire no. 2.
Huber (M. R. C.), 1895 (d. m.)	2,518,456.22 497,676.65	289 19 18	Alma, schoolhouse.
Beef Slough (M. R. C.) (Wis.), 1895 (d. m.).	2,534,890.26 507,183.75		
Wabasha east base (M. R. C.), 1895 (d. m.).	2,521,970.47 505,362.52		
Wabasha west base (M. R. C.), 1895 (d. m.).	2,516,749.43 509,691.54		
Bottom (M. R. C.) (Wis.), 1895 (d. m.)	2,503,892.59 519,556.58	31 17 01*	Reeds Landing, church spire (M. R. C.).
Chippewa (M. R. C.) (Wis.), 1895 (d. m.)	2,503,707.97 541,803.59		
Guthrie (M. R. C.) (Wis.), 1895 (d. m.)	2,487,336.10 536,263.54	323 05 52.3	Reeds Landing, church spire (M. R. C.).
Knud (M. R. C.), 1895 (d. m.)	2,482,781.11 519,809.56	184 12 15	Pepin, spire.
Lakeport (M. R. C.) (Wis.), 1895 (d. m.)	2,475,069.83 533,071.31	86 46 13.8	Lake City, water tower (M. R. C.).
Loon (M. R. C.), 1895 (d. m.)	2,465,265.37 523,564.49		
Carlson (M. R. C.) (Wis.), 1895 (d. m.)	2,464,340.33 539,465.66	59 44 13.6	Lake City, church spire (M. R. C.).
Sugar Loaf (M. R. C.), 1895 (d. m.)	2,442,439.02 535,316.90		
Moline (M. R. C.) (Wis.), 1895 (d. m.)	2,451,119.08 547,931.09		

* This azimuth has been computed by means of the θ correction. (See p. 140.)

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
Girard (M. R. C.), 1895 (d. m.)	2,436,589.30 553,062.40		
Frontenac (M. R. C.), 1895 (d. m.)	2,428,640.61 564,895.28		
Rush (M. R. C.) (Wis.), 1895 (d. m.)	2,434,380.95 577,798.75		
Bowles (M. R. C. (Wis.), 1895 (d. m.)	2,413,927.04 578,961.76		
Wacouta (M. R. C.), 1895 (d. m.)	2,414,309.09 565,832.26		
Hoard (M. R. C.), 1895 (d. m.)	2,400,882.38 571,179.46		
Webster (M. R. C.) (Wis.), 1895 (d. m.)	2,394,086.06 585,603.88		
Trenton (M. R. C.) (Wis.), 1895 (d. m.)	2,373,795.81 587,794.04		
Red Wing upper base (M. R. C.) (Wis.), 1895 (d. m.).	2,385,129.03 585,942.10	100 30 20	Hogar, church.
Red Wing lower base (M. R. C.) (Wis.), 1895 (d. m.).	2,388,727.80 581,945.38		
Peterson (M. R. C.), 1895 (d. m.)	2,365,231.69 574,127.10		
Cannon (M. R. C.), 1895 (d. m.)	2,358,350.24 583,993.22		
Mero=B. M. 248/1 (M. R. C.) (Wis.), 1895 (d. m.).	2,362,958.37 598,844.24		
Rosby (M. R. C.), 1985 (d. m.)	2,342,263.81 600,520.34		
Yanz (M. R. C.), 1895 (d. m.)	2,324,998.07 612,198.97		
Lucky (M. R. C.) (Wis.), 1895 (d. m.)	2,330,711.63 628,030.19		
Prescott (Wis.), 1891 (d. m.)	2,320,940.31 650,669.39		
Crossing (M. R. C.), 1895 (d. m.)	2,295,895.74 643,311.65		
Hastings (M. R. C.), 1895 (d. m.)	2,294,018.09 626,824.73		
Simmons (M. R. C.), 1895 (d. m.)	2,285,525.26 636,993.02		
Daly (M. R. C.), 1895 (d. m.)	2,280,123.58 657,072.62		
Brown (M. R. C.), 1895 (d. m.)	2,263,843.27 639,431.81		
Dayton (M. R. C.), 1895 (d. m.)	2,244,301.40 710,760.54		
Mendota (M. R. C.), 1895 (d. m.)	2,215,602.59 685,814.88		
St. Paul front base (M. R. C.), 1895 (d. m.).	2,210,233.60 691,655.99		
Boshart (M. R. C.), 1895 (d. m.)	2,204,166.41 692,069.59	202 46 16.9 286 11 00	Soldiers Home (M. R. C.). Mendota, spire.
St. Paul back base (M. R. C.), 1895 (m.)	2,206,913.70 687,397.06		

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*		
Powder Horn (M. R. C.), 1898 (d. m.)	2, 191, 745. 52 708, 603. 16		
Guaranty Loan Tower (M. R. C.), 1898 (d. m.).	2, 189, 857. 37 722, 494. 01		
Windom (M. R. C.), 1898 (d. m.)	2, 198, 255. 46 735, 232. 90		
Peck (M. R. C.), 1898 (d. m.)	2, 184, 677. 96 737, 317. 60		
Mulcara (M. R. C.), 1898 (d. m.)	2, 196, 045. 15 753, 302. 40		
Palmer (M. R. C.), 1898 (d. m.)	2, 175, 710. 48 759, 043. 78		
Dunn (M. R. C.), 1898 (d. m.)	2, 181, 959. 49 780, 778. 32		
Kilmer (M. R. C.), 1898 (d. m.)	2, 166, 202. 86 776, 892. 95		
Powell (M. R. C.), 1898 (d. m.)	2, 172, 106. 54 791, 234. 35		
Howard (M. R. C.), 1898 (d. m.)	2, 156, 044. 50 789, 533. 99		
Carvel (M. R. C.), 1898 (d. m.)	2, 154, 038. 53 809, 171. 55		
Johnson (M. R. C.), 1898 (d. m.)	2, 140, 360. 32 805, 367. 45		
Carpenter (M. R. C.), 1898 (d. m.)	2, 141, 765. 67 819, 458. 71		
Diegel (M. R. C.), 1898 (d. m.)	2, 126, 121. 74 812, 753. 19		
Clark (M. R. C.), 1898 (d. m.)	2, 128, 445. 89 827, 132. 53		
Carrow (M. R. C.), 1898 (d. m.)	2, 118, 446. 27 821, 117. 58		
Castle (M. R. C.), 1898 (d. m.)	2, 118, 004. 28 834, 929. 60		
Fritz (M. R. C.), 1898 (d. m.)	2, 107, 041. 24 831, 915. 63		
Elk River (M. R. C.), 1898 (d. m.)	2, 106, 523. 89 847, 000. 02		
Davis Island (M. R. C.), 1898 (d. m.)	2, 097, 344. 05 837, 351. 17		
Williams (M. R. C.), 1898 (d. m.)	2, 087, 833. 75 844, 374. 97		
Baker (M. R. C.), 1898 (d. m.)	2, 083, 592. 54 837, 206. 95		
Varley (M. R. C.), 1898 (d. m.)	2, 075, 659. 95 848, 590. 13		
Lambert (M. R. C.), 1898 (d. m.)	2, 070, 827. 22 835, 782. 21		
Telephone (M. R. C.), 1898 (d. m.)	2, 062, 344. 52 847, 126. 89		
Monticello (M. R. C.), 1898 (d. m.)	2, 048, 773. 97 839, 398. 83		
Monticello east base (M. R. C.), 1898 (d. m.).	2, 062, 969. 80 840, 017. 93		

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Principal points—Continued			
	Feet		
Monticello west base (M. R. C.), 1898 (d. m.).	2,057,568.52 839,999.00		
Big Lake (M. R. C.), 1898 (d. m.)	2,056,821.91 851,216.52		
Shenton (M. R. C.), 1898 (d. m.)	2,042,461.20 858,460.34		
Ackerman (M. R. C.), 1898 (d. m.)	2,023,275.60 859,925.66		
Becker (M. R. C.), 1898 (d. m.)	2,034,428.81 869,861.82		
Parks (M. R. C.), 1898 (d. m.)	2,019,948.70 879,080.94		
River Bank (M. R. C.), 1898 (d. m.)	2,011,847.71 865,943.49		
Benson (M. R. C.), 1898 (d. m.)	1,999,190.00 873,296.92		
Clear Lake (M. R. C.), 1898 (d. m.)	2,001,878.82 890,408.46		
Clearwater (M. R. C.), 1898 (d. m.)	1,984,495.29 886,501.41		
Cater (M. R. C.), 1898 (d. m.)	1,991,509.85 905,062.24		
St. Augusta (M. R. C.), 1898 (d. m.)	1,968,185.55 904,403.45		
Reformatory (M. R. C.), 1898 (d. m.)	1,970,951.33 926,118.61		
North Star (M. R. C.), 1898 (d. m.)	1,953,184.74 925,338.78		
Sauk Rapids (M. R. C.), 1898 (d. m.)	1,951,366.35 950,539.67		
Heinen (M. R. C.), 1898 (d. m.)	1,933,494.10 942,380.89		
Gartner (M. R. C.), 1898 (d. m.)	1,937,914.84 957,853.25		
Supplementary points			
Lansing, cupola (round) (M. R. C.) (Iowa), 1894 (n. d.).	2,740,071.81 144,687.21		
Lansing, cupola (square) (M. R. C.) (Iowa), 1894 (n. d.).	2,739,937.00 145,263.79		
DeSoto, water tank (M. R. C.) (Wis.), 1894 (n. d.).	2,745,125.76 165,361.79		
New Albin, spire (M. R. C.) (Iowa), 1894 (n. d.).	2,720,232.13 192,301.34		
State Line (M. R. C.) (Iowa-Minn.), 1894 (n. d.).	2,720,887.95 194,552.77		
Genoa, spire (M. R. C.) (Wis.), 1894 (n. d.).	2,735,300.08 221,509.39		
Stoddard, water tank (M. R. C.) (Wis.), 1894 (n. d.).	2,735,300.28 254,032.53		
La Crosse, brewery cupola (M. R. C.) (Wis.), 1894 (n. d.).	2,727,605.37 301,433.62		
La Crosse, St. Joseph Church, spire (M. R. C.) (Wis.), 1894 (n. d.).	2,726,252.08 308,039.77		

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
North La Crosse, spire (M. R. C.) (Wis.), 1894 (n. d.).	2,726,820.53 317,284.45		
Onalaska, spire (M. R. C.) (Wis.), 1894 (n. d.).	2,729,633.48 336,042.27		
Trempealeau, spire (M. R. C.) (Wis.), 1895 (n. d.).	2,673,249.51 377,021.13		
Winona, Polish Church, spire (M. R. C.), 1895 (n. d.).	2,625,135.22 390,771.88		
Minneiska, spire (M. R. C.), 1895 (n. d.)	2,556,508.50 444,342.73		
Alma, Catholic Church, spire (M. R. C.) (Wis.), 1895 (n. d.).	2,545,829.45 488,848.29		
Wabasha, church spire (M. R. C.), 1895 (n. d.).	2,514,106.27 509,840.27		
Reeds Landing, church spire, (M. R. C.), 1895 (n. d.).	2,502,098.31 516,603.60		
Reeds Landing, schoolhouse (M. R. C.), 1895 (n. d.).	2,501,926.80 516,705.01		
Lake City, church spire (M. R. C.), 1895 (n. d.).	2,451,952.27 532,237.42		
Lake City, water tower (M. R. C.), 1895 (n. d.).	2,451,686.32 531,752.01		
Villa Maria Academy (M. R. C.), 1895 (n. d.).	2,436,784.54 556,273.32		
Red Wing, reform school (M. R. C.), 1895 (n. d.).	2,391,749.92 572,737.70		
Red Wing, water tank (M. R. C.), 1895 (n. d.).	2,384,471.46 572,761.87		
Red Wing, Catholic School (M. R. C.), 1895 (n. d.).	2,382,693.34 572,883.19		
Red Wing, convent spire (M. R. C.), 1895 (n. d.).	2,378,492.72 571,350.14		
Diamond Bluff, upper church (M. R. C.), 1895 (n. d.).	2,356,579.00 604,817.64		
Diamond Bluff, lower church (M. R. C.), 1895 (n. d.).	2,358,452.42 603,485.62		
Hastings, convent (M. R. C.), 1895 (n. d.)	2,298.796.70 637,193.73		
Hastings, Catholic Church (M. R. C.), 1895 (n. d.).	2,298,938.18 636,454.88		
Hastings, Baptist Church (M. R. C.), 1895 (n. d.).	2,298,122.56 635,699.23		
Hastings, Congregational Church (M. R. C.), 1895 (n. d.).	2,298,117.83 636,447.91		
Hastings, courthouse (M. R. C.), 1895 (n. d.).	2,298,365.18 637,374.21		
Hastings, Gardner's Elevator (M. R. C.), 1895 (n. d.).	2,298,864.65 631,219.16		
Prescott, white church (M. R. C.) (Wis.), 1895 (n. d.).	2,312,338.37 640,578.72		
Prescott, schoolhouse (M. R. C.) (Wis.), 1895 (n. d.).	2,312,105.65 640,183.54		
Prescott, Catholic Church (M. R. C.) (Wis.), 1895 (n. d.).	2,312,293.50 639,203.01		

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
St. Paul, City Hall (M. R. C.), 1895 (n. d.)	2,234,799.24 710,469.06		
State Capitol (M. R. C.), 1895 (n. d.)	2,233,708.11 712,076.32		
Soldiers Home (M. R. C.), 1898 (n. d.)	2,206,652.19 697,991.31		
City Hall (M. R. C.), 1898 (n. d.)	2,190,212.63 721,782.58		
Soo Lines, shop chimney (M. R. C.), 1898 (n. d.).	2,193,753.56 737,330.89		
Exposition Building (M. R. C.), 1898 (n. d.).	2,192,259.43 724,923.68		
Anoka, Catholic Church, spire (M. R. C.), 1898 (n. d.).	2,158,306.79 802,187.91		
Mill, flagstaff (M. R. C.), 1898 (n. d.)	2,157,250.83 802,204.11		
Anoka, courthouse (M. R. C.), 1898 (n. d.)	2,158,219.13 801,996.64		
Dayton, church spire (M. R. C.), 1898 (n. d.).	2,125,123.40 818,034.40		
Elk River, school (M. R. C.), 1898 (n. d.)	2,108,906.10 840,587.55		
Big Lake, church cupola (M. R. C.), 1898 (n. d.).	2,065,907.42 850,157.94		
Otsego, spire (M. R. C.), 1898 (n. d.)	2,099,933.84 835,061.27		
Monticello, Methodist Episcopal Church (M. R. C.), 1898 (n. d.)	2,051,589.15 840,320.37		
Becker, church cupola (M. R. C.), 1898 (n. d.).	2,032,108.47 872,896.83		
Clear Lake, church (M. R. C.), 1898 (n. d.).	1,999,885.34 890,798.16		
Clearwater, church belfry (M. R. C.), 1898 (n. d.).	1,986,977.49 882,060.64		
Clearwater, church spire (M. R. C.), 1898 (n. d.).	1,987,068.13 883,048.87		
St. Augusta, spire (M. R. C.), 1898 (n. d.)	1,961,004.23 904,017.90		
Hospital, water tank (M. R. C.), 1898 (n. d.).	1,966,908.31 925,804.00		
Catholic Cathedral (M. R. C.), 1898 (n. d.).	1,958,497.11 933,001.17		
Catholic Church, spire (M. R. C.), 1898 (n. d.).	1,958,556.22 934,607.83		
East St. Cloud, school (M. R. C.), 1898 (n. d.).	1,962,503.10 934,275.73		
Standpipe (M. R. C.), 1898 (n. d.)	1,957,616.71 933,894.35		
Sauk Rapids, school (M. R. C.), 1898 (n. d.).	1,957,995.59 944,718.29		

CENTRAL ZONE

Ninety-eighth meridian arc

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points	*Feet*	° ′ ″	
Boating (S. Dak.), 1903, r. 1935 (d. m.)	1,292,703.80 117,165.09	213 43 59	Reference mark.
Preacher Hill (S. Dak.), 1903, r. 1935 (d. m.).	1,267,641.30 184,861.09		
Brown Valley southeast base (S. Dak.), 1903, r. 1935 (d. m.).	1,334,790.05 209,293.30	202 18 02 281 38 32*	Determan's red barn, south gable. T. 124 N., R. 49 W., sec. 18, southeast corner.
Drywood (S. Dak.), 1903, r. 1935 (d. m.)	1,259,159.26 243,541.94		
Layden, 1903, r. 1935 (d. m.)	1,364,150.94 243,051.31	48 15 24 48 10 30*	Reference mark. T. 125 N., R. 48 W., sec. 17, west ¼ corner.
Brown Valley northwest base (S. Dak.), 1903, r. 1935 (d. m.).	1,321,724.54 232,899.23	181 23 39	Reference mark.
Enwiller (S. Dak.), 1904, r. 1935 (d. m.)	1,367,955.68 312,935.35	0 15 43*	T. 128 N., R. 49 W., sec. 36, east ¼ corner.
Oscarson, 1904, r. 1935 (d. m.)	1,420,076.71 331,818.56	136 18 59	Ball on spire at White Rock.
Hankinson (N. Dak.), 1904, r. 1934 (d. m.)	1,314,196.53 390,073.42	272 26 44 275 22 31*	Reference mark (1904). T. 130 N., R. 50 W., sec. 28, southeast corner.
Foss, 1904, r. 1934 (d. m.)	1,420,808.25 410,101.40	45 06 28 3 36 03.2	Fairmount, municipal water tank. Childs (Kutzer), tallest elevator.
Bullis, 1904, r. 1935 (d. m.)	1,521,929.46 351,716.16	235 56 38 170 48 31.7	Schoolhouse (District 17), chimney. Hereford, elevator.
Western, 1904, r. 1935 (d. m.)	1,512,621.68 419,832.65	357 46 53 180 18 05*	Reference mark. T. 131 N., R. 44 W., sec. 26, north ¼ corner.
Wahpeton, 1904, r. 1934 (d. m.)	1,418,861.96 459,633.55	322 01 10	Azimuth mark.
Fox, 1906, l. 1935 (d. m.)	1,475,054.36 474,497.63	82 00 01	Hans J. Hanson's house, east gable.
Indian, 1906, r. 1935 (d. m.)	1,503,377.49 530,608.43	328 49 29* 267 37 09	B. M. E 4. Highest point of very large rock in corner of field.
Meadows, 1906, r. 1935 (d. m.)	1,431,164.93 530,488.26	221 10 43.6	Lawndale, elevator.
Barnesville, 1906, l. 1935 (d. m.)	1,444,128.22 621,884.03	322 28 28.0	Barnesville, tall elevator.
Tansem, 1906, r. 1935 (d. m.)	1,506,597.74 626,292.46	199 58 43*	T. 137 N., R. 44 W., sec. 2, southwest corner.
Eglon, 1906, r. 1935 (d. m.)	1,498,425.04 677,086.76	13 34 43	Windmill.
Riverton, 1906, r. 1935 (d. m.)	1,448,402.44 676,621.22	6 27 16 316 08 34*	Reference mark. T. 139 N., R. 46 W., sec. 23, south ¼ corner.
Keene, 1906, r. 1935 (d. m.)	1,458,351.50 741,793.85	204 43 27	Deserted house, chimney.
Morken, 1906, r. 1935 (d. m.)	1,412,569.19 750,849.91	141 01 38	Carlson's house, tall chimney.
Syre, 1906, r. 1935 (d. m.)	1,519,803.83 807,785.11	59 55 47	Reference mark.

*This azimuth has been computed by means of the θ correction. (See p. 140.)

Ninety-eighth meridian arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued			
Borup, 1906, r. 1935 (d. m.)	*Feet* 1,440,550.09 804,277.55	° ′ ″ 18 36 53*	Borup, church spire.
Supplementary points			
Browns Valley, white spire, 1903, l. 1935 (d.) [1].	1,339,506.19 226,887.14		
Browns Valley, water tower, 1903 (d.)	1,339,383.56 227,541.15		
Browns Valley, large building, high spire, 1903 (d.).	1,339,730.75 226,935.16		
T. 124 N., R. 49 W., sec. 18, southeast corner, 1903 (d. m.) [1].	1,336,281.41 208,985.72		
Beardsley, water tank, 1903, r. 1935 (n. d.)	1,369,186.20 213,471.19		
Beardsley, square slender decorated spire, 1903, l. 1935 (d.).	1,369,669.85 211,662.97		
Graceville, water tower, 1903, l. 1935 (d.)	1,440,479.89 215,267.88		
Graceville, Catholic Church, spire, 1903, r. 1935 (n. d.).	1,439,875.23 214,804.48		
T. 125 N., R. 48 W., sec. 17, west ¼ corner, 1903, l. 1935 (d. m.) [1].	1,363,211.93 242,211.01		
Indian, church spire (S. Dak.), 1903 (d.)	1,328,373.26 238,534.87		
T. 125 N., R. 52 W., sec. 10, northeast corner (S. Dak.), 1903, r. 1904 (d. m.) [1].	1,259,816.62 243,631.42		
Large church, spire on west end (S. Dak.), 1904 (n. d.).	1,314,546.35 290,060.22		
T. 128 N., R. 49 W., sec. 36, east ¼ corner (S. Dak.), 1903, l. 1935 (d. m.) [1].	1,367,949.43 311,602.23		
Swedish Lutheran Church, spire (2 miles east of station Enwiller) (S. Dak.), 1904, r. 1935 (d.).	1,378,395.02 311,407.01		
Church, very tall black spire (S. Dak.), 1904, r. 1935 (d.).	1,293,997.58 322,356.37		
Wheaton, water tank, 1904, l. 1921 (n. d.)	1,426,324.47 303,611.55		
Herman, water tower, 1904, r. 1935 (n. d.)	1,517,952.81 301,273.84		
Hankinson, high school spire (N. Dak.), 1904, (n. d.).	1,327,589.33 401,227.81		
Hankinson, Catholic Church, spire (N. Dak.), 1904 (n. d.).[1]	1,327,209.52 401,455.48		
Schoolhouse chimney (½ mile north of station Hankinson) (N. Dak.), 1904 (n. d.).	1,315,042.48 391,748.47		
T. 130 N., R. 50 W., sec. 28, southeast corner (N. Dak.), 1904 (d. m.).[1]	1,314,688.34 390,026.85		
Fairmount, Catholic Church, spire (N. Dak.), 1904 (n.d.).	1,402,923.52 394,272.84		
Fairmount, National Elevator (N. Dak.), 1904, (n. d.).	1,401,926.26 393,475.90		
Fairmount, tall east elevator (N. Dak.), 1904 (n. d.).	1,403,588.80 394,702.41		

* This azimuth has been computed by means of the θ correction. (See page 140.)

[1] No check on this position.

Ninety-eighth meridian arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Supplementary points—Continued			
	Feet		
Fairmount, elevator (N. Dak.), 1904 (n. d.).	1, 403, 074. 98 394, 723. 84		
Blackmer, south elevator (N. Dak.), 1904 (n. d.)[1]	1, 403, 582. 77 364, 717. 20		
Church, black spire (near Childs (Kutzer)), 1904, r. 1935 (d.).	1, 417, 023. 72 381, 240. 01		
Childs (Kutzer), tallest elevator, 1904, l. 1935, (n. d.).	1, 419, 985. 84 397, 032. 79		
Nashua, west elevator, 1904, r. 1935 (d.)	1, 477, 293. 90 384, 749. 32		
Nashua, east elevator, 1904, r. 1935 (n. d.)	1, 477, 526. 20 384, 743. 28		
Nashua, white church, 1904 r. 1935 (d.)	1, 477, 512. 38 384, 498. 84		
Western Post Office, church spire, 1904, r. 1935 (n. d.).	1, 510, 298. 79 426, 165. 55		
Campbell, church spire, 1904, r. 1935 (d.)	1, 453, 240. 97 407, 491. 57		
Campbell, church, open belfry, 1904, r. 1935 (d.).	1, 453, 362. 74 407, 007. 66		
Campbell, elevator no. 1 (Campbell Grain Co.'s elevator), 1904, r. 1935 (n. d.).	1, 454, 057. 58 408, 370. 47		
Campbell, elevator no. 2 (Farmers' Elevator), 1904, r. 1935 (n. d.).	1, 453, 962. 65 408, 531. 74		
Church spire (east of Doran), 1904, r. 1935 (n. d.).	1, 453, 123. 84 436, 759. 61		
T. 131 N., R. 44 W., sec. 26, north ¼ corner, 1904, l. 1935 (d. m.).[1]	1, 512, 626. 27 420, 694. 58		
Foxhome, white elevator, 1906, r. 1935 (n. d.).	1, 479, 922. 55 473, 370. 66		
Foxhome, red elevator, 1906, r. 1935 (n. d.)	1, 479, 489. 93 473, 364. 38		
Foxhome, schoolhouse cupola, 1906, r. 1935 (n. d.).	1, 479, 102. 60 471, 449. 63		
Watosco, lone elevator, 1906, l. 1935 (n. d.).	1, 437, 779. 57 469, 491. 09		
Everdell, broad elevator, 1906, l. 1935 (n. d.).	1, 454, 021. 73 470, 926. 61		
Everdell, slender elevator, 1906, r. 1935 (n. d.).	1, 453, 366. 96 470, 861. 18		
Breckenridge, hospital cupola, 1906, r. 1935 (n. d.).	1, 408, 624. 74 467, 945. 35		
Breckenridge, courthouse cupola, 1906, l. 1935 (n. d.).	1, 408, 976. 49 468, 340. 62		
Wahpeton, standpipe (N. Dak.), 1906, r. 1935 (n. d.).	1, 406, 032. 28 470, 625. 54		
Wahpeton, schoolhouse cupola (N. Dak.), 1904 (n. d.).	1, 403, 859. 07 473, 442. 47		
Fergus Falls, Northwestern College, tower, 1906, r. 1935 (n. d.).	1, 540, 453. 63 470, 520. 12		
Fergus Falls, asylum stack, 1906, r. 1935 (n. d.).	1, 536, 928. 82 479, 564. 46		
Fergus Falls, courthouse cupola, 1906, l. 1935 (n. d.).	1, 538, 563. 95 472, 112. 06		

[1] No check on this position.

Ninety-eighth meridian arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
Carlisle, elevator, north gable, 1906, r. 1935 (n. d.).[1]	1,510,037.82 505,070.86		
Church spire (6 miles north of station Fox), 1906, r. 1935 (n. d.).	1,474,215.63 506,313.73		
Church spire (8 miles northwest of Foxhome), 1906, r. 1935 (n. d.).	1,466,988.00 511,725.24		
Brushvale, low elevator, center, 1906, r. 1935 (n. d.).[1]	1,395,846.99 508,866.23		
Brushvale, tall elevator, center, 1906, r. 1935 (n. d.)[1]	1,395,825.34 509,032.07		
Oscar, church spire, 1906 (n. d.)	1,504,651.42 515,715.93		
B. M. E 4, 1906, r. 1935 (d. m.)[1]	1,503,927.91 529,698.10		
Church (5 miles north of station Indian), 1906 (n. d.).	1,504,206.01 558,704.70		
Lawndale, elevator, 1906, r. 1935 (n. d.)	1,469,404.24 574,201.33		
Barnesville, tall elevator, 1906, r. 1935 (n. d.).	1,455,683.15 606,839.26		
Barnesville, church spire, 1906, r. 1935 (n. d.).	1,455,156.46 611,382.96		
Barnesville, standpipe, 1906, r. 1935 (n. d.)	1,455,051.01 610,796.97		
Barnesville, stack, 1906, l. 1935 (n. d.)	1,454,791.92 609,639.57		
Gray church spire (7 miles south of station Tansem), 1906, r. 1935 (n. d.).[1]	1,503,116.00 590,091.57		
White church spire (5 miles south of station Tansem), 1906, r. 1935 (n. d.).[1]	1,506,608.65 598,385.84		
T. 137 N., R. 44 W., sec. 2, southwest corner, 1906, l. 1935 (d. m.).[1]	1,506,897.27 627,115.77		
Rollag, church spire, 1906, r. 1935 (n. d.) [1]	1,501,545.63 640,741.15		
Baker, church spire, 1906, r. 1935 (n. d.) [1]	1,417,931.57 635,375.10		
Downer, northwest elevator, 1906, r. 1935 (n. d.).	1,440,108.25 646,903.77		
Downer, southeast elevator, 1906, r. 1935 (n. d.).	1,440,234.11 646,626.79		
Sabin, elevator, 1906, r. 1935 (n. d.) [1]	1,395,050.89 656,919.14		
Church spire (2 miles east of station Eglon), 1906, r. 1935 (n. d.).	1,507,383.84 675,085.86		
Muskoda, elevator, 1906, r. 1935 (n. d.)	1,460,642.37 689,398.82		
T. 139 N., R. 46 W., sec. 23, south ¼ corner, 1906 (d. m.).[1]	1,448,912.45 676,090.07		
Glyndon, elevator, 1906, r. 1935 (n. d.) [1]	1,417,432.83 691,728.04		
Glyndon, church spire, 1906, r. 1935 (n. d) [1]	1,418,191.31 692,041.22		
Fargo, Catholic Church, spire (N. Dak.), 1906, r. 1935 (n. d.).	1,365,394.80 696,577.77		

[1] No check on this position.

Ninety-eighth meridian arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
Fargo, brewery cupola (N. Dak.), 1906, l. 1935 (n. d.).[1]	1,366,999.52 692,345.58		
Fargo, large square tower (N. Dak.), 1906 (n. d.).[1]	1,366,521.74 694,511.73		
Fargo, large round tower (N. Dak.), 1906 (n. d.).[1]	1,367,391.74 694,634.94		
Church spire (8 miles northeast of Fargo), 1906, l. 1935 (n. d.).[1]	1,398,332.67 724,891.55		
Averill, elevator, 1906, r. 1935 (n. d.)	1,426,180.22 725,634.42		
Hitterdal, tall church spire, 1906 (n. d.)[1]	1,498,474.85 726,889.09		
Hitterdal, elevator, 1906 (n. d.)[1]	1,498,948.79 727,880.39		
Hitterdal, low church spire, 1906 (n. d.)[1]	1,498,797.12 726,412.70		
Church spire (3 miles northeast of station Keene), 1906, r. 1935 (n. d.).	1,472,843.90 749,322.78		
T. 141 N., R. 47 W., sec. 10 southeast corner, 1906, l. 1935 (d. m.).[1]	1,412,666.86 750,890.59		
Felton, elevator, 1906 (n. d.)	1,437,769.70 766,130.93		
Felton, church spire, 1906, r. 1935 (n. d.)	1,439,122.96 766,065.44		
Felton, schoolhouse cupola, 1906, l. 1935 (n. d.).	1,439,284.11 766,090.57		
Borup, church spire, 1906, r. 1935 (n. d.)	1,440,156.84 803,109.89		
Borup, elevator (slender top), 1906 (n. d.)	1,438,785.56 803,188.77		
Borup, tall elevator, 1906, r. 1935 (n. d.)	1,438,783.45 803,371.78		
B. M. E 5, 1906, l. 1935 (d. m.)[1]	1,440,428.93 803,005.46		
Wheatville, red elevator (slender top), 1906, r. 1935 (n. d.).[1]	1,439,246.29 819,440.62		
Wheatville, yellow elevator, 1906, r. 1935 (n. d.).[1]	1,439,244.72 819,579.54		
Church spire (5 miles northeast of Borup), 1906, r. 1935 (n. d.).[1]	1,457,065.42 828,896.58		
Twin Valley, standpipe, 1906, r. 1935 (n. d.).	1,501,063.02 830,435.67		
Twin Valley, white church spire, 1906, r. 1935 (n. d.).	1,500,440.03 830,350.75		
Twin Valley, tall elevator (slender top), 1906, l. 1935 (n. d.).[1]	1,501,337.06 830,232.69		
Ada, standpipe, 1906, l. 1935 (n. d.)	1,437,615.88 847,290.30		
Ada, schoolhouse cupola, 1906, l. 1935 (n. d.).	1,438,838.42 845,901.89		
Ada, courthouse tower, 1906, r. 1935 (n. d.)	1,438,467.56 846,223.48		

[1] No check on this position.

Ninety-eighth meridian to Royalton to Duluth arc

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points	*Feet*	° ′ ″	
Elbow, 1904, r. 1935 (d. m.)	1,571,895.80 374,598.60	8 28 56	E. J. Colemark's barn, west gable.
Dalton, 1904, r. 1935 (d. m.)	1,572,833.52 432,259.42	270 14 16*	Dalton astronomical station.
Leaf, 1904, r. 1935 (d. m.)	1,664,525.35 417,163.41	125 37 57	J. Christianson's barn, spire.
Holmes, 1904, r. 1935 (d. m.)	1,651,302.21 314,049.40	288 09 53	Holmes City, Swedish Church, spire.
Alexandria, 1904, r. 1934 (d. m.)	1,720,657.15 322,929.81	259 23 05	Azimuth mark (1934).
Parker, 1904, r. 1935 (d. m.)	1,719,807.14 405,714.61	206 48 59	New Parkers Prairie, open belfry, spire.
Leslie, 1904, r. 1934 (d. m.)	1,789,707.89 364,961.30	87 41 10	Azimuth mark (1934).
Osakis, 1904, r. 1934 (d. m.)	1,775,390.56 301,795.49	162 06 45.8	Osakis, water tower.
Maple, 1904, r. 1935 (d. m.)	1,810,298.78 328,906.94	51 37 57.5 340 03 21*	Gordon, church spire. Long Bridge, church spire.
Birch, 1904, r. 1935 (d. m.)	1,840,363.69 239,920.40	37 54 23.7	Sauk Center, Catholic Church, spire.
Long, 1904, r. 1935 (d. m.)	1,835,469.35 355,520.41	268 44 48.5 139 31 51	Long Prairie, Catholic Church, spire. House of Vandyke & Vandyke, west gable.
Lone, 1904, r. 1935 (d. m.)	1,877,303.52 379,650.59	52 15 16.2 83 36 30	Long Prairie, water tank. Gust. Nelson's house, east gable.
Eagle, 1904, r. 1935 (d. m.)	1,890,551.52 301,694.23	174 46 25	Burtrum, white church, red cone, spire.
Falls, 1904, l. 1935 (d. m.)	1,997,432.06 356,589.03		
Brockway (Suintax (M. R. C.), 1898), 1904, r. 1935 (d. m.).	1,984,975.10 280,694.61	281 40 14.5	Skounter Hill (M. R. C.).
Alberta, 1904, r. 1931 (d. m.)	2,034,673.95 293,225.07	188 27 10.1 201 31 03	Buckman, Catholic Church, spire. James McCullough's house, chimney.
Royalton north base, 1904, r. 1935 (d. m.)	2,000,156.60 297,372.07	74 17 37*	Royalton (M. R. C.).
Royalton south base, 1904, r. 1935 (d. m.)	2,012,428.35 268,232.46	75 39 36 333 30 58.8	Reference mark. Rice back base (M. R. C.).
Johnson, 1904, r. 1935 (d. m.)	1,933,679.19 427,739.52	142 23 00* 79 57 41	Lake Alexander, tallest island, highest point. John Lagerquist's house, chimney.
Daggett, 1904, r. 1935 (d. m.)	2,015,861.17 427,399.78	160 51 08	John Vogel's house, south gable.
Rail, 1904, r. 1935 (d. m.)	1,946,773.94 447,609.09	192 35 13	Ridgley's house, west gable.
Gull, 1904, r. 1935 (d: m.)	1,968,190.93 526,306.47	173 19 57	Schoolhouse (District no. 2), top of belfry.
Jones, 1904, r. 1905 (d. m.)	2,045,420.11 509,445.17	76 07 43.7	Brainerd, Brainerd Lumber Co., stack.
Brook, 1905, r. 1934 (d. m.)	2,079,719.13 612,910.83	39 39 11	Frank Richter's farmhouse, north gable.

* This azimuth has been computed by means of the θ correction. (See p. 140.)

Ninety-eighth meridian to Royalton to Duluth arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
Rabbit, 1905, r. 1934 (d. m.)	2,086,599.32 550,343.51	132 12 02	Azimuth mark.
French, 1905, r. 1934 (d. m.)	2,178,885.42 595,245.09	358 51 56	Azimuth mark.
Bethlehem, 1905, r. 1934 (d. m.)	2,159,709.51 538,793.57	84 12 22	Reference mark no. 3.
Rae, 1905, r. 1935 (d. m.)	2,215,023.50 560,002.53	167 53 15	Jennison's barn, south gable.
Kimberly, 1905, r. 1935 (d. m.)	2,207,692.00 588,140.89	195 41 35	E. D. Turner's house, south gable.
Grindle, 1905, r. 1935 (d. m.)	2,243,244.28 569,518.67	157 42 49.3	McGregor, Vandewater Sawmill, stack.
Gregor, 1905 (d. m.)	2,234,306.86 599,137.05	352 05 53.0	McGregor, Vandewater Sawmill, stack.
Douglas, 1905, r. 1935 (d. m.)	2,279,368.79 589,992.54	275 32 41	Fred Burger's house, north gable.
Tamarack, 1905, r. 1935 (d. m.)	2,265,293.34 624,305.86	139 01 49	Dan McGary's house, east gable.
Wright, 1905, r. 1935 (d. m.)	2,300,392.66 635,620.72		
Bachelor, 1905, r. 1935 (d. m.)	2,315,953.26 606,911.83	214 23 23	Grant Rice's house, chimney.
Island, 1905, r. 1935 (d. m.)	2,346,074.36 604,809.25	153 27 58	Mr. Photo's house, south gable.
Cromwell, 1905, r. 1935 (d. m.)	2,364,323.35 628,338.17	56 06 17	Two-story farmhouse, north west gable.
Mahtowa, 1905, r. 1935 (d. m.)	2,397,988.17 590,181.23	317 39 15	Mahtowa, Swedish Lutheran Church, spire.
Sawyer, 1905, r. 1935 (d. m.)	2,403,944.06 619,071.43	199 03 08	Indian schoolhouse, chimney.
Atkinson, 1905, r. 1935 (d. m.)	2,419,618.77 584,789.73	211 06 15	Presbyterian Church, spire.
Cloquet, 1905, r. 1935 (d. m.)	2,445,521.45 644,079.77	342 56 16.0	Cloquet, Catholic Church, spire.
Annie, 1905, r. 1935 (d. m.)	2,497,820.85 629,021.39	129 32 53	Charles Hendrickson's house, south gable.
Carlton, 1905, r. 1935 (d. m.)	2,457,887.00 604,887.79	192 26 02	Carlton, Presbyterian Church, spire.
Dedham (Wis.), 1905 (d. m.)	2,526,565.54 565,043.32	179 42 27	Great Northern Railway, trestle.
Superior (Wis.), 1905, r. 1921 (d. m.)	2,543,652.56 608,357.29	142 47 06.0	South Superior, Webster Chair Manufacturing Co., stack.
		29 13 20*	Boylston, Great Northern Railway, signal tower.
Duluth, 1905, l. 1921 (d. m.)	2,521,672.28 648,021.63	343 12 30.5	Duluth, Union Match Co., water tank.
Mississippi River Commission (second order)			
Rice back base (M. R. C.), 1898, r. 1935 (d. m.).	2,015,232.39 262,604.41		
Gottwalt (M. R. C.), 1898, r. 1904 (d. m.)	2,019,024.18 286,785.77		
Royalton (M. R. C.), 1898, r. 1935 (d. m.)	1,995,856.17 296,162.81		

* This azimuth has been computed by means of the θ correction. (See p. 140.)

Ninety-eighth meridian to Royalton to Duluth arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Mississippi River Commission (second order)—Continued			
	Feet		
Skounter Hill (M. R. C.), 1898, r. 1935 (d. m.).	2,000,323.23 277,524.35		
Swan Creek (M. R. C.), 1898, r. 1904 (d. m.).	1,961,650.83 344,390.86		
Gregory (M. R. C.), 1898, r. 1935 (d. m.)	1,980,493.00 337,669.27		
Big Mound (M. R. C.), 1898, r. 1935 (d. m.).	1,957,051.61 448,995.14		
Oleson (M. R. C.), 1898, r. 1904 (d. m.)	2,002,659.91 460,252.49		
Supplementary points			
Hereford, elevator, 1904, r. 1935 (d.)	1,518,081.30 375,498.59		
Elbow Lake, water tower, 1904 (n. d.)	1,561,674.12 366,673.45		
Wendell, tallest elevator, 1904 (n. d.)	1,530,417.79 382,762.64		
Wendell, railway water tank, 1904 (n. d.) [1]	1,530,639.54 382,597.08		
Wendell, west elevator, 1904 (n. d.)	1,530,254.17 382,842.04		
Wendell, schoolhouse spire, 1904 (n. d.)	1,530,622.49 383,082.39		
Wendell, church spire, 1904 (n. d.)	1,530,549.85 383,322.58		
Dalton, astronomical station, 1904, l. 1935 (d. m.).	1,577,854.07 432,238.55		
Church (5 miles west of Elbow Lake), 1905 (n. d.).	1,540,220.80 364,843.20		
Church (6 miles southwest of Dalton), 1904 (n. d.).	1,567,036.39 403,589.57		
Church spire (7 miles southwest of Dalton), 1904 (n. d.).	1,541,808.91 409,325.52		
T. 129 N., R. 42 W., sec. 3, east ¼ corner, 1904 (n. d.).[1]	1,571,909.55 374,319.29		
Evansville, water tower, 1904, r. 1935 (n. d.).	1,634,329.90 370,732.00		
Evansville, Methodist Church, spire, 1904, r. 1935 (n. d.).	1,634,155.99 370,869.40		
Evansville, Catholic Church, spire, 1904, r. 1935 (n. d.).	1,633,359.62 370,854.92		
Alexandria, water tower, 1904, r. 1935 (n. d.).	1,712,728.19 324,562.29		
Alexandria, Catholic Church, spire, 1904, r. 1935 (d.).	1,713,407.38 325,608.57		
Alexandria, courthouse, spire, 1904, r. 1935 (n. d.).	1,711,899.99 324,496.91		
Osakis, water tower, 1904 (n. d.)	1,770,385.23 317,304.07		
Osakis, tall church spire, 1904 (n. d.)	1,768,782.60 317,198.80		
Osakis, low church spire, 1904 (n. d.)	1,770,386.13 317,121.73		

[1] No check on this position.

Ninety-eighth meridian to Royalton to Duluth arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
Gordon, church spire, 1904, r. 1935 (n. d.)	1,799,653.52 320,479.48		
Long Bridge, church spire, 1904, r. 1935 (n. d.).[1]	1,816,017.74 313,145.02		
Sauk Center, Catholic Church, spire, 1904, r. 1935 (d.).	1,821,490.00 269,681.83		
Long Prairie, water tank, 1904 (n. d.)	1,846,499.38 355,803.35		
Long Prairie, Catholic Church, spire, 1904 (n. d.).	1,845,442.98 355,738.59		
Little Falls, Catholic Church, spire, 1904, r. 1935 (n. d.).[1]	1,972,633.81 356,394.05		
ittle Falls, courthouse spire, 1904, r. 1935 (n. d.).[1]	1,971,983.89 355,743.65		
Little Falls, high school spire, 1904, r. 1935 (d.).[1]	1,970,904.68 355,705.68		
Little Falls, Pine Tree Lumber Co., stack, 1904, l. 1935 (n. d.).[1]	1,970,793.32 358,296.83		
Royalton, old Catholic Church, cross, 1904 (n. d.).[1]	1,988,135.57 302,532.40		
Catholic Church on ridge, tall spire, 1904 (n. d.).	1,993,765.20 255,828.97		
Rice, Catholic Church, spire, 1904, l. 1935 (d.).	2,008,805.41 274,851.93		
Rice, Protestant Church, 1904, l. 1935 (n. d.).	2,007,752.91 273,939.80		
Church (1 mile west of Alberta), 1904 (n. d.).	2,028,120.68 292,399.91		
Buckman, Catholic Church, spire, 1904, r. 1935 (n. d.).	2,039,707.68 327,097.35		
Rich Prairie, Catholic Church, spire, 1904, r. 1935 (n. d.).	2,037,252.33 357,402.25		
Lake Alexander, tallest island, highest point, 1904 (n. d.).[1]	1,925,048.02 438,941.09		
Brainerd, Brainerd Lumber Co., stack, 1905, l. 1935 (n. d.).	2,019,151.29 502,958.31		
Brainerd, railroad shops, tallest stack, 1905, r. 1935 (d.).	2,015,971.11 495,323.54		
Brainerd, Catholic Church, spire, 1905, r. 1935 (d.).[1]	2,013,749.48 496,073.09		
Brainerd, other church spire, 1905 (n. d.)[1]	2,017,362.56 496,251.14		
Aitkin, water tower, 1904, l. 1935 (d.)	2,135,651.23 558,805.97		
Aitkin, high school, 1904, l. 1935 (d.)	2,135,487.44 559,779.77		
Aitkin, jail, 1904, l. 1935 (n. d.) [1]	2,136,398.15 559,387.57		
Bethlehem, church spire, 1905 (n. d.)	2,159,643.50 538,873.06		
McGregor, Vandewater Sawmill, stack, 1905, l. 1935 (n. d.).	2,235,946.32 587,325.06		

[1] No check on this position.

Ninety-eighth meridian to Royalton to Duluth arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
McGregor, schoolhouse belfry, 1905, l. 1935 (n. d.).	2, 236, 737. 57 587, 258. 37		
Peterson's (Wm.) house, chimney, 1905 (n. d.).[1]	2, 410, 679. 43 579, 627. 42		
Cloquet, Catholic Church, spire, 1905, l. 1935 (d.).	2, 449, 202. 28 632, 086. 92		
Cloquet, paper mill stack, 1905, r. 1935 (n. d.).	2, 456, 299. 48 634, 316. 15		
Johnson's sawmill, stack (1½ mile southeast of Scanlon), 1905, l. 1935 (n. d.).	2, 459, 418. 86 626, 742. 98		
Scanlon, schoolhouse cupola, 1905, r. 1935 (d.).[2]	2, 457, 178. 32 627, 479. 65		
Scanlon, sawmill stack (southeast edge of town), 1905, l. 1935 (n. d.).[2]	2, 457, 976. 72 626, 803. 92		
Duluth, Union Match Co., water tank, 1904, r. 1935 (d.).	2, 524, 074. 68 640, 060. 24		
Duluth, Union Match Co., cupola, 1904, l. 1935 (d.).	2, 523, 946. 92 640, 109. 25		
Duluth & Superior Interstate Bridge, operator's tower, center of draw span, 1905, r. 1935 (n. d.).	2, 538, 944. 68 645, 292. 34		
Proctorknott, railway shops, water tank (Wis.), 1905, l. 1935 (n. d.).[2]	2, 507, 423. 02 642, 783. 32		
West Duluth, Irving School, chimney, 1905, r. 1935 (n. d.).[2]	2, 521, 834. 75 639, 781. 33		
Superior, State Normal School, smaller and higher tower (Wis.), 1905, r. 1935 (n. d.).[2]	2, 541, 417. 89 633, 646. 56		
Superior, Elevator K, stack (Wis.), 1905, r. 1935 (n. d.).	2, 552, 806. 27 632, 124. 98		
Superior, Elevator T, south gable (Wis.) 1905, r. 1935 (n. d.).[2]	2, 535, 973. 90 629, 835. 44		
Superior, St. Mary's Hospital, spire (Wis.) 1905, r. 1935 (n. d.).[1]	2, 541, 511. 07 636, 721. 78		
Superior, pierhead, Front Range Lighthouse (Wis.), 1905, r. 1935 (n. d.).[1]	2, 561, 961. 64 631, 135. 39		
Superior, pierhead, Rear Range Lighthouse (Wis.), 1905, r. 1935 (n. d.).[1]	2, 560, 561. 35 630, 112. 79		
Superior, Elevator S, Great Northern Railway, south gable (Wis.), 1905 r. 1935 (n. d.).	2, 536, 674. 99 642, 293. 96		
Boylston, Great Northern Railway, signal tower (Wis.), 1905 (n. d.).[1]	2, 532, 992. 26 589, 300. 03		
Duluth, Brewing & Malting Co., dome, 1905, r. 1935 (n. d.).[2]	2, 530, 972. 03 648, 019. 38		
Duluth, church spire, 1905 (n. d.)[1]	2, 537, 209. 61 659, 190. 00		
Duluth, house at head of West Fifth Avenue (chimney in center of 4-pitch roof), 1905 (n. d.).	2, 535, 296. 61 658, 996. 79		
Duluth, Elevator B, stack, 1905, r. 1935 (d.).[1]	2, 537, 356. 74 653, 475. 22		
Duluth, high school cupola, spire, 1905, r. 1935 (n. d.).[2]	2, 538, 524. 56 659, 702. 98		

[1] No check on this position.
[2] Checked by vertical angles only.

Ninety-eighth meridian to Royalton to Duluth arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
Duluth, Incline Pavilion, Weather Bureau, signal tower, 1905, r. 1935 (n. d.).[1]	2, 534, 827. 09 658, 328. 04		
Duluth, Elevator H, stack, 1905, r. 1935 (d.).[2]	2, 537, 150. 20 651, 176. 24		
Duluth, aerial bridge, southwest column of north pier, 1905, r. 1935 (n. d.).[1]	2, 540, 344. 08 656, 256. 12		
South Superior, Webster Chair Manufacturing Co., stack (Wis.), 1905, l. 1935 (n. d.)	2, 537, 232. 14 616, 811. 29		
South Superior, Bryant School, northeast corner of northwest chimney (Wis.), 1905, r. 1935 (n. d.).	2, 539, 707. 24 615, 032. 95		
South Superior, Billings School, belfry (Wis.), 1905, r. 1935 (n. d.).	2, 538, 896. 82 611, 937. 05		
Superior, ore docks, Weather Bureau signal tower (Wis.), 1905 (n. d.).	2, 558, 556. 09 628, 663. 54		
East Superior, Presbyterian Church, spire (Wis.), 1905, r. 1935 (n. d.).	2, 550, 324. 14 630, 569. 97		
East Superior, Lincoln School, flagstaff in center of tower (Wis.), 1905, l. 1935 (n. d.).	2, 547, 173. 54 634, 697. 34		
Saunders, Great Northern Railway, water tank (Wis.), 1905, l. 1935 (n. d.).	2, 537, 729. 23 604, 697. 92		
Itasca, Chicago, St. Paul, Minneapolis and Omaha Railway, elevator stack (Wis.), 1905, r. 1935 (n. d.).	2, 561, 137. 71 624, 805. 39		

Duluth to Keweenaw Point arc

Principal points		° ′ ″	
Minnesota Point south base (U. S. L. S.), 1870, r. 1935 (d. m.).	2, 556, 357. 91 632, 719. 63	331 32 42*	Superior, ore docks, Weather Bureau signal, tower.
Minnesota Point north base (U. S. L. S.), 1870, r. 1935 (d. m.).	2, 544, 207. 10 648, 441. 35	59 06 13. 9	Duluth & Superior Interstate bridge, center of draw span, operator's tower.
Lester River (U. S. L. S.), 1871 (d. m.)	2, 565, 979. 87 688, 293. 76		
Oneota River (U. S. L. S.), 1870, r. 1871 (d. m.).	2, 530, 549. 45 647, 123. 37		
Aminicon River (U. S. L. S.) (Wis.), 1871 (d. m.).	2, 599, 188. 44 626, 131. 16		
Brule River (U. S. L. S.) (Wis.), 1871 (d. m.).	2, 667, 034. 33 651, 174. 64		

Royalton to Albert Lea arc

Principal points			
Schumer, 1927, r. 1931 (d. m.)	1, 994, 008. 68 255, 948. 22	16 25 57	Reference mark no. 1.
Voight, 1927, r. 1935 (d. m.)	2, 046, 464. 68 252, 833. 14	27 14 12	Reference mark no. 1.

*This azimuth has been computed by means of the θ correction. (See p. 140.)

[1] No check on this position.
[2] Checked by vertical angles only

Royalton to Albert Lea arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Principal points—Continued			
	Feet	° ′ ″	
St. Cloud, 1927, r. 1935 (d. m.)	2,017,260.72 196,227.63	179 54 04 212 31 56.8	Reference mark no. 1. St. Cloud, Stearns County Courthouse, dome.
Duelm, 1927, r. 1935 (d. m.)	2,082,502.70 214,332.08	104 46 24	Reference mark no. 1.
Enfield, 1927, r. 1935 (d. m.)	2,084,469.66 125,771.27	189 49 22	Reference mark no. 1.
Quick, 1927 (d. m.)	2,137,438.10 182,287.32	14 02 26	Azimuth mark.
Godfrey, 1927 (d. m.)	2,173,402.98 123,523.32	209 50 24 347 14 18.3	Reference mark no. 1. Elk River, water tank (white roof).
Supplementary points			
Pierz, Catholic Church, 1927 (n. d.).[1]	2,037,245.85 357,396.47		
Pierz, highest grain elevator, 1927 (n. d.) [1]	2,033,900.36 350,000.43		
Pierz, church building (dark top), 1927 (n. d.).[1]	2,038,787.64 357,303.15		
Buckman, red wooden water tank, 1927 (n. d.).[1]	2,039,743.97 327,488.30		
Royalton, water tank, 1927 (n. d.)	1,989,418.26 302,832.51		
Royalton, Catholic Church, spire, 1927 (n. d.).	1,989,359.96 303,729.35		
White church steeple (gray top), 1927 (n. d.).[1]	2,071,660.63 305,914.57		
Rice, Powers Grain Elevator, 1927 (n. d.).[1]	2,007,938.48 274,111.76		
St. Stephens, Catholic Church, spire, 1927 (n. d.).	1,993,766.33 255,845.68		
Saint Joseph Catholic Church, south spire, 1927 (n. d.).	1,963,411.41 211,540.95		
Saint Joseph Catholic Church, north spire, 1927 (n. d.).	1,963,410.78 211,587.03		
Foley, steel water tank, 1927, r. 1935 (n. d.).	2,086,452.79 242,642.48		
St. Cloud, State Reformatory, concrete standpipe, 1927, r. 1935 (n. d.).	2,034,246.17 197,767.01		
St. Cloud, State Reformatory, smokestack, 1927, r. 1935 (n. d.).	2,034,071.40 198,081.73		
St. Cloud, State Reformatory, flagpole, 1927, r. 1935 (n. d.).	2,033,616.51 197,640.26		
St. Cloud, Old Folks Home, cupola, 1927, r. 1935 (n. d.).	2,030,972.73 196,735.78		
St. Cloud, Catholic Orphanage, cross on tower, 1927, r. 1935 (n. d.).	2,024,051.56 196,572.54		
St. Cloud, Stearns County Courthouse, dome, 1927, r. 1935 (n. d.).	2,022,513.45 204,462.47		
St. Cloud, Catholic Cathedral, tower, 1927, r. 1935 (n. d.).	2,022,596.17 205,511.62		
St. Cloud, St. Raphaels Hospital, chimney, 1927, r. 1935 (n. d.).	2,020,844.36 209,785.39		

[1] No check on this position.

Royalton to Albert Lea arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
St. Cloud, tall white smokestack, 1927, r. 1935 (n. d.).[1]	2,023,158.35 206,807.55		
St. Cloud, Breen Hotel, chimney, 1927, r. 1935 (n. d.).[1]	2,022,615.90 204,537.03		
St. Cloud, city waterworks standpipe, 1927, r. 1935 (n. d.).[1]	2,021,658.59 204,795.29		
St. Cloud, power plant smokestack, 1927, r. 1935 (n. d.).[1]	2,024,754.67 198,828.81		
St. Cloud, Old Folks Home, water tank, 1927, r. 1935 (n. d.).[1]	2,030,938.85 196,641.33		
Sauk Rapids, Catholic Church, 1927 (n. d.).[1]	2,035,544.75 212,271.82		
Sauk Rapids, water tank, 1927, (n. d.)	2,023,386.36 214,542.69		
Princeton, steel water tank, 1927, r. 1935 (n. d.).[1]	2,171,814.39 207,786.30		
Glendorado, black church spire (white belfry), 1927, r. 1935 (n. d.).[1]	2,112,380.16 212,933.90		
Elk River, water tank (white roof), 1927, r. 1935 (n. d.).	2,175,925.94 112,383.90		
Elk River, creamery smokestack, 1927, r. 1935 (n. d.).[1]	2,176,923.37 110,923.74		
Maple Lake, Catholic Church, 1927, r. 1935 (n. d.).[1]	2,064,086.04 83,943.72		
Maple Lake, water tank, 1927, r. 1935 (n. d.).	2,063,843.05 83,959.96		
Maple Lake, flagpole, 1927 (n. d.).[1]	2,064,294.74 84,042.62		
Dayton, St. John Catholic Church, spire, 1927 (n. d.).	2,189,433.46 89,285.89		
Dayton, water tank, 1927, r. 1935 (n. d.).[1]	2,195,046.88 86,137.57		
Anoka, Catholic Church, gold cross on top, 1927, r. 1935 (n. d.).[1]	2,202,561.58 73,814.89		

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc

Principal points			
Big Lake (M. R. C.), 1898 (d. m.)	2,121,123.56 122,434.90		
Shenton (M. R. C.), 1898 (d. m.)	2,106,738.94 129,632.56		
Ackerman (M. R. C.), 1898 (d. m.)	2,087,548.12 131,036.39		
Becker (M. R. C.), 1898 (d. m.)	2,098,669.74 141,008.45		
Parks (M. R. C.), 1898 (d. m.)	2,084,160.09 150,181.28		
River Bank (M. R. C.), 1898 (d. m.)	2,076,100.81 137,017.98		
Benson (M. R. C.), 1898 (d. m.)	2,063,419.69 144,331.44		

[1] No check on this position.

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*		
Clear Lake (M. R. C.), 1898 (d. m.)	2,066,054.45 161,451.36		
Clearwater (M. R. C.), 1898 (d. m.)	2,048,683.52 157,489.67		
Cater (M. R. C.), 1898 (d. m.)	2,055,639.66 176,072.01		
St. Augusta (M. R. C.), 1898 (d. m.)	2,032,318.37 175,340.34		
Reformatory (M. R. C.), 1898 (d. m.)	2,035,016.47 197,062.84		
North Star (M. R. C.), 1898 (d. m.)	2,017,253.60 196,228.02		
Sauk Rapids (M. R. C.), 1898 (d. m.)	2,015,357.67 221,420.99		
Heinen (M. R. C.), 1898 (d. m.)	1,997,512.35 213,208.24		
Gartner (M. R. C.), 1898 (d. m.)	2,001,885.28 228,692.40		
Watab (M. R. C.), 1898 (d. m.)	2,015,705.24 244,647.22		
Perry (M. R. C.), 1898 (d. m.)	2,003,349.47 253,178.97		
Anderson (M. R. C.), 1898 (d. m.)	2,016,392.08 257,542.18		
Rice River base (M. R. C.), 1898 (d. m.)	2,009,532.36 262,661.90		
Kipp (M. R. C.) 1898 (d. m.)	2,017,102.70 265,502.48		
North Prairie (M. R. C.), 1898 (d. m.)	1,973,549.32 288,168.62		
Muncy (M. R. C.), 1898 (d. m.)	1,989,079.16 308,352.14		
Hay Creek (M. R. C.), 1898 (d. m.)	1,968,388.09 317,521.09		
Hole-In-The-Day (M. R. C.), 1898 (d. m.).	1,977,552.92 364,914.07		
Little Elk (M. R. C.), 1898 (d. m.)	1,963,975.35 373,835.49		
Belle Prairie (M. R. C.), 1898 (d. m.)	1,983,811.57 384,897.22		
Fish Lake (M. R. C.), 1898 (d. m.)	1,961,779.49 390,797.94		
Laforce (M. R. C.), 1898 (d. m.)	1,982,153.19 408,961.51		
Fort Ripley (M. R. C.), 1898 (d. m.)	1,963,066.40 427,360.75		
Vallee (M. R. C.), 1898 (d. m.)	1,984,425.31 444,521.19		
Crow Wing (M. R. C.), 1898 (d. m.)	1,963,686.07 466,148.80		
Hardy (M. R. C.), 1898 (d. m.)	1,982,559.88 478,540.58		
Brainerd (M. R. C.), 1898 (d. m.)	2,018,783.63 506,860.07		

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*		
Mille Lac (M. R. C.), 1898 (d. m.)	2,028,977.09 481,881.57		
Pegg (M. R. C.), 1898 (d. m.)	2,031,980.99 499,905.17		
Brainerd south base (M. R. C.), 1898 (d. m.).	2,018,235.47 497,272.26		
Rice Lake (M. R. C.), 1898 (d. m.)	2,024,004.03 502,165.54		
Brainerd north base (M. R. C.), 1898 (d. m.).	2,018,017.27 502,668.06		
Necessity (M. R. C.), 1898 (d. m.)	2,029,657.14 514,003.95		
Parker (M. R. C.), 1898 (d. m.)	2,025,762.28 522,443.42		
Snag (M. R. C.), 1898 (d. m.)	2,041,076.20 525,346.98		
Cranberry (M. R. C.), 1898 (d. m.)	2,044,275.34 542,852.12		
Wixon (M. R. C.), 1898 (d. m.)	2,052,784.32 538,727.40		
Rabbit (M. R. C.), 1898 (d. m.)	2,052,798.02 547,034.89		
Camp (M. R. C.), 1898 (d. m.)	2,040,725.19 557,753.13		
Mission (M. R. C.), 1898 (d. m.)	2,050,854.66 570,699.35		
Mud Lake (M. R. C.), 1898 (d. m.)	2,070,147.08 554,905.77		
Surre (M. R. C.), 1898 (d. m.)	2,079,901.49 567,152.02		
Dahning (M. R. C.), 1898 (d. m.)	2,090,417.78 554,749.75		
Kemres (M. R. C.), 1898 (d. m.)	2,097,267.88 573,865.42		
Cedar Lake (M. R. C.), 1898 (d. m.)	2,111,459.80 554,091.45		
Pine Knoll (M. R. C.), 1898 (d. m.)	2,115,587.70 579,837.68		
Aitkin (M. R. C.), 1898 (d. m.)	2,141,077.10 556,921.96		
Seeley (M. R. C.), 1898 (d. m.)	2,146,853.53 572,139.57		
Stewart (M. R. C.), 1898 (d. m.)	2,148,717.71 560,913.45		
Aitkin upper base (M. R. C.), 1898 (d. m.).	2,144,655.96 563,673.50		
Aitkin lower base (M. R. C.), 1898 (d. m.).	2,139,865.69 563,397.70		
Gull Lake (M. R. C.), 1898 (d. m.)	1,968,198.62 526,294.40		
Pelican Lake (M. R. C.), 1898 (d. m.)	2,010,285.29 562,121.98		
Maple Hill (M. R. C.) 1898 (d. m.)	1,940,369.03 601,332.17		

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued			
	Feet		
Indian Creek (M. R. C.), 1898 (d. m.)	2, 002, 335. 17 642, 430. 10		
Pine Mountain Lake (M. R. C.), 1898 (d. m.).	1, 914, 878. 05 666, 474. 38		
Spider Lake (M. R. C.), 1898 (d. m.)	1, 901, 128. 16 617, 441. 47		
Hubbard (M. R. C.), 1898 (d. m.)	1, 834, 537. 27 671, 668. 22		
Chamberlin (M. R. C.), 1898 (d. m.)	1, 876, 360. 09 704, 098. 02		
Dorset (M. R. C.), 1898 (d. m.)	1, 823, 427. 07 717, 500. 81		
Mantrap (M. R. C.), 1898 (d. m.)	1, 849, 640. 27 765, 013. 65		
Eagle Lake (M. R. C.) 1898 (d. m.)	1, 785, 530. 54 734, 283. 47		
Ockerson Heights (M. R. C.), 1898 (d. m.)	1, 770, 679. 49 792, 361. 60		
School Craft (M. R. C.), 1898 (d. m.)	1, 840, 500. 70 850, 129. 09		
Prospect Hill P. B. M. (M. R. C.), 1898, (d. m.).	1, 767, 932. 06 844, 904. 46		
Squaw Lake (M. R. C.), 1898 (d. m.)	1, 749, 867. 40 817, 263. 43		
Christensen (M. R. C.), 1898 (d. m.)	1, 765, 854. 39 803, 996. 50		
Itasca P. B. M. (M. R. C.), 1898 (d. m.)	1, 766, 646. 42 815, 518. 29		
Itasca west base (M. R. C.), 1898 (d. m.)	1, 760, 511. 76 810, 108. 61		
Itasca east base (M. R. C.), 1898 (d. m.)	1, 767, 251. 67 809, 359. 39		
County Line P. B. M. (M. R. C.), 1898 (d. m.).	1, 805, 751. 37 880, 399. 54		
Marquette (M. R. C.), 1898 (d. m.)	1, 837, 105. 12 891, 135. 17		
Phillippi (M. R. C.), 1898 (d. m.)	1, 820, 727. 75 906, 710. 17		
Bemidji (M. R. C.), 1898 (d. m.)	1, 846, 069. 15 898, 863. 14		
Outlet (M. R. C.), 1898 (d. m.)	1, 855, 160. 59 907, 535. 85		
Supplementary points			
Becker, church cupola (M. R. C.), 1898 (n. d.).	2, 096, 339. 64 144, 036. 05		
Clear Lake, church (M. R. C.), 1898 (n. d.).	2, 064, 059. 80 161, 834. 75		
Clearwater, church belfry (M. R. C.) 1898 (n. d.).	2, 051, 179. 62 153, 056. 73		
Clearwater, church spire (M. R. C.) 1898 (n. d.).	2, 051, 267. 15 154, 045. 24		
St. Augusta, spire (M. R. C.), 1898 (n. d.).	2, 025, 138. 54 174, 932. 53		

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
Hospital, water tank (M. R. C.), 1898 (n. d.).	2, 030, 974. 73 196, 735. 69		
Catholic Cathedral (M. R. C.), 1898 (n. d.).	2, 022, 541. 89 203, 906. 22		
Catholic Church, spire (M. R. C.), 1898 (n. d.).	2, 022, 596. 03 205, 512. 93		
East St. Cloud, school (M. R. C.), 1898 (n. d.).	2, 026, 543. 59 205, 193. 08		
Standpipe (M. R. C.), 1898 (n. d.)	2, 021, 658. 80 204, 796. 61		
Sauk Rapids, school (M. R. C.), 1898 (n. d.).	2, 022, 004. 17 215, 620. 69		
Church spire (M. R. C.), 1898 (n. d.)	2, 035, 537. 07 260, 018. 56		
Rice, church spire (M. R. C.), 1898 (n. d.)	2, 008, 804. 91 274, 852. 64		
North Prairie, church (M. R. C.), 1898 (n. d.).	1, 974, 675. 03 291, 781. 79		
Royalton, school (M. R. C.), 1898 (n. d.)	1, 989, 774. 05 303, 472. 88		
Courthouse (M. R. C.), 1898 (n. d.)	1, 971, 984. 52 355, 742. 13		
Schoolhouse flagstaff (M. R. C.), 1898 (n. d.).	1, 972, 633. 89 356, 394. 76		
Belle Prairie Station, church (M. R. C.), 1898 (n. d.).	1, 977, 579. 45 377, 060. 46		
Crow Wing, church (M. R. C.), 1898 (n. d.).	1, 978, 550. 57 465, 139. 96		
Nit (M. R. C.), 1898 (m. n. d.)	1, 953, 432. 84 469, 230. 01		
Brainerd, Catholic Church (M. R. C.), 1898 (n. d.).	2, 013, 749. 27 496, 071. 27		
Brainerd, high school (M. R. C.), 1898 (n. d.).	2, 013, 486. 43 493, 033. 76		
Aitkin, water tank (M. R. C.), 1898 (n. d.).	2, 135, 787. 32 558, 821. 79		
Aitkin, church spire (M. R. C.), 1898 (n. d.).	2, 137, 106. 43 560, 333. 52		
Bemidji, water tank (M. R. C.), 1898 (n. d.).	1, 842, 835. 32 901, 371. 80		
Bemidji, City Hall (M. R. C.), 1898 (n. d.).	1, 843, 518. 64 902, 035. 57		

Aitkin to Bemidji traverse

Principal points		° ′ ″	
Swamp (M. R. C.) (n. d.)	2, 153, 480. 90 571, 783. 01		
Cut-off P. B. M. (M. R. C.), 1898 (d. m.)	2, 149, 399. 91 579, 238. 75	331 18 19.3	Swamp (M. R. C.).
△ 1 (M. R. C.) (n. d.)	2, 148, 691. 90 582, 511. 61	347 47 36.4	Cut-off P. B. M. (M. R. C.).

Aitkin to Bemidji traverse—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
△ 2 (M. R. C.) (n. d.)	2,150,410.18 584,411.90	42 07 13.8	△ 1 (M. R. C.).
△ 3 (M. R. C.) (n. d.)	2,149,603.31 589,700.23	351 19 29.9	△ 2 (M. R. C.).
△ 4 (M. R. C.) (n. d.)	2,149,709.48 592,104.46	2 31 42.7	△ 3 (M. R. C.).
△ 5 (M. R. C.) (n. d.)	2,152,965.68 596,057.79	39 28 36.9	△ 4 (M. R. C.).
△ 6 (M. R. C.) (n. d.)	2,155,308.87 597,947.34	51 07 02.2	△ 5 (M. R. C.).
△ 7 (M. R. C.) (n. d.)	2,156,759.04 598,963.05	54 59 32.3	△ 6 (M. R. C.).
△ 8 (M. R. C.) (n. d.)	2,158,459.97 601,056.61	39 05 32.7	△ 7 (M. R. C.).
△ 9 (M. R. C.) (n. d.)	2,159,009.41 603,508.02	12 37 59.0	△ 8 (M. R. C.).
△ 10 (M. R. C.) (n. d.)	2,160,367.37 605,142.64	39 43 05.2	△ 9 (M. R. C.).
△ 11 (M. R. C.) (n. d.)	2,159,505.71 607,678.87	341 14 07.1	△ 10 (M. R. C.).
△ 12 (M. R. C.) (n. d.)	2,160,681.60 609,106.92	39 28 07.8	△ 11 (M. R. C.).
△ 13 (M. R. C.) (n. d.)	2,162,914.08 612,576.67	32 45 27.8	△ 12 (M. R. C.).
△ 14 (M. R. C.) (n. d.)	2,165,534.28 613,983.06	61 46 31.3	△ 13 (M. R. C.).
△ 15 (M. R. C.) (n. d.)	2,166,688.54 613,702.68	103 39 11.6	△ 14 (M. R. C.).
△ 16 (M. R. C.) (n. d.)	2,168,875.27 614,883.61	61 37 44.5	△ 15 (M. R. C.).
△ 17 (M. R. C.) (n. d.)	2,171,519.01 614,552.19	97 08 43.2	△ 16 (M. R. C.).
△ 18 (M. R. C.) (n. d.)	2,175,068.69 616,731.84	58 26 54.1	△ 17 (M. R. C.).
△ 19 (M. R. C.) (n. d.)	2,177,704.95 616,809.64	88 18 34.6	△ 18 (M. R. C.).
△ 20 (M. R. C.) (n. d.)	2,181,274.55 618,591.75	63 28 10.2	△ 19 (M. R. C.).
△ 21 (M. R. C.) (n. d.)	2,183,443.68 619,588.46	65 19 16.8	△ 20 (M. R. C.).
△ Strand P. B. M. (M. R. C.), 1898 (d. m.).	2,186,056.22 619,322.19	95 49 10.2	△ 21 (M. R. C.).
△ 22 (M. R. C.) (n. d.)	2,187,889.91 620,385.14	59 54 00.2	△ Strand P. B. M. (M. R. C.).
△ 23 (M. R. C.) (n. d.)	2,190,227.52 621,740.39	59 53 47.8	△ 22 (M. R. C.).
△ 24 (M. R. C.) (n. d.)	2,190,204.48 622,516.49	358 17 58.4	△ 23 (M. R. C.).
△ 25 (M. R. C.) (n. d.)	2,191,658.53 624,381.35	37 56 38.1	△ 24 (M. R. C.).
△ 26 (M. R. C.) (n. d.)	2,195,555.28 625,343.67	76 07 41.2	△ 25 (M. R. C.).

Aitkin to Bemidji traverse—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
△ 27 (M. R. C.) (n. d.)	2,196,344.52 626,156.64	44 09 05.3	△ 26 (M. R. C.).
△ Carlson P. B. M. (M. R. C.), 1898 (d. m.).	2,198,680.22 628,839.23	41 02 44.6	△ 27 (M. R. C.).
△ 28 (M. R. C.) (n. d.)	2,199,207.73 630,352.29	19 13 15.0	△ Carlson P. B. M. (M. R. C.).
△ 29 (M. R. C.) (n. d.)	2,201,284.99 632,887.62	39 19 43.1	△ 28 (M. R. C.)
△ 30 (M. R. C.) (n. d.)	2,202,253.34 633,249.10	69 31 46.8	△ 29 (M. R. C.).
△ 31 (M. R. C.) (n. d.)	2,205,394.41 634,797.13	63 45 51.5	△ 30 (M. R. C.).
△ 32 (M. R. C.) (n. d.)	2,207,745.43 636,287.45	57 37 45.3	△ 31 (M. R. C.).
△ 33 (M. R. C.) (n. d.)	2,209,528.73 636,292.30	89 50 39.0	△ 32 (M. R. C.).
△ 34 (M. R. C.) (n. d.)	2,211,429.60 637,768.98	52 09 30.1	△ 33 (M. R. C.).
△ 35 (M. R. C.) (n. d.)	2,212,594.62 638,957.23	44 26 04.0	△ 34 (M. R. C.).
△ 36 (M. R. C.) (n. d.)	2,213,500.94 642,009.72	16 32 12.4	△ 35 (M. R. C.).
△ 37 (M. R. C.) (n. d.)	2,214,165.01 643,976.52	18 39 24.2	△ 36 (M. R. C.).
△ 38 (M. R. C.) (n. d.)	2,215,308.09 645,347.77	39 48 53.0	△ 37 (M. R. C.).
△ 39 (M. R. C.) (n. d.)	2,216,446.24 646,945.88	35 27 28.4	△ 38 (M. R. C.).
△ 40 (M. R. C.) (n. d.)	2,218,001.10 648,490.77	45 11 03.4	△ 39 (M. R. C.).
△ 41 (M. R. C.) (n. d.)	2,218,808.60 650,498.74	21 54 26.6	△ 40 (M. R. C.).
△ 42 (M. R. C.) (n. d.)	2,219,700.48 654,831.27	11 37 56.0	△ 41 (M. R. C.).
△ 43 (M. R. C.) (n. d.)	2,219,893.11 656,078.83	8 46 38.9	△ 42 (M. R. C.).
△ 44 (M. R. C.) (n. d.)	2,220,741.42 659,937.01	12 24 01.7	△ 43 (M. R. C.).
△ 45 (M. R. C.) (n. d.)	2,221,371.86 662,657.89	13 02 43.7	△ 44 (M. R. C.).
△ 46 (M. R. C.) (n. d.)	2,221,703.23 664,088.49	13 02 29.2	△ 45 (M. R. C.).
△ Big Lagoon P. B. M. (M. R. C.), 1898 (d. m.).	2,221,974.80 664,854.82	19 30 47.4	△ 46 (M. R. C.).
△ 47 (M. R. C.) (n. d.)	2,221,985.82 665,840.42	0 38 26.2	△ Big Lagoon P. B. M. (M. R. C.).
△ 48 (M. R. C.) (n. d.)	2,222,912.11 667,775.26	25 34 56.7	△ 47 (M. R. C.).
△ 49 (M. R. C.) (n. d.)	2,224,736.68 669,713.52	43 16 09.8	△ 48 (M. R. C.).
△ 50 (M. R. C.) (n. d.)	2,224,898.72 671,181.88	6 17 50.5	△ 49 (M. R. C.).
△ 51 (M. R. C.) (n. d.)	2,225,613.63 672,260.59	33 32 03.3	△ 50 (M. R. C.).

Aitkin to Bemidji traverse—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
△ 52 (M. R. C.) (n. d.)	2,225,256.67 673,450.21	343 17 50.9	△ 51 (M. R. C.).
△ 53 (M. R. C.) (n. d.)	2,224,531.81 673,956.66	304 56 29.4	△ 52 (M. R. C.).
△ 54 (M. R. C.) (n. d.)	2,223,896.45 674,396.87	304 42 58.3	△ 53 (M. R. C.).
△ 55 (M. R. C.) (n. d.)	2,222,867.99 675,550.69	318 17 15.8	△ 54 (M. R. C.).
△ 56 (M. R. C.) (n. d.)	2,222,271.22 676,456.94	326 38 05.6	△ 55 (M. R. C.).
△ 57 (M. R. C.) (n. d.)	2,221,533.66 677,576.82	326 37 51.0	△ 56 (M. R. C.).
△ 58 (M. R. C.) (n. d.)	2,220,825.02 679,482.23	339 35 57.7	△ 57 (M. R. C.).
△ 59 (M. R. C.) (n. d.)	2,220,505.23 680,453.32	341 46 21.9	△ 58 (M. R. C.).
△ 60 (M. R. C.) (n. d.)	2,220,005.88 682,896.03	348 26 47.5	△ 59 (M. R. C.).
△ 61 (M. R. C.) (n. d.)	2,220,503.75 684,918.95	13 49 35.5	△ 60 (M. R. C.).
△ 62 (M. R. C. (n. d.)	2,220,822.92 686,203.33	13 57 19.4	△ 61 (M. R. C.).
△ 63 (M. R. C. (n .d.)	2,220,107.92 687,445.39	330 04 22.2	△ 62 (M. R. C.).
△ 64 (M. R. C.) (n. d.)	2,220,372.87 689,175.87	8 42 17.4	△ 63 (M. R. C.).
△ 65 (M. R. C.) (n. d.)	2,220,318.72 690,340.09	357 20 13.2	△ 64 (M. R. C.).
△ 66 (M. R. C.) (n. d.)	2,221,147.78 691,043.14	49 42 06.4	△ 65 (M. R. C.).
△ 67 (M. R. C.) (n. d.)	2,221,490.81 692,957.17	10 09 38.2	△ 66 (M. R. C.).
△ 68 (M. R. C.) (n. d.)	2,222,436.18 695,461.06	20 41 04.4	△ 67 (M. R. C.).
△ 69 (M. R. C.) (n. d.)	2,225,354.04 696,213.80	75 32 03.9	△ 68 (M. R. C.).
△ 70 (M. R. C.) (n. d.)	2,226,757.18 697,361.43	50 43 12.8	△ 69 (M. R. C.).
△ 71 (M. R. C.) (n. d.)	2,228,377.07 698,490.98	55 06 42.9	△ 70 (M. R. C.).
△ 72 (M. R. C.) (n. d.)	2,230,601.86 701,025.39	41 16 39.9	△ 71 (M. R. C.).
△ 73 (M. R. C.) (n. d.)	2,232,816.05 703,545.24	41 18 20.7	△ 72 (M. R. C.).
△ 74 (M. R. C.) (n. d.)	2,233,860.58 704,950.26	36 37 41.2	△ 73 (M. R. C.).
△ 75 (M. R. C.) (n. d.)	2,235,012.08 707,901.62	21 18 49.3	△ 74 (M. R. C.).
△ 76 (M. R. C.) (n. d.)	2,236,854.78 710,573.58	34 35 30.6	△ 75 (M. R. C.).
△ 77 (M. R. C.) (n. d.)	2,235,963.03 713,425.26	342 38 06.0	△ 76 (M. R. C.).
△ 78 (M. R. C.) (n. d.)	2,236,233.02 716,059.43	5 51 07.6	△ 77 (M. R. C.).

Aitkin to Bemidji traverse—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
△ 79 (M. R. C.) (n. d.)	2,238,954.14 718,633.61	46 35 22.2	△ 78 (M. R. C.).
△ 80 (M. R. C.) (n. d.)	2,238,489.53 720,677.60	347 11 38.2	△ 79 (M. R. C.).
△ 81 (M. R. C.) (n. d.)	2,238,253.32 722,552.81	352 49 14.1	△ 80 (M. R. C.).
△ 82 (M. R. C.) (n. d.)	2,238,025.61 724,347.08	352 46 02.2	△ 81 (M. R. C.).
△ 83 (M. R. C.) (n. d.)	2,238,468.74 725,810.72	16 50 39.0	△ 82 (M. R. C.).
△ Fiessen P. B. M. (M. R. C.), 1898 (d. m.).	2,239,180.27 728,474.51	14 57 18.8	△ 83 (M. R. C.)
△ 84 (M. R. C.) (n. d.)	2,239,173.50 730,088.17	359 45 34.6	△ Fiessen P. B. M. (M. R. C.).
△ 85 (M. R. C.) (n. d.)	2,238,641.79 732,156.07	345 34 48.6	△ 84 (M. R. C.).
△ 86 (M. R. C.) (n. d.)	2,237,630.19 734,929.60	339 57 41.0	△ 85 (M. R. C.).
△ 87 (M. R. C.) (n. d.)	2,234,960.68 736,593.28	301 55 54.5	△ 86 (M. R. C.).
△ 88 (M. R. C.) (n. d.)	2,235,385.01 738,622.02	11 48 49.1	△ 87 (M. R. C.).
△ 89 (M. R. C.) (n. d.)	2,232,982.47 740,653.61	310 13 04.4	△ 88 (M. R. C.).
△ 90 (M. R. C.) (n. d.)	2,230,306.26 741,987.51	296 29 34.8	△ 89 (M. R. C.).
△ 91 (M. R. C.) (n. d.)	2,227,768.05 744,295.98	312 17 10.0	△ 90 (M. R. C.).
△ 92 (M. R. C.) (n. d.)	2,225,552.72 745,355.09	295 33 05.9	△ 91 (M. R. C.).
△ 93 (M. R. C.) (n. d.)	2,224,057.63 747,389.32	323 41 07.4	△ 92 (M. R. C.).
△ 94 (M. R. C.) (n. d.)	2,221,107.36 748,658.55	293 16 40.0	△ 93 (M. R. C.).
△ 95 (M. R. C.) (n. d.)	2,219,029.42 749,264.90	286 16 02.7	△ 94 (M. R. C.).
△ 96 (M. R. C.) (n. d.)	2,215,524.97 750,791.76	293 32 32.5	△ 95 (M. R. C.).
△ 97 (M. R. C.) (n. d.)	2,214,171.25 752,329.78	318 38 48.2	△ 96 (M. R. C.).
△ Split Hand P. B. M. (M. R. C.), 1898 (d. m.).	2,214,385.41 754,293.99	6 13 20.8	△ 97 (M. R. C.).
△ 98 (M. R. C.) (n. d.)	2,212,746.16 756,616.39	324 47 02.1	△ Split Hand P. B. M. (M. R. C.).
△ 99 (M. R. C.) (n. d.)	2,210,967.58 756,577.73	268 45 17.2	△ 98 (M. R. C.).
△ 100 (M. R. C.) (n. d.)	2,210,477.52 758,901.90	348 05 36.2	△ 99 (M. R. C.).
△ 101 (M. R. C.) (n. d.)	2,209,970.00 761,017.17	346 30 28.7	△ 100 (M. R. C.).
△ 102 (M. R. C.) (n. d.)	2,209,912.68 762,540.44	357 50 42.0	△ 101 (M. R. C.).
△ 103 (M. R. C.) (n. d.)	2,209,512.52 764,783.94	349 53 12.6	△ 102 (M. R. C.).

Aitkin to Bemidji traverse—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
△ 104 (M. R. C.) (n. d.)	2,209,182.62 766,627.44	349 51 14.9	△ 103 (M. R. C.).
△ 105 (M. R. C.) (n. d.)	2,208,797.26 769,578.14	352 33 33.5	△ 104 (M. R. C.).
△ 106 (M. R. C.) (n. d.)	2,209,293.43 772,334.74	10 12 13.0	△ 105 (M. R. C.).
△ 107 (M. R. C.) (n. d.)	2,209,905.29 774,020.59	19 56 52.0	△ 106 (M. R. C.).
△ 108 (M. R. C.) (n. d.)	2,209,856.41 775,897.80	358 30 30.4	△ 107 (M. R. C.).
△ 109 (M. R. C.) (n. d.)	2,209,750.32 777,236.18	355 28 04.0	△ 108 (M. R. C.).
△ 110 (M. R. C.) (n. d.)	2,209,544.55 780,018.08	355 46 10.8	△ 109 (M. R. C.).
△ 111 (M. R. C.) (n. d.)	2,208,524.97 783,394.15	343 11 44.1	△ 110 (M. R. C.).
△ Five Pines P. B. M. (M. R. C.), 1898 (d. m.).	2,205,229.96 784,923.20	294 53 37.2	△ 111 (M. R. C.).
△ 112 (M. R. C.) (n. d.)	2,206,039.04 787,857.41	15 24 56.4	△ Five Pines P. B. M. (M. R. C.).
△ 113 (M. R. C.) (n. d.)	2,206,718.97 790,199.57	16 11 16.9	△ 112 (M. R. C.).
Porcupine (M. R. C.), 1898 (d. m.)	2,202,276.05 792,030.20	292 23 35.8	△ 113 (M. R. C.).
Blackberry B. M. (M. R. C.), 1898 (d. m.)	2,209,697.51 799,400.67	45 11 51.0	Porcupine (M. R. C.).
Halfway (M. R. C.) (n. d.)	2,203,542.83 803,381.56	302 53 42.3	Blackberry B. M. (M. R. C.).
La Prairie (M. R. C.), 1898 (d. m.)	2,193,758.58 809,722.89	302 56 52.5	Halfway (M. R. C.).
Grand Rapids B. M. (M. R. C.), 1898 (d. m.).	2,181,040.48 815,738.26	295 18 47.1	La Prairie (M. R. C.).
Race Track (M. R. C.), 1898 (d. m.)	2,180,284.34 814,238.37	206 45 14.6	Grand Rapids B. M. (M. R. C.).
Courthouse (M. R. C.) (n. d.)	2,179,867.97 815,970.30	346 28 55.8	Race Track (M. R. C.).
Grand Rapids (M. R. C.), 1898 (d. m.)	2,172,272.68 815,827.36	268 55 18.6	Courthouse (M. R. C.).
Dam (M. R. C.) (n. d.)	2,165,121.42 821,635.22	309 04 49.3	Grand Rapids (M. R. C.).
Pokegama (M. R. C.) (n. d.)	2,160,406.73 823,828.15	294 56 39.9	Dam (M. R. C.).
Cohasset (M. R. C.) (n. d.)	2,156,001.98 825,876.62	294 56 28.4	Pokegama (M. R. C.).
Littlefield (M. R. C.) (n. d.)	2,153,885.03 827,149.74	301 01 20.7	Cohasset (M. R. C.).
Hull (M. R. C.) (n. d.)	2,145,831.88 831,861.62	300 19 54.5	Littlefield (M. R. C.).
Summit (M. R. C.) (n. d.)	2,138,581.67 836,105.59	300 20 34.5	Hull (M. R. C.).
Deer River (M. R. C.), 1898 (d. m.)	2,114,249.40 850,271.19	300 12 24.6	Summit (M. R. C.).
Old Road (M. R. C.), 1898 (d. m.)	2,109,305.07 853,263.89	301 11 08.3	Deer River (M. R. C.)

Aitkin to Bemidji traverse—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued			
	Feet	° ′ ″	
Papoose (M. R. C.) (n. d.)	2,107,537.51 853,359.31	273 05 24.2	Old Road (M. R. C.).
Squaw (M. R. C.) (n. d.)	2,102,173.33 852,677.30	262 45 15.1	Papoose (M. R. C.).
Buck (M. R. C.) (n. d.)	2,092,940.49 851,503.23	262 45 10.9	Squaw (M. R. C.).
Starke (M. R. C.), 1898 (d. m.)	2,089,738.68 851,095.90	262 44 59.5	Buck (M. R. C.).
Wigwam B. M. (M. R. C.), 1898 (d. m.)	2,082,775.90 846,679.33	237 36 45.4	Starke (M. R. C.).
Ball Club (M. R. C.) (n. d.)	2,080,693.17 846,754.36	272 03 47.4	Wigwam B. M. (M. R. C.).
Tomahawk B. M. (M. R. C.), 1898 (d. m.)	2,077,188.42 847,165.34	276 41 17.4	Ball Club (M. R. C.).
Mississip B. M. (M. R. C.), 1898 (d. m.)	2,068,524.89 848,184.90	276 42 43.0	Tomahawk B. M. (M. R. C.)
Divide (M. R. C.), 1898 (d. m.)	2,056,764.14 849,574.60	276 44 20.6	Mississip B. M. (M. R. C.).
Cranberry (M. R. C.) (n. d.)	2,051,786.29 850,162.03	276 43 49.0	Divide (M. R. C.).
Nishka (M. R. C.) (n. d.)	2,040,750.12 851,466.27	276 44 23.6	Cranberry (M. R. C.).
Windego (M. R. C.) (n. d.)	2,029,288.24 852,821.37	276 44 33.3	Nishka (M. R. C.).
Norway Grove (M. R. C.), 1898 (d. m.)	2,020,301.89 853,888.25	276 46 14.1	Windego (M. R. C.).
Bena (M. R. C.), 1898 (d. m.)	2,008,405.09 855,303.63	276 47 04.8	Norway Grove (M. R. C.).
Bigosh (M. R. C.), 1898 (d. m.)	2,004,483.06 855,920.34	278 56 10.2	Bena (M. R. C.).
Portage (M. R. C.), 1898 (d. m.)	1,992,098.96 857,932.18	279 13 38.2	Bigosh (M. R. C.).
Longsight (M. R. C.) (n. d.)	1,979,980.71 859,899.69	279 13 19.3	Portage (M. R. C.).
Schley (M. R. C.), 1898 (d. m.)	1,974,467.22 860,792.41	279 11 50.1	Longsight (M. R. C.).
Bug Nog (M. R. C.) (n. d.)	1,964,328.69 862,435.36	279 12 17.2	Schley (M. R. C.).
Santiago (M. R. C.) (n. d.)	1,951,298.39 864,545.59	279 11 56.6	Bug Nog (M. R. C.).
Cuba (M. R. C.), 1898 (d. m.)	1,940,528.99 864,679.02	270 42 35.4	Santiago (M. R. C.).
Lamond (M. R. C.), 1898 (d. m.)	1,928,400.77 864,802.01	270 34 51.6	Cuba (M. R. C.).
Pike Bay (M. R. C.), 1898 (d. m.)	1,926,341.92 865,834.38	296 37 50.1	Lamond (M. R. C.).
Sand Pit (M. R. C.) (n. d.)	1,924,589.16 865,952.20	273 50 44.2	Pike Bay (M. R. C.).
Chippewa (M. R. C.), 1898 (d. m.)	1,922,621.95 866,858.96	294 44 48.2	Sand Pit (M. R. C.).
Depot (M. R. C.) (n. d.)	1,910,163.34 867,060.79	270 55 41.2	Chippewa (M. R. C.).
Wye (M. R. C.), 1898 (d. m.)	1,908,137.28 867,082.83	270 37 23.7	Depot (M. R. C.).
Spring (M. R. C.), 1898 (d. m.)	1,902,928.07 867,176.91	271 02 04.8	Wye (M. R. C.).

Aitkin to Bemidji traverse—Continued

Station	x coordinate; y coordinate	Plane azimuth			Mark
Principal points—Continued	*Feet*	°	′	″	
Dump (M. R. C.) (n. d.)	1,893,900.59 867,322.03	270	55	15.5	Spring (M. R. C.).
Ferris (M. R. C.) (n. d.)	1,887,089.74 867,429.85	270	54	25.0	Dump (M. R. C.).
Midge (M. R. C.) (n. d.)	1,882,529.94 867,501.40	270	53	56.3	Ferris (M. R. C.).
Grace (M. R. C.) (n. d.)	1,878,347.95 869,133.09	291	18	51.4	Midge (M. R. C.).
Bates (M. R. C.) (n. d.)	1,867,903.84 873,207.41	291	18	40.0	Grace (M. R. C.).
Kirkpatrick (M. R. C.) (n. d.)	1,866,144.44 874,924.07	314	17	44.0	Bates (M. R. C.).
Pillsbury (M. R. C.) (n. d.)	1,864,543.01 876,647.90	317	06	29.0	Kirkpatrick (M. R. C.).
Rosby (M. R. C.) (n. d.)	1,860,698.45 880,790.01	317	08	01.0	Pillsbury (M. R. C.).
Stone Point (M. R. C.) (n. d.)	1,858,949.03 882,947.06	320	57	25.6	Rosby (M. R. C.).
Omega (M. R. C.) (n. d.)	1,853,880.90 889,196.53	320 141	57 03	32.4 27.9	Stone Point (M. R. C.). Bemidji (M. R. C.).
Supplementary points					
U. S. E. 202 B. M. (d. m.)	2,145,704.09 579,732.87	227	04	38*	△1 (M. R. C.).
Biggar P. B. M. (M. R. C.), 1898 (d. m.)	2,150,969.97 589,429.33	101	12	37*	△3 (M. R. C.).
Sutton P. B. M. (M. R. C.), 1898 (d. m.)	2,157,528.93 599,882.69	39	56	05*	△7 (M. R. C.).
U. S. E. 209 B. M. (d. m.)	2,160,344.04 606,591.72	359 142	04 21	34* 45*	△10 (M. R. C.). △11 (M. R. C.).
Waldeck P. B. M. (M. R. C.), 1898 (d. m.).	2,161,806.83 610,824.56	33	13	44*	△12 (M. R. C.).
Foulds P. B. M. (M. R. C.), 1898 (d. m.)	2,174,467.88 616,430.24	243	20	37*	△18 (M. R. C.).
School P. B. M. (M. R. C.), 1898 (d. m.)	2,211,119.68 637,533.99	232	49	52*	△34 (M. R. C.).
Pat P. B. M. (M. R. C.), 1898 (d. m.)	2,216,908.31 647,130.74	68	11	55*	△39 (M. R. C.).
Midway P. B. M. (M. R. C.), 1898 (d. m.).	2,221,330.74 679,178.66	120	58	22*	△58 (M. R. C.).
Wells P. B. M. (M. R. C.), 1898 (d. m.)	2,221,412.44 691,276.69	48	34	32*	△66 (M. R. C.).
Stone P. B. M. (M. R. C.), 1898 (d. m.)	2,230,479.30 700,401.87	191	07	23*	△72 (M. R. C.).
Vicinity P. B. M. (M. R. C.), 1898 (d. m.).	2,233,617.22 740,866.88	71	25	30*	△89 (M. R. C.).
Slip P. B. M. (M. R. C.), 1898 (d. m.)	2,223,639.47 747,655.72	302	30	03*	△93 (M. R. C.).
Hamilton P. B. M. (M. R. C.), 1898 (d. m.).	2,208,984.43 768,144.28	352	33	21*	△104 (M. R. C.).
Strawberry P. B. M. (M. R. C.), 1898 (d. m.).	2,204,357.94 794,463.45	331	01	32*	△113 (M. R. C.).
Zwick (M. R. C.), 1898 (d. m.)	2,200,507.26 797,765.60	310	36	54*	Strawberry P. B. M. (M. R. C.).
Dam B. M. (M. R. C.), 1898 (d. m.)	2,165,090.36 821,660.39				

* This azimuth has been computed by means of the θ correction. (See p. 140.)

Aitkin to Bemidji traverse—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*	° ′ ″	
Cohasset B. M. (M. R. C.), 1898 (d. m.)	2,155,496.57 826,111.64	294 56 30*	Cohasset (M. R. C.).
Round House B. M. (M. R. C.), 1898 (d. m.).	2,113,974.71 847,411.90	185 29 13*	Deer River (M. R. C.).
Camp (M. R. C.) (n. d.)	2,113,984.35 849,953.40	219 49 23*	Deer River (M. R. C.).
△34 Fanbel (M. R. C.) (n. d.)	1,924,233.24 866,083.07	290 11 00*	Sand Pit (M. R. C.).
Fanbel B. M. (M. R. C.) (B. M. 342 (U. S. E.)) (d. m.).	1,924,220.16 866,081.80		
Hub (Chip) (M. R. C.) (n. d.)	1,922,622.51 866,892.90		
East Base (M. R. C.) (n. d.)	1,915,563.11 867,007.22	270 55 40*	Hub (chip) (M. R. C.).
West Base (M. R. C.) (n. d.)	1,914,163.30 867,029.91	270 55 39*	East Base (M. R. C.).
△35 Fanbel (M. R. C.) (n. d.)	1,914,538.72 865,166.63	168 36 29*	West Base (M. R. C.).
U. S. E. 347 B. M. (d. m.)	1,914,622.94 865,174.46		
Cass Lake (M. R. C.), 1898 (d. m.)	1,910,137.31 868,003.28	65 17 12*	Wye (M. R. C.).
Wye P. B. M. (M. R. C.), 1898 (d. m.)	1,907,833.47 866,457.01	205 53 43*	Wye (M. R. C.).
Hub (M. R. C.) (n. d.)	1,882,520.85 867,478.15		
Check point (M. R. C.) (n. d.)	1,881,216.81 867,987.28	291 19 33*	Hub (M. R. C.).
Midge P. B. M. (M. R. C.), 1898 (d. m.)	1,881,231.68 868,057.52		
△ 1a (M. R. C.) (n. d.)	1,901,698.41 867,777.14	296 01 05*	Spring (M. R. C.).
△ 2a (M. R. C.) (n. d.)	1,901,652.66 869,676.92	358 37 17*	△ 1a (M. R. C.).
△ 3a (M. R. C.) (n. d.)	1,900,395.40 871,171.93	319 56 15*	△ 2a (M. R. C.).
△ 4a (M. R. C.) (n. d.)	1,900,360.73 873,153.35	358 59 54*	△ 3a (M. R. C.).
△ 5a (M. R. C.) (n. d.)	1,899,289.88 874,240.03	315 25 10*	△ 4a (M. R. C.).
△ 6a (M. R. C.) (n. d.)	1,898,263.58 874,963.16	305 10 15*	△ 5a (M. R. C.).
△ 7a (M. R. C.) (n. d.)	1,896,848.45 876,074.97	308 09 22*	△ 6a (M. R. C.).
△ 8a (M. R. C.) (n. d.)	1,896,128.81 877,613.16	334 55 38*	△ 7a (M. R. C.).
△ 9a (M. R. C.) (n. d.)	1,894,887.40 881,532.34	342 25 27*	△ 8a (M. R. C.).
△ 10a (M. R. C.) (n. d.)	1,894,430.68 882,835.72	340 41 27*	△ 9a (M. R. C.).
Wolf Lake (M. R. C.), 1898 (d. m.)	1,893,448.65 884,275.71	325 42 28*	△ 10a (M. R. C.).

* This azimuth has been computed by means of the θ correction. (See p. 140.)

NORTHERN ZONE

Ninety-eighth meridian arc

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points	*Feet*	° ′ ″	
Eglon, 1906, r. 1935 (d. m.)	1, 210, 705. 62 139, 890. 56	14 28 00	Windmill.
Riverton, 1906, r. 1935 (d. m.)	1, 160, 677. 19 140, 202. 03	7 20 46 317 02 04*	Reference mark. T. 139 N., R. 46 W., sec. 23, south ¼ corner.
Keene, 1906, r. 1935 (d. m.)	1, 171, 639. 55 205, 215. 43	205 36 55	Deserted house, chimney.
Morken, 1906, r. 1935 (d. m.)	1, 126, 003. 55 214, 983. 82	141 55 18	Carlson's house, tall chimney.
Syre, 1906, r. 1935 (d. m.)	1, 234, 106. 49 270, 243. 39	60 49 00	Reference mark.
Borup, 1906, r. 1935 (d. m.)	1, 154, 813. 27 267, 967. 01	19 30 26*	Borup, church spire.
Wicklow, 1906, r. 1935 (d. m.)	1, 156, 640. 38 338, 988. 66	62 16 32* 301 13 07	B. M. K 5. Jacob Hadler's house, chimney.
Gary, 1906, r. 1935 (d. m.)	1, 214, 399. 62 342, 682. 40	290 37 22	Reference mark.
Fertile, 1906, r. 1935 (d. m.)	1, 207, 579. 37 390, 761. 59	251 32 17. 7 241 47 29*	Fertile, standpipe. Fertile, large elevator.
Beltrami, 1906, r. 1935 (d. m.)	1, 138, 582. 56 394, 412. 06	92 05 40 91 37 47*	Reference mark. T. 147 N., R. 47 W., sec. 23, southeast corner.
Tilden, 1905, r. 1935 (d. m.)	1, 204, 916. 69 455, 633. 65	1 13 08 8 22 28*	Reference mark. T. 149 N., R. 44 W., sec. 19, southeast corner.
Andover, 1906, r. 1935 (d. m.)	1, 136, 281. 34 463, 592. 43	85 22 03	Reference mark.
Ives, 1906, l. 1935 (d. m.)	1, 178, 342. 94 542, 080. 00	339 59 39	Dorothy, elevator.
Shirley, 1906, r. 1935 (d. m.)	1, 120, 815. 10 516, 749. 19		
Sherack, 1906, r. 1935 (d. m.)	1, 110, 005. 15 575, 858. 23	83 47 13*	B. M. D 6.
Bray, 1906, r. 1935 (d. m.)	1, 174, 495. 70 589, 993. 75		
Warren, 1906, r. 1935 (d. m.)	1, 114, 505. 47 649, 784. 07	90 27 24*	T. 155 N., R. 47 W., sec. 19, southeast corner.
Viking, 1906, r. 1935 (d. m.)	1, 174, 773. 96 660, 880. 04	115 11 18	Windmill.
Wright, 1906, l. 1935. (d. m.)	1, 165, 160. 58 711, 845. 06	246 45 04	House, chimney.
Argyle, 1906, r. 1935 (d. m.)	1, 096, 550. 81 703, 817. 34	183 12 00* 187 44 24	B. M. O 6. House, east chimney.
Stephen east base, 1906, r. 1935 (d. m.)	1, 118, 338. 42 742, 987. 03	1 53 53	Reference mark.
Donaldson, 1907, r. 1935 (d. m.)	1, 081, 221. 05 767, 750. 26	179 10 20. 2 268 55 03*	Donaldson, tall elevator. T. 158 N., R. 48 W., sec 6, northeast corner.
Stephen west base, 1905, r. 1935 (d. m.)	1, 088, 969. 72 735, 720. 66	92 27 21	Reference mark.

* This azimuth has been computed by means of the θ correction. (See page 140).

Ninety-eighth meridian arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
Deer, 1907, r. 1935 (d. m.)	1,143,646.44 777,465.85		
Jupiter, 1907, r. 1935 (d. m.)	1,117,023.18 828,182.20	346 49 12.6	Church spire (7 miles northwest of station Deer.
Skane, 1907, l. 1935 (d. m.)	1,053,943.24 827,788.88	17 00 47*	Church spire (3 miles south of station Skane).
Granville, 1907, r. 1935 (d. m.)	1,103,675.75 888,439.62	319 56 31.7 326 42 24*	Lancaster, tall elevator. Lancaster, school, cupola.
Hallock, 1907, r. 1935 (d. m.)	1,077,009.44 860,392.81	17 35 45.2	Hallock, courthouse, tower.
Hill, 1907 (d. m.)	1,033,164.59 881,418.13		
States, 1907 (d. m.)	1,033,424.89 937,267.76	93 11 13*	United States-Canada Boundary Monument No. 837.
Canada, 1907, r. 1935 (d. m.)	1,091,115.92 934,300.42		
Ridgeville (G. S. of C.) (Canada), 1924 (d. m.).	1,069,518.36 962,366.30		
Humboldt (G. S. of C.), 1923, r. 1935 (d. m.).	1,033,183.61 881,456.61		
Pembina (G. S. of C.) (N. Dak.), 1925 (d. m.).	993,215.20 926,050.51		
Letellier (G. S. of C.) (Canada), 1925 (d. m.).	999,739.58 982,297.19	90 34 23*	D. L. S. No. 44 (G. S. of C.).
Supplementary points			
Rollag, church spire, 1906, r. 1935 (n. d.) [1]	1,213,262.86 103,496.79		
Downer, northwest elevator, 1906, r. 1935 (n. d.).	1,151,920.40 110,613.96		
Downer, southeast elevator, 1906, r. 1935 (n. d.).	1,152,041.95 110,335.02		
Sabin, elevator, 1906, r. 1935 (n. d.) [1]	1,107,019.11 121,332.36		
Church spire (2 miles east of station Eglon), 1906, r. 1935 (n. d.).	1,219,633.17 137,750.89		
Muskoda, elevator, 1906, r. 1935 (n. d.)	1,173,115.46 152,788.76		
T. 139 N., R. 46 W., sec. 23, south ¼ corner, 1906 (d. m.).[1]	1,161,178.92 139,662.95		
Glyndon, elevator, 1906, r. 1935 (n. d.) [1]	1,129,944.12 155,790.90		
Glyndon, church spire, 1906, r. 1935 (n. d.). [1]	1,130,707.45 156,092.23		
Fargo, Catholic Church, spire (N. Dak.), 1906, r. 1935 (n. d.).	1,077,984.41 161,454.03		
Fargo, brewery cupola (N. Dak.), 1906, l. 1935 (n. d.).[1]	1,079,522.74 157,196.91		
Fargo, large square tower (N. Dak.), 1906 (n. d.).[1]	1,079,078.93 159,370.44		
Fargo, large round tower (N. Dak.), 1906 (n. d.).[1]	1,079,950.81 159,480.01		

* This azimuth has been computed by means of the θ correction. (See p. 140.)

[1] No check on this position.

Ninety-eighth meridian arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
Church spire (8 miles northeast of Fargo), 1906, l. 1935 (n. d.).[1]	1, 111, 363. 06 189, 250. 49		
Averill, elevator, 1906 r. 1935 (n. d.)	1, 139, 219. 79 189, 558. 59		
Hitterdal, tall church spire, 1906 (n. d.) [1]	1, 211, 527. 48 189, 689. 15		
Hitterdal, elevator, 1906 (n. d.) [1]	1, 212, 016. 74 190, 673. 01		
Hitterdal, low church spire, 1906 (n. d.).[1]	1, 211, 842. 34 189, 207. 81		
Church spire (3 miles northeast of station Keene) 1906, r. 1935 (n. d.).	1, 186, 247. 33 212, 518. 25		
T. 141 N., R. 47 W., sec. 10, southeast corner, 1906, l. 1935 (d. m.).[1]	1, 126, 101. 85 215, 022. 96		
Felton, elevator, 1906 (n. d.)	1, 151, 439. 12 229, 869. 89		
Felton, church spire, 1906, r. 1935 (n. d.)	1, 152, 791. 17 229, 783. 33		
Felton, schoolhouse cupola, 1906, l. 1935 (n. d.).	1, 152, 952. 69 229, 805. 93		
Borup, church spire, 1906, r. 1935 (n. d.)	1, 154, 401. 91 266, 805. 68		
Borup, elevator (slender top), 1906 (n. d.)	1, 153, 032. 11 266, 905. 91		
Borup, tall elevator, 1906, r. 1935 (n. d.)	1, 153, 032. 85 267, 088. 92		
B. M. E 5, 1906, l. 1935 (d. m.)[1]	1, 440, 428. 93 803, 005. 46		
Wheatville, red elevator (slender top), 1906, r. 1935 (n. d.).[1]	1, 153, 745. 92 283, 147. 41		
Wheatville, yellow elevator, 1906, r. 1935 (n. d.).[1]	1, 153, 746. 52 283, 286. 32		
Church spire (5 miles northeast of Borup), 1906, r. 1935 (n. d.).[1]	1, 171, 708. 47 292, 323. 99		
Twin Valley, standpipe, 1906, r. 1935 (n. d.).	1, 215, 720. 35 293, 179. 55		
Twin Valley, white church spire, 1906, r. 1935 (n. d.).	1, 215, 096. 19 293, 104. 30		
Twin Valley, tall elevator (slender top), 1906, l. 1935 (n. d.).[1]	1, 215, 991. 19 292, 972. 37		
Ada, standpipe, 1906, l. 1935 (n. d.)	1, 152, 549. 74 311, 016. 30		
Ada, schoolhouse cupola, 1906, l. 1935 (n. d.).	1, 153, 750. 36 309, 609. 17		
Ada, courthouse tower, 1906, r. 1935 (n. d.)	1, 153, 384. 59 309, 936. 47		
Hadler, south elevator, 1906, r. 1935 (n. d.).	1, 149, 139. 86 335, 991. 82		
Hadler, north elevator, 1906, r. 1935 (n. d.)	1, 149, 115. 11 336, 169. 49		
B. M. K 5, 1906, r. 1935 (d. m.).[1]	1, 155, 022. 06 338, 138. 01		

[1] No check on this position.

Ninety-eighth meridian arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
Gary, church spire, 1906, r. 1935 (n. d.)	1, 215, 485. 66 333, 820. 22		
Gary, north elevator 1906, r. 1935 (n. d.)	1, 214, 872. 33 334, 522. 93		
Gary, south elevator 1906, r. 1935 (n. d.)	1, 214, 847. 21 333, 449. 01		
Lockhart, church spire, 1906, l. 1935 (n. d.).	1, 149, 418. 78 356, 399. 57		
Lockhart, elevator, 1906, r. 1935 (n. d.)	1, 146, 924. 32 361, 978. 56		
Flaming, elevator, 1906, l. 1935 (n. d.)	1, 215, 878. 63 365, 914. 89		
Rindal, church spire, 1906, r. 1935 (n. d.).[1]	1, 227, 298. 67 364, 545. 86		
Fertile, large elevator, 1906, r. 1935 (n. d.).[1]	1, 214, 236. 02 394, 331. 75		
Fertile, small elevator, 1906, r. 1935 (n. d.).[1]	1, 214, 339. 69 394, 764. 52		
Fertile, standpipe, 1906, r. 1935 (n. d.)	1, 214, 960. 10 393, 225. 67		
Beltrami, south elevator (slender top), 1906, r. 1935 (n. d.).	1, 152, 766. 95 398, 611. 42		
Beltrami, north elevator, 1906, l. 1935 (d.)	1, 152, 790. 49 399, 223. 43		
T. 147 N., R. 47 W., sec. 23, southeast corner, 1906, l. 1935 (d. m.).[1]	1, 135, 407. 29 394, 502. 45		
Climax, tall elevator, 1906, r. 1935 (n. d.) [1]	1, 083, 931. 56 425, 956. 35		
Russia, elevator, 1906, r. 1935 (n. d.)	1, 147, 129. 29 429, 623. 78		
Melvin, elevator, 1906, r. 1935 (n. d.)	1, 190, 468. 49 425, 802. 67		
Eldred, southwest low elevator, 1906, r. 1935 (n. d.).[1]	1, 093, 313. 09 452, 407. 07		
Eldred, northeast tall elevator, 1906, r. 1935 (n. d.).[1]	1, 093, 925. 73 452, 757. 22		
Kittson, elevator, 1906, l. 1935 (n. d.)	1, 139, 889. 13 451, 167. 86		
T. 149 N., R. 44 W., sec. 19, southeast corner, 1906 (d. m.).[1]	1, 204, 837. 63 455, 098. 49		
T. 149 N., R. 46 W., sec. 18, southwest corner, 1906 (d. m.).[1]	1, 136, 318. 46 463, 433. 23		
Crookston, standpipe, 1906, r. 1935 (n. d.)	1, 137, 206. 44 484, 328. 62		
Crookston, high school cupola, 1906, l. 1935 (n. d.).	1, 138, 900. 55 484, 785. 60		
Crookston, Catholic Church, spire, 1906, r. 1935 (n. d.).	1, 137, 935. 79 483, 053. 87		
Crookston, courthouse dome, 1906, r. 1935 (n. d.).	1, 139, 348. 83 485, 904. 45		
Crookston, brickyard, chimney, 1906, l. 1935 (n. d.).	1, 140, 290. 25 480, 791. 70		

[1] No check on this position.

Ninety-eighth meridian arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued			
	Feet		
Euclid, school belfry, 1906, r. 1935 (n. d.)	1, 133, 009. 74 557, 227. 26		
Euclid, tall brown elevator, 1906, r. 1935 (n. d.).	1, 133, 853. 25 556, 675. 90		
Euclid, low red elevator, 1906, r. 1935 (n. d.).	1, 133, 760. 44 556, 945. 78		
T. 153 N., R. 47 W., sec. 31, southeast corner, 1906 (d. m.).[1]	1, 110, 051. 58 575, 784. 83		
Sherack, tall elevator, 1906, r. 1935 (n. d.)	1, 098, 933. 31 576, 417. 05		
Sherack, low elevator, 1906, r. 1935 (n. d.) [1]	1, 098, 947. 91 575, 673. 01		
B. M. D 6, 1906, l. 1935 (d. m.) [1]	1, 109, 317. 93 575, 783. 89		
Tabor, west church spire, 1906, r. 1935 (n. d.).[1]	1, 078, 898. 28 598, 326. 55		
Tabor, east church spire, 1906, r. 1935 (n. d.).[1]	1, 081, 243. 96 598, 207. 15		
Angus, tall elevator (low top), 1906, r. 1935 (n. d.).	1, 120, 064. 50 596, 597. 55		
Angus, tall elevator (tall top), 1906, r. 1935 (n. d.).	1, 119, 888. 57 597, 132. 31		
Brush Farm Elevator, 1906, r. 1935 (n. d.)	1, 110, 744. 06 602, 805. 15		
Lone elevator (3 miles north of Angus), 1906, r. 1935 (n. d.).	1, 119, 374. 86 610, 843. 57		
Roon, elevator, 1906, r. 1935 (n. d.)	1, 110, 957. 15 622, 979. 32		
Warren, standpipe, 1906, r. 1935 (n. d.)	1, 104, 178. 50 641, 371. 33		
Warren, courthouse tower, 1906, r. 1935 (n. d.).	1, 105, 663. 77 639, 642. 46		
Warren, school cupola, 1906, r. 1935 (n. d.).	1, 105, 756. 19 640, 383. 16		
T. 155 N., R. 47 W., sec. 19, southeast corner, 1906, l. 1935 (d. m.) [1]	1, 113, 173. 32 649, 795. 26		
Radium, low east elevator, 1906, r. 1935 (n. d.).	1, 144, 306. 28 649, 678. 47		
Radium, tall elevator, 1906, r. 1935 (n. d.)	1, 144, 197. 03 649, 648. 84		
Radium, west elevator (large top), 1906, r. 1935 (n. d.).	1, 143, 974. 73 649, 589. 47		
Viking, west elevator (slender top), 1906, r. 1935 (n. d.).	1, 194, 495. 28 643, 516. 65		
Viking, east elevator (large top), 1906, r. 1935 (n. d.).	1, 194, 755. 38 643, 406. 24		
Viking, low elevator, 1906 (n. d.)	1, 194, 601. 64 643, 472. 35		
Woodward Farm Elevator, 1906 (n. d.) [1]	1, 090, 346. 72 650, 896. 84		
Luna, elevator, 1906, r. 1935 (n. d.)	1, 100, 455. 49 661, 359. 82		

[1] No check on this position.

Ninety-eighth meridian arch—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
Argyle, electric-light plant, smokestack, 1906, l. 1935 (n. d.).	1,096,342.00 690,082.63		
Argyle, tallest elevator, 1906, r. 1935 (n. d.).	1,096,034.52 690,478.68		
Argyle, tallest church spire, 1906, r. 1935 (n. d.).	1,094,213.91 690,689.76		
B. M. O 6, 1906, r. 1935 (d. m.) [1]	1,096,622.62 705,098.56		
Stephen, low church spire, 1906, r. 1935 (n. d.).	1,083,571.14 733,472.87		
Stephen, tall church spire, 1906, r. 1935 (n. d.).	1,083,535.80 734,006.13		
Stephen, school cupola, 1906, l. 1935 (n. d.).	1,083,295.82 733,740.48		
Stephen west base longitude station, 1907 (d. m.).[1]	1,089,001.88 735,722.75		
B. M. T 6, 1906 (d. m.) [1]	1,088,874.29 735,638.66		
Church spire (8 miles northwest of station Wright), 1906, r. 1935 (n. d.).	1,133,959.94 744,198.11		
Church spire (5 miles northeast of station Stephen west base), 1906, r. 1935 (n. d.).	1,105,103.72 758,906.71		
T. 158 N., R. 48 W., sec. 6, northeast corner, 1906, l. 1935 (d. m.).[1]	1,082,365.73 767,772.09		
Donaldson, church spire, 1906, l. 1935 (n. d.).[1]	1,081,939.88 778,457.72		
Donaldson, tall elevator, 1906, r. 1935 (n. d.).	1,081,058.21 779,021.25		
Kennedy, school cupola, 1907, r. 1935 (n. d.).	1,079,610.83 802,997.80		
Kennedy, church spire, 1907, r. 1935 (n. d.).	1,079,809.46 802,918.40		
Church spire (7 miles northwest of station Deer), 1907, r. 1935 (n. d.).	1,121,629.43 808,512.21		
Church spire (9 miles northwest of station Deer), 1907, r. 1935 (n. d.).	1,110,951.59 808,757.18		
Church spire (3 miles south of station Skane), 1907, r. 1935 (n. d.).[1]	1,049,157.37 812,147.18		
T. 160 N., R. 49 W., sec. 8, northwest corner, 1907, l. 1935 (d. m.).[1]	1,053,905.76 827,862.92		
Halma, elevator, 1907, r. 1935 (n. d.)[1]	1,154,824.69 807,384.04		
Chatham, elevator, 1907, r. 1935 (n. d.)[1]	1,077,455.61 831,495.02		
Hallock, tall church spire, 1907, r. 1935 (n. d.).	1,073,461.62 852,118.49		
Hallock, courthouse tower, 1907, r. 1935 (n. d.).	1,074,267.57 851,747.18		
Hallock, standpipe, 1907, r. 1935 (n. d.)	1,073,956.92 851,122.22		
Church spire (6 miles east-southeast of station Hallock), 1907, r. 1935 (n. d.).	1,102,669.00 846,141.18		

[1] No check on this position.

Ninety-eighth meridian arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
Church spire (4 miles east of station Hallock), 1907, r. 1935 (n. d.).	1,099,321.68 862,148.53		
Lancaster, tall elevator, 1907, r. 1935 (n. d.)	1,109,186.00 881,886.21		
Lancaster, school cupola, 1907, l. 1935 (n. d.).[1]	1,108,743.01 880,723.89		
Northcote, tall elevator, 1907, l. 1935 (n. d.)	1,061,403.07 878,209.46		
Northcote, church spire, 1907, r. 1935 (n. d.).	1,061,308.12 879,486.44		
Joliette, tall church spire (N. Dak.), 1907 (n. d.).	1,006,312.56 872,017.64		
Joliette, tall elevator (N. Dak.), 1907 (n. d.).	1,005,988.68 873,087.36		
Northern Pacific Railway, tall elevator (N. Dak.), 1907 (n. d.).	1,006,844.95 892,891.80		
Humboldt, church spire, 1907, r. 1935 (n. d.).	1,039,775.73 908,083.55		
Humboldt, school cupola, 1907, r. 1935 (n. d.).	1,040,328.16 908,821.36		
Orleans, school cupola, 1907, r. 1935 (n. d.)	1,078,819.81 907,642.43		
Grampian, lone elevator, 1907, r. 1935 (n. d.).	1,049,489.04 922,432.72		
Pembina, square open tower (N. Dak.), 1907 (n. d.).	1,003,986.62 926,782.28		
St. Vincent Junction, elevator, 1907, r. 1935 (n. d.).	1,015,501.37 926,209.94		
St. Vincent, bell tower, 1907 (n. d.)------	1,004,823.93 926,950.99		
St. Vincent, tower (round top), 1907 (n. d.).	1,004,996.87 927,504.77		
Emerson, tall church spire (Canada), 1907 (n. d.).	1,013,467.82 940,476.51		
Emerson, tower (flat top) (Canada), 1907 (n. d.).	1,012,872.59 940,285.61		
United States-Canada Boundary Monument No. 848, 1907, r. 1935 (d. m.).[1]	1,091,198.77 934,296.25		
United States-Canada Boundary Monument No. 837, 1907, r. 1935 (d. m.).[1]	1,033,065.56 937,287.72		
D. L. S. No. 44 (G. S. of C.) (Canada), 1925 (d. m.).	999,244.42 982,302.26		
Letellier, elevator (G. S. of C.) (Canada), 1925 (d.).	993,909.30 988,628.08		

[1] No check on this position.

International Boundary triangulation and traverse

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points	*Feet*	° ′ ″	
Tolstoi (G. S. of C.) (Canada), 1924 (d. m.)	1,111,232.22 960,173.20	93 00 34.4	Ridgeville (G. S. of C.).
Stuartburn (G. S. of C.) (Canada), 1924 (d. m.).	1,134,819.92 958,974.57	92 54 32.5	Tolstoi (G. S. of C.).
Vita (G. S. of C.) (Canada), 1924 (d. m.)	1,154,842.29 980,149.65	43 23 50.2	Stuartburn (G. S. of C.).
Read (G. S. of C.) (Canada), 1924 (d. m.)	1,176,959.12 978,979.12	93 01 46.4	Vita (G. S. of C.).
Ingram (G. S. of C.) (Canada), 1924 (d. m.).	1,188,030.23 978,511.11	92 25 14.3	Read (G. S. of C.).
Caliento (G. S. of C.) (Canada), 1924 (d. m.).	1,207,408.12 977,888.40	91 50 26.1	Ingram (G. S. of C.).
Menisino (G. S. of C.) (Canada), 1924 (d. m.).	1,271,482.46 957,369.48	107 45 25.0	Caliento (G. S. of C.).
Piney (G. S. of C.) (Canada), 1924 (d. m.)	1,282,965.57 954,552.53	103 46 59.5	Menisino (G. S. of C.).
Fast (G. S. of C.) (Canada), 1924 (d. m.)	1,297,780.72 952,479.83	97 57 51.2	Piney (G. S. of C.).
McQuade (G. S. of C.) (Canada), 1924 (d. m.).	1,310,697.11 952,083.33	91 45 29.8	Fast (G. S. of C.).
Slow (G. S. of C.) (Canada), 1924 (d. m.)	1,325,865.90 945,888.57	112 12 52.4	McQuade (G. S. of C.).
Guilbault (G. S. of C.) (Canada), 1924 (d. m.).	1,331,657.53 941,082.72	129 41 08.2	Slow (G. S. of C.).
South Junction (G. S. of C.) (Canada), 1924 (d. m.).	1,361,352.26 937,593.04	96 42 09.3	Guilbault (G. S. of C.).
Swamp (G. S. of C.) (Canada), 1924 (d. m.).	1,367,513.51 934,884.62	113 43 47.2	South Junction (G. S. of C.).
Tod (G. S. of C.) (Canada), 1924 (d. m.)	1,375,844.37 935,961.08	82 38 14.6	Swamp (G. S. of C.).
Soft (G. S. of C.) (Canada), 1924 (d. m.)	1,379,918.00 938,083.40	62 28 51.4	Tod (G. S. of C.).
Sprague (G. S. of C.) (Canada), 1924 (d. m.).	1,387,918.39 935,091.51	110 30 15.1	Soft (G. S. of C.).
Rita (G. S. of C.) (Canada), 1924 (d. m.)	1,406,606.00 932,263.79	98 36 16.0	Sprague (G. S. of C.).
Middleboro (G. S. of C.) (Canada), 1924 (d. m.).	1,438,452.06 927,299.95	98 51 33.8	Rita (G. S. of C.).
Muskeg (G. S. of C.) (Canada), 1924 (d. m.).	1,451,566.75 925,299.76	98 40 18.0	Middleboro (G. S. of C.).
Warroad north base (I. B. C.) (Boundary Monument 909 (I. B. C.)) (Minn.-Canada) 1912, r. 1934 (d. m.).	1,453,818.72 919,614.01	339 52 44	Azimuth mark (1934).
Warroad south base (I. B. C.), 1912, r. 1934 (d. m.).	1,464,781.39 891,246.80	158 45 52	Azimuth mark
Thunder (I. B. C.) (Canada), 1917, r. 1934 (d. m.).	1,484,849.44 922,089.67		
West Willow (I. B. C.), 1917 (d. m.)	1,504,497.22 880,490.12		
Stoney (I. B. C.), 1913, r. 1917 (d. m.)	1,513,505.72 973,433.21		
Miller (I. B. C.), 1917, r. 1921 (d. m.)	1,553,910.84 907,387.92		

International Boundary triangulation and traverse—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
Garden (I. B. C.), 1913, r. 1917 (d. m.)	1,574,296.77 984,670.83		
Big (I. B. C.) (Canada), 1913, r. 1921 (d. m.).	1,611,387.94 945,475.45		
Reference monument 48 (I. B. C.), 1917 (d. m.).	1,616,427.38 870.864.08		
Burton (I. B. C.) (Canada), 1913, r. 1921 (d. m.).	1,635,732.93 897,133.18		
War, 1923 (d. m.)	1,465,478.84 889,309.87	160 11 49.4	Warroad south base (I. B. C.).
Road, 1923 (d. m.)	1,467,648.63 881,230.35	164 58 03.6	War.
Red, 1923 (d. m.)	1,476,106.92 874,122.04	130 02 36.8	Road.
Full, 1923 (d. m.)	1,503,404.31 856,224.95	123 15 00.7	Red.
Dout, 1923 (d. m.)	1,521,503.24 844,294.91	123 23 28.2	Full.
Wet, eccentric, 1923 (d.)	1,531,087.18 840,648.26	110 49 53.8	Dout.
Wet, 1923 (d. m.)	1,531,083.39 840,638.72		
May, 1923 (d. m.)	1,544,298.81 835,735.19	110 23 56.0	Wet eccentric.
Spur, 1923 (d. m.)	1,563,813.58 828,332.39	110 46 26.1	May.
Hen eccentric, 1923 (d.)	1,578,020.31 823,005.91	110 33 08.5	Spur.
Hen, 1923 (d. m.)	1,578,029.89 823,035.40		
Ton, 1923 (d. m.)	1,593,016.02 817,402.48	110 29 20.9	Hen eccentric.
Bon, 1923 (d. m.)	1,602,902.34 813,700.84	110 31 36.9	Ton.
Brush, 1923 (d. m.)	1,611,552.77 810,414.40	110 48 09.4	Bon.
Baudette, 1923 (d. m.)	1,637,651.37 811,722.50	87 07 50.4	Brush.
Toad (Canada), 1923, r. 1925 (d. m.)	1,641,698.71 814,226.14	58 15 34.3	Baudette.
Gip (Canada), 1923 (d. m.)	1,654,393.55 813,987.47	91 04 37.4	Toad.
Fritz (Canada), 1923 (d. m.)	1,659,797.19 813,891.30	91 01 10.6	Gip.
Ray (Canada), 1923 (d. m.)	1,673,974.28 813,686.13	90 49 44.8	Fritz.
Henri (Canada), 1923 (d. m.)	1,698,131.36 813,229.78	91 04 56.1	Ray.
Reddy (Canada), 1923, r. 1925 (d. m.)	1,703,190.44 811,569.42	108 10 10.3	Henri.
Myrtle (Canada), 1923, r. 1925 (d. m.)	1,719,166.80 806,404.43	107 54 55.7	Reddy.
Delf (Canada), 1923, r. 1925 (d. m.)	1,736,993.79 800,653.63	107 52 45.0	Myrtle.

International Boundary triangulation and traverse—Continued

Station	x coordinate; y coordinate	Plane azimuth			Mark
Principal points—Continued	*Feet*	°	′	″	
Pipp (Canada), 1923 (d. m.)	1,763,668.43 791,935.25	108	05	58.4	Delf.
Grace (Canada), 1923 (d. m.)	1,780,002.37 786,625.38	108	00	30.3	Pipp.
Zip (Canada), 1923 (d. m.)	1,792,605.99 782,496.84	108	08	13.7	Grace
Rip (Canada), 1923 (d. m.)	1,798,036.14 781,701.48	98	19	58.5	Zip.
Pat (Canada), 1923 (d. m.)	1,803,733.54 781,823.41	88	46	26.4	Rip.
Rub (Canada), 1923 (d. m.)	1,809,419.74 780,351.24	104	30	55.0	Pat.
Jesse (Canada), 1923 (d. m.)	1,812,235.80 779,547.72	105	55	31.1	Rub.
Walt (Canada), 1923, r. 1925 (d. m.)	1,815,978.36 779,421.21	91	56	09.7	Jesse.
Pine (Canada), 1923, r. 1925 (d. m.)	1,825,938.16 774,675.38	115	28	39.8	Walt.
La Belle (Canada), 1923 (d. m.)	1,842,963.85 773,333.80	94	30	19.6	Pine.
Stone (Canada), 1923 (d. m.)	1,848,128.45 772,928.01	94	29	33.3	La Belle.
States (Canada), 1923 (d. m.)	1,863,203.98 771,698.87	94	39	40.1	Stone.
Rob (Canada), 1923 (d. m.)	1,886,440.28 771,542.62	90	23	07.0	States.
Pig (Canada), 1923 (d. m.)	1,892,914.27 771,449.49	90	49	27.0	Rob.
Fort Frances west base eccentric (Canada), 1923 (d. m.).	1,898,117.59 771,439.37	90	06	41.2	Pig.
Fort (Canada), 1923, r. 1925 (d. m.)	1,929,405.30 771,193.54	90	27	00.6	Fort Frances west base eccentric.
Zero (Canada), 1923 (d. m.)	1,937,649.90 779,275.38	45	34	16.2	Fort.
Lake, 1923, r. 1925 (d. m.)	1,963,386.85 776,124.68	96	58	45.8	Zero.
Rainy Lake 14 (I. B. C.) (Raney) (Canada), 1913, r. 1925 (d. m.).	1,979,118.84 777,851.50	83	44	09.6	Lake.
Rainy Lake 37 (I. B. C.) (Water) (Canada), 1913, r. 1925 (d. m.).	1,980,143.08 774,766.00	161	38	10.6	Rainy Lake 14 (I. B. C.) (Raney).
Roll (Canada), 1923, r. 1925 (d. m.)	2,000,766.60 776,479.83	85	14	58.5	Rainy Lake 37 (I. B. C.) (Water).
Sea (Canada), 1923, r. 1925 (d. m.)	2,038,612.31 769,322.50	100	42	33.2	Roll.
Breaul, 1923, r. 1925 (d. m.)	2,048,968.38 763,354.67	119	57	11.9	Sea.
Manitou (Canada), 1923, r. 1925 (d. m.)	2,068,730.19 757,914.04	105	23	34.0	Breaul.
Boundary (I. B. C.) (Late) (Canada), 1914, r. 1925 (d. m.).	2,091,662.11 746,715.74	116	01	39.2	Manitou.
Joy (Canada), 1923, r. 1925 (d. m.)	2,113,515.31 745,680.38	92	42	45.1	Boundary (I. B. C.) (Late).
Dog (Canada), 1923, r. 1925 (d. m.)	2,114,938.91 733,645.28	173	15	14.3	Joy.

International Boundary triangulation and traverse—Continued

Station	x coordinate; y coordinate	Plane azimuth			Mark
Principal points—Continued	*Feet*	°	′	″	
Bell (Canada), 1923 (d. m.)	2,114,176.66 729,687.23	190	54	02.5	Dog.
Knox (Canada), 1923 (d. m.)	2,112,869.92 727,468.99	210	30	06.7	Bell.
Nix (Canada), 1923 (d. m.)	2,110,964.69 727,977.28	284	56	16.2	Knox.
Bat, 1923, r. 1925 (d. m.)	2,106,841.14 729,420.93	289	17	42.3	Nix.
Doran (Canada), 1923, r. 1925 (d. m.)	2,106,324.53 728,295.65	204	39	34.6	Bat.
Bees Kees, 1923, r. 1925 (d. m.)	2,096,881.50 728,514.13	271	19	31.4	Doran.
Reference monument 340 (I. B. C.) (Pluss), 1915, r. 1925 (d. m.).	2,096,358.71 723,621.72	186	05	57.6	Bees Kees.
Harry, 1923, r. 1925 (d. m.)	2,094,306.75 715,784.71	194	40	20.5	Reference monument 34 (I. B. C.) (Pluss).
Rye (Canada), 1923, r. 1925 (d. m.)	2,097,225.56 715,168.38	101	55	23.9	Harry.
Deer (Canada), 1923, r. 1925 (d. m.)	2,108,051.39 706,951.04	127	12	01.1	Rye.
Randolph, 1923, r. 1924 (d. m.)	2,109,367.72 701,421.91	166	36	31.6	Deer
Namakan west base (Canada), 1923, r. 1924 (d. m.).	2,117,091.79 708,790.45				
Grassy, 1923, r. 1925 (d. m.)	2,125,255.73 705,240.71				
Portage, 1924 (d. m.)	2,134,259.15 695,700.71				
Namakan east base, 1923, r. 1924 (d. m.)	2,141,747.60 710,958.92				
Tower (Canada), 1923, r. 1924 (d. m.)	2,147,080.83 721,683.23				
Fish (I. B. C.) (Canada), 1915, r. 1924 (d. m.).	2,185,499.78 690,455.14				
Vermilion (I. B. C.) (Canada), 1915, r. 1924 (d. m.).	2,172,952.71 662,746.26				
Center II (I. B. C.) (Canada), 1915, r. 1924 (d. m.).	2,192,953.33 674,724.53				
Loon, 1924 (d. m.)	2,211,463.43 657,136.56				
Burnt (I. B. C.), 1915, r. 1924 (d. m.)	2,204,721.31 684,136.85				
Granite, 1924 (d. m.)	2,228,189.91 662,599.68				
Timber, 1924 (d. m.)	2,246,758.01 638,647.60				
Cedar (Canada), 1924 (d. m.)	2,250,037.15 681,947.95				
Shortiss (I. B. C.) (Canada), 1915, r. 1924 (d. m.).	2,282,084.07 652,678.25				
Falls (I. B. C.), 1915, r. 1924 (d. m.)	2,283,164.04 622,497.04				
Lister (I. B. C.), 1915, r. 1924 (d. m.)	2,291,186.63 616,079.50				

International Boundary triangulation and traverse—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Principal points—Continued			
	Feet		
Ark (Canada), 1924 (d. m.)	2,326,281.53 645,220.37		
Hargo (I. B. C.), 1913, r. 1924 (d. m.)	2,325,258.63 614,874.55		
Glint (I. B. C.) (Canada), 1914, r. 1924 (d. m.).	2,354,063.62 623,865.70		
Beaver (Canada), 1924 (d. m.)	2,373,940.75 605,406.91		
Rock, 1924, r. 1934 (d. m.)	2,361,423.10 578,246.55		
Canada (G. S. of C.) (Canada), 1917, r. 1924 (d. m.).	2,384,578.76 586,391.30		
Found (I. B. C.), 1914, r. 1934 (d. m.)	2,393,502.10 556,382.89		
Emily (I. B. C.) (Canada), 1914, r. 1924 (d. m.).	2,389,006.24 575,596.67		
Fang (I. B. C.), 1913, r. 1915 (d. m.)	2,411,258.80 561,851.31		
Gone (I. B. C.) (Canada), 1915 (d. m.)	2,399,789.08 582,124.54		
Had (I. B. C.), 1913, r. 1915 (d. m.)	2,390,464.63 573,530.42		
Garb (I. B. C.) (Canada), 1913, r. 1915 (d. m.).	2,401,553.50 579,137.54		
Sunday (G. S. of C.) (Canada), 1916 (d. m.).	2,417,897.55 604,745.79		
Paddy (G. S. of C.) (Canada), 1915, r. 1917 (d. m.).	2,454,039.96 589,511.42		
Ewing (G. S. of C.), 1915 (d. m.)	2,452,299.58 569,635.75		
Trouble (G. S. of C.) (Canada), 1916 (d. m.).	2,449,954.02 613,101.17		
Saunders (G. S. of C.), 1916 (d. m.)	2,475,470.35 582,696.29		
Dorothy (G. S. of C.) (Canada), 1916 (d. m.).	2,480,738.10 616,210.75		
Poly (G. S. of C.), 1916 (d. m.)	2,514,222.82 585,444.25		
Helga (G. S. of C.), 1916 (d. m.)	2,509,558.87 620,016.05		
Paulsen (G. S. of C.), 1915, r. 1934 (d. m.)	2,550,809.41 588,432.90		
Mabel (I. B. C.), 1912, r. 1916 (d. m.)	2,542,218.72 620,071.92		
Vera (I. B. C.) (Canada), 1912, r. 1917 (d. m.).	2,520,285.69 640,257.96		
Stuart (G. S. of C.) (Canada), 1915 (d. m.)	2,556,903.02 648,783.33		
Light (G. S. of C.) (Canada), 1915 (d. m.)	2,573,340.25 638,894.49		
John (G. S. of C.) (Canada), 1915 (d. m.)	2,558,255.98 667,311.29		
Mowe (G. S. of C.) (Canada), 1915 (d. m.)	2,572,598.82 689,073.60		

International Boundary triangulation and traverse—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*		
Gunflint (G. S. of C.) (Canada), 1915, r. 1917 (d. m.).	2, 613, 653. 59 608, 044. 76		
Addie (G. S. of C.) (Canada), 1914, r. 1917 (d. m.).	2, 666, 713. 49 621, 749. 91		
Greenwater (G. S. of C.) (Canada), 1914 (d. m.).	2, 648, 066. 06 738, 632. 85		
Echo (G. S. of C.) (Canada), 1913 (d. m.).	2, 750, 020. 74 691, 510. 79		
Whitefish (G. S. of C.) (Canada), 1912, r. 1917 (d. m.).	2, 770, 584. 43 621, 628. 41		
Devilfish (G. S. of C.), 1913, r. 1934 (d. m.).	2, 733, 505. 55 554, 117. 22		
Pigeon (G. S. of C.), 1911, r. 1934 (d. m.).	2, 820, 716. 92 556, 180. 01		
Blake (G. S. of C.) (Canada), 1913 (d. m.).	2, 880, 916. 10 639, 675. 96		

Ninety-eighth meridian to Royalton to Duluth arc

Principal points		° ′ ″	
Tamarack, 1905, r. 1935 (d. m.)	1, 976, 785. 24 75, 586. 85	139 51 50	Dan McGary's house, east gable.
Wright, 1905, r. 1935 (d. m.)	2, 012, 050. 32 86, 392. 25		
Bachelor, 1905, r. 1935 (d. m.)	2, 027, 195. 54 57, 456. 30	215 13 11	Grant Rice's house, chimney.
Island, 1905, r. 1935 (d. m.)	2, 057, 288. 35 54, 917. 75	154 17 38	Mr. Photo's house, south gable.
Cromwell, 1905, r. 1935 (d. m.)	2, 075, 878. 15 78, 184. 56	56 55 52	Two-story farmhouse, northwest gable.
Mahtowa, 1905, r. 1935 (d. m.)	2, 108, 995. 57 39, 540. 00	318 28 42	Mahtowa, Swedish Lutheran Church, spire.
Sawyer, 1905, r. 1935 (d. m.)	2, 115, 367. 41 68, 346. 71	199 52 34	Indian schoolhouse, chimney.
Atkinson, 1905, r. 1935 (d. m.)	2, 130, 550. 77 33, 837. 07	211 55 37	Presbyterian Church, spire.
Cloquet, 1905, r. 1935 (d. m.)	2, 157, 305. 50 92, 759. 42	343 45 30. 0	Cloquet, Catholic Church, spire.
Annie, 1905, r. 1935 (d. m.)	2, 209, 391. 71 76, 952. 92	130 21 54	Charles Hendrickson's house, south gable.
Carlton, 1905, r. 1935 (d. m.)	2, 169, 110. 54 53, 388. 30	193 15 14	Carlton, Presbyterian Church, spire.
Dedham (Wis.), 1905 (d. m.)	2, 237, 227. 61 12, 559. 63	180 31 21	Great Northern Railway, trestle.
Superior (Wis.), 1905, r. 1921 (d. m.)	2, 254, 932. 22 55, 635. 17	30 02 10* 143 35 56. 3	Boylston, Great Northern Railway, signal tower. South Superior, Webster Chair Manufacturing Co., stack.
Duluth, 1905, l. 1921 (d. m.)	2, 233, 514. 74 95, 614. 11	344 01 25. 8 70 37 51*	Duluth, Union Match Co., water tank. Proctorknott, railway shops, water tank.

* This azimuth has been computed by means of the θ correction. (See p. 140.)

Ninety-eighth meridian to Royalton to Duluth arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Supplementary points	*Feet*		
Peterson's (Wm.) house, chimney, 1905 (n. d.).[1]	2, 121, 536. 34 28, 802. 65		
Cloquet, Catholic Church, spire, 1905, l. 1935 (d.).	2, 160, 814. 69 80, 713. 42		
Cloquet, paper mill stack, 1905, r. 1935 (n. d.).	2, 167, 944. 10 82, 841. 13		
Johnson's sawmill, stack (½ mile southeast of Scanlon), 1905, l. 1935 (n. d.).	2, 170, 955. 25 75, 222. 97		
Scanlon, schoolhouse cupola, 1905, r. 1935 (d.).[2]	2, 168, 725. 14 75, 991. 74		
Scanlon, sawmill stack (southeast edge of town), 1905, l. 1935 (n. d.).[2]	2, 169, 513. 92 75, 304. 55		
Duluth, Union Match Co., water tank, 1904, r. 1935 (d.).	2, 235, 803. 92 87, 618. 27		
Duluth, Union Match Co., cupola, 1904, l. 1935 (d.).	2, 235, 676. 85 87, 669. 10		
Duluth & Superior Interstate Bridge, operator's tower, center of draw span, 1905, r. 1935 (n. d.).	2, 250, 748. 84 92, 639. 11		
Proctorknott, railway shops, water tank (Wis.), 1905, l. 1935 (n. d.).[2]	2, 219, 190. 45 90, 578. 52		
West Duluth, Irving School, chimney, 1905, r. 1935 (n. d.).[2]	2, 233, 559. 95 87, 371. 22		
Superior, State Normal School, smaller and higher tower (Wis.), 1905, r. 1935 (n. d.).[2]	2, 253, 056. 68 80, 957. 75		
Superior, Elevator K, stack (Wis.), 1905, r. 1935 (n. d.).	2, 264, 423. 99 79, 274. 38		
Superior, Elevator T, south gable (Wis.), 1905, r. 1935 (n. d.).[2]	2, 247, 558. 26 77, 223. 80		
Superior, St. Marys Hospital, spire (Wis.), 1905, r. 1935 (n. d.).[1]	2, 253, 193. 55 84, 031. 77		
Superior, pierhead, Front Range Lighthouse (Wis.), 1905, r. 1935 (n. d.).[1]	2, 273, 565. 76 78, 154. 85		
Superior, pierhead, Rear Range Lighthouse (Wis.), 1905, r. 1935 (n. d.).[1]	2, 272, 150. 90 77, 152. 05		
Superior, Elevator S, Great Northern Railway, south gable (Wis.), 1905, r. 1935 (n. d.).	2, 248, 436. 46 89, 672. 88		
Boylston, Great Northern Railway, signal tower (Wis.), 1905 (n. d.).[1]	2, 244, 000. 11 36, 727. 73		
Duluth, Brewing and Malting Co., dome, 1905, r. 1935 (n. d.).[2]	2, 242, 814. 70 95, 479. 56		
Duluth, church spire, 1905 (n. d.)[1]	2, 249, 211. 22 106, 561. 74		
Duluth, house at head of West Fifth Avenue (chimney in center of 4-pitch roof), 1905 (n. d.).	2, 247, 295. 44 106, 395. 72		
Duluth, Elevator B, stack, 1905, r. 1935 (d.).[1]	2, 249, 277. 13 100, 844. 76		
Duluth, high school cupola, spire, 1905, r. 1935 (n. d.).[2]	2, 250, 533. 48 107, 056. 04		

[1] No check on this position.
[2] Checked by vertical angles only.

Ninety-eighth meridian to Royalton to Duluth arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*		
Duluth, Incline Pavilion, Weather Bureau, signal tower, 1905, r. 1935 (n. d.).[1]	2, 246, 816. 40 105, 733. 63		
Duluth, Elevator H, stack, 1905, r. 1935 (d.)[2]	2, 249, 037. 91 98, 548. 68		
Duluth, aerial bridge, southwest column of north pier, 1905, r. 1935 (n. d.).[1]	2, 252, 304. 06 103, 583. 28		
South Superior, Webster Chair Manufacturing Co., stack (Wis.). 1905, l. 1935 (n. d.).	2, 248, 631. 45 64, 181. 01		
South Superior, Bryant School, northeast corner of northwest chimney (Wis.), 1905, r. 1935 (n. d.).	2, 251, 081. 45 62, 307. 38		
South Superior, Billings School, belfry (Wis.), 1905, r. 1935 (n. d.).	2, 250, 226. 97 59, 282. 77		
Superior, ore docks, Weather Bureau, signal tower (Wis.), 1905 (n. d.).	2, 270, 124. 98 75, 731. 17		
East Superior, Presbyterian Church, spire (Wis.), 1905, r. 1935 (n. d.).	2, 261, 919. 66 77, 754. 52		
East Superior, Lincoln School, flagstaff in center of tower (Wis.), 1905, l. 1935 (n. d.).	2, 258, 827. 51 81, 926. 82		
Saunders, Great Northern Railway, water tank (Wis.), 1905, l. 1935 (n. d.).	2, 248, 956. 42 52, 059. 68		
Itasca, Chicago, St. Paul, Minneapolis and Omaha Railway, elevator stack (Wis.), 1905, r. 1935 (n. d.).	2, 272, 652. 02 71, 836. 19		

Duluth to Keweenaw Point arc

Principal points		° ′ ″	
Minnesota Point south base (U. S. L. S.), 1870, r. 1935 (d. m.).	2, 267, 984. 24 79, 818. 65	332 21 28*	Superior, ore docks, Weather Bureau, signal tower.
Minnesota Point north base (U.S. L. S.), 1870, r. 1935 (d. m.).	2, 256, 056. 15 95, 713. 45	13 46 05* 59 55 04. 0	Superior, St. Marys Hospital, spire. Duluth & Superior, Interstate Bridge, center of draw span, operator's tower.
Lester River (U. S. L. S.), 1871 (d. m.)	2, 278, 394. 43 135, 257. 10		
Oneota River (U. S. L. S.), 1870, r. 1871 (d. m.).	2, 242, 379. 39 94, 589. 53		
Aminicon River (U. S. L. S.), (Wis.), 1871 (d. m.).	2, 310, 723. 73 72, 623. 26		
Buchanan (U. S. L. S.), 1871 (d. m.)	2, 327, 572. 33 163, 686. 79		
Brule River (U. S. L. S.), (Wis.), 1871, (d. m.).	2, 378, 925. 62 96, 711. 71		
Burlington (U. S. L. S.), 1871 (d. m.)	2, 363, 762. 37 196, 901. 91		
Clay Banks (U. S. L. S.), (Wis.), 1871 (d. m.).	2, 447, 885. 04 121, 261. 56		
Split Rock (U. S. L. S.), 1870, r. 1871 (d. m.).	2, 426, 095. 53 255, 594. 88		

* This azimuth has been computed by means of the θ correction. (See p. 140.)
[1] No check on this position.
[2] Checked by vertical angles only.

Duluth to Keweenaw Point arc—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*		
Detour (U. S. L. S.), (Wis.), 1870, r. 1908 (d. m.).	2,532,241.10 169,115.53		
West Sawteeth (U. S. L. S.), 1870 (d. m.)	2,471,904.92 323,861.35		
Outer Island (U. S. L. S.), (Wis.), 1870 (d. m.).	2,662,557.21 219,823.63		
Farquhars Knob (U. S. L. S), 1869, r. 1934 (d. m.).	2,763,025.92 517,908.40		
East Sawteeth (U. S. L. S.), 1870 (d. m.)	2,477,796.39 330,081.12		
Porcupine Mountains (U. S. L. S.), (Mich.), 1869, r. 1870 (d. m.).	2,843,954.52 121,856.76		
Wheal Kate (U. S. L. S.) (Mich.), 1869, r. 1934 (d. m.).	3,105,221.00 240,481.42		
Isle Royale East (U. S. L. S.) (Mich.), 1869, r. 1911 (d. m.).	3,107,986.26 626,631.46		
Supplementary points			
Outer Island latitude station (U. S. L. S.) (Wis.), 1870 (d. m.).[1]	2,662,567.05 219,859.66		
Farquhars Knob latitude station (U. S. L. S.), 1869 (d. m.).[1]	2,763,050.81 517,903.52		
East Sawteeth latitude station (U. S. L. S.), 1870 (d.m.).[1]	2,477,775.36 330,126.60		
Porcupine Mountains latitude station (U. S. L. S.) (Mich.), 1870 (d. m.).[1]	2,843,967.02 121,902.34		
Wheal Kate latitude station (U. S. L. S.) (Mich.), 1866, r. 1870 (d. m.).[1]	3,105,312.04 240,519.03		
Isle Royale East latitude station (U. S. L. S.) (Mich.), 1866, r. 1906 (d. m.).[1]	3,108,073.71 626,640.75		

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc

Principal points			
Mantrap (M. R. C.), 1898 (d. m.)	1,563,235.14 222,442.33		
Eagle Lake (M. R. C.), 1898 (d. m.)	1,498,668.92 192,684.13		
Ockerson Heights (M. R. C.), 1898 (d. m.)	1,484,700.00 250,979.36		
School Craft (M. R. C.), 1898 (d. m.)	1,555,379.98 307,679.15		
Prospect Hill P. B. M. (M. R. C.), 1898 (d. m.).	1,482,749.91 303,553.06		
Squaw Lake (M. R. C.), 1898 (d. m.)	1,464,257.05 276,192.59		
Christensen (M. R. C.), 1898 (d. m.)	1,480,052.22 262,685.34		
Itasca P. B. M. (M. R. C.), 1898 (d. m.)	1,481,018.87 274,192.87		
Itasca west base (M. R. C.), 1898 (d. m.)	1,474,803.35 268,877.35		

[1] No check on this position.

Iowa-Minnesota State line to St. Paul to Aitkin and Bemidji arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued			
	Feet		
Itasca east base (M. R. C.), 1898 (d. m.)	1,481,530.58 268,026.02		
County Line P. B. M. (M. R. C.), 1898 (d. m.).	1,521,096.82 338,466.20		
Marquette (M. R. C.), 1898 (d. m.)	1,552,603.56 348,725.33		
Phillippi (M. R. C.), 1898 (d. m.)	1,536,466.22 364,542.66		
Bemidji (M. R. C.), 1898 (d. m.)	1,561,681.36 356,315.86		
Outlet (M. R. C.), 1898 (d. m.)	1,570,900.59 364,848.92		
Supplementary points			
Bemidji, water tank (M. R. C.), 1898 (n. d.).	1,558,486.34 358,872.46		
Bemidji, City Hall (M. R. C.), 1898 (n. d.)	1,559,179.45 359,525.73		

Aitkin to Bemidji traverse

Principal points			
Swamp (M. R. C.) (n. d.)	1,864,196.37 24,694.68		
		° ′ ″	
Cutoff P. B. M. (M. R. C.), 1898 (d. m.)	1,860,224.50 32,211.14	332 08 49.2	Swamp (M. R. C.).
△ 1 (M. R. C.) (n. d.)	1,859,564.52 35,494.73	348 38 07.2	Cutoff P. B. M. (M. R. C.).
△ 2 (M. R. C.) (n. d.)	1,861,310.88 37,369.93	42 57 45.0	△ 1 (M. R. C.).
△ 3 (M. R. C.) (n. d.)	1,860,581.65 42,670.60	352 10 00.5	△ 2 (M. R. C.).
△ 4 (M. R. C.) (n. d.)	1,860,723.17 45,073.47	3 22 14.2	△ 3 (M. R. C.).
△ 5 (M. R. C.) (n. d.)	1,864,037.69 48,979.28	40 19 06.1	△ 4 (M. R. C.).
△ 6 (M. R. C.) (n. d.)	1,866,408.81 50,834.54	51 57 32.2	△ 5 (M. R. C.).
△ 7 (M. R. C.) (n. d.)	1,867,874.02 51,829.03	55 50 01.1	△ 6 (M. R. C.).
△ 8 (M. R. C.) (n. d.)	1,869,605.81 53,897.76	39 56 01.0	△ 7 (M. R. C.).
△ 9 (M. R. C.) (n. d.)	1,870,191.28 56,341.27	13 28 27.0	△ 8 (M. R. C.).
△ 10 (M. R. C.) (n. d.)	1,871,573.33 57,956.07	40 33 32.6	△ 9 (M. R. C.).
△ 11 (M. R. C.) (n. d.)	1,870,748.86 60,505.12	342 04 35.8	△ 10 (M. R. C.).
△ 12 (M. R. C.) (n. d.)	1,871,945.77 61,915.99	40 18 34.4	△ 11 (M. R. C.).
△ 13 (M. R. C.) (n. d.)	1,874,229.32 65,353.18	33 35 55.3	△ 12 (M. R. C.).
△ 14 (M. R. C.) (n. d.)	1,876,870.32 66,721.20	62 36 58.2	△ 13 (M. R. C.).

Aitkin to Bemidji traverse—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued	Feet	° ′ ″	
△ 15 (M. R. C.) (n. d.)	1,878,020.52 66,423.86	104 29 39.5	△ 14 (M. R. C.).
△ 16 (M. R. C.) (n. d.)	1,880,224.70 67,572.78	62 28 09.8	△ 15 (M. R. C.).
△ 17 (M. R. C.) (n. d.)	1,882,863.72 67,202.55	97 59 09.4	△ 16 (M. R. C.).
△ 18 (M. R. C.) (n. d.)	1,886,445.55 69,330.28	59 17 17.6	△ 17 (M. R. C.).
△ 19 (M. R. C.) (n. d.)	1,889,083.10 69,369.43	89 08 58.6	△ 18 (M. R. C.).
△ 20 (M. R. C.) (n. d.)	1,892,679.00 71,099.31	64 18 33.1	△ 19 (M. R. C.).
△ 21 (M. R. C.) (n. d.)	1,894,862.83 72,064.28	66 09 38.8	△ 20 (M. R. C.).
△ Strand P. B. M. (M. R. C.), 1898 (d. m.).	1,897,471.61 71,759.73	96 39 30.9	△ 21 (M. R. C.).
△ 22 (M. R. C.) (n. d.)	1,899,320.94 72,795.87	60 44 20.5	△ Strand P. B. M. (M. R. C.).
△ 23 (M. R. C.) (n. d.)	1,901,678.52 74,116.95	60 44 08.6	△ 22 (M. R. C.).
△ 24 (M. R. C.) (n. d.)	1,901,666.85 74,893.42	359 08 20.2	△ 23 (M. R. C.).
△ 25 (M. R. C.) (n. d.)	1,903,148.27 76,737.08	38 46 57.4	△ 24 (M. R. C.).
△ 26 (M. R. C.) (n. d.)	1,907,059.25 77,642.39	76 58 00.4	△ 25 (M. R. C.).
△ 27 (M. R. C.) (n. d.)	1,907,860.42 78,443.85	44 59 22.7	△ 26 (M. R. C.).
△ Carlson P. B. M. (M. R. C.), 1898 (d. m.).	1,910,235.49 81,092.35	41 53 04.2	△ 27 (M. R. C.).
△ 28 (M. R. C.) (n. d.)	1,910,785.16 82,597.75	20 03 31.6	△ Carlson P. B. M. (M. R. C.).
△ 29 (M. R. C.) (n. d.)	1,912,899.59 85,102.79	40 10 00.2	△ 28 (M. R. C.).
△ 30 (M. R. C.) (n. d.)	1,913,873.25 85,450.12	70 22 02.5	△ 29 (M. R. C.).
△ 31 (M. R. C.) (n. d.)	1,917,037.06 86,952.25	64 36 08.4	△ 30 (M. R. C.).
△ 32 (M. R. C.) (n. d.)	1,919,409.94 88,408.23	58 28 01.4	△ 31 (M. R. C.).
△ 33 (M. R. C.) (n. d.)	1,921,193.37 88,387.01	90 40 54.1	△ 32 (M. R. C.).
△ 34 (M. R. C.) (n. d.)	1,923,115.88 89,835.95	52 59 44.6	△ 33 (M. R. C.).
△ 35 (M. R. C.) (n. d.)	1,924,298.29 91,007.21	45 16 17.1	△ 34 (M. R. C.).
△ 36 (M. R. C.) (n. d.)	1,925,249.24 94,046.52	17 22 26.6	△ 35 (M. R. C.).
△ 37 (M. R. C.) (n. d.)	1,925,942.06 96,003.66	19 29 37.6	△ 36 (M. R. C.).
△ 38 (M. R. C.) (n. d.)	1,927,105.20 97,358.24	40 39 06.4	△ 37 (M. R. C.).
△ 39 (M. R. C.) (n. d.)	1,928,266.71 98,939.74	36 17 41.6	△ 38 (M. R. C.).

Aitkin to Bemidji traverse—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued			
△ 40 (M. R. C.) (n. d.)	Feet 1,929,844.17 100,461.94	°′″ 46 01 16.8	△ 39 (M. R. C.).
△ 41 (M. R. C.) (n. d.)	1,930,681.01 102,458.14	22 44 39.2	△ 40 (M. R. C.).
△ 42 (M. R. C.) (n. d.)	1,931,636.19 106,777.68	12 28 09.0	△ 41 (M. R. C.).
△ 43 (M. R. C.) (n. d.)	1,931,847.04 108,022.44	9 36 50.7	△ 42 (M. R. C.).
△ 44 (M. R. C.) (n. d.)	1,932,751.70 111,868.24	13 14 14.0	△ 43 (M. R. C.).
△ 45 (M. R. C.) (n. d.)	1,933,421.86 114,579.92	13 52 54.6	△ 44 (M. R. C.).
△ 46 (M. R. C.) (n. d.)	1,933,774.13 116,005.67	13 52 42.6	△ 45 (M. R. C.).
△ Big Lagoon P. B. M. (M. R. C.), 1898 (d. m.).	1,934,056.89 116,768.04	20 20 58.6	△ 46 (M. R. C.).
△ 47 (M. R. C.) (n. d.)	1,934,082.30 117,753.47	1 28 37.5	△ Big Lagoon P. B. M. (M. R. C.).
△ 48 (M. R. C.) (n. d.)	1,935,036.84 119,674.76	26 25 09.2	△ 47 (M. R. C.).
△ 49 (M. R. C.) (n. d.)	1,936,889.68 121,586.37	44 06 20.1	△ 48 (M. R. C.).
△ 50 (M. R. C.) (n. d.)	1,937,073.16 123,052.34	7 08 02.4	△ 49 (M. R. C.).
△ 51 (M. R. C.) (n. d.)	1,937,803.81 124,120.59	34 22 15.3	△ 50 (M. R. C.).
△ 52 (M. R. C.) (n. d.)	1,937,464.21 125,315.41	344 08 00.3	△ 51 (M. R. C.).
△ 53 (M. R. C.) (n. d.)	1,936,746.77 125,832.44	305 46 43.6	△ 52 (M. R. C.).
△ 54 (M. R. C.) (n. d.)	1,936,117.85 126,281.92	305 33 10.2	△ 53 (M. R. C.).
△ 55 (M. R. C.) (n. d.)	1,935,106.25 127,450.74	319 07 27.1	△ 54 (M. R. C.).
△ 56 (M. R. C.) (n. d.)	1,934,522.72 128,365.67	327 28 15.0	△ 55 (M. R. C.).
△ 57 (M. R. C.) (n. d.)	1,933,801.53 129,496.29	237 28 02.5	△ 56 (M. R. C.).
△ 58 (M. R. C.) (n. d.)	1,933,120.73 131,412.01	340 26 10.7	△ 57 (M. R. C.).
△ 59 (M. R. C.) (n. d.)	1,932,815.12 132,387.73	342 36 31.2	△ 58 (M. R. C.).
△ 60 (M. R. C.) (n. d.)	1,932,351.46 134,837.68	349 17 00.8	△ 59 (M. R. C.).
△ 61 (M. R. C.) (n. d.)	1,932,878.85 136,853.27	14 39 46.9	△ 60 (M. R. C.).
△ 62 (M. R. C.) (n. d.)	1,933,216.78 138,132.94	14 47 33.9	△ 61 (M. R. C.).
△ 63 (M. R. C.) (n. d.)	1,932,519.93 139,385.41	330 54 33.4	△ 62 (M. R. C.).
△ 64 (M. R. C.) (n. d.)	1,932,810.14 141,111.95	9 32 29.5	△ 63 (M. R. C.).
△ 65 (M. R. C.) (n. d.)	1,932,773.00 142,276.92	358 10 26.4	△ 64 (M. R. C.).

Aitkin to Bemidji traverse—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
△ 66 (M. R. C.) (n. d.)	1,933,612.30 142,967.84	50 32 18.4	△ 65 (M. R. C.).
△ 67 (M. R. C.) (n. d.)	1,933,983.28 144,876.79	10 59 51.4	△ 66 (M. R. C.).
△ 68 (M. R. C.) (n. d.)	1,934,965.16 147,366.77	21 31 15.3	△ 67 (M. R. C.).
△ 69 (M. R. C.) (n. d.)	1,937,893.88 148,076.89	76 22 14.4	△ 68 (M. R. C.).
△ 70 (M. R. C.) (n. d.)	1,939,313.71 149,203.97	51 33 25.2	△ 69 (M. R. C.).
△ 71 (M. R. C.) (n. d.)	1,940,950.00 150,309.84	55 56 51.4	△ 70 (M. R. C.).
△ 72 (M. R. C.) (n. d.)	1,943,211.67 152,811.65	42 06 50.4	△ 71 (M. R. C.).
△ 73 (M. R. C.) (n. d.)	1,945,462.49 155,299.06	42 08 29.3	△ 72 (M. R. C.).
△ 74 (M. R. C.) (n. d.)	1,946,527.46 156,688.78	37 27 49.2	△ 73 (M. R. C.).
△ 75 (M. R. C.) (n. d.)	1,947,721.94 159,623.17	22 08 57.8	△ 74 (M. R. C.).
△ 76 (M. R. C.) (n. d.)	1,949,603.50 162,268.09	35 25 39.1	△ 75 (M. R. C.).
△ 77 (M. R. C.) (n. d.)	1,948,753.39 165,132.60	343 28 13.9	△ 76 (M. R. C.).
△ 78 (M. R. C.) (n. d.)	1,949,061.78 167,762.65	6 41 15.9	△ 77 (M. R. C.).
△ 79 (M. R. C) (n. d.)	1,951,820.25 170,296.97	47 25 30.1	△ 78 (M. R. C.).
△ 80 (M. R. C.) (n. d.)	1,951,385.46 172,347.58	348 01 44.0	△ 79 (M. R. C.).
△ 81 (M. R. C.) (n. d.)	1,951,176.60 174,226.09	353 39 20.5	△ 80 (M. R. C.).
△ 82 (M. R. C.) (n. d.)	1,950,975.08 176,023.54	353 36 10.9	△ 81 (M. R. C.).
△ 83 (M. R. C.) (n. d.)	1,951,439.50 177,480.60	17 40 44.6	△ 82 (M. R. C.).
△ Fiessen P. B. M. (M. R. C.), 1898 (d. m.).	1,952,189.83 180,133.80	15 47 27.6	△ 83 (M. R. C.).
△ 84 (M. R. C.) (n. d.)	1,952,206.58 181,747.41	0 35 41.0	△ Fiessen P. B. M. (M. R. C.)
△ 85 (M. R. C.) (n. d.)	1,951,705.06 183,822.89	346 24 54.4	△ 84 (M. R. C.).
△ 86 (M. R. C.) (n. d.)	1,950,733.99 186,610.91	340 47 48.2	△ 85 (M. R. C.).
△ 87 (M. R. C.) (n. d.)	1,948,088.99 188,313.36	302 46 02.2	△ 86 (M. R. C.).
△ 88 (M. R. C.) (n. d.)	1,948,542.86 190,335.71	12 38 56.9	△ 87 (M. R. C.).
△ 89 (M. R. C.) (n. d.)	1,946,170.19 192,402.14	311 03 12.9	△ 88 (M. R. C.).
△ 90 (M. R. C.) (n. d.)	1,943,513.73 193,774.97	297 19 46.0	△ 89 (M. R. C.).
△ 91 (M. R. C.) (n. d.)	1,941,009.46 196,120.22	313 07 18.8	△ 90 (M. R. C.).

Aitkin to Bemidji traverse—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
△ 92 (M. R. C.) (n. d.)	1,938,809.82 197,211.55	296 23 16.3	△ 91 (M. R. C.).
△ 93 (M. R. C.) (n. d.)	1,937,344.58 199,267.39	324 31 18.3	△ 92 (M. R. C.).
△ 94 (M. R. C.) (n. d.)	1,934,413.15 200,579.55	294 06 50.9	△ 93 (M. R. C.).
△ 95 (M. R. C.) (n. d.)	1,932,344.29 201,216.18	287 06 15.1	△ 94 (M. R. C.).
△ 96 (M. R. C.) (n. d.)	1,928,862.54 202,794.05	294 22 45.2	△ 95 (M. R. C.).
△ 97 (M. R. C.) (n. d.)	1,927,531.44 204,351.66	319 29 00.6	△ 96 (M. R. C.).
△ Split Hand P. B. M. (M. R. C.), 1898 (d. m.).	1,927,774.27 206,312.52	7 03 34.1	△ 97 (M. R. C.).
△ 98 (M. R. C.) (n. d.)	1,926,169.14 208,658.59	325 37 15.3	△ Split Hand P. B. M. (M. R. C.).
△ 99 (M. R. C.) (n. d.)	1,924,390.23 208,645.93	269 35 32.1	△ 98 (M. R. C.).
△ 100 (M. R. C.) (n. d.)	1,923,934.19 210,976.97	348 55 50.1	△ 99 (M. R. C.).
△ 101 (M. R. C.) (n. d.)	1,923,457.64 213,099.39	347 20 42.6	△ 100 (M. R. C.).
△ 102 (M. R. C.) (n. d.)	1,923,422.59 214,623.31	358 40 56.8	△ 101 (M. R. C.).
△ 103 (M. R. C.) (n. d.)	1,923,055.27 216,872.36	350 43 27.2	△ 102 (M. R. C.).
△ 104 (M. R. C.) (n. d.)	1,922,752.35 218,720.45	350 41 29.2	△ 103 (M. R. C.).
△ 105 (M. R. C.) (n. d.)	1,922,410.17 221,676.38	353 23 48.5	△ 104 (M. R. C.).
△ 106 (M. R. C.) (n. d.)	1,922,946.57 224,425.34	11 02 28.7	△ 105 (M. R. C.).
△ 107 (M. R. C.) (n. d.)	1,923,582.98 226,102.00	20 47 07.0	△ 106 (M. R. C.).
△ 108 (M. R. C.) (n. d.)	1,923,561.53 227,979.66	359 20 43.8	△ 107 (M. R. C.).
△ 109 (M. R. C.) (n. d.)	1,923,475.02 229,319.40	356 18 19.5	△ 108 (M. R. C.).
△ 110 (M. R. C.) (n. d.)	1,923,309.93 232,103.90	356 36 25.1	△ 109 (M. R. C.).
△ 111 (M. R. C.) (n. d.)	1,922,339.85 235,494.35	344 01 59.0	△ 110 (M. R. C.).
△ Five Pines P. B. M. (M. R. C.), 1898 (d. m.).	1,919,067.69 237,071.33	295 43 52.4	△ 111 (M. R. C.).
△ 112 (M. R. C.) (n. d.)	1,919,919.54 239,993.24	16 15 12.4	△ Five Pines P. B. M. (M. R. C.).
△ 113 (M. R. C.) (n. d.)	1,920,633.60 242,325.09	17 01 32.4	△ 112 (M. R. C.).
Porcupine (M. R. C.), 1898 (d. m.)	1,916,218.18 244,220.39	293 13 52.4	△ 113 (M. R. C.).
Blackberry B. M. (M. R. C.), 1898 (d. m.)	1,923,746.12 251,481.11	46 02 06.6	Porcupine (M. R. C.).
Halfway (M. R. C.) (n. d.)	1,917,650.71 255,551.26	303 43 57.5	Blackberry B. M. (M. R. C.).

Aitkin to Bemidji traverse—Continued

Station	x coordinate; y coordinate	Plane azimuth			Mark
Principal points—Continued	*Feet*	°	′	″	
La Prairie (M. R. C.), 1898 (d. m.)	1,907,961.00 262,034.53	303	47	09.6	Halfway (M. R. C.).
Grand Rapids B. M. (M. R. C.), 1898 (d. m.).	1,895,333.43 268,234.97	296	09	07.7	La Prairie (M. R. C.).
Race Track (M. R. C.), 1898 (d. m.)	1,894,555.45 266,746.44	207	35	37.7	Grand Rapids B. M. (M. R. C.).
Courthouse (M. R. C.) (n. d.)	1,894,164.54 268,484.13	347	19	18.6	Race Track (M. R. C.).
Grand Rapids (M. R. C.), 1898 (d. m.)	1,886,568.64 268,452.53	269	45	41.9	Courthouse (M. R. C.).
Dam (M. R. C.) (n. d)	1,879,503.96 274,364.09	309	55	18.5	Grand Rapids (M. R. C.).
Pokegama (M. R. C.) (n. d.)	1,874,822.42 276,625.74	295	47	06.6	Dam (M. R. C.).
Cohasset (M. R. C.) (n. d.)	1,870,448.65 278,738.44	295	46	56.4	Pokegama (M. R. C.).
Littlefield (M. R. C.) (n. d.)	1,868,350.82 280,042.38	301	51	49.3	Cohasset (M. R. C.).
Hull (M. R. C.) (n. d.)	1,860,368.62 284,871.53	301	10	24.6	Littlefield (M. R. C.).
Summit (M. R. C.) (n. d.)	1,853,182.37 289,221.12	301	11	06.3	Hull (M. R. C.).
Deer River (M. R. C.), 1898 (d. m.)	1,829,064.18 303,741.51	301	03	00.4	Summit (M. R. C.).
Old Road (M. R. C.), 1898 (d. m.)	1,824,165.14 306,806.34	302	01	48.1	Deer River (M. R. C.).
Papoose (M. R. C.) (n. d.)	1,822,399.43 306,927.79	273	56	05.1	Old Road (M. R. C.).
Squaw (M. R. C.) (n. d.)	1,817,026.51 306,325.04	263	35	57.0	Papoose (M. R. C.).
Buck (M. R. C.) (n. d.)	1,807,778.60 305,287.46	263	35	54.3	Squaw (M. R. C.).
Starke (M. R. C.), 1898 (d. m.)	1,804,571.55 304,927.48	263	35	44.0	Buck (M. R. C.).
Wigwam B. M. (M. R. C.), 1898 (d. m.)	1,797,545.22 300,614.78	238	27	31.6	Starke (M. R. C.).
Ball Club (M. R. C.) (n. d.)	1,795,464.09 300,720.57	272	54	36.0	Wigwam B. M. (M. R. C.).
Tomahawk B. M. (M. R. C.), 1898 (d. m.).	1,791,966.24 301,183.24	277	32	05.7	Ball Club (M. R. C.).
Mississip B. M. (M. R. C.), 1898 (d. m.)	1,783,319.86 302,330.63	277	33	32.7	Tomahawk B.M., (M. R. C.).
Divide (M. R. C.), 1898 (d. m.)	1,771,582.48 303,894.01	277	35	13.0	Mississip B. M. (M. R. C.).
Cranberry (M. R. C.) (n. d.)	1,766,614.54 304,555.00	277	34	43.5	Divide (M. R. C.).
Nishka (M. R. C.) (n. d.)	1,755,600.38 306,022.45	277	35	20.4	Cranberry (M. R. C.).
Windego (M. R. C.) (n. d.)	1,744,161.40 307,547.19	277	35	32.6	Nishka (M. R. C.).
Norway Grove (M. R. C.), 1898 (d. m.)	1,735,193.11 308,747.21	277	37	16.7	Windego (M. R. C.).
Bena (M. R. C.), 1898 (d. m.)	1,723,320.27 310,338.98	277	38	09.6	Norway Grove (M. R. C.).

Aitkin to Bemidji traverse—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
Bigosh (M. R. C.), 1898 (d. m.)	1,719,408.41 311,013.84	279 47 17.2	Bena (M. R. C.).
Portage (M. R. C.), 1898 (d. m.)	1,707,057.34 313,209.41	280 04 47.3	Bigosh (M. R. C.).
Longsight (M. R. C.) (n. d.)	1,694,971.49 315,356.89	280 04 31.7	Portage (M. R. C.).
Schley (M. R. C.), 1898 (d. m.)	1,689,472.70 316,331.55	280 03 04.6	Longsight (M. R. C.).
Bug Nog (M. R. C.) (n. d.)	1,679,361.29 318,125.28	280 03 33.9	Schley (M. R. C.).
Santiago (M. R. C.) (n. d.)	1,666,365.89 320,429.46	280 03 16.1	Bug Nog (M. R. C.).
Cuba (M. R. C.), 1898 (d. m.)	1,655,601.31 320,723.78	271 33 58.2	Santiago (M. R. C.).
Lamond (M. R. C.), 1898 (d. m.)	1,643,478.10 321,028.12	271 26 16.1	Cuba (M. R. C.).
Pike Bay (M. R. C.), 1898 (d. m.)	1,641,435.24 322,091.04	297 29 18.2	Lamond (M. R. C.).
Sand Pit (M. R. C.) (n. d.)	1,639,684.73 322,235.06	274 42 11.9	Pike Bay (M. R. C.).
Chippewa (M. R. C.), 1898 (d. m.)	1,637,731.61 323,171.03	295 36 16.5	Sand Pit (M. R. C.).
Depot (M. R. C.) (n. d.)	1,625,279.32 323,559.43	271 47 11.5	Chippewa (M. R. C.).
Wye (M. R. C.), 1898 (d. m.)	1,623,254.14 323,611.84	271 28 56.8	Depot (M. R. C.).
Spring (M. R. C.), 1898 (d. m.)	1,618,047.71 323,783.99	271 53 37.6	Wye (M. R. C.).
Dump (M. R. C.) (n. d.)	1,609,024.81 324.064.50	271 46 50.4	Spring (M. R. C.).
Ferris (M. R. C.) (n. d.)	1,602,217.39 324,274.53	271 46 01.1	Dump (M. R. C.).
Midge (M. R. C.) (n. d.)	1,597,659.89 324,414.55	271 45 35.1	Ferris (M. R. C.).
Grace (M. R. C.) (n. d.)	1,593,503.54 326,108.64	292 10 31.3	Midge (M. R. C.).
Bates (M. R. C.) (n. d.)	1,583,123.50 330,338.88	292 10 21.6	Grace (M. R. C.).
Kirkpatrick (M. R. C.) (n. d.)	1,581,390.40 332,081.52	315 09 27.0	Bates (M. R. C.).
Pillsbury (M. R. C.) (n. d.)	1,579,815.37 333,828.96	317 58 13.9	Kirkpatrick (M. R. C.).
Rosby (M. R. C.) (n. d.)	1,576,034.21 338,027.75	317 59 45.0	Pillsbury (M. R. C.).
Stone Point (M. R. C.) (n. d.)	1,574,317.75 340,210.51	321 49 10.2	Rosby (M. R. C.).
Omega (M. R. C.) (n. d.)	1,569,345.17 346,534.47	321 49 18.3 141 55 15.5	Stone Point (M. R. C.). Bemidji.
Supplementary points			
U. S. E. 202 B. M. (d. m.)	1,856,535.59 32,759.63	227 55 09*	△ 1 (M. R. C.).
Biggar P. B. M. (M. R. C.), 1898 (d. m.)	1,861,944.45 42,379.59	102 03 07*	△ 3 (M. R. C.).

* This azimuth has been computed by means of the θ correction. (See p. 140.)

Aitkin to Bemidji traverse—Continued

Station	*x* coordinate; *y* coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*	° ′ ″	
Sutton P. B. M. (M. R. C.), 1898 (d. m.)	1,868,657.46 52,737.44	40 46 34*	△ 7 (M. R. C.).
U. S. E. 209 B. M. (d. m.)	1,871,571.26 59,405.58	359 55 02*	△ 10 (M. R. C.).
Waldeck P. B. M. (M. R. C.), 1898 (d. m.).	1,873,096.28 63,617.22	34 04 12*	△ 12 (M. R. C.).
Foulds P. B. M. (M. R. C.), 1898 (d. m.)	1,885,840.29 69,037.46	244 11 01*	△ 18 (M. R. C.).
School P. B. M. (M. R. C.), 1898 (d. m.)	1,922,802.51 89,605.49	233 40 06*	△ 34 (M. R. C.).
Pat P. B. M. (M. R. C.), 1898 (d. m.)	1,928,731.50 99,117.86	69 02 08*	△ 39 (M. R. C.).
Midway P. B. M. (M. R. C.), 1898 (d. m.).	1,933,622.00 131,101.06	121 48 34*	△ 58 (M. R. C.).
Wells P. B. M. (M. R. C.), 1898 (d. m.)	1,933,880.36 143,197.51	49 24 44*	△ 66 (M. R. C.).
Stone P. B. M. (M. R. C.), 1898 (d. m.)	1,943,080.02 152,189.95	191 57 32*	△ 72 (M. R. C.).
Vicinity P. B. M. (M. R. C.), 1898 (d. m.)	1,946,807.99 192,606.14	72 15 39*	△ 89 (M. R. C.).
Slip P. B. M. (M. R. C.), 1898 (d. m.)	1,936,930.35 199,539.86	303 20 14*	△ 93 (M. R. C.).
Hamilton P. B. M. (M. R. C.), 1898 (d. m.).	1,922,576.36 220,239.97	353 23 35*	△ 104 (M. R. C.).
Strawberry P. B. M. (M. R. C.), 1898 (d. m.).	1,918,335.30 246,622.78	331 51 48*	△ 113 (M. R. C.).
Zwick (M. R. C.), 1898 (d. m.)	1,914,533.56 249,980.69	311 27 11*	Strawberry P. B. M. (M. R. C.).
Dam B. M. (M. R. C.), 1898 (d. m.)	1,879,473.29 274,389.71		
Cohasset B. M. (M. R. C.), 1898 (d. m.)	1,869,946.79 278,980.84	295 46 58*	Cohasset (M. R. C.).
Round House B. M. (M. R. C.), 1898 (d. m.).	1,828,747.43 300,886.97	186 19 52*	Deer River (M. R. C.).
Camp (M. R. C.)(n. d.)	1,828,794.51 303,427.71	220 40 02*	Deer River (M. R. C.).
△ 34 Fanbel (M. R. C.) (n. d.)	1,639,330.84 322,371.22	291 02 28*	Sand Pit (M. R. C.).
Fanbel B. M. (M. R. C.) (B. M. 342 (U. S. E.)), (d. m.)	1,639,317.75 322,370.15		
Hub (Chip) (M. R. C.) (n. d.)	1,637,732.66 323,204.96		
East Base (M. R. C.) (n. d.)	1,630,676.87 323,424.97	271 47 09.6	Hub (Chip) (M. R. C.).
West Base (M. R. C.) (n. d.)	1,629,277.75 323,468.62	271 47 10*	East Base (M. R. C.).
△ 35 Fanbel (M. R. C.) (n. d.)	1,629,625.16 321,600.20	169 28 00*	West Base (M .R. C.).
U. S. E. 347 B. M. (d. m.)	1,629,709.48 321,606.78		
Cass Lake (M. R. C.), 1898 (d. m.)	1,625,267.42 324,502.07	66 08 44*	Wye (M. R. C.).

* This azimuth has been computed by means of the θ correction. (See p. 140.)

Aitkin to Bemidji traverse—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Supplementary points—Continued	*Feet*	° ′ ″	
Wye P. B. M. (M. R. C.), 1898 (d. m.)	1,622,941.03 322,990.74	206 45 15*	Wye (M. R. C.).
Hub (M. R. C.) (n. d.)	1,597,650.46 324,391.44		
Check point (M. R. C.) (n. d.)	1,596,354.41 324,920.03	292 11 12*	Hub (M. R. C.).
Midge P. B. M. (M. R. C.), 1898 (d. m.)	1,596,370.33 324,990.03		
△1a (M. R. C.) (n. d.)	1,616,827.39 324,402.50	296 52 39*	Spring (M. R. C.).
△2a (M. R. C.) (n. d.)	1,616,810.14 326,302.47	359 28 51*	△1a (M. R. C.).
△3a (M. R. C.) (n. d.)	1,615,575.65 327,815.92	320 47 49*	△2a (M. R. C.).
△4a (M. R. C.) (n. d.)	1,615,570.71 329,797.32	359 51 28*	△3a (M. R. C.).
△5a (M. R. C.) (n. d.)	1,614,516.46 330,899.77	316 16 45*	△4a (M. R. C.).
△6a (M. R. C.) (n. d.)	1,613,501.27 331,638.10	306 01 50*	△5a (M. R. C.).
△7a (M. R. C.) (n. d.)	1,612,103.23 332,770.84	309 00 57*	△6a (M. R. C.).
△8a (M. R. C.) (n. d.)	1,611,406.86 334,319.38	335 47 13*	△7a (M. R. C.).
△9a (M. R. C.) (n. d.)	1,610,224.61 338,256.09	343 17 03*	△8a (M. R. C.).
△10a (M. R. C.) (n. d.)	1,609,787.58 339,565.95	341 33 03*	△9a (M. R. C.).
Wolf Lake (M. R. C.), 1898 (d. m.)	1,608,827.45 341,020.26	326 34 05*	△10a (M. R. C.).
Superior National Forest			
Principal points			
Fernberg, 1934 (d. m.)	2,392,966.80 531,132.50	238 23 42	Azimuth mark.
Ely Lookout Tower, 1934 (d. m.)	2,302,989.90 509,310.77	158 49 43	Ely, water tank.
Angleworm Lookout Tower, 1934 (d. m.)	2,295,157.82 580,623.60		
Jack Pine, 1934 (d. m.)	2,380,350.11 452,554.60		
Babbitt, 1934 (d. m.)	2,293,964.83 435,831.83		
Isabella, 1934 (d. m.)	2,410,786.94 407,160.53	11 02 04	Azimuth mark.
Wanless, 1934 (d. m.)	2,474,883.83 426,463.89		
Mount Weber, 1934 (d. m.)	2,356,921.65 362,428.92	330 12 07	Azimuth mark.
Kelso Mountain, 1934 (d. m.)	2,531,786.98 525,107.60		

* This azimuth has been computed by means of the θ correction. (See p. 140.)

Superior National Forest—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
Principal points—Continued	*Feet*	° ′ ″	
Lundeen, 1934 (d. m.)	2, 565, 815. 16 490, 791. 34		
Brule, 1934 (d. m.)	2, 603, 131. 80 526, 714. 39		
Paulsen (Gunflint) Fire Lookout Tower, 1934 (d. n. m.).	2, 550, 839. 34 588, 412. 68		
Onion Mountain, 1934 (d. m.)	2, 567, 865. 45 415, 423. 35	96 46 17. 5	Wanless.
Trout Lake, 1934 (d. m.)	2, 618, 422. 96 459, 593. 25		
Pine Mountain, 1934 (d. m.)	2, 680, 149. 35 521, 074. 73	180 36 31	Azimuth mark.
Gaskin, 1934 (d. m.)	2, 644, 111. 09 550, 399. 50		
Bearskin, 1934 (d. m.)	2, 661, 479. 10 581, 113. 51		
Eliason, 1934 (d. m.)	2, 700, 663. 31 493, 943. 49		
Devilfish Fire Lookout Tower, 1934 (d. n. m.).	2, 733, 479. 56 554, 118. 45		
Overbys, 1934 (d. m.)	2, 704, 013. 82 495, 873. 93		
Gabimichigami, 1934 (d. m.) [1]	2, 500, 221. 73 575, 054. 35		

[1] No check on this position.

EXPLANATION OF PLANE-COORDINATE PROJECTION TABLES

The State tables of plane coordinates are intended primarily for use in the reduction of geodetic positions to grid coordinates, and they were computed with that end in view. However, they serve another purpose, sometimes being needed in the computation of surveys on the grid coordinate system. The zone projection constants are frequently needed in the solution of special problems, while the scale factors are necessary if computations are to produce exact results through the elimination of variations in scale.

There are several ways in which the table of scales can be used on the Lambert grids. The factors are listed for every minute of latitude and the most rigid method of using them is to determine the mean latitude of each line of a survey and interpolate the factor for this value. But in general we do not have the latitudes of the stations of a survey and hence we have no means of computing the latitude of the middle of a given line. If United States Geological Survey quadrangle maps for the region are available, a traverse can be plotted on them approximately by angles and distances, and then the latitudes of the middle points of the various lines can be scaled from the maps. This has been found to be very satisfactory in a general way. Unfortunately, these maps are not always available and for many sections of the country no such maps have yet been made.

With most traverses of ordinary length, it would be sufficiently accurate to determine the mean latitude of the whole traverse. If the traverse runs from one geodetic control point to another, the latitudes of the control points would be known and from these a mean latitude of the whole traverse could be found. The scale factor for this mean latitude could then be adopted for the whole traverse. By noting how much change there is in the scale factor as given for the two control stations, one can judge whether this method would be satisfactory. Except where exact results are sought, this method would be satisfactory, unless the traverse is a very long one and covers a great distance in a north-south direction.

A third method of approximation can be employed in the following manner: If the computations of the grid coordinates for the control stations are available, a mean of the y'' values for these control stations can be subtracted from the y coordinates of the various traverse stations to determine approximate y' values for those stations. A mean of these for the ends of each line of the traverse would give a mean approximate y' value for each line with which interpolation could be made in the y' table for a scale factor for the various lines. This method is not very acceptable for two reasons. In general the computations of the grid coordinates of the control stations would not be available, since only the coordinates of the same are given; and in the second place, a preliminary computation of the y coordinates for the various stations of the traverse would have to be made. Either a plotting of the traverse on a map or the adoption of a mean scale factor would seem to be the best solution of the question.

The scale factors are tabulated in two forms: First, as a correction to the final places of the logarithm of the length; and, second, as a ratio for direct multiplication. The logarithmic corrections are given in units of the seventh place of logarithms, with tenths for the eighth place. These corrections are given the signs that must be used in applying them to the measured lengths reduced to sea level; that is, they must be added algebraically with the sign as given to the logarithms of those lengths. The ratio form is used as a factor for multiplying the measured lengths. If one wishes to go from the grid length to the geodetic length, the logarithmic correction must be subtracted algebraically and the factor used as a divisor. This correction of a grid length gives a geodetic or sea-level length; a further correction for elevation must be applied to secure the ground-level length. In the computation of the traverse the measured length should be reduced to sea level before the grid factor is applied.

Reference should be made to Special Publication No. 193, Manual of Plane-Coordinate Computation and to Special Publication No. 194, Manual of Traverse Computation on the Lambert Grid. These publications give full accounts of the use of the State tables and of the use of coordinates in computations.

PLANE-COORDINATE PROJECTION TABLES

TABLE OF CONSTANTS

Constant	Zone		
	Southern	Central	Northern
Standard parallel (south)	43°47′	45°37′	47°02′
Standard parallel (north)	45°13′	47°03′	48°38′
Central meridian	94°00′	94°15′	93°06′
l	0.7009277824	0.7233880702	0.7412196637
log l	9.8456732744−10	9.8593713423−10	9.8699469322−10
log K	7.5920526950	7.5870052553	7.5836141410
y_0 feet	547,343.08	486,777.44	487,079.13
$\log \frac{1}{2\rho_0^2 \sin 1''}$	0.3720861−10	0.3718974−10	0.3717434−10

$$\text{Geodetic azimuth} - \text{grid azimuth} = +\theta - \frac{x_2 - x_1}{2\rho_0^2 \sin 1''}\left(y_1 - y_0 + \frac{y_2 - y_1}{3}\right)$$

SOUTHERN ZONE

Table I

Latitude	R	y' (y value on the central meridian)	Tabular difference of R for one second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
° ′	*Feet*	*Feet*	*Feet*		
43 00	21 874 349.14	0.00	101.26850	+1 134.4	1.000 2612
01	21 868 273.03	6 076.11	817	1 102.0	537
02	21 862 196.94	12 152.20	767	1 070.0	464
03	21 856 120.88	18 228.26	717	1 038.3	391
04	21 850 044.85	24 304.29	683	1 007.0	319
05	21 843 968.84	30 380.30	633	976.1	248
43 06	21 837 892.86	36 456.28	101.26600	+945.5	1.000 2177
07	21 831 816.90	42 532.24	567	915.3	108
08	21 825 740.96	48 608.18	517	885.4	2039
09	21 819 665.05	54 684.09	483	855.9	1971
10	21 813 589.16	60 759.98	433	826.7	904
43 11	21 807 513.30	66 835.84	101.26400	+797.9	1.000 1837
12	21 801 437.46	72 911.68	367	769.4	772
13	21 795 361.64	78 987.50	333	741.3	707
14	21 789 285.84	85 063.30	300	713.6	643
15	21 783 210.06	91 139.08	267	686.2	580
43 16	21 777 134.30	97 214.84	101.26233	+659.2	1.000 1518
17	21 771 058.56	103 290.58	200	632.5	456
18	21 764 982.84	109 366.30	167	606.2	396
19	21 758 907.14	115 442.00	150	580.3	336
20	21 752 831.45	121 517.69	117	554.7	277
43 21	21 746 755.78	127 593.36	101.26083	+529.5	1.000 1219
22	21 740 680.13	133 669.01	050	504.6	162
23	21 734 604.50	139 744.64	017	480.1	105
24	21 728 528.89	145 820.25	26000	455.9	1050
25	21 722 453.29	151 895.85	.25983	432.1	0995
43 26	21 716 377.70	157 971.44	101.25950	+408.7	1.000 0941
27	21 710 302.13	164 047.01	933	385.6	888
28	21 704 226.57	170 122.57	917	362.8	835
29	21 698 151.02	176 198.12	883	340.5	784
30	21 692 075.49	182 273.65	867	318.6	734

Table I—Continued

Latitude		R	y′ (y value on the central meridian)	Tabular difference of R for one second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
°	′	*Feet*	*Feet*	*Feet*		
43	31	21 685 999.97	188 349.17	101.25850	+297.1	1.000 0684
	32	21 679 924.46	194 424.68	817	275.8	635
	33	21 673 848.97	200 500.17	800	254.9	587
	34	21 667 773.49	206 575.65	783	234.3	539
	35	21 661 698.02	212 651.12	783	214.1	493
43	36	21 655 622.55	218 726.59	101.25750	+194.3	1.000 0447
	37	21 649 547.10	224 802.04	750	174.8	402
	38	21 643 471.65	230 877.49	717	155.7	359
	39	21 637 396.22	236 952.92	717	137.0	315
	40	21 631 320.79	243 028.35	700	118.6	273
43	41	21 625 245.37	249 103.77	101.25700	+100.6	1.000 0232
	42	21 619 169.95	255 179.19	683	82.9	191
	43	21 613 094.54	261 254.60	667	65.6	151
	44	21 607 019.14	267 330.00	650	48.7	112
	45	21 600 943.75	273 405.39	650	32.1	074
43	46	21 594 868.36	279 480.78	101.25650	+15.9	1.000 0037
	47	21 588 792.97	285 556.17	633	0.0	1.000 0000
	48	21 582 717.59	291 631.55	633	−15.5	0.999 9964
	49	21 576 642.21	297 706.93	633	30.3	930
	50	21 570 566.83	303 782.31	617	45.5	895
43	51	21 564 491.46	309 857.68	101.25617	−59.9	0.999 9862
	52	21 558 416.09	315 933.05	617	73.9	830
	53	21 552 340.72	322 008.42	617	87.6	798
	54	21 546 265.35	328 083.79	617	100.9	768
	55	21 540 189.98	334 159.16	617	113.9	738
43	56	21 534 114.61	340 234.53	101.25617	−126.5	0.999 9709
	57	21 528 039.24	346 309.90	617	138.7	681
	58	21 521 963.87	352 385.27	633	150.6	653
	59	21 515 888.49	358 460.65	617	162.1	627
44	00	21 509 813.12	364 536.02	633	173.3	601
44	01	21 503 737.74	370 611.40	101.25633	−184.1	0.999 9576
	02	21 497 662.36	376 686.78	633	194.5	552
	03	21 491 586.98	382 762.16	650	204.5	529
	04	21 485 511.59	388 837.55	667	214.2	507
	05	21 479 436.19	394 912.95	667	223.6	485
44	06	21 473 360.79	400 988.35	101.25667	−232.5	0.999 9465
	07	21 467 285.39	407 063.75	683	241.1	445
	08	21 461 209.98	413 139.16	700	249.4	426
	09	21 455 134.56	419 214.58	700	257.3	408
	10	21 449 059.14	425 290.00	717	264.8	390
44	11	21 442 983.71	431 365.43	101.25733	−272.0	0.999 9374
	12	21 436 908.27	437 440.87	750	278.8	358
	13	21 430 832.82	443 516.32	767	285.2	343
	14	21 424 757.36	449 591.78	783	291.3	329
	15	21 418 681.89	455 667.25	800	297.0	316
44	16	21 412 606.41	461 742.73	101.25817	−302.3	0.999 9304
	17	21 406 530.92	467 818.22	833	307.3	292
	18	21 400 455.42	473 893.72	850	311.9	282
	19	21 394 379.91	479 969.23	867	316.1	272
	20	21 388 304.39	486 044.75	900	320.0	263
44	21	21 382 228.85	492 120.29	101.25917	−323.5	0.999 9255
	22	21 376 153.30	498 195.84	950	326.6	248
	23	21 370 077.73	504 271.41	967	329.4	242
	24	21 364 002.15	510 346.99	5983	331.8	236
	25	21 357 926.56	516 422.58	6017	333.9	231
44	26	21 351 850.95	522 498.19	101.26050	−335.6	0.999 9227
	27	21 345 775.32	528 573.82	067	336.9	224
	28	21 339 699.68	534 649.46	100	337.8	222
	29	21 333 624.02	540 725.12	117	338.4	221
	30	21 327 548.35	546 800.79	167	338.6	220

Table I—Continued

Latitude		R	y' (y value on the central meridian)	Tabular difference of R for one second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
°	′	*Feet*	*Feet*	*Feet*		
44	31	21 321 472.65	552 876.49	101.26183	−338.4	0.999 9221
	32	21 315 396.94	558 952.20	217	337.9	222
	33	21 309 321.21	565 027.93	250	337.0	224
	34	21 303 245.46	571 103.68	283	335.8	227
	35	21 297 169.69	577 179.45	317	334.2	230
44	36	21 291 093.90	583 255.24	101.26350	−332.2	0.999 9235
	37	21 285 018.09	589 331.05	400	329.8	241
	38	21 278 942.25	595 406.89	433	327.1	247
	39	21 272 866.39	601 482.75	467	324.0	254
	40	21 266 790.51	607 558.63	500	320.6	262
44	41	21 260 714.61	613 634.53	101.26533	−316.8	0.999 9271
	42	21 254 638.69	619 710.45	583	312.6	280
	43	21 248 562.74	625 786.40	617	308.1	291
	44	21 242 486.77	631 862.37	667	303.2	302
	45	21 236 410.77	637 938.37	717	297.9	314
44	46	21 230 334.74	644 014.40	101.26750	−292.2	0.999 9327
	47	21 224 258.69	650 090.45	800	286.2	341
	48	21 218 182.61	656 166.53	833	279.8	356
	49	21 212 106.51	662 242.63	883	273.0	371
	50	21 206 030.38	668 318.76	933	265.9	388
44	51	21 199 954.22	674 394.92	101.26983	−258.4	0.999 9405
	52	21 193 878.03	680 471.11	7033	250.5	423
	53	21 187 801.81	686 547.33	083	242.3	442
	54	21 181 725.56	692 623.58	133	233.7	462
	55	21 175 649.28	698 699.86	183	224.7	483
44	56	21 169 572.97	704 776.17	101.27233	−215.4	0.999 9504
	57	21 163 496.63	710 852.51	283	205.7	526
	58	21 157 420.26	716 928.88	350	195.6	550
	59	21 151 343.85	723 005.29	400	185.1	574
45	00	21 145 267.41	729 081.73	450	174.3	599
45	01	21 139 190.94	735 158.20	101.27517	−163.1	0.999 9624
	02	21 133 114.43	741 234.71	567	151.6	651
	03	21 127 037.89	747 311.25	617	139.7	678
	04	21 120 961.32	753 387.82	683	127.4	707
	05	21 114 884.71	759 464.43	750	114.7	736
45	06	21 108 808.06	765 541.08	101.27800	−101.7	0.999 9766
	07	21 102 731.38	771 617.76	867	88.3	797
	08	21 096 654.66	777 694.48	7933	74.5	828
	09	21 090 577.90	783 771.24	8000	60.3	861
	10	21 084 501.10	789 848.04	050	45.8	895
45	11	21 078 424.27	795 924.87	101.28117	−30.8	0.999 9929
	12	21 072 347.40	802 001.74	183	−15.6	0.999 9964
	13	21 066 270.49	808 078.65	267	0.0	1.000 0000
	14	21 060 193.53	814 155.61	317	+16.0	37
	15	21 054 116.54	820 232.60	383	32.3	74
45	16	21 048 039.51	826 309.63	101.28467	+49.1	1.000 0113
	17	21 041 962.43	832 386.71	533	66.2	152
	18	21 035 885.31	838 463.83	600	83.7	193
	19	21 029 808.15	844 540.99	683	101.6	234
	20	21 023 730.94	850 618.20	750	119.8	276
45	21	21 017 653.69	856 695.45	101.28817	+138.4	1.000 0319
	22	21 011 576.40	862 772.74	900	157.4	362
	23	21 005 499.06	868 850.08	8967	176.7	407
	24	20 999 421.68	874 927.46	9050	196.4	452
	25	20 993 344.25	881 004.89	117	216.5	499
45	26	20 987 266.78	887 082.36	101.29200	+237.0	1.000 0546
	27	20 981 189.26	893 159.88	283	257.8	594
	28	20 975 111.69	899 237.45	367	279.0	642
	29	20 969 034.07	905 315.07	450	300.6	692
	30	20 962 956.40	911 392.74	517	322.5	743

Table I—Continued

Latitude		R	y′ (y value on the central meridian)	Tabular difference of R for one second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
°	′	*Feet*	*Feet*	*Feet*		
45	31	20 956 878.69	917 470.45	101.29617	+344.8	1.000 0794
	32	20 950 800.92	923 548.22	683	367.5	846
	33	20 944 723.11	929 626.03	767	390.6	899
	34	20 938 645.25	935 703.89	867	414.0	0953
	35	20 932 567.33	941 781.81	29950	437.8	1008
45	36	20 926 489.36	947 859.78	101.30033	+462.0	1.000 1064
	37	20 920 411.34	953 937.80	117	486.6	120
	38	20 914 333.27	960 015.87	200	511.5	178
	39	20 908 255.15	966 093.99	300	536.8	236
	40	20 902 176.97	972 172.17	383	562.5	295
45	41	20 896 098.74	978 250.40	101.30483	+588.6	1.000 1355
	42	20 890 020.45	984 328.69	567	615.0	416
	43	20 883 942.11	990 407.03	667	641.8	478
	44	20 877 863.71	996 485.43	767	669.0	540
	45	20 871 785.25	1 002 563.89	850	696.5	604
45	46	20 865 706.74	1 008 642.40	101.30950	+724.4	1.000 1668
	47	20 859 628.17	1 014 720.97	1050	752.7	733
	48	20 853 549.54	1 020 799.60	133	781.4	799
	49	20 847 470.86	1 026 878.28	250	810.4	866
	50	20 841 392.11	1 032 957.03	350	839.8	1934
45	51	20 835 313.30	1 039 035.84	101.31433	+869.6	1.000 2002
	52	20 829 234.44	1 045 114.70	533	899.8	072
	53	20 823 155.52	1 051 193.62	650	930.3	142
	54	20 817 076.53	1 057 272.61	750	961.2	213
	55	20 810 997.48	1 063 351.66	850	992.5	285
45	56	20 804 918.37	1 069 430.77	101.31950	+1 024.2	1.000 2358
	57	20 798 839.20	1 075 509.94	2050	1 056.3	432
	58	20 792 759.97	1 081 589.17	167	1 088.7	507
	59	20 786 680.67	1 087 668.47	101.32267	1 121.5	582
46	00	20 780 601.31	1 093 747.83		1 154.7	1.000 2659

Table II

[1″ of longitude=0″. 70092778 of θ]

Longitude		θ			Longitude		θ			Longitude		θ		
°	′	°	′	″	°	′	°	′	″	°	′	°	′	″
91	00	+2	06	10.0200	91	26	+1	47	56.5727	91	51	+1	30	25.1810
	01		05	27.9644		27		47	14.5170		52		29	43.1254
	02		04	45.9087		28		46	32.4614		53		29	01.0697
	03		04	03.8530		29		45	50.4057		54		28	19.0140
	04		03	21.7974		30		45	08.3500		55		27	36.9584
	05		02	39.7417	91	31	+1	44	26.2944	91	56	+1	26	54.9027
91	06	+2	01	57.6860		32		43	44.2387		57		26	12.8470
	07		01	15.6304		33		43	02.1830		58		25	30.7914
	08		00	33.5747		34		42	20.1274		59		24	48.7357
	09	+1	59	51.5190		35		41	38.0717	92	00		24	06.6800
	10		59	09.4634	91	36	+1	40	56.0160	92	01	+1	23	24.6244
91	11	+1	58	27.4077		37		40	13.9604		02		22	42.5687
	12		57	45.3520		38		39	31.9047		03		22	00.5130
	13		57	03.2964		39		38	49.8490		04		21	18.4574
	14		56	21.2407		40		38	07.7934		05		20	36.4017
	15		55	39.1850	91	41	+1	37	25.7377	92	06	+1	19	54.3460
91	16	+1	54	57.1294		42		36	43.6820		07		19	12.2904
	17		54	15.0737		43		36	01.6264		08		18	30.2347
	18		53	33.0180		44		35	19.5707		09		17	48.1790
	19		52	50.9624		45		34	37.5150		10		17	06.1234
	20		52	08.9067	91	46	+1	33	55.4594	92	11	+1	16	24.0677
91	21	+1	51	26.8510		47		33	13.4037		12		15	42.0120
	22		50	44.7954		48		32	31.3480		13		14	59.9564
	23		50	02.7397		49		31	49.2924		14		14	17.9007
	24		49	20.6840		50		31	07.2367		15		13	35.8450
	25		48	38.6284										

Table II—Continued

[1″ of longitude=0″. 70092778 of θ]

Longitude	θ	Longitude	θ	Longitude	θ
° ′	° ′ ″	° ′	° ′ ″	° ′	° ′ ″
92 16	+1 12 53.7894	93 21	+0 27 20.1710	94 26	−0 18 13.4473
17	12 11.7337	22	26 38.1153	27	18 55.5030
18	11 29.6780	23	25 56.0597	28	19 37.5587
19	10 47.6224	24	25 14.0040	29	20 19.6143
20	10 05.5667	25	24 31.9483	30	21 01.6700
92 21	+1 09 23.5110	93 26	+0 23 49.8927	94 31	−0 21 43.7257
22	08 41.4554	27	23 07.8370	32	22 25.7813
23	07 59.3997	28	22 25.7813	33	23 07.8370
24	07 17.3440	29	21 43.7257	34	23 49.8927
25	06 35.2884	30	21 01.6700	35	24 31.9483
92 26	+1 05 53.2327	93 31	+0 20 19.6143	94 36	−0 25 14.0040
27	05 11.1770	32	19 37.5587	37	25 56.0597
28	04 29.1214	33	18 55.5030	38	26 38.1153
29	03 47.0657	34	18 13.4473	39	27 20.1710
30	03 05.0100	35	17 31.3917	40	28 02.2267
92 31	+1 02 22.9544	93 36	+0 16 49.3360	94 41	−0 28 44.2823
32	01 40.8987	37	16 07.2803	42	29 26.3380
33	00 58.8430	38	15 25.2247	43	30 08.3937
34	+1 00 16.7874	39	14 43.1690	44	30 50.4493
35	+0 59 34.7317	40	14 01.1133	45	31 32.5050
92 36	+0 58 52.6760	93 41	+0 13 19.0577	94 46	−0 32 14.5607
37	58 10.6204	42	12 37.0020	47	32 56.6163
38	57 28.5647	43	11 54.9463	48	33 38.6720
39	56 46.5090	44	11 12.8907	49	34 20.7277
40	56 04.4534	45	10 30.8350	50	35 02.7833
92 41	+0 55 22.3977	93 46	+0 09 48.7793	94 51	−0 35 44.8390
42	54 40.3420	47	09 06.7237	52	36 26.8947
43	53 58.2864	48	08 24.6680	53	37 08.9503
44	53 16.2307	49	07 42.6123	54	37 51.0060
45	52 34.1750	50	07 00.5567	55	38 33.0617
92 46	+0 51 52.1194	93 51	+0 06 18.5010	94 56	−0 39 15.1173
47	51 10.0637	52	05 36.4453	57	39 57.1730
48	50 28.0080	53	04 54.3897	58	40 39.2287
49	49 45.9524	54	04 12.3340	59	41 21.2843
50	49 03.8967	55	03 30.2783	95 00	42 03.3400
92 51	+0 48 21.8410	93 56	+0 02 48.2227	95 01	−0 42 45.3957
52	47 39.7854	57	02 06.1670	02	43 27.4514
53	46 57.7297	58	01 24.1113	03	44 09.5070
54	46 15.6740	59	00 42.0557	04	44 51.5627
55	45 33.6184	94 00	00 00.0000	05	45 33.6184
92 56	+0 44 51.5627	94 01	−0 00 42.0557	95 06	−0 46 15.6740
57	44 09.5070	02	01 24.1113	07	46 57.7297
58	43 27.4514	03	02 06.1670	08	47 39.7854
59	42 45.3957	04	02 48.2227	09	48 21.8410
93 00	42 03.3400	05	03 30.2783	10	49 03.8967
93 01	+0 41 21.2843	94 06	−0 04 12.3340	95 11	−0 49 45.9524
02	40 39.2287	07	04 54.3897	12	50 28.0080
03	39 57.1730	08	05 36.4453	13	51 10.0637
04	39 15.1173	09	06 18.5010	14	51 52.1194
05	38 33.0617	10	07 00.5567	15	52 34.1750
93 06	+0 37 51.0060	94 11	−0 07 42.6123	95 16	−0 53 16.2307
07	37 08.9503	12	08 24.6680	17	53 58.2864
08	36 26.8947	13	09 06.7237	18	54 40.3420
09	35 44.8390	14	09 48.7793	19	55 22.3977
10	35 02.7833	15	10 30.8350	20	56 04.4534
93 11	+0 34 20.7277	94 16	−0 11 12.8907	95 21	−0 56 46.5090
12	33 38.6720	17	11 54.9463	22	57 28.5647
13	32 56.6163	18	12 37.0020	23	58 10.6204
14	32 14.5607	19	13 19.0577	24	58 52.6760
15	31 32.5050	20	14 01.1133	25	−0 59 34.7317
93 16	+0 30 50.4493	94 21	−0 14 43.1690	95 26	−1 00 16.7874
17	30 08.3937	22	15 25.2247	27	00 58.8430
18	29 26.3380	23	16 07.2803	28	01 40.8987
19	28 44.2823	24	16 49.3360	29	02 22.9544
20	28 02.2267	25	17 31.3917	30	03 05.0100

Table II—Continued

[1″ of longitude=0″.70092778 of θ]

Longitude	θ	Longitude	θ	Longitude	θ
° ′	° ′ ″	° ′	° ′ ″	° ′	° ′ ″
95 31	−1 03 47.0657	96 06	−1 28 19.0140	96 41	−1 52 50.9624
32	04 29.1214	07	29 01.0697	42	53 33.0180
33	05 11.1770	08	29 43.1254	43	54 15.0737
34	05 53.2327	09	30 25.1810	44	54 57.1294
35	06 35.2884	10	31 07.2367	45	55 39.1850
95 36	−1 07 17.3440	96 11	−1 31 49.2924	96 46	−1 56 21.2407
37	07 59.3997	12	32 31.3480	47	57 03.2964
38	08 41.4554	13	33 13.4037	48	57 45.3520
39	09 23.5110	14	33 55.4594	49	58 27.4077
40	10 05.5667	15	34 37.5150	50	59 09.4634
95 41	−1 10 47.6224	96 16	−1 35 19.5707	96 51	−1 59 51.5190
42	11 29.6780	17	36 01.6264	52	−2 00 33.5747
43	12 11.7337	18	36 43.6820	53	01 15.6304
44	12 53.7894	19	37 25.7377	54	01 57.6860
45	13 35.8450	20	38 07.7934	55	02 39.7417
95 46	−1 14 17.9007	96 21	−1 38 49.8490	96 56	−2 03 21.7974
47	14 59.9564	22	39 31.9047	57	04 03.8530
48	15 42.0120	23	40 13.9604	58	04 45.9087
49	16 24.0677	24	40 56.0160	59	05 27.9644
50	17 06.1234	25	41 38.0717	97 00	06 10.0200
95 51	−1 17 48.1790	96 26	−1 42 20.1274	97 01	−2 06 52.0757
52	18 30.2347	27	43 02.1830	02	07 34.1314
53	19 12.2904	28	43 44.2387	03	08 16.1871
54	19 54.3460	29	44 26.2944	04	08 58.2427
55	20 36.4017	30	45 08.3500	05	09 40.2984
95 56	−1 21 18.4574	96 31	−1 45 50.4057	97 06	−2 10 22.3541
57	22 00.5130	32	46 32.4614	07	11 04.4097
58	22 42.5687	33	47 14.5170	08	11 46.4654
59	23 24.6244	34	47 56.5727	09	12 28.5211
96 00	24 06.6800	35	48 38.6284	97 10	13 10.5767
96 01	−1 24 48.7357	96 36	−1 49 20.6840		
02	25 30.7914	37	50 02.7397		
03	26 12.8470	38	50 44.7954		
04	26 54.9027	39	51 26.8510		
05	27 36.9584	40	52 08.9067		

CENTRAL ZONE

Table I

Latitude	*R*	*y′* (*y* value on the central meridian)	Tabular difference of *R* for one second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
° ′	*Feet*	*Feet*	*Feet*		
45 00	20 493 457.15	0.00	101.29750	+826.5	1.000 1903
01	20 487 379.30	6 077.85	700	797.7	837
02	20 481 301.48	12 155.67	667	769.2	771
03	20 475 223.68	18 233.47	633	741.1	706
04	20 469 145.90	24 311.25	600	713.4	643
05	20 463 068.14	30 389.01	550	686.1	580
45 06	20 456 990.41	36 466.74	101.29533	+659.1	1.000 1518
07	20 450 912.69	42 544.46	500	632.4	456
08	20 444 834.99	48 622.16	467	606.1	396
09	20 438 757.31	54 699.84	450	580.2	336
10	20 432 679.64	60 777.51	417	554.6	277
45 11	20 426 601.99	66 855.16	101.29383	+529.4	1.000 1219
12	20 420 524.36	72 932.79	350	504.6	162
13	20 414 446.75	79 010.40	317	480.1	105
14	20 408 369.16	85 087.99	300	455.9	1050
15	20 402 291.58	91 165.57	283	432.1	0995
45 16	20 396 214.01	97 243.14	101.29250	+408.7	1.000 0941
17	20 390 136.46	103 320.69	233	385.6	888
18	20 384 058.92	109 398.23	200	362.9	836
19	20 377 981.40	115 475.75	183	340.6	784
20	20 371 903.89	121 553.26	167	318.6	734

Table I—Continued

Latitude		R	y′ (y value on the central meridian)	Tabular difference of R for one second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
°	′	*Feet*	*Feet*	*Feet*		
45	21	20 365 826.39	127 630.76	101.29150	+297.0	1.000 0684
	22	20 359 748.90	133 708.25	133	275.7	635
	23	20 353 671.42	139 785.73	100	254.8	587
	24	20 347 593.96	145 863.19	083	234.3	539
	25	20 341 516.51	151 940.64	067	214.1	493
45	26	20 335 439.07	158 018.08	101.29067	+194.3	1.000 0447
	27	20 329 361.63	164 095.52	050	174.8	402
	28	20 323 284.20	170 172.95	017	155.7	359
	29	20 317 206.79	176 250.36	017	136.9	315
	30	20 311 129.38	182 327.77	29000	118.6	273
45	31	20 305 051.98	188 405.17	101.28983	+100.5	1.000 0231
	32	20 298 974.59	194 482.56	983	82.9	191
	33	20 292 897.20	200 559.95	967	65.6	151
	34	20 286 819.82	206 637.33	967	48.6	112
	35	20 280 742.44	212 714.71	950	32.0	074
45	36	20 274 665.07	218 792.08	101.28950	+15.8	1.000 0036
	37	20 268 587.70	224 869.45	933	0.0	1.000 0000
	38	20 262 510.34	230 946.81	933	−15.5	0.999 9964
	39	20 256 432.98	237 024.17	933	30.7	929
	40	20 250 355.62	243 101.53	917	45.5	895
45	41	20 244 278.27	249 178.88	101.28917	−59.9	0.999 9862
	42	20 238 200.92	255 256.23	917	73.9	830
	43	20 232 123.57	261 333.58	917	87.6	798
	44	20 226 046.22	267 410.93	917	100.9	768
	45	20 219 968.87	273 488.28	917	113.9	738
45	46	20 213 891.52	279 565.63	101.28917	−126.5	0.999 9709
	47	20 207 814.17	285 642.98	933	138.7	681
	48	20 201 736.81	291 720.34	917	150.6	653
	49	20 195 659.46	297 797.69	917	162.1	627
	50	20 189 582.11	303 875.04	933	173.3	601
45	51	20 183 504.75	309 952.40	101.28933	−184.1	0.999 9576
	52	20 177 427.39	316 029.76	950	194.5	552
	53	20 171 350.02	322 107.13	950	204.6	529
	54	20 165 272.65	328 184.50	950	214.3	507
	55	20 159 195.28	334 261.87	967	223.6	485
45	56	20 153 117.90	340 339.25	101.28967	−232.6	0.999 9464
	57	20 147 040.52	346 416.63	983	241.2	445
	58	20 140 963.13	352 494.02	9000	249.4	426
	59	20 134 885.73	358 571.42	017	257.3	408
46	00	20 128 808.32	364 648.83	017	264.8	390
46	01	20 122 730.91	370 726.24	101.29033	−272.0	0.999 9374
	02	20 116 653.49	376 803.66	050	278.8	358
	03	20 110 576.06	382 881.09	067	285.2	343
	04	20 104 498.62	388 958.53	083	291.3	329
	05	20 098 421.17	395 035.98	100	297.0	316
46	06	20 092 343.71	401 113.44	101.29117	−302.3	0.999 9304
	07	20 086 266.24	407 190.91	133	307.3	292
	08	20 080 188.76	413 268.39	150	311.9	282
	09	20 074 111.27	419 345.88	167	316.1	272
	10	20 068 033.77	425 423.38	200	320.0	263
46	11	20 061 956.25	431 500.90	101.29217	−323.5	0.999 9255
	12	20 055 878.72	437 578.43	250	326.7	248
	13	20 049 801.17	443 655.98	267	329.5	241
	14	20 043 723.61	449 733.54	283	331.9	236
	15	20 037 646.04	455 811.11	317	333.9	231
46	16	20 031 568.45	461 888.70	101.29350	−335.6	0.999 9227
	17	20 025 490.84	467 966.31	367	336.9	224
	18	20 019 413.22	474 043.93	400	337.8	222
	19	20 013 335.58	480 121.57	417	338.4	221
	20	20 007 257.93	486 199.22	450	338.6	220
46	21	20 001 180.26	492 276.89	101.29500	−338.5	0.999 9221
	22	19 995 102.56	498 354.59	517	338.0	222
	23	19 989 024.85	504 432.30	550	337.1	224
	24	19 982 947.12	510 510.03	583	335.9	227
	25	19 976 869.37	516 587.78	617	334.3	230

Table I—Continued

Latitude		R	y′ (y value on the central meridian)	Tabular difference of R for one second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
°	′	*Feet*	*Feet*	*Feet*		
46	26	19 970 791.60	522 665.55	101.29667	−332.3	0.999 9235
	27	19 964 713.80	528 743.35	683	329.9	240
	28	19 958 635.99	534 821.16	733	327.2	247
	29	19 952 558.15	540 899.00	767	324.1	254
	30	19 946 480.29	546 976.86	800	320.7	262
46	31	19 940 402.41	553 054.74	101.29833	−316.9	0.999 9270
	32	19 934 324.51	559 132.64	883	312.7	280
	33	19 928 246.58	565 210.57	933	308.1	291
	34	19 922 168.62	571 288.53	29967	303.2	302
	35	19 916 090.64	577 366.51	30000	297.9	314
46	36	19 910 012.64	583 444.51	101.30050	−292.3	0.999 9327
	37	19 903 934.61	589 522.54	100	286.2	341
	38	19 897 856.55	595 600.60	150	279.8	356
	39	19 891 778.46	601 678.69	183	273.1	371
	40	19 885 700.35	607 756.80	233	265.9	388
46	41	19 879 622.21	613 834.94	101.30283	−258.4	0.999 9405
	42	19 873 544.04	619 913.11	333	250.6	423
	43	19 867 465.84	625 991.31	383	242.3	442
	44	19 861 387.61	632 069.54	433	233.7	462
	45	19 855 309.35	638 147.80	483	224.7	483
46	46	19 849 231.06	644 226.09	101.30533	−215.4	0.999 9504
	47	19 843 152.74	650 304.41	583	205.7	526
	48	19 837 074.39	656 382.76	633	195.6	550
	49	19 830 996.01	662 461.14	700	185.2	574
	50	19 824 917.59	668 539.56	750	174.4	598
46	51	19 818 839.14	674 618.01	101.30817	−163.2	0.999 9624
	52	19 812 760.65	680 696.50	867	151.6	651
	53	19 806 682.13	686 775.02	917	139.7	678
	54	19 800 603.58	692 853.57	0983	127.4	707
	55	19 794 524.99	698 932.16	1050	114.7	736
46	56	19 788 446.36	705 010.79	101.31100	−101.7	0.999 9766
	57	19 782 367.70	711 089.45	167	88.3	797
	58	19 776 289.00	717 168.15	233	74.5	828
	59	19 770 210.26	723 246.89	300	60.3	861
47	00	19 764 131.48	729 325.67	350	45.8	895
47	01	19 758 052.67	735 404.48	101.31417	−30.9	0.999 9929
	02	19 751 973.82	741 483.33	483	15.6	0.999 9964
	03	19 745 894.93	747 562.22	550	0.0	1.000 0000
	04	19 739 816.00	753 641.15	633	+16.0	37
	05	19 733 737.02	759 720.13	683	32.4	75
47	06	19 727 658.01	765 799.14	101.31767	+49.1	1.000 0113
	07	19 721 578.95	771 878.20	833	66.2	152
	08	19 715 499.85	777 957.30	900	83.7	193
	09	19 709 420.71	784 036.44	1967	101.6	234
	10	19 703 341.53	790 115.62	2050	119.8	276
47	11	19 697 262.30	796 194.85	101.32117	+138.5	1.000 0319
	12	19 691 183.03	802 274.12	200	157.4	362
	13	19 685 103.71	808 353.44	267	176.8	407
	14	19 679 024.35	814 432.80	350	196.5	452
	15	19 672 944.94	820 512.21	417	216.6	499
47	16	19 666 865.49	826 591.66	101.32500	+237.1	1.000 0546
	17	19 660 785.99	832 671.16	583	257.9	594
	18	19 654 706.44	838 750.71	667	279.1	643
	19	19 648 626.84	844 830.31	750	300.7	692
	20	19 642 547.19	850 909.96	817	322.7	743
47	21	19 636 467.50	856 989.65	101.32900	+345.0	1.000 0794
	22	19 630 387.76	863 069.39	33000	367.7	847
	23	19 624 307.96	869 149.19	067	390.8	900
	24	19 618 228.12	875 229.03	167	414.3	0954
	25	19 612 148.22	881 308.93	233	438.1	1009
47	26	19 606 068.28	887 388.87	101.33333	+462.3	1.000 1064
	27	19 599 988.28	893 468.87	417	486.9	121
	28	19 593 908.23	899 548.92	517	511.8	178
	29	19 587 828.12	905 629.03	101.33600	537.2	237
47	30	19 581 747.96	911 709.19		562.9	1.000 1296

Table II

[1″ of longitude=0″.72338807 of θ]

Longitude	θ	Longitude	θ	Longitude	θ
° ′	° ′ ″	° ′	° ′ ″	° ′	° ′ ″
91 30	+1 59 21.5419	92 36	+1 11 36.9251	93 41	+0 24 35.7117
31	58 38.1386	37	10 53.5219	42	23 52.3084
32	57 54.7353	38	10 10.1186	43	23 08.9051
33	57 11.3320	39	09 26.7153	44	22 25.5018
34	56 27.9288	40	08 43.3120	45	21 42.0985
35	55 44.5255	92 41	+1 07 59.9087	93 46	+0 20 58.6952
91 36	+1 55 01.1222	42	07 16.5054	47	20 15.2920
37	54 17.7189	43	06 33.1021	48	19 31.8887
38	53 34.3156	44	05 49.6989	49	18 48.4854
39	52 50.9123	45	05 06.2956	50	18 05.0821
40	52 07.5091	92 46	+1 04 22.8923	93 51	+0 17 21.6788
91 41	+1 51 24.1058	47	03 39.4890	52	16 38.2755
42	50 40.7025	48	02 56.0857	53	15 54.8723
43	49 57.2992	49	02 12.6824	54	15 11.4690
44	49 13.8959	50	01 29.2792	55	14 28.0657
45	48 30.4926	92 51	+1 00 45.8759	93 56	+0 13 44.6624
91 46	+1 47 47.0893	52	+1 00 02.4726	57	13 01.2591
47	47 03.6861	53	+0 59 19.0693	58	12 17.8558
48	46 20.2828	54	58 35.6660	59	11 34.4525
49	45 36.8795	55	57 52.2627	94 00	10 51.0493
50	44 53.4762	92 56	+0 57 08.8595	94 01	+0 10 07.6460
91 51	+1 44 10.0729	57	56 25.4562	02	09 24.2427
52	43 26.6696	58	55 42.0529	03	08 40.8394
53	42 43.2664	59	54 58.6496	04	07 57.4361
54	41 59.8631	93 00	54 15.2463	05	07 14.0328
55	41 16.4598	93 01	+0 53 31.8430	94 06	+0 06 30.6296
91 56	+1 40 33.0565	02	52 48.4397	07	05 47.2263
57	39 49.6532	03	52 05.0365	08	05 03.8230
58	39 06.2499	04	51 21.6332	09	04 20.4197
59	38 22.8467	05	50 38.2299	10	03 37.0164
92 00	37 39.4434	93 06	+0 49 54.8266	94 11	+0 02 53.6131
92 01	+1 36 56.0401	07	49 11.4233	12	02 10.2099
02	36 12.6368	08	48 28.0200	13	01 26.8066
03	35 29.2335	09	47 44.6168	14	00 43.4033
04	34 45.8302	10	47 01.2135	15	0 00 00.0000
05	34 02.4269	93 11	+0 46 17.8102	94 16	−0 00 43.4033
92 06	+1 33 19.0237	12	45 34.4069	17	01 26.8066
07	32 35.6204	13	44 51.0036	18	02 10.2099
08	31 52.2171	14	44 07.6003	19	02 53.6131
09	31 08.8138	15	43 24.1971	20	03 37.0164
10	30 25.4105	93 16	+0 42 40.7938	94 21	−0 04 20.4197
92 11	+1 29 42.0072	17	41 57.3905	22	05 03.8230
12	28 58.6040	18	41 13.9872	23	05 47.2263
13	28 15.2007	19	40 30.5839	24	06 30.6296
14	27 31.7974	20	39 47.1806	25	07 14.0328
15	26 48.3941	93 21	+0 39 03.7773	94 26	−0 07 57.4361
92 16	+1 26 04.9908	22	38 20.3741	27	08 40.8394
17	25 21.5875	23	37 36.9708	28	09 24.2427
18	24 38.1843	24	36 53.5675	29	10 07.6460
19	23 54.7810	25	36 10.1642	30	10 51.0493
20	23 11.3777	93 26	+0 35 26.7609	94 31	−0 11 34.4525
92 21	+1 22 27.9744	27	34 43.3576	32	12 17.8558
22	21 44.5711	28	33 59.9544	33	13 01.2591
23	21 01.1678	29	33 16.5511	34	13 44.6624
24	20 17.7645	30	32 33.1478	35	14 28.0657
25	19 34.3613	93 31	+0 31 49.7445	94 36	−0 15 11.4690
92 26	+1 18 50.9580	32	31 06.3412	37	15 54.8723
27	18 07.5547	33	30 22.9379	38	16 38.2755
28	17 24.1514	34	29 39.5347	39	17 21.6788
29	16 40.7481	35	28 56.1314	40	18 05.0821
30	15 57.3448	93 36	+0 28 12.7281	94 41	−0 18 48.4854
92 31	+1 15 13.9416	37	27 29.3248	42	19 31.8887
32	14 30.5383	38	26 45.9215	43	20 15.2920
33	13 47.1350	39	26 02.5182	44	20 58.6952
34	13 03.7317	40	25 19.1149	45	21 42.0985
35	12 20.3284				

Table II—Continued

[1″ of longitude=0″.72338807 of θ]

Longitude		θ			Longitude		θ			Longitude		θ		
°	′	°	′	″	°	′	°	′	″	°	′	°	′	″
94	46	−0	22	25.5018	95	36	−0	58	35.6660	96	26	−1	34	45.8302
	47		23	08.9051		37	−0	59	19.0693		27		35	29.2335
	48		23	52.3084		38	−1	00	02.4726		28		36	12.6368
	49		24	35.7117		39		00	45.8759		29		36	56.0401
	50		25	19.1149		40		01	29.2792		30		37	39.4434
94	51	−0	26	02.5182	95	41	−1	02	12.6824	96	31	−1	38	22.8467
	52		26	45.9215		42		02	56.0857		32		39	06.2499
	53		27	29.3248		43		03	39.4890		33		39	49.6532
	54		28	12.7281		44		04	22.8923		34		40	33.0565
	55		28	56.1314		45		05	06.2956		35		41	16.4598
94	56	−0	29	39.5347	95	46	−1	05	49.6989	96	36	−1	41	59.8631
	57		30	22.9379		47		06	33.1021		37		42	43.2664
	58		31	06.3412		48		07	16.5054		38		43	26.6696
	59		31	49.7445		49		07	59.9087		39		44	10.0729
95	00		32	33.1478		50		08	43.3120		40		44	53.4762
95	01	−0	33	16.5511	95	51	−1	09	26.7153	96	41	−1	45	36.8795
	02		33	59.9544		52		10	10.1186		42		46	20.2828
	03		34	43.3576		53		10	53.5219		43		47	03.6861
	04		35	26.7609		54		11	36.9251		44		47	47.0893
	05		36	10.1642		55		12	20.3284		45		48	30.4926
95	06	−0	36	53.5675	95	56	−1	13	03.7317	96	46	−1	49	13.8959
	07		37	36.9708		57		13	47.1350		47		49	57.2992
	08		38	20.3741		58		14	30.5383		48		50	40.7025
	09		39	03.7773		59		15	13.9416		49		51	24.1058
	10		39	47.1806	96	00		15	57.3448		50		52	07.5091
95	11	−0	40	30.5839	96	01	−1	16	40.7481	96	51	−1	52	50.9123
	12		41	13.9872		02		17	24.1514		52		53	34.3156
	13		41	57.3905		03		18	07.5547		53		54	17.7189
	14		42	40.7938		04		18	50.9580		54		55	01.1222
	15		43	24.1971		05		19	34.3613		55		55	44.5255
95	16	−0	44	07.6003	96	06	−1	20	17.7645	96	56	−1	56	27.9288
	17		44	51.0036		07		21	01.1678		57		57	11.3320
	18		45	34.4069		08		21	44.5711		58		57	54.7353
	19		46	17.8102		09		22	27.9744		59		58	38.1386
	20		47	01.2135		10		23	11.3777	97	00	−1	59	21.5419
95	21	−0	47	44.6168	96	11	−1	23	54.7810	97	01	−2	00	04.9452
	22		48	28.0200		12		24	38.1843		02		00	48.3485
	23		49	11.4233		13		25	21.5875		03		01	31.7517
	24		49	54.8266		14		26	04.9908		04		02	15.1550
	25		50	38.2299		15		26	48.3941		05		02	58.5583
95	26	−0	51	21.6332	96	16	−1	27	31.7974	97	06	−2	03	41.9616
	27		52	05.0365		17		28	15.2007		07		04	25.3649
	28		52	48.4397		18		28	58.6040		08		05	08.7682
	29		53	31.8430		19		29	42.0072		09		05	52.1715
	30		54	15.2463		20		30	25.4105	97	10		06	35.5747
95	31	−0	54	58.6496	96	21	−1	31	08.8138					
	32		55	42.0529		22		31	52.2171					
	33		56	25.4562		23		32	35.6204					
	34		57	08.8595		24		33	19.0237					
	35		57	52.2627		25		34	02.4269					

NORTHERN ZONE

Table I

Latitude		R	y′ (y value on the central meridian)	Tabular difference of R for one second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
°	′	*Feet*	*Feet*	*Feet*		
46	30	19 471 398.75	0.00	101.32250	+743.6	1.000 1712
	31	19 465 319.40	6 079.35	200	714.8	646
	32	19 459 240.08	12 158.67	183	686.4	580
	33	19 453 160.77	18 237.98	133	658.3	516
	34	19 447 081.49	24 317.26	117	630.6	452
	35	19 441 002.22	30 396.53	067	603.2	389
46	36	19 434 922.98	36 475.77	101.32033	+576.2	1.000 1327
	37	19 428 843.76	42 554.99	2017	549.6	266
	38	19 422 764.55	48 634.20	1967	523.3	205
	39	19 416 685.37	54 713.38	950	497.4	145
	40	19 410 606.20	60 792.55	917	471.8	086
46	41	19 404 527.05	66 871.70	101.31883	+446.6	1.000 1028
	42	19 398 447.92	72 950.83	867	421.7	0971
	43	19 392 368.80	79 029.95	833	397.2	915
	44	19 386 289.70	85 109.05	817	373.1	859
	45	19 380 210.61	91 188.14	783	349.3	804
46	46	19 374 131.54	97 267.21	101.31750	+325.9	1.000 0750
	47	19 368 052.49	103 346.26	733	302.8	697
	48	19 361 973.45	109 425.30	717	280.1	645
	49	19 355 894.42	115 504.33	700	257.8	594
	50	19 349 815.40	121 583.35	667	235.8	543
46	51	19 343 736.40	127 662.35	101.31650	+214.2	1.000 0493
	52	19 337 657.41	133 741.34	633	192.9	444
	53	19 331 578.43	139 820.32	617	172.0	396
	54	19 325 499.46	145 899.29	583	151.4	349
	55	19 319 420.51	151 978.24	583	131.2	302
46	56	19 313 341.56	158 057.19	101.31567	+111.4	1.000 0256
	57	19 307 262.62	164 136.13	550	91.9	212
	58	19 301 183.69	170 215.06	533	72.8	168
	59	19 295 104.77	176 293.98	517	54.1	125
47	00	19 289 025.86	182 372.89	500	35.7	082
47	01	19 282 946.96	188 451.79	101.31500	+17.7	1.000 0041
	02	19 276 868.06	194 530.69	483	0.0	1.000 0000
	03	19 270 789.17	200 609.58	483	−17.3	0.999 9960
	04	19 264 710.28	206 688.47	467	34.3	921
	05	19 258 631.40	212 767.35	450	50.9	883
47	06	19 252 552.53	218 846.22	101.31450	−67.1	0.999 9846
	07	19 246 473.66	224 925.09	450	82.9	809
	08	19 240 394.79	231 003.96	433	98.5	773
	09	19 234 315.93	237 082.82	433	113.6	738
	10	19 228 237.07	243 161.68	433	128.4	704
47	11	19 222 158.21	249 240.54	101.31417	−142.9	0.999 9671
	12	19 216 079.36	255 319.39	433	156.9	639
	13	19 210 000.50	261 398.25	417	170.6	607
	14	19 203 921.65	267 477.10	417	184.0	576
	15	19 197 842.80	273 555.95	433	196.9	547
47	16	19 191 763.94	279 634.81	101.31417	−209.6	0.999 9517
	17	19 185 685.09	285 713.66	417	221.8	489
	18	19 179 606.24	291 792.51	433	233.7	462
	19	19 173 527.38	297 871.37	433	245.2	435
	20	19 167 448.52	303 950.23	433	256.4	410
47	21	19 161 369.66	310 029.09	101.31433	−267.2	0.999 9385
	22	19 155 290.80	316 107.95	450	277.6	361
	23	19 149 211.93	322 186.82	450	287.7	338
	24	19 143 133.06	328 265.69	450	297.4	315
	25	19 137 054.19	334 344.56	467	306.7	294
47	26	19 130 975.31	340 423.44	101.31483	−315.7	0.999 9273
	27	19 124 896.42	346 502.33	483	324.3	253
	28	19 118 817.53	352 581.22	500	332.6	234
	29	19 112 738.63	358 660.12	517	340.5	216
	30	19 106 659.72	364 739.03	517	348.0	199

Table I—Continued

Latitude		R	y′ (y value on the central meridian)	Tabular difference of R for one second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
°	′	*Feet*	*Feet*	*Feet*		
47	31	19 100 580.81	370 817.94	101.31550	−355.2	0.999 9182
	32	19 094 501.88	376 896.87	550	362.0	166
	33	19 088 422.95	382 975.80	567	368.4	152
	34	19 082 344.01	389 054.74	583	374.5	138
	35	19 076 265.06	395 133.69	600	380.2	125
47	36	19 070 186.10	401 212.65	101.31617	−385.6	0.999 9112
	37	19 064 107.13	407 291.62	633	390.6	101
	38	19 058 028.15	413 370.60	650	395.2	090
	39	19 051 949.16	419 449.59	683	399.4	80
	40	19 045 870.15	425 528.60	700	403.3	71
47	41	19 039 791.13	431 607.62	101.31717	−406.8	0.999 9063
	42	19 033 712.10	437 686.65	750	410.0	56
	43	19 027 633.05	443 765.70	767	412.8	50
	44	19 021 553.99	449 844.76	783	415.2	44
	45	19 015 474.92	455 923.83	817	417.3	39
47	46	19 009 395.83	462 002.92	101.31850	−419.0	0.999 9035
	47	19 003 316.72	468 082.03	867	420.3	32
	48	18 997 237.60	474 161.15	900	421.2	30
	49	18 991 158.46	480 240.29	933	421.8	29
	50	18 985 079.30	486 319.45	950	422.1	28
47	51	18 979 000.13	492 398.62	101.31983	−421.9	0.999 9029
	52	18 972 920.94	498 477.81	2017	421.4	30
	53	18 966 841.73	504 557.02	067	420.6	32
	54	18 960 762.49	510 636.26	083	419.3	35
	55	18 954 683.24	516 715.51	117	417.7	38
47	56	18 948 603.97	522 794.78	101.32150	−415.7	0.999 9043
	57	18 942 524.68	528 874.07	183	413.4	48
	58	18 936 445.37	534 953.38	233	410.7	54
	59	18 930 366.03	541 032.72	267	407.6	61
48	00	18 924 286.67	547 112.08	300	404.2	69
48	01	18 918 207.29	553 191.46	101.32333	−400.4	0.999 9078
	02	18 912 127.89	559 270.86	383	396.2	88
	03	18 906 048.46	565 350.29	433	391.7	098
	04	18 899 969.00	571 429.75	467	386.8	109
	05	18 893 889.52	577 509.23	500	381.5	122
48	06	18 887 810.02	583 588.73	101.32550	−375.8	0.999 9135
	07	18 881 730.49	589 668.26	600	369.8	149
	08	18 875 650.93	595 747.82	633	363.4	163
	09	18 869 571.35	601 827.40	683	356.7	179
	10	18 863 491.74	607 907.01	733	349.5	195
48	11	18 857 412.10	613 986.65	101.32783	−342.1	0.999 9212
	12	18 851 332.43	620 066.32	833	334.2	230
	13	18 845 252.73	626 146.02	867	326.0	249
	14	18 839 173.01	632 225.74	933	317.4	269
	15	18 833 093.25	638 305.50	2983	308.4	290
48	16	18 827 013.46	644 385.29	101.33033	−299.1	0.999 9311
	17	18 820 933.64	650 465.11	083	289.4	334
	18	18 814 853.79	656 544.96	133	279.3	357
	19	18 808 773.91	662 624.84	200	268.8	381
	20	18 802 693.99	668 704.76	250	258.0	406
48	21	18 796 614.04	674 784.71	101.33300	−246.9	0.999 9431
	22	18 790 534.06	680 864.69	367	235.3	458
	23	18 784 454.04	686 944.71	417	223.4	486
	24	18 778 373.99	693 024.76	483	211.1	514
	25	18 772 293.90	699 104.85	533	198.4	543
48	26	18 766 213.78	705 184.97	101.33600	−185.4	0.999 9573
	27	18 760 133.62	711 265.13	667	172.0	604
	28	18 754 053.42	717 345.33	733	158.2	636
	29	18 747 973.18	723 425.57	783	144.0	668
	30	18 741 892.91	729 505.84	850	129.5	702
48	31	18 735 812.60	735 586.15	101.33917	−114.6	0.999 9736
	32	18 729 732.25	741 666.50	3983	99.4	771
	33	18 723 651.86	747 746.89	4050	83.8	807
	34	18 717 571.43	753 827.32	117	67.8	844
	35	18 711 490.96	759 907.79	183	51.4	882

Table I—Continued

Latitude		R	y' (y value on the central meridian)	Tabular difference of R for one second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
°	′	*Feet*	*Feet*	*Feet*		
48	36	18 705 410.45	765 988.30	101.34250	−34.6	0.999 9920
	37	18 699 329.90	772 068.85	317	17.5	0.999 9960
	38	18 693 249.31	778 149.44	400	0.0	1.000 0000
	39	18 687 168.67	784 230.08	467	+17.9	041
	40	18 681 087.99	790 310.76	550	36.1	083
48	41	18 675 007.26	796 391.49	101.34617	+54.7	1.000 0126
	42	18 668 926.49	802 472.26	683	73.7	170
	43	18 662 845.68	808 553.07	767	93.0	214
	44	18 656 764.82	814 633.93	833	112.8	260
	45	18 650 683.92	820 714.83	4917	132.9	306
48	46	18 644 602.97	826 795.78	101.35000	+153.3	1.000 0353
	47	18 638 521.97	832 876.78	067	174.2	401
	48	18 632 440.93	838 957.82	150	195.4	450
	49	18 626 359.84	845 038.91	233	217.0	500
	50	18 620 278.70	851 120.05	317	239.0	550
48	51	18 614 197.51	857 201.24	101.35400	+261.3	1.000 0602
	52	18 608 116.27	863 282.48	483	284.0	654
	53	18 602 034.98	869 363.77	567	307.1	707
	54	18 595 953.64	875 445.11	650	330.6	761
	55	18 589 872.25	881 526.50	733	354.4	816
48	56	18 583 790.81	887 607.94	101.35833	+378.6	1.000 0872
	57	18 577 709.31	893 689.44	5900	403.2	928
	58	18 571 627.77	899 770.98	6000	428.1	0986
	59	18 565 546.17	905 852.58	083	453.5	1044
49	00	18 559 464.52	911 934.23	183	479.2	103
49	01	18 553 382.81	918 015.94	101.36267	+505.3	1.000 1163
	02	18 547 301.05	924 097.70	367	531.7	224
	03	18 541 219.23	930 179.52	450	558.4	286
	04	18 535 137.36	936 261.39	550	585.7	349
	05	18 529 055.43	942 343.32	650	613.3	412
49	06	18 522 973.44	948 425.31	101.36733	+641.3	1.000 1477
	07	18 516 891.40	954 507.35	833	669.6	542
	08	18 510 809.30	960 589.45	6933	698.3	608
	09	18 504 727.14	966 671.61	7033	727.4	675
	10	18 498 644.92	972 753.83	117	756.9	743
49	11	18 492 562.65	978 836.10	101.37233	+786.7	1.000 1811
	12	18 486 480.31	984 918.44	333	816.9	881
	13	18 480 397.91	991 000.84	433	847.5	1951
	14	18 474 315.45	997 083.30	533	878.5	2023
	15	18 468 232.93	1 003 165.82	633	909.8	95
49	16	18 462 150.35	1 009 248.40	101.37733	+941.5	1.000 2168
	17	18 456 067.71	1 015 331.04	850	973.6	242
	18	18 449 985.00	1 021 413.75	7950	1 006.1	317
	19	18 443 902.23	1 027 496.52	8050	1 039.0	392
	20	18 437 819.40	1 033 579.35	167	1 072.2	469
49	21	18 431 736.50	1 039 662.25	101.38283	+1 105.8	1.000 2546
	22	18 425 653.53	1 045 745.22	383	1 139.8	624
	23	18 419 570.50	1 051 828.25	483	1 174.1	703
	24	18 413 487.41	1 057 911.34	617	1 208.9	783
	25	18 407 404.24	1 063 994.51	717	1 244.0	864
49	26	18 401 321.01	1 070 077.74	101.38833	+1 279.5	1.000 2946
	27	18 395 237.71	1 076 161.04	8933	1 315.3	3029
	28	18 389 154.35	1 082 244.40	9067	1 351.6	112
	29	18 383 070.91	1 088 327.84	101.39167	1 388.2	196
49	30	18 376 987.41	1 094 411.34		1 425.2	1.000 3282

Table II

[1″ of longitude=0″.74121966 of θ]

Longitude	θ	Longitude	θ	Longitude	θ
° ′	° ′ ″	° ′	° ′ ″	° ′	° ′ ″
88 30	+3 24 34.5977	89 36	+2 35 39.3678	90 41	+1 47 28.6111
31	23 50.1245	37	34 54.8946	42	46 44.1379
32	23 05.6513	38	34 10.4214	43	45 59.6647
33	22 21.1781	39	33 25.9482	44	45 15.1915
34	21 36.7050	40	32 41.4750	45	44 30.7184
35	20 52.2318				
		89 41	+2 31 57.0019	90 46	+1 43 46.2452
88 36	+3 20 07.7586	42	31 12.5287	47	43 01.7720
37	19 23.2854	43	30 28.0555	48	42 17.2988
38	18 38.8122	44	29 43.5823	49	41 32.8256
39	17 54.3391	45	28 59.1091	50	40 48.3524
40	17 09.8659				
		89 46	+2 28 14.6360	90 51	+1 40 03.8793
88 41	+3 16 25.3927	47	27 30.1628	52	39 19.4061
42	15 40.9195	48	26 45.6896	53	38 34.9329
43	14 56.4463	49	26 01.2164	54	37 50.4597
44	14 01.9732	50	25 16.7432	55	37 05.9866
45	13 27.5000				
		89 51	+2 24 32.2701	90 56	+1 36 21.5134
88 46	+3 12 43.0268	52	23 47.7969	57	35 37.0402
47	11 58.5536	53	23 03.3237	58	34 52.5670
48	11 14.0804	54	22 18.8505	59	34 08.0938
49	10 29.6073	55	21 34.3773	91 00	33 23.6207
50	09 45.1341				
		89 56	+2 20 49.9042	91 01	+1 32 39.1475
88 51	+3 09 00.6609	57	20 05.4310	02	31 54.6743
52	08 16.1877	58	19 20.9578	03	31 10.2011
53	07 31.7145	59	18 36.4846	04	30 25.7279
54	06 47.2414	90 00	17 52.0114	05	29 41.2548
55	06 02.7682				
		90 01	+2 17 07.5383	91 06	+1 28 56.7816
88 56	+3 05 18.2950	02	16 23.0651	07	28 12.3084
57	04 33.8218	03	15 38.5919	08	27 27.8352
58	03 49.3486	04	14 54.1187	09	26 43.3620
59	03 04.8755	05	14 09.6455	10	25 58.8889
89 00	02 20.4022				
		90 06	+2 13 25.1724	91 11	+1 25 14.4157
89 01	+3 01 35.9291	07	12 40.6992	12	24 29.9425
02	00 51.4559	08	11 56.2260	13	23 45.4693
03	3 00 06.9827	09	11 11.7528	14	23 00.9961
04	2 59 22.5095	10	10 27.2796	15	22 16.5230
05	58 38.0363				
		90 11	+2 09 42.8065	91 16	+1 21 32.0498
89 06	+2 57 53.5632	12	08 58.3333	17	20 47.5766
07	57 09.0900	13	08 13.8601	18	20 03.1034
08	56 24.6168	14	07 29.3869	19	19 18.6302
09	55 40.1436	15	06 44.9137	20	18 34.1571
10	54 55.6704				
		90 16	+2 06 00.4406	91 21	+1 17 49.6839
89 11	+2 54 11.1973	17	05 15.9674	22	17 05.2107
12	53 26.7241	18	04 31.4942	23	16 20.7375
13	52 42.2509	19	03 47.0210	24	15 36.2643
14	51 57.7777	20	03 02.5478	25	14 51.7912
15	51 13.3045				
		90 21	+2 02 18.0747	91 26	+1 14 07.3180
89 16	+2 50 28.8314	22	01 33.6015	27	13 22.8448
17	49 44.3582	23	00 49.1283	28	12 38.3716
18	48 59.8850	24	+2 00 04.6551	29	11 53.8984
19	48 15.4118	25	+1 59 20.1819	30	11 09.4253
20	47 30.9386				
		90 26	+1 58 35.7088	91 31	+1 10 24.9521
89 21	+2 46 46.4655	27	57 51.2356	32	09 40.4789
22	46 01.9923	28	57 06.7624	33	08 56.0057
23	45 17.5191	29	56 22.2892	34	08 11.5325
24	44 33.0459	30	55 37.8160	35	07 27.0594
25	43 48.5727				
		90 31	+1 54 53.3429	91 36	+1 06 42.5862
89 26	+2 43 04.0996	32	54 08.8697	37	05 58.1130
27	42 19.6264	33	53 24.3965	38	05 13.6398
28	41 35.1532	34	52 39.9233	39	04 29.1666
29	40 50.6800	35	51 55.4501	40	03 44.6935
30	40 06.2068				
		90 36	+1 51 10.9770	91 41	+1 03 00.2202
89 31	+2 39 21.7337	37	50 26.5038	42	02 15.7471
32	38 37.2605	38	49 42.0306	43	01 31.2739
33	37 52.7873	39	48 57.5574	44	00 46.8007
34	37 08.3141	40	48 13.0843	45	00 02.3276
35	36 23.8409				

Table II—Continued

[1″ of longitude=0″.72338807 of θ]

Longitude		θ			Longitude		θ			Longitude		θ		
°	′	°	′	″	°	′	°	′	″	°	′	°	′	″
91	46	+0	59	17.8543	92	51	+0	11	07.0977	93	56	−0	37	03.6590
	47		58	33.3812		52		10	22.6245		57		37	48.1322
	48		57	48.9080		53		09	38.1513		58		38	32.6053
	49		57	04.4348		54		08	53.6782		59		39	17.0785
	50		56	19.9617		55		08	09.2050	94	00		40	01.5517
91	51	+0	55	35.4885	92	56	+0	07	24.7318	94	01	−0	40	46.0249
	52		54	51.0153		57		06	40.2586		02		41	30.4981
	53		54	06.5421		58		05	55.7854		03		42	14.9712
	54		53	22.0689		59		05	11.3123		04		42	59.4444
	55		52	37.5958	93	00		04	26.8391		05		43	43.9176
91	56	+0	51	53.1226	93	01	+0	03	42.3659	94	06	−0	44	28.3908
	57		51	08.6494		02		02	57.8927		07		45	12.8640
	58		50	24.1762		03		02	13.4195		08		45	57.3371
	59		49	39.7030		04		01	28.9464		09		46	41.8103
92	00		48	55.2299		05		00	44.4732		10		47	26.2835
92	01	+0	48	10.7567	93	06	−0	00	00.0000	94	11	−0	48	10.7567
	02		47	26.2835		07	−0	00	44.4732		12		48	55.2299
	03		46	41.8103		08		01	28.9464		13		49	39.7030
	04		45	57.3371		09		02	13.4195		14		50	24.1762
	05		45	12.8640		10		02	57.8927		15		51	08.6494
92	06	+0	44	28.3908	93	11	−0	03	42.3659	94	16	−0	51	53.1226
	07		43	43.9176		12		04	26.8391		17		52	37.5958
	08		42	59.4444		13		05	11.3123		18		53	22.0689
	09		42	14.9712		14		05	55.7854		19		54	06.5421
	10		41	30.4981		15		06	40.2586		20		54	51.0153
92	11	+0	40	46.0249	93	16	−0	07	24.7318	94	21	−0	55	35.4885
	12		40	01.5517		17		08	09.2050		22		56	19.9617
	13		39	17.0785		18		08	53.6782		23		57	04.4348
	14		38	32.6053		19		09	38.1513		24		57	48.9080
	15		37	48.1322		20		10	22.6245		25		58	33.3812
92	16	+0	37	03.6590	93	21	−0	11	07.0977	94	26	−0	59	17.8543
	17		36	19.1858		22		11	51.5709		27	−1	00	02.3276
	18		35	34.7126		23		12	36.0441		28		00	46.8007
	19		34	50.2395		24		13	20.5172		29		01	31.2739
	20		34	05.7663		25		14	04.9904		30		02	15.7471
92	21	+0	33	21.2931	93	26	−0	14	49.4636	94	31	−1	03	00.2202
	22		32	36.8199		27		15	33.9368		32		03	44.6935
	23		31	52.3467		28		16	18.4100		33		04	29.1666
	24		31	07.8736		29		17	02.8831		34		05	13.6398
	25		30	23.4004		30		17	47.3563		35		05	58.1130
92	26	+0	29	38.9272	93	31	−0	18	31.8295	94	36	−1	06	42.5862
	27		28	54.4540		32		19	16.3027		37		07	27.0594
	28		28	09.9808		33		20	00.7759		38		08	11.5325
	29		27	25.5077		34		20	45.2490		39		08	56.0057
	30		26	41.0345		35		21	29.7222		40		09	40.4789
92	31	+0	25	56.5613	93	36	−0	22	14.1954	94	41	−1	10	24.9521
	32		25	12.0881		37		22	58.6686		42		11	09.4253
	33		24	27.6149		38		23	43.1418		43		11	53.8984
	34		23	43.1418		39		24	27.6149		44		12	38.3716
	35		22	58.6686		40		25	12.0881		45		13	22.8448
92	36	+0	22	14.1954	93	41	−0	25	56.5613	94	46	−1	14	07.3180
	37		21	29.7222		42		26	41.0345		47		14	51.7912
	38		20	45.2490		43		27	25.5077		48		15	36.2643
	39		20	00.7759		44		28	09.9808		49		16	20.7375
	40		19	16.3027		45		28	54.4540		50		17	05.2107
92	41	+0	18	31.8295	93	46	−0	29	38.9272	94	51	−1	17	49.6839
	42		17	47.3563		47		30	23.4004		52		18	34.1571
	43		17	02.8831		48		31	07.8736		53		19	18.6302
	44		16	18.4100		49		31	52.3467		54		20	03.1034
	45		15	33.9368		50		32	36.8199		55		20	47.5766
92	46	+0	14	49.4636	93	51	−0	33	21.2931	94	56	−1	21	32.0498
	47		14	04.9904		52		34	05.7663		57		22	16.5230
	48		13	20.5172		53		34	50.2395		58		23	00.9961
	49		12	36.0441		54		35	34.7126		59		23	45.4693
	50		11	51.5709		55		36	19.1858	95	00		24	29.9425

Table II—Continued

[1″ of longitude=0″.72338807 of θ]

Longitude	θ	Longitude	θ	Longitude	θ
° ′	° ′ ″	° ′	° ′ ″	° ′	° ′ ″
95 01	−1 25 14.4157	95 51	−2 02 18.0747	96 41	−2 39 21.7337
02	25 58.8889	52	03 02.5478	42	40 06.2068
03	26 43.3620	53	03 47.0210	43	40 50.6800
04	27 27.8352	54	04 31.4942	44	41 35.1532
05	28 12.3084	55	05 15.9674	45	42 19.6264
95 06	−1 28 56.7816	95 56	−2 06 00.4406	96 46	−2 43 04.0996
07	29 41.2548	57	06 44.9137	47	43 48.5727
08	30 25.7279	58	07 29.3869	48	44 33.0459
09	31 10.2011	59	08 13.8601	49	45 17.5191
10	31 54.6743	96 00	08 58.3333	50	46 01.9923
95 11	−1 32 39.1475	96 01	−2 09 42.8065	96 51	−2 46 46.4655
12	33 23.6207	02	10 27.2796	52	47 30.9386
13	34 08.0938	03	11 11.7528	53	48 15.4118
14	34 52.5670	04	11 56.2260	54	48 59.8850
15	35 37.0402	05	12 40.6992	55	49 44.3582
95 16	−1 36 21.5134	96 06	−2 13 25.1724	96 56	−2 50 28.8314
17	37 05.9866	07	14 09.6455	57	51 13.3045
18	37 50.4597	08	14 54.1187	58	51 57.7777
19	38 34.9329	09	15 38.5919	59	52 42.2509
20	39 19.4061	10	16 23.0651	97 00	53 26.7241
95 21	−1 40 03.8793	96 11	−2 17 07.5383	97 01	−2 54 11.1973
22	40 48.3524	12	17 52.0114	02	54 55.6704
23	41 32.8256	13	18 36.4846	03	55 40.1436
24	42 17.2988	14	19 20.9578	04	56 24.6168
25	43 01.7720	15	20 05.4310	05	57 09.0900
95 26	−1 43 46.2452	96 16	−2 20 49.9042	97 06	−2 57 53.5632
27	44 30.7184	17	21 34.3773	07	58 38.0363
28	45 15.1915	18	22 18.8505	08	−2 59 22.5095
29	45 59.6647	19	23 03.3237	09	−3 00 06.9827
30	46 44.1379	20	23 47.7969	10	00 51.4559
95 31	−1 47 28.6111	96 21	−2 24 32.2701	97 11	−3 01 35.9291
32	48 13.0843	22	25 16.7432	12	02 20.4022
33	48 57.5574	23	26 01.2164	13	03 04.8754
34	49 42.0306	24	26 45.6896	14	03 49.3486
35	50 26.5038	25	27 30.1628	15	04 33.8218
95 36	−1 51 10.9770	96 26	−2 28 14.6360	97 16	−3 05 18.2950
37	51 55.4501	27	28 59.1091	17	06 02.7681
38	52 39.9233	28	29 43.5823	18	06 47.2413
39	53 24.3965	29	30 28.0555	19	07 31.7145
40	54 08.8697	30	31 12.5287	97 20	08 16.1877
95 41	−1 54 53.3429	96 31	−2 31 57.0019		
42	55 37.8160	32	32 41.4750		
43	56 22.2892	33	33 25.9482		
44	57 06.7624	34	34 10.4214		
45	57 51.2356	35	34 54.8946		
95 46	−1 58 35.7088	96 36	−2 35 39.3678		
47	1 59 20.1819	37	36 23.8409		
48	2 00 04.6551	38	37 08.3141		
49	00 49.1283	39	37 52.7873		
50	01 33.6015	40	38 37.2605		

ELEVATIONS

The datum for all elevations is mean sea level.

The elevations given in class 1 are fixed directly by first-order leveling, as determined by the 1929 adjustment of the first-order level net, and are subject to a probable error of ±0.06 meter. For more exact elevations of the stations fixed by first-order leveling and for an exact description of the point on each station mark to which such elevations are referred, the published results of first-order leveling should be consulted.

The elevations given in class 2 are fixed by reciprocal measures of vertical angles, and are subject to probable errors varying from ±0.1 to ±0.7 meter, the accuracy of each elevation depending mainly upon the remoteness of that station from a station whose elevation is given in class 1.

The elevations given in class 3 are for third-order stations, fixed by nonreciprocal measures of vertical angles and are subject to a probable error which may amount to as much as ±2 meters.

The elevations of classes 2 and 3 are based on results obtained by adjustments of the level net made previous to 1929. The change in elevations resulting from the 1929 adjustment was so small that it was not considered necessary to readjust the class 2 and 3 elevations to conform to the new values for class 1.

The stations in the following tables are arranged alphabetically by classes for the various arcs.

TABLES OF ELEVATIONS

Ninety-eighth meridian arc

Station	Point to which elevation refers	Elevation	
Class 1		*Meters*	*Feet*
Argyle	Station mark	259.89	852.7
B. M. D 6 [1]	do	261.854	859.099
B. M. E 4 [1]	do	421.420	1,382.609
B. M. E 5 [1]	do	276.873	908.374
B. M. K 5 [1]	do	275.804	904.867
B. M. O 6 [1]	do	259.655	851.885
B. M. T 6 [1]	do	253.033	830.159
Borup	do	277.14	909.3
Foss	do	296.686	973.377
Foss reference mark	do	296.784	973.699
Indian	do	425.91	1,397.3
Oscarson	do	317.009	1,040.054
Oscarson reference mark	do	316.183	1,037.344
Sherack	do	262.64	861.7
Stephen east base	do	268.62	881.3
Stephen west base	do	252.922	829.795
Wicklow	do	277.10	909.1
Class 2			
Andover	do	269.2	883
Barnesville	do	296.8	974
Beltrami	do	273.7	898
Boating (S. Dak.)	do	619.2	2,031
Bray	do	308.9	1,013
Brown Valley northwest base (S. Dak.)	do	355.4	1,166
Brown Valley southeast base (S. Dak.)	do	347.7	1,141
Bullis	do	326.7	1,072
Canada	do	280.9	922
Deer	do	297.4	976
Donaldson	do	252.0	827
Drywood (S. Dak.)	do	623.3	2,045
Eglon	do	428.8	1,407
Enwiller (S. Dak.)	do	337.7	1,108
Fertile	do	362.5	1,189
Fox	do	312.1	1,024
Gary	do	339.2	1,113
Granville	do	279.1	916

[1] No check on geographic position of this station.

Ninety-eighth meridian arc—Continued

Station	Point to which elevation refers	Elevation	
		Meters	*Feet*
Class 2—Continued			
Hallock	Station mark	252.2	827
Hankinson (N. Dak.)	do	380.2	1,247
Hill	do	243.8	800
Ives	do	306.3	1,005
Jupiter	do	275.9	905
Keene	do	340.8	1,118
Layden	do	367.0	1,204
Meadows	do	298.3	979
Morken	do	276.5	907
Preacher Hill (S. Dak.)	do	650.6	2,135
Riverton	do	327.3	1,074
Shirley	do	267.8	879
Skane	do	247.0	810
States	do	245.1	804
Syre	do	414.4	1,360
Tansem	do	469.5	1,540
Tilden	do	333.9	1,095
Viking	do	318.2	1,044
Wahpeton	do	294.6	967
Warren	do	268.1	880
Western	do	340.4	1,117
Wright	do	319.9	1,050
Class 3			
Ada, courthouse tower	Top	302.2	991
Ada, schoolhouse cupola	Top of cupola	303.3	995
Ada, standpipe	Top	307.7	1,010
Angus, tall elevator (low top)	do	287.1	942
Angus, tall elevator (tall top)	do	287.0	942
Argyle, electric-light plant, smokestack	do	277.6	911
Argyle, tallest church spire	Bottom of cone	274.3	900
Argyle, tallest elevator	Top	281.0	922
Barnesville, church spire	Top of roof	328.6	1,078
Barnesville, stack	Top	331.9	1,089
Barnesville, standpipe	do	346.8	1,138
Barnesville, tall elevator	do	338.9	1,112
Beardsley, square slender decorated spire	Top of pyramid	356.3	1,169
Beardsley, water tank	Top of cone	367.1	1,204
Beltrami, north elevator	Top	298.7	980
Beltrami, south elevator (slender top)	do	298.8	980
Blackmer, south elevator (N. Dak.) [2]	do	316.6	1,039
Borup, church spire	Top of roof	287.8	944
Borup, elevator (slender top)	Top	294.9	968
Borup, tall elevator	do	298.2	978
Breckenridge, courthouse cupola	Top of cupola	321.6	1,055
Breckenridge hospital, cupola	Bottom of cupola	312.1	1,024
Browns Valley, large building, high spire	Top of slender cone	333.4	1,094
Browns Valley, water tower	Top of dull cone	341.0	1,119
Browns Valley, white spire [1]	Top of cone	326.6	1,072
Brush Farm Elevator	Top	283.4	930
Brushvale, low elevator, center [3]	do	312.7	1,026
Brushvale, tall elevator, center [3]	do	331.9	1,089
Campbell, church, open belfry	Top of cone	318.8	1,046
Carlisle, elevator, north gable [3]	Top	397.0	1,302
Chatham, elevator [3]	do	271.4	890
Church, black spire (near Childs (Kutzer))	Top of spire	323.9	1,063
Childs (Kutzer), tallest elevator	Top	317.0	1,040
Church spire (5 miles northeast of Borup) [3]	Top of roof	292.6	960
Church spire (8 miles northeast of Fargo) [3]	Top of cone	300.0	984
Church spire (8 miles northeast of Foxhome)	do	327.1	1,073
Church spire (5 miles north of station Indian)	Bottom of cone	433.3	1,422
Church spire (8 miles northwest of station Wright)	Top of roof	293.9	964
Church spire (7 miles northwest of station Deer)	Top	289.4	949
Church spire (9 miles northwest of station Deer)	do	297.0	974

[1] No check on geographic position of this station.
[2] No check on this elevation.
[3] Geographic position checked by vertical angles only.

Ninety-eighth meridian arc—Continued

Station	Point to which elevation refers	Elevation	
Class 3—Continued		*Meters*	*Feet*
Church spire (2 miles east of station Eglon)	Top of roof	444.8	1,459
Church spire (6 miles north of station Fox)	Top	330.4	1,084
Church spire (4 miles east of station Hallock)	do	285.9	938
Church spire (6 miles southeast by east of station Hallock).	do	286.5	940
Church spire (3 miles northeast of station Keene)	Top of roof	363.3	1,192
Church spire (3 miles south of station Skane)[3]	Top	269.7	885
Church spire (5 miles northeast of station Stephen west base).	Top of roof	272.2	893
Church, very tall black spire (S. Dak.)	Top of cone	395.5	1,298
Climax, tall elevator [3]	Top	287.9	945
Crookston, brickyard chimney	Top of chimney	293.0	961
Crookston, Catholic Church, spire	Top of cone	295.4	969
Crookston, courthouse dome	Top	299.7	983
Crookston, high school cupola	Top of cupola	292.2	959
Crookston, standpipe	Top	300.9	987
Donaldson, church spire [3]	Top of roof	262.7	862
Donaldson, tall elevator	Top	274.7	901
Doran, church spire east of [3]	Top of roof	312.0	1,024
Downer, northwest elevator	Top	317.7	1,042
Downer, southeast elevator	do	317.3	1,041
Eldred, northeast tall elevator [3]	do	288.1	945
Eldred, southwest low elevator	do	283.4	930
Emerson tower (flat top)	Flat top	262.7	862
Emerson, tall church spire	Top	266.7	875
Euclid, low red elevator	do	291.7	957
Euclid, school belfry	Top of roof	283.1	929
Euclid, tall brown elevator	Top	293.9	964
Everdell, broad elevator	do	322.5	1,058
Everdell, slender elevator	do	321.2	1,054
Fairmount, tall east elevator (N. Dak.)[2]		318.3	1,044
Fargo, Catholic Church, spire	Top of cone	323.1	1,060
Felton, church spire	Top of roof	288.0	945
Felton, elevator	Top	297.6	976
Felton, schoolhouse cupola	Top of roof	291.9	958
Fergus Falls, asylum stack	Top of stack	426.7	1,400
Fergus Falls, Northwestern College, tower	Top of dome	403.6	1,324
Fertile, large elevator [3]	Top	368.4	1,209
Fertile, small elevator [3]	do	363.7	1,193
Fertile, standpipe	do	385.0	1,263
Flaming, elevator	do	268.5	881
Foxhome, red elevator	do	335.3	1,100
Foxhome, schoolhouse cupola	Top of roof	328.3	1,077
Foxhome, white elevator	Top	334.3	1,097
Gary, church spire	Bottom of cone	350.6	1,150
Gary, north elevator	Top	353.5	1,160
Gary, south elevator	do	354.6	1,163
Glyndon, church spire [3]	do	303.4	995
Glyndon, elevator [3]	do	303.2	995
Graceville, Catholic Church, spire	do	376.3	1,235
Graceville, water tower	do	371.8	1,220
Grampian, lone elevator	do	261.9	859
Hadler, north elevator	do	297.2	975
Hadler, south elevator	do	297.4	976
Hallock, courthouse tower	Top of tower	275.4	904
Hallock, standpipe	Top	291.4	956
Hallock, tall church spire	do	274.2	900
Halma, elevator [3]	do	325.0	1,066
Hankinson, Catholic Church, spire [2]	do	346.7	1,137
Hankinson, high school spire (N. Dak.)[2]	do	352.6	1,157
Herman, water tower	do	368.2	1,208
Hitterdal, elevator [3]	do	399.8	1,312
Hitterdal, low church spire [3]	Bottom of cone	394.4	1,294
Hitterdal, tall church spire [3]	Middle of cone	400.7	1,315
Humboldt, church spire	Top	259.5	851
Humboldt, school cupola	do	261.8	859
Indian, church spire	Top of pyramid	354.6	1,163
Joliette, tall church spire	Top	263.0	863
Joliette, tall elevator	do	263.9	866

[2] No check on this elevation.
[3] Geographic position checked by vertical angles only.

Ninety-eighth meridian arc—Continued

Station	Point to which elevation refers	Elevation	
Class 3—Continued		*Meters*	*Feet*
Kennedy, church spire	Top	273.8	898
Kennedy, school cupola	do	277.2	909
Kittson, elevator	do	287.8	944
Lancaster, school cupola [2]	do	293.3	962
Lancaster, tall elevator	do	298.8	980
Large church, spire on west end (S. Dak.)	do	375.6	1,232
Lawndale, elevator	do	344.9	1,132
Lockhart, church spire	Top of cone	286.8	941
Lockhart, elevator	Top	294.1	965
Lone elevator (3 miles north of Angus)	do	282.3	926
Luna, elevator	do	280.4	920
Melvin, elevator	do	330.9	1,086
Muskoda, elevator	do	348.8	1,144
Nashua, white church [2]	Top of spire	323.3	1,061
Northcote, church spire	Top	263.6	865
Northcote, tall elevator	do	267.8	879
Northern Pacific Railway, tall elevator (N. Dak.)	do	263.8	865
Orleans, school cupola	do	272.5	894
Oscar, church spire	Ball on top	415.2	1,362
Pembina, square open tower (N. Dak.)	Top	267.8	879
Radium, low east elevator	do	302.4	992
Radium, tall elevator	do	304.7	1,000
Radium, west elevator (large top)	do	303.8	997
Rindal, church spire [3]	Top of roof	369.9	1,214
Rollag, church spire [3]	do	430.9	1,414
Roon, elevator	Top	284.0	932
Russia, elevator	do	291.7	957
St. Vincent, bell tower	do	261.8	859
St. Vincent Junction, elevator	do	266.8	875
St. Vincent tower (round top)	do	264.7	868
Sherack, low elevator [3]	do	279.2	916
Sherack, tall elevator	do	282.5	927
Stephen, low church spire	Top of cone	269.8	885
Stephen, school cupola	Top	272.2	893
Stephen, tall church spire	Bottom of cone	265.0	869
Swedish Lutheran Church, spire (2 miles east of station Enwiller).	Top	354.4	1,163
Tabor, east church spire [3]	Top of roof	269.0	883
Tabor, west church spire [3]	Bottom of cone	266.9	876
T. 124 N., R. 49 W., sec. 18, southeast corner		345.4	1,133
T. 125 N., R. 48 W., sec. 17, W. ¼ corner	Top of mound	359.6	1,180
Twin Valley, standpipe	Top	370.4	1,215
Twin Valley, tall elevator (slender top)[3]	do	353.5	1,160
Twin Valley, white church spire	Top of cone	356.3	1,169
Viking, east elevator (large top)	Top	384.5	1,261
Viking, low elevator	do	347.0	1,138
Viking, west elevator (slender top)	do	384.5	1,261
Wahpeton, schoolhouse cupola (N. Dak.)	Top of roof	316.5	1,038
Wahpeton, standpipe (N. Dak.)	Top	336.9	1,105
Warren, courthouse tower	Top of solid portion	284.0	932
Warren, school cupola	Top of cupola	284.8	934
Warren, standpipe	Top	298.7	980
Watosco, lone elevator	do	320.0	1,050
Western Post Office, church spire [2]	Ball of spire	353.6	1,160
Wheaton, water tank	Top	339.7	1,114
Wheatville, red elevator (slender top)	do	295.1	968
Wheatville, yellow elevator [3]	do	295.8	970
Woodward Farm Elevator [3]	do	275.8	905

[2] No check on this elevation.
[3] Geographic position checked by vertical angles only.

Ninety-eighth meridian to Royalton to Duluth arc

Station	Point to which elevation refers	Elevation	
Class 1		*Meters*	*Feet*
Aitkin, high school	Top of cone	405.19	1,329.4
Aitkin, jail [1]	do	390.89	1,282.4
Aitkin, water tower	Top	402.39	1,320.2
Alexandria	Station mark	450.755	1,478.852
Alexandria reference mark R. M	Mark	450.258	1,477.221
Carlton	Station mark	376.61	1,235.6
Dalton	do	422.756	1,386.992
Dalton astronomical station	do	419.493	1,376.287
Duluth, Union Match Co., cupola	Top of cupola	213.71	701.1
Duluth, Union Match Co., water tank	Top	219.00	718.5
Elbow	Station mark	389.544	1,278.029
Osakis	do	427.918	1,403.928
Royalton north base	do	348.23	1,142.5
Royalton south base	do	324.17	1,063.5
Class 2			
Alberta	do	361.6	1,186
Annie	do	437.6	1,436
Atkinson	do	392.5	1,288
Bachelor	do	402.8	1,322
Bethlehem	do	402.1	1,319
Birch	do	437.9	1,437
Brook	do	440.8	1,446
Cloquet	do	427.2	1,402
Cromwell	do	435.4	1,428
Daggett	do	401.5	1,317
Dedham (Wis.)	do	294.3	966
Douglas	do	398.9	1,309
Duluth	do	389.1	1,277
Eagle	do	446.5	1,465
Falls	do	405.4	1,330
French	do	386.1	1,267
Gregor	do	379.4	1,245
Gull	do	440.4	1,445
Holmes	do	483.4	1,586
Island	do	410.4	1,346
Johnson	do	458.3	1,504
Jones	do	397.6	1,304
Kimberly	do	405.1	1,329
Leaf	do	526.8	1,728
Leslie	do	431.8	1,417
Lone	do	458.0	1,503
Mahtowa	do	399.9	1,312
Maple	do	431.3	1,415
Parker	do	494.8	1,623
Rabbit	do	425.8	1,397
Rae	do	390.5	1,281
Rail	do	467.8	1,535
Sawyer	do	415.7	1,364
Superior (Wis.)	do	203.5	668
Tamarack	do	389.7	1,279
Wright	do	395.4	1,297
Class 3			
Alexandria, courthouse spire	Top of dome	432.5	1,419
Alexandria, water tower	Top	463.5	1,521
Bethlehem, church spire	Top of cone	433.2	1,421
Boylston, Great Northern Railroad, signal tower [1] [2]	Top	224.1	735
Brainerd, Brainerd Lumber Co., stack	do	410.2	1,346
Brainerd, Catholic Church, spire	Top of cone	405.0	1,329
Brainerd, other church spire	Top of spire	402.0	1,319
Brainerd, railroad shops, tallest stack	Top	406.3	1,333
Buckman, Catholic Church, spire	Cross on dome	409.6	1,344

[1] No check on geographic position of this station.
[2] No check on this elevation.

Ninety-eighth meridian to Royalton to Duluth arc—Continued

Station	Point to which elevation refers	Elevation	
Class 3—Continued		*Meters*	*Feet*
Church (6 miles south by west of Dalton)	Top of spire	407.3	1,336
Cloquet, Catholic Church, spire	Center of cross	424.7	1,393
Cloquet, paper mill stack	Top of stack	405.8	1,331
Duluth, Aerial Bridge, southwest column of north pier [1] [2].	Southwest column of north pier at lower chord of truss.	226.2	742
Duluth, Brewing and Malting Co., dome [2] [3]	Top of dome	221.0	725
Duluth, church spire	Top	281.3	923
Duluth, Elevator B, stack [3]	Top of stack	226.0	741
Duluth, Elevator H, stack [3]	do	228.5	750
Duluth, high school cupola, spire [3]	Top of spire	281.0	922
Duluth, house at head of West Fifth Avenue (chimney in center of 4-pitch roof).	Top of center chimney	368.1	1,208
Duluth, Incline Pavilion, Weather Bureau, signal tower. [1] [2]	Top of flagstaff	366.4	1,202
Duluth & Superior, Interstate Bridge, operator's tower, center of draw span.	Top of tower	202.9	666
East Superior, Lincoln School, flagstaff in center of tower (Wis.).	do	216.7	711
East Superior, Presbyterian Church, spire (Wis.)	Top	227.6	747
Elbow Lake, water tower	do	409.5	1,344
Evansville, water tower	do	450.8	1,479
Gottwalt (M. R. C.)	Top of cap on pipe	331.3	1,087
Gregory (M. R. C.)	do	375.3	1,231
Herford, elevator	Top	348.4	1,143
Itasca, Chicago, St. Paul, Minneapolis & Omaha Railroad, elevator stack (Wis.).	Top of stack	240.1	788
Little Falls, Catholic Church, spire [2]	Cross	373.3	1,225
Little Falls, courthouse spire [2]	Top	367.2	1,205
Little Falls, high school spire [2]	Belfry top	369.2	1,211
Little Falls, Pine Tree Lumber Co., stack [2]	Top	380.0	1,247
Long Bridge, church spire [2]	do	435.8	1,430
Long Prairie, water tank	do	442.0	1,450
McGregor, schoolhouse belfry	Top of belfry	392.3	1,287
Osakis, water tower	Top	446.4	1,465
Proctorknott, railway shops, water tank (Wis.) [3]	Top of tank	418.4	1,373
Rice, Catholic Church, spire	Cross	339.1	1,113
Rich Prairie, Catholic Church, spire	Top	408.5	1,340
Royalton (M. R. C.)	Top of pipe station mark	347.9	1,141
Royalton, old Catholic Church, cross	Cross	349.6	1,147
Sauk Center, Catholic Church, spire	Top of cone	417.1	1,368
Saunders, Great Northern Railroad, water tank (Wis)	Top	218.2	716
Scanlon, sawmill stack (southeast edge of town) [3]	Top of stack	382.1	1,254
Scanlon, schoolhouse cupola [3]	Top of belfry	384.2	1,260
Skounter Hill (M. R. C.) [1], [2]	Top of cap on pipe	336.7	1,105
South Superior, Billings School, belfry (Wis.)	Top of belfry	222.2	729
South Superior, Bryant School, northeast corner of northwest chimney (Wis.).	Top of chimney	228.2	749
South Superior, Webster Chair Manufacturing Co., stack (Wis.).	Top of stack	236.2	775
Superior, Elevator K, stack (Wis.)	do	233.2	765
Superior, Elevator T, south gable (Wis.) [3]	Top of south gable	232.8	764
Superior, Great Northern Railroad, south elevator, south gable (Wis.)	do	255.9	840
Superior, ore docks, Weather Bureau, signal tower (Wis.).	Top of cone	220.6	724
Superior, pierhead, Rear Range Lighthouse (Wis.). [1] [2]	do	203.5	668
Superior, St. Marys Hospital, spire (Wis.). [1] [2]	do	225.0	738
Superior, State Normal School, smaller and higher tower (Wis.). [3]	Top of smaller higher tower	222.4	730
Swan Creek (M. R. C.)	Top of cap on pipe	376.2	1,234
Wendell, tallest elevator	Top	367.8	1,207

[1] No check on geographic position of this station.
[2] No check on this elevation.
[3] Geographic position checked by vertical angles only.

EXPLANATION OF ELEVATIONS ALONG THE MISSISSIPPI RIVER

The elevations of the stations of the Mississippi River Commission along the Mississippi River were originally on the Memphis Datum. This datum was used by the United States Army, Corps of Engineers, for the elevations of their second-order triangulation and traverse stations. Some of the old stations have been used by the United States Coast and Geodetic Survey and have new values based on the 1929 General Adjustment of the First-Order Level Net of the United States. All the available elevations along the river are published in the following table. All elevations are on the Memphis Datum unless shown in italic type. (See footnote (*) at end of table.)

Table of elevations along the Mississippi River

Station	Point to which elevation refers	Elevation (Memphis Datum)*	
		Meters	*Feet*
Ackerman (M. R. C.)[1]	Top of pipe	314.4	1,032
Aitkin (M. R. C.)[1]	do	389.2	1,277
Aitkin lower base (M. R. C.)[2]	Top of bolt in tile	*364.989*	*1,197.47*
Do.[2]	Top of cap on pipe	*366.203*	*1,201.45*
Aitkin upper base (M. R. C.)[3]	do	370.449	1,215.38
Anderson (M. R. C.)[1]	Top of pipe	323.4	1,061
Atwood (M. R. C.) (Wis.)[4]	Top of bent bolt	333.1	1,093
Baker (M. R. C.)[1]	Top of pipe	295.4	969
Beardsley (M. R. C.) (Wis.)[1]	Top	230.4	756
Becker (M. R. C.)[1]	Top of pipe	298.7	980
Beef Slough (M. R. C.) (Wis.)[1]	Tile and short iron pipe	***354.5***	***1,163***
Belle Prairie (M. R. C.)[1]	Top of pipe	351.1	1,152
Bemidji (M. R. C.)[2]	Top of bolt in tile	*415.236*	*1,362.32*
Do.[2]	Top of cap on pipe	*416.449*	*1,366.30*
Bena (M. R. C.)[2]	Top of cap	*402.452*	*1,320.31*
Do.[2]	Top of bolt in tile	*401.220*	*1,316.34*
Benson (M. R. C.)[1]	Top of pipe	303.0	994
Big Lake (M. R. C.)[1]	do	292.0	958
Biggar, P. B. M. (M. R. C.)[2]	Top of cap	*367.358*	*1,205.24*
Do.[2]	Top of bolt in tile	*366.144*	*1,201.26*
Bigosh (M. R. C.)[2]	Top of cap	*402.836*	*1,321.64*
Do.[2]	Top of bolt in tile	*401.621*	*1,317.65*
Blackberry, B. M. (M. R. C.)[2]	Top of cap	*397.160*	*1,303.02*
Do.[2]	Top of bolt in tile	*395.949*	*1,299.04*
Boshart (M. R. C.)[1]	Tile and iron pipe	***268.2***	***880***
Bottom (M. R. C.) (Wis.)[3]	Cap on pipe	207.014	679.18
Do.[3]	Bolt in tile	205.795	675.18
Bowles (M. R. C.) (Wis.)[1]	Tile and pipe	***336.2***	***1,103***
Brainerd (M. R. C.)[1]	Top of pipe	414.2	1,359
Brainerd north base (M. R. C.)[2]	Top of bolt in tile	*366.757*	*1,203.27*
Do.[2]	Top of cap on pipe	*367.971*	*1,207.25*
Brainerd south base (M. R. C.)[2]	Top of bolt in tile	*369.457*	*1,212.13*
Do.[2]	Top of cap on pipe	*370.669*	*1,216.10*
Brown (M. R. C.) (Houston County)[4]	do	331.3	1,087
Brown (M. R. C.) (Dakota County)[1]	Tile and pipe	***274.3***	***900***
Brownsville (M. R. C.)[4]	Top of cap on pipe	341.1	1,119
Burley (M. R. C.)[1]	Tile and short iron pipe	***359.1***	***1,178***
Calvert (M. R. C.) (Wis.)[1]	Tile and pipe	***203.0***	***666***
Camp (M. R. C.)[1]	Top of pipe	368.96	1,210.5
Cannon (M. R. C.)[1]	Tile and pipe	***303.6***	***996***
Carlston (M. R. C.) (Wis.)[1]	do	***329.5***	***1,081***
Carlson, P. B. M. (M. R. C.)[2]	Top of cap	*374.551*	*1,228.84*
Do.[2]	Top of bolt in tile	*373.339*	*1,224.86*
Carpenter (M. R. C.)[1]	Top of pipe	275.8	905
Carrow (M. R. C.)[1]	do	287.4	943
Carvel (M. R. C.)[1]	Tile and pipe	***273.4***	***897***
Castle (M. R. C.)[1]	Top of pipe	289.3	949
Cater (M. R. C.)[1]	do	320.6	1,052
Cedar Lake (M. R. C.)[1]	do	375.5	1,232
Chamberlin (M. R. C.)[1]	do	454.00	1,489.5
Chapin (M. R. C.) (Wis.)[1]	Tile and pipe	***313.3***	***1,028***
Chippewa (M. R. C.) (Wis.)[1]	Top of copper bolt in rock	354.18	1,162
Christensen (M. R. C.)[1]	Top of pipe	485.9	1,594
Clark (M. R. C.)[1]	do	277.7	911
Clear Lake (M. R. C.)[1]	do	306.3	1,005
Clearwater (M. R. C.)[1]	do	307.2	1,008
Cohasset, B. M. (M. R. C.)[2]	Top of cap	*391.228*	*1,283.55*
Do.[2]	Top of bolt in tile	*390.019*	*1,279.59*

See footnotes at end of table.

Table of elevations along the Mississippi River—Continued

Station	Point to which elevation refers	Elevation (Memphis Datum)	
		Meters	*Feet*
County Line, P. B. M. (M. R. C.)[2]	Top of bolt in tile	*447.345*	*1,467.66*
Do.[2]	Top of cap on pipe	*448.561*	*1,471.65*
Cowles (M. R. C.) (Iowa)[4]	do	338.0	1,109
Cranberry (M. R. C.)[1]	Top of pipe	403.56	1,324.0
Crossing (M. R. C.)[1]	Tile and pipe	*265.2*	*870*
Crow Wing (M. R. C.)[1]	Top of pipe	399.3	1,310
Cut-off, P. B. M. (M. R. C.)[2]	Top of cap	*367.088*	*1,204.35*
Do.[2]	Top of bolt in tile	*365.871*	*1,200.36*
Dahning (M. R. C.)[1]	Top of pipe	412.24	1,352.5
Dakota (M. R. C.)[4]	Top of cap on pipe	383.7	1,259
Daly (M. R. C.)[1]	Tile and iron pipe	*249.9*	*820*
Dam, B. M. (M. R. C.)[2]	Top of cap	*393.840*	*1,292.12*
Do.[2]	Top of bolt in tile	*392.629*	*1,288.15*
Davis Island (M. R. C.)[1]	Top of pipe	279.2	916
Dayton (M. R. C.)[3]	Top of cap on pipe	286.214	939.02
Do.[3]	Top of bolt in tile	235.004	935.05
De Soto lower base (M. R. C.) (Iowa)[3]	Top of cap on pipe	192.439	631.36
Do.[3]	Top of bolt in tile	191.238	627.42
De Soto upper base (M. R. C.) (Wis.)[3]	Top of cap on pipe	192.805	632.56
Deer River (M. R. C.)[3]	Top of cap	*396.484*	*1,300.80*
Do.[3]	Top of bolt in tile	*395.264*	*1,296.80*
Diegel (M. R. C.)[1]	Top of pipe	286.2	939
Divide (M. R. C.)[2]	Top of cap	*403.404*	*1,323.50*
Do.[2]	Top of bolt in tile	*402.199*	*1,319.55*
Dorset (M. R. C.)[1]	Top of pipe	467.9	1,535
Dresbach (M. R. C.)[1]	Tile and pipe	*388.6*	*1,275*
Dunn (M. R. C.)[2]	Top of bolt in tile	269.5474	884.340
Do.[2]	Top of cap on pipe	270.7617	888.324
Eagle Lake (M. R. C.)[1]	Top of pipe	475.03	1,558.5
Eder (M. R. C.) (Wis.)[1]	Tile and pipe projecting 12 inches above ground.	367.3	1,205
Elgar (M. R. C.)[1]	Tile and pipe	*340.8*	*1,118*
Elk River (M. R. C.)[1]	Top of pipe	296.11	971.5
Erding (M. R. C.)[1]	Tile and short iron pipe	*343.51*	*1,127*
Ferryville (M. R. C.) (Wis.)[4]	Top of cap on pipe	316.7	1,039
Fish Lake (M. R. C.)[1]	Top of pipe	373.4	1,225
Fiessen, P. B. M. (M. R. C.)[2]	Top of cap	381.835	1,252.74
Do.[2]	Top of bolt in tile	380.620	1,248.75
Five Pines, P. B. M. (M. R. C.)[2]	Top of cap	*391.530*	*1,284.54*
Do.[2]	Top of bolt in tile	*390.317*	*1,280.56*
Fort Ripley (M. R. C.)[1]	Top of pipe	406.9	1,335
Foulds, P. B. M. (M. R. C.)[2]	Top of cap	*369.428*	*1,212.03*
Do.[2]	Top of bolt in tile	*368.212*	*1,208.04*
Fritz (M. R. C.)[1]	Top of pipe	273.25	896.5
Frontenac (M. R. C.)[1]	Tile and short iron pipe	*337.4*	*1,107*
Gartner (M. R. C.)[1]	Top of pipe	324.9	1,066
Girard (M. R. C.)[1]	Tile and pipe	*217.6*	*714*
Gottwalt (M. R. C.)[4]	Top of cap on pipe	331.3	1,087
Grand Rapids (M. R. C.)[2]	Top of cap	*390.221*	*1,280.25*
Do.[2]	Top of bolt in tile	*389.010*	*1,276.28*
Grand Rapids, B. M. (M. R. C.)[2]	Top of cap	*391.635*	*1,284.89*
Do.[2]	Top of bolt in tile	*390.424*	*1,280.92*
Grandfather (M. R. C.) (Wis.)[1]	Tile and pipe	*360.6*	*1,183*
Gregory (M. R. C.)[4]	Top of cap on pipe	375.3	1,231
Guaranty Loan Tower (M. R. C.)[1]	Roof of tower	317.3	1,041
Gull Lake (M. R. C.)[1]	Top of pipe	443.5	1,455
Guthrie (M. R. C.) (Wis.)[1]	Tile and pipe projecting 8 inches above ground.	318.8	1,046
Hamilton, P. B. M. (M. R. C.)[2]	Top of cap	*387.239*	*1,270.47*
Do.[2]	Top of bolt in tile	*386.023*	*1,266.48*
Hardy (M. R. C.)[1]	Top of pipe	393.5	1,291
Hastings (M. R. C.)[1]	Cap on top of pipe	254.5	835
Haussinger (M. R. C.) (Wis.)[1]	Tile and iron pipe	*369.7*	*1,213*
Hay Creek (M. R. C.)[1]	Top of pipe	355.7	1,167
Heinen (M. R. C.)[1]	do	327.7	1,075
Heytmans (M. R. C.) (Iowa)[4]	Cap on top of pipe	326.1	1,070
Hoard (M. R. C.)[1]	Tile and iron pipe	*318.5*	*1,045*
Hole-In-The-Day (M. R. C.)[1]	Top of pipe	384.0	1,260
Holman (M. R. C.) (Wis.)[4]	Cap on top of pipe	283.2	929
Howard (M. R. C.)[1]	Top of pipe	282.9	928
Hubbard (M. R. C.)[1]	do	435.3	1,428
Huber (M. R. C.)[1]	Top of copper bolt in rock	349.6	1,147

See footnotes at end of table.

Table of elevations along the Mississippi River—Continued

Station	Point to which elevation refers	Elevation (Memphis Datum)*	
		Meters	*Feet*
Indian Creek (M. R. C.)[1]	Top of pipe	454.8	1,492
Itasca east base (M. R. C.)[1]	Top of copper bolt	452.17	1,483.5
Itasca, P. B. M. (M. R. C.)[2]	Top of bolt in tile	*466.624*	*1,530.92*
Do.[2]	Top of cap on pipe	*467.840*	*1,534.90*
Itasca west base[1]	Top of pipe	461.5	1,514
Johnson (M. R. C.)[1]	do	287.27	942.5
Kains (M. R. C.) (Iowa)[1]	Tile and pipe	***346.6***	***1,137***
Kemres (M. R. C.)[1]	Top of pipe	371.6	1,219
Kilmer (M. R. C.)[1]	do	269.4	884
Kipp (M. R. C.)[1]	do	330.1	1,083
Klein (M. R. C.) (Wis.)[1]	Top of copper bolt	348.1	1,142
Knud (M. R. C.)[1]	Tile and pipe projecting 10 inches above ground.	343.5	1,127
La Prairie (M. R. C.)[2]	Top of cap	*391.089*	*1,283.10*
Laforce (M. R. C.)[1]	Top of pipe	386.8	1,269
Lakeport (M. R. C.) (Wis.)[3]	Top of copper bolt in tile	218.240	716.01
Do.[3]	Top of cap on pipe	219.447	719.97
Lambert (M. R. C.)[1]	Top of pipe	310.3	1,018
Little Elk (M. R. C.)[1]	do	370.6	1,216
Loon (M. R. C.)[1]	Tile and iron pipe	214.6	704
Lucky (M. R. C.) (Wis.)[1]	Tile and pipe projecting 14 inches above ground.	292.91	961.0
Mantrap (M. R. C.)[1]	Top of pipe	564.03	1,850.5
Maple Hill (M. R. C.)[1]	do	473.7	1,554
Marquette (M. R. C.)[1]	do	435.6	1,429
Martin (M. R. C.)[1]	Top of cap on pipe	367.9	1,207
Mendota (M. R. C.)[1]	Tile and iron pipe	295.4	969
Mero=B.M. 248/1 (M. R. C.) (Wis.)[3]	Top of copper bolt in tile	231.225	758.61
Do.[3]	Top of cap on pipe	232.435	762.58
Midge, P. B. M. (M. R. C.)[2]	Top of cap	*405.734*	*1,331.15*
Do.[2]	Top of bolt in tile	*404.525*	*1,327.18*
Midway, P. B. M. (M. R. C.)[2]	Top of cap	*379.125*	*1,243.85*
Do.[2]	Top of bolt in tile	*377.905*	*1,239.84*
Mille Lac (M. R. C.)[1]	Top of pipe	392.9	1,289
Mission (M. R. C.)[1]	do	405.5	1,330.4
Moline (M. R. C.) (Wis.)[1]	Tile and pipe	340.8	1,118
Monticello (M. R. C.)[1]	Top of pipe	296	971
Monticello east base (M. R. C.)[2]	Top of bolt in tile	286.0999	938.646
Do.[2]	Top of cap on pipe	287.3142	942.630
Monticello west base (M. R. C.)[2]	Top of bolt in tile	285.9847	938.268
Do.[2]	Top of cap on pipe	287.1920	942.229
Mud Lake (M. R. C.)[1]	Top of pipe	404.2	1,326
Mulcara (M. R. C.)[1]	Tile and pipe	320.0	1,050
Muncy (M. R. C.)[1]	Top of pipe	345.0	1,132
Necessity (M. R. C.)[1]	do	407.5	1,337
New Albin (M. R. C.)[4]	Top of cap on pipe	337.7	1,108
North Prairie (M. R. C.)[1]	Top of pipe	358.1	1,175
North Star (M. R. C.)[1]	do	356.3	1,169
Norway Grove (M. R. C.)[2]	Top of cap	*403.809*	*1,324.83*
Do.[2]	Top of bolt in tile	*402.601*	*1,320.87*
Ockerson Heights (M. R. C.)[1]	Top of pipe	508.4	1,668
Old Road (M. R. C.)[2]	Top of cap	*395.067*	*1,296.15*
Do.[2]	Top of bolt in tile	*393.858*	*1,292.18*
Onalaska (M. R. C.) (Wis.)[1]	Tile and pipe	376.7	1,236
Outlet (M. R. C.)[1]	Top of pipe	429.2	1,408
Palmer (M. R. C.)[1]	do	263.3	864
Parker (M. R. C.)[1]	do	399.6	1,311
Parks (M. R. C.)[1]	do	301.1	988
Pat, P. B. M. (M. R. C.)[2]	Top of cap	*372.068*	*1,220.69*
Do.[2]	Top of bolt in tile	*370.855*	*1,216.71*
Peck (M. R. C.)[1]	Tile and pipe	289.3	949
Pegg (M. R. C.)[1]	Top of pipe	388.9	1,276
Pelican Lake (M. R. C.)[1]	do	407.8	1,338
Perry (M. R. C.)[1]	do	347.2	1,139
Peterman (M. R. C.)[1]	Tile and pipe projecting 18 inches above ground.	358.4	1,176
Peterson (M. R. C.)[1]	Top of copper bolt in rock	297.8	977
Phillippi (M. R. C.)[1]	Top of pipe	442.72	1,452.5
Pine Knoll (M. R. C.)[1]	do	370.6	1,216
Pine Mountain Lake (M. R. C.)[1]	do	489.2	1,605
Powder Horn (M. R. C.)[1]	Tile and pipe	266.7	875
Powell (M. R. C.)[2]	Top of bolt in tile	266.5722	874.579
Do.[2]	Top of cap on pipe	267.7875	878.566
Prescott (Wis.)[1]	Top of copper bolt	320.3	1,051

See footnotes at end of table.

Table of elevations along the Mississippi River—Continued

Station	Point to which elevation refers	Elevation (Memphis Datum)*	
		Meters	*Feet*
Prospect Hill, P. B. M. (M. R. C.)[3]	Top of bolt in tile	*512.016*	*1,679.84*
Do.[3]	Top of cap on pipe	*513.234*	*1,683.84*
Prospect Park [1]	Top of stone	299.0	981
Rabbit (M. R. C.)[1]	Top of pipe	397.2	1,303
Race Track (M. R. C.)[2]	Top of cap	*390.222*	*1,280.25*
Do.[2]	Top of bolt in tile	*389.012*	*1,276.28*
Red Wing lower base (M. R. C.) (Wis.)[3]	do	234.364	768.91
Do.[3]	Top of cap on pipe	235.574	772.88
Red Wing upper base (M. R. C.) (Wis.)[1]	Tile and pipe	*237.7*	*780*
Reformatory (M. R. C.)[1]	Top of pipe	338.3	1,110
Reno (M. R. C.)[4]	Top of cap on pipe	331.9	1,089
Rice Lake (M. R. C.)[1]	Top of pipe	389.99	1,279.5
Rice back base (M. R. C.)[2]	Top of cap	*322.906*	*1,059.40*
Do.[2]	Top of bolt in title	*321.693*	*1,055.42*
Rice river base (M. R. C.)[2]	do	*320.597*	*1,051.83*
Do.[2]	Top of cap on pipe	*321.810*	*1,055.80*
Richmond (M. R. C.)[4]	Top of copper bolt	347.2	1,139
River Bank (M. R. C.)[1]	Top of pipe	305.7	1,003
Root River (M. R. C.)[1]	Copper bolt surmounted by iron pipe.	*329.5*	*1,081*
Rosby (M. R. C.)[1]	Tile and pipe	*222.5*	*730*
Round House, B. M. (M. R. C.)[2]	Top of cap	*394.192*	*1,293.28*
Do.[2]	Top of bolt in tile	*392.993*	*1,289.34*
Royalton (M. R. C.)[4]	Top of pipe, station mark	347.9	1,141
Rush (M. R. C.) (Wis.)[1]	Tile and pipe	*311.2*	*1,021*
Rush Creek (M. R. C.) (Wis.)[4]	Top of cap on pipe	324.3	1,064
St. Augusta (M. R. C.)[1]	Top of pipe	311.8	1,023
St. Paul front base (M. R. C.)[3]	Top of copper bolt in upper tile.	248.242	814.44
Do.[3]	Top of cap on pipe	249.455	818.42
Sauk Rapids (M. R. C.)[1]	Top of pipe	334.1	1,096
School, P. B. M. (M. R. C.)[2]	Top of cap	*373.706*	*1,226.07*
Do.[2]	Top of bolt in tile	*372.495*	*1,222.09*
School Craft (M. R. C.)[1]	Top of pipe	472.4	1,550
Seeley (M. R. C.)[1]	do	369.1	1,211
Shenton (M. R. C.)[1]	do	298.4	979
Slip, P. B. M. (M. R. C.)[2]	Top of cap	*383.648*	*1,258.68*
Do.[2]	Top of bolt in tile	*382.436*	*1,254.71*
Simmons (M. R. C.)[1]	Top of pipe	*296.9*	*974*
Skounter Hill (M. R. C.)[4]	Top of cap on pipe	336.7	1,105
Snag (M. R. C.)[1]	Top of pipe	416.7	1,367
Spider Lake (M. R. C.)[1]	do	493.8	1,620
Split Hand, P. B. M. (M. R. C.)[2]	Top of cap	*386.335*	*1,267.50*
Do.[2]	Top of bolt in tile	*385.118*	*1,263.51*
Squaw Lake (M. R. C.)[1]	Top of pipe	511.5	1,678
Starke (M. R. C.)[2]	Top of cap	*392.752*	*1,288.55*
Do.[2]	Top of bolt in tile	*391.539*	*1,284.58*
Stewart (M. R. C.)[4]	Top of pipe	383.7	1,259
Stoddard (M. R. C.) (Wis.)[4]	Top of cap on pipe	299.9	984
Stone, P. B. M. (M. R. C.)[2]	Top of cap	*378.016*	*1,240.21*
Do.[2]	Top of bolt in tile	*376.803*	*1,236.23*
Strand, P. B. M. (M. R. C.)[2]	Top of cap	*370.016*	*1,213.96*
Do.[2]	Top of bolt in tile	*368.808*	*1,210.00*
Strawberry, P. B. M. (M. R. C.)[2]	Top of cap	*396.404*	*1,300.54*
Do.[2]	Top of bolt in tile	*395.189*	*1,296.55*
Sugar Loaf (M. R. C.)[1]	Tile and pipe projecting 18 inches above ground.	327.7	1,075
Suintax (M. R. C.)[1]	Top of pipe	383.1	1,257
Surre (M. R. C.)[1]	do	393.2	1,290
Sutton, P. B. M. (M. R. C.)[2]	Top of cap	*368.209*	*1,208.03*
Do.[2]	Top of bolt in tile	*366.989*	*1,204.03*
Swan Creek (M. R. C.)[4]	Top of cap on pipe	376.2	1,234
Telephone (M. R. C.)[1]	Top of pipe	290.5	953
Tomahawk, B. M. (M. R. C.)[2]	Top of cap	*398.007*	*1,305.79*
Do.[2]	Top of bolt in tile	*396.803*	*1,301.84*
Trempealeau east base=B. M. 221/1 (M. R. C.) (Wis.)[3]	do	197.243	647.12
Do.[3]	Top of cap on pipe	198.456	651.10
Trempealeau west base (M. R. C.) (Wis.)[3]	do	199.635	654.97
Trenton (M. R. C.) (Wis.)[3]	Top of bolt in tile	234.230	768.47
Do.[3]	Top of cap on pipe	235.437	772.43
U. S. E. D., B. M. 202 (M. R. C.)[2]	Top of cap	*366.924*	*1,203.82*
U. S. E. D., B. M. 209 (M. R. C.)[2]	Top of cap	*368.772*	*1,209.88*
Do.[2]	Top of bolt in tile	*367.567*	*1,205.92*
U. S. E. D., B. M. 347 (M. R. C.)[2]	Top of cap	*406.078*	*1,332.27*
Do.[2]	Top of bolt in tile	*404.878*	*1,328.34*

See footnotes at end of table.

Table of elevation along the Mississippi River—Continued.

Station	Point to which elevation refers	Elevation (Memphis Datum)*	
Vallee (M. R. C.)[1]	Top of pipe	402.6	1,321
Varley (M. R. C.)[1]	do	287.1	942
Vicinity, P. B. M. (M. R. C.)[2]	Top of cap	*383.694*	*1,258.84*
Do.[2]	Top of bolt in tile	*382.482*	*1,254.86*
Volker (M. R C.) (Wis.)[1]	Top of cap on pipe	369.1	1,211
Wabasha east base=B. M. 235/3 (M. R. C.)[3]	Top of bolt in tile	204.543	671.07
Do.[3]	Top of cap on pipe	205.466	674.10
Wabasha west base (M. R. C.)[3]	Tile and pipe	***207.38***	***680.38***
Wacouta (M. R. C.)[1]	do	***325.2***	***1,067***
Watab (M. R. C.)[1]	Top of copper bolt	336.8	1,105
Webster (M. R. C.) (Wis.)[1]	Tile and pipe	***243.5***	***799***
Wells, P. B. M. (M. R. C.)[2]	Top of cap	*377.352*	*1,238.03*
Do.[2]	Top of bolt in tile	*376.141*	*1,234.06*
Whitman (M. R. C.)[1]	Tile and iron pipe	***370.9***	***1,217***
Wigwam, B. M. (M. R. C.)[2]	Top of cap	*393.785*	*1,291.94*
Do.[2]	Top of bolt in tile	*392.571*	*1,287.96*
Williams (M. R. C.)[1]	Top of pipe	284.7	934
Windom (M. R. C.)[1]	Tile and pipe	***293.5***	***963***
Wixon (M. R. C.)[1]	Top of pipe	387.4	1,271
Wyburn (M. R. C.) (Wis.)[4]	Top of copper bolt	364.8	1,197
Wye, P. B. M. (M. R. C.)[2]	Top of cap	*406.844*	*1,334.79*
Do.[2]	Top of bolt in tile	*405.629*	*1,330.80*
Yanz (M. R. C.)[1]	Tile and pipe	***243.2***	***798***

[1] Approximate elevation.
[2] Elevation determined by first-order levels.
[3] Elevation determined by ordinary levels.
[4] Elevation determined by vertical angles.
* Elevations shown in ***bold-faced italic*** type are from sea-level datum based upon the 1929 General Adjustment of the First-Order Level Net of the United States. Elevations shown in *italic* type are from sea-level datum based upon the 1912 General Adjustment of the First-Order Level Net of the United States.

DESCRIPTIONS OF TRIANGULATION STATIONS

The following descriptions of stations may be conveniently consulted by reference to the illustrations at the end of this publication or to the index. Azimuths given in the descriptions are geodetic azimuths, unless noted otherwise, and are reckoned continuously from true south around by west to 360°, south being 0°, west 90°, north 180°, and east 270°. Do not confuse these azimuths with plane-coordinate azimuths. (See p. 140.) Where magnetic azimuths are given they are indicated as such. Wherever the name of a point is printed in *italics* in the body of the descriptions, its position may be found in the tables.

In general, except where the contrary is specifically stated, the surface and underground marks are not in contact, so that a disturbance of the surface mark will not necessarily affect the underground mark. The underground mark should be resorted to only where there is evidence that the surface mark has been disturbed.

The name and dates given in each description immediately after the county refer to the chief of party by whom the station was established, the date of the establishment of the station, and the date when the station was last recovered.

Any person who finds that one of the stations herein described has been disturbed or that the description no longer fits the facts is requested to send such information to the Director, Coast and Geodetic Survey, Washington, D. C.

MARKING OF STATIONS

The standard disk station and reference marks referred to in the following descriptions and notes consist of a disk and shank of brass cast in one piece, as shown in figure 8. The disk of the station mark is 90 millimeters in diameter, with a hole at the center surrounded by a 20-millimeter equilateral triangle, and has the following inscribed legend: "U. S. Coast and Geodetic Survey Triangulation Station. For information write to the Superintendent, Washington, D. C. $250 fine or imprisonment for disturbing this mark." On the new marks made since March 1921 the word "Director" replaces the word "Superintendent" in the inscription. The shank is 25 millimeters in diameter and 80 millimeters long, with a slit at the lower end into which a wedge is inserted, so that when it is driven into a drill hole in the rock it will bulge at the bottom and hold the mark firmly in place. The marks used between about 1915 and 1920 have grooves cut around the shank instead of the slit.

The standard disk reference mark, shown in figure 8, is the same size and shape as the station mark, described above, but instead of a triangle it has an arrow at the center of the disk, which, when the mark is properly set, points toward the station. The legend is the same as for the station mark except that the words "reference mark" take the place of the words "triangulation station."

The standard notes on the marking of stations which are given below serve as a guide to the field observer in selecting the best type of mark for each particular station. They are also useful to the observer in writing his descriptions, as he need not describe the marking used at a station but simply give the numbers of the standard notes which describe the station, underground, reference, and witness marks. The notes were made as general as possible in order that it might not be necessary in the field to describe small and unimportant details.

At the end of the standard notes are given a number of additional notes, describing marks which were largely used before the adoption of the standard disk station and reference marks. These vary to a great extent with the locality, depending somewhat upon the character of the material available for the construction of permanent marks.

For the convenience of the reader, a brief description of the marking is given in each of the following descriptions of stations. In addition, the number of the note describing the mark in detail is also given.

STANDARD NOTES ON THE MARKING OF STATIONS

Surface marks

Note 1.—A standard disk triangulation station mark set in the top of (*a*) a square block or post of concrete, (*b*) a concrete cylinder, (*c*) an irregular mass of concrete.

Note 2.—A standard disk triangulation station mark wedged in a drill hole in outcropping bedrock (*a*) and surrounded by a triangle chiseled in the rock, (*b*) and surrounded by a circle chiseled in the rock, (*c*) at the intersection of two lines chiseled in the rock.

Note 3.—A standard disk triangulation station mark set in concrete in a depression in outcropping bedrock.

Note 4.—A standard disk triangulation station mark wedged in a drill hole in a boulder.

Note 5.—A standard disk triangulation station mark set in concrete in a depression in a boulder.

Note 6.—A standard disk triangulation station mark set in concrete at the center of the top of a tile (*a*) which is embedded in the ground, (*b*) which is surrounded by a mass of concrete, (*c*) which is fastened by means of concrete to the upper end of a long wooden pile driven into the marsh, (*d*) which is set in a block of concrete and projects from 12 to 20 inches above the block.

Underground marks

Note 7.—A block of concrete 3 feet below the ground containing at the center of its upper surface (*a*) a standard disk triangulation station mark, (*b*) a copper bolt projecting slightly above the concrete, (*c*) an iron nail with the point projecting above the concrete, (*d*) a glass bottle with the neck projecting a little above the concrete, (*e*) an earthenware jug with the mouth projecting a little above the concrete.

Note 8.—In bedrock (*a*) a standard disk triangulation station mark wedged in a drill hole, (*b*) a standard disk triangulation station mark set in concrete in a depression, (*c*) a copper bolt set in cement in a drill hole or depression, (*d*) an iron spike set point up in cement in a drill hole or depression.

Note 9.—In a boulder 3 feet below the ground (*a*) a standard disk triangulation station mark wedged in a drill hole, (*b*) a standard disk triangulation station mark set in concrete in a depression, (*c*) a copper bolt set with cement in a drill hole or depression, (*d*) an iron spike set with cement in a drill hole or depression.

Note 10.—Embedded in earth 3 feet below the surface of the ground (*a*) a bottle in an upright position, (*b*) an earthenware jug in an upright position, (*c*) a brick in a horizontal position with a drill hole in its upper surface.

Reference marks

Note 11.—A standard disk reference mark with the arrow pointing toward the station set at the center of the top of (*a*) a square block or post of concrete, (*b*) a concrete cylinder, (*c*) an irregular mass of concrete.

Note 12.—A standard disk reference mark with the arrow pointing toward the station (*a*) wedged in a drill hole in outcropping bedrock, (*b*) set in concrete in a depression in outcropping bedrock, (*c*) wedged in a drill hole in a boulder, (*d*) set in concrete in a depression in a boulder.

Note 13.—A standard disk reference mark with the arrow pointing toward the station, set in concrete at the center of the top of a tile (*a*) which is embedded in the ground, (*b*) which is surrounded by a mass of concrete, (*c*) which is fastened by means of concrete to the upper end of a long wooden pile driven into the marsh, (*d*) which is set in a block of concrete and projects from 12 to 20 inches above the block.

Witness marks

Note 14.—A conical mound of earth surrounded by a circular trench.

Note 15.—A tree marked with (*a*) a triangular blaze with a nail at the center and each apex of the triangle, (*b*) a square blaze with a nail at the center and each corner of the square, (*c*) a blaze with a standard disk reference mark set at its center into the tree.

ADDITIONAL NOTES ON THE MARKING OF STATIONS

Surface marks

Note 16.—The point of a 60-penny wire nail projecting above the top of a terra-cotta pipe, 2 feet long and 4 inches in diameter, filled with and set in concrete 18 inches in diameter.

Note 17.—The point of a 60-penny wire nail projecting above the top of an iron pipe, 2 feet long and of the diameter given in the particular description, filled with and set in concrete 18 inches in diameter.

Note 18.—A 3-inch bronze disk marked with triangle and legend "Geodetic Survey of Canada, triangulation station. For information write Director,

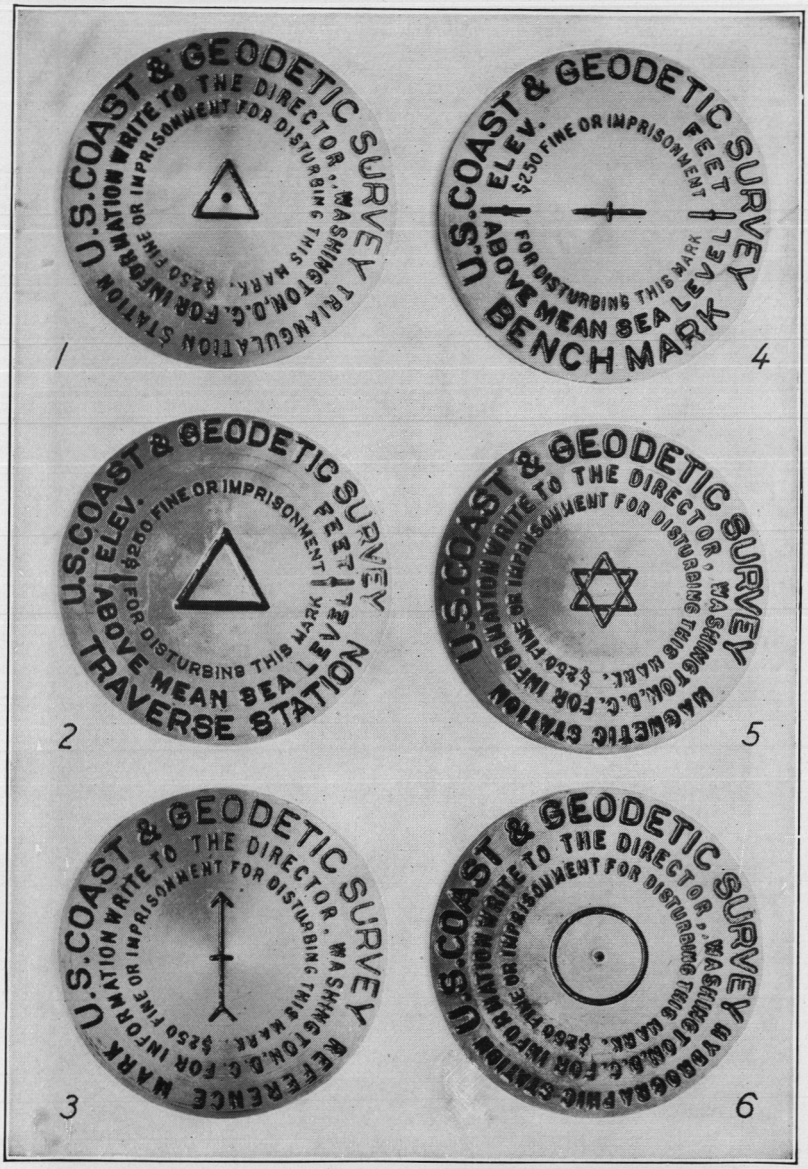

FIGURE 8.—STANDARD MARKS OF THE U. S. COAST AND GEODETIC SURVEY.

1. Triangulation station mark.
2. Traverse station mark.
3. Reference mark.
4. Bench mark.
5. Magnetic station mark.
6. Hydrographic station mark.

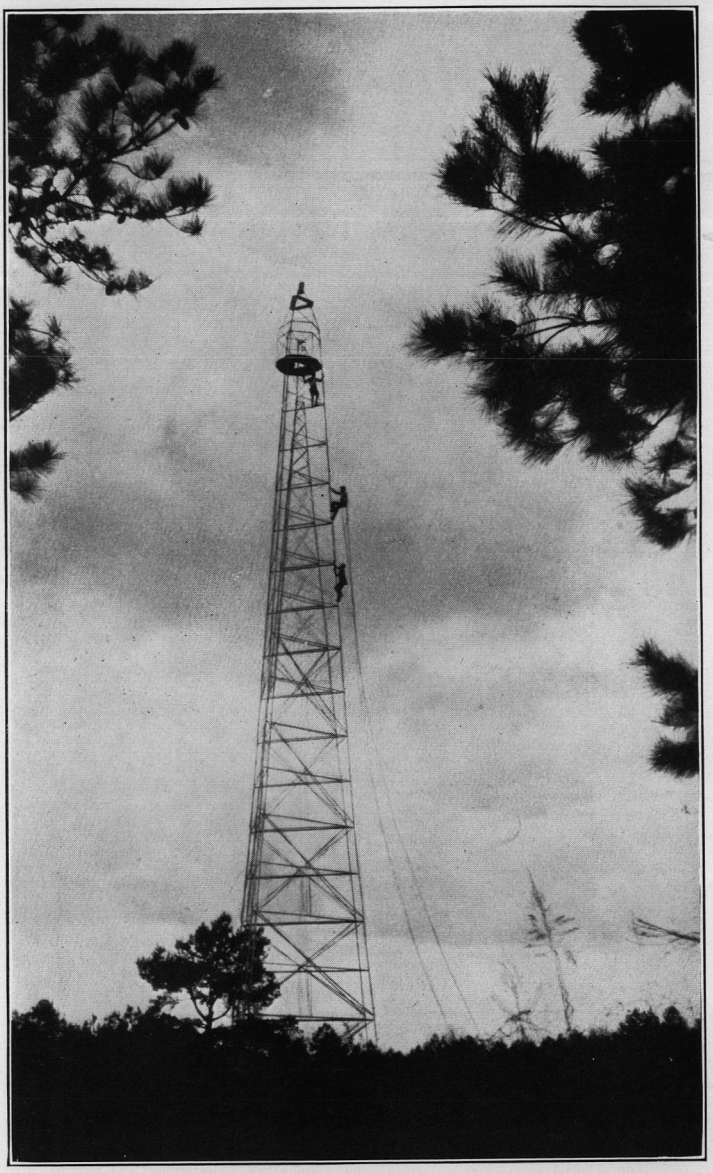

FIGURE 9.—STEEL TOWER USED BY UNITED STATES COAST AND GEODETIC SURVEY.

Ottawa." The disk is set in top of concrete monument, 56 inches long with bases 10 and 16 inches square, and projecting a foot or so above surface of ground.

Note 19.—The standard survey mark of the Mississippi River Commission consisting of a steel pipe, 4 inches in diameter and 4 feet long, resting on a vitrified tile, 18 inches square and 4 inches thick. The bottom end of the pipe is split for several inches and spread out to about 10 inches in diameter. A brass cap is riveted on top of pipe. The cap is marked "Mississippi River Commission. $250 fine for disturbing this mark"; on each side of a small hole in the center are the letters "U. S."; below this are the words "Latitude, Longitude", and "Elevation above sea", with a blank space left for cutting in the data. In the tile is leaded a copper bolt surrounded with the inscription "Mississippi River Commission, U. S." in sunk letters.

Underground marks

Note 20.—The point of a 60-penny wire nail, 2½ feet below the surface of the ground, projecting one-fourth inch above the top of a terra-cotta pipe, 2 feet long and 4 inches in diameter, filled with and set in concrete 12 inches in diameter.

Note 21.—The point of a 60-penny wire nail, 2½ feet below the surface of the ground, projecting one-fourth inch above the top of an iron pipe, 2 feet long and of the diameter given in the particular description, filled with and set in concrete 12 inches in diameter.

Note 22.—A bronze disk of the Geodetic Survey of Canada, described in note 18, set in top of concrete monument 20 inches long and 16 inches square, and separated from upper monument by a sheet of tarred paper.

Reference marks

Note 23.—The point of a 60-penny wire nail projecting one-fourth inch above the top of a terra-cotta pipe, 2 feet long and 4 inches in diameter, filled with and set in concrete 1 foot in diameter.

Note 24.—The point of a 60-penny wire nail projecting one-fourth inch above the top of an iron pipe, 2 feet long and of the diameter given in the particular description, filled with and set in concrete 1 foot in diameter.

NINETY-EIGHTH MERIDIAN ARC

Principal points

Boating (Grant County, S. Dak., O. W. Ferguson, 1903; 1935).—One mile south and 2 miles east of Summit, in NE¼SE¼ sec. 13, T. 121 N., R. 51 W. of the fifth principal meridian, on land owned in 1935 by Mr. Miller and occupied by Arthur Markus, on highest point of prominent knoll, ½ mile east-northeast of Markus' house. To reach from Summit, go south 2½ miles and east 2 miles on U. S. Route 12, and go north about 1¼ miles on private trail to Mr. Markus' place (third group of buildings north of highway) and station site. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, flush with surface of ground, near east ¼ corner, on west side of trail extending north along section line, about 50 yards north of small slough, at intersection of projections of north-and-south and east-and-west fence lines, and 413.73 meters (1,357.4 feet) from station in azimuth 211°44′42″. Following distances and azimuths are from station: Mr. Hong's windmill tower, about 1½ miles, 10°27′42″; cupola of large barn, about 1½ miles, 75°28′29″; and schoolhouse (District No. 4) chimney, about 2 miles, 240°07′24″.

Preacher Hill (Roberts County, S. Dak., O. W. Ferguson, 1903; 1935).—In Sisseton Indian Reservation, about 7 miles west and 5 miles south of Peever, in northeast corner of NE¼ sec. 1, T. 123 N., R. 52 W. of the fifth principal meridian, on dead Indian land leased in 1903 to J. E. Aiken, and on high rounded hill known in vicinity as "Preacher Hill." Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16

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and 20. In 1935, upper mark had been slightly exposed on one side, but was firmly in place. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, flush with surface of ground, about 10 feet south of highest point of rocky knoll, and 149.97 meters (492.0 feet) from station in azimuth 258°22′55″. It is 3.50 meters (11.5 feet) lower in elevation than station. Following distances and azimuths are from station: Kinsman's house, stovepipe chimney, about ¾ mile, 88°41′16″; Mrs. Lentz's house, west gable, about ¾ mile, 256°.4; and Mrs. Echart's house, west gable, about 1¼ miles, 306°11′15″.

Brown Valley southeast base (Roberts County, S. Dak., O. W. Ferguson, 1903; 1935).—About 3½ miles south and ½ mile west of Browns Valley, Minn., in SW¼SE¼ sec. 18, T. 124 N., R. 49 W. of the fifth principal meridian, on land owned by an insurance company and occupied by Fay Foster, 250 feet north of center line of section-line road, on slight elevation in farmyard, and 59 feet north of north face of Foster's house. Marked by cross cut in battered top of ⅝-inch copper bolt set in red granite block 2 feet square embedded in concrete base 4 feet square and top flush with surface of ground. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, in section line, 1.49 meters (4.9 feet) lower in elevation than station at distance of 66.42 meters (217.9 feet) from station in azimuth 356°44′. In 1935 reference mark was not recovered and had evidently been removed by grading and widening of section-line road. Following distances and azimuths are from station: Henry Sykora's windmill, about 1 mile, 115°55′06″; Determan's red barn, south gable, about 1,100 yards, 200°25′20″; *T. 124 N., R. 49 W., sec. 18, southeast corner* (see description thereof), 464.2 meters (1,523 feet) 279°45′50″; and Determan's house, chimney, about 875 yards, 351°43′28″.

Drywood (Roberts County, S. Dak., O. W. Ferguson, 1903; 1935).—About 1¼ miles north of Drywood Lake, 2 miles south and 4¼ miles west of Sisseton in Sisseton Indian Reservation, in NE¼NE¼ sec. 10, T. 125 N., R. 52 W. of the fifth principal meridian, Dry Wood Lake Township, on land belonging (in 1904) to M. K. Hemle, on a high prominent knoll, and 122 feet south of center of east-and-west section-line road. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, in road corner of section, and 190.81 meters (626.0 feet) from station in azimuth 262°20′20″. It is 18.99 meters (62.3 feet) lower in elevation than station. Following distances and azimuths are from station: W. J. Arfstrom's house, chimney, about 1 mile, 49°03′35″; *T. 125 N., R. 52 W., sec. 10, northeast corner* (see description thereof), 202.2 meters (663 feet), 260°09′36″; and M. K. Hemle's barn, north gable, about 300 yards, 292°41′09″ (in 1935, reported hidden by trees). Reported in 1935 that top of tile at station was broken flush with surface of ground and nail bent to one side, and reference mark probably removed by road grading.

Layden (Traverse County, O. W. Ferguson, 1903; 1935).—About 4 miles north and 4½ miles east of Browns Valley, in SW¼NW¼ sec. 17, T. 125 N., R. 48 W., on land belonging in 1904 to James Layden and in 1935 to Rural Credits Dept. of State of Minnesota (farmed by Fred Cannon), on west end of prominent mound, about 300 yards from west and south lines of quarter section, and about 200 feet west of highest point on knoll. To reach from Beardsley, go west 1.4 miles on Route 28 from the Cargill elevator to crossroads, leave highway and go north 1.7 miles to county line, jog east and thence north on dirt road 3.0 miles to where gravel road comes in from west, continue north on gravel road 0.6 mile to gate in fence at south end of small grove of trees, leave road, go east through gate, then east and north along fence line, thence east to top of mound and station site. Surface and underground marks were nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. In 1935 station was remarked by standard station disks, notes 1b and 7a. Upper mark was set 18 inches below surface of ground. Reference mark, not recovered in 1935, was nail in terra cotta pipe filled with and set in concrete, note 23, at southwest corner of section, in southwest corner of field, and 371.13 meters (1217.6 feet) from station in azimuth 46°27′30″. It was 6.40 meters (21.0 feet) lower in elevation than station. In 1935 two new reference marks, standard reference disks in concrete, note 11b, projecting about 8 inches above surface of ground were established. No. 1 is about 0.1 mile north of gate to field, 33 feet east of center line of road, about 50 feet north of fence corner, 1 foot west of north-

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and-south fence line, and 916.5 feet from station in azimuth 99°32′08″. No. 2 is about 0.2 mile north of gate, 33 feet east of center line of road, 1 foot west of north-and-south fence, and 1,123.5 feet from station in azimuth 127°50′20″. Distance between reference marks no. 1 and no. 2 was reported 537.1 feet. Azimuth mark, standard reference disk in concrete, note 11a, established in 1935, projects 6 inches above surface of ground, 0.35 mile south of gate, just west of fence corner, 34 feet east of center line of road, and 0.4 mile from station azimuth 20°47′34″. Azimuth from station to Graceville, tank is 288°11′39″. In 1903 the following distances and azimuths were from station: *T. 125 N., R. 48 W., sec. 17, west ¼ corner* (see description thereof), 384.1 meters (1,260 feet), 46°22′36″; William Cobert's house, chimney, about ¾ mile, 96°03′50″; James Layden's house (1904), chimney, about ¾ mile, 170°30′13″; windmill tower at Boner's house, about ¾ mile, 271°58′20″. In 1935 it was reported that Cobert's house chimney had been destroyed; and Boner's windmill tower rebuilt.

Brown Valley northwest base (Roberts County, S. Dak., O. W. Ferguson, 1903; 1935).—In Sisseton Indian Reservation, about 3 miles west and 1 mile north of Browns Valley, Minn., in NE¼SE¼ sec. 15, T. 125 N., R. 50 W. of the fifth principal meridian, in open prairie land owned by George Cloud and occupied by Leonard Nigg, about one-fourth mile west of east section line, 415 meters (1,362 feet) from northeast corner of quarter section, 142.88 meters (468.8 feet) south of east-and-west center line of section, about 125 yards southwest of small lone house, and 25 yards east of line dividing prairie from cultivated field. Marked by drill hole in ⅝-inch copper bolt set in 2-foot square granite block embedded in concrete base 4 feet square and flush with surface of ground. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 3 inches below surface of ground, on east-and-west half-section line, 20 feet north of little-used trail, and 142.88 meters (468.8 feet) from station in azimuth 179°28′36″. Following distances and azimuths are from station: Joe Seven Brothers' house (occupied by widow), stovepipe, about 975 yards, 35°01′10″; Mrs. Nigg's house (smaller and older one of two houses at northeast corner of section), chimney, about 1,550 yards, 191°33′56″; and Lena Nelson's house, west gable, about 2,400 yards, 282°55′43″.

Enwiller (Roberts County, S. Dak., W. H. Burger, 1904; 1935).—About 7 miles west and 6¼ miles south of town of White Rock, 2.15 miles south (along State Route 81) from junction with east-and-west road at south edge of Rosholt, 2 miles east and 1¼ miles south of Crawford post office, near east side center of NE¼ sec 36, T. 128 N., R. 49 W. of the fifth principal meridian, Victor Township, Sisseton Indian Reservation, on land belonging in 1904 to Harry Enwiller and in 1935 to Albert Enwiller, about one-fourth mile west of his home in section 31, on prominent ridge which extends east and west, in cultivated field, 73 feet west of east right-of-way fence, 40 feet west from center of wagon road where it crosses ridge, 6 feet west of line of telephone poles on west side of north-and-south section road, and 21 feet south of extended fence line to east which is south of lane leading to Mr. Enwiller's house. Surface and underground marks are nails in 2½-inch iron pipes filled with and set in concrete, notes 17 and 21. In 1935, upper mark was flush with surface of ground. Reference mark (reported lost in 1935) was nail in cement, 10 inches east from fence line, and 23.37 meters (76.7 feet) from station in azimuth 9°30′. Following distances and azimuths are from station: Christopher Schneider's house, chimney, about one-half mile, 141°18′51″; William Enwiller's barn, vane (in 1935, reported obscured by trees), about three-eighths mile, 230°41′55″; Harry (Albert in 1935) Enwiller's house, north chimney, about one-fourth mile, 258°29′09″; and *T. 128 N., R. 49 W., sec. 36, east 1/4 corner* (see description thereof), 406.52 meters (1,333.7 feet), 358°28′06″.

Oscarson (Traverse County, W. H. Burger, 1904; 1935).—About 2½ miles south and 2 miles east of White Rock, South Dakota, in NW¼ sec. 24, T. 128 N., R. 47 W., on land owned and occupied in 1935 by Adolf Niesche, 45 feet west and slightly south of northwest corner of his house, 18 feet south of southeast corner of granary, 50 feet south of south edge of grove of trees, 35 feet north of center line of lane, and (in 1904) about 6 paces north of road leading from west side of section to house of Ben Cartwright. To reach from the First National Bank in Wheaton, go east 0.3 mile on Route 75, thence north 5.0 miles on Route 75 to crossroads at school, leave highway and go west on narrow gravel road 2.0 miles to dirt crossroads, thence north on dirt road 0.8 mile to lane to Niesche's house, thence east on lane for 0.2 mile to station

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site in yard. Original surface mark was nail in terra-cotta pipe filled with and set in concrete, note 16. In 1935 nail was replaced by standard station disk. Underground mark is nail in terra-cotta pipe filled with and set in concrete, note 20. Reference mark not recovered in 1935, was nail in terra cotta pipe filled with and set in concrete, note 23, at south edge of timber and 24.213 meters (79.44 feet) from station in azimuth 180°44′. In 1935 two reference marks, standard reference disks in concrete, note 11b, were set, projecting 6 inches above surface of ground. No. 1 is 70 feet west of barn, 1 foot north of fence and 42.946 meters (140.90 feet) from station in azimuth 339°30′. No. 2 is 40 feet north of center line of lane, and 45.643 meters (149.75 feet) from station in azimuth 98°25′. Azimuth mark standard reference disk in concrete, note 11a, established in 1935, projecting 4 inches above surface of ground, is 35 feet west of center line of road, 1 foot west of fence, 20 feet north of east-and-west fence and 0.8 mile from station in azimuth 14°40′14″. To reach azimuth mark from station go west 0.2 mile, turn left (south) and go 0.8 mile to mark on right (west). Azimuth from station to Wheaton, tank (new) is 345°37′02″. Following distances and azimuths were observed from station in 1904: Adolph Carlson's house, east gable, about ⅜ mile, 94°03′29″; ball on spire at White Rock (reported not visible on account of trees in 1935), 134°40′08″; Alex Johnson's barn, spire (in 1935 reported owned by Hollander and obscured by trees), about ¼ mile, 256°54′25″; Ben Cartwright's house, northwest corner (in 1935 reported replaced by Niesche's house), 58.5 meters (192 feet), 279°02′16″.

Hankinson (Richland County, N. Dak., W. H. Burger, 1904; 1934).—On top of southernmost of very prominent group of hills, about 4 miles southwest of Hankinson, in SE¼SE¼ sec. 28, T. 130 N., R. 50 W. of the fifth principal meridian, Brightwood Township, 10 paces north of center of section-line road, about 89 paces south of west from northwest corner of old deserted barn (in 1906), on land owned (in 1906) by Mr. Harrison, West Concord, Minn., about 160 yards west of southeast corner of section, and about one-third mile a little southwest of white schoolhouse (independent school district) on high part of ridge. To reach from post office in Hankinson, go south 0.45 mile, turn right (west) at point west of school building, go one-fourth mile, turn left (south), go 1.0 mile, turn right (west), and go 2.0 miles, turn left (south), go 0.9 mile, turn right (west), and go 0.1 mile to hilltop and station site. Surface and underground marks were originally described as nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20, but reported in 1934 that surface mark is nail in cast-iron pipe filled with and set in concrete 14 inches in diameter flush with surface of ground and inscribed "U. S. C. & G. S. 1904." Reference mark established in 1904 is nail in terra-cotta pipe filled with and set in concrete, note 23, in southeast fence corner at corner of section, and 141.66 meters (464.8 feet) from station in azimuth 270°29′30″. In 1934, two other reference marks and azimuth mark (probably standard reference disks) were established. Reference mark no. 1 is 15 feet south of center line of field road and 46.052 meters (151.09 feet) from station in azimuth 243°30′. No. 2 is on northeast side of rock pile and 62.119 meters (203.80 feet) from station in azimuth 40°33′. Azimuth mark is 39 feet west of center line of north-and-south road, on northeast side of rock pile, and 0.9 mile from station in azimuth 355°49′29″. To reach azimuth mark from station, go east 0.1 mile, thence to right (south) 0.9 mile to mark on right. In 1904, the following distances and azimuths were observed from station: Behle's house, chimney, about one-half mile, 77°12′03″; *Schoolhouse chimney*, 572 meters (1,877 feet), 204°50′23″; *Hankinson, high school, spire*, about 3⅓ miles, 228°15′24″; and *T. 130 N., R. 50 W., sec. 28, southeast corner* (see description thereof), 150.473 meters (493.68 feet), 273°25′17″. In 1906, Hankinson latitude station, marked by wooden pier, was established 6.59 meters (21.6 feet) due east of station. In 1934, azimuths from station to points in Hankinson were observed as follows: Finial on black steel municipal water tank, about 125 feet high, 1 block south of railroad tracks, 226°13′01″; gold cross on top of taller of two spires on St. Phillips (Catholic) Church (clock on belfry of spire), 3 blocks south of railroad tracks over main street, 229°08′26″; and center of square brick stack of heating plant of St. Francis Academy (Catholic), at south end of main street, 231°42′42″.

Foss (Wilkin County, W. H. Burger, 1904; 1934).—Two and one-half miles north of Kutzer siding (formerly town of Childs), close to quarter-section

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corner on west side of sec. 1, T. 130 N., R. 47 W. of the fifth principal meridian, Campbell Township, about 30 feet east of center line of north-and-south road, and on west edge of field belonging (in 1904) to M. E. Foss, who lived three-fourths mile southeast. To reach from municipal water tank in Fairmount, N. Dak., go south 0.25 mile, turn left (east), go 3.0 miles, turn left (north), go 1.0 mile to Kutzer railroad crossing, continue north 2.0 miles to crossroads, and again continue north 0.45 mile to station site. Original surface and underground marks were nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. In 1934, station was re-marked with standard disk, stamped "FOSS 1904–1934", set in fresh concrete 12 inches below surface of ground. Original reference mark (not found in 1934) was described in 1904 as being nail in terra-cotta pipe filled with and set in concrete, note 23, in sec. 2, across wagon road from station, on land owned by Ed Joy, one-eighth mile south of his house, 0.82 meter (2.7 feet) west of north-and-south fence, 0.20 meter (0.7 foot) south of east-and-west fence which intersected the former at southeast corner of Mr. Joy's land, and 22.124 meters (72.59 feet) from station in azimuth 90°19′. In 1934, two new reference marks and azimuth mark (probably standard reference disks) were established. No. 1 is in fence line, 20 feet west of center line of north-and-south road, and 119.39 feet from station in azimuth 33°04′. No. 2 is in fence line, 27 feet west of center line of north-and-south road, and 123.56 feet from station in azimuth 147°37′. Azimuth mark is in northeast corner of schoolyard, 105 feet northeast of northeast corner of schoolhouse, 30 feet west of center line of road, and 1 mile from station in azimuth 1°00′26″. In 1904, following distances and azimuths were observed from station: *Childs* (*Kutzer*), *tallest elevator*, center of top, about 2½ miles, 1°56′57″; house in southeast corner of sec. 1, north gable, about one-half mile, 8°47′46″; Ed Joy's house, chimney, about one-eighth mile, 171°19′12″; and M. E. Foss' barn, cupola, about three-eighths mile, 304°56′52″. In 1934, municipal water tank in Fairmount, N. Dak., which is approximately 100 feet high and is in eastern part of town, 135 feet west of U. S. Route 81, and 120 feet north of Main Street, was observed from station in azimuth 43°27′21″.

Bullis (Grant County, W. H. Burger, 1904; 1935).—About 5 miles south and three-fourths mile east of Hereford, at north side of NW¼NW¼ sec. 31, T. 129 N., R. 43 W. of the fifth principal meridian, Elbow Lake Township, on grassland belonging (in 1904) to heirs living in Iowa, one-half mile south of home of A. H. Bullis, 435 feet east of north-and-south power line just west of top of ridge and on west line of sec. 31, 62.7 feet south of east-and-west fence which is near south side of sec. 30, 64 feet south of fence corner at northwest corner of trail intersection, 38 feet south of east-and-west trail, 9 paces west of center of old State road leading along top of small ridge from Hereford to Herman, and 7 paces south from center of section-line road on north side of section. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. In 1935, upper mark was flush with surface of ground. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, across section-line road from station, at edge of wheel track, 27 feet northwest of intersection of trails, 20 feet south-southwest of fence corner, and 14.350 meters (47.08 feet) from station in azimuth 180°08′. Following distances and azimuths are from station: Wilcox's house, chimney (1904), about 1 mile, 83°02′56″; *Hereford, elevator*, about 4½ miles, 169°26′57″; A. H. Bullis' house (Alder Larson's in 1935), chimney, about three-eighths mile, 179°46′29″; and schoolhouse (District 17), chimney, about 1¼ miles, 234°35′03″.

Western (Otter Tail County, W. H. Burger, 1904; 1935).—About 75 yards west of highest ground in open cultivated field on private road along half-section line leading from north quarter corner of sec. 26, T. 131 N., R. 44 W. of the fifth principal meridian, Western Township, to house of William B. Dewey, who lives near center of section, about 862 feet south of north quarter corner, and 12.75 feet east of north-and-south fence about on quarter-section line. To reach from Fergus Falls, which is about 10 miles north and 5 miles east, follow main-traveled road leading southwest to Western post office. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. In 1935, upper mark was flush with surface of ground. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, in northwest corner of Dewey's Grove, 63 feet east of tele-

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phone line on north-and-south half-section line, 25 feet east of west fence and 19 feet south of north fence surrounding grove, 9 feet west-northwest of cottonwood stump, 8 feet west-southwest of boxelder tree, 6 feet west of northwest corner tree (12 inches) of grove, and 253.495 meters (831.67 feet) from station in azimuth 356°23′26″. Following distances and azimuths are from station: F. Swift's house, chimney, about one-half mile, 93°46′07″; post office or Davenport's house, south gable, about 1 mile, 145°02′55″; *T. 131 N., R. 44 W., sec. 26, north 1/4 corner* (see description thereof), 262.79 meters (862.2 feet), 178°54′38″; and William Dewey's windmill, center of wheel (in 1935 reported destroyed), about ⅜ mile, 341°43′.

Wahpeton (Wilkin County, W. H. Burger, 1904; 1934).—About 2½ miles southeast of Breckenridge, in E½NW¼ sec. 23, T. 132 N., R. 47 W. of the fifth principal meridian, 111 feet southwest of center line of U. S. Route 75, and in field belonging to Joe Pazdernik. To reach from Wilkin County courthouse in Breckenridge, go south 0.15 mile on U. S. Route 75, turn left (east) and continue east and south 2.55 miles on U. S. Route 75 to telephone pole no. 8115 near station site. Original surface and underground marks were nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. In 1934, original surface mark was reported destroyed and new surface mark was established by setting standard station disk stamped "WAHPETON 1904–1934" in concrete, note 1b. Original reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, on edge of field, 8.30 meters (27.2 feet) from center line of wagon road, 36.56 meters (119.9 feet) from west rail of Great Northern Railway, and 44.808 meters (147.01 feet) from station in azimuth 188°13′. In 1934 two new reference marks (standard reference disks stamped "WAHPETON 1934" in concrete, note 11b) and azimuth mark (standard reference disk stamped "WAHPETON 1934" in concrete, note 11a) were established. No. 1 is 42 feet southwest of center line of U. S. Route 75 and 483.46 feet from station in azimuth 312°50′53″. No. 2 is 40 feet southwest of center line of U. S. Route 75 and 454.31 feet from station in azimuth 150°31′12″. Azimuth mark is 45 feet southwest of center line of U. S. Route 75 and about three-fourth mile from station in azimuth 320°21′28″. In 1904, following azimuths were observed from station: Wahpeton, Catholic Church, western spire, 124°49′19″; northwest corner post of field of Hermann Degner, east of track at intersection of road with railway, 167°54′00″; and Hermann Degner's house, chimney, distant about 250 meters (820 feet), 247°06′05″. In 1934, following azimuths were observed from station: Wahpeton, tank, 128°55′45″; and Breckenridge, tank, 136°45′38″.

Fox (Wilkin County, W. Bowie, 1906).—About one-half mile west-northwest from town of Foxhome on Northern Pacific Railway, in S½SE¼ sec. 34, T. 133 N., R. 45 W. of the fifth principal meridian, on property belonging to J. A. Jargensen of Foxhome and leased to Otto Zashledorff, 9 meters (30 feet) north of center of section road, and near edge of field. Surface and underground marks are nails in 1½-inch iron pipes filled with and set in concrete, notes 17 and 21. Reference mark is nail in 1½-inch iron pipe filled with and set in concrete, note 24, near edge of field, 9 meters (30 feet) north of section road, and 27.700 meters (90.88 feet) from station in azimuth 90°04′. Following distances and azimuths are from station: Hans J. Haanson's house, east gable, about 278.0 meters (912 feet), 80°29′53″; and small bridge, center, about 237.0 meters (778 feet), 87°45′. In 1935, station, reference mark, and small bridge reported destroyed in highway construction.

Indian (Otter Trail County, Minn., W. Bowie, 1906; 1935).—About 3 miles east and 2¼ miles south of Rothsay on Great Northern Railway in NE¼NE¼ sec. 9, T. 134 N., R. 44 W. of the fifth principal meridian on north slope of very prominent hill known as Indian Mountain. In 1906 described as being on property of Mrs. Gure Arneson 6 meters (19 feet) north of line fence between her property and that of Seurin Lerbakker, and about 150 meters (492 feet) west of north-and-south section-line road. In 1935 reported that land now owned by Mrs. Thomas Juverud and rented to Carlner Lerbakker who lives about ¼ mile northeast of station. To reach from Rothsay, follow U. S. Route 52 southeast 2.5 miles to crossroads, leave Route 52 and go left (east) 1.8 miles to crossroads, turn right (south) and go 0.05 mile, then turn west and continue to farmhouse. From house go south through pasture to top of hill and station site. To reach from Erhard, follow gravel road west 5.7 miles, turn left (south) and follow gravel road 1.0 mile to west turn, continue south

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on dirt road 2.25 miles to crossroad, continue south 0.05 mile, turn right (west) and go to farmhouse, and thence south to station as above. Original surface and underground marks were nails in 1¼-inch iron pipes filled with and set in concrete, notes 17 and 21. In 1935 surface mark was replaced by standard station disk in concrete. Original reference mark is nail in 1¼-inch iron pipe filled with and set in concrete, note 24, flush with surface of ground, in east-and-west fence line, and 52.190 meters (171.23 feet) from station in azimuth 84°10′. Reference mark no. 2 (1935) is standard reference disk in concrete, note 11a, flush with surface of ground, and 53.712 meters (176.22 feet) from station in azimuth 216°38′. Azimuth mark is standard reference disk in concrete, note 11b, projecting 6 inches above ground, 0.1 mile north of crossroads which are northeast of station, 30 feet west of north-and-south road, in west right-of-way fence, and approximately 0.4 mile from station in azimuth 193°14′24″. Azimuth from station to Rothsay, Hammer Lutheran Church, tip of spire, is 131°28′41″. In 1906 the following distances and azimuths were from station: Highest point of Indian Mountain, 144.7 meters (475 feet), 11°00′; Mr. Helgeson's red barn, cupola, about 500 meters (1,640 feet), 183°42′07″; highest point of very large rock in corner of field, 137.5 meters (451 feet) 266°11′39″; and *B. M. E 4* (see description thereof), 324.275 meters (1,063.89 feet), 327°23′59″.

Meadows (Wilkin County, W. Bowie, 1906; 1935).—About 17 miles south of Barnesville, about 10½ miles west and 2.7 miles south of Rothsay, about 10.9 miles north along County Route 82 from junction with U. S. Route 3 (east of Breckenridge), 3½ miles south and 1 mile west of Manston, in NW¼SW¼ sec. 8, T. 134 N., R. 46 W. of the fifth principal meridian, Meadows Township. In 1906 described as being on land owned by Albert Russel of Breckenridge, and farmed by Eugene Van Tassel, in northeast corner of his pasture, just south of his house, and west of an old abandoned railroad grade leading north-northeast from Wahpeton, N. Dak. In 1935 reported that old railroad grade is now Route 82, and station is in open grass section, on land owned by J. A. Bratsberg of Adrian, about 0.35 mile north of wooden bridge over ditch on Route 82, about 300 feet southerly of private road leading to ruins of farm buildings, 144 feet west of center line of Route 82, about 70 feet north of east-and-west fence, and 217 feet south of south wall of remains of a cobblestone foundation. To reach from south edge of Rothsay, go west about 10 miles on County Route 6 (gravel), thence south 2.7 miles on Route 82 to station site. Original surface and underground marks were nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. In 1935 surface mark was replaced by standard station disk in concrete, note 1a, flush with surface of ground. Original reference mark, reported destroyed in 1935, was nail in terra-cotta pipe filled with and set in concrete, note 23, in fence corner, just west of Route 82, and 61.745 meters (202.58 feet) from station in azimuth 235°22′. New reference marks set in 1935 are standard reference disks in concrete, note 11b, projecting 6 inches above ground. No. 1 is in fence corner, 39 feet north of center line of Route 82, and 39.279 meters (128.87 feet) from station in azimuth 321°34′. No. 2 is in fence line, 60.387 meters (198.12 feet) from station in azimuth 68°11′. Azimuth mark (1935) is standard reference disk in concrete, note 11a, projecting 6 inches above ground, 30 feet west of center line of Route 82, 1 foot east of fence line, and about 0.7 mile from station in azimuth 16°49′36″. In 1906 azimuth from station to Albert Russel's house, south corner, distant 66.325 meters (217.60 feet), was 198°07′; and of line normal to railroad grade center, distant 44.6 meters (146 feet), 290°16′.

Barnesville (Clay County, W. Bowie, 1906).—About 2¼ miles north and 2 miles west of town of Barnesville, in NE¼ sec. 15, T. 137 N., R. 46 W. of the fifth principal meridian, on land owned by J. P. McWilliams, of Illinois, and leased to C. W. Austin, just south of dwelling house and barns, on top of slight ridge running north and south, about 300 meters (984 feet) west of section road, and about 700 meters (2,297 feet) north of Fargo branch of Great Northern Railway. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 13.63 meters (44.7 feet) south of large barn, 1.16 meters (3.8 feet) west of southwest corner of small barn, and 37.480 meters (122.97 feet) from station in azimuth 181°38′. Following distances and azimuths are from station: McWilliams' house, south

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gable, 88.73 meters (291.1 feet), 192°33′; large red barn, cupola, about 400 meters (1,312 feet), 206°33′; and signboard "R. R. Crossing", about 700 meters (2,297 feet), 339°36′. In 1935, point reported to be destroyed and marks lying in sand pit, reference mark destroyed, and red barn rebuilt.

Tansem (Clay County, W. Bowie, 1906; 1935).—About 3 miles north and 10 miles east of town of Barnesville, in NE¼NE¼ sec. 10, T. 137 N., R. 44 W. of the fifth principal meridian, on one of several bare knolls in immediate vicinity about 900 feet southwest of corner common to secs. 2, 3, 10, and 11, 76 paces south of east-and-west fence, 270 feet west of north-and-south fence on west side of section-line road, 28 paces east and 7 paces south of southeast corner of fence around cultivated field, on rocky land owned by Ole Gulbranson, who lives about ½ mile west of station. To reach from Dunville go southwest 0.35 mile on Routes 43 and 73 to junction, turn right (west) and go 10.1 miles on Route 43 to junction with Route 32, turn right (north) and go 3 miles on Route 32, turn right (east) onto dirt road and go 1.1 miles to crossroads, turn right and go 0.1 mile to gate on right, pass through gate and go southwest 0.1 mile to station site. Original surface and underground marks were nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. In 1935 nail in surface mark was replaced with standard station disk. Original reference mark (recovered but not observed on in 1935) is nail in terra-cotta pipe filled with and set in concrete, note 23, flush with surface of ground, 15 feet west of center of north-and-south road, 10 feet east of fence, and 78.301 meters (256.89 feet) from station in azimuth 274°09′. Reference mark no. 2 is standard reference disk in boulder, note 12c, 22.189 meters (72.80 feet) from station in azimuth 33°55′. Reference mark no. 3 is standard reference disk in concrete, note 11b, projecting 6 inches above ground, 1 foot east of fence, 40 feet north of fence corner, and 31.193 meters (102.34 feet) from station in azimuth 118°21′. Azimuth mark, probably standard station disk in concrete, is about 0.3 mile west of small schoolhouse, 15 feet south of center line of road 2 feet south of fence, and 0.45 mile from station in azimuth 316°20′39″. To reach azimuth mark from station, go northeast to gate, turn right (south) and go 0.25 mile, then east 0.35 mile to mark on knoll. Azimuth from station to Barnesville, tank, finial, is 71°50′46″. In 1906 the following distances and azimuths were from station: *T. 137 N., R. 44 W., sec. 2, southwest corner* (see description thereof), 266.876 meters (875.58 feet), 198°33′21″; and schoolhouse cupola, about 800 meters (2,625 feet), 302°07′13″.

Eglon (Clay County, W. Bowie, 1906; 1935).—About 3 miles south and 3 miles east of town of Hawley, in NE¼SW¼ sec. 21, T. 139 N., R. 44 W. of the fifth principal meridian, on southwest corner of flat-topped hill, about 600 feet southwest of wooded section on top of hill, and in cultivated field owned by heirs of Mrs. Mary Hogetvetd. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, in north-and-south fence line just west of station, and 26.275 meters (86.20 feet) from station in azimuth 98°08′. Following distances and azimuths are from station: Windmill, about 800 meters (2,625 feet), 12°07′43″; and house, chimney, about 400 meters (1,312 feet), 17°00′43″. In 1935, station recovered with copper bolt leaded in top of surface mark slightly east of south of nail. Reference mark and house and chimney reported destroyed.

Riverton (Clay County, W. Bowie, 1906; 1935).—On low ridge, 2¾ miles south and 1½ miles east of Stockwood on Northern Pacific Railway, in SE¼SW¼ sec. 23, T. 139 N., R. 46 W. of the fifth principal meridian, 1,000 feet northwest of frame schoolhouse (bell in cupola in front and chimney at rear), 300 feet west of willow thicket, and on slight knoll in vacant prairie land said to belong to P. Figi, address unknown. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, about 800 feet west of schoolhouse, 24 feet north of east-and-west road, 15 feet south of fence line to east enclosing school yard on north edge of section road just south of station, and 145.070 meters (475.95 feet) from station in azimuth 4°51′36″. Azimuth from station to *T. 139 N., R. 46 W., sec. 23, south ¼ corner* (see description thereof), distant 224.410 meters (736.25 feet), is 314°32′54″. In 1935, station reported to have been heaved by frost; not known if position has been changed.

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Keene (Clay County, W. Bowie, 1906; 1935).—About 4½ miles south and 4 miles east of town of Felton on Great Northern Railway, in SW¼NW¼ sec. 20, T. 141 N., R. 45 W. of the fifth principal meridian, on land owned by Philip Weisbrod of Iowa, just north of half-section line, on low ridge running north and south between two deserted dwelling houses, and about 350 feet northwest of lone pair of cottonwood trees east of foundation of southern house site. Surface and underground marks are nails in 2-inch iron pipes filled with and set in concrete, notes 17 and 21. Reference mark is nail in 2-inch iron pipe filled with and set in concrete, note 24, on half-section line, and 49.700 meters (163.06 feet) from station in azimuth 359°47′. Following distances and azimuths are from station: Deserted house, chimney, 114.3 meters (375 feet), 203°09′12″; and deserted frame house, chimney, 72 meters (236 feet), 346°49′. In 1935, mark reported to have been heaved by frost and old houses destroyed.

Morken (Clay County, W. Bowie, 1906; 1935).—About 5 miles west and 3 miles south of town of Felton on Great Northern Railway, in northeast corner of sec. 15, T. 141 N., R. 47 W. of the fifth principal meridian, on land owned by the Wheeler Land Co. of Moorehead, 13.3 meters (43.6 feet) south of center of east-and-west road, and 30 meters (98 feet) west of center of north-and-south road. Surface and underground marks are nails in 2-inch iron pipes filled with and set in concrete, notes 17 and 21. Reference mark is nail in 2-inch iron pipe filled with and set in concrete, note 24, in extreme northeast corner of sec. 15, in line with telephone poles, 9.1 meters (30 feet) south of center of east-and-west section road, 10.3 meters (34 feet) west of center of north-and-south road, 26.75 feet west of west end of large galvanized culvert under north-and-south road, and 20.070 meters (65.85 feet) from station in azimuth 256°36′. Following distances and azimuths are from station: Carlson's house, tall chimney, about 150 meters (492 feet), 139°19′23″; Carlson's barn, south gable, about 200 meters (656 feet), 154°45′; and *T. 141 N., R. 47 W., sec. 10, southeast corner* (see description thereof), 32.24 meters (105.8 feet), 245°22′. In 1906, latitude observations were made at Morken latitude station, a wooden pier, 12.40 meters (40.7 feet) from station in azimuth 88°37′. In 1935, surface mark reported to have been destroyed; underground mark was recovered 19.25 feet southwest of telephone pole on south side of east-and-west road, 13 feet south of line of poles, and about 3 feet below surface of ground; and Carlson's house and barn have been destroyed.

Syre (Norman County, W. Bowie, 1906; 1935).—About 1¼ miles north and 3½ miles east of station Syre on Northern Pacific Railway, 4½ miles south and 4 miles east of Twin Valley on Northern Pacific Railway, in NW¼SE¼ sec. 18, T. 143 N., R. 43 W., of the fifth principal meridian, Flom Township, on land belonging to Helge Lee, one-fourth mile southwest of his house, and on highest point of "Frenchman's Bluff." Surface and underground marks are nails in 2-inch iron pipe filled with and set in concrete, notes 17 and 21. Reference mark is nail in 2-inch iron pipe filled with and set in concrete, note 24, in fence corner just southwest of station, and 145.705 meters (478.03 feet) from station in azimuth 58°31′57″. Chimney of Helge Lee's dwelling house is about 400 meters (1,312 feet) from station in azimuth 231°34′32″. In 1935, station reported to project slightly above ground and reference mark not found.

Borup (Norman County, W. Bowie, 1906; 1935).—About one-fourth mile north and one-half mile east of town of Borup on Great Northern Railway, in SW¼SW¼ sec. 22, T. 143 N., R. 46 W., of the fifth principal meridian, Winchester Township, on land belonging to T. O. Lian, one-eighth mile northwest of his house, east of center of State highway, 86 feet north of and in line with third power pole north of east-and-west road, at top of ditch excavation, at northwest side of fence post, and in northwest corner of Mr. Lian's pasture. Surface and underground marks are nails in 2-inch iron pipes filled with and set in concrete, notes 17 and 21. Reference mark is nail in 2-inch iron pipe filled with and set in concrete, note 24, in fence corner, 7 meters (23 feet) east of center of road, and 26.731 meters (87.70 feet) from station in azimuth 172°49′. Following distances and azimuths are from station: *B. M. E 5* (see description thereof), 389.622 meters (1,278.28 feet), 3°49′30″; and *Borup, church spire*, 375.5 meters (1,232 feet), 16°59′14″.

Wicklow (Norman County, W. Bowie, 1906; 1935).—About 5½ miles north and one-fourth mile east of town of Ada on Great Northern Railway, about one-half mile north and 1½ miles east of station Hadler on Great Northern Railway, in SW¼NE¼ sec. 15, T. 145 N., R. 46 W. of the fifth principal meridian,

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Pleasant View Township, on land owned by Jacob Hadler, about one-half mile northwest of his house, 18 feet east of north-and-south quarter-section-line fence, and 402 feet south of north end of fence. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, in half-section line, and 30.012 meters (98.46 feet) from station in azimuth 7°39′. Following distances and azimuths are from station; *B. M. K 5* (see description thereof), 557.235 meters (1,828.20 feet), 59°45′06″; white house, chimney, about 700 meters (2,297 feet), 68°55′53″; and Jacob Hadler's house, chimney, about 800 meters (2,625 feet), 298°41′41″. In 1935, surface mark and reference mark reported destroyed; underground mark was found 3½ feet below surface of ground.

Gary (Norman County, W. Bowie, 1906; 1935).—Forty-eight telegraph poles (about 1½ miles) north of Gary, 172 meters (564 feet) west of center of Northern Pacific Railway tracks, near center of NW¼ sec. 9, T. 145 N., R. 44 W. of the fifth principal meridian, Strand Township, on land belonging to John Grove Land Company of St. Paul and rented to S. S. Vrstad, about 1,000 meters (3,281 feet) east of Vrstad's house, near center of grassy plot about 50 feet through in sandy section, and on slight rise of ground about 125 feet north of growth of willows in hollow. Surface and underground marks are nails in 2-inch iron pipes filled with and set in concrete, notes 17 and 21. Reference mark is nail in 2-inch iron pipe filled with and set in concrete, note 24, in fence line on west side of railway right-of-way, 51 feet west of center of tracks, 25 feet south of telephone pole no. 4, 6 feet north of fence post, and 116.114 meters (380.95 feet) from station in azimuth 288°16′16″. Following distances and azimuths are from station: Red barn, south gable, about 1,000 meters (3,281 feet), 69°26′09″; lone tree, just west of railway, about 500 meters (1,640 feet), 188°00′21″; and house east of railway, chimney, about 800 meters (2,625 feet), 278°49′48″.

Fertile (Polk County, W. Bowie, 1906; 1935).—One and one-half miles west and three-fourths mile south of town of Fertile on Northern Pacific Railway, in NW¼ sec. 30, T. 147 N., R. 44 W. of the fifth principal meridian, Garfield Township, on United States land, and on top of third highest point of what are known as "Sand Hills." Highest point is very sharp and composed of loose sand, while second highest point is too sharp to accommodate signal. To reach from Fertile, go west 1½ miles to road south (100 feet beyond flour mills), climb hill and follow trail south about three-fourths mile to Ole Strom's farm, and proceed west one-half mile to station. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, on highest point of second highest peak of Sand Hill, and 53.00 meters (173.9 feet) from station in azimuth 179°21′. Highest point of Sand Hill is about 130 meters (427 feet) from station in azimuth 220°27′. In 1935, surface mark reported removed and underground mark in position under about 6 inches of earth. Pile of earth and pole were placed over mark to protect it from shifting sand. Reference mark was found at foot of hill.

Beltrami (Polk County, W. Bowie, 1906; 1935).—One mile south and three miles west of town of Beltrami on Great Northern Railway, in SW¼SE¼ sec. 24, T. 147 N., R. 47 W. of the fifth principal meridian, Scandia Township, in cultivated field on land owned by firm of Holden & Robinson of Plymouth, Iowa, 40 feet north of center of east-and-west section road, and 11 feet north of north edge of north road ditch. Surface and underground marks are nails in 1½-inch iron pipes filled with and set in concrete, notes 17 and 21. Reference mark is nail in 1½-inch iron pipe filled with and set in concrete, note 24, in fence corner in southeast corner of grove just west of station, 39 feet north of center of section road, 9 feet north of north ditch, 5½ feet north of bulletin-board post, 4 feet northeast of southeast tree of grove, 3 feet east of north-and-south fence, and 163.079 meters (535.04 feet) from station in azimuth 89°30′32″. Following distances and azimuths are from station: Windmill near large barn, about 1,400 meters (4,593 feet) 26°46′01″; *T. 147 N., R. 47 W., sec. 23, southeast corner* (see description thereof), 968.290 meters (3,176.80 feet), 89°02′39″; white house, chimney, 300 meters (984 feet), 155°25′55″; and Edgewood farmhouse, west chimney, about 700 meters (2,297 feet), 279°24′23″. In 1935, surface mark reported destroyed and underground mark recovered 3½ feet below surface of ground.

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Tilden (Polk County, W. H. Burger, 1905; 1935).—About 14 miles east-southeast of Crookston, about 3 miles west of station Dugdale on Great Northern Railway, nearly 2 miles west of town of Tilden, in southwest corner of sec. 20, T. 149 N., R. 44 W. of the fifth principal meridian, Tilden Township, in cultivated field on land belonging to John Clayton of Illinois, 14.9 meters (49 feet) east of center of wagon road, 12.8 meters (42 feet) east of north-and-south section line, and 153 meters (501 feet) north of center of railway track. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, on edge of railway cut, 23.7 meters (78 feet) north of center of track, 69 feet east of center line of north-and-south section road, 38 feet north and directly back of telegraph pole no. E20, 18 feet south of row of trees used as snow fence for railway, 8.5 meters (28 feet) from center of first telegraph pole east of railway crossing, and 129.217 meters (423.94 feet) from station in azimuth 358°49′29″. Signboard at railway crossing is distant about 145 meters (476 feet) in azimuth 5°14′. *T. 149 N., R. 44 W., sec. 19, southeast corner* (see description thereof), is 164.887 meters (540.97 feet) from station in azimuth 5°58′49″. In 1905, latitude observations were made at Tilden latitude station, a triangular-shaped pier (built of 4- by 6-inch wooden posts, boxed with 2- by 8-inch planks), 3.9 meters (13 feet) east of section-line and 8.90 meters (29.2 feet) due west of station.

Andover (Polk County, W. Bowie, 1906; 1935).—About 3½ miles due south of Crookston, in southeast corner of sec. 13, T. 149 N., R. 47 W. of the fifth principal meridian, Andover Township, on land belonging to William H. Johnson of Ames, Iowa, 49.75 meters (163.2 feet) a little west of north of section corner, 12.7 meters (42 feet) west of center of north-and-south road, 5 feet west of north-and-south fence, and 3 feet in cultivated field. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, in edge of field west of station, in right-of-way and 8.0 meters (26 feet) east of center of railway track, 25.0 meters (82 feet) north of center of east-and-west section road, and 181.946 meters (596.93 feet) from station in azimuth 82°45′57″. Center of railway crossing is 185.45 meters (608.4 feet) from station in azimuth 75°03′; and *T. 149 N., R. 46 W., sec. 18, southwest corner* (see description thereof), is 49.75 meters (163.2 feet) from station in azimuth 344°20′. In 1935, surface mark reported to have been disturbed.

Ives (Red Lake County, W. Bowie, 1906).—About five-eighths mile north of store and elevator at Dorothy on Northern Pacific Railway, about 9 miles northwest of Red Lake Falls, in center of SW¼ sec. 32, T. 152 N., R. 45 W., of the fifth principal meridian, Wylie Township, on land belonging to E. D. Healy, of Red Lake Falls, on top of prominent narrow sand ridge running north from Dorothy, and 19.6 meters (64 feet) west of road running along top of ridge. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 3.0 meters (10 feet) west of center of road, and 16.840 meters (55.25 feet) from station in azimuth 256°47′. Following distances and azimuths are from station: Windmill, about 500 meters (1,640 feet), 286°20′56″; and Dorothy, elevator, about 1,000 meters (3,281 feet), 337°30′31″. Could not be found in 1935, surface mark found lying in road ditch.

Shirley (Polk County, W. Bowie, 1906; 1935).—About 7 miles northwest of Crookston, near north edge of NE¼ sec. 33, T. 151 N., R. 47 W. of the fifth principal meridian, Fanny Township, 116.10 meters (380.9 feet) south of center of east-and-west section road, on land owned by J. W. Hichon, of Algona, Iowa, at south edge of grassy area at north edge of cultivated field, and 1 foot west of post at opening in east-and-west fence. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 4 meters (13 feet) south of windmill, about 10 meters (33 feet) south of old well, and 35.815 meters (117.50 feet) from station in azimuth 174°15′. Following distances and azimuths are from station: Center of tree marked with triangle in corner of grove, 85.53 meters (280.6 feet), 90°01′; and Mr. Hichon's dwelling house, southeast corner, 84.00 meters (275.6 feet), 137°16′.

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Sherack (Polk County, W. Bowie, 1906; 1935).—Two miles east of railroad station at Sherack, 2 miles west and 4 miles south of town of Angus, in southeast corner of sec. 31, T. 153 N., R. 47 W. of the fifth principal meridian, Angus Township, in cultivated field on land owned by James Robbins, of Renova, Pa., 16.4 meters (54 feet) west of center of north-and-south section road, 21.6 meters (71 feet) north of center of east-and-west section road, 40½ feet north of east-and-west power-pole line, and 20½ feet west of north-and-south power-pole line. Surface and underground marks are nails in 2-inch iron pipes filled with and set in concrete, notes 17 and 21. Reference mark is nail in 2-inch iron pipe filled with and set in concrete, note 24, 8.3 meters (27 feet) west of center of north-and-south section road, and 28.700 meters (94.16 feet) from station in azimuth 194°51′. *B. M. D 6* (see description thereof) is 210.630 meters (691.04 feet) from station in azimuth 81°05′25″, and *T. 153 N., R. 47 W., sec. 31, southeast corner* (see description thereof), is 26.415 meters (86.66 feet) from station in azimuth 325°06′. In 1935, surface mark and reference mark reported destroyed, and underground mark was 3 feet below surface of ground.

Bray (Pennington County, W. Bowie, 1906; 1935).—On land said to belong to Great Northern Railway, in SW¼ sec. 17, T. 153 N., R. 45 W., of the fifth principal meridian, Bray Township, one-half mile south of temporary ranch building, one-fourth mile north of partly graded east-and-west road, and on highest part of high north-and-south ridge along top of which runs the old "Pembina Trail" which is now well-traveled road. Just east of this ridge and opposite station is large marsh with some open water known locally as "The Goose Pond." Station is 5 meters (16 feet) east of center of wagon road and between two dwelling houses on ridge, one to north and other to south. To reach from Euclid, follow U. S. Route 75 north 3.6 miles, follow gravel road east 8.4 miles to top of ridge, and go north about 1½ miles to station site. Surface and underground marks are nails in 2-inch iron pipes filled with and set in concrete, notes 17 and 21. Reference mark is nail in 2-inch iron pipe filled with and set in concrete, note 24, 5 meters (16 feet) east of center of wagon road, and 21.725 meters (71.28 feet) from station in azimuth 192°33′. Following distances and azimuths are from station: House south of station, chimney, about 2,400 meters (7,874 feet), 13°58′38″; and house north of station, chimney, about 1,600 meters (5,249 feet), 206°27′50″. In 1935, dwellings reported to have been destroyed.

Warren (Marshall County, W. Bowie, 1906; 1935).—One and one-half miles north and 1¾ miles east of town of Warren, in southeast corner of SW¼SW¼ sec. 20, T. 155 N., R. 47 W., of the fifth principal meridian, McCrea Township, on land belonging to E. P. Hunsted, 200 meters (656 feet) southwest of his home, 13.8 meters (45 feet) north of east-and-west section road, 74½ feet north and slightly east of large fence corner post south of east-and-west road, 23 feet northeast of small telephone pole north of road, and 10 feet east of north and south fence south of road. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 8.6 meters (28 feet) north of center of east-and-west section road, and 41.830 meters (137.24 feet) from station in azimuth 83°03′. Following distances and azimuths are from station: *T. 155 N., R. 47 W., sec. 19 southeast corner* (see description thereof), 406.035 meters (1,332.13 feet), 87°45′47″; and windmill near house of E. P. Hunsted, about 200 meters (656 feet), 198°18′27″. In 1935, reference mark reported destroyed in road construction.

Viking (Marshall County, W. Bowie, 1906; 1935).—On highest part of prominent north-and-south sand ridge along top of which runs the "Pembina Trail", in SW¼ sec. 7, T. 155 N., R. 45, W., of the fifth principal meridian, Viking Township, 24.2 meters (79 feet) southwest of center of trail, in large cultivated field, west of low partly timbered area, three-fourths mile southwest of Ivar Nelson's farmhouse, about three-fourths mile southwest of point where traveled road turns north at gravel pit, and about 150 meters (492 feet) east of well-defined edge of strip of low trees and brush along west edge of sand ridge. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 2.8 meters (9 feet) southwest of center of "Pembina Trail", and 25.843 meters (84.79 feet) from station in azimuth 177°53′. Windmill is about 2,000 meters (6,562 feet) from station in azimuth 112°40′35″. Windmill was not located in 1935.

For notes in regard to marking of stations see p. 245.

Wright (Marshall County, W. Bowie, 1906).—Near center of SW¼ sec. 24, T. 157 N., R. 46 W., of the fifth principal meridian, Wright Township, on school land which has been taken up by Carl Edmon, about 200 meters (656 feet) southwest of his home, on top of high north-and-south sand ridge along which runs the "Pembina Trail", 11.9 meters (39 feet) east of "Pembina Trail", and 221.0 meters (725 feet) north of center of east-and-west section road which runs along south side of sec. 24. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 2.3 meters (8 feet) west of center of "Pembina Trail", in edge of bushes, and 72.050 meters (236.38 feet) from station in azimuth 15°34′. Chimney of house is about 200 meters (656 feet) from station in azimuth 244°12′11″. Station could not be found in 1935, evidence showed that surface and reference marks had been destroyed.

Argyle (Marshall County, W. Bowie, 1906; 1935).—About 3½ miles north and one-fourth mile east of town of Argyle, in southeast corner of SW¼SW¼ sec. 35, T. 157 N., R. 48 W., of the fifth principal meridian, Tamarac Township, 10.3 meters (34 feet) north of center of east-and-west section road, 8.5 meters (28 feet) west of center of north-and-south private road, 91 feet south and slightly west of large cottonwood tree (first tree north of fence corner), 13 feet west of corner fence post, 1 foot north of first post west of corner, on land owned by parties in Illinois and rented to Edward Fournier, and about 550 meters (1,804 feet) south of Fournier's house which is in grove. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, on quarter-section line, 3.2 meters (10 feet) west of center of north-and-south road, and 27.064 meters (88.79 feet) from station in azimuth 191°14′. Following distances and azimuths are from station: *B. M. 0 6* (see description thereof), 391.100 meters (1,283.13 feet), 180°26′38″; and dwelling house, east chimney, about 461 meters (1,512 feet), 184°59′02″. In 1935, top of reference mark reported to have been broken off.

Stephen east base (Marshall County, O. B. French, 1906; 1935).—About 2 miles north and 6½ miles east of town of Stephen, near center of west side of SW¼NW¼ sec. 28, T. 158 N., R. 47 W., of the fifth principal meridian, Augsburg Township, on land belonging to James Winczewski, of Winona, in cultivated field known as the "Old Taylor Farm", 12.3 meters (40 feet) east of section line, 16½ feet east of north-and-south fence line, and 208.8 meters (685 feet) north of half-section line. Marked as follows: ½-inch copper bolt in marble block, 6 inches square and 1 foot deep, placed 5 feet below surface; and above this, empty section of 4-inch sewer pipe. Surface mark is 1-millimeter drill hole in bronze station mark set in granite block, 2 feet square and 1 foot deep. Pipe and both stones are surrounded by mass of concrete 2 feet square at base and 4 feet square at surface. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, on quarter-section line, 16.0 meters (52 feet) east of quarter-section corner, and 208.825 meters (685.12 feet) from station in azimuth 359°12′10″. Following distances and azimuths are from station: Dwelling house on Wheeler farm, north chimney, about 2,200 meters (7,218 feet), 31°13′45″; and deserted house, chimney, about 400 meters (1,312 feet), 190°31′05″. Reference mark was not found in 1935.

Donaldson (Marshall County, W. Bowie, 1907; 1935).—Two miles south of Donaldson, just west of Great Northern Railway, in NE¼NE¼ sec. 6, T. 158 N., R. 48 W. of the fifth principal meridian, Sinnott Township, in cultivated field on land belonging to E. A. Kindlee, of Stephen, and G. F. Johnson, of Crookston, 23.58 meters (77.46 feet) south of section line forming boundary between Marshall and Kittson Counties, and about 175 meters (574 feet) from railway. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, on edge of field just east of station, and 27.771 meters (91.11 feet) from station in azimuth 263°14′. Following distances and azimuths are from station: Center of railway crossing, 177.37 meters (581.9 feet), 262°06′ and *T. 158 N., R. 48 W., sec. 6, northeast corner* (see description thereof), 348.90 meters (1,144.7 feet), 266°06′19″. Sur-

For notes in regard to marking of stations see p. 245.

face and reference marks reported destroyed in 1935; underground mark is about 3½ feet below surface of ground.

Stephen west base (Marshall County, W. H. Burger, 1905; 1935).—About one-half mile north and three-fourths mile east of town of Stephen, in southwest corner of SE¼ sec. 33, T. 158 N., R. 48 W. of the fifth principal meridian, Sinnott Township, in cultivated field belonging to Mr. J. Gillespie, of Stephen, 31.0 meters (102 feet) east of half-section line, 15.0 meters (49 feet) north of center of east-and-west section-line road, and north of cemetery. Marked as follows: ½-inch copper bolt in marble block, 6 inches square and 1 foot deep, placed 5 feet below surface of ground, and above this, empty section of 4-inch sewer pipe. Surface mark is 1-millimeter drill hole in bronze station mark set in granite block, 2 feet square and 1 foot deep. Pipe and both stones are surrounded by mass of concrete 2 feet square at base and 4 feet square at surface. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, in southwest corner of section, 9.0 meters (30 feet) east of north-and-south section road, 9.6 meters (31 feet) north of east-and-west section road, and 832.510 meters (2,731.33 feet) from station in azimuth 89°40′19″. Following distances and azimuth are from station: *B. M. T. 6* (see description thereof), 38.410 meters (126.02 feet), 46°30′; house chimney, about 600 meters (1,968 feet), 170°11′47″; and house chimney, about 800 meters (2,625 feet), 267°11′09″. In 1905, latitude observations were made at Stephen west base latitude station, a wooden pier (triangular prismatic in shape), 101.81 meters (334.0 feet) from station in azimuth 253°19′08″. In 1907, longitude observations were made at *Stephen west base longitude station*, a pier of concrete resting on brick base, 9.77 meters (32.1 feet) from station in azimuth 262°57′.

Deer (Kittson County, W. Bowie, 1907; 1935).—About three-eighths mile north of remains of old Deer post office, 12 miles east of Donaldson on Great Northern Railway, on north-and-south half-section line of sec. 19, T. 159 N., R. 46 W. of the fifth principal meridian, in small clearing on land belonging to Great Northern Railway, 182 feet southwest of small house owned and occupied by William Hamms, and 48 feet east of center of road winding along top of low north-and-south ridge. Ridge is cleared on top for width of 50 meters (164 feet) and has bushes on its slopes. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 15.30 meters (50.2 feet) east of center of road, and 29.357 meters (96.32 feet) from station in azimuth 177°27′.

Jupiter (Kittson County, W. Bowie, 1907; 1935).—About 4½ miles west-southwest of station Bronson on Minneapolis, St. Paul & Sault Ste. Marie Railway, near eastern edge of SE¼NE¼ sec. 6, T. 160 N., R. 47 W. of the fifth principal meridian, Jupiter Township, on land belonging to P. Benson, one-fourth mile southeast of his home, 100 feet north of east-and-west quarter-section line, halfway between two small clusters of poplar trees (one near road at south end of field, other near road east of farmhouse), and 31 feet west of center of section road. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 13 feet west of center of section road, and 29.377 meters (96.38 feet) from station in azimuth 349°48′. Cupola of P. Benson's barn is about 450 meters (1,476 feet) from station in azimuth 142°31′. In 1935, station and reference marks reported to have piles of rocks around them.

Skane (Kittson County, W. Bowie, 1907).—About 5 miles south and 3 miles west of Hallock on Great Northern Railway, in northwest corner of sec. 8, T. 160 N., R. 49 W. of the fifth principal meridian, Skane Township, on land belonging to Charles Lander, one-half mile northwest of his house, 21.50 meters (70.5 feet) south of east-and-west section road, and 12.60 meters (41.3 feet) east of north-and-south road. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 12.50 meters (70.5 feet) east of north-and-south section road, and 24.493 meters (80.36 feet) from station in azimuth 1°20′. *T. 160 N., R. 49 W., sec. 8, northwest corner* (see description thereof) is 25.245 meters (82.82 feet) from station in azimuth 150°07′. Station not found in 1935; probably destroyed in field cultivating.

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Granville (Kittson County, W. Bowie, 1907; 1935).—One and one-half miles north and three-fourths mile west of town of Lancaster on Minneapolis, St. Paul & Sault Ste. Marie Railway, near center of north side of NE¼ sec. 11, T. 162 N., R. 48 W. of the fifth principal meridian, Granville Township, 36 feet south of center of east-and-west section road, 5 feet south of south ditch line, about 10 feet east of wood road joining graded road near station, and on land belonging to D. D. Murphy, of Blue Earth. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, in sec. 2, 6.70 meters (22.0 feet) north of center of east-and-west section road, and 17.215 meters (56.48 feet) from station in azimuth 177°16′. Cupola of Benson Lockwood's barn is about 80 meters (262 feet) from station in azimuth 216°35′; and east gable of his house, distant about 85 meters (279 feet), is in azimuth 159°26′. In 1935 Lockwood's barn reported to be rebuilt and station 194.5 feet southwest of southwest corner of new structure. Reference mark destroyed by road construction.

Hallock (Kittson County, W. Bowie, 1907; 1935).—One and one-half miles north and ¾ mile east of town of Hallock, in NE¼SE¼ sec. 1, T. 161 N., R. 49 W. of the fifth principal meridian, Hallock Township, on ditch line, 10.90 meters (35.8 feet) west of north-and-south section road, and on land belonging to Eugene Glyddon who lives in Hallock. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, on half-section line of sec. 6, T. 161 N., R. 48 W., 10.60 meters (34.8 feet) east of center of north-and-south section road, and 70.865 meters (232.50 feet) from station in azimuth 197°12′. Following distances and azimuths are from station: House chimney, about 300 meters (984 feet), 352°15′; and house chimney, about 160 meters (525 feet), 236°03′. In 1935, surface mark and reference reported to have been destroyed by road construction, old mark was placed over underground mark to aid identification.

Hill (Kittson County, W. Bowie, 1907).—Five miles west of Northcote on Great Northern Railway, in southwest corner of SE¼ sec. 15, T. 162 N., R. 50 W. of the fifth principal meridian, Hill Township, on land belonging to Henry Nolte, ½ mile southwest of his house, 20.38 meters (66.9 feet) east of quarter-section line, and 10.70 meters (35.1 feet) north of east-and-west section-line road. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, on quarter-section line, 10.60 meters (34.8 feet) north of east-and-west section road, and 20.380 meters (66.86 feet) from station in azimuth 90°06′. In 1935, station was reported destroyed, and station *Humboldt* (*G. S. of C.*) (see description and geographic position thereof) was established nearby.

States (Kittson County; Emerson Electoral District, Manitoba, Canada, W. Bowie, 1907).—One and one-half miles north and 4 miles east of St. Vincent on Great Northern Railway, on boundary between United States and Canada, just east of iron boundary monument no. 387 which is 4 miles east of Red River, and within few feet of line between secs. 27 and 28, T. 164 N., R. 50 W. of the fifth principal meridian. Surface and underground marks are nails in 2-inch iron pipes filled with and set in concrete, notes 17 and 21. Reference mark is nail in 2-inch iron pipe filled with and set in concrete, note 24, and 21.871 meters (71.76 feet) from station in azimuth 270°01′. *United States-Canada boundary monument no. 837* (see description thereof) is 109.68 meters (359.8 feet) from station in azimuth 90°12′06″.

Canada (Kittson County; Provencher District, Manitoba, Canada, W. Bowie, 1907; 1935).—Seven miles by road north by east from Orleans on Minneapolis, St. Paul & Sault Ste. Marie Railway, on boundary between United States and Canada, just west of iron boundary monument no. 848 which is 15 miles east of Red River, and within a few feet of north end of line between secs. 28 and 29, T. 164 N., R. 48 W. of the fifth principal meridian. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, on or very near boundary, and 22.065 meters (72.39 feet) from station in azimuth 90°15′. *United States-Canada boundary monument no. 848* (see description thereof) is 25.29 meters (83.0 feet) from station in azimuth 270°03′.

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Ridgeville (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—On the right-of-way of the Canadian National Railway at mileage 59.6 from South Junction, opposite point of tangency of first curve west of Tolstoi station, and 19.79 meters (64.9 feet) north of south rail. Surface and underground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22.

Humboldt (G. S. of C.) (Kittson County, Geodetic Survey of Canada, 1923; 1935).—A station established close to the site of station *Hill* (see description and geographic position thereof) which had been destroyed. Surface and underground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22, in cultivated field. Upper mark projects about 24 inches aboveground.

Pembina (G. S. of C.) (Pembina County, N. Dak., Geodetic Survey of Canada, 1925).—Two miles due west of town of Pembina, in southwest corner of SW¼ sec. 6, T. 163 N., R. 51 W. of the fifth principal meridian, and in small pasture field about 200 yards west of some farm buildings. Surface and underground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22. Upper mark projects about 18 inches above ground.

Letellier (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1925).—In the southwest corner of river lot 121, of the old Red River survey. Sec. 17, T. 2, R. 2 E., is just west of this lot. Surface and underground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22. *D. L. S. No. 44 (G. S. of C.)* (see description thereof) is 150.82 meters (494.8 feet) from station in azimuth 87°28′35″.

Supplementary points

Browns Valley, white spire (Traverse County, O. W. Ferguson, 1903).—In 1935, reported that this spire had been on Baptist Church, which is no longer standing.

Browns Valley, water tower (Traverse County, O. W. Ferguson, 1903).—In 1935, reported that a new tank, slightly shorter but of the same diameter, has been placed on the same foundation and tower.

Browns Valley, large building, high spire (Traverse County, O. W. Ferguson, 1903).—In 1935, reported that this is probably the old frame schoolhouse which stands on high ground and is the same as in 1903.

T. 124 N., R. 49 W., sec. 18, southeast corner (Roberts County, S. Dak., O. W. Ferguson, 1903).—Marked by mound of earth surrounded by four depressions on lines at right angles to each other. Station *Brown Valley southeast base* (see description thereof) is 464.2 meters (1,523 feet) from station in azimuth 99°46′05″. In 1935, reported that a high road grade had been thrown up at this point. Mark was not recovered.

Beardsley, square slender decorated spire (Big Stone County, O. W. Ferguson, 1903).—In original records this point was called "square slate decorated spire." In 1935, it was reported that this spire had been on an old Catholic church which was located about 100 feet south of the present building which was erected in 1904.

Graceville, water tower (Traverse County, O. W. Ferguson, 1903).—In 1935, tank reported to have been rebuilt at distance of approximately 100 feet to east of old position.

T. 125 N., R. 48 W., sec. 17, west ¼ corner (Traverse County, O. W. Ferguson, 1903; 1904).—Marked by mound of earth surrounded by four depressions, on lines at right angles to each other. Station *Layden* (see description thereof) is 384.1 meters (1,260 feet) from mark in azimuth 226°22′27″. Reported lost in 1935.

Indian church, spire (1½ miles northeast of station Brown Valley northwest base) (Roberts County, S. Dak., O. W. Ferguson, 1903).—In 1935 reported that top of belfry has been made smaller and lower, but its position was probably not changed.

T. 125 N., R. 52 W., sec. 10, northeast corner (Roberts County, S. Dak., O. W. Ferguson, 1903; 1904).—Corner common to secs. 2, 3, 10, and 11. Marked in 1868 by post in mound of earth. Station *Drywood* (see description thereof) is 202.2 meters (663 feet) from mark in azimuth 80°09′43″. In 1935, reported buried under road grade.

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T. 128 N., R. 49 W., sec. 36, east ¼ corner (Roberts County, S. Dak., W. H. Burger, 1904).—Marked in 1869 by charred post, mound of earth and pits. Station *Enwiller* (see description thereof) is 406.52 meters (1,333.7 feet) from mark in azimuth 178°28′06″. Point reported destroyed in 1935.

Swedish Lutheran Church, spire (2 miles east of station Enwiller) (Roberts County, S. Dak., W. H. Burger, 1904; 1935).—Two and one-half miles south and 2 miles east of Rosholt. Point recovered in 1935.

Church, very tall black spire (Roberts County, S. Dak., W. H. Burger, 1904; 1935).—One-fourth mile south of Hammer. Building known as "Nidaros Church."

T. 130 N., R. 50 W., sec. 28, southeast corner (Richland County, N. Dak., W. H. Burger, 1904).—Marked in 1874 by charred stake and post 4 feet long and 4 inches square, 1 foot in ground in mound 4½ feet in diameter and 2 feet high, with 4 pits 2 feet square and 1 foot deep. Station *Hankinson* (see description thereof) is 150.473 meters (493.68 feet) from mark in azimuth 93°25′22″.

Church, black spire (near Childs (Kutzer)) (Traverse County, W. H. Burger, 1904; 1935).—About 2½ miles east and 2 miles south of Fairmount, N. Dak.

Nashua, west elevator (Wilkin County, W. H. Burger, 1904; 1935).—Point recovered in 1935. Lean-to has been built on east side, but does not affect highest part.

Nashua, white church (Wilkin County, W. H. Burger, 1904; 1935).—Recovered in 1935, and reported to be Lutheran church.

Campbell, church spire (Wilkin County, W. H. Burger, 1904; 1935).—In 1935, reported that according to geographic position this should be the Congregational church, which has an open belfry, and that building is said to be standing the same as in 1904.

Campbell, church, open belfry (Wilkin County, W. H. Burger, 1904; 1935).—In 1935, reported that according to geographic position this should be the Lutheran Church, which has a closed belfry, and that building is said to be standing the same as in 1904.

T. 131 N., R. 44 W., sec. 26, north ¼ corner (Otter Tail County, W. H. Burger, 1904).—Marked in 1869 by post in mound. Station *Western* (see description thereof) is 262.79 meters (862.2 feet) from mark in azimuth 358°54′38″. In 1935, point reported destroyed.

B. M. E 4 (Otter Tail County, W. Bowie, 1906; 1935).—About 4½ miles southeast of Rothsay, in SW¼NW¼ sec. 10, T. 134 N., R. 44 W. of the fifth principal meridian, about 148 paces north of west ¼ corner, 1 foot east of fence on east side of public road, in fence corner, in slight hollow, on land of Peter Walstrom, and due west of his house. Marked by 3-inch red metal cap (somewhat curved) on iron pipe set in ground and cemented at base, projecting about 4 inches above ground and protected by pile of small rocks. Square or small circle is cut in outline in center of cap. Station *Indian* (see description thereof) is 324.275 meters (1,063.89 feet) from station in azimuth 147°24′05″.

T. 137 N., R. 44 W., sec. 2, southwest corner (Clay County, W. Bowie, 1906).—Corner common to secs. 2, 3, 10, and 11. Marked by stone. Station *Tansem* (see description thereof) is distant 266.876 meters (875.58 feet) in azimuth 18°33′24″. In 1935, point reported to have been destroyed.

T. 139 N., R. 46 W., sec. 23, south ¼ corner (Clay County, W. Bowie, 1906).—Marked in 1870 by post in mound of earth. Station *Riverton* (see description thereof) is 224.410 meters (736.25 feet) from station in azimuth 134°33′00″. Point was not found in 1935.

T. 141 N., R. 47 W., sec. 10, southeast corner (Clay County, W. Bowie, 1906).—Corner common to secs. 10, 11, 14, and 15. Marked in 1870 by post in mound of earth. Station *Morken* (see description thereof) is 32.24 meters (105.8 feet) from station in azimuth 65°22′. In 1935, point reported to have been destroyed by road construction.

B. M. E 5 (Norman County, W. Bowie, 1906).—At Borup, about 400 meters (1,312 feet) east of Great Northern Railway tracks, in northeast corner of public school grounds, 7 meters (23 feet) from eastern edge of property, and 3 meters (10 feet) from north edge. Marked by copper bolt in top of 4-foot reinforced-concrete post, 7 inches square with edges beveled, projecting about 6 inches above ground. Top is marked "U. S. B. M." Station *Borup* (see description thereof) is 389.622 meters (1,278.28 feet) from station in

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azimuth 183°49′29″. In 1935, station reported to have been destroyed by road construction, and school reported to be on north side of east-and-west road.

B. M. K 5 (Norman County, W. Bowie, 1906; 1935).—About 1½ miles east and one-half mile north of Hadler, near northeast corner of SE¼ sec. 15, T. 145 N., R. 46 W. of the fifth principal meridian, Pleasant View Township, in corner of pasture fence, on farm owned by H. J. Poeler, about 730 feet east of west face and 8 feet north of north face of barn, and about five meters (16 feet) south of quarter-section road. Marked by 3-inch red metal cap (somewhat curved) screwed to top of 4- or 4½-foot iron pipe set in sandy clay, cemented at base, and flush with surface of ground. Base of pipe is split and spread to diameter of about 1 foot. Square or small circle is cut in outline in center of cap. Station *Wicklow* (see description thereof) is 557.235 meters (1,828.20 feet) from station in azimuth 239°44′49″.

Beltrami, north elevator (Polk County, W. Bowie, 1906).—In 1935, elevator reported to have been destroyed and rebuilt.

T. 147 N., R. 47 W., sec. 23, southeast corner (Polk County, W. Bowie, 1906).—The corner common to secs. 23, 24, 25, and 26, T. 147 N., R. 47 W. Marked in 1872 by post in mound of earth, witnessed by pits. Station *Beltrami* (see description thereof) is 968.290 meters (3,176.80 feet) from station in azimuth 269°02′05″. In 1935, point reported to have been destroyed by road construction.

T. 149 N., R. 44 W., sec. 19, southeast corner (Polk County, W. H. Burger, 1905).—The corner common to secs. 19, 20, 29, and 30, T. 149 N., R. 44 W. Marked by a large wire nail in a decayed wooden stake. Station *Tilden* (see description thereof) is 164.887 meters (540.97 feet) from station in azimuth 185°58′48″. Point not found in 1935.

T. 149 N., R. 46 W., sec. 18, southwest corner (Polk County, W. Bowie, 1906).—Corner common to secs. 18 and 19, T. 149 N., R. 46 W. and secs. 13 and 24, T. 149 N., R. 47 W. Marked in 1872 by post in mound of earth. Station *Andover* (see description thereof) is 49.75 meters (163.2 feet) from station in azimuth 164°20′. In 1935, point reported to have been destroyed by road construction.

T. 153 N., R. 47 W., sec. 31, southeast corner (Polk County, W. Bowie, 1906).—Corner common to secs. 31 and 32, T. 153 N., R. 47 W. of the fifth principal meridian, on line between Tps. 152 and 153 N. Marked in 1872 by post in mound of earth. Station *Sherack* (see description thereof) is 26.415 meters (86.66 feet) from station in azimuth 145°06′. Point not located in 1935. Roads have been graded.

B. M. D 6 (Polk County, W. Bowie, 1906).—Near Angus, in northwest corner of NE ¼ sec. 1, T. 152 N., R. 48 W. of the fifth principal meridian, Keystone Township, 25 paces west of road crossing, and 1 foot south of pasture fence. Marked by 3-inch red metal cap (somewhat curved) screwed to top of 4- or 4½-foot iron pipe set in ground, cemented at base and projecting 4 to 6 inches. Base of pipe is split and spread to diameter of about 1 foot. Square or small circle is cut in outline in center of cap. Station *Sherack* (see description thereof) is 210.630 meters (691.04 feet) from station in azimuth 261°05′18″. In 1935 point reported to have been destroyed.

T. 155 N., R. 47 W., sec. 19, southeast corner (Marshall County, W. Bowie, 1906).—The corner common to secs. 19, 20, 29, and 30, T. 155 N., R. 47 W. Marked in 1872 by post in mound of earth, witnessed by pits. Station *Warren* (see description thereof) is 406.035 meters (1,332.12 feet) from station in azimuth 267°45′32″. In 1935 point reported to have been destroyed by road construction.

B. M. O 6 (Marshall County, W. Bowie, 1906; 1935).—About 2½ miles north and one-half mile east of Argyle, in sec. 35, T. 157 N., R. 48 W. of the fifth principal meridian, Tamarac Township, on west side of road leading to farmhouse, in fence corner, 1,282 feet north of south fence corner, 109 feet north of most northerly tree in row along east side of fence, 95 feet south and slightly west of southwestern tree (24-inch cottonwood) in southwest corner of small grove in front of Mr. Beaudry's house, 1.5 feet west of north-and-south fence, and on property of Mr. Beaudry. Marked by 3-inch red metal cap (somewhat curved) screwed to top of 4- or 4½-foot iron pipe set in clay, cemented at base, and projecting 4 to 6 inches. Base of pipe is split and spread to diameter of about 1 foot. Square or small circle is cut in outline in center of cap. Station

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Argyle (see description thereof) is 391.100 meters (1,283.13 feet) from station in azimuth 0°26′38″. In 1935 mark reported to be about 4 inches below surface of ground.

Stephen west base longitude station (Marshall County, W. H. Burger, 1907; 1908).—Concrete pier on brick base 9.77 meters (32.1 feet) in azimuth 262°57′ from station *Stephen west base* (see description thereof).

B. M. T 6 (Marshall County, W. Bowie, 1906).—About one-half mile north and three-fourths mile east of Stephen, in northwest corner of NE¼ sec. 4, T. 157 N., R. 48 W. of the fifth principal meridian, 11 meters (36 feet) south of road, and 5 meters (16 feet) east of drainage ditch. Marked by 3-inch red metal cap (somewhat curved) screwed to top of 4- or 4½-foot iron pipe set in clay, cemented at base, and projecting 4 to 6 inches. Base of pipe is split and spread to diameter of about 1 foot. Square or small circle is cut in outline in center of cap. Station *Stephen west base* (see description thereof) is 38.410 meters (126.02 feet) from station in azimuth 226°30′.

T. 158 N., R. 48 W., sec. 6, northeast corner (Marshall County, W. Bowie, 1907).—Corner common to secs. 5 and 6, T. 158 N., R. 48 W. and secs. 31 and 32, T. 159 N., R. 48 W. Marked in 1872 by post and charred stake with mound of earth and pits. Station *Donaldson* (see description thereof) is 348.90 meters (1,144.7 feet) from station in azimuth 86°06′32″. In 1935, point reported to have been destroyed by road construction.

T. 160 N., R. 49 W., sec. 8, northwest corner (Kittson County, W. Bowie, 1907).—Corner common to secs. 5, 6, 7, and 8, T. 160 N., R. 49 W. of the fifth principal meridian. Marked in 1872 by post in mound of earth and witnessed by pits. In 1907, corner was reported in intersection of roads. Station *Skane* (see description thereof) is 25.245 meters (82.82 feet) from station in azimuth 330°07′. In 1935, point reported to have been destroyed by road construction.

United States-Canada Boundary Monument No. 848 (Kittson County, Minn.; Provencher District, Manitoba, Canada, W. Bowie, 1907; 1935).—Seven miles by road north by east from Orleans on Minneapolis, St. Paul & Sault Ste. Marie Railway, on boundary between United States and Canada, and 15 miles east of Red River. Known as boundary monument no. 54 prior to treaty of 1908. Marked by iron post. In 1907, top of post was reported broken off. Broken piece, which is 0.32 meter (1.0 foot) long, was found on ground near monument and was replaced while observations were made. Height of entire monument is 1.41 meters (4.6 feet). Station *Canada* (see description thereof) is 25.29 meters (83.0 feet) from base of monument in azimuth 90°03′. Reported in 1935 that broken monument has been replaced by new one.

United States-Canada Boundary Monument No. 837 (Kittson County, Minn.; Provencher District, Manitoba, Canada, W. Bowie, 1907; 1935).—One and one-half miles north and 4 miles east of St. Vincent on Great Northern Railway, on boundary between United States and Canada, and 4 miles east of Red River. Known as boundary monument no. 65 prior to treaty of 1908. Marked by iron post which projects 1.01 meters (3.3 feet). One side of post is marked "October 20th 1818", and other is marked "Convention of London." Station *States* (see description thereof) is 109.68 meters (359.8 feet) from station in azimuth 270°12′02″. In 1935, it was reported post was marked "Convention of 1818" on one side, "Treaty of 1908" on other side, "Canada" on north face, and "United States" on south face.

D. L. S. No. 44 (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1925).—Dominion Lands Survey post at southwest corner of River Lot 121 of the old Red River Survey, in parish of Sainte Agathe. Station *Letellier (G. S. of C.)* (see description thereof) is distant 150.82 meters (494.8 feet) in azimuth 267°28′29″.

Letellier, elevator (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1925).—The east one of two elevators at Letellier. Also known as "N. M. Patterson elevator." Mark is west end of ridge of elevator roof.

INTERNATIONAL BOUNDARY TRIANGULATION AND TRAVERSE

Principal points

Tolstoi (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—On the right-of-way of the Canadian National Railway at

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mileage 51.7 from South Junction, 46.54 meters (152.7 feet) east of the center of Tolstoi station and 5.37 meters (17.6 feet) south of the south rail. Surface and underground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22.

Stuartburn (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—On the right-of-way of the Canadian National Railway at mileage 47.38 from South Junction, at the point of intersection of the tangents of the first curve west of Stuartburn station, and 2,112.88 meters (6,932.00 feet) west of the center of Stuartburn station. Station mark is a nail in a wooden post.

Vita (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—On the right-of-way of the Canadian National railway at mileage 41.8 from South Junction, at the point of intersection of the tangents of the first curve west of Vita station, and 5,000 meters (16,404 feet) west of the center of the telegraph office at Vita station. Station mark is a nail in a wooden post.

Read (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—On the right-of-way of the Canadian National Railway at mileage 37.65 from South Junction, 1,692.6 meters (5,553 feet) east of the center of the telegraph office at Vita station, and 5.44 meters (17.8 feet) south of the north rail. Surface and underground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22.

Ingram (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—On the right-of-way of the Canadian National Railway at mileage 35.51 from South Junction, 5,569.6 meters (18,273 feet) west of the center of Caliento station, and 4.29 meters (14.1 feet) south of the north rail. Surface and underground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22.

Caliento (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—On the right-of-way of the Canadian National Railway at mileage 32.96 from South Junction, 338.7 meters (1,111 feet) east of Caliento station, and 9.903 meters (32.49 feet) north of the north rail. Surface and underground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22.

Menisino (G. S. of C.) (Provencher District, Manitoba Canada, Geodetic Survey of Canada, 1924).—On the right-of-way of the Canadian National Railway at mileage 18.5 from South Junction, 272.6 meters (894 feet) west of the center of Menisino station, and 1.99 meters (6.5 feet) south of the south rail. Surface and underground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22.

Piney (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—On the most southerly projection of a high ridge about 2 miles east of Menisino, overlooking lowlands to east, south, and west; about one-fourth mile north of the Canadian National Railway, and 11.3 meters (37 feet) north of the center of the old ridge road. Surface and underground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22.

Fast (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—On the right-of-way of the Canadian National Railway at mileage 13.4 from South Junction, 2.6 miles west of Piney station, 188.5 meters (618 feet) west of the beginning of the first curve west of Piney station, and on the line of the tangent produced. Surface and underground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22.

McQuade (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—On the right-of-way of the Canadian National Railway in the Piney yards at mileage 10.94 from South Junction, 148.68 meters (487.7 feet) west of the center of the telegraph office at Piney station, and 3.396 meters (11.14 feet) south of the north rail. Surface and underground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22.

Slow (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—On the right-of-way of the Canadian National Railway at mileage 7.4 from South Junction and 149.5 meters (490 feet) west of the beginning of the curve at the end of the Guilbault-Slow tangent. Surface and under-

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ground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22.

Guilbault (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—North of the right-of-way of the Canadian National Railway at mileage 5.3 from South Junction, in line with the tangent of the south rail, 2,537 meters (8,323 feet) west of the beginning of the first curve west of South Junction, and 877 meters (2,877 feet) west of the northeast corner of sec. 14, T. 1, R. 12 E. Surface and underground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22.

South Junction (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—On the right-of-way of the Canadian National Railway at mileage 63.5 from Rainy River, between the tracks of the Winnipeg—Fort Frances line and the branch line to Emerson, 106.77 meters (350.3 feet) northwest of the point of junction switch, and 7.37 meters (24.2 feet) southwest of the northeast rail of the main line. Surface and underground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22.

Swamp (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—South of the right-of-way of the Canadian National Railway at mileage 62.2 from Rainy River, at the point of intersection of the tangents of the first curve southeast of South Junction, south of the rails, and 350 meters (1,148 feet) southeast of the beginning of the curve. Station mark is nail in wooden post.

Tod (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—South of the right-of-way of the Canadian National Railway at mileage 60.35 from Rainy River, at the point of intersection of the lines Tod–Soft, Tod–Swamp, on the second curve southeast of South Junction, and 150 meters (492 feet) from the beginning of the curve of the northeast rail. Station mark is a nail in a wooden post.

Soft (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—North of the right-of-way of the Canadian National Railway at mileage 59.8 from Rainy River, at the point of intersection of the tangents of the second curve northwest of Sprague station, and 250 meters (820 feet) northwest of the beginning of the curve of the south rail. Station mark is a nail in a wooden post.

Sprague (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—On the right-of-way of the Canadian National Railway at mileage 58.1 from Rainy River, ½ mile northwest of Sprague station, 126.05 meters (413.5 feet) northwest of milepost 58, 150 meters (492 feet) northwest of the beginning of the first curve northwest of Sprague station, and on the line of the north rail produced. Surface and underground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22.

Rita (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—On the right-of-way of the Canadian National Railway at mileage 54.6 from Rainy River, about 3 miles southeast of Sprague station, 960.1 meters (3,150 feet) northwest of milepost 54, and 9.907 meters (32.50 feet) northeast of the northeast rail. Surface and underground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22.

Middleboro (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—On the right-of-way of the Canadian National Railway at mileage 48.4 from Rainy River, just southeast of Middleboro station, and 9.45 meters (31.0 feet) southwest of the northeast rail. Surface and underground marks are Geodetic Survey of Canada bronze disks set in concrete monuments, notes 18 and 22.

Muskeg (G. S. of C.) (Provencher District, Manitoba, Canada, Geodetic Survey of Canada, 1924).—Northeast of the right-of-way of the Canadian National Railway, 1¼ miles from the point where the railway crosses the international boundary, at the point of intersection of the tangents of the first curve northwest of that point, and 450 meters (1,476 feet) northwest of the beginning of the curve. Station mark is a nail in a wooden post.

Warroad north base (I. B. C.) (Boundary Monument 909 (I. B. C.)) (Provencher District, Manitoba, Canada; Roseau County, Minn., International Boundary Commission, 1912; C. M. Durgin, 1923; 1934).—About 4.0 miles west of intersection of International Boundary and west shore of Lake of the Woods, 2.5 miles west and 6.5 miles north of Warroad, and 47.7 feet east of east rail

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of Canadian National Railway. To reach from Canadian National Railway depot in Warroad, go north 1.0 mile on east side of track, turn left and go 1.05 miles on main road, turn left across tracks and go 1.05 miles, turn right and go 4.25 miles to milepost 44 on telegraph pole and end of truck travel, and proceed north-northwest about 1.0 mile along railway to international boundary and station site on right. Marked by 5-foot cast-iron post set in concrete base, at foot of which is set a bronze disk-bearing inscription "U. S. & C. B. Survey, B.M.—Elevation 1072 feet above sea level." Top of post is frustrum of pyramid having cross to mark center. In 1917, post was straightened and additional concrete placed, making base 5 feet square and 2½ feet deep resting on clay bottom. In 1934 two reference marks and an azimuth mark were established. Reference marks are standard reference disks in concrete, note 11b. No. 1 is 39.4 feet west of west rail, 6.0 feet south of international boundary, and 97.14 feet from station in azimuth 86°32′. No. 2 is 42.5 feet east of east rail, about 100 feet north of international boundary, and 115.00 feet from station in azimuth 154°31′. Azimuth mark is standard reference disk in concrete, note 11a, 32.5 feet west of west rail of main tracks, 4.0 feet north of milepost 44, and about 1.0 mile from station in azimuth 338°11′33″.

Warroad south base (I. B. C.) (Roseau County, International Boundary Commission, 1912; C. M. Durgin, 1923; 1934).—About 1 mile north and 0.5 mile west of Warroad, in SW¼ sec. 20, T. 163 N., R. 36 W. of the fifth principal meridian, 48 feet east of east rail of Canadian National Railway tracks, 12 feet east of east right-of-way fence, and 26 feet west of center line of dirt county road. Surface mark is standard bronze disk of the International Boundary Commission inscribed "U. S. & C. B. S." and embedded in a mass of concrete 2 feet in diameter by 2.5 feet deep, projecting a little above the surface. Underground marks are a similar disk in concrete block about 2½ feet below surface and a cross in the top of another concrete block which is placed about 3 feet below surface. Original reference marks were crosses cut in tops of 8- by 8- by 18-inch concrete posts set flush with surface of ground, inside railway right-of-way fences, and one on each side of track. One was 26.622 meters (87.34 feet) west of station and other was 3.885 meters (12.75 feet) west of station. In 1934: The more distant of the original reference marks appeared to have been moved. Two additional reference marks and an azimuth mark were established (probably standard reference disks in concrete). No. 1 is in east right-of-way fence and 135.35 feet from station in azimuth 341°23′. No. 2 is 2 feet east of east right-of-way fence and 128.25 feet from station in azimuth 153°33′. Azimuth mark is 2 feet east of east right-of-way fence, 20 feet south of county road at point where it turns sharply to west across railway tracks, and 0.6 mile from station in azimuth 157°06′52″. Azimuth from station to Warroad, tank, is 339°17′15″; and to Warroad, fire lookout tower, 339°39′09″.

Thunder (I. B. C.) (Provencher District, Manitoba, Canada, International Boundary Commission, 1917; C. M. Durgin, 1923; 1934).—On west side of Lake of the Woods, about 1,300 meters (4,265 feet) northwest of Buffalo Point, about 1,100 meters (3,609 feet) north of international boundary and on sandy timbered ridge about 10 meters (33 feet) above lake level. To reach from Warroad, go by boat to Buffalo Point, follow trail northwest about one-fourth mile from point keeping to left of small cornfield, take left fork and follow to second fork, take right fork and go about 275 yards to station site. Marked by standard bronze disk of International Boundary Commission in concrete block 14 inches in diameter. In 1934 two reference marks were established (probably standard reference disks in concrete). No. 1 is 87.48 feet from station in azimuth 41°57′. No. 2 is 76.28 feet from station in azimuth 237°05′.

West Willow (I. B. C.) (Roseau County, International Boundary Commission, 1917).—On south shore of Lake of the Woods, about 1¼ miles west of mouth of Willow Creek, in eastern part of fractional sec. 33, T. 163 N., R. 35 W. of the fifth principal meridian, on a small sand bar at lake shore, and backed by swamp which extends one-half mile inland. Marked by standard bronze disk of International Boundary Commission in concrete block 2 feet square and 3 feet deep.

Stoney (I. B. C.) (Lake of the Woods County, International Boundary Commission, 1913, 1917).—On north side of Lake of the Woods, on Stoney Point,

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about 300 meters (984 feet) southeast of shore of Sand Point Bay which lies south of mouth of Stoney Creek in southwest corner sec. 35, T. 166 N., R. 35 W., of the fifth principal meridian, and on first rise of ground from muskeg as approached from south or west. Marked by standard bronze disk of International Boundary Commission in concrete block flush with ground.

Miller (I. B. C.) (Lake of the Woods County, International Boundary Commission, 1917; J. S. Bilby, 1921).—On south shore of Lake of the Woods, about 1¼ miles southeast of Long Point, about 200 meters (656 feet) inshore southwest of shallow indenture of shore line, in edge of burnt timber, and on bare rock about 10 meters (33 feet) above lake level. Marked by standard bronze disk of International Boundary Commission in rock. Reference marks are arrows cut in rock and pointing toward station. One is 7.71 meters (25.3 feet) from station in bearing S. 5° E. (magnetic) and other is 7.16 meters (23.5 feet) from station in bearing S. 85° E. (magnetic).

Garden (I. B. C.) (Lake of the Woods County, International Boundary Commission, 1913; 1917).—On Lake of the Woods, near middle of lake, on Garden Island, about one-third mile from northwest end of island, and nearer north shore than south shore. Best approach is from north shore, as south shore is swamp. Lines cut in 1913 through heavy timber show location. Marked by standard bronze disk of International Boundary Commission in concrete block.

Big (I. B. C.) (Kenora district, Ontario, Canada, International Boundary Commission, 1913; J. S. Bilby, 1921).—On Lake of the Woods, on southwest point of Big Island, and on bare rock about 3½ meters (11 feet) above lake level. Growth of large hardwood timber is back of rock. Marked by standard bronze disk of International Boundary Commission in solid rock.

Reference Monument 48 (I. B. C.) (Lake of the Woods County, International Boundary Commission, 1917).—On long narrow island in Lake of the Woods, about 12½ miles northwest of Baudette, Minn., and Rainy River, Ontario, 2 miles north of mouth of Rainy River, and on most eastern knoll of island, ½ mile southwest of the two lighthouses. Marked by standard wrought-iron reference post of International Boundary Commission, about 12 inches high and 2 inches square, in square concrete base.

Burton (I. B. C.) (Rainy River district, Ontario, Canada, International Boundary Commission, 1913, J. S. Bilby, 1921).—On Lake of the Woods, about 7½ miles northeast of mouth of Rainy River, and on bare rock on west end of Burton Island. Marked by standard bronze disk of International Boundary Commission in solid rock.

War (Roseau County, C. M. Durgin, 1923).—About one-half mile west of Warroad, at first curve of Canadian National Railway, west of Warroad, and at intersection of tangents to north rail from west and north rail from east. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 19.29 meters (63.3 feet) from station in azimuth 321°49′.

Road (Roseau County, C. M. Durgin, 1923).—About 1 mile east of Warroad, in field of H. Moorehead, at first curve east of Warroad on Canadian National Railway, and at intersection of north rail from west and south rail from east. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 104.28 meters (342.1 feet) from station in azimuth 307°48′38″.

Red (Roseau County, C. M. Durgin, 1923).—About 3 miles east of Warroad, at second curve on Canadian National Railway east of Warroad, on extension of south rail from west, 7.475 meters (24.52 feet) south of extension of north rail from east, and 95 meters (312 feet) west of milepost 35. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 28.35 meters (93.0 feet) from station in azimuth 122°11′.

Full (Roseau County, C. M. Durgin, 1923).—About 3 miles east of Swift, on highest point on line between Swift and Roosevelt, 9.826 meters (32.24 feet) north of north rail of Canadian National Railway, and 199.3 meters (654 feet) east of milepost 29. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 7.270 meters (23.85 feet) from station in azimuth 228°47′.

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Dout (Lake of the Woods County, C. M. Durgin, 1923).—About 1 mile east of Roosevelt, at first curve of Canadian National Railway east of Roosevelt, on extension of south rail from east and 6.514 meters (21.37 feet) south of extension of north rail from west. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is probably standard reference disk in concrete 52.46 meters (172.1 feet) from station in azimuth 263°20′.

Wet eccentric (Lake of the Woods County, C. M. Durgin, 1923).—About 2¼ miles east of Roosevelt, on top of bank of cut of Canadian National Railway. Position is not marked. Station *Wet* (see description and geographic position thereof) is visible from ground at station.

Wet (Lake of the Woods County, C. M. Durgin, 1923).—About 2¼ miles east of Roosevelt, on top of bank of cut on edge of right-of-way of Canadian National Railway, 12.91 meters (42.4 feet) south of south rail of track, and 240 meters (787 feet) east of milepost 23. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 47.3 meters (156 feet) from station in azimuth 189°50′. Station *Wet eccentric* (see description and geographic position thereof) is visible from ground at station.

May (Lake of the Woods County, C. M. Durgin, 1923).—About 1¾ miles west of Williams, on knoll 8.018 meters (27.31 feet) north of south rail of Canadian National Railway, and 3 meters (10 feet) east of private road crossing. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 22.800 meters (74.80 feet) from station in azimuth 37°57′.

Spur (Lake of the Woods County, C. M. Durgin, 1923).—About 2½ miles east of Williams and one-tenth mile west of Cedar Spur, 3 meters (10 feet) north of fence at west switch, and 7.641 meters (25.07 feet) south of south rail of Canadian National Railway. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 22.73 meters (74.6 feet) from station in azimuth 189°26′.

Hen eccentric (Lake of the Woods County, C. M. Durgin, 1923).—One mile west of Graceton. Position is not marked. Station *Hen* (see description and geographic position thereof) is visible from ground at station.

Hen (Lake of the Woods County, C. M. Durgin, 1923).—One mile west of Graceton, 8 meters (26 feet) east of road crossing where main highway comes close to Canadian National Railway track, 1.572 meters (5.16 feet) south of south rail, and between main track and passing track. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 17.82 meters (58.5 feet) from station in azimuth 24°40′. Station *Hen eccentric* (see description and geographic position thereof) is visible from ground at station.

Ton (Lake of the Woods County, C. M. Durgin, 1923).—About 3 miles east of Graceton, 8.040 meters (26.38 feet) north of south rail, and 5 meters (16 feet) west of point where main road crosses Canadian National Railway. Marked by standard station disk in concrete, note 1a. Reference mark is standard reference disk in concrete, note 11a, 26.02 meters (85.4 feet) from station in azimuth 344°21′.

Bon (Lake of the Woods County, C. M. Durgin, 1923).—About one-third mile west of Pitt, 150 meters (492 feet) east of west switch at Pitt, and 11.477 meters (37.65 feet) north of south rail of Canadian National Railway. Marked by standard station disk in concrete, note 1a. Reference mark is standard reference disk in concrete, note 11a, 27.20 meters (89.2 feet) from station in azimuth 35°49′.

Brush (Lake of the Woods County, C. M. Durgin, 1923).—About 1½ miles east of Pitt, about 5 miles west of Baudette, at first curve of Canadian National Railway west of Baudette, at intersection of center of track from both directions, and 17.91 meters (58.8 feet) south of south rail. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 14.99 meters (49.2 feet) from station in azimuth 119°16′.

Baudette (Lake of the Woods County, C. M. Durgin, 1923; 1925).—In northwest part of Baudette, on extension from west of north rail on curve of Canadian National Railway west of Baudette, about 15 meters (49 feet) south

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of nearest track which is spur that runs to Spooner, in middle of roadway leading to back entrance of Cross Dodds Lumber Co., and about 15 meters (49 feet) west of their back gate. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Surface mark was not recovered in 1925. Reference mark is standard reference disk in concrete, note 11a, 86.82 meters (284.8 feet) from station in azimuth 102°43′.

Toad (Rainy River District, Ontario, Canada, C. M. Durgin, 1923; 1925).—About 1 mile west of Rainy River, on first curve of Canadian National Railway east of the international bridge between Baudette and Rainy River, 40 meters (131 feet) east of first road crossing track east of bridge, 50 meters (164 feet) from nearest track, and on the extension of center line of main track to east. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 46.21 meters (151.6 feet) from station in azimuth 71°17′.

Gip (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—About 1 mile east of Rainy River, 977 meters (3,205 feet) west of milepost 141 of Canadian National Railway, and 1.924 meters (6.31 feet) south of south rail. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 11.705 meters (38.40 feet) from station in azimuth 2°38′.

Fritz (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—About 2 miles east of Rainy River, 976 meters (3,202 feet) west of milepost 140 of Canadian National Railway, and 2.620 meters (8.60 feet) south of south rail. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 12.32 meters (40.4 feet) from station in azimuth 3°11′.

Ray (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—Near Sleeman, 155 meters (509 feet) east of milepost 138 of Canadian National Railway, and 10.890 meters (35.73 feet) north of south rail. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 38.91 meters (127.7 feet) from station in azimuth 50°51′.

Henri (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—About 2½ miles west of Pinewood, at curve of Canadian National Railway, 552 meters (1,811 feet) west of milepost 133, on extension of south rail from west, and 3.212 meters (10.54 feet) south of extension of north rail from east. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 11.385 meters (37.35 feet) from station in azimuth 293°15′.

Reddy (Rainy River District, Ontario, Canada, C. M. Durgin, 1923; 1925).—About 1½ miles west of Pinewood, 1,071 meters (3,514 feet) east of milepost 133 of Canadian National Railway, and 7.353 meters (24.12 feet) south of south rail. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 16.38 meters (53.7 feet) from station in azimuth 185°30′.

Myrtle (Rainy River District, Ontario, Canada, C. M. Durgin, 1923; 1925).—About 1¾ miles east of Pinewood, 262 meters (860 feet) west of milepost 129 of Canadian National Railway, and 3.884 meters (12.74 feet) south of south rail. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 10.83 meters (35.5 feet) from station in azimuth 345°01′.

Delf (Rainy River District, Ontario, Canada, C. M. Durgin, 1923; 1925).—About 1¼ miles west of Stratton, 878 meters (2,881 feet) west of milepost 125 of Canadian National Railway, and 3.752 meters (12.31 feet) north of south rail. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. In 1925, surface mark appeared to have been moved north 0.086 meter (0.28 foot) at right angles to railway track. Reference mark is standard reference disk in concrete, note 11a, 17.55 meters (57.6 feet) from station in azimuth 10°44′.

Pipp (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—About 4¾ miles west of Barwick, between main track and spur track of Canadian National Railway, 477 meters (1,565 feet) west of milepost 120, and 1.525 meters (5.00 feet) south of south rail of main track. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Ref-

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erence mark is standard reference disk in concrete, note 11a, 13.00 meters (42.7 feet) from station in azimuth 28°45′.

Grace (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—About 1½ miles west of Barwick, 22 meters (72 feet) west of milepost 117 of Canadian National Railway, and 3.21 meters (10.5 feet) north of south rail. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 11.865 meters (38.93 feet) from station in azimuth 196°25′.

Zip (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—About 1 mile east of Barwick, at curve of Canadian National Railway, 800 meters (2,625 feet) west of milepost 114, at intersection of south rail from east and south rail from west. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 9.98 meters (32.7 feet) from station in azimuth 53°57′.

Rip (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—About 4½ miles west of Emo, at curve on Canadian National Railway, 846 meters (2,776 feet) west of milepost 113, and at intersection of south rail from east with south rail from west. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 22.50 meters (73.8 feet) from station in azimuth 192°18′.

Pat (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—About 3½ miles west of Emo, 637 meters (2,090 feet) west of milepost 112 of Canadian National Railway, 87 meters (285 feet) east of road crossing at Tobas, and 1.456 meters (4.77 feet) south of extension of south rail from east. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 90.70 meters (297.6 feet) from station in azimuth 83°13′.

Rub (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—About 2¼ miles west of Emo, 462 meters (1,516 feet) west of milepost 111 of Canadian National Railway, and 9.493 meters (31.14 feet) north of south rail. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 22.83 meters (74.9 feet) from station in azimuth 28°55′.

Jesse (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—About 1¾ miles west of Emo, at curve of Canadian National Railway, 431 meters (1,414 feet) east of milepost 111, 35 meters (115 feet) west of bridge no. 110.72, on extension of north rail from east, and 7.313 meters (23.99 feet) south of extension of south rail from west. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 54.36 meters (178.3 feet) from station in azimuth 250°31′.

Walt (Rainy River District, Ontario, Canada, C. M. Durgin, 1923; 1925).—About 1 mile west of Emo, 79 meters (259 feet) west of milepost 110 of Canadian National Railway, and 1.605 meters (5.27 feet) north of north rail. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 14.64 meters (48.0 feet) from station in azimuth 214°29′.

Pine (Rainy River District, Ontario, Canada, C. M. Durgin, 1923; 1925).—About 1 mile east of Emo, at second curve east of Emo on Canadian National Railway, and 1.8 meters (6 feet) north of intersection of south rail from east and north rail from west. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 14.10 meters (46.3 feet) from station in azimuth 52°52′.

LaBelle (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—About 5⅓ miles east of Emo, 544 meters (1,785 feet) east of milepost 105 of Canadian National Railway, 100 meters (328 feet) east of private road crossing in rear of LaBelle farm, and 7.448 meters (24.43 feet) north of south rail. Surface mark is standard station disk in concrete, note 1a. Reference mark is standard reference disk in concrete, note 11a, 21.45 meters (70.4 feet) from station in azimuth 358°31′. Azimuth from station to reference mark of station *Stone* is 274°36′02″.

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Stone (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—About 6⅓ miles east of Emo, 546 meters (1,791 feet) east of milepost 104 of Canadian National Railway, on hill near Bishop's farm, and 9.12 meters (29.9 feet) north of south rail. Marked by standard station disk in rock, note 2. Reference mark is standard reference disk in rock, note 12a, 22.26 meters (73.0 feet) from station in azimuth 321°25′.

States (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—About 550 meters (1,804 feet) east of Devlin railway station, on curve of Canadian National Railway, and at intersection of tangents to south rail. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 11.77 meters (38.6 feet) from station in azimuth 351°51.

Rob (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—About 1¼ miles west of Crozier, 500 meters (1,640 feet) west of milepost 96 of Canadian National Railway, and 9.526 meters (31.25 feet) north of south rail. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 23.82 meters (78.1 feet) from station in azimuth 8°08′.

Pig (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—About 200 meters (656 feet) west of Crozier railway station and 2.22 meters (7.3 feet) south of south rail at highest point in track of Canadian National Railway. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 23.9 meters (78 feet) from station in azimuth 243°52′.

Fort Frances west base eccentric (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—Near Crozier, 8.06 meters (26.4 feet) north of south rail of Canadian National Railway, 281 meters (922 feet) west of milepost 94, and 354 meters (1,161 feet) west of main road crossing. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 23.9 meters (78 feet) from station in azimuth 341°04′. Station "Fort Frances west base", marked by standard bronze disk of International Boundary Commission in concrete base 16 inches square and 2 feet deep at surface and standard bench-mark disk in concrete base 3 feet below ground, is 54 meters (177 feet) south of south rail and 61.97 meters (203.3 feet) from station in azimuth 0°09′.

Fort (Rainy River District, Ontario, Canada, C. M. Durgin, 1923; 1925).—In Fort Frances, on south side of Fourth Street, and 38.25 meters (125.5 feet) from east side of Victoria Street. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 2 feet below ground. Reference mark is standard reference disk in concrete, note 11a, on east side of Christy Street, 5.58 meters (18.3 feet) from south fence line, 7.11 meters (23.3 feet) from telephone pole, and 76.41 meters (250.7 feet) from station in azimuth 275°37′.

Zero (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—On first curve of Canadian National Railway east of Fort Frances, 8.68 meters (28.5 feet) south of south rail, and 10 meters (33 feet) east of first road crossing west of an Indian's house. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference mark is standard reference disk in concrete, note 11a, 24.38 meters (80.0 feet) from station in azimuth 123°54′.

Lake (Koochiching County, C. M. Durgin, 1923; 1925).—On Rainy Lake, about 5 miles east of Ranier, on most northern point of Signal Island which is most northern of Fransen Islands, about 11 meters (36 feet) from shore line, and about 3 meters (10 feet) above lake level. Marked by standard station disk in rock, note 2. Reference mark is standard reference disk in rock, note 12a, 10.00 meters (32.8 feet) from station in azimuth 320°46′. "Reference Monument 270 (I. B. C.)", marked by 8-inch bronze post, is 0.2 meter (1 foot) from station in azimuth 242°; and station "Rainy Lake 9 (I. B. C.)", marked by standard bronze disk of International Boundary Commission in rock, is 0.21 meter (0.7 foot) from station in azimuth 282°.

Rainy Lake 14 (I. B. C.) (Raney) (Rainy River District, Ontario, Canada, International Boundary Commission, 1913; C. M. Durgin, 1923; 1925).—About 8 miles east of Ranier, on Rainy Lake, on south end of small island 1 mile due south of Dunsmoore Island, on first island north of narrows between Red Sucker Island and Red Pine Island, on narrow rocky point about 1.5

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meters (5 feet) above lake level, 8 meters (26 feet) from end of point, and 2.5 meters (8 feet) from shore on either side. Marked by standard bronze disk of International Boundary Commission in ledge rock. Reference mark is standard reference disk in rock, note 12a, 10.00 meters (32.8 feet) from station in azimuth 219°42′.

Rainy Lake 37 (I. B. C.) (Water) (Koochiching County, International Boundary Commission, 1913; C. M. Durgin, 1923; 1925).—About 8½ miles east of Ranier, on Rainy Lake south of American Narrows, about 450 meters (1,476 feet) southeast of Red Sucker Island and 300 meters (984 feet) from Red Pine Island, and in center of bare diamond-shaped rock which is about 15 meters (49 feet) long and 9 meters (30 feet) wide and whose top is 1.5 meters (5 feet) above normal lake level. About 30 meters (98 feet) east is another small rock whose shore line, at low water, will join that of rock on which station is located. Marked by standard bronze disk of International Boundary Commission in ledge rock. Reference mark is standard reference disk in rock, note 12a, 3.701 meters (12.14 feet) from station in azimuth 73°40′.

Roll (Rainy River District, Ontario, Canada, C. M. Durgin, 1923; 1925).—On Rainy Lake, on southeast island of group of five small islands just south of Sand Point, midway between east and west ends of Sand Point Island, and about 40 meters (131 feet) west of east end of island. Island is mass of vertical stratified rock. Marked by standard station disk in rock, note 2. Reference mark is standard reference disk in rock, note 12a, 11.32 meters (37.1 feet) from station in azimuth 256°10′.

Sea (Rainy River District, Ontario, Canada, C. M. Durgin, 1923; 1925).—On Rainy Lake about 20 miles east of Ranier, Minn., on south end of large island lying just west of Mackenzie Island, on north side of west entrance to Brule Narrows, about 75 meters (246 feet) from shore on west side, and 50 meters (164 feet) from shore on south side. Marked by standard station disk in rock, note 2. Reference mark is standard reference disk in rock, note 12a, 5.35 meters (17.6 feet) from station in azimuth 176°13′.

Breaul (St. Louis County, C. M. Durgin, 1923; 1925).—On Rainy Lake, one-quarter mile east of Smithville, on long point just south of east entrance to Brule Narrows (variously called "Soldier Point" and "Point Observe"), and about 75 meters (246 feet) west of east end of point. Marked by standard station disk in rock, note 2. Reference mark is standard reference disk in rock, note 12a, 4.695 meters (15.40 feet) from station in azimuth 186°17′. Station "Rainy Lake 60 (I. B. C.)", marked by standard bronze disk of International Boundary Commission, and "Reference Monument 291 (I. B. C.)", marked by standard 8-inch bronze post of International Boundary Commission, are side by side on east end of point, and 99 meters (325 feet) from station in azimuth 272°11′.

Manitou (Rainy River District, Ontario, Canada, C. M. Durgin, 1923; 1925).—On Rainy Lake, about 26 miles east of Ranier, Minn., about 5 miles east of Brule Narrows, and on highest point of large rock 100 meters (328 feet) south of Anchor Islands. Marked by standard station disk in rock, note 2. "Reference Monument 294 (I. B. C.)", marked by standard 8-inch bronze post of International Boundary Commission in solid rock, is 11.89 meters (39.0 feet) from station in azimuth 16°43′.

Boundary (I. B. C.) (Late) (Rainy River District, Ontario, Canada, International Boundary Commission, 1914; C. M. Durgin, 1923; 1925).—On Rainy Lake, 10 miles east of Brule Narrows, 5 miles northwest of Kettle Falls, 31 miles east of Ranier, Minn., on highest point of second island south of first island west of Black Point, which is also northwest one of group of 5 small islands, and 3 meters (10 feet) above lake level. Marked by standard bronze disk of International Boundary Commission in ledge rock. Four eye bolts, used for guy wires, are in ledge as follows: 3.25 meters (10.7 feet) south, 3.80 meters (12.5 feet) west, 4.55 meters (14.9 feet) north, and 3.82 meters (12.5 feet) east of station. Reference mark is standard reference disk in rock, note 12a, 3.145 meters (10.32 feet) from station in azimuth 312°10′.

Joy (Rainy River District, Ontario, Canada, C. M. Durgin, 1923; 1925).—On Rainy Lake, about 34 miles east of Ranier, Minn., and on southernmost point of Breezy Island which is about 1½ miles north of mouth of Kettle River. Marked by standard station disk in rock, note 2. Reference mark is standard

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reference disk in rock, note 12a, 6.416 meters (21.05 feet) from station in azimuth 210°06′.

Dog (Rainy River District, Ontario, Canada, C. M. Durgin, 1923; 1925).—On Oak Point Island at mouth of Kettle River at head of Rainy Lake, about 34 miles east of Ranier, Minn., about 750 meters (2,461 feet) south of Surveyor's Island and mouth of river, on highest point of hill, about 120 meters (394 feet) back from shore, and nearly due east of first narrow place in river above its mouth. Marked by standard station disk in rock, note 2. Reference mark is standard reference disk in rock, note 12a, 6.30 meters (20.7 feet) from station in azimuth 147°21′. Station "Rainy Lake 90 (I. B. C.)", marked by standard bronze disk of International Boundary Commission in ledge rock, is 16.30 meters (53.5 feet) from station in azimuth 144°29′.

Bell (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—At upper end of Rainy Lake, 36 miles east of Ranier, Minn., about 700 meters (2,297 feet) east of Kettle Falls, Minn., and on eastern point of first island east of Kettle Falls between Canadian Channel and Kettle River. Marked by standard station disk in rock, note 2. Reference mark is standard reference disk in rock, note 12a, in azimuth 334°57′ from station.

Knox (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—On Rainy Lake, 36 miles east of Ranier, Minn., on northeastern part of flat point about 600 meters (1,968 feet) due east of Canadian dam at Kettle Falls, Minn., and ⅓ mile east of Oliver Knox's house. Marked by standard station disk in rock, note 2. Reference mark is standard reference disk in rock, note 12a, 33.71 meters (110.6 feet) from station in azimuth 70°06′.

Nix (Rainy River District, Ontario, Canada, C. M. Durgin, 1923).—Between Rainy Lake and Namakan Lake, 37 miles east of Ranier, Minn., and 9.10 meters (29.9 feet) west of north end of dam in Canadian Channel at Kettle Falls, Minn. Marked by standard station disk in rock, note 2. Reference mark is standard reference disk in rock, note 12a, 4.595 meters (15.08 feet) from station in azimuth 88°29′.

Bat (St. Louis County, C. M. Durgin, 1923; 1925).—One mile west of Kettle Falls, on north shore of Namakan Lake, on western side of and at entrance to Squirrel Narrows, on highest part of point which runs out from west, and about 200 meters (656 feet) north of point where lake straightens for straight stretch to Mica Island. Marked by standard station disk in rock, note 2. Reference mark is standard reference disk in rock, note 12a, 7.25 meters (23.8 feet) from station in azimuth 1°21′.

Doran (Rainy River District, Ontario, Canada, C. M. Durgin, 1923; 1925).—At foot of Namakan Lake, about 1¼ miles west of Kettle Falls, Minn., and on northeast corner of point between two bays on south side of Squirrel Narrows where lake straightens for straight stretch to Mica Island. Marked by standard station disk in rock, note 2. "Reference Monument 333 (I. B. C.)", marked by standard 8-inch manganese-bronze post of International Boundary Commission, is 13.46 meters (44.2 feet) from station in azimuth 267°36′.

Bees Kees (St. Louis County, C. M. Durgin, 1923; 1925).—On Namakan Lake, about 3 miles west of Kettle Falls, and on southern high point of small rocky island just southwest of Mica Island. Marked by standard station disk in rock, note 2. "Reference Monument 338 (I. B. C.)", standard 8-inch manganese-bronze post of International Boundary Commission, is 36.6 meters (120 feet) from station in azimuth 186°39′.

Reference Monument 340 (I. B. C.) (Pluss) (St. Louis County, International Boundary Commission, 1915; C. M. Durgin, 1923; 1925).—On most eastern point of shore of Namakan Lake, on west side of Squaw Narrows, and 4 miles west of Kettle Falls. Marked by standard 8-inch manganese-bronze post of International Boundary Commission in solid rock. Reference mark is standard reference disk in rock, note 12a, 7.17 meters (23.5 feet) from station in azimuth 269°16′.

Harry (St. Louis County, C. M. Durgin, 1923; 1925).—On Namakan Lake, 5¾ miles southwest of Kettle Falls, 1½ miles south of Squaw Narrows, on highest point of Lone Tree Island, and about 300 meters (984 feet) northeast of Bivo Island. Marked by standard station disk in rock, note 2. Reference mark is standard reference disk in rock, note 12a, 19.76 meters (64.8 feet) from station in azimuth 279°41′.

Rye (Rainy River District, Ontario, Canada, C. M. Durgin, 1923; 1925).—On Namakan Lake, 6 miles southwest of Kettle Falls, Minn., 1¾ miles south

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of Squaw Narrows, on highest point of small rocky island just northwest of Erickson (or Dunsmoore) Island. Marked by standard station disk in rock, note 2. Reference mark is standard reference disk in rock, note 12a, 6.27 meters (20.6 feet) from station in azimuth 191°35′.

Deer (Rainy River District, Ontario, Canada, C. M. Durgin, 1923; 1925).—On Namakan Lake, about 9 miles by water south of Kettle Falls, Minn., on southwestern point of Randolph Island, and 1 mile north of Randolph fishery. Marked by standard disk in rock, note 2. Reference mark is standard reference disk in rock, note 12a, 18.53 meters (60.8 feet) from station in azimuth 34°17′. "Reference Monument 351 (I. B. C.)", marked by standard 8-inch manganese-bronze post of International Boundary Commission, is 83.9 meters (275 feet) from station in azimuth 290°05′.

Randolph (St. Louis County, C. M. Durgin, 1923; 1924).—On south side of Namakan Lake, about 9 miles by international boundary line southeast of Kettle Falls, on eastern end of high rocky ridge, about ½ mile south of Randolph fishery, and on highest point of bare rock at eastern end of ridge. Top of ridge has scattering growth of trees about 35 feet in height. Other parts of ridge and slopes are heavily timbered. To reach via Namakan Lake go by motor boat to Randolph's fish camp, thence go westward about ½ mile to first small bay and small log cabin on side of hill about 60 meters (197 feet) from shore, proceed to cabin, then go south about 200 meters (656 feet) on trail up hill, bear southeast to top of ridge and go east along north rim of ridge to station site. Marked by standard station disk in rock, note 2. Reference mark is standard reference disk in rock, note 12a, 17.93 meters (58.8 feet) from station in azimuth 105°06′.

Namakan west base (Rainy River District, Ontario, Canada, C. M. Durgin, 1923; 1924).—On Namakan Lake, on extreme southern end of Blackstone Island which is connected with mainland at low water. Marked by standard station disk in rock, note 2. "Reference Monument 353 (I.B.C.)." marked by standard 8-inch manganese-bronze post of International Boundary Commission, is 14.49 meters (47.5 feet) from station in azimuth 209°44′. In 1925, the water level of Namakan Lake was high, station was probably under surface of water and was not found.

Grassy (St. Louis County, C. M. Durgin, 1923; 1925).—On Namakan Lake, on longest island just off entrance to Grassy Portage, 100 meters (328 feet) northwest of "Reference Monument 356 (I.B.C.)" which is on highest point of island, and about 25 feet above and 20 meters (66 feet) back from water on north side. Marked by standard station disk in rock, note 2. Reference mark is standard reference disk in rock, note 12a, 9.2 meters (30 feet) from station in azimuth 214°42′.

Portage (St. Louis County, W. Mussetter, 1924).—About 1½ miles south of east of Namakan Lake end of Grassy Portage, ¾ mile northeast of head of Grassy Bay of Sand Point Lake, and on summit of prominent, high, rocky, burned-over hill. To reach from Namakan Lake go via Grassy Portage to swamp on Sand Point side, follow along east side of swamp about 300 yards to triangle-blazed pine tree, and follow blazed trail east 1 mile to station site. To reach from Sand Point Lake go via Grassy Bay which joins Sand Point opposite Joe La France's to point near last narrows before reaching Grassy Portage, and follow dimly marked trail ½ mile to station site. Marked by standard station disk in solid rock. Reference mark is standard reference disk in solid rock 20.93 meters (68.7 feet) from station in azimuth 201°35′.

Namakan east base (St. Lous County, C. M. Durgin, 1923; 1924).—On west end of small island in eastern part of Namakan Lake, a little north of Gull Island, about 1 mile south of mainland, about 2 miles almost due west of mouth of Namakan River, and at west entrance of passage between two large islands through which international boundary passes just before turning toward Namakan Narrows. Island has sheer drop of about 10 meters (33 feet) on west side and beach on east side. Marked by standard station disk in rock, note 2. "Reference Monument 360 (I.B.C.)", marked by standard 8-inch manganese-bronze post of International Boundary Commission in rock, is 13.90 meters (45.6 feet) from station in azimuth 42°26′.

Tower (Rainy River District, Ontario, Canada, C. M. Durgin, 1923; 1924).—On very high, rocky, timbered point about two-thirds mile north of north shore of Namakan Lake, about 1 mile from east end of lake, and about 2 miles airline nearly due north of Namakan Narrows. There are several islands in lake at

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this point and small bay to north. Station bears a little west of north from head of bay. Marked by standard station disk in rock, note 2. Reference mark is standard reference disk in rock, note 12a, 9.09 meters (29.8 feet) from station in azimuth 207°36′.

Fish (I. B. C.) (Rainy River District, Ontario, Canada, International Boundary Commission, 1915; W. Mussetter, 1924).—About 4 miles north of east of head of Clear Water Bay, 3½ miles northwest of Lac La Croix, 1 mile northwest of Thompson Lake, on divide between Sand Point Lake and Lac La Croix, and on steep bluff overlooking north shore of small lake. To reach from Sand Point Lake, go via Joe La France's Narrows into Clear Water Bay, proceed to head of Clear Water Bay, take ¼ mile portage into Whitefish Lake, proceed 1½ miles to eastern extremity of lake at mouth of creek, follow portage trail which leads up left branch of creek 1½ miles to Mahnomen (or Mud) Lake, follow blazed trail which leads from outlet around northwest shore of lake 1 mile, go up small creek ½ mile to small lake, and continue around east end of lake and up hill to station site. Marked by standard bronze disk of International Boundary Commission in outcropping boulder. Reference mark is Geodetic Survey of Canada bronze disk in outcropping ledge 11.315 meters (37.12 feet) from station in azimuth 319°58′. "Reference Monument 250 (I.B.C.)", marked by standard 8-inch manganese-bronze post of International Boundary Commission, is 0.08 meter (0.26 foot) from station in azimuth 252°53′.

Vermilion (I. B. C.) (Rainy River District, Ontario, Canada, International Boundary Commission, 1915; W. Mussetter, 1924).—About 1½ miles east of north end of Little Vermilion Lake, 1 mile northwest of Trout Lake, and on rocky timbered hill which is highest in vicinity. To reach from Little Vermilion Lake, proceed to narrow bay about 2 miles south of Little Vermilion Narrows on east side of lake, go north ¾ mile up bay to ¼-mile portage leading east to Trout Lake, follow up northwest shore of lake to blazed trail leaving lake from shallow bay just south of high rock bluffs and about 1 mile from portage, and follow blazed trail north about 1 mile to station site. Marked by standard bronze disk of International Boundary Commission in solid rock. Reference mark is Geodetic Survey of Canada bronze disk in solid rock 5.64 meters (18.5 feet) from station in azimuth 8°40′.

Center II (I. B. C.) (Rainy River District, Ontario, Canada, International Boundary Commission, 1915; W. Mussetter 1924).—On north side of Lac La Croix, about 1 mile east of Wilkins Bay, on high and prominent hill covered with dense growth of jack pine, and ¾ mile northwest of "Reference Monument 513 (I.B.C.)" on prominent point opposite Snow Bay. To reach from Lac La Croix, land in small bay just north of point opposite Snow Bay which is about 5 miles due north of Loon Lake-Lac La Croix portage, and follow blazed trail from head of bay about 1 mile to station site. Marked by standard bronze disk of International Boundary Commission in solid rock. Reference mark is Geodetic Survey of Canada bronze disk in solid rock 12.69 meters (41.6 feet) from station in azimuth 350°49′.

Loon (St. Louis County, W. Mussetter, 1924).—About 2 miles northeast of head of extreme northeast bay of Loon Lake, ½ mile southeast of Steep Lake, ¾ mile west of Eugene Lake, and on high hill which is thickly timbered with small jack pine. To reach from Loon Lake, go to bay leading northwest from extreme eastern end of lake, go through narrow opening at head of bay which leads into bay or lake extending 1 mile north, follow blazed trail which leads northeast from north end of this bay just west of cedar swamp, cross Slim Lake on fallen trees, and continue east to station site about 3 miles from landing in bay. To reach from Lac La Croix, proceed to North Lake, continue to South Lake, make portage to Steep Lake, proceed to southeast end of lake, and follow blazed trail to station site. Marked by standard station disk in solid rock. Reference mark is standard reference disk in solid rock, 5.515 meters (18.09 feet) from station in azimuth 265°26′.

Burnt (I. B. C.) (Rainy River District, Ontario, Canada, International Boundary Commission, 1915; W. Mussetter, 1924).—On north side of Lac La Croix, 5 miles west of outlet into Namakan River, 5 miles northwest of Andrew Williams' trading post, about three-fourths mile northwest of northwest corner of bay of Lac La Croix, just north of solitary dome-shaped island in middle of lake, and on summit of very conspicuous, high, burned-over ridge which is thickly covered with white-pine snags. Ridge extends several miles along

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northwest shore of Lac La Croix and is between it and Thompson Lake. To reach from Lac La Croix, go to head of bay in north shore which lies just west of narrows leading eastward through numerous islands to main body of lake, continue north about one-half mile, and head west to station site. Marked by standard bronze disk of International Boundary Commission in boulder. Reference mark is standard International Boundary Commission reference disk in drill hole in sandstone outcrop 9.155 meters (30.04 feet) from station in azimuth 334°31′.

Granite (St. Louis County, W. Mussetter, 1924).—On south side of Lac La Croix, about 1½ miles south of shallow bay at southwest corner of main body of lake, due south of Twentyseven Island which is low heavily timbered island about 1½ miles east of Andrew Williams' trading post, and on high timbered ridge. Blazed trail leads to station site from head of shallow bay. Marked by standard station disk in solid rock. Reference mark is standard reference disk in solid rock 13.04 meters (42.8 feet) from station in azimuth 230°49′.

Timber (St. Louis County, W. Mussetter, 1924).—About 5 miles south of Coleman Island, 5 miles west of Bottle Portage, on very high hill covered with pines about 100 feet tall, and about 1¼ miles west of south of head of long narrow arm of Lac La Croix which extends south from western part of Coleman Island. To reach from north, take passage west of Coleman Island, continue due south about 4 miles to head of channel; or to reach from eastern end of Lac La Croix, proceed via channel south of Coleman Island to deep bay, and go south as above. Follow trail which leads south on west side of swamp and is cut and blazed through timber to station site. Marked by standard station disk in top of 10- by 20-foot rock which extends about 6 feet above general surface of ground. Reference mark is standard reference disk in solid rock, 6 feet lower in elevation and 18.20 meters (59.7 feet) from station in azimuth 247°06′.

Cedar (Rainy River District, Ontario, Canada, W. Mussetter, 1924).—On small low island at east end of main open body of Lac La Croix, near most westerly extremity of island, and about 50 feet from shore. Island lies 1¼ miles east of very small island lying in open part of lake and made conspicuous by its lone bushy topped pine tree. Island on which station is located is covered with tall Norway pine, white pine, and cedar trees. Marked by Geodetic Survey of Canada bronze disk in rock ledge about 1 foot below ground level. Hole is walled up with rock to surface. Reference mark is Geodetic Survey of Canada bronze disk in solid rock ledge, near lake shore, and 24.13 meters (79.2 feet) from station in azimuth 58°09′.

Shortiss (I. B. C.) (Rainy River District, Ontario, Canada, International Boundary Commission, 1915; W. Mussetter, 1924).—About 3 miles northeast of Bottle Portage, 1 mile northeast of Bass Lake, and on highest point of Shortiss Island which is in southeastern part of Lac La Croix. Island is made conspicuous by grove of tall Norway pines on summit of hill. To reach from Bottle Portage, follow east shore of Lac La Croix north 1 mile to northeast corner of head of bay, make short portage to Bass Lake and follow blazed trail which leads from northeasterly extremity of Bass Lake (just east of high rock bluff) 1½ miles to station site. Marked by standard bronze disk of International Boundary Commission in small boulder flush with surface of ground. Reference mark is Geodetic Survey of Canada bronze disk in small boulder, projecting 6 inches above ground, 24.29 meters (79.7 feet) from station in azimuth 22°16′.

Falls (I. B. C.) (St. Louis County, International Boundary Commission, 1915; W. Mussetter, 1924).—About 1½ miles east of south of mouth of Beartrap River which discharges into Iron Lake, about one-half mile southeast of head of slough leading south from Beartrap River at point about one-half mile above its mouth, and on low hill densely covered with small jack pine and spruce. To reach from Iron Lake, go to mouth of Beartrap River, continue up stream through rocky narrows to wild rice slough at which point stream divides, follow southerly branch about one-half mile to its head, and follow blazed trail to station site. Sloughs are nearly dry at low water. Marked by standard bronze disk of International Boundary Commission in solid rock. Reference mark is standard bronze disk of International Boundary Commission in solid rock 12.265 meters (40.24 feet) from station in azimuth 233°43′.

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Lister (I. B. C.) (St. Louis County, International Boundary Commission, 1915; W. Mussetter, 1924).—About 5 miles south of Curtain Falls, 1½ miles southwest of head of deep bay on south shore of Crooked Lake, and on low flat-topped hill which is covered with dense growth of small jack pine. To reach from Curtain Falls, cross western end of Crooked Lake in almost due south direction to first and largest bay on south side of lake about 4 miles from Curtain Falls, and follow blazed trail which leads from head of bay about 2 miles to station site. Originally marked by drill hole in solid rock surrounded by a triangle cut in rock, and remarked in 1924 by standard station disk in same hole. Reference mark, established in 1924, is standard reference disk in solid rock 22.84 meters (74.9 feet) from station in azimuth 180°49′.

Ark (Rainy River District, Ontario, Canada; W. Mussetter, 1924).—About 2 miles northwest of most northern extremity of Gardner Bay of Crooked Lake, one-half mile west of Elk Lake, on divide between Elk and Trout Lakes, and on high, prominent, burned-over hill made conspicuous by dense stand of large white-pine snags. To reach from Crooked Lake, go via deep bay extending north just west of rapids to entrance into Gardner Bay, proceed to southwest corner of northwest bay of Gardner Bay, make portage into small beaver-dam lake, cross lake and make portage to another beaver dam, continue up narrow channel through floating bog to short portage into Elk Lake, proceed to head of first little bay on west side of Elk Lake about three-fourths mile from portage, and follow cut-and-blazed trail to station site. Marked by Geodetic Survey of Canada bronze disk in solid rock. Reference mark is standard reference disk in solid rock 15.03 meters (49.3 feet) from station in azimuth 21°59′.

Hargo (I. B. C.) (Lake County, International Boundary Commission, 1913; W. Mussetter, 1924).—On south side of Crooked Lake, on west side of most easterly, large southern arm of large irregular portion of lake, 1⅞ miles southwest across lake from south end of narrow boundary channel with rapids in it which passes around north and west sides of large island and connects upper and lower levels of lake, about 400 meters (1,312 feet) west of lake shore, and about 75 meters (246 feet) above level of lake on north end of summit of steep rounded hill covered with dense growth of jack pine. To reach from Crooked Lake, proceed about 2 miles up large deep bay of lake which extends south at point just west of rapids to shallow bay lying behind low island on west shore, continue to head of bay, and follow cut-and-blazed trail one-half mile to station site. Originally marked by drill hole in rock surrounded by triangle cut in rock, and re-marked in 1924 by standard station disk in same hole. Reference mark, established in 1924, is standard reference disk in solid rock 16.60 meters (54.5 feet) from station in azimuth 231°59′.

Glint (I. B. C.) (Rainy River district, Ontario, Canada, International Boundary Commission, 1914; W. Mussetter, 1924).—About one-fourth mile east of Robinson Lake, on summit of high, steep, rocky hill. To reach from Crooked Lake, go to head of Moose Bay, which is on east side and opens into narrow part of lake about 2¼ miles north of Lower Basswood Falls, proceed up creek at head of Moose Bay, make portage around rapids and continue about 1 mile to Robinson Lake, proceed to east side of lake at point about 2½ miles north of outlet and directly across narrow channel from first island from south end of lake, and follow blazed trail from the shore to station site on southwest end of hill. Marked by Geodetic Survey of Canada bronze disk in solid rock and surrounded by triangle cut in rock. Reference mark is standard reference disk in solid rock 12.65 meters (41.5 feet) from station in azimuth 268°21′.

Beaver (Rainy River District, Ontario, Canada, W. Mussetter, 1924).—About 1 mile north of head of North Bay of Basswood Lake, one-half mile northwest of an inland lake, and on summit of rocky burned-over ridge. To reach from North Bay, make one-half mile portage to inland lake and point where cut-and-blazed trail leads from bay in north shore of lake just west of narrows at west end of main body of water, and follow trail to station site. To reach station site with outfit, go along northwest shore from arm of Basswood Lake east of North Bay to narrows opening into lake, cross lake to portage at mouth of small creek, make short portage to beaver dam, continue up slough to another short portage leading into above-mentioned inland lake, follow left shore of lake through first narrows to north shore of bay, and follow trail to station site. Marked by Geodetic Survey of Canada bronze disk in solid rock. Reference marks are arrows cut in solid rock. No. 1 is 8.17 meters (26.8 feet) from

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station in azimuth 248°21′. No. 2 is 8.69 meters (28.5 feet) from station in azimuth 338°43′.

Rock (Lake County, W. Mussetter, 1924; 1934).—South of Basswood Lake, about 2½ miles southeast of Upper Basswood Falls, 1¼ miles east of entrance to Jackfish Bay and Pipestone Falls branch of Basswood Lake, about one-half mile back from shore line to west, and on highest point and near southwest end of highest hill on United States point. Point may be identified from the west by steep smooth rock bluff on that side and thin growth of tall Norway pines on summit. To reach from Basswood Lake, go to small bay on west shore of United States point about midway of its length, and follow cut-and-blazed trail which leads from small sand beach to station site. Another trail to station site leads from lake at point just south of rock bluff lying behind island east of entrance to Pipestone Bay. Marked by unstamped standard station disk in solid rock. Reference mark is standard reference disk in solid rock 29.35 feet from station in magnetic azimuth 220°. Nail in center of triangle blazed on Norway pine is 14.71 meters (48.3 feet) from station in azimuth 29°45′.

Canada (G. S. of C.) (Rainy River district, Ontario, Canada, Geodetic Survey of Canada, 1917; W. Mussetter, 1924).—On highest hill on Canadian point, about 2 miles east of channel connecting western and middle bodies of Basswood Lake. To reach from west, make landing in small bay about 1 mile due east of extremity of United States point, and follow blazed trail to station site. Triangle-blazed pine tree at foot of trail can be easily seen from lake. Cleared lines through heavy timber converge at station. Marked by copper bolt stamped "G. S. C." set flush in solid rock. Reference marks are copper bolts set flush in outcropping boulder. No. 1 is 19.90 meters (65.3 feet) from station in azimuth 346°58′. No. 2, distance not measured and not recovered in 1924, is in azimuth 99°17′ from station. No. 3 is 18.09 meters (59.4 feet) from station in azimuth 232°03′.

Found (I. B. C.) (Lake County, International Boundary Commission, 1914; W. Mussetter, 1924; 1934).—About 3 miles south of Basswood Lake, 1 mile east of Wind Lake, 1 mile northwest of New Found Lake, and on high, bare, rocky hill southeast of stand of burnt timber. Cleared lines through timber converge at station site. To reach from Basswood Lake, go via Prairie Portage and Sucker Lake to New Found Lake and then northwest to station site. To reach from Ely, follow Ely-Fernberg road about 20 miles to road marked "Canadian Border Lodge—3 miles", follow this road to its end and lodge, continue by canoe 3 miles on Moose Lake to first large bay on left, follow around bay to camp site and blazed trail marked "Tower", and follow trail up ridge about 1½ miles to wooden tower and station site. Marked by copper bolt within triangle cut in rock. Reference marks are copper bolts in solid rock. One is 8.16 meters (26.8 feet) from station in azimuth 340°17′; and other is 12.92 meters (42.4 feet) from station in azimuth 90°39′.

Emily (I. B. C.) (Rainy River district, Ontario, Canada, International Boundary Commission, 1914; W. Mussetter, 1924).—On north shore of Basswood Lake, on south end of point between Merriam and Bayley Bays, on highest point of rocks, about 100 meters (328 feet) back from shore line, and about 30 meters (98 feet) above lake level. Marked by drill hole within triangle cut in rock. In 1924, masonry pier with copper bolt in center had been built over mark.

Fang (I. B. C.) (Lake County, International Boundary Commission, 1913; 1915).—On southeast side of Sucker Lake, on high, bare, rock hill about 700 meters (2,297 feet) south of dam at west end of Iron Mountain (Ensign) Lake. Hill is series of white granite ledges, one above the other. It is highest in vicinity and commands an extensive view in all directions. Marked by drill hole within triangle cut in solid ledge of summit.

Gone (I. B. C.) (Rainy River District, Ontario, Canada, International Boundary Commission, 1915).—On prominent peninsula that lies on west side of most northeastern small bay of northern shore of Bayley Bay, on north side near east end of Basswood Lake, and on flat rock well up on southern point of eastern ridge of peninsula. There is a small island lying about 125 meters (410 feet) offshore south of station. Marked by drill hole within triangle cut in rock.

Had (I. B. C.) (Lake County, International Boundary Commission, 1913; 1915).—On Minnesota shore of Basswood Lake, south of peninsula that lies between Merriam and Bayley Bays, on wooded point about 1 mile west of Rice Bay, and on large boulder about 3 meters (10 feet) from water's edge. About

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10 meters (33 feet) back from station, point is higher, rocky, and wooded. Marked by standard bronze disk of International Boundary Commission in rock.

Garb (I. B. C.) (Rainy River District, Ontario, Canada, International Boundary Commission, 1913; 1915).—On Canadian side of Basswood Lake, on east shore of Bayley Bay, one-third mile north of wooded island, near middle of flat rock about 10 feet square that projects into lake, and 1 foot above lake level. Marked by standard bronze disk of International Boundary Commission in rock.

Sunday (G. S. of C.) (Rainy River District, Ontario, Canada, Geodetic Survey of Canada, 1916).—On hill about 2 miles northwest of northeast bay of Sunday Lake, and on southwest end of a hogback hill which runs in northeasterly direction. Trail from northwest corner of bay leads to station site. Marked by copper bolt stamped "G. S. C. 1916." Three reference bolts are as follows: No. 1, 7.73 meters (25.4 feet) from station in azimuth 1°05′; no. 2, 8.93 meters (29.3 feet) from station in azimuth 112°35′; and no. 3, 14.87 meters (48.8 feet) from station in azimuth 248°50′.

Paddy (G. S. of C.) (Rainy River District, Ontario, Canada, Geodetic Survey of Canada, 1915; 1917).—On north side of Knife Lake, opposite mouth of big southern arm of lake, on top of high timbered hill, and about 400 meters (1,312 feet) back from shore of small bay. Marked by copper bolt in drill hole within triangle cut in rock.

Ewing (G. S. of C.) (Lake County, Geodetic Survey of Canada, 1915).—About 2 miles southwest of west end of Cacaquabic Lake, on hill about one-fourth mile from wagon road, and about three-fourths mile from abandoned lumber camp. Marked by copper bolt in rock.

Trouble (G. S. of C.) (Rainy River District, Ontario, Canada, Geodetic Survey of Canada, 1916).—On burned-over hill, about 2 miles from northeast corner of Louisa Lake. Marked by copper bolt stamped "G. S. C. 1916."

Saunders (G. S. of C.) (Lake County, Geodetic Survey of Canada, 1916).—On hill on south side of long narrow arm of Knife Lake. There is an island at entrance of arm. The hill, which can be seen from water, is flat oval with long side east and west, and its south side slopes steeply down to a small lake. Marked by copper bolt stamped "G. S. C. 1914." Three copper reference bolts are as follows: No. 1, 23.90 meters (78.4 feet) from station in azimuth 255°42′; no. 2, 14.42 meters (47.3 feet) from station in azimuth 1°21′; and no. 3, 17.74 meters (58.2 feet) from station in azimuth 118°10′.

Dorothy (G. S. of C.) (Rainy River District, Ontario, Canada, Geodetic Survey of Canada, 1916).—On prominent point 30 meters (98 feet) southwest of highest part of hill, a mile northeast of bay in Cypress Lake, and north of island which is about 2 miles northeast of west end of Cypress Lake. Marked by copper bolt stamped "G. S. C. 1916" in solid rock. Three reference bolts are as follows: No. 1, 5.29 meters (17.4 feet) from station in azimuth 140°24′; no. 2, 9.43 meters (30.9 feet) from station in azimuth 264°48′; and no. 3, 6.04 meters (19.8 feet) from station in azimuth 1°29′.

Poly (G. S. of C.) (Cook County, Geodetic Survey of Canada, 1916).—On highest part of hill about three-fourths mile northeast of north bay of Lake Gabbimichigama, and about 2½ miles southwest of Seagull Lake south of Saganaga Lake. Marked by copper bolt stamped "G. S. C. 1916" in solid rock. Three reference bolts are as follows: No. 1, 18.12 meters (59.4 feet) from station in azimuth 211°46′; no. 2, 18.03 meters (59.2 feet) from station in azimuth 282°31′; and no. 3, 10.67 meters (35.0 feet) from station in azimuth 80°38′.

Helga (G. S. of C.) (Cook County, Geodetic Survey of Canada, 1916).—On high wooded hill on south side of west end of Saganaga Lake, and about three-fourths mile south of bay. Hill is covered by deep soil. Marked by copper bolt stamped "G. S. C. 1916."

Paulsen (G. S. of C.) (Cook County, Geodetic Survey of Canada, 1915; J. P. Lushene, 1934).—On prominent east-and-west ridge and about 10 minutes' walk north from buildings of abandoned Paulsen Iron Mine. A 5-mile trail, following right-of-way of abandoned Port Arthur & Duluth Railway, leads from west end of Gunflint Lake to mine buildings. To reach from Grand Marais, follow Gunflint Trail north 2 miles from Gunflint Lodge resort to trail marked "Gunflint Lookout—1½ miles" (also referred to as "Paulsen Lookout") and proceed up steep hill to station site 36 feet west of tower.

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Marked by copper bolt stamped "G. S. C. 1915" in solid rock within triangle cut in rock. Three reference bolts in solid rock are as follows: No. 1, 4.50 meters (14.8 feet) from station in azimuth 226°01′; no. 2, 7.01 meters (23.0 feet) from station in azimuth 358°30′; and no. 3, 8.65 meters (28.4 feet) from station in azimuth 96°50′. *Paulsen or Gunflint fire lookout tower* is 11.015 meters (36.14 feet) from station in azimuth 305°39′.

Mabel (I. B. C.) (Cook County, International Boundary Commission, 1912; 1916).—About 1½ miles west of south end of Maraboeuf (Gneiss) Lake, ¼ mile east of south end of east arm of Saganaga Lake, and on summit of high, sharp, rocky point which is highest within several miles. Marked by copper bolt stamped "G. S. C. 1916" in solid rock. Three reference bolts are as follows: No. 1, 16.06 meters (52.7 feet) from station in azimuth 216°57′; no. 2, 13.98 meters (45.9 feet) from station in azimuth 339°06′; and no. 3, 17.02 meters (55.8 feet) from station in azimuth 111°12′.

Vera (I. B. C.) (Rainy River district, Ontario, Canada, International Boundary Commission, 1912; 1917).—On north shore of Saganaga Lake, 2⅛ miles northeast of entrance to Cache Bay, on summit of high rock cliff, about 175 meters (574 feet) back from lake shore, and about 50 meters (164 feet) above lake level. Marked by copper bolt stamped "G. S. C. 1916." Four reference marks (not described) are as follows: No. 1, 12.40 meters (40.7 feet) from station in azimuth 52°11′; no. 2, 14.62 meters (48.0 feet) from station in azimuth 151°42′; no. 3, 10.14 meters (33.3 feet) from station in azimuth 263°29′; and no. 4, on boundary line between Rainy River and Thunder Bay districts and 71.61 meters (234.9 feet) from station in azimuth 256°18′.

Stuart (G. S. of C.) (Thunder Bay district, Ontario, Canada, Geodetic Survey of Canada, 1915).—In center of much dissected peninsula at northeastern end of Saganaga Lake, at eastern end of ridge which runs in southeasterly direction. Part of ridge is covered with jack pine, spruce, and a few birch and poplar, while rest has been swept by fire. There is distinct drop of 175 feet to east of station into swampy valley. Trail is blazed through timber from head of marshy bay along summit of ridge in southeasterly direction. Marked by copper bolt stamped "G. S. C. 1915" in solid outcrop of gray granite and within triangle cut in rock. Three reference bolts in rock are as follows: No. 1, 11.75 meters (38.5 feet) from station in azimuth 54°55′; no. 2, 4.60 meters (15.1 feet) from station in azimuth 186°08′; and no. 3, 3.89 meters (12.8 feet) from station in azimuth 300°25′.

Light (G. S. of C.) (Thunder Bay district, Ontario, Canada, Geodetic Survey of Canada, 1915).—On hill about 1½ miles southeast of end of large bay on Northern Light Lake, opposite outlet of lake. Northern Light Lake may be entered at its west end by river which flows from it into Saganaga Lake. Trail enters woods near large rock outcrop and goes in southeasterly direction to high hill and then in easterly direction to station site. Hill is timbered with jack pine and spruce, and a few birch and poplar. Marked by copper bolt stamped "G. S. C. 1915" in solid outcrop of gray granite. Three reference bolts are as follows: No. 1, 7.24 meters (23.8 feet) from station in azimuth 182°43′; no. 2, 10.13 meters (33.2 feet) from station in azimuth 320°59′; and no. 3, 9.78 meters (32.1 feet) from station in azimuth 61°27′.

John (G. S. of C.) (Thunder Bay District, Ontario, Canada, Geodetic Survey of Canada, 1915).—On prominent rock outcrop on heavily wooded hill, about 1 mile north of northeast arm of Saganaga Lake, about 1½ miles from northeast end of lake, and behind more easterly of two large islands. Trail leads almost due north along ravine and turns slightly to west over higher ground onto ridge where station is located. Marked by copper bolt stamped "G. S. C. 1915" in solid rock within triangle cut in rock. Three reference bolts are as follows: No. 1, 12.54 meters (41.1 feet) from station in azimuth 282°53′; no. 2, 12.53 meters (41.1 feet) from station in azimuth 18°29′; and no. 3, 15.17 meters (49.8 feet) from station in azimuth 130°20′.

Mowe (G. S. of C.) (Thunder Bay District, Ontario, Canada, Geodetic Survey of Canada, 1915).—On summit of heavily wooded, flat ridge, about 1 mile northwest of northwest angle of Mowe Lake. Mowe Lake is about 2 miles northeast from northeast angle of Saganaga Lake. Marked by copper bolt stamped "G. S. C. 1915" in solid rock. Three reference bolts are as follows: No. 1, 12.07 meters (39.6 feet) from station in azimuth 11°38′; no. 2, 39.69 meters (130.2 feet) from station in azimuth 122°46′; and no. 3, 12.67 meters (41.6 feet) from station in azimuth 228°23′.

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Gunflint (G. S. of C.) (Thunder Bay District, Ontario, Canada, Geodetic Survey of Canada, 1915; 1917).—On top of north-and-south ridge, which is covered with jack pines, and 2 miles from small bay in northwest angle of North Lake. Ridge is an abrupt outcrop of granite with small amount of soil on surface and drops off abruptly 12 feet west of station. Well-blazed trail leads from bay to station site. Marked by copper bolt stamped "G. S. C. 1915" in solid rock within triangle cut in rock. Three reference bolts in solid rock are as follows: No. 1, 8.15 meters (26.7 feet) from station in azimuth 189°54′; no. 2, 7.72 meters (25.3 feet) from station in azimuth 254°39′; and no. 3, 7.99 meters (26.2 feet) from station in azimuth 43°30′.

Addie (G. S. of C.) (Thunder Bay District, Ontario, Canada, Geodetic Survey of Canada, 1914; 1917).—On summit of wooded round-topped hill, about three-fourths mile southeast of milepost 45 (1½ miles west of Addie Lake station) of branch of Canadian National Railway from Port Arthur to North Lake. Marked by copper bolt stamped "G. S. C. 1914" in solid rock and referenced by three copper bolts.

Greenwater (G. S. of C.) (Thunder Bay District, Ontario, Canada, Geodetic Survey of Canada, 1914).—On hill about 2 miles southwest of southern arm of Greenwater Lake. Best reached from Kashabowi on the Canadian National Railway. Marked by copper bolt stamped "G. S. C. 1914" and referenced by three copper bolts.

Echo (G. S. of C.) (Thunder Bay district, Ontario, Canada, Geodetic Survey of Canada, 1913).—In woods in Marks Township. To reach from Silver Mountain on branch line of Canadian National Railway between Port Arthur and North Lake, follow road north 6 miles to station site. Marked by copper bolt stamped "G. S. C. 1913" in solid rock about 10 inches below surface, and referenced by three copper bolts.

Whitefish (G. S. of C.) (Thunder Bay district, Ontario, Canada, Geodetic Survey of Canada, 1912; 1917).—On hill about 7½ miles south of Silver Mountain, which is on branch line of Canadian National Railway from Port Arthur to North Lake. To reach, follow road which follows east side of Little Whitefish River about 7½ miles to point near base of rock bluff about 30 feet high close to river. From here magnetic bearing to station is 245°, and distance is about 2 miles. Marked by copper bolt stamped "G. S. C. 1912" in solid rock, and referenced by three copper bolts.

Devilfish (G. S. of C.) (Cook County, Geodetic Survey of Canada, 1913; J. P. Lushene, 1934).—About 14 miles northwest of Hovland, in lot 31, T. 64 N., R. 3 E. of the fourth principal meridian, on summit of high wooded hill which slopes gradually to south and abruptly to north, and ½ mile south and 2 miles east of east end of Devilfish Lake. To reach from Hovland, follow McFarland Lake road about 12 miles to road leading left and follow left road 6 miles to Devilfish fire lookout tower and station site. Marked by copper bolt stamped "G. S. C. 1913" in solid rock. Three reference bolts are as follows: No. 1, 3.07 meters (10.1 feet) from station in azimuth 334°07′; no. 2, 8.46 meters (27.8 feet) from station in azimuth 84°41′; and no. 3, 3.83 meters (12.6 feet) from station in azimuth 207°18′. *Devilfish fire lookout tower* (see description thereof) is 7.932 meters (26.02 feet) from station in azimuth 94°51′.

Pigeon (G. S. of C.) (Cook County, Geodetic Survey of Canada, 1911; J. P. Lushene, 1934).—About 10 miles southwest of mouth of Pigeon River, about 4 miles west of Grand Portage, and on low hill (highest in vicinity) which rises abruptly on south and east and slopes gradually on the other sides. To reach from Grand Portage, follow "Cascade Trail" about 4 miles to station site. To reach from Grand Marais, follow Duluth-Port Arthur road (Lake Shore Drive) to road on east 3 miles north of Mineral Center, follow road on east to Mount Maude lookout of the Minnesota State Forest Service, and proceed east one-fourth mile across country to next hill and station site. Marked by ⅝-inch copper bolt stamped "G.S.C. 1911", and referenced by three bolts.

Blake (G. S. of C.) (Thunder Bay district, Ontario, Canada, Geodetic Survey of Canada, 1913).—In southwest corner of Blake Township, and on summit of southern shoulder of hill which rises abruptly from western shore of Mud Lake and the northern part of which is quite precipitous. To reach from Twin City Junction, near Fort Williams, follow Pigeon River road south about 25 miles. Marked by copper bolt stamped "G. S. C. 1913" in solid rock. Three reference bolts are as follows: No. 1, 12.17 meters (39.9 feet) from station in azimuth 255°15′; no. 2, 6.00 meters (19.7 feet) from station in azimuth 5°54′; and no. 3, 8.75 meters (28.7 feet) from station in azimuth 142°59′.

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NINETY-EIGHTH MERIDIAN TO ROYALTON TO DULUTH ARC

Principal points

Elbow (Grant County, W. H. Burger, 1904; 1935).—Two miles east and 1½ miles north of town of Elbow Lake on Minneapolis, St. Paul & Sault Ste. Marie Railway, in SE¼NE¼ sec. 3, T. 129 N., R. 42 W. of the fifth principal meridian (Sanford Township), on ridge in cultivated field belonging to Neils N. Olson, three-eighths mile southeast of his home, 288 feet north of fence on east-and-west quarter line, 81 feet northwest of one and 59.5 feet southwest of other of two small pointed boulders, which are 16 feet west of center of road, projecting 6 inches above ground, 67.5 feet west of center of road, and 5½ paces west of east section-line fence. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Upper mark is 1 foot below surface of ground. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, in fence corner at southeast corner of pasture, 1 foot west of east fence, 1½ feet north of south fence, 2.430 meters (7.97 feet) west from stone said to mark quarter corner of section 3, and 84.767 meters (278.11 feet) from station in azimuth 357°34′. Following are distances and azimuths from station: E. J. Colemark's barn, west gable, about one-half mile, 7°15′48″; N. N. Olson's house, east gable, about three-eighths mile, 164°31′04″; schoolhouse (District 38), flagstaff, about five-eighths mile, 348°06′04″; and *T. 129 N., R. 42 W., sec. 3, east one-fourth corner*, 85.252 meters (279.70 feet), 355°58′. Reference mark was not recovered in 1935. In 1935 north-and-south fence lines reported no longer in existence.

Dalton (Otter Tail County, W. H. Burger, 1904; 1935).—One mile due west of Dalton on Great Northern Railway in NE¼SE¼ sec. 10, T. 131 N., R. 42 W. of the fifth principal meridian (Tumuli Township), on knoll in pasture belonging to I. Vik, about three-eighths mile east of north and across small lake from his home, and 2.42 meters (7.9 feet) west of fence on east side of section. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, in corner of pasture, about 4 paces south of road which leads from Dalton westward along half-section line, 1 foot west of east fence, 1 foot south of north fence, and 85.278 meters (279.78 feet) from station in azimuth 181°11′. Following distances and azimuths are from station: I. Vik's barn, cupola, about three-eighths mile, 17°38′37″; A. Johnson's house, south gable, about three-eighths mile, 162°26′04″; A. Summor's house, west gable, about three-eighths mile, 225°23′33″; Dalton, schoolhouse spire, about 1 mile, 263°00′22″; Dalton, elevator, center of top, about 1 mile, 271°02′33″; and *Dalton, astronomical station* (see description thereof), about 1 mile, 269°01′05″. In 1935 station mark was reported to be 1 foot below surface of ground; and reference mark to be 12 feet south of top of road cut, 1 foot west of one fence, and 4 feet south of fence on top of cut.

Leaf (Otter Tail County, W. H. Burger, 1904; 1935).—Five miles east and 9 miles north of Evansville on Great Northern Railway, in NW¼ sec. 27, T. 131 N., R. 39 W. of the fifth principal meridian (Leaf Mountain Township), in Inspiration Park, on land controlled (in 1904) by agent named Hoyt (who lived in Fergus Falls), on highest point of prominent Inspiration Peak (formerly known as "Leaf Mountain") which is covered with fairly heavy timber but with top bare, close to southeast edge, about due east of picnic grounds, 25 paces from west slope, about 25 paces from southeast point of mountain, and 4 paces from east slope. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Upper mark projects about 1 foot above ground. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, at extreme southeast edge of brow of hill, 2.5 feet in elevation, below station, and 25.131 meters (82.45 feet) from station in azimuth 352°12′. Following distances and azimuths are from station: John Klenick's house, chimney, about three-fourths mile, 4°51′00″; Thomas Klenick's barn, west gable, about five-eighths mile, 64°38′38″; and John Christianson's barn, spire, about 1 mile, 124°40′31″.

Holmes (Douglas County, W. H. Burger, 1904; 1935).—Four and one-half miles west and 2 miles north of Holmes City, three-fourths mile northwest of main part of Lake Oscar, 3¾ miles east and 5½ miles north of Kensington on

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Minneapolis, St. Paul & Sault Ste. Marie Railway, near center of N½SE¼ sec. 31, T. 128 N., R. 39 W. of the fifth principal meridian (Moe Township), on northern part of high ridge formerly belonging to C. G. Rusk and now owned by the Federal Land Bank of St. Paul, about three-eighths mile north of Mr. Rusk's house, and 23 paces east of north-and-south line which divides two southeast quarter sections. To reach from Kensington, follow road leading toward Brandon as far as schoolhouse (District 45) at northwest corner of section 31, then turn southeast on road and go one-half mile to house of John P. Edman, go south from his house, and follow around right-hand, edge of lake along hillside and through timber to station site which is in clearing at crest of hill (north edge of which is heavily wooded). Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, at north edge of clearing, 2 feet lower in elevation than station, and 24.547 meters (80.53 feet) from station in azimuth 209°06′. Following distances and azimuths are from station: Schoolhouse (District 45), flagstaff, about 1 mile, 121°41′33″; and Holmes City, Swedish Church, spire, about 4½ miles, 287°10′29″.

Alexandria (Douglas County, W. H. Burger, 1904; 1934).—About 1½ miles east-southeast of Alexandria, one-third mile northwest of Lake Victoria, in NE¼SE¼ sec. 20, T. 128 N., R. 37 W. of the fifth principal meridian (Alexandria Township), on land owned by A. J. Thompson, about 400 feet due south of Mr. Thompson's house, 160 feet south-southeast of southeast corner of red barn, 103 feet west of center line of north-and-south section-line road, and 18 feet east of north-and-south fence line which separates garden and barn lots. To reach from corner of Broadway and Lincoln Avenues in Alexandria, go east 1.55 miles on Lincoln Avenue or 0.95 mile beyond Alexandria railroad station, turn right onto T-road at sign "Victoria Recreation Resort" and follow section-line road along east side of section 20 due south 0.3 mile to white house on right (home of A. J. Thompson), and continue about 400 feet to station site on right-hand side of road. Original surface and underground marks were nails in terra-cotta pipes (18 inches in diameter) filled with and set in concrete, notes 16 and 20. Original reference mark was nail in terra-cotta pipe filled with and set in concrete, note 23, just inside fence line on east side of section, and probably 35.849 meters (117.61 feet) from station in azimuth 227°54′. In 1934: Nail marking station was replaced by standard station disk. Original reference mark was not recovered. Two reference marks and an azimuth mark (probably standard reference disks in concrete) were established. No. 1 is flush with surface of ground, in barn lot, 8 feet south of lone tree, and 34.328 meters (112.62 feet) from station in azimuth 100°15′. No. 2 projects about 8 inches above ground and is 1 foot west of fence separating garden and barn lot, and 26.870 meters (88.16 feet) from station in azimuth 168°01′. Azimuth mark projects about 8 inches above ground, and is on ridge where roadbed is cut through hill, 60 feet south of center line of highway, 60 feet east-southeast of telephone pole, and about 1.5 miles from station in azimuth 258°35′29″. To reach azimuth mark from station, go north 0.3 mile, turn right (east) onto U. S. Route 52 and go 1.5 miles to mark on right.

Parker (Otter Tail County, W. H. Burger, 1904; 1935).—One and three-fourths miles west and 3 miles south of Parkers Prairie on Minneapolis, St. Paul & Sault Ste. Marie Railway, in southeast corner of sec. 32, T. 131 N., R. 37 W. of the fifth principal meridian, and on highest point of prominent hill known as Bear Hill (which is covered with scrub oak and small brush), and on land owned by Bert Kuniston (formerly by Van Cleve), who lives about 1½ miles south of station. Station is said to be almost at corner common to sections 32, 33, 4, and 5. Land in NE¼ sec. 5 belongs to R. W. Zintar, who lives 3 miles to south. To reach from Parkers Prairie, follow Alexandria highway south 4 miles, turn west onto graveled road and go 1 mile, turn north onto angling road, and go one-half mile to station site. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 2½ feet in elevation lower than station, and 8.280 meters (27.17 feet) from station in azimuth 282°24′. Following distances and azimuths are from station: New Parkers Prairie, open belfry, spire, 206°01′02″; and Louis Korth's red barn, west

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gable, three-fourths mile, 316°32′41″. In 1935 surface mark and reference mark were found broken down, with nails missing.

Leslie (Todd County, W. H. Burger, 1904; 1934).—About 1½ miles west and 1½ miles south of Clotho, 10 miles west and 2 miles north of Long Prairie, near center of sec. 10, T. 129 N., R. 35 W. of the fifth principal meridian (Leslie Township), about 480 feet west of white house of L. Johnson, and 28 feet north of center line of east-and-west road. To reach from L. Weishair's store in Clotho, go south 2.2 miles on dirt road, turn right (west) and go 0.3 mile to Johnson's house, and continue west 480 feet to station site. Surface and underground marks are nails in 4-inch terra-cotta pipes filled with and set in concrete, notes 16 and 20. Original reference mark was nail in terra-cotta pipe filled with and set in concrete, note 23, 7.4 meters (24 feet) north of half-section-line road, 5.9 meters (19 feet) north of center of section, and 91.517 meters (300.25 feet) from station in azimuth 90°29′. Following distances and azimuths are from station: Frank Moore's house, center of highest chimney, 4°50′14″; William Carbo's house, west gable, about one-fourth mile, 84°02′01″; Mrs. Beach's house, chimney, about one-fourth mile, 100°12′41″; T. 129 N., R. 35 W., sec. 10, west quarter corner, about one-half mile, 90°15′17″; and B. F. Rowe's house (probably now owned by L. Johnson), chimney, about 125 yards, 245°31′31″. In 1934: Original reference mark was not recovered. Station "*Leslie, eccentric*", marked with standard station disks in concrete, notes 1b and 7a, was established 5.084 meters (16.68 feet) distant in azimuth 176°40′ in case present station should be destroyed by road construction. Two reference marks, consisting of standard reference disks in concrete, note 11b, and an azimuth mark, consisting of standard reference disk in concrete, note 11a, were established. No. 1 is 29 feet south of center line of road, approximately on right-of-way fence line, and 159.548 feet from station in azimuth 290°42′. No. 2 is 27 feet south of center line of road, approximately in right-of-way fence line, and 104.898 feet from station in azimuth 59°32′. Distance between reference marks is 239.7 feet. Azimuth mark is 30 feet south of center line of road, approximately in right-of-way fence line, and 856.15 feet from station in azimuth 87°05′15″.

Osakis (Todd County, W. H. Burger, 1904; 1934).—Three miles south and 1 mile east of Osakis, on hill at north side of wheat field near center of sec. 7, T. 127 N., R. 35 W. of the fifth principal meridian (West Union Township), on land owned by A. L. Markthaler, about 0.45 mile east of his house, 29.9 meters (98.1 feet) east from fence running north to his house, 3.45 meters (11.3 feet) south of north fence, 15 feet south of telephone line, and 17 feet east of center line of new road being constructed in 1934. Station may be destroyed by road construction. To reach from West Union, go northwest 2.1 miles on Route 52 to crossroads, turn left (south) and go 0.15 mile, turn right (west) and go 0.45 mile to point where main road turns west, and follow dim trail 0.6 mile to top of hill and station site. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, in northeast corner of wheat field, almost at center of section, 0.60 meter (2.0 feet) west from east fence, 1.2 meters (4 feet) south from north fence, and 52.831 meters (173.33 feet) from station in azimuth 263°59′. Following distances and azimuths are from station: A. L. Markthaler's house, low south chimney, about 0.4 mile, 86°21′23″; *Osakis, water tower*, about 3 miles, 161°28′31″; C. A. Markthaler's barn, cupola, about 200 meters (656 feet), 168°45′14″; and Catholic farm, cupola of large house, about one-half mile, 129°40′00″. In 1906 latitude observations were made at wooden pier 3 feet 4½ inches west and 3 inches south of station. Station "*Osakis, eccentric*", marked with standard station disks in concrete, notes 1b and 7a, was established 5.368 meters (17.61 feet) from station in azimuth 356°36′.

Maple (Todd County, W. H. Burger, 1904; 1935).—Six and one-half miles west and 5 miles south of Long Prairie on Great Northern Railway, in SE¼NE¼ sec. 18, T. 128 N., R. 34 W. of the fifth principal meridian (Little Sauk Township), on land belonging to the heirs of Anthony Mennett, of Long Prairie, in cultivated field, on slight knoll, 675 paces south of Lake Maple, 340 paces north of east quarter corner of sec. 18 (exact corner could not be found), 888 feet north of north end of corrugated culvert on west side of section road and under quarter-section-line road leading west from quarter corner, 96 feet west of center of north-and-south section road, and 77.5 feet west of fence on west side of

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road. To reach from Long Prairie, take road southwest to Lake Maple, then south about 1½ miles around east side of lake to station. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 18.731 meters (61.45 feet) from station in azimuth 272°06′. Following distances and azimuths are from station: Manuel Johnson's house, chimney, about five-eighths mile, 3°54′42″; *Gordon, church spire*, about 2 miles, 51°05′36″; Hans Larson's house, chimney, about three-eighths mile, 92°41′45″; approximate position of T. 128 N., R. 34 W., sec. 18 east ¼ corner, about 340 paces, 353°51′; and *Long Bridge, church spire*, about 3 miles, 339°31′01″. Reference mark was reported destroyed in 1935.

Birch (Todd County, W. H. Burger, 1904; 1935).—Four and one-half miles north and 4 miles east of Sauk Center on Great Northern and Northern Pacific Railways, near middle of south side of SE¼ sec. 18, T. 127 N., R. 33 W. of the fifth principal meridian (Birchdale Township), about one-fourth mile east of high barren knoll with junction of east-and-west fence and north-and-south fence (from knoll, north end of lake at southwest corner of sec. 18 can be seen), in pasture covered with scrub oak and brush, on highest part of hill, on land owned by Oscar Christensen (formerly by Eugene Clossen), on northeast edge of lake, about 380 feet north of east-and-west fence, 121 feet east of 15-inch oak tree, and 7.5 feet south of 4-inch scrub-oak tree (both having 16-penny nails on east and south sides about 1 foot above ground). To reach from Sauk Center, follow road to Grey Eagle northeast 2 miles to where it crosses Northern Pacific Railway, thence north about 2 miles on Long Prairie Road to road which turns east to farm of the Morse brothers, pass their house and follow first road on right around north shore of lake to E. Clossen's house. Old road up hill leads to station. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 15.950 meters (52.33 feet) from station in azimuth 177°39′. Following distances and azimuths are from station: *Sauk Center, Catholic Church, spire*, about 4½ miles, 37°27′13″; E. Clossen's old shanty, chimney, about 200 meters (656 feet), 87°09′19″; and south side center, SE¼ sec. 18, T. 127 N., R. 33 W., about 127 paces, 355°23′51″. In 1935 reference mark was found loose in ground. Station reached in 1935 as follows: Follow trunk highway south about 10 miles to graded road leading east, turn east and go 3½ miles to turn to east, at turn, go west about 1,000 feet to woods road leading south, and go south to first fence leading west (fence is south line of sec. 18).

Long (Todd County, W. H. Burger, 1904; 1935).—About 2 miles west of Long Prairie, about 62 meters (203 feet) north of middle of east side of NE¼NE¼ sec. 24, T. 129 N., R. 34 W. of the fifth principal meridian (Reynolds Township), at edge of timber, on north-and-south section-line fence at east side of pasture lane bordering east side of cultivated field, on land belonging to Frank Ditterman, who lives one-eighth mile north of station (formerly owned by Vandyke and Vandyke, of Long Prairie), and about 85 feet south along fence from large pile of rocks which is just north of brow of hill. To reach from railroad depot in Long Prairie, cross tracks and follow graded road west and north 1.5 miles along bottomland, turn west onto section-line road, and go to top of steep hill and Ditterman's house on south side of road. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 0.33 meter (1.1 feet) west of fence on east side of section, 1.19 meters (3.9 feet) from fence corner said to be center of east side of NE¼ sec. 24, in pasture lane, and 61.714 meters (202.47 feet) from station in azimuth 359°02′. Following distances and azimuths are from station: House of Vandyke and Vandyke, west gable, about one-eighth mile, 139°03′46″; and *Long Prairie, Catholic church, spire*, about 2 miles 268°16′43″.

Lone (Todd County, W. H. Burger, 1904; 1935).—Five miles north and 6 miles east from Long Prairie on Great Northern Railway, in NE¼SE¼ sec. 29, T. 130 N., R. 32 W. of fifth principal meridian (Hartford Township), on third hill north of break in range of hills which is about one-half mile east of lower end of Lake McClure (or McGuire), on land belonging to Herman Sandstrom (formerly owned by Gust. Nelson), and on quite prominent, sharp, barren hill, To reach from Long Prairie, follow State Route 27 east 2.5 miles, north 3 miles, east 2 miles, and north one-half mile to road near foot of lake, go east to

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farm of Anna Virkus, and then go north one-half mile through timber to station. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 4.4 meters (14 feet) east of 18-inch tree, and 9.230 meters (30.28 feet) from station in azimuth 238°25′. Witness marks are three nails in blaze (14 inches from ground) on 1-foot pine tree 2.2 meters (7 feet) northeast of station; and three nails in blaze (12 inches from ground) on 18-inch pine tree 5 meters (16 feet) from station in azimuth 224°00′. Trees are 3.2 meters (10 feet) apart. Following distances and azimuths are from station: John Steinert's house, chimney, about 1 mile, 43°47′41″; *Long Prairie, water tank*, 51°54′17″; and Gust. Nelson's house, east gable, about three-eighths mile, 83°15′32″.

Eagle (Todd County, W. H. Burger, 1904; 1935).—About 3 miles due south of Burtrum on Great Northern Railway, in SE¼NW¼ sec. 11, T. 127 N., R. 32 W. of the fifth principal meridian (Grey Eagle Township), on land belonging to Emma Krauss (formerly owned by Great Northern Railway) about one-fourth mile southeast of her house, about one-half mile south of sharp peak on north side of Mound Lake known as "The Mound", about one-fourth mile south of central part of Mound Lake, and on top of high hill. Crest of hill consists of 4 small elevations forming crescent three-eighths mile long, the 2 inner elevations being further north. Station is on highest point of second knob from eastern end, in cultivated field, and 41 feet south of east-and-west fence. To reach from Burtrum, go south a little over 1 mile, then west on road to Grey Eagle, taking first left-hand road leading around west side of Mound Lake, follow old road to homestead of Mrs. Carrie Whipple on south bank of lake, then follow old rough road through swamps and over ridge to station. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 14.850 meters (48.72 feet) from station in azimuth 90°45′. Following distances and azimuths are from station: Burtrum, white church, red cone, spire, about 3 miles, 174°27′47″; and highest point of "The Mound", about one-half mile, 197°47′. In 1935 reference mark was reported destroyed. Station reached from Burtrum in 1935 by following road south past brick school to Krauss' farm.

Falls (Morrison County, W. H. Burger, 1904).—Four and one-half miles due east of Little Falls on Northern Pacific Railway, near middle of SE¼ sec. 12, T. 40 N., R. 32 W. of the fourth principal meridian, in small brush and timber on southeast edge of ridge, nearly one-half mile north of house of Charles Lang and about 300 yards west of very prominent tall tree. To reach from Little Falls, take road leading southeast from Columbia Hotel. About three-fourths mile out, this road bends and goes east through centers of sections 11 and 12 toward Rich Prairie, and Mr. Lang's house is north of this road about 5 miles from town. An old road leads north from house up draw to station. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 14.533 meters (47.68 feet) from station in azimuth 54°09′. Following distances and azimuths are from station: *Little Falls, Pine Tree Lumber Co., stack*, 93°39′36″; Charles Steinberg's barn, north gable, about 1 mile, 349°21′25″; and Charles Lang's house, chimney, about one-half mile, 357°03′47″. In 1935 pieces of tile and concrete, (supposedly underground mark), were found, and surface mark was found at foot of hill about 1,000 feet from pieces of broken tile and concrete. Reference mark was found broken down. Station probably lost.

Brockway (Suintax (M. R. C.)) (Stearns County, Mississippi River Commission, 1898; W. H. Burger, 1904; 1935).—About 6 miles below Royalton Bridge over Mississippi River, 1½ miles north and 3 miles west of Rice on Northern Pacific Railway, about 1½ miles west of Mississippi River, in NE¼ sec. 34, T. 127 N., R. 29 W. of the fifth principal meridian, about ⅓ mile south of Morrison-Stearns County line, on highest point of very high and prominent ridge, between two small draws, on north-and-south road, 500 meters (1,640 feet) south of its junction with east-and-west road, and 200 meters (656 feet) west of house of Tom Jessok. To reach from Rice, go west 2 miles to bridge over Mississippi River, follow west bank north 2 miles, go west along county line 1 mile, then south about ¼ mile to Tom Jessok's house. Station is marked by standard marks of Mississippi River Commission, brass cap on

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steel pipe above, and copper bolt in tile below, note 19. Surface mark projects 15 inches. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, on ridge 11.42 meters (37.5 feet) from station in azimuth 40°. Blazed, 10-inch, burr-oak tree is 10.2 meters (33 feet) from station in azimuth 149°. Following distances and azimuths are from station: North Prairie, Catholic Church, cross on spire, 137°02′53″; Tom Jessok's house, chimney, about 200 meters (656 feet), 243°09′05″; and *Rice, Catholic Church, spire,* 5 miles, 283°44′01″. In 1935 reference mark was found broken down with nail missing. Station *Skounter Hill* (*M. R. C.*) (see description and geographic position thereof) is visible from ground at station.

Alberta (Benton County, W. H. Burger, 1904; 1931).—Eight and one-half miles east and 1¾ miles south of Royalton on Northern Pacific Railway, near middle of west side of sec. 8, T. 38 N., R. 30 W. of the fourth principal meridian (Graham Township), 261 paces north of west quarter corner of section 8, and 8 paces east of center of section-line road on west side of section. To reach from Royalton, go east 9 miles to Little Rock, then south 1½ miles to first road crossing, then west 1 mile, south ¼ mile, and station is 8 paces east of road at this point, on west slope of ridge, and in small timber on land belonging to Mrs. B. E. Walling, who lives in Royalton. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 7 paces east of section-line road at west side of section, and 22.736 meters (74.59 feet) from station in azimuth 179°10′. Following distances and azimuths are from station: *Buckman, Catholic Church, spire,* 188°33′05″; James McCullough's house, chimney, about 1 mile, 201°36′57″; and B. Crowley's house, east gable, about 1 mile, 79°13′10″. This house was reported gone in 1931.

Royalton north base (Benton County, W. H. Burger, 1904; 1935).—One mile south and 2 miles east of Royalton on Northern Pacific Railway, 69 paces east of center of sec. 6, T. 38 N., R. 31 W. of the fourth principal meridian (Langola Township), 3½ feet north of fence running east from section center, just north of high part of cultivated field belonging to Joseph Englerth, and about ⅛ mile northeast of his house. To reach from Royalton, go south 1½ miles on east side of track, go east a little over 1 mile, and north ½ mile to Mr. Englerth's house. Subsurface mark is 1-millimeter hole in copper bolt set in stone, 6 inches square and 1 foot high, placed in concrete 5 feet below surface of ground. Surface mark is 1-millimeter hole in bronze station mark set in granite block, 2 feet square, 14 inches high, and weighing about 900 pounds, set in mass of concrete. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 0.65 meter (2.1 feet) east of west fence of pasture, 7 paces south of its north fence, and 57.755 meters (189.48 feet) from station in azimuth 83°01′. Following distances and azimuths are from station: Joseph Englerth's house, chimney, about ⅛ mile, 44°29′56″; Teman's house, east gable, about ⅜ mile, 70°11′37″; station *Royalton* (*M. R. C.*) (see description thereof) about ¾ mile, 74°17′39″; and Matt Klein's barn, cupola, about ¼ mile, 282°08′56″. In 1935 reference mark could not be located, as it is probably under rock pile; station reported to be 193 feet east of large gray rock at northwest corner of rock pile at center of section, and 8 feet north of 4-inch, scrub-oak tree.

Royalton south base (Benton County, W. H. Burger, 1904; 1935).—About 1⅜ miles southeast of Rice, just east of middle of south side of sec. 33, T. 38 N., R. 31 W. of the fourth principal meridian (Langola Township), 22 paces north of road at south side of section, about 240 paces east of railway track, and in cultivated field belonging to Mrs. A. J. Frommelt who lives in Rice. Underground mark is 1-millimeter drill hole in copper bolt set in stone, ½ foot square and 1 foot high, which is set in cement 5 feet below surface of ground. Surface mark is 1-millimeter drill hole in bronze station mark set in stone block, 2 feet square, 14 inches high, and weighing about 900 pounds, which is set in mass of concrete. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 1½ feet inside of east right-of-way fence of railway, 14.215 meters (46.64 feet) east of east rail of railway track (at right angle to tracks), 89 feet south of seventeenth pole south of signal tower no. 677, 25.50 meters (83.7 feet) south of where section-line road prolonged intersects right-of-way fence, 34 feet west of center of State Route 10, 12 feet

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east of pole line, and 163.78 meters (537.3 feet) from station in azimuth 75°41′43″. *Rice, Catholic Church, spire,* is in azimuth 151°20′29″; and station *Rice back base* (*M. R. C.*) (see description and geographic position thereof) is visible from ground at station.

Johnson (Morrison County, W. H. Burger, 1904; 1935).—Six miles (10 miles by wagon road) due north of Randall on Northern Pacific Railway, about 2 miles due south of Lake Alexander, in northern half of SW¼ sec. 7, T. 131 N., R. 30 W. of the fifth principal meridian (Prairie Township), on highest part of mound on prominent hill, just north of clearing in grass about one-half mile west of Randall-Pillager road, about three-eighths mile northwest of farm of Ross Wilcox who lives one-fourth mile from road, on land belonging to Ed Johnson, 95 paces northwest of site of his house (now destroyed), and 21 paces north of fence on north side of Johnson's garden lot. To reach from Randall, take Randall and Alexander Lake road and follow to station. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 5 feet lower than crest of mound, 15 paces north of fence on north side of Johnson's garden lot, and 18.753 meters (61.53 feet) from station in azimuth 51°38′. Following distances and azimuths are from station: John Lagerquist's house, chimney, about five-eighths mile, 79°46′19″; John Vertin's house, chimney, about three-eighths mile, 231°32′42″; and Ed Johnson's house (now destroyed), chimney, 95 paces, 308°35′. Station reached from Randall in 1935 as follows: Follow gravel road north 5.5 miles to crossroad, go west to Ross Wilcox's farm, and follow woods trail west of house to station (following east fork at point west and north of small lake near center of section).

Daggett (Crow Wing County, W. H. Burger, 1904; 1935).—Two miles north and 2 miles east of Gilbert post office, 13 miles due south of Brainerd on Northern Pacific Railway, at southwest corner of sec. 30, T. 43 N., R. 30 W. of the fourth principal meridian (Daggett Township), on small knoll on land belonging to A. J. Tomberlin, 105 paces to northwest of his house, 86.480 meters (283.73 feet) northeast of southwest corner of section, and 19.7 meters (64.6 feet) south of tall prominent pine 1⅝ feet in diameter. Section corner is 8.93 meters (29.3 feet) east of and in line with south fence line of John Vogel's pasture. To reach from Brainerd, follow range line south to station. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, on east side of range line, 61.02 meters (200.2 feet) east of north section corner, and 50.742 meters (166.48 feet) from station in azimuth 89°24′. Following distances and azimuths are from station: John Vogel's house, south gable, about one-half mile, 160°53′51″; A. J. Tomberlin's house, chimney, about 105 paces, 294°06′25″; and John Campbell's barn, west gable, about five-eighths mile, 348°11′50″. According to 1935 recovery, station is 12 feet east of triangle-blazed oak tree, 18 feet south of another triangle-blazed oak tree; reference mark is 198 feet north along road from intersection of roads, 33 feet east of center of north-and-south road, and near edge of top of road cut. The 1⅝-foot pine has been destroyed.

Rail (Morrison County, W. H. Burger, 1904; 1935).—About 2½ miles northeast of eastern end of Lake Alexander, about 3 miles east and 1 mile south of Rail Prairie post office, 5 miles north and 4½ miles west of Fort Ripley on Northern Pacific Railway, in NE¼ sec. 21, T. 132 N., R. 30 W. of the fifth principal meridian (Rail Prairie Township), on high sharp-pointed hill (known locally as "Pikes Peak") near geometric center of base of Minnesota Forest Service Lookout tower "Rail Mountain", and 12 paces west from tall lone pine tree on summit of hill. To reach from Fort Ripley, cross Mississippi River at bridge about three-fourths mile above town, then go north along west bank of river about 3 miles, and after crossing small stream take first road to left up hill and follow it 3 miles to house of Merritt Tubs, pass through his farm to house of A. Erricsson, take left-hand road for about one-half mile, then follow dim road on right hand leading past old loggers camp. To reach from Randall, follow Randall-Pillager road (county route 6) north about 10 miles, turn east and go 2 miles to tower. Station is 2 miles from Mr. Erricsson's house. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 5½ feet lower in elevation than station, and

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14.911 meters (48.92 feet) from station in azimuth 6°08′. Following distances and azimuths are from station: G. Olson's house, chimney, about 2½ miles, 97°11′36″; L. G. Johnson's house, chimney, about 1 mile, 153°18′09″; and Ridgley's house, west gable, about three-fourths mile, 192°26′05″. In 1935 reference mark was reported destroyed.

Gull (Cass County, W. H. Burger, 1904; 1935).—About 6 miles north and 8 miles west of Brainerd on Northern Pacific Railway, on highest peak on west side of Gull Lake, near center of S½SE¼ sec. 6, T. 134 N., R. 29 W. of the fifth principal meridian, on land constituting State reserve, on top of high hill, 1.4 meters (5 feet) west of fence on west edge of 80-acre field owned by J. M. Hayes and rented by A. W. Merrick, about one-eighth mile west of Mr. Merrick's house, 43 feet north of triangle-blazed 15-inch white pine, 29 feet south of east-and-west fence, and 24 feet east of north-and-south fence. To reach from Brainerd, follow State Route 2 west 2 miles to junction with State Route 371, go north 2.3 miles to road leading west, go west 6.4 miles, follow west fork 7.2 miles, go east to white school near small lake, go to farm of Mr. Johnson and continue south to top of high hill and station. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 0.6 meter (2 feet) west of fence, about 2 meters (7 feet) lower in elevation than station mark, and 21.187 meters (69.51 feet) from station in azimuth 357°35′. Following distances and azimuths are from station: Schoolhouse (District 2), top of belfry, about 1 mile, 173°14′28″; J. M. Hayes' house, west gable about 250 meters (820 feet), 267°23′18″; *Brainerd, railroad shops, tallest stack*, about 13 miles, 302°52′12″; and *Gull Lake* (*M. R. C.*) (see description thereof), 4.158 meters (13.64 feet), 331°07′.

Jones (Crow Wing County, W. H. Burger, 1904; 1905).—About one-half mile south of Jonesville railway station on Northern Pacific Railway, 8 miles by road north of east from Brainerd, in SW¼NE¼ sec. 12, T. 45 N., R. 30 W. of the fourth principal meridian, on hill covered with small brush and timber 30 and 40 feet high, and on land owned by V. A. Loerch, who lives at railway station. To reach from Brainerd take road leading to Jonesville and when within one-half mile of Jonesville (at center of sec. 12) go east 290 paces along road, then turn north 185 paces through timber to station. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 23.018 meters (75.52 feet) from station in azimuth 272°46′. Following distances and azimuths are from station: John Peterson's red barn, north gable, about three-fourths mile, 1°24′05″; *Brainerd railroad shops, tallest stack*, 64°30′40″; Fredrick Bergemann's house, chimney about one-fourth mile, 91°44′27″; and Jonesville, railway station, chimney, about one-half mile, 177°27′08″. In 1935 station was searched for but could not be found. Hill is covered with heavy timber and brush, and ground has heavy coating of leaves.

Brook (Crow Wing County, H. D. King, 1905; 1934).—About 14 miles north of Crosby, about 3.7 miles south and 1.0 mile east of Emily, near center of sec. 14, T. 137 N., R. 26 W. of the fifth principal meridian, on prominent knoll, and directly under Emily fire lookout tower. To reach from Emily go south 3.7 miles on Route 6 to sign "Emily Lookout Tower" on left, turn left and go 1.15 miles on trail through woods to tower and station on top of hill. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark was nail in terra-cotta pipe filled with and set in concrete, note 23, 20.66 meters (67.8 feet) from station in azimuth 227°01′. In 1934 reference mark was not recovered. Following distances and azimuths are from station: Frank Richter's farmhouse, north gable, about 2½ miles, 39°52′58″; and Emily, hotel, west gable, about 3½ miles, 161°31′56″. Station "Emily", marked with standard station disks in concrete, notes 1b and 7a, was established in 1934, 6.282 meters (20.61 feet) distant, northeast of station.

Rabbit (Crow Wing County, H. D. King, 1905; 1934).—About 2½ miles north of Deerwood, in SW¼ sec. 32. T. 47 N., R. 28 W. of the fourth principal meridian, on land owned by C. Ehrich, who lives in northwest quarter of section, on eastern end of range of small hills between Serpent Lake and Rabbit Lake, on highest hill in vicinity, about three-eighths mile northeast of Agate Lake, five-eighths mile north of Serpent Lake, and about 1 mile south of island

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in Rabbit Lake. To reach from First National Bank in Deerwood, go west 2.8 miles on U. S. Route 210, proceed north 3.45 miles, east 0.2 mile, north 0.5 mile, and east 0.4 mile to railroad crossing, continue east 0.35 mile to end of truck travel, and go south 0.7 mile to top of hill and station. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, on south edge of hill, and 43.500 meters (142.72 feet) from station in azimuth 3°59′. In 1934 top of reference mark was found to have been damaged, but apparently had not been moved. An additional reference mark and an azimuth mark were established (probably standard reference disks in concrete). Reference mark no. 2 is on west edge of hill and 25.525 meters (83.74 feet) from station in azimuth 104°59′. Azimuth mark is 100 feet southeast of the Cuyuna municipal water tank, north of east-and-west road, and about 1.0 mile from station in azimuth 132°26′58″. Following distances and azimuths are from station: D. E. Whitlen's house, five-eighths mile, 25°00′04″; Robert Combeau's farmhouse, southwest gable, 1½ miles, 130°04′18″; C. Ehrich's old sheep house, south gable, three-eighths mile, 162° 45′02″; tall tree on island in Rabbit Lake, 1 mile, 171°58′; Deerwood, white church with black spire, 353°53′28″; Crosby, municipal water tank, finial, 51°09′48″; and Cuyna, municipal water tank, finial, 132°56′34″.

French (Aitkin County, H. D. King, 1905; 1934).—About 12.5 miles north and east of Aitkin, in sec. 20, T. 48 N., R. 25 W. of the fourth principal meridian, on ridge dividing French Lake from Gun Lake, on land owned by O. G. Jacobson, 38 paces north-northwest of gate to his house on west side of road, 19 feet west of center line of gravel road, 1 foot west of west right-of-way fence line, and about 28 feet south of edge of woods. To reach from Aitkin, go north on U. S. Route 169 and U. S. Route 210 to their junction, proceed east 3.1 miles on U. S. Route 210 to gravel road leading north and east, and follow this road 1.5 miles to Jacobson's house and station site. Surface and underground marks were nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 30 feet south of gate to Jacobson's house, 20 feet east of center line of road, 1.4 feet west of east right-of-way fence line, and 47.922 meters (157.22 feet) from station in azimuth 343°58′. In 1934, surface station mark was re-marked with a standard station disk. One corner of reference mark had been broken off. Two additional reference marks and an azimuth mark were established (probably standard reference disks in concrete). No. 1 is 24 feet east of center line of road, inside Jacobson's yard, 6 feet south of walk to house, 2.5 feet east of fence, and 39.960 meters (131.10 feet) from station in azimuth 339°03′. No. 2 is in west side of corral, 4.5 feet west of north-and-south fence line, 57.5 feet north of east-and-west fence line, and 43.103 meters (141.41 feet) from station in azimuth 43°16′. Azimuth mark is in rail-gate fence corner, 7 feet west of gate, and 0.25 mile from station in azimuth 359°22′50″. To reach azimuth mark from station, go south 0.25 mile on gravel road to driveway on west side of road. Following distances and azimuths are from station: J. Hegman's house, east gable, one-fourth mile, 140°42′31″; and Jacobson's house, west gable, about 75 meters (246 feet), 306°01′.

Bethlehem (Aitkin County, H. D. King, 1905; 1934).—Near center of sec. 10, T. 46 N., R. 26 W. of the fourth principal meridian (Northland Township), in yard of Bethlehem church, on small hill which is timbered and highest point in vicinity, 99 feet southeast of southeast corner of church, and 32 feet west of north-and-south wire fence. To reach from railroad depot in south side of Aitkin, go south 0.35 mile on U. S. Route 169 to junction with Route 56, turn left (east) onto Route 56 and go 1.0 mile, turn right (south) and go 0.55 mile, leave Route 56 and continue south 1.2 miles on gravel road, take left fork (east) and go 1.9 miles to T-intersection, continue straight ahead (east) 1.1 miles to small grocery store, continue straight ahead (east) 1.15 miles to schoolhouse, take left fork and go 0.3 mile to top of hill, turn left and go about 100 yards to church and station site. Surface and underground marks were nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark was nail in terra-cotta pipe filled with and set in concrete note 23, 96 feet east of southeast corner of church, 10 feet east of north-and-south wire fence, and 26.641 meters (87.40 feet) from station in azimuth 209°13′. In 1934: Nail in surface station mark was replaced with standard station disk stamped "Bethlehem 1905–1934." Nail in reference mark

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was replaced with standard reference disk stamped "Bethlehem #1 1905–1934." Two additional reference marks were established (probably standard reference disks in concrete). No. 2 is flush with surface, 15 feet south-southwest of southeast corner of church, and 28.293 meters (92.82 feet) from station in azimuth 140°40′. No. 3 is in square block projecting about 8 inches, 1.5 feet east of west fence of cemetery, and 568.5 feet from station in azimuth 84°39′53″. Following distances and azimuths are from station: John Larsen's barn, north gable of cupola, about three-fourths mile, 284°29′51″; Christensen's house, chimney, about one-half mile, 1°23′02″; John Hansen's barn, south gable, about three-eighths mile, 98°27′55″; *Bethlehem, church spire*, 31.5 meters (103 feet), 140°46′; and N. Lordineroff's house, center chimney, about one-fourth mile, 247°30′40″.

Rae (Aitkin County, H. D. King, 1905; 1935).—About 4½ miles southeast of Kimberly railway station, in NE¼ sec. 29, T. 47 N., R. 24 W. of the fourth principal meridian, on land belonging to State and used as game preserve (formerly Davidson & McRae stock farm), on highest part of slight hill (thinly wooded), in cluster of brush, about 425 feet south of section-line road, 142 paces from section-line fence, about 150 feet east along north section-line road from first house west of frame school east of corner of road, 52 feet west of blazed 15-inch white oak, 34 feet east of triangle-blazed 6-inch red oak, 19 feet northeast of trail, and 12 feet northwest of triangle-blazed 6-inch red oak. To reach from Kimberly, follow road south 4.5 miles to State game preserve, thence to house of C. J. Peterson (formerly occupied by E. Antell), thence south 160 paces to station. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 32.51 meters (106.7 feet) from station in azimuth 349°47′. Following distances and azimuths are from station: O. Cosselin's house, east gable, about 1 mile, 118°02′37″; Jennison's barn, south gable, about 1 mile, 168°30′20″; and center of island in Rice Lake, 347°38′. In 1935, reference mark was reported destroyed.

Kimberly (Aitkin County, H. D. King, 1905; 1935).—About 5 miles by wagon road northeast of Kimberly railway station, 1 mile north of Northern Pacific Railway tracks near Portage station, in SE¼SE¼ sec. 30, T. 48 N., R. 24 W. of the fourth principal meridian (Jevne Township), about 22 paces west of west wagon road from Ole Jevne's house to Portage, in center of small knoll in timber and brush about one-half mile south of Jevne's house, about 700 feet northwest of house occupied by Mr. Gray, about 600 feet west along highway from southeast corner of sec. 30, and 500 feet north of highway. To reach from Kimberly railway station, follow road on north side of track in easterly direction 3½ miles to deep railway cut, there take left-hand road northeast for about 1¼ miles toward Ole Jevne's house, leaving timbered hills on south side of road. About one-eighth mile before reaching Jevne's place take road to south toward Portage, and main road to McGregor for one-fourth or three-eighths mile to highest point of timbered ridge. To reach from Aitkin, follow U. S. Route 210 east about 17.5 miles to southeast corner of sec. 30. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, on small knoll across old woods road, 8 paces from middle of road, and 26.47 meters (86.8 feet) from station in azimuth 222°50′. Following distances and azimuths are from station: F. W. Turner's house, south gable, about three-fourths mile, 162°07′18″; E. D. Turner's house, south gable, about 1 mile, 196°17′27″; and Robert Bailey's house, west gable, about 1½ miles, 276°05′13″.

Grindle (Aitkin County, H. D. King, 1905; 1935).—Four and one-half miles south by wagon road from McGregor, in SW¼ sec. 17, T. 47 N., R. 23 W. of the fourth principal meridian, on land owned by John Lewis, 65 paces northwest of his house, on west section line, 250 paces north of quarter-section corner, north of private road leading to Lewis' farm buildings, 72 feet east of center of highway, and 17 feet north of short east-and-west fence. To reach from McGregor, follow highway south to railroad crossing and continue south about 3.9 miles to station. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Upper mark projects 6 inches above ground. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, just outside of fence between Lewis' house and

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road, 75 feet east of center of highway, 13 feet north and 56 feet west of house, and 34.96 meters (114.7 feet) from station in azimuth 359°49′. Following distances and azimuths are from station: Holder's house, north gable, about one-fourth mile, 10°14′; Westburger's barn, east gable, about three-fourths mile, 53°23′36″; center of island in Rice Lake, 56°27′; *McGregor, Vandewater Sawmill, stack*, 158°24′47″; Vernon Grindle's house, northeast corner, 200 paces, 65°45′; *McGregor, schoolhouse belfry*, 160°32′26″; John Graydon's house, southeast gable, about 1 mile, 171°12′15″; schoolhouse belfry, about 1 mile, 181°43′34″; Carlson's house (on northeast shore of lake), south gable, about one-fourth mile, 230°52′50″; Johnson's barn, west gable, about one-eighth mile, 268°56′13″; and Lewis' house, east gable, 50 paces, 299°42′.

Gregor (Aitkin County, H. D. King, 1905).—About 2 miles north of McGregor railway station, in SW¼SW¼ sec. 18, T. 48 N., R. 23 W. of the fourth principal meridian (McGregor Township), on land belonging to Ole Hoven, on small knoll about 75 meters (246 feet) southwest of Hoven's house, and 7 meters (23 feet) west of fence between cultivated field and pasture. Line between towns of McGregor and Jevne passes by station, and corner common to sections 18 and 19 of McGregor Township and sections 13 and 24 of Jevne Township is about 210 paces south of station. To reach station from McGregor, cross railway just east of railway station, and take first right-hand turn, follow main road across Sandy River bridge, turn east and follow wagon trail to Hoven's place, total distance of 5 miles. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, near gateway to Hoven's house, and 36.70 meters (120.4 feet) from station in azimuth 182°00′. Following distances and azimuths are from station: Schoolhouse belfry, about 1½ miles, 151°17′08″; John Dahl's house, west gable, about one-half mile, 216°34′26″; *McGregor, schoolhouse belfry*, about 2 miles, 349°06′36″; and *McGregor, Vandewater Sawmill, stack*, about 2 miles, 352°46′24″.

Douglas (Aitkin County, H. D. King, 1905; 1935).—Three and one-half miles by road west of south from Tamarack, near center of NE¼SW¼ sec. 28, T. 48 N., R. 22 W. of the fourth principal meridian, one-fourth mile northwest of Tower Lake, on hill that is covered with light poplar and brush, on land belonging to Frank Clef (formerly owned by E. L. Douglas), 24 feet south of triangle-blazed 6-inch poplar tree, and 13 feet east of another similar tree. To reach from Tamarack, follow main road south 2¼ miles to farm of Guy Russel and follow woods trail through timber to station. Hill has a few dead trees and small bushes on left-hand (south) side of trail, which apparently ends a little farther on. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, on south side of trail, about 5 feet lower than station, 12 feet west of triangle-blazed 8-inch poplar tree, and 44.86 meters (147.2 feet) from station in azimuth 70°53′. Following distances and azimuths are from station: John Maxwell's house, west corner, three-eighths mile, 240°41′06″; Leveitchi's barn, northwest gable, about three-eighths mile, 254°56′17″; and Fred Burger's house, north gable, about one-half mile, 276°20′56″.

Tamarack (Aitkin County, H. D. King, 1905; 1935).—On north shore of Round Lake, in NE¼NE¼ sec. 25, T. 49 N., R. 23 W. of the fourth principal meridian, on land belonging to Edward Obernolte, about 125 meters (410 feet) northeast of his house, on knoll in cultivated field, and about 200 meters (656 feet) north of wagon road along lake shore. To reach from Tamarack, follow County Route 10 north and west to north end of Round Lake and Obernolte's farm. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, in east-and-west fence line (north fence line about barns and outbuildings), 34 feet east of east face of machinery shed, 1 foot east of fence post, and 67.51 meters (221.5 feet) from station in azimuth 12°41′. Following distances and azimuths are from station: Edward Obernolte's house, north gable, 125 meters (410 feet), 37°25′; Dan McGary's house (on shore of Mud Lake), east gable, about 2¼ miles, 139°47′43″; John Anderson's house, northeast corner eaves, about three-fourths mile, 325°44′31″; and Francis Jacobson's house (southeast corner of Round Lake), northwest corner eaves, 332°53′21″.

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Wright (Carlton County, H. D. King, 1905; 1935).—Four miles north and 2 miles west of Wright, in NE¼NW¼ sec. 18, T. 49 N., R. 21 W. of the fourth principal meridian, about three-eighths mile east of John T. Norten's house, and on State land on small knoll on which are a few dead trees and bushes. To reach from creamery in Wright, go north about one-half mile to old highway (good gravel road), go west 2¼ miles to crossroads, and go north 3.9 miles to road cut and station which is 60 paces south of timber and 60 paces north of tamarack swamp. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, close to wagon trail, and 27.91 meters (91.6 feet) from station in azimuth 274°29′. In 1935, station reported to be in NW¼NE¼ sec. 18, and land owned by Oscar Anderson. Station also reported to be 110 feet south and 56 feet west of southwest corner of concrete foundation of Anderson's house, 112 feet east of top of road cut, and on small, stony, east-and-west ridge.

Bachelor (Carlton County, H. D. King, 1905; 1935).—Near northeast corner of SW¼ sec. 10, T. 48 N., R. 21 W. of the fourth principal meridian, on small knoll in cultivated field just south of Tamarack Lake, on land owned (in 1905) by J. D. Jones (Mathilda Northberg owner in 1935), about 150 meters (492 feet) east of Jones' house, 128 feet east of fence, and in line with north face of granary (metal-covered building). To reach from Wright, go up Tamarack River in small boat from wagon bridge, one-fourth mile east of town, to Tamarack Lake. From head of river station bears about south by east (magnetic) across lake. To reach station by road, go through A. R. Burdick's field and follow old trail around west end of lake to Jones' place. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 30.07 meters (98.7 feet) from station in azimuth 191°12′. Following distances and azimuths are from station: J. D. Jones' house, east gable, 150 meters (492 feet) 90°14′18″; house on north shore of Tamarack Lake, chimney, one-fourth mile, 203°59′44″; and Grant Rice's house, chimney, 300 meters (984 feet), 215°18′00″. Directions given in 1935 for reaching station from west end of Wright are: Cross concrete highway and follow road southerly around lake to point where road again turns south (leaving lake), go east through gate into field, and proceed to Northberg's house on small hill on south bank of lake. Station is about 800 feet almost due east of this house.

Island (Carlton County, H. D. King, 1905; 1935).—About 2 miles south of Cromwell which is nearest railway station, in northeast corner of sec. 16, T. 48 N., R. 20 W. of the fourth principal meridian, on State school land, about 47 meters (154 feet) south of section corner, at east edge of timber on west side of wagon road from Cromwell to Moose Lake, and 23.5 feet west of center line of north-and-south road. To reach from Cromwell, follow concrete highway east to first road leading south on east side of lake and go south about 2 miles. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, on same side of road as station, and 43.56 meters (142.9 feet) from station in azimuth 179°59′. Following distances and azimuths are from station: Mr. Photo's house, south gable, about 3 miles, 154°27′47″; August Newquist's house, southwest gable, 275 meters (902 feet), 155°51′21″; Axel Swanson's house, south gable, about 3 miles, 156°24′02″; Payne's house, chimney, about 3 miles, 158°13′33″; E. Benson's house, south gable, about 3 miles, 166°11′31″; Bellanger's barn, west gable, about 2 miles, 179°40′25″; Ole Hangland's house, chimney, 300 meters (984 feet), 183°55′; Beck's barn, west gable, about 3 miles, 186°10′01″; and reference stake for corner common to sections 9, 10, 15, and 16, about 47 meters (154 feet), 193° 00′. In 1935, station reported to be on ridge, 138 feet north of east-and-west fence which is on south slope of hill and at south edge of cultivated field, 67 feet west by south of triangle-blazed 12-inch soft maple on east side of road, and 5.5 feet west of fence.

Cromwell (Carlton County, H. D. King, 1905; 1935).—About 6 miles by wagon road northeast from Cromwell, about 400 feet south of center of sec. 19, T. 49 N., R. 19 W. of the fourth principal meridian, on thinly wooded hill, about 7 meters (23 feet) south of center of road, and in center of small cleared space. To reach from Cromwell, follow paved highway east to railway cross-

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ing (overpass), follow road north 1 mile, east ½ mile, north 1 mile, east ½ mile, north 1½ miles, east ½ mile, north ½ mile, east 1 mile, and south about ¾ mile to end of road, and follow old road south to center of section. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 29.09 meters (95.4 feet) from station in azimuth 266°38′. Northwest gable of 2-story farmhouse is about 2½ miles from station in azimuth 57°09′19″. In 1935, hill reported to be covered with heavy growth of small timber and brush; and station is slightly east of cleared north-and-south quarter-section line, and about 24 feet south of old woods trail (seldom used).

Mahtowa (Carlton County, H. D. King, 1905; 1935).—About ¼ mile west and ⅛ mile north of southeast corner of SE¼ sec. 30, T. 48 N., R. 18 W. of the fourth principal meridian (Atkinson Township), in cleared field belonging to August Lundberg, 29.5 meters (97 feet) south by east from southeast corner of Lundberg's house, and 8 meters (26 feet) east-southeast from southeast corner of dooryard fence. To reach station from Mahtowa, take road north toward Park Lake, and when about ½ mile south of lake turn west and go about ¾ mile to Lundberg's house. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, at northeast corner of dooryard fence, and 30.22 meters (99.1 feet) from station in azimuth 212°42′. Following distances and azimuths are from station: Charles Lindberg's house, southeast end of highest ridge, about ½ mile, 147°49′52″; Andrew Peterson's house, chimney, about ⅜ mile, 157°50′21″; August Lundberg's house, highest chimney, 50 meters (164 feet), 166°51′; Ole Eyberg's house, chimney, about ¾ mile, 296°21′48″; Ole Peterson's house, highest chimney, 1 mile, 314°24′59″; Mahtowa, Swedish Lutheran Church, spire, 318°47′59″; Mahtowa, Northern Pacific Railway station, chimney, 325°44′59″; and Chas. Chell's house, chimney, ¾ mile, 348°15′14″. In 1935, surface mark reported destroyed. Underground mark is in cultivated field, 22.5 feet east and slightly south of fence corner and 3 feet below surface of ground.

Sawyer (Carlton County, H. D. King, 1905; 1935).—About 2 miles north of Sawyer railway station, in SE¼SE¼ sec. 29, T. 49 N., R. 18 W. of the fourth principal meridian, in Fond du Lac Indian Reservation, on prominent knoll at southwest edge of Indian village at St. Marys Lake, and about 50 paces north of west from white log house which is plainly visible from railway train in passing west of Sawyer. To reach from Sawyer, follow road north by section house to Indian village, and after passing Indian Catholic Church keep left-hand road to top of knoll. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 29.66 meters (97.3 feet) from station in azimuth 86°13′. Following distances and azimuths are from station: *Cloquet, Catholic Church, spire*, 255°07′11″; white house, south gable, 50 meters (164 feet), 260°57′; Indian house, south gable, 125 meters (410 feet), 277°24′03″; Indian house, ¼ mile, 291°50′58″; Sawyer, Northern Pacific Railway section house, west chimney, 341°59′29″; Sawyer railway station, west chimney, 342°27′20″; and Indian schoolhouse, chimney, 225 meters (738 feet), 200°13′00″. In 1935, station reported to be about 1,000 feet northwest of old Indian Catholic Church, about 1,000 feet southwest of dwellings on hill at west end of Big Lake, on land owned by Joe Petit (lot E, no. 72), 120 feet west of old cellar excavation, about 288 feet west of center of road along east line of sec. 29, and in old wagon trail which crosses road. To reach from brick schoolhouse in Cromwell, go north to Catholic Church, follow fork (about 200 feet north of cemetery) west to top of hill directly west of section-line road.

Atkinson (Carlton County, H. D. King, 1905; 1935).—About 1¾ miles (2¾ miles by road) south of Atkinson railway station, about ⅜ mile east of southwest corner of sec. 36, T. 48 N., R. 18 W. of the fourth principal meridian, on land belonging to S. A. Williams and Julia Williams, on highest point of prominent hill covered with small brush, 18.8 meters (62 feet) east of fence between pasture land and a cleared field belonging to James French, and just west of small excavation in side of hill. To reach from Atkinson, follow paved highway south to gravel pit on east, cross railway tracks and go south about 300 feet, follow road south about 1 mile to southwest corner of section, and go east about three-eighths mile to top of hill and station. Surface

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and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, at fence corner, and 27.85 meters (91.4 feet) from station in azimuth 45°33′. Following distances and azimuths are from station: Thomas Ratcliffe's house, chimney, about ⅝ mile, 91°46′16″; George Hannevel's house, south gable, about ¼ mile, 111°43′07″; James French's small house, southeast corner, about ⅛ mile, 136°39′49″; J. Atkinson's red barn, south gable, 1¼ miles, 167°45′54″; C. G. Wallie's house, highest chimney, ¾ mile, 177°59′23″; Charles Lee's house, west gable, about ¾ mile, 199°45′29″; G. Anderson's store, chimney, 207°09′55″; Presbyterian Church, spire, 1 mile, 212°18′42″; William Culver's house, chimney, 2 miles, 231°10′39″; and A. Matthew's barn, south gable, 3 miles, 277°42′38″.

Cloquet (Carlton County, H. D. King, 1905; 1935).—About 2 miles north and one-half mile west of Cloquet, in SE¼SE¼ section 3, T. 49 N., R. 17 W. of the fourth principal meridian (Knife Falls Township), near line between sections 2 and 3, at highest point of prominent wooded hill, and on land belonging to Mr. Smith of Cloquet. To reach from Cloquet, follow route 33 north to filling station and store on east side of road at top of hill (about 0.8 mile from wood conversion plant), follow road west ¼ mile and north 1.15 miles to point where station site can be seen nearly to west. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 22.23 meters (72.9 feet) from station in azimuth 295°50. Following distances and azimuths are from station: Indian village of Cloquet, church spire, 66°32′32″; red-roofed log barn, gable, 1½ miles, 285°52′52″; blue dwelling house, chimney, about 1¼ miles, 291°16′ 28″; large new barn, cupola, 1½ miles, 308°42′53″; *Cloquet, paper mill, stack*, 313°27′32″; Cloquet, gray church, black spire, 337°58′00″; *Cloquet, Catholic Church, spire*, 344°13′24″; and Limer's barn, north gable, about 1½ miles, 348°32′20″.

Annie (St. Louis County, H. D. King, 1905; 1935).—Ten miles by wagon road northeast of Carlton, 12 miles southwest of Duluth, 7 miles southwest of West Duluth, in SW¼SE¼ section 20, T. 49 N., R. 15 W. of the fourth principal meridian, on highest point of prominent wooded and rocky hill, ¼ mile south of Carlton and Duluth wagon road at Annie post office which is about ½ mile east of crossroads to Fond du Lac and New Duluth, and ⅛ mile west of fork leading to Pike Lake. To reach station from Duluth or West Duluth, take Carlton and Duluth wagon road to Annie post office, go about 200 yards east of post office to corner of cleared field, continue on cut-and-blazed trail south through timber to top of hill and station site. Station was marked as follows: Hole 20 inches in diameter was dug 20 inches deep to solid rock ledge, underground mark was marked on this rock by intersection of two lines each 2 inches long. Over this cross was set piece of 4-inch terra-cotta sewer pipe, 2 feet long, and hole was filled with concrete level with surface of ground. Pipe projects 4 inches above concrete, and in its top was set 60-penny wire nail, head down, its point projecting one-fourth inch and marking station. Letters "U. S. C. & G. S. 1905" were inscribed in concrete surrounding pipe. Reference mark is rude cross in circle, about 5 inches in diameter, cut in outcropping ledge and 16.78 meters (55.1 feet) from station in azimuth 225°19′. Following distances and azimuths are from station: Mr. Weeter's house, center chimney, 1½ miles, 105°20′01″; schoolhouse, center chimney, about 1¼ miles, 121°29′04″; Thomas Johnson's house, chimney, about ½ mile, 129°37′00″; Charles Hendrickson's house, south gable, about ⅝ mile, 130°59′01″; Anderson Brothers house, about ⅜ mile, 179°03′33″; and William's house, chimney, about ½ mile, 198°31′30″. In 1935, surface mark reported to have been broken and nail missing. Mark is on property of Nopeming Sanitarium, about one-fourth mile east and a little north of sanitarium, on hill known locally as "Signal Hill", leading back of cottages and east of brick building.

Carlton (Carlton County, H. D. King, 1905; 1935).—About 1 mile south of Carlton, near center of west side of NW¼ sec. 18, T. 48 N., R. 16 W. of the fourth principal meridian, in pasture belonging (in 1905) to James Dumphy (merchant of Carlton), (in 1935, in yard at N. A. Moline's house) about 75 paces west of wagon road from Carlton to Twin Lakes, and on hill covered with small bushes and scattering timber. To reach from Carlton, follow main road south one-half mile to forks of road, go south three-fourth mile on

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right-hand road to farmhouse of Gus Mosers, and continue to height of land and station site. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, just inside fence on east side of road, and 55.61 meters (182.4 feet) from station in azimuth 90°08′. Following distances and azimuths are from station: Small farmhouse, chimney, one-half mile, 26°18′05″; gray farmhouse, chimney, about one-half mile, 54°39′58″; Gus Mosers' house, chimney, 300 meters (984 feet), 167°43′41″; Carlton County courthouse, round tower, 185°52′39″; Carlton, high-school belfry, 187°46′59″; Carlton, Presbyterian Church, spire, 193°45′10″; Thompson, brown church, south gable, 226°23′50″; and farmhouse, chimney, about five-eighth mile, 359°36′46″. Station was not recovered in 1935, probably destroyed when land was leveled for building of house. In 1935, reference mark was described as being in front of Mr. N. A. Moline's house, 75 feet southwest of telephone pole in front yard, 37 feet east of power pole almost in front of house and at east side of north-and-south road, and 7.5 feet south of a line between power pole mentioned and a power pole just south of house.

Dedham (Douglas County, Wis., H. D. King, 1905).—About one-eighth mile south of Dedham and Black River Falls wagon road, 2½ miles south of east from Dedham railway station on Great Northern Railway, 2 miles southwest from Black River Falls, and in NE¼ sec. 30, T. 47 N., R. 14 W. of the fourth principal meridian. To reach from Superior, take road south via South Superior, Greenwood Cemetery, and Nemadji River bridge to Black River Falls, when about 2 miles southwest of bridge over Black River take trail south for about one-eighth mile toward Mr. Conigan's place, then proceed west about 85 paces to station site on top of small rocky hill covered with small poplar brush. Marked as follows: Hole 20 inches in diameter was dug 18 inches deep to solid ledge of rock, in this rock was drilled a hole, 2 inches in diameter and 4 inches deep, and a 40-penny wire nail was set head down in drill hole which was filled with cement. Nail is 17½ inches below surface, and projects ½ inch above rock. Over this underground mark was placed 4-inch terra-cotta sewer pipe 2 feet long, and hole in ground and pipe both filled with concrete; 60-penny wire nail was embedded head down in concrete-filled pipe, and projects one-fourth inch above concrete. In concrete surrounding pipe were inscribed letters "U. S. C. & G. S. 1905." Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 19.96 meters (65.5 feet) from station in azimuth 47°16′. Following distances and azimuths are from station: Farmhouse, chimney, about 2 miles, 104°11′41″; Dedham, Great Northern Railway station, chimney, 113°02′40″; Dedham, hotel chimney, 115°39′18″; and Great Northern Railway trestle, about 2 miles, 181°13′16″.

Superior (Douglas County, Wis., H. D. King, 1905; 1921).—About 1¾ miles southeast of South Superior, in middle of south side of SE¼ sec. 11, T. 48 N., R. 14 W. of the fourth principal meridian, 20 paces north of abandoned wagon road along south side of section 11, in wooded field which was formerly a pasture, and about halfway between turn to east mentioned below and bridge over creek. To reach from Superior, take Tower Avenue south through South Superior to the Fred Billings public school, then follow road east and southeast across Nemadji River to where road turns due east again, and follow it to height of land between Nemadji River and first small creek to east. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, just inside fence along north side of road, and 41.71 meters (136.8 feet) from station in azimuth 280°05′. Following distances and azimuths are from station: *Boylston, Great Northern Railway, signal tower*, 30°47′18″; *Saunders, Great Northern Railway, water tank*, 1¼ miles, 59°51′31″; farmhouse, chimney, about ½ mile, 113°19′12″; *South Superior, Billings School, belfry*, 1 mile, 128°32′10″; *South Superior, Webster Chair Manufacturing Co., stack*, 144°21′05″; *South Superior, Bryant School, northeast corner of northwest chimney*, 1.5 miles, 150°58′59″; elevator M, stack, 203°40′20″; *Superior, ore docks, Weather Bureau signal tower*, 5 miles, 217°50′32″; and *Itasca, Chicago, St. Paul, Minneapolis and Omaha Railway, elevator stack*, 4½ miles, 228°18′59″.

Duluth (St. Louis County, H. D. King, 1905).—About 1½ miles back from St. Louis Bay, ¾ mile from Grand Avenue, on summit of hill at head of

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Fortieth Avenue, West Duluth, about 50 paces back from brow of hill, and just southwest of prolongation of Fortieth Avenue which is opened to foot of hill. Marked as follows: Hole was dug 20 inches in diameter and 12 inches deep to solid rock, and cross with 2-inch arms intersecting at right angles cut in rock to mark station. Over this mark was set 4-inch terra-cotta sewer pipe 17 inches long, and hole and pipe filled with concrete; pipe projects 5 inches above concrete. In concrete in top of pipe was embedded 60-penny wire nail, head down, its point projecting one-fourth inch. Concrete surrounding pipe was marked with letters "U. S. C. & G. S. 1905." Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, 16.45 meters (54.0 feet) from station in azimuth 65°41′. Following distances and azimuths are from station: *Proctorknott, railway shops, water tank*, 3 miles, 71°19′17″; *Duluth, house at head of West Fifth Avenue, chimney in center of 4-pitch roof*, 3 miles, 232°39′09″; National Iron Works, tower, 342°19′21″; *Duluth, Union Match Co., water tank*, 1½ miles, 344°42′53″; and *Duluth, Union Match Co., cupola*, 1½ miles, 345°28′02″. In 1921, station was not recovered and station *Duluth 2* was established in approximately same position as old station.

Mississippi River Commission (second order)

Rice back base (M. R. C.) (Benton County, Mississippi River Commission, 1898; W. H. Burger, 1903; 1935).—In open prairie 300 feet west of Northern Pacific Railway, 2.6 miles south of Rice railway station, about 10 meters (33 feet) south of section line, and near north side center of NW¼ sec. 10, T. 37 N., R. 31 W. of the fourth principal meridian. Marked by standard mark of the Mississippi River Commission, brass cap on steel pipe above and copper bolt in tile below, note 19. In 1935, station reported to be in cultivated field, 16½ rail lengths (or 4 poles) south of first signal stand south of milepost 86, 415 feet east of east rail of railway, 315 feet west of center line of Route 10, 28 feet south of east-and-west fence (approximately north line of sec. 10), and projecting 10 inches above ground.

Gottwalt (M. R. C.) (Benton County, Mississippi River Commission, 1898; W. H. Burger, 1904).—Near west side of sec. 14, T. 38 N., R. 31 W. of the fourth principal meridian, near middle of north-and-south road, 5 meters (16 feet) east of wagon track, midway between Joseph Culeger's house and Lewis E. Gottwalt's house, one-half mile north of road leading northeast from Rice, about 3 miles from Rice, and on first road branching to left after passing Rice Mill. Marked by standard mark of the Mississippi River Commission, brass cap on steel pipe above and copper bolt in tile below, note 19. In 1935 reported that station has possibly been destroyed by road construction.

Royalton (M. R. C.) (Benton County, Mississippi River Commission, 1898; W. H. Burger, 1903; 1935).—About 1½ miles below Royalton, in E½SW¼ sec. 1, T. 38 N., R. 32 W. of the fourth principal meridian, on property owned by Eliza Tiemann (formerly owned by S. G. Hillman), in scrub-oak timber on ridge 600 meters (1,968 feet) east of the Northern Pacific Railway, 350 meters (1,148 feet) north of east-and-west wagon road, about 250 meters (820 feet) west and 40 meters (131 feet) south of Hillman's house, and 30 meters (98 feet) west of edge of wheat field. Marked by standard mark of the Mississippi River Commission, brass cap on steel pipe above and copper bolt below, note 19. Blazed trees are at following distances and azimuths from station: 8-inch scrub oak, 15.7 meters (52 feet), 136°; 10-inch scrub oak, 5.6 meters (18 feet), 246°; and 8-inch black oak, 7.2 meters (24 feet), 3°. In 1935, station reported to be about one-fourth mile west of Tiemann's farm buildings which are near east side of section, on shady knoll in scrub-oak timber, about 200 feet west of cultivated field, and projecting about 30 inches above ground. To reach from Royalton, follow Route 10 south to first section road leading east after passing bridge, and follow road east three-fourths mile and north three-eighths mile to Tiemann's farm.

Skounter Hill (M. R. C.) (Benton County, Mississippi River Commission, 1898; W. H. Burger, 1904; 1935).—One and one-half miles northwest of Rice, on highest part of large bare sand mound, the only one of size in the vicinity and known as "Skounter Hill", and on property of Deering Manufacturing Co., of St. Paul. Marked by standard mark of the Mississippi River Commission, brass cap on steel pipe above and copper bolt below, note 19. In 1935, station was found tilted to north and loose in ground, so was straightened but not

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centered. Also reported to be 198.5 feet north of east-and-west fence, 313 feet south and a little east of triangle-blazed tree which is north of hill.

Swan Creek (M. R. C.) (Morrison County, Mississippi River Commission, 1898; W. H. Burger, 1904).—About 3 miles below Little Falls, in SW¼ sec. 12, T. 128 N., R. 30 W. of the fifth principal meridian on high ridge on the right bank of the Mississippi River, 1 mile below mouth of Swan Creek, one-half mile west of river, 300 meters (984 feet) northeast of group of three houses which stand on second east-and-west road below Swan Creek, 2 meters (7 feet) south of an east-and-west fence, 65 meters (213 feet) west of junction of that fence with a north-and-south fence, in timber on property of Wiecoent Rekocoski, and 150 meters (492 feet) nearly south of large lone pine. Marked by standard mark of the Mississippi River Commission, brass cap on steel pipe above and copper bolt below, note 19. Blazed trees are at following distances and azimuths from station: 24-inch white oak, 17.4 meters (57 feet), 264°; 20-inch white oak, 23.1 meters (76 feet), 161°30′; and 10-inch red oak, 3.4 meters (11 feet), 45°. In 1935 station was not recovered. Stump of large lone pine tree was found. All reference trees and fences were reported destroyed. Swan Creek is called Pike Creek.

Gregory (M. R. C.) (Morrison County, Mississippi River Commission, 1898; W. H. Burger, 1904; 1935).—About 4 miles south and 1 mile east of Little Falls, on a bluff on east side of Mississippi River, in NW¼ sec. 34, T. 40 N., R. 32 W. of the fourth principal meridian (Little Falls Township), 350 meters (1,148 feet) back from end of ridge, 9 meters (30 feet) south of wire fence, and 5 meters (16 feet) west of 4-foot boulder. To reach from Little Falls, follow road south past ball grounds of country schoolhouse to where road turns east, follow road along quarter-section line of sections 26 and 27 to right-hand road near top of ridge, take right-hand road and go three-eighths mile to house of Mr. J. Crabtree, go through his yard and take faint road through brush to top of ridge and station site. Marked by standard mark of the Mississippi River Commission, brass cap on steel pipe above and copper bolt below, note 19. In 1935, land at station reported to be in NE¼ sec. 33, and owned by Barney Burton. Station reached from Little Falls as follows: Follow highway south to depot at Gregory, go east 2.1 miles to top of ridge and road leading south through timber, and follow this road to Frank Crabtree's house. Station is west along south fence line of his cultivated field.

Big Mound (M. R. C.) (Morrison County, Mississippi River Commission, 1898; W. H. Burger, 1904; 1935).—About 4 miles above old Fort Ripley, 1½ miles from the river, in NE¼ sec. 23, T. 132 N., R. 30 W. of the fifth principal meridian, 400 meters (1,312 feet) north of the second road above Fort Ripley ferry (now abandoned) which branches to left from river road about 1½ miles east of Mrs. Brown's residence, and on top of largest mound in vicinity which is the largest mound east of Chadwick Lake. A small log cabin stands at junction of above road with river road. Marked by standard mark of the Mississippi River Commission, brass cap on steel pipe above and copper bolt below, note 19. In 1935, station reported to be about 900 feet northeast of center of section (center marked by point where road turns west), and about one-half mile north of deserted house which has two rows of pine trees along lane leading to it. To reach from Fort Ripley, follow paved road north to road leading west and crossing Mississippi River, on west side of river continue north 3.2 miles to road to west, and follow this road west and north past house to center of section.

Oleson (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898; W. H. Burger, 1904).—About 3 miles northeast of Crow Wing depot, about 3 miles below point where road crosses railroad, about ¼ mile southwest of Chris Oleson's farmhouse on Brainerd and St. Mathias wagon road, in S½ sec. 27, T. 44 N., R. 31 W. of the fourth principal meridian, on property of the Northern Pacific Railway Co., in jackpines, 80 meters (262 feet) east of north-and-south wire fence, and on upper end of last high ridge in vicinity. Marked by standard mark of the Mississippi River Commission, brass cap on steel pipe above and copper bolt below, note 19. Following distances and azimuths are from station to blazed trees: 6-inch red oak, 5 meters (16 feet), 346°; 14-inch jackpine, 3.3 meters (11 feet), 143°; and 12-inch jackpine, 13.7 meters (45 feet) 236°. Station was not found in 1935.

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Supplementary points

Hereford, elevator (Grant County, W. H. Burger, 1904; 1935).—Recovered in 1935, and reported to be Monarch Elevator Co.'s building.

Dalton astronomical station (Otter Tail County, W. H. Burger, 1904; 1907).—In town of Dalton, near Great Northern Railway station, and on prominent small knoll in vacant lot belonging to M. T. McMahon who lives in Fergus Falls. Surface and underground marks are nails in terra-cotta pipes filled with and set in concrete, notes 16 and 20. Reference mark is nail in terra-cotta pipe filled with and set in concrete, note 23, on north side of street at south end of lot belonging to John Rorang of Dalton and leading back from store building just west of Bank of Dalton, 120 paces east of railway station, and 29.757 meters (97.63 feet) from station in azimuth 179°26′. Following distances and azimuths are from station: Dalton Lumber Co.'s building, gable, about 300 feet, 6°48′; Minneapolis and Northern, elevator, northeast corner, 80.3 meters (263 feet), 59°00′; Bank of Dalton, chimney, about 175 feet, 187°05′; and Oliver Rustadt's house, small gable over west entrance, about 200 feet, 273°08′. Stations *Dalton* and *Leaf* (see descriptions thereof) are both visible from ground. In 1935, creamery reported to have been built over station; station lost.

Alexandria, Catholic Church, spire (Douglas County, W. H. Burger, 1904; 1935).—Spire on red brick church which faces south and is in eastern part of town of Alexandria.

Sauk Center, Catholic Church, spire (Stearns County, W. H. Burger, 1904; 1935).—Spire on red brick church, located just east of main business street in Sauk Center.

Little Falls, high school spire (Morrison County, W. H. Burger, 1904; 1935).—Spire on what was formerly the high school in Little Falls, now a graded school.

Brainerd, railroad shops, tallest stack (Crow Wing County, H. D. King, 1905; 1935).—Stack at shops of Northern Pacific Railway Co. in eastern part of Brainerd.

Brainerd, Catholic Church, spire (Crow Wing County, H. D. King, 1905; 1935).—Spire on church three blocks south of railway tracks and three blocks east of main north-and-south street in Brainerd. In 1935 reported this is Lutheran Church.

Scanlon, schoolhouse cupola (Carlton County, H. D. King, 1905; 1935).—Cupola on frame schoolhouse on high hill, on west side of concrete highway entering Scanlon.

Duluth, Union Match Co., water tank (St. Louis County, H. D. King, 1904; 1935).—Water tank at plant in western section of Duluth, near street railway barns.

Duluth, Elevator B, stack (St. Louis County, H. D. King, 1905; 1935).—Stack is located on water front, near Interstate Bridge approach.

Duluth, Elevator H, stack (St. Louis County, H. D. King, 1905; 1935).—Stack and elevator located on water front near Interstate Bridge approach.

DULUTH TO KEWEENAW POINT ARC

Principal points

Minnesota Point south base (U. S. L. S.) (St. Louis County, U. S. Lake Survey, 1870; 1935).—About three-eighths mile north of south end of long sand spit, which separates Lake Superior from Superior Bay, and 60 feet from shore of Superior Bay. Underground mark is red sandstone block 1 foot square and 3 feet long, its top 5 feet below surface; in top of stone is triangular brass plug, 0.03 foot on side in cross section, on end of which are two scratches starting from two corners of plug, and intersecting at its center to mark station. Above subsurface stone was placed block of granite 1 foot square and 4 feet 10 inches long, top of stone 6 inches above surface, with ¼-inch drill hole in center to mark station. Three red sandstone blocks 1 foot square and 3 feet long were placed as reference marks, each 15 feet from station, one in prolongation of base line, and two at right angles to and on opposite sides of that line. Following azimuths are from station: Elevator "M", smokestack, 75°07′01″; *Superior*,

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elevator "K" stack, 82°06′01″; East Superior, Lincoln School, flagstaff, 103°45′15″; lighthouse, 287°23′31″; lighthouse, 303°24′33″; Itasca, Chicago, Saint Paul, Minneapolis and Omaha Railway, elevator stack, 330°28′29″; and Superior Ore Docks, Weather Bureau signal tower, 33°08′58″.

Minnesota Point north base (U. S. L. S.) (St. Louis County, U. S. Lake Survey, 1870; 1935).—On low sand spit which is about 6 miles long and one-fifth mile wide, largely covered with shrubbery and pine forest, and separates Lake Superior from Superior Bay; about 10 meters (33 feet) from west shore of spit, about 1½ miles south of Duluth ship canal, about 100 feet west of car track, and just north of Twenty-fifth Street. Marked as follows: Red sandstone block 1 foot square on top and 3 feet long was set on end so that its top was about 1 inch below surface of ground; in center of top was set triangular brass plug, 0.03 foot on side in cross section, and on end of plug were two scratches running from two corners of plug and intersecting near center, to mark station. Above sandstone block was placed cast-iron cap or cover, ½-inch thick and 2 feet square, provided with flange 6 inches wide setting down into ground around head of stone, so that top of surface of cap was even with surface of ground; in center of upper surface of cover was hub $\frac{3}{16}$-inch high and 2 inches in diameter, in center of which was drilled ¼-inch hole to mark station. Three reference stones were placed, each 15 feet from station, one in prolongation of base, and two at right angles to base line and on either side of it. These stones are similar to stone at center of station, being 1 foot square, and 3 feet long, and of red sandstone. North reference mark is incased in concrete. Station is surrounded by many small summer cottages. Following azimuths are from station: *Superior, St. Mary's Hospital, spire*, 14°31′31″; *Duluth & Superior, Interstate Bridge, center of draw span, operator's tower*, 60°40′29″; Agler & Smith's sawmill, smokestack, 71°17′15″; Duluth, elevator "H", stack, 112°45′15″; *Duluth, elevator "B", stack*, 127°52′54″; Superior State Normal School, chimney, 181°39′15″; and elevator "M", smokestack, 334°10′19″.

Lester River (U. S. L. S.) (St. Louis County, U. S. Lake Survey, 1871).—About 7 miles northeast of Duluth, about 2 miles northeast of mouth of Lester River, and about 1 mile from north shore of Lake Superior. Station mark is brass frustrum leaded into the solid surface rock. Reference marks are three pine stumps, approximately north, south, and west, correspondingly lettered on blazes by means of nails, and distant, respectively, 16.42 feet, 15.42 feet, and 17.33 feet from station. U. S. Lake Survey records also call this station "Lester."

Oneota River (U. S. L. S.) (St. Louis County, U. S. Lake Survey, 1870; 1871).—About three-fourths mile east of village of Oneota, 30 feet from north shore of St. Louis Bay, on east bank of small stream flowing into bay, 61 feet south of south rail of Lake Superior and Mississippi Railway. Surface and underground marks are stone posts. Top of upper post projects 6 inches above surface. Top of lower post is 3 feet below surface. U. S. Lake Survey records also call this station "Oneota."

Aminicon River (U. S. L. S.) (Douglas County, Wis., U. S. Lake Survey, 1871).—About one-fourth mile west of mouth of Aminicon River, close to south shore of Lake Superior. Surface and underground marks are stone posts. Top of upper post is nearly flush with surface. Top of lower post is 3 feet below surface. Reference marks are three birch stumps, approximately north, south, and west, correspondingly lettered on blazes by means of nails, and distant, respectively, 14.08 feet, 4.25 feet, and 9.58 feet from station. Large pine post bearing S. 50°54′ E. is 30.43 feet from station. U. S. Lake Survey records also call this station "Aminicon."

Buchanan (U. S. L. S.) (St. Louis County, U. S. Lake Survey, 1871).—In northeast part of St. Louis County, about 1 mile southwest of Granite Point, and not more than 100 feet from north shore of Lake Superior. Station apparently not marked, referenced as follows: Brass frustrum leaded into solid rock, S. 36°30′ E., distant 2 feet; iron bolt, leaded in rock, N. 36°30′ W., distant 3 feet; and large boulder, used as latitude post, S. 78°44′ W., distant 1,194.1 feet.

Brule River (U. S. L. S.) (Douglas County, Wis., U. S. Lake Survey, 1871).—Close to south shore of Lake Superior and 1 mile east of mouth of Bois Brule River. Station apparently not marked, referenced as follows: Latitude post, S. 80°00′ W., distant 69 feet; and another post due south of latitude post

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and 69.3 feet distant from it, under which is a boulder with cross cut on top. U. S. Lake Survey records also call this station "Brule."

Burlington (U. S. L. S.) (Lake County, U. S. Lake Survey, 1871).—On north shore of Lake Superior, on point of land bounding northeast side of Burlington Bay. Station mark is brass frustrum leaded into solid rock. Three similar frustrums are set north, south, and west, each 50 feet from station.

Clay Banks (U. S. L. S.) (Bayfield County, Wis., U. S. Lake Survey, 1871).—About 4 miles northeast of Port Wing, about 6 miles west of Bark Point, and one-half mile from lake shore. Station mark is stone post set over wrought-iron spike driven into sandstone surface rock. Distances and directions from station to following objects are: Granite boulder, 27 feet, north; pine stump marked "W", 23.75 feet, west; and poplar stump marked "S", 37 feet, south.

Split Rock (U. S. L. S.) (Lake County, U. S. Lake Survey, 1870; 1871).—On Split Rock Point. Station mark is cross cut in solid surface rock. Reference marks are three crosses cut in rock, east, south, and west of station, each distant 15 feet from station.

Detour (U. S. L. S.) (Bayfield County, Wis., U. S. Lake Survey, 1870; W. Bowie, 1908).—About due south of west end of Sand Island, about 30 feet from rock bluff at shore. Station mark is copper bolt at center of cross in top of stone post 8 inches square. Three stone reference posts, similarly marked, are east, south, and west, each 15 feet from station. Azimuths and distances from station to three balsam trees are, 290°25′, 50 feet; 331°38′, 31.2 feet; 25°49′, 39.6 feet.

West Sawteeth (U. S. L. S.) (Lake County, U. S. Lake Survey, 1870).—On highest of Sawteeth Mountains, about 2 miles due north from mouth of Baptism River. Station mark is brass frustrum leaded into solid surface rock. Reference marks are three blazed pine trees as follows: One northeast, distant 67.5 feet; another northwest, distant 25 feet; and a third south, distant 95 feet.

Outer Island (U. S. L. S.) (Bayfield County, Wis., U. S. Lake Survey, 1870).—On northwest side of Outer Island. Surface and underground marks are stone posts. Top of upper post is flush with surface. Top of lower post is 3 feet below surface. Three stone posts were set, north, south, and west of station, each distant 9 feet from station. In 1901 this station was reported "not found, probably caved off bank." *Outer Island latitude station* (*U. S. L. S.*) (see description thereof) is 11.28 meters (37.0 feet) distant in azimuth 197°17′.

Farquhars Knob (U. S. L. S.) (Cook County, U. S. Lake Survey, 1869; J. P. Lushene, 1934).—On northwest shore of Lake Superior, about 4 miles northwest of Hovland. To reach from Hovland, follow McFarland Lake Road about 3⅓ miles to new road to left (Hovland Tower Road), turn left and continue about one-half mile to small garage on right. Trail leading to station is directly across road from garage, follow up trail about 400 yards to top of hill and station site. Station mark is cross cut in solid rock, 3 feet below surface, over which is centered stone post. *Farquhars Knob latitude station* (*U. S. L. S.*) (see description thereof) is 7.801 meters (25.59 feet) distant in azimuth 283°20′.

East Sawteeth (U. S. L. S.) (Lake County, U. S. Lake Survey, 1870).—On one of Sawteeth Mountains, 1½ miles northeast of station *West Sawteeth* (*U. S. L. S.*) (see description thereof) and about 2 miles from lake shore. Station mark is stone post. *East Sawteeth latitude station* (*U. S. L. S.*) (see description thereof) is distant 15.28 meters (50.1 feet) from station in azimuth 156°35′.

Porcupine Mountains (U. S. L. S.) (Ontonagon County, Mich., U. S. Lake Survey, 1869; 1870).—On one of highest ridges of Porcupine Mountains, about 2 miles south of Carp Lake, and about 4 miles south of the Carp Lake Mining Company landing. Station mark is stone post. *Porcupine Mountains latitude station* (*U. S. L. S.*) (see description thereof) is distant 14.40 meters (47.2 feet) from station in azimuth 197°53′.

Wheal Kate (U. S. L. S.) (Houghton County, Mich., U. S. Lake Survey, 1869; 1934).—About 1 mile west of South Range, on highest point of bluff, and directly (not centered) under fire tower erected by State. Station can best be reached from southwest, starting from west of South Range School and following path to summit. Originally marked by stone post. In 1934 only a remnant of old mark was found. Dirt was tamped around and above this mark and a

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new station mark, 1½-inch iron pipe in concrete, with geodetic disk, was centered over old mark. Mark is 6 inches below ground. Reference marks are the four concrete abutments of tower. These have the following approximate bearings and distances from station: Northwest, 13.45 feet; northeast, 7.55 feet; southeast, 17.80 feet; and southwest, 20.5 feet. *Wheal Kate latitude station* (*U. S. L. S.*) (see description thereof) is distant 30.012 meters (98.46 feet) from station in azimuth 256°50′.

Isle Royale East (U. S. L. S.) (Keweenaw County, Mich., U. S. Lake Survey, 1869; 1906).—Near east end of Isle Royale and about 1½ miles north of old mining company's landing at Rock Harbor. Station originally marked by stone post. In 1906 it was reported that station was marked by copper bolt in bedrock. *Isle Royale East latitude station* (*U. S. L. S.*) (see description thereof) is distant 26.82 meters (88.0 feet) from station in azimuth 267°17′. Cross in 4-inch circle cut in large boulder bears N. 18°44′ E. from station and is distant 7.33 feet. From cross, station is S. 18°44′ W. when Thunder Cape Lighthouse is N. 55°23′ W. U. S. Lake Survey records also call this station Isle Royale.

Supplementary points

Outer Island latitude station (U. S. L. S.) (Bayfield County, Wis., U. S. Lake Survey, 1870).—On northwest side of Outer Island. Marked by wooden post, distant 10.77 meters (35.3 feet) or 0″.35 of latitude north and 3.35 meters (11.0 feet) east of station *Outer Island* (*U. S. L. S.*) (see description thereof).

Farquhars Knob latitude station (U. S. L. S.) (Cook County, U. S. Lake Survey, 1869).—On northwest shore of Lake Superior, about 4 miles northwest of Hovland. Marked by wooden post, 1.80 meters (5.9 feet) or 0″.06 of latitude south and 7.59 meters (24.9 feet) east of station *Farquhars Knob* (*U. S. L. S.*) (see description thereof).

East Sawteeth latitude station (U. S. L. S.) (Lake County, U. S. Lake Survey, 1870).—On one of Sawteeth mountains, 1½ miles northwest of station *West Sawteeth* (*U. S. L. S.*) (see description thereof), and about 2 miles from lake shore. Marked by wooden post, 14.92 meters (46.0 feet) or 0″.06 of latitude north and 6.07 meters (19.9 feet) west of station *East Sawteeth* (*U. S. L. S.*) (see description thereof).

Porcupine Mountains latitude station (U. S. L. S.) (Ontonagon County, Mich., U. S. Lake Survey, 1870).—On one of highest ridges of Porcupine Mountains, about 2 miles south of Carp Lake, and about 4 miles south of Carp Lake Mining Co. landing. Marked by wooden post, 13.7 meters (45 feet) or 0″.44 of latitude north and 4.42 meters (14.5 feet) east of station *Porcupine Mountains* (*U. S. L. S.*) (see description thereof).

Wheal Kate latitude station (U. S. L. S.) (Houghton County, Mich., U. S. Lake Survey, 1866; 1870).—About 1 mile west of South Range. Marked by wooden post, 9.85 meters (32.3 feet) or 0″.32 of latitude north and 28.35 meters (93.0 feet) east of station *Wheal Kate* (*U. S. L. S.*) (see description thereof).

Isle Royale East latitude station (U. S. L. C.) (Keweenaw County, Mich., U. S. Lake Survey, 1866; 1906).—Near east end of Isle Royale, and about 1½ miles north of mining company's old landing at Rock Harbor. Marked by wooden post, 0.9 meter (3 feet) or 0″.03 of latitude north and 26.8 meters (88 feet) east of station *Isle Royale East* (*U. S. L. S.*) (see description thereof).

NINETY-EIGHTH MERIDIAN TO ALBERT LEA TO FOND DU LAC ARC

Principal points

Baltic (Minnehaha County, S. Dak., H. W. Hemple, 1927; 1934).—About 1¼ miles north and 3½ miles east of town of Baltic, 4½ miles north and 8½ miles west of Garretson, in SW¼ sec. 25, T. 104 N., R. 49 W. of the fifth principal meridian, on land owned by Ola Molsknes and leased by the Hammer brothers, on highest part of ridge, about 200 paces east of west section-line road, and 106.4 meters (349 feet) south of half-section fence line. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 1 foot below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 3.5 meters (11 feet) south and 14.3 meters (47 feet) west of northwest fence corner of section, and 356.27 meters (1,168.9 feet) from station in azimuth 35°48′12″. No. 2 is in west

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fence line, 4.13 meters (13.5 feet) north of northwest fence corner of section, 8.45 meters (27.7 feet) east of center line of north-south section-line road, and 190.55 meters (625.2 feet) from station in azimuth 121°51′.

Corson (Minnehaha County, S. Dak., H. W. Hemple, 1927; 1934).—About three-fourths mile north and 3 miles east of Corson, in NE¼ sec. 19, T. 102 N., R. 47 W. of the fifth principal meridian, on farm of J. C. Anderson, on highest point of ridge southwest of Anderson's farmhouse, 229.5 meters (753 feet) west of north-and-south section-line road, 370.6 meters (1,216 feet) south of east-and-west road, and about 5 meters (16 feet) east of north-and-south fence line. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 5.5 meters (18 feet) west of center line of north-and-south road, just outside fence corner at southeast corner of truck patch at farmhouse, and 271 meters (889 feet) from station in azimuth 235°36′32″. No. 2 is at fence corner, 7.9 meters (26 feet) south of center line of east-and-west road, and 403.4 meters (1,323 feet) from station in azimuth 153°01′51″. In 1934 reported soil around reference mark no. 1 was washed away.

Post (Rock County, H. W. Hemple, 1927; 1935).—About 5 miles north and 6½ miles west of Luverne, 7 miles west and 3 miles south of town of Hardwick, 463 feet east of southwest corner of SE¼ sec. 10, T. 103 N., R. 46 W. of the fifth principal meridian, 7.66 meters (25.1 feet) north of center line of section-line road, and 1 foot south of north right-of-way fence of road, in line of telephone poles, and 2 feet west of pole. To reach from Hardwick, go 1.5 miles west to point where U. S. Route 75 turns north and gravel road continues west, go west 5.0 miles to dirt crossroads, turn south onto dirt road and go 3.0 miles to another crossroad, thence west 0.45 mile to top of grade and station site on right (north). Surface and underground marks are standard station disk in concrete, notes 1a and 7a. Upper mark is flush with surface of ground. Reference marks no. 1 and no. 2 are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 400 feet west of center line of north-south road, 24 feet north of center line of east-west road, 1 foot south of north right-of-way fence, and 541.1 meters (1,775 feet) from station in azimuth 269°10′57″. No. 2 is in NE¼ sec. 15, 20 feet south of center line of east-west section-line road, 11 feet north of right-of-way fence line, and 30.891 meters (101.34 feet) from station in azimuth 62°33′. No. 3 established in 1935, is standard reference disk in concrete, note 11b; it projects 6 inches above ground, and is 29 feet south of center line of dirt road, 1 foot north of right-of-way fence line, and 19.975 meters (65.53 feet) from station in azimuth 325°23′.

Luverne (Rock County, H. W. Hemple, 1927; 1928).—About 2½ miles south and 4¼ miles west of town of Luverne, near center of SE¼ sec. 24, T. 102 N., R. 46 W. of the fifth principal meridian, 552 meters (1,811 feet) northwest from turn in road (old U. S. Route 16) which is about 4 miles west of Luverne where road turns from east to north, 471 meters (1,545 feet) west of old Route 16, 1 mile south of new U. S. Route 16, on land owned by Mr. W. I. Grout, and immediately west of fence. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark 18 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is at fence corner in southeast corner of section, 32 feet from center lines of section-line roads, 1 mile west of turn in old U. S. Route 16, and 538 meters (1,765 feet) from station in azimuth 305°50′16″. No. 2 is 222 meters (728 feet) north of old U. S. Route 16, at fence corner, at northwest corner of grove, and 247.8 meters (813 feet) from station in azimuth 40°36′46″. In 1935, reference marks recovered, but station marks could not be found. Distances to reference marks possibly in error.

Hardwick (Rock County, H. W. Hemple, 1927; 1935).—About 9 miles north and 3 miles west of Luverne, 3½ miles west and 1 mile north of Hardwick, in NW¼ sec. 29, T. 104 N., R. 45 W. of the fifth principal meridian, on land owned by Walter Bausian, on prominent knoll in pasture about 300 paces east and 127.71 meters (419.0 feet) south of northwest corner of section, and 10 paces north of abandoned gravel pit on south side of knoll. To reach from the main general store in Hardwick, go west 0.5 mile on gravel road to U. S. Route 75, continue west 1.0 mile on Route 75 to where it turns north, continue ahead (west) on gravel road 2.0 miles to section-line road and schoolhouse on right (north), turn north onto gravel road and go 0.8 mile to lane leading

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to two-story frame house (east of road), turn east into lane and continue straight ahead past house and through barnyard 0.15 mile, turn left (north) and continue north-northeast through pasture 0.15 mile up slope to top of small hill and station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is in SE¼ sec. 19, T. 104 N., R. 45 W., 25 feet west of center line of north-south section-line road, 13.03 meters (42.7 feet) north of center line of east-west section-line road, 4.52 meters (14.8 feet) north of fence corner of section, and 321.42 meters (1,054.5 feet) from station in azimuth 115°36′41″. No. 2 is in same quarter section as station, 25 feet south of center line of east-west section-line road, at south right-of-way fence, and 119.55 meters 392.2 feet) from station in azimuth 172°08′14″. In 1935 it was reported that finish on top of reference mark no. 2 concrete post was spalled off but disk was firmly in place. Azimuth mark established in 1935 is standard reference disk in concrete, note 11a, in northeast corner of school yard, 43 feet west of north-and-south road, 10 feet west of fence corner, 1 foot south of east-and-west fence line, 156 feet north-northeast of northeast corner of schoolhouse, and approximately 0.95 mile from station in azimuth 11°41′11″. Azimuth mark reached from entrance to farmyard by going south 0.8 mile.

Lismore (Nobles County, H. W. Hemple, 1927; 1935).—About 1 mile north and 1½ miles west of Lismore, on south side of SE¼ sec. 34, T. 104 N., R. 43 W. of the fifth principal meridian, 12.6 meters (41.3 feet) north of center line of east-and-west road, 982 meters (3,222 feet) east of intersection of this road with north-and-south road, and on south side of farm owned by Shade & Carpenter of Luverne and leased by Cornelius Zwart. To reach from Lismore, take road leading west at southern end of town and go 2 miles, turn north and go 1 mile, and go east one-half mile to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 1 foot below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 (destroyed in 1935) is 8.2 meters (27 feet) south of center line of east-and-west road and 20.85 meters (68.4 feet) from station in azimuth 358°01′. No. 2 is on first ridge east of north-and-south road, 12 meters (39 feet) north of center line of east- and-west road, and 533.1 meters (1,749 feet) from station in azimuth 88°58′43″.

Adrian (Nobles County, H. W. Hemple, 1927; 1934).—About 2 miles south and 1 mile east of Adrian, on north side of NW¼ sec. 32, T. 102 N., R. 42 W. of the fifth principal meridian, on farm owned by the Adrian State Bank, 10.6 meters (34.7 feet) south of center line of east-and-west road, and 241 meters (791 feet) east of north-and-south road. To reach from post office in Adrian, go south 2.3 miles on State Route 91 to crossroads, turn left (east) and go 1.15 miles on gravel road to station site on right of road. Surface and underground marks were standard station disks in concrete, notes 1a and 7a. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 8.6 meters (28.2 feet) north of center line of east-and-west road, and 19.23 meters (63.1 feet) from station in azimuth 184°12′. No. 2 is 9.7 meters (31.8 feet) south of center line of east-and-west road, 78.0 meters (256 feet) west of center line of north-and-south road, and 319.7 meters (1,049 feet) from station in azimuth 88°41′27″. In 1934 reported surface mark had been moved during road widening, and station *Adrian 2* (see description and geographic position thereof) was established 5.635 meters (18.48 feet) from station in azimuth 358°50′.

Wilmont (Nobles County, H. W. Hemple, 1927; 1934).—About 4½ miles east-northeast of Lismore, 1¾ miles west of Wilmont, on south side center of sec. 34, T. 104 N., R. 42 W. of the fifth principal meridian, on property of Charles Springman, 84 feet northwest of driveway to Springman's house, 46 feet north of center line of east-and-west gravel road, 13 feet northwest of corner post of north-and-south and east-and-west fences, 12.6 feet north of east-and-west fence, and 13 feet from north-and-south fence. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 18 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is flush with surface of ground, 31.6 feet south of center line of east-and-west gravel road, 1 foot north of east-and-west fence line, and 153.36 meters (503.2 feet) from station in azimuth 81°33′18″. No. 2 is flush with surface of ground, in fence line, 8.0 meters (26 feet) west of

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center line of north-and-south road, and 0.6 mile from station in azimuth 299°32′47″. No. 3 projects 6 inches above ground, is 32 feet south of center line of east-and-west road, 9 feet east of center line of driveway to farmhouse, and 31.755 meters (104.18 feet) from station in azimuth 318°26′.

Reading (Nobles County, H. W. Hemple, 1927; 1934).—About 6 miles west and 8 miles north of Worthington, 1¾ miles north and ¼ mile west of Reading Railroad station, in NE¼ sec. 14, T. 103 N., R. 41 W. of the fifth principal meridian, on land owned by the Schelle estate, and 172.4 meters (566 feet) south of center line of east-west section-line road. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 1 foot below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is flush with surface of ground, in SE¼ sec. 11, T. 103 N., R. 41 W., 10.90 meters (35.8 feet) north of center line of east-west section-line road, 11.0 meters (36 feet) west of center line of north-south section-line road, and 372.43 meters (1221.9 feet) from station in azimuth 240°13′13″. No. 2 is flush with surface of ground, in same quarter section as station, 10.0 meters (33 feet) west of center line of north-south section-line road, 2 feet north of first telephone pole north of grove of trees north of Mr. Gissen's yard, and 546.75 meters (1,793.8 feet) from station in azimuth 324°05′41″. In 1934, azimuth mark, standard reference disk, was established 32 feet south of center line of graded road, 12.5 feet east of center line of lane at Mr. Schroeder's mail box, 2.5 feet south of fence corner, in north-and-south fence line, and 0.8 mile from station in azimuth 261°36′58″.

Donner (Nobles County, H. W. Hemple, 1927; 1934).—About 5 miles west and 1 mile south of Worthington, on east side of SE¼ sec. 25, T. 102 N., R. 41 W. of the fifth principal meridian, 9 meters (30 feet) west of center line of north-and-south section-line road, 214 meters (702 feet) north of east-and-west section-line road, and on highest ground of land owned by Mrs. Minnie Blum and leased by Mr. Blum. To reach from Worthington, take road loading southwest around southern end of lake to road leading west that passes on viaduct over railroad tracks adjacent to road followed, then take latter road west to station. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is flush with surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is flush with surface of ground, 9 meters (30 feet) east of center line of north-and-south road, 284 meters (932 feet) north of east-and-west section-line road, and 69.95 meters (229.5 feet) from station in azimuth 194°42′. No. 2 is 8 meters (26 feet) north of center line of east-and-west road, 329 meters (1,079 feet) east of north-and-south road, and 396.9 meters (1,302 feet) from station in azimuth 301°43′07″. In 1934 two additional reference marks were established. No. 3 is standard reference disk in concrete, note 11b, 0.14 mile north of east-and-west section-line road, 28 feet east of center line of north-and-south section-line road, and 176.69 feet from station in azimuth 340°57′. Azimuth mark is standard reference disk in concrete, note 11a, 700 feet north of east-and-west section-line road, on east side of private trail leading to house on S. V. Calvin's property, in half-section fence line, and 0.5 mile east of station in azimuth 267°07′18″.

Kay (Jackson County, H. W. Hemple, 1927; 1934).—About 6 miles east of Brewster, near east side center of NE¼ sec. 26, T. 103 N., R. 38 W. of the fifth principal meridian, on property of C. Hussang, opposite land owned by the Kay brothers, 503.5 meters (1,652 feet) south of east-and-west section-line road, 8.4 meters (28 feet) west of center line of north-and-south section-line road, 1.68 meters (5.5 feet) southwest of black triangle on fence post, and 0.6 meter (2 feet) west of west right-of-way fence. To reach from Okabena, go south 2.4 miles on county route B to crossroads, turn right and go west 2.0 miles on county route G to crossroads, turn left and go south 0.3 mile to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 1 foot below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 4 inches below surface of ground, 28 feet east of center line of north-south section-line road, 18 inches west of east right-of-way fence, and 17.381 meters (57.02 feet) from station in azimuth 270°57′. No. 2 is flush with surface of ground, 50.3 meters (165 feet) south of center line of east-and-west section-line road, and 8.0 meters (26 feet) west of center line of north-and-south section-line road, and 0.25 mile from station in azimuth 180°01′23″. In 1934 standard reference disk

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in concrete, projecting 6 inches above ground, was established 26 feet west of center line of north-and-south section-line road, 1.5 feet west of west right-of-way fence and 26.111 meters (85.66 feet) from station in azimuth 359°26′.

Kluever (Jackson County, H. W. Hemple, 1927).—About 10 miles east and 3 miles south of Worthington, on north side of sec. 10, T. 101 N., R. 38 W. of the fifth principal meridian, on farm of Mat Kluever, 560 meters (1,837 feet) east of north-and-south section-line road, and 7.3 meters (24 feet) south of center line of east-and-west section-line road. To reach from Worthington, go east 10 miles on U. S. Route 16 to church, then south 3 miles and east 0.3 mile to station. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 7.5 meters (25 feet) north of center line of road and 14.89 meters (48.9 feet) from station in azimuth 179°51′. No. 2 is 130 meters (426 feet) west of north-and-south road, 9.5 meters (31 feet) north of center line of east-and-west road, and 690 meters (2,264 feet) from station in azimuth 90°26′59″.

Tusa (Jackson County, H. W. Hemple, 1927; 1934).—About 4 miles west and 3½ miles south of Jackson, in NE¼NW¼ sec. 8, T. 101 N., R. 35 W. of the fifth principal meridian, 358 meters (1,175 feet) north of east-and-west section-line road, 6 meters (20 feet) east of fence line marking half-section, and on highest ground of land leased by J. F. Tusa. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 1 foot below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 as originally established was 9 meters (30 feet) north of center line of east-and-west road, 7 meters (23 feet) west of fence corner, and 505.8 meters (1,659 feet) from station in azimuth 312°39′19″. No. 2 as originally established was 8.8 meters (29 feet) north of center line of east-and-west road, about 10 meters (33 feet) west of private road leading into field, and 339.96 meters (1,115.4 feet) from station in azimuth 4°16′17″. In 1934, due to road construction, both reference marks were moved directly toward station and are now in new right-of-way fence line. No. 1 is 502.1 meters (1,647 feet) from station in azimuth 312°39′19″. No. 2 is 337.69 meters (1,107.9 feet) from station in azimuth 4°16′17″.

Firence (Jackson County, H. W. Hemple, 1927; 1934).—About 5½ miles north and 5½ miles west of Jackson, near north side center of NE¼, sec. 25, T. 103 N., R. 36 W. of the fifth principal meridian, on highest point of ground, 99.87 meters (327.7 feet) south of center line of east-west section-line road, and on land owned by William Frenz. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 1 foot below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is in SW¼ sec. 19, T. 103 N., R. 35 W. of the fifth principal meridian, 48.20 meters (158.1 feet) north of center line of east-west section-line road, 7.70 meters (25.3 feet) east of center line of north-south section-line road, and 417.12 meters (1,368.5 feet) from station in azimuth 250°01′59″. This mark was destroyed in road construction in 1930. No. 2 is in same quarter section as station, 7.70 meters (25.3 feet) south of center line of east-west section-line road, and 92.17 meters (302.4 feet) from station in azimuth 170°17′. In 1934 two additional standard reference disks in concrete were established. One is 125 feet south of center line of east-and-west road, 16 feet from center line of lane leading to Mr. Frenz's house, about 130 feet northeast of house, and 359.75 feet from station in azimuth 274°15′51″. Other (azimuth mark) is 28 feet west of center line of road and 1.1 miles from station in azimuth 347°46′52″.

Jackson west base (Jackson County, H. W. Hemple, 1927).—In NW¼ sec. 19, T. 102 N., R. 34 W. of the fifth principal meridian, about one-fourth mile east of Chicago, Milwaukee, St. Paul & Pacific Railroad station at Jackson, 21.28 meters (69.8 feet) north of north rail of main track, 4.68 meters (15.4 feet) south of snow fence, and 15.62 meters (51.2 feet) south of center line of north section-line road of section 19, and on wedge-shaped ground which lies between railway tracks and public section-line road. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark projects 2 inches above ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 1 foot south of north fence line, 11.62 meters (38.1 feet) north of center line of east-west section-line road, and 27.24 meters (89.4 feet) from station in azimuth 175°38′. No. 2 is 35.46 meters (116.3 feet)

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south of south rail of main track, 10.05 meters (33.0 feet) south of center line of section-line highway, 28.50 meters (93.5 feet) east of driveway leading to Asher O. Nasby's Stock Farm, and 356.17 meters (1,168.5 feet) from station in azimuth 273°26′ 38″.

Alpha (Jackson County, H. W. Hemple, 1927; 1934).—About 10 miles west-southwest of Sherburn, 5 miles east-southeast of Jackson, 4 miles south-southwest of Alpha, near north quarter corner of sec. 3, T. 101 N., R. 34 W. of the fifth principal meridian, on land owned and occupied by Tom Ambrose, 474 meters (1,555 feet) west of center line of north-and-south section-line road, 150 yards northeast of farmhouse, 8.4 meters (28 feet) south of center line of east-and-west section-line road, 17 feet east of large boulder, and 2 feet north of fence line. To reach from Sherburn, go west 7 miles on U. S. Route 16 to intersection with county route F, proceed south 4.05 miles on route F through Alpha to crossroads, and go west (right) 1.3 miles on narrow gravel road to station site. To reach from U. S. Route 71 at intersection with Standard Oil station on northeast corner in Jackson, go east across bridge, turn south and go 0.1 mile to gravel side street leading left (east) up hill, continue 0.4 mile to T-road, turn right (south) and go 0.25 mile on gravel road to gravel side road leading left (east), turn east and go 3 miles to crossroads, turn right (south), and go 1.95 miles on dirt road to crossroads, and go left (east) 0.7 mile on narrow gravel road to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is flush with surface of ground. Reference and azimuth marks are standard reference disks in concrete, note 11a. No. 1 projects 3 inches above ground, is 20 feet north of center line of road, 2 feet south of fence line, and 14.40 meters (47.2 feet) from station in azimuth 183°13′. No. 2 is 5 inches below surface of ground, 44 feet northeast of center line of T-intersection, 35 feet east of north-and-south road, 28 feet north of center line of east-and-west road, 6 feet east of fence corner, 1½ feet north of fence line, and approximately 0.3 mile from station in azimuth 267°56′45″. No. 3, established in 1934, projects 5 inches above ground, is 25 feet south of center line of road, 8 inches north of fence line, and 80.69 feet from station in azimuth 89°12′.

Motl (Jackson County, H. W. Hemple, 1927; 1935).—About 5½ miles north and 1 mile west of Alpha, one-half mile west of district schoolhouse no. 94, in NW¼ sec. 23, T. 103 N., R. 34 W. of the fifth principal meridian, on land owned by the Motl brothers, 108.32 meters (355.4 feet) east of corner of sections 14, 15, 22, and 23, and 9.50 meters (31.2 feet) south of center line of east-west section-line road. To reach from the Triumph State Bank in Triumph, go west and south 4.3 miles on State Route 4 to crossroads with cemetery on hill in southwest angle, leave Route 4 and go west 7 miles on gravel road to junction with County Route F, continue west 1 mile to top of grade and station site. Surface and underground marks are standard station disks in concerete, notes 1a and 7a. Upper mark is 2 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 4 inches below surface of ground, 8.60 meters (28.2 feet) north of center line of road, 1.0 foot south of fence line, and 497.46 meters (1,632.1 feet) from station in azimuth 266°51′45″. No. 2 is 2 inches below surface of ground, 8.16 meters (26.8 feet) north of center line of section-line road, 1.0 foot south of woven-wire fence, and 17.663 meters (57.95 feet) from station in azimuth 170°08′. No. 3, established in 1935, is probably standard reference disk in concrete, 9.50 meters (31.2 feet) south of center line of road, and 29.845 meters (97.92 feet) from station in azimuth 88°40′. Azimuth from station to Enterprise, Town Hall, center of chimney, distant 1 mile, is 89°20′50″.

Jackson east base (Martin County, H. W. Hemple, 1927; 1935).—About 3¾ miles east of Alpha, near east side of NE¼ sec. 16, T. 102 N., R. 33 W. of the fifth principal meridian, 1 foot inside right-of-way of Chicago, Milwaukee, St. Paul & Pacific Railroad, on prolongation of south rail at first curve east of Alpha, 14.22 meters (46.7 feet) south of south rail, 84 feet south of telephone line, about 200 meters (656 feet) west of north-and-south section-line road, and on land owned by Charles A. Groom. To reach from junction of State Route 4 and U. S. Route 16 in Sherburn, go west 3.0 miles on U. S. Route 16 to gravel crossroad (sign Peters Evergreen Nursery in southeast angle), leave U. S. Route 16 and go south 0.1 mile, cross railroad, and go west on south side of tracks about 650 feet to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference

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marks are standard reference disks in concrete, note 11a. No. 1 is 62 feet north of north rail of railroad track, 10.1 meters (33 feet) west of center line of north-and-south section-line road, and 209.05 meters (685.9 feet) from station in azimuth 337°32′46″. No. 2 is 4 inches below surface of ground, about 465 meters (1,526 feet) south of railway tracks, at third fence line south of tracks, just south of opening to field 10.1 meters (33 feet) west of center line of section-line road, 2 feet east of fence post on extension of east-and-west fence, 42 feet south of telephone pole, 2 feet east of telephone line, and 509.5 meters (1,672 feet) from station in azimuth 250°38′35″.

Grupe (Martin County, H. W. Hemple, 1927; 1934).—About 5½ miles south and 1 mile west of Welcome, 3.7 miles due north of Ceylon, 1¼ miles south of Manyaska station on Chicago and North Western Railway, on prominent knoll in SW¼ sec. 36, T. 102 N., R. 32 W. of the fifth principal meridian, 137 meters (449 feet) east of north-and-south section-line road, 66.5 meters (218 feet) north of east-and-west section-line road, 71 feet east of north-south fence, 320 yards west of Chicago and North Western Railway tracks, and on summit of prominent knoll in cleared field on land owned by Arthur Grupe. To reach from west edge of Ceylon, go north 3.7 miles to T-intersection, and go east 417 feet to point opposite station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 8 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 15 meters (49 feet) west of west rail of railway, 11.2 meters (37 feet) north of center line of east-west road, and 281.64 meters (924.0 feet) from station in azimuth 281°42′01″. No. 2 is 1 foot below surface of ground, 13.2 meters (43 feet) northeast of intersection of section-line roads, just inside corner formed by right-of-way fences, and 139.2 meters (457 feet) from station in azimuth 66°21′48″. Azimuth mark, standard reference disk in concrete, established in 1934, projects 4 inches above ground, is 60 yards northwest of square stucco farmhouse, 0.5 foot east of west right-of-way fence of north-south road, and 0.5 mile from station in azimuth 11°08′52″. Azimuth from station to *Welcome, water tank*, is 187°18′10″.

Senne (Martin County, H. W. Hemple, 1927; 1935).—About 5 miles north and ¾ mile west of Welcome, in SE sec. 11, T. 103 N., R. 32 W. of the fifth principal meridian, on land leased and farmed by Albert H. Senne, 281.86 meters (924.7 feet) west of north-south section-line road, 522.75 meters (1,715 feet) north of east-west section-line road, on highest point of ground, in a field west of house, and 160 feet northwest of northwest corner of grove of trees. To reach from Triumph State Bank in Triumph, go east 0.6 mile on Route M–4 to where road turns north, continue east 1 mile on County Road D, thence south 2.3 miles on winding road (County Road) to where main road curves to right, take graded road east (sign "Triumph 4 miles" is in northeast angle) and go 1.7 miles to crossroads; from here go north 0.3 mile to lane leading to Mr. Senne's house, then west 0.05 mile to house. Surface and underground marks are standard station disks in concrete, note 1a and 7a. Upper mark is 14 inches below surface of ground References marks nos. 1 and 2, established in 1927, are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 9.30 meters (30.5 feet) west of center line of north-south section-line road, in north-south fence line, and 272.56 meters (894.2 feet) from station in azimuth 271°23′53″. No. 2 is 29.5 feet north of center line of east-west section-line road, 3 feet south of east-west fence, and 513.82 meters (1,685.8 feet) from station in azimuth 359°15′26″. No. 3 is probably standard reference disk in concrete projecting 6 inches above surface of ground, on west side of grove of trees, and 55.216 meters (181.15 feet) from station in azimuth 309°05′. Azimuth from station to Monterery, municipal water tank, finial, distant 4.5 miles is 113°15′51″.

Fairmont (Martin County, H. W. Hemple, 1927).—In northeast section of fairgrounds of Fairmont, 59.20 meters (194.2 feet) west of center line of Route 15 (north-south road on eastern side of grounds), and directly north of group of buildings being used by county as bridge yard. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 12.30 meters (40.4 feet) south of center line of Route 16, about 1 foot south of south fence line of highway, and 948.79 meters (3,112.8 feet) from station in azimuth 251°06′05″. No. 2 is 9.93 meters (32.6 feet) west of center

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line of Route 15, 1 foot east of high fence built about county bridge yard, about 6 feet south of gate leading to yard, and 85.70 meters (281.2 feet) from station in azimuth 324°22′.

Wilbert (Martin County, H. W. Hemple, 1927).—About 5½ miles south of Fairmont, ½ mile north of Wilbert Lake, on top of ridge, near north side center of NE¼ sec. 7, T. 101 N., R. 30 W. of the fifth principal meridian, 6.7 meters (22 feet) south of center line of east-and-west section-line road, and 3 meters (10 feet) east of fence corner. To reach from Fairmont, go east to northeast corner of fairgrounds, proceed south 3½ miles, then west 2 miles, south 2 miles, and east ¾ mile to ridge. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is flush with surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is on top of ridge, 7.8 meters (26 feet) north of center line of east-and-west road, and 662.7 meters (2,174 feet) from station in azimuth 90°11′46″. No. 2 is 8.8 meters (29 feet) north of center line of road and 15.54 meters (51.0 feet) from station in azimuth 183°47′.

Granada (Martin County, H. W. Hemple, 1927).—About 3 miles north of Granada railroad station, 5½ miles west and ¼ mile north of Huntley, in northeast part of SE¼ sec. 7, T. 103 N., R. 29 W. of the fifth principal meridian, on prominent knoll near old abandoned gravel pit, 18.70 meters (61.4 feet) south of east-west half-section fence line, about 160 meters (525 feet) west of center line of north-south section-line road, and on land owned by Mrs. William Reinkin of Varina, Iowa. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is about 8 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 projects 1 inch above ground, is 9.57 meters (31.3 feet) east of center line of north-south section-line road, 1 foot west of east fence line along road, and 167.94 meters (551.0 feet) from station in azimuth 261°42′10″. No. 2 is flush with surface of ground, 104 meters (341 feet) north of center line of east-west section-line road, 10.90 meters (35.8 feet) west of center line of north-south section-line road, 1 foot west of west fence line along road, and 694.08 meters (2,277.2 feet) from station in azimuth 347°55′11″.

Chain (Martin County, H. W. Hemple, 1927).—Near south side center of sec. 31, T. 102 N., R. 29 W. of the fifth principal meridian, about 5 miles south and one-half mile west of Imogene station on Chicago, Milwaukee, St. Paul and Pacific Railroad, 5½ miles east and 4½ miles south of Fairmont, 2 miles north of Chain Lake, one-fourth mile east of district school no. 104, on land owned by Carl Holhtran, and 9.2 meters (30.2 feet) north of center line of east-and-west section-line road. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 10.5 meters (34.4 feet) south of center line of east-and-west road, and 646.46 meters (2120.9 feet) from station in azimuth 270°27′53″. No. 2 is at fence corner, 6.6 meters (21.6 feet) south of center line of road, and 31.27 meters (102.6 feet) from station in azimuth 297°00′.

Guckeen (Faribault County, H. W. Hemple, 1927).—In north side of NW¼ sec. 6, T. 102 N., R. 28 W. of the fifth principal meridian, about 1½ miles north and 0.8 mile west of Guckeen railway station, 1½ miles north of U. S. Route 16, on farm owned by V. A. Carpenter, on south fence line, 8.56 meters (28.1 feet) south of center line of east-west section-line road, and 145.68 meters (477.9 feet) east of stone denoting northwest corner of section. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark projects 4 inches above ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 projects 2 inches above ground, is 8.50 meters (27.9 feet) north of center line of east-west section-line road, 1 foot south of north fence line of road, and 17.06 meters (56.0 feet) from station in azimuth 176°17′. No. 2 projects 4 inches above ground, is 9.30 meters (30.5 feet) west of center line of section-line road between sections 5 and 6, 1,100 feet south of east-west section-line road, and 1,517.12 meters (4,977.4 feet) from station in azimuth 280°48′19″.

Winnebago (Faribault County, H. W. Hemple, 1927).—About 1¼ miles south and three-fourths mile east of Winnebago, in south side of SE¼ sec. 2, T. 103 N., R. 28 W. of the fifth principal meridian, on south side of farm owned and occupied by Ray Chaffee, about 65 paces west of Mr. Chaffee's

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house, 275 paces west of southeast corner of section, 4.15 meters (13.6 feet) north of road fence, 13.50 meters (44.3 feet) north of center line of section-line road, and just west of row of trees. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark projects about 1 inch above ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is flush with surface of ground, 7.96 meters (26.1 feet) south of center line of section-line road, 1 foot north of south right-of-way fence line of road, and 21.46 meters (70.4 feet) from station in azimuth 1°22′. No. 2 projects 1 inch above surface of ground, is 7.28 meters (23.9 feet) north of center line of road, 1 foot south of north fence line of road, and 679.25 meters (2,228.5 feet) from station in azimuth 89°39′06″.

Kennedy (Faribault County, H. W. Hemple, 1927).—About 2 miles south and 2¾ miles west of Blue Earth, about three-fourths mile west of Blue Earth-Pilot Grove Road, in NW¼ sec. 26, T. 102 N., R. 28 W. of the fifth principal meridian, one-fourth mile west of small schoolhouse, 8.9 meters (29.2 feet) east of center line of road which is one-fourth mile east of west line of section, 565 meters (1,854 feet) north of east-and-west road which forms T-intersection with road running north and south, and on west side of farm owned by Ernest Gearman. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is flush with surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 16 meters (52 feet) northwest of intersection of center lines of T-roads and 561.0 meters (1,841 feet) from station in azimuth 2°09′15″. No. 2 is 9.8 meters (32.1 feet) west of center line of north-and-south road and 18.87 meters (61.9 feet) from station in azimuth 96°52′.

Easton (Faribault County, H. W. Hemple, 1927).—About 1½ miles west and 3 miles south of Easton, in NE¼ of sec. 22, T. 103 N., R. 26 W. of the fifth principal meridian, on land owned by Henry Hefner, 200 paces southwest of district schoolhouse no. 54, 95 meters (311.7 feet) south of Easton-Blue Earth Road, and 150.06 meters (492.3 feet) west of north-south section-line road which, with above-mentioned road, forms a Y southeast of schoolhouse. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 1 foot below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 9.68 meters (31.8 feet) west of center line of section-line road between Blue Earth and Easton, 2.2 meters (7.2 feet) south of corner post at northeast corner of school property, and 231.24 meters (758.7 feet) from station in azimuth 216°43′09″. No. 2 is 8.60 meters (28.2 feet) west of center line of section-line road, 1 foot east of west fence line of road, and 526.27 meters (1,726.6 feet) from station in azimuth 344°12′55″.

Frost (Faribault County, H. W. Hemple, 1927).—About one-half mile northwest of Frost, in SE¼ sec. 34, T. 102 N., R. 26 W. of the fifth principal meridian, 11.9 meters (39.0 feet) north of northwest corner of Emerald Cemetery, 404 meters (1,325 feet) west of north-and-south road leading into Frost, just east of bend in road where it turns from north to west, and on land owned by John Anderson. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 9.5 meters (31 feet) west of center line of north-and-south road, 480 meters (1,575 feet) north of center line of road leading west to Emerald Cemetery, and 564.9 meters (1,853 feet) from station in azimuth 225°10′27″. No. 2 is 14 meters (46 feet) south of southwest corner of cemetery, 7 meters (23 feet) south of center line of east-and-west road, and 80.81 meters (265.1 feet) from station in azimuth 358°20′.

Walters (Faribault County, H. W. Hemple, 1927).—About 3 miles north of Kiester, on farm of M. J. Herric, 638 meters (2,093 feet) north of east-and-west road, and 531 meters (1,742 feet) west of north-and-south road running into Kiester. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 1 foot below surface of ground. Station *Kiester* (see description thereof) is distant 885.69 meters (2,905.8 feet) in azimuth 239°32′54″.

Shorty (Faribault County, H. W. Hemple, 1927).—About three-fourths mile south and one-half mile west of Wells, about 75 paces east and 5 paces south of northwest fence corner of SE¼ sec. 17, T. 103 N., R. 24 W. of the fifth principal meridian, on farm owned by W. T. Boyce, of Ralston, and 16.26 meters (53.3 feet) south of center line of east-west quarter-section line. Sur-

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face and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 6 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 8.60 meters (28.2 feet) north of east-west section line and 24.86 meters (81.6 feet) from station in azimuth 178°32′. No. 2 is 9.70 meters (31.8 feet) west of center line of north-south gravel road, 20.40 meters (66.9 feet) south of center line of quarter-section-line road, 1 foot east of west right-of-way fence on gravel road, and 718.39 meters (2,356.9 feet) from station in azimuth 270°50′43″.

Wells (Faribault County, H. W. Hemple, 1927).—About 3 miles east and 2 miles south of Wells, on east side of NE¼ sec. 23, T. 103 N., R. 24 W. of the fifth principal meridian, one-fourth mile south of Chicago, Milwaukee, St. Paul & Pacific Railroad, on east side of farm owned by Edward Tatge, on highest ground on west side of road, 9.20 meters (30.2 feet) west of center line of road, and about 300 paces east of house and barns. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Surface mark is flush with surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 9.44 meters (31.0 feet) east of center line of section-line road and 18.64 meters (61.2 feet) from station in azimuth 271°42′. No. 2 is 10.70 meters (35.1 feet) east of center line of section-line road and 600.71 meters (1,970.8 feet) from station in azimuth 358°17′24″.

Kiester (Fairbault County, H. W. Hemple, 1926; 1928).—About 3½ miles north of Kiester, in SW¼NW¼ sec. 3, T. 101 N., R. 24 W. of the fifth principal meridian, on highest part of knoll, 320 meters (1,050 feet) east of north-and-south road which leads to Kiester, on land owned by H. W. Boenders, and about 300 meters (984 feet) southeast of his farmhouse. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark projects 4 inches above ground. Reference marks are standard reference disks in concrete, note 11a, projecting 4 inches above ground. No. 1 is at fence line between cultivated land and pasture and 45.34 meters (148.8 feet) (slope) from station in azimuth 356°56′. No. 2 is 1 foot outside east fence line along road leading to Kiester and 310.93 meters (1,020.1 feet) (slope) from station in azimuth 84°29′39″. Station *Sletten* (see description and geographic position thereof) is visible from ground at station.

Schmidt (Freeborn County, H. W. Hemple, 1926; 1927).—About 6 miles west of Albert Lea, in NE¼ sec. 16, T. 102 N., R. 22 W. of the fifth principal meridian, on highest part of knoll, about 200 meters (656 feet) south of farmhouse of Mr. Schmidt who owns the land, and about 70 meters (230 feet) west of road on east side of section. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is about 1 foot below surface of ground. Reference marks are standard reference disks in concrete, note 11a, projecting 4 inches above ground. No. 1 is on embankment west of above-mentioned road, about 10 meters (33 feet) from center line of same, and 59.35 meters (194.7 feet) from station in azimuth 268°26′. No. 2 is directly west of southern end of Mr. Schmidt's barn, at fence line, and 194.18 meters (637.1 feet) from station in azimuth 150°54′34″. Station *Sletten* (see description and geographic position thereof) is visible from ground at station.

Sletten (Freeborn County, H. W. Hemple, 1926).—About 6 miles west of Emmons, about 2 miles north of Scarville, Iowa, near south side center of SE¼ sec. 32, T. 101 N., R. 24 W., on rather prominent knoll on land owned by H. O. Sletten, about 38 meters (125 feet) north of center line of Minnesota-Iowa State-line road, and 304 meters (997 feet) east-northeast of land section corner marked by intersection of State-line highway with road leading to Scarville. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is flush with surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is at fence line between pasture and cultivated land to east and 22.71 meters (74.5 feet) from station in azimuth 276°59′. No. 2 is about 14.9 meters (49 feet) north of center line of State-line road on first embankment east of road to Scarville, 5.8 meters (19 feet) north of north property line along road, and 109.20 meters (358.3 feet) from station in azimuth 6°26′26″. Station *Kiester* and *Schmidt* (see descriptions thereof) are visible from ground at station.

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Brua (Worth County, Iowa, H. W. Hemple, 1926; 1934).—About 2 miles south and 1½ miles east of Emmons, near center of sec. 20, T. 100 N., R. 22 W., on farm of Edward L. Brua, and in pen just north of main barn. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. In 1934, upper station mark was 3 inches below surface of ground. Reference mark no. 1 is standard reference disk in concrete, note 11a, flush with surface of ground, at northeast corner of shed attached to northeast corner of above-mentioned barn and 24.41 meters (80.1 feet) from station in azimuth 307°55′. Reference mark no. 2 is northwest corner of concrete foundation of main barn, 79 feet west of reference mark no. 1, and 16.63 meters (54.6 feet) from station in azimuth 17°53′.

Scarville (Winnebago County, Iowa, H. W. Hemple, 1926; 1934).—About 2½ miles south and ¼ mile west of Scarville, in NE¼ sec. 1, T. 99 N., R. 24 W., on highest part of knoll about 300 meters (984 feet) south of road on north side of the section line, about ⅓ mile southwest of farmhouse of Mrs. George L. Johnson who owns the land, and just south of east-and-west fence line. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. In 1934, upper station mark was 18 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is at fence line mentioned above flush with surface of ground and 4.56 meters (15.0 feet) from station in azimuth 182°11′. No. 2 projects 4 inches, is at second fence corner (on west line of northeast quarter of section) west from north-and-south road and 177.22 meters (581.4 feet) from station in azimuth 89°36′05″.

Freeborn (Freeborn County, H. W. Hemple, 1926, 1927).—About 8½ miles north and 5½ miles west of Albert Lea, 1 mile south and 4½ miles east of Freeborn, 2 miles north and 1½ miles west of Manchester railway station, near center of sec. 4, T. 103 N., R. 22 W. of the fifth principal meridian, on west side of road, about 50 paces west of West Freeborn Lutheran Church, on west side of farm owned and occupied by the Martenson brothers, on west side of open space used as parking place, and 20.91 meters (68.6 feet) west of center line of north-south half-section-line road. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark projects 4 inches above ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 1 meter (3 feet) west of southwest corner of West Freeborn Lutheran Church, 8.90 meters (29.2 feet) east of center line of north-south half-section-line road, and 37.39 meters (122.7 feet) from station in azimuth 306°12′. No. 2 is 9.90 meters (32.5 feet) south of center line of east-west section-line road directly south of station and 566.13 meters (1,857.4 feet) from station in azimuth 42°01′53″.

Nelson (Freeborn County, H. W. Hemple, 1927).—About 8 miles north and 3 miles east of Albert Lea, three-fourths mile east and one-fourth mile south of Clarks Grove, in NE¼ sec. 2, T. 103 N., R. 21 W. of the fifth principal meridian, on land owned by Earnest Nelson, on highest point of ridge about 300 paces to eastward of Mr. Nelson's house, in pasture, on south edge of grove of oak trees, and 2.96 meters (9.7 feet) west of fence line. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 1.5 feet below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 1 foot north of meandering fence line and 174.25 meters (571.7 feet) from station in azimuth 37°06′15″. No. 2 is on south right-of-way fence line of State route 1, 8.90 meters (29.2 feet) south of center line of highway, just west of driveway from highway to Mr. Nelson's house, and 590.47 meters (1,937.2 feet) from station in azimuth 154°06′02″.

Albert Lea west base (Freeborn County, H. W. Hemple, 1927; 1931).—About 1¼ miles north and 7.5 miles east of Albert Lea, 1 mile north and 1¼ miles east from Hayward, ¼ mile north of U. S. Route 16, and in SE¼ sec. 3, T. 102 N., R. 20 W. of the fifth principal meridian. To reach from main street in Albert Lea, go east 7.5 miles on U. S. Route 16 to grove of trees located one-fourth mile north of overhead highway bridge. Station is 30 feet southwest from southwest corner of grove of trees, just west of roadway running from old route 16 to house where road turns to east, on land owned by L. P. Esse, and 125 paces southwest of Mr. Esse's house. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 2 inches below surface of ground. Reference marks are standard

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reference disks in concrete, note 11a. No. 1 is 11.30 meters (37.1 feet) south of center line of east-west road (old route 16), 8.80 meters (28.9 feet) east of center line of driveway into Mr. Esse's property, and 519.53 meters (1,704.5 feet) from station in azimuth 180°11′41″. No. 2 is 2 meters (7 feet) southwest of southwest corner of Mr. Esse's garage and 101.65 meters (333.5 feet) from station in azimuth 271°38′38″.

Newry (Freeborn County, H. W. Hemple, 1927).—About 7½ miles east and 1 mile south of Geneva, ½ mile south and ½ mile east of Newry (country store and creamery), near center of sec. 16, T. 104 N., R. 19 W. of the fifth principal meridian, on land owned by D. J. Hogan, on prominent knoll with scattered trees to east and cleared field to west, 16.35 meters (53.6 feet) east of north-and-south fence line, 18.67 meters (61.3 feet) northwest of center post of section 16, 17 meters (56 feet) north of east-and-west fence line, and 800 meters (2,625 feet) east of north-and-south section-line road. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 1 foot below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 8 meters (26 feet) west of center post of section 16 and 16.96 meters (55.6 feet) from station in azimuth 91°35′. No. 2 is 8 meters (26 feet) west of center line of north-and-south road, 8.6 meters (28 feet) north of road leading into Daniel Carter's dairy farm, and 809.3 meters (2,655 feet) from station in azimuth 2°36′03″.

Albert Lea east base (Freeborn County, H. W. Hemple, 1927).—About 1¼ miles west and 1 mile south of Oakland, ½ mile south of U. S. Route 16, near south side center of SE¼ sec. 4, T. 102 N., R. 19 W. of the fifth principal meridian, 462 meters (1,516 feet) west of north-and-south road, 41 meters (135 feet) north of east-and-west road, on east side of cultivated field and on west side of pasture in which there are scattered trees, 2.6 meters (9 feet) west of north-and-south fence line, and on land owned by Hans Running. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 12 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 5.9 meters (19.4 feet) north of east-and-west road, 466 meters (1,529 feet) west of north-and-south road, and 33.9 meters (111.2 feet) from station in azimuth 8°37′. No. 2 is 9.9 meters (32 feet) south of center line of U. S. Route 16, 170 meters (558 feet) east of road leading into farm of T. H. Kirkpatrick, and 1,834.5 meters (6,019 feet) from station in azimuth 114°44′01″.

Sargeant (Mower County, H. W. Hemple, 1927; 1935).—About 10 miles north and 10 miles east of Austin, 1 mile north of Sargeant railroad station, in SE¼ sec. 7, T. 104 N., R. 16 W. of the fifth principal meridian, and on land owned by F. R. Sage, of Washington, Iowa, and occupied by Joseph Sweayey. Station is in barnyard, 95 feet northeast of northeast corner of barn, 35 feet south and a little east of most easterly stump of row of stumps, and 171.85 meters (563.8 feet) north of center line of east-and-west section-line road. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is flush with surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is flush with surface of ground, 55 feet west of center line of north-south section-line road, 22 feet west of fence corner at southeast corner of section, 8.68 meters (28.5 feet) north of center line of east-and-west section-line road, 16.50 meters (54.1 feet) west of fence corner at northwest corner of section, and 722.28 meters (2,369.7 feet) from station in azimuth 283°22′58″. No. 2 is flush with surface of ground, 7.60 meters (24.9 feet) south of center line of east-and-west section-line road, 127 feet east of center line of quarter-section-line road, and 183.15 meters (600.9 feet) from station in azimuth 12°34′06.″

Elkton (Mower County, H. W. Hemple, 1927; 1935).—About 3½ miles south and 1½ miles east of Dexter, 1½ miles east and ½ mile north of Elkton, near center of sec. 6, T. 102 N., R. 15 W. of the fifth principal meridian, on land owned by Mr. Vogue who lives in Austin, about 215 meters (705 feet) northeast of old deserted farmhouse and barn which stand in small grove of trees, and 1,066 meters (3,497 feet) northeast of section corner. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is about 5 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with ground. No. 1 is 0.40 meter (1.3 feet) north of half-section-line fence, 8 meters (26 feet) east of

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large lone tree, at intersection of half-section line with quarter-section line and 162.04 meters (531.6 feet) from station in azimuth 30°14′16″. No. 2 is 0.40 meter (1.3 feet) east of section-line fence and 492.69 meters (1,616.4 feet) from station in azimuth 106°55′31″. In 1935 reported in good condition.

Stewart (Mower County, H. W. Hemple, 1927; 1935).—About 2 miles south and 4 miles west of Stewartville, 8½ miles north of Grand Meadow, ¾ mile west of Grand Meadow-Stewartville gravel road, in northwest corner of SE¼ sec. 12, T. 104 N., R. 15 W. of the fifth principal meridian, and on land rented by Owen Osten. To reach from Grand Meadow, follow gravel road north about 4¾ miles, turn east ½ mile, north 3½ miles, then west 0.8 mile to station site in barn lot just west of barn. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is flush with surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 1.0 foot west of west fence line of orchard and 92.30 meters (302.8 feet) from station in azimuth 215°10′. No. 2 is 5.80 meters (19.0 feet) south of center line of east-and-west road, 1.5 feet north of fence line on south side of road, and 498.97 meters (1,637.0 feet) from station in azimuth 121°50′15″. In 1935 recovered, marks in good condition. Station 96 feet southwest of concrete silo, 35 feet east of corner fence post of north lane fence, and 12 feet south of south fence of barnyard.

Meadow (Mower County, H. W. Hemple, 1927).—About 3 miles east and 1¾ miles south of Grand Meadow, near southwest corner of NW¼ sec. 34, T. 103 N., R. 14 W. of the fifth principal meridian, on land rented by Peter Schnecklot, about ½ mile south of schoolhouse at crossroads, and 7.2 meters (24 feet) east of center line of north-and-south section-line road. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is flush with surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with ground. No. 1 is 7.7 meters (25 feet) west of center line of north-and-south section-line road, 2.6 meters (9 feet) south of fence line corner, about three-fourths mile south of crossroads at school, and 385.81 meters (1,265.8 feet) from station in azimuth 2°43′07″. No. 2 is 7.3 meters (24 feet) west of center line of highway and 14.56 meters (47.79 feet) from station in azimuth 84°37′. In 1933 all marks at this station reported destroyed by road construction. In 1935 station searched for and not recovered.

Anderson (Fillmore County, H. W. Hemple, 1927; 1935).—About 3 miles south and 6 miles east of Stewartville, 8 miles west of Chatfield, 9 miles north and 1 mile west of Spring Valley, in NW¼ sec. 11, T. 104 N., R. 13 W. of the fifth principal meridian. To reach from Racine, go east to first gravel road and proceed north about 3½ miles. Station is 1½ miles to east, on highest point of section, near southerly edge of abandoned gravel pit, about one-fourth mile east of north-and-south section-line road, and about seven-sixteenths mile south of east-and-west section-line road. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is about 1.0 foot below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 1.78 meters (5.8 feet) north of half-section fence corner, 8.68 meters (28.5 feet) east of north-and-south section-line road, and 442.89 meters (1,453.0 feet) from station in azimuth 66°21′03″. No. 2 is 7.30 meters (24.0 feet) east of north-and-south section-line road, 15.40 meters (50.5 feet) south of east-and-west section-line road, and 743.33 meters (2,438.7 feet) from station in azimuth 148°37′32″. In 1935 station recovered. Marks reported in good condition.

Wykoff (Fillmore County, H. W. Hemple, 1927; 1934).—About 2 miles southwest of Wykoff, about 5 miles east of Spring Valley, in NE¼ sec. 32, T. 103 N., R. 12 W., on crest of small knoll on farm owned by John Freiheit, about 700 feet south of U. S. Route 16, 346 feet east of center line of north-and-south road which passes in front of Mr. Freiheit's house, 90 feet north of east-and-west barbed-wire fence line, and 92 feet north-northwest of triangle-blazed large fence post. To reach from Spring Valley, go east 5.0 miles on U. S. Route 16 to crossroads, go south through gap in high board snow fence, follow dirt road south 0.1 mile across railroad tracks to Mr. Freiheit's house, and continue east about 300 feet across field to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 12 inches below surface of ground. Reference marks (1927) are standard reference disks in concrete, note 11a. No. 1 projects 3 inches

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above ground, is 30 feet north of center line of Route 16, 113 feet north of tracks of Chicago, Milwaukee, St. Paul & Pacific Railroad, about 0.3 mile east of north-and-south road which leads past farmhouse, and 515.1 meters (1,690 feet) from station in azimuth 221°59′49″. No. 2 is 180 meters (591 feet) south of Route 16, 7.7 meters (25 feet) west of center line of north-and-south road, and 393.21 feet from station in azimuth 114°11′. In 1934 reference mark no. 2 was destroyed and two more reference marks were established which are standard reference disks in concrete, note 11b. No. 3 projects 1 inch above ground, is 28 feet north of center line of east-and-west road, 121 feet east of north-and-south road, on barbed-wire right-of-way fence, and 610.14 feet from station in azimuth 21°21′14″. No. 4 projects 1 inch above ground, is 18 feet west of center line of north-and-south road, 15 feet south of telephone pole, 17 feet north of north gatepost, and 381.68 feet from station in azimuth 111°55′55″. Distance between reference marks no. 3 and no. 4 is 722.66 feet.

Chatfield (Olmsted County, H. W. Hemple, 1927; 1935).—About 1½ miles east and 2 miles north of Chatfield, in SW¼ sec. 20, T. 105 N., R. 11 W. of the fifth principal meridian, and on land of E. W. Richter. To reach from Chatfield, go north one-half mile on U. S. Route 55 to outskirts of town and then go east 2½ miles on the Dover-St. Charles road to the Richter farm and station site. Station is 180 meters (591 feet) west of center line of road, and about 145 paces south of barnyard fence. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is about 8 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 10.0 meters (33 feet) west of center line of Dover-St. Charles road, near southeast corner of lot containing owner's home, and 195.82 meters (642.5 feet) from station in azimuth 226°50′56″. No. 2 is 8.0 meters (26 feet) west of center line of same road and 556.16 meters (1,824.7 feet) from station in azimuth 344°33′04″. No. 3 is in fence line 334.93 feet from station in azimuth 338°08′47″.

Fountain (Fillmore County, H. W. Hemple, 1927; 1935).—About 1½ miles east-northeast of Fountain, in NE¼ sec. 11, T. 103 N., R. 11 W. of the fifth principal meridian, on land owned by the T. S. Mulvihill estate, on highest point of hill about 300 yards southwest of farmhouse, 152 meters (499 feet) southwest of fence corner and gate, 243 feet south of fence line, and 203 feet east of fence line. To reach from Fountain post office, go north 0.3 mile to junction with Route 52, go north 0.15 mile on Route 52, go east 1.2 miles to lane leading south to Mulvihill's farmhouse, continue to Mulvihill farmhouse, and proceed southwest to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 12 inches below surface of ground. Reference marks (1927) are standard reference disks in concrete, note 11a. No. 1 is flush with surface of ground, 8 feet east of center line of road, 1 foot west of fence line, 266 feet south of curve where main road turns east, and 1,335.4 meters (4,381 feet) from station in azimuth 40°27′56″. To reach reference mark no. 1 from post office, go south 0.05 mile to T-intersection, go east 0.6 mile, turn and go south 0.35 mile to mark. No. 2 is flush with surface of ground, 26 feet south of center line of road, 2.5 feet northwest of fence corner, and 280.60 meters (920.6 feet) from station in azimuth 167°42′49″. No. 3 (1934) is standard reference disk in concrete, note 11b, projecting 6 inches above ground, 1 foot west of fence line, about 225 feet south of fence corner, and 225.10 feet from station in azimuth 116°12′. In 1935, reference mark no. 3 was reset in fence line, 68.268 meters (223.98 feet) from station in azimuth 116°18′. No. 4 (1935) standard reference disk in concrete, note 11a, is in north-south fence line, and 88.122 meters (287.15 feet) from station in azimuth 45°21′. Azimuth from station to Fountain Catholic Church is 75°15′54″.

Pilot (Fillmore County, H. W. Hemple, 1927; 1935).—About 10½ miles east of Chatfield, about 10 miles south-southeast of St. Charles, about 8 miles north of Lanesboro, about 2 miles east and 1¼ miles north of Pilotmound store, in SW¼ sec. 1, T. 104 N., R. 10 W. of the fifth principal meridian, on highest point in field owned by T. D. Olson, and 0.6 mile southeast of his house and barn. To reach from Chatfield, go south about 2.0 miles on U. S. Route 55, turn left onto road leading to Pilotmound and Arendahl, follow to Pilotmound store, continue nearly 4 miles more to gravel road leading north, go north ¾ mile, jog west and then north about ¾ mile, go west 1½ miles

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to Mr. Olson's house. From house go south on driveway, continue in lane across fields 0.55 mile to gate in east-west fence, thence left (east) along south side of fence 70 meters (230 feet) to reference mark no. 2 on left in fence line. To reach from junction of U. S. Route 14 and State Route M 74 in St. Charles, go south and east 1.95 miles on Route M 74 to crossroad, thence left (east) on gravel road 2.25 miles to side road on left, thence east on gravel road 0.75 mile to crossroad, thence right (south) on gravel road 2.0 miles to crossroad, thence left (east) on gravel road 1.2 miles, thence right (south) on T-road (gravel) 4.0 miles, thence right (west) on dirt T-road to Mr. Olson's house on left. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is about 8 inches below surface of ground. Reference marks no. 1 and no. 2 are standard reference disks in concrete, note 11a. No. 1 is flush with the surface of ground, in cultivated field, 1½ miles due east of Mr. Olson's house, 280 paces south along section-line road from northeast corner of section, 25.9 meters (85 feet) southwest of telephone-line pole, 49 feet west of line of telephone poles on east side of road 7.0 meters (23 feet) west of center line of north-south gravel road leading to Arendahl, and about 1.3 miles from station in azimuth 247°52′35″. No. 1 reached from gate in east-west fence line by going east on dim road 1.2 miles to north-south gravel road, thence left (north) 0.45 mile to top of grade and mark on left. No. 2 projects 1 inch above surface of ground, is 71.5 meters (235 feet) from center of gate in east-west fence, 5.50 meters (18 feet) east of fence corner, 0.4 meter (1 foot) south of east-west fence, and 223.55 meters (733.4 feet) from station in azimuth 150°08′58″. Reference mark no. 3, established in 1935, is standard reference disk in concrete, note 11b, projecting about 4 inches above surface of ground, it is 0.4 meter (1 foot) south of east-west fence, and 194.92 meters (639.5 feet) from station in azimuth 182°42′49″. Following azimuths and distances are from station: Top of windmill tower, 0.5 mile, 107°32′; top of Mr. Olson's windmill tower, 0.6 mile, 157°19′; spire, 1.5 miles, 284°36′34″.

Highland (Fillmore County, H. W. Hemple, 1927; 1935).—About 5 miles east and 2¾ miles south of Lanesboro, at a small village named "Highland", in NW¼ sec. 35, T. 103 N., R. 9 W. of the fifth principal meridian, on hill north-northeast of church at Highland, 75 meters (246 feet) west of timber on hill, and on land owned by Oscar T. Johnson. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is about 10 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 9.9 meters (32 feet) west of center line of north-and-south road, 16.1 meters (53 feet) from intersection of center lines of roads, 46.3 meters (152 feet) from northwest gatepost of cemetery, and 629.25 meters (2,064.5 feet) from station in azimuth 198°57′54″. No. 2 is at fence line, 0.6 meter (2 feet) north of fence corner, and 42.98 meters (141.0 feet) from station in azimuth 16°06′. In 1935 recovered, all marks reported in good condition.

Hart (Winona County, H. W. Hemple, 1927; 1935).—About 2 miles north and 0.7 mile east of Hart, in NE¼ sec. 13, T. 105 N., R. 8 W. of the fifth principal meridian, on land owned by August Heiden, of Rushford, about 300 feet south of east-and-west road, 4.60 meters (15.1 feet) east of north-and-south fence line, and 15.70 meters (51.5 feet) southeast of corner post. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is about 8 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, projecting about 4 inches above surface of ground. No. 1 is 5.30 meters (17.4 feet) south of northwest fence corner (reported destroyed in 1935) of cultivated field, 9.75 meters (32.0 feet) south of center line of east-and-west section-line road, and 79.84 meters (261.9 feet) from station in azimuth 174°04′. No. 2 is 10.0 meters (33 feet) south of center line of same road and 514.26 meters (1,687.2 feet) from station in azimuth 260°29′56″. In 1935 station recovered, all marks reported in good condition. Reference mark no. 1 reported 8 feet south of lone oak tree said to be on the north-south quarter-section line.

Bratsberg (Fillmore County, H. W. Hemple, 1927; 1935).—About 1 mile north and one-third mile east of Bratsberg, in SW¼ sec. 2, T. 103 N., R. 8 W. of the fifth principal meridian, on highest part of cultivated field, about one-third mile east of north-and-south road that leads from Rushford to Bratsberg, 120 meters (394 feet) north of center line of east-and-west road, and 235

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meters (771 feet) northeast of fence corner. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is about 12 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is about three-fourths mile east of the Rushford-Bratsberg road, 4.1 meters (13 feet) north of center line of east-and-west road, and 596.63 meters (1,957.4 feet) from station in azimuth 281°46′05″. No. 2 is 5.45 meters (17.9 feet) north of center line of east-and-west road, 207 meters (679 feet) east of fence corner, and 114.5 meters (376 feet) from station in azimuth 359°01′34″. In 1935 station recovered, all marks reported in good condition.

Ridgeway west base (Winona County, H. W. Hemple, 1927; 1935).—At east edge of town of Ridgeway, in NW¼ sec. 9, T. 105 N., R. 6 W. of the fifth principal meridian, 9.50 meters (31.2 feet) north of center line of gravel road leading through town, and on land of Julius Groth and southwest of his home which is on north side of above road a short distance east of two churches. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark projects about 4 inches above ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 projects about 5 inches above ground, is 5.10 meters (16.7 feet) west of center line of north-and-south section-line road, and 531.54 meters (1,743.9 feet) from station in azimuth 198°45′19″. No. 2 projects about 4 inches above ground, is 7.50 meters (24.6 feet) south of center line of east-and-west gravel road, and 38.10 meters (125.0 feet) from station in azimuth 296°19′. In 1935 station recovered, all marks in good condition. Station reported as being southeast of house of Julius Groth, in cultivated garden patch.

Houston (Houston County, H. W. Hemple, 1927; 1935).—About 3 miles east and 3 miles south of Houston, in SW¼ sec. 13, T. 103 N., R. 6 W. of the fifth principal meridian, on land owned by Dan Dugan, on highest part of hill southeast of his farmhouse, about 440 meters (1,444 feet) east of north-and-south road, and 6.6 meters (22 feet) north of center line of east-and-west road. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 12 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 2.80 meters (9.2 feet) south of center line of east-and-west road, 7.8 meters (26 feet) southeast of fence corner on north side of road (this fence being the first one east of station), and 49.34 meters (161.9 feet) from station in azimuth 282°31′. No. 2 is 32.97 meters (108.2 feet) north-northeast of northeast corner of schoolhouse at T-intersection of roads, 54.6 meters (179 feet) from intersection of roads, 6 meters (20 feet) west of center line of north-and-south road, and 479.68 meters (1,573.8 feet) from station in azimuth 96°52′25″. In 1935 station recovered, all marks reported in good condition.

Ridgeway east base (Winona County, H. W. Hemple, 1927; 1932).—About 1¼ miles north of Nodine, in SW¼ sec. 4, T. 105 N., R. 5 W. of the fifth principal meridian, at fence line between property of Clyde Bateman on east and of Joe Pagel on west, about 200 yards east of Pagel's house, about 100 yards west of Bateman's house, about 200 feet a little north of west of northwest corner of pasture which is northwest of Bateman's house, about 190 meters (623 feet) south of gravel road leading to Ridgeway, and 7.10 meters (23.3 feet) north of fence corner. To reach from Nodine, follow main gravel road north 1¼ miles to Bateman's farm, whose home is the first house on west side of road south of road corner. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark projects about 6 inches above ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 7.83 meters (25.7 feet) south of center line of east-and-west gravel road and 197.13 meters (646.8 feet) from station in azimuth 199°03′29″. No. 2 is 7.30 meters (24.0 feet) south of center line of east-and-west gravel road, 2 feet northeast of corner post, and 523.57 meters (1,717.7 feet) from station in azimuth 111°44′41″.

McDonald (M. R. C.) (Houston County, Mississippi River Commission, 1894; H. W. Hemple, 1927; 1931).—About 6 miles southwest of La Crosse, 3 miles southeast of Hokah, about 80 yards northeast of abandoned house, and in small cultivated field owned by Ed Reilly and leased by Herman Miller. To reach from Hokah go south 0.3 mile on Lake road to second left fork

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(dirt road bearing left over small bridge) and point just beyond road bearing right up steep grade, go south 1.8 miles to ravine, follow left fork 0.3 mile, follow right fork (main road) 0.3 mile to fork just over hill from house on left, follow left fork north 0.8 mile, turn east through red gate and go 0.3 mile to Mr. Reilly's house, follow farm road northeast 0.5 mile to old abandoned house, and continue northeast about 80 yards to station site. Marked by Mississippi River Commission iron pipe, reinforced (in 1930) with concrete, and projecting about 1 foot above ground. Reference marks (1930) are standard reference disks in concrete, note 11a, projecting 4 inches above ground. No. 1 is in fence corner and 91.370 feet from station in azimuth 314°32′. No. 2 is north of foundation of granary and 84.256 feet from station in azimuth 61°16′.

Walden (La Crosse County, Wis., I. T. Sanders, 1930; 1931).—About 9 miles north-northeast of La Crosse, 6 miles northwest of West Salem, about 330 yards southwest of farmhouse, on highest point of hill (near eastern slope), about 100 yards north of east-and-west road, and in cultivated field owned by Louis Waldenberger. To reach from West Salem, go west 1 mile on county route B to intersection, turn north and go 5.1 miles up Larson Coulee on county route U to top of grade, turn left onto dirt road leading along ridge and continue 2.6 miles through fields to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 14 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, projecting 4 inches above ground. No. 1 is on north side of east-and-west fence line, at southwest corner of field, at turn of farm road, and 325.45 feet from station in azimuth 322°11′. No. 2 is at northeast point of woods and 256.42 feet from station in azimuth 2°37′.

St. Joseph (La Crosse County, Wis., I. T. Sanders, 1930; 1931).—About 12 miles east-southeast of La Crosse, 1½ miles west of church in St. Joseph, 91 feet north of center line of State route 33, about 300 yards east of William Schams' house, in half-section-line fence, and 1 foot west of north-and-south property-line fence between properties owned by William Schams and Phillip Hess. To reach from La Crosse, follow route 33 toward St. Joseph direct to station. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark projects 4 inches above ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 projects 4 inches above ground, is in fence corner south of culvert, on south side of highway, and 607.70 feet (slope) from station in azimuth 272°01′26″. No. 2 was projecting 4 inches above ground, on south side of highway in east-and-west fence line, and 241.60 feet (slope) from station in azimuth 52°59′. In 1931 reference mark no. 2 was found uprooted and lying on bank; it was reset flush with surface of ground, 1 foot south of fence on north side of road, 14.60 meters (47.9 feet) north of center line of route 33, 56 yards west of north-and-south fence on west side of lane leading into field, and 57.05 meters (187.1 feet) from station in azimuth 58°41′.

Ridgeway "A" (Winona County, H. W. Hemple, 1927; 1935).—About 2½ miles east of town of Ridgeway by main gravel road, on land owned by Orville Henderson, 86.6 meters (284 feet) north of district schoolhouse no. 77, 6.6 meters (22 feet) east of center line of north-and-south highway, and 120 meters (394 feet) north of turn in road. Mark is standard disk station mark in concrete, note 1a. In 1935 station recovered, mark reported in good condition.

Ridgeway "B" (Winona County, H. W. Hemple, 1927; 1935).—About 2.9 miles west of town of Nodine by main gravel highway, on land owned by Vernon Lee, 164.8 meters (541 feet) south of east-and-west road, and 68.1 meters (223 feet) west of north-and-south fence line. Mark is standard disk station mark in concrete, note 1a, about 12 inches below surface of ground. In 1935 station recovered, mark reported in good condition.

Ridgeway "C" (Winona County, H. W. Hemple, 1927; 1935).—About 2 miles west of Nodine by main-traveled highway, on farm of Herbert Stedman, in sec. 6, T. 105 N., R. 5 W., 102.66 meters (336.8 feet) south of east-and-west road, and 55.3 meters (181 feet) east of north-and-south fence line. Mark is standard disk station mark in concrete, note 1a. In 1935 station recovered, mark reported in good condition.

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Supplementary points

Minnedoka (Minnehaha County, S. Dak., H. W. Hemple, 1927; 1935).—About 2 miles east and one-half mile south of Garretson, in SW¼ sec. 22, T. 103 N., R. 47 W. of the fifth principal meridian, on highest point of most prominent hill in vicinity, on land owned by Marta Stemmer and occupied by Ned Phillips, in cultivated field, 830.44 meters (2,724.5 feet) west of center line of road on boundary line, 309.8 meters (1,016 feet) north of east-and-west road, about 100 yards south of east-and-west center line of southwest quarter section, and 23 feet north of a point in line with an east-and-west fence in southeast quarter section. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark, stamped "Minnekoda", is 1.3 feet below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1, stamped "Minnekoda No. 1", is flush with surface of ground, at crest of slight elevation, 352 meters (1,155 feet) north of intersection of State-line road with first road south of station, 92 feet south of a point in line with a fence extending west from State-line road, 18.5 feet east of center line of State-line road, and 870.6 meters (2,856 feet) from station in azimuth 261°14′50″. No. 2, stamped "Minnekoda No. 2", is 12 inches below surface of ground, 963.8 meters (3,162 feet) west of State-line road, 23 feet north of center line of east-and-west road south of station, 13 feet south of north right-of-way fence, in line with woven-wire fence extending north from section-line road, and 334.1 meters (1,096 feet) from station in azimuth 18°20′28″. In 1935 reported that reference mark no. 2 had been lowered, but probably not changed in position, when road was graded.

Sotowa (Dickinson County, Iowa, H. W. Hemple, 1927).—About 7 miles south and one-half mile west of Jackson, in NW¼ sec. 8, T. 100 N., R. 35 W. of the fifth principal meridian, about 113 meters (371 feet) east of north-and-south section-line road, 687 meters (2,254 feet) south of center line of road along State boundary, and on land owned by J. Jacobs. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 12 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 8 meters (26 feet) east of center line of north-and-south road and 687.4 meters (2,255 feet) from station in azimuth 89°50′39″. No. 2 is 7 meters (23 feet) south of road along State boundary, 18 meters (59 feet) west of center line of road running north, 14 meters (46 feet) east of road running south from boundary road, and 105.7 meters (346.8 feet) from station in azimuth 170°34′33″. Section-line road running north and south has correction at boundary line.

Austin, Catholic Church, spire (Mower County, H. W. Hemple, 1927; 1935).—Spire on large brick church near center of city of Austin.

Austin, packing company, smokestack (Mower County, H. W. Hemple, 1927; 1935).—Very tall smokestack of the Hormel Co.

Spring Valley, Lutheran Church, spire (Fillmore County, H. W. Hemple, 1927; 1935).—Spire on brick church about 2 miles east of Spring Valley and on U. S. Route 16.

Spring Valley, Catholic Church, spire (Fillmore County, H. W. Hemple, 1927; 1935).—Spire on small frame church in south part of town of Spring Valley.

Fountain, Catholic Church, spire (Fillmore County, H. W. Hemple, 1927; 1935).—Spire on brick church in center of town of Fountain.

Arendahl, Lutheran Church, spire (Fillmore County, H. W. Hemple, 1927; 1935).—Spire on wooden structure in most eastern part of town of Arendahl.

Caledonia, courthouse, spire (Houston County, H. W. Hemple, 1927; 1935).—Spire on Houston County courthouse at Caledonia.

ROYALTON TO ALBERT LEA ARC

Principal points

Schumer (Stearns County, H. W. Hemple, 1927; 1931).—About 10 miles north and 5½ miles west from St. Cloud, 3 miles west and 4 miles north from Rice, 2½ miles west of river road along west bank of Mississippi River, in village of Brockway (now incorporated as St. Stephens), in northwest corner of NE¼ sec. 25, T. 126 N., R. 29 W. of the fifth principal meridian, on land owned by Peter Schumer, about 120 meters (394 feet) northeast of

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St. Stephens Catholic Church, and 61.5 meters (202 feet) east of center line of north-south section-line road. To reach from St. Cloud, go north on State route 27 to Sartell, then across Mississippi River and north on road along west bank of river 5.7 miles, then west 2.5 miles to St. Stephens. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 1 foot below surface of ground. Reference marks are standard reference disks in concrete, note 11a. Marks are flush with surface of ground. No. 1 is 9.8 meters (32 feet) east of center line of north-south section-line road and 205.62 meters (674.6 feet) from station in azimuth 16°24′56″. No. 2 is 4.5 meters (15 feet) east of center line of north-south section-line road and 58.71 meters (192.6 feet) from station in azimuth 107°06′.

Voight (Benton County, H. W. Hemple, 1927; 1935).—About 5 miles east and 7 miles north of town of Sauk Rapids, in SW¼ sec. 15, T. 37 N., R. 30 W. of the fourth principal meridian, in cultivated field, on farm of I. B. Voight, just south of a pine grove west of the house, 100 meters (328 feet) east of north-and-south section-line road, 207 meters (679 feet) north of center line of east-and-west section-line road, 48.9 meters (160 feet) southwest of southwest corner of Voight's farmhouse, 13.25 meters (43.5 feet) north of roadway into farm, 31 feet southeast of the southwest pine tree of grove, 33 feet southwest of first pine tree east of the southwest tree, and 29 feet south of a line between these trees. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 15 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is in fence corner, in southwest corner of intersection of cross-roads, 10.15 meters (33 feet) from intersection of center lines, and 242.8 meters (797 feet) from station in azimuth 27°22′06″. No. 2 is 5 meters (16 feet) west of center line of north-and-south road, 680 feet north of intersection of section-line roads at southwest corner of section, 12.55 meters (41.2 feet) northwest of intersection of center line of north-and-south road with road leading into Voight's farm, and 105.6 meters (346 feet) from station in azimuth 89°58′46″.

St. Cloud (Stearns County, H. W. Hemple, 1927; 1935).—About 2 miles southwest from city of St. Cloud, on knoll at southwest corner of cemetery, 1 meter (3 feet) east of west fence line. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark projects 5 inches above ground. Reference mark is standard reference disk in concrete, note 11a, flush with surface of ground, 1 foot east of north-and-south fence line of cemetery, 29.32 meters (96.2 feet) north by west of large monument marking lot in cemetery, bearing name "FROST", and 186.30 meters (611.2 feet) from station in azimuth 179°56′59″. Station *North Star* (*M. R. C.*) (see description and geographic position thereof) is visible from ground at station.

Duelm (Benton County, H. W. Hemple, 1927; 1935).—About 1 mile north and ¼mile east of village of Duelm, about ¼ mile south of St. Cloud-Princeton road, ¼ mile west of Duelm-Foley road, near center of NE¼ sec. 27 T. 36 N., R. 29 W. of the fourth principal meridian, on highest part of hill on which are trees about 30 feet high, and on farm owned by Paul Jurek. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is flush with surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 0.7 mile west of section-line road intersection, 8.3 meters (27 feet) north of center line of Princeton-St. Cloud road, 3.9 meters (13 feet) east of center line of driveway leading north, and 922.1 meters (3,025 feet) from station in azimuth 105°00′23″. No. 2 is 0.2 mile west of section-line-road intersection, 0.2 meter (0.7 foot) north of north fence line of Princeton-St. Cloud road, and 266.3 meters (874 feet) from station in azimuth 167°29′16″.

Enfield (Wright County, H. W. Hemple, 1927; 1935).—About 1 mile south and three-fourths mile east from Enfield railroad station, 6 miles west and 2½ miles north from Monticello, near center of south half of sec. 26, T. 122 N., R. 26 W. of the fifth principal meridian, in southwest corner of farm owned by E. J. Trogen, about one-third mile southwest of his house, and about 100 feet north of a grove of trees. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 1 foot below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 6.15 meters (20.2 feet) south of center line of east-and-west road, on edge of grove of trees, and 679.34 meters (2,228.8 feet) from station in azimuth 190°03′37″. No. 2 is 1 foot north of

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east-and-west line fence and 29.22 meters (95.9 feet) from station in azimuth 319°51′. In 1935 station was reported to be in cultivated field 10 feet east of north-and-south fence between cultivated field and pasture. Reference mark no. 1 was not found in 1935, the indicated distance from center line of road falling in ditch.

Quick (Sherburne County, H. W. Hemple, 1927; 1934).—About 8 miles southwest of Princeton, 4 miles north and 6 miles west of Zimmerman, on highest point of Blue Hill, near center of NW¼ sec. 28, T. 35 N., R. 27 W. of the fourth principal meridian, and on land owned by Mrs. George Newbert. Blue Hill is a very prominent lone hill surrounded by flat land, has rather abrupt slopes on all sides except to south, and is covered with small timber and brush, with scattering growth on top and on south. To reach from Princeton, go south 4.75 miles on U. S. Route 169 to crossroad, turn west and go 6.25 miles to small house on north side of road, turn and pass on north side of house, go west 100 yards across field, turn northwest onto woods road and go 90 paces across northeast corner of field to fence, go through fence and continue 350 yards on woods road to summit of hill and station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is flush with surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 projects 5 inches above ground, is on same hill as station and 44.46 meters (145.8 feet) from station in azimuth 287°25′. No. 2 was opposite farmhouse of Mrs. Olson, 20.07 meters (65.8 feet) from intersection of east-and-west road with driveway into Mrs. Olson's farm, 5.5 meters (18 feet) north of east-and-west road, and about one-half mile from station in azimuth 347°52′15″. In 1934 reference mark no. 2 was destroyed, and two standard reference disks were established, note 11a. Reference mark no. 3 projects 3 inches above ground, and is 71.7 feet from station in azimuth 152°09′. Azimuth mark projects 4 inches above ground, is 0.1 mile west of Mrs. Olson's farm buildings, 27 feet north of center line of east-and-west road, and 0.4 mile from station in azimuth 14°25′42″. Azimuth from station to small white church spire, distant about 3 miles, is 1°54′44″.

Monticello (Wright County, H. W. Hemple, 1927; 1934).—About 1½ miles east and 2 miles south from town of Monticello, near north side center of NE¼ sec. 24, T. 121 N., R. 25 W. of the fifth principal meridian, on small piece of land owned by Robert Haddon of Monticello, on knoll about 50 paces south of summer cottage owned by Mr. Haddon, 0.2 mile south of east-and-west road, and about 100 yards east of north-and-south public road. To reach from Monticello, go southeast 2.05 miles on State Route 152 from its junction with State Route 25 to a left turn south of railroad crossing, continue straight ahead (south) 0.35 mile on narrow sand road to gate on east side of road, and go east through gate 100 yards to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is flush with surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 8.40 meters (27.5 feet) west of center line of north-and-south road, 2 meters (6 feet), south of iron fence corner post in concrete, 1.0 meter (3 feet) east of right-of-way fence line, and 0.65 mile from station in azimuth 6°38′16″. A barn is on line between station and reference mark no. 1. No. 2 is 3.95 meters (13 feet) east of center line of north-south section-line road, in east right-of-way fence, about 50 yards south of gate into field, and 125.55 meters (411.9 feet) from station in azimuth 52°05′37″.

Godfrey (Sherburne County, H. W. Hemple, 1927; 1934).—About 2½ miles north and ⅔ mile west of Elk River, in NE¼ sec. 21, T. 33 N., R. 26 W. of the fourth principal meridian, on farm owned by B. K. Godfrey, about ⅓ mile southwest of Godfrey's house, about ¼ mile west of section-line road, on high knoll in cultivated field, 69 meters (229 feet) west of north-and-south fence line, and 78.6 meters (257 feet) north of east-and-west fence line. To reach from Elk River, go north 2.75 miles on State Route 169 to gravel crossroads, go west 0.6 mile, go south 0.05 mile to Godfrey's house, and continue southwest ⅔ mile to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 18 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 projects 4 inches above ground, is 5.6 meters (20 feet) east of center line of section-line road, 6 inches west of fence line, 100 feet south-southeast of driveway to

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Godfrey's house, opposite space between barn and silo on Godfrey's farm, 36.1 meters (119 feet) north-northeast of northeast fence corner of cultivated field, and 667.5 meters (2,190 feet) from station in azimuth 210°19′40″. No. 2 projects 4 inches above ground, is 1 foot north of fence line, about 225 feet west of southwest fence corner of cultivated field, and 78.59 meters (257.7 feet) from station in azimuth 350°14′. In 1934: Reference mark no. 3, standard reference disk, projecting 10 inches above ground, was established 56 feet south of highest point in fence line, 1 foot west of fence line, and 239.47 feet from station in azimuth 250°29′.

Esterly (Wright County, H. W. Hemple, 1927; 1935).—About 4½ miles south and ¾ mile west of Albertville, 2 miles south and ¼ mile west of St. Michael's Church, 1½ miles north and ¾ mile west of Hanover, near north side center of SE¼ sec. 26, T. 120 N., R. 24 W., of the fifth principal meridian, on highest point of knoll in wooded pasture owned by Gottlieb Esterly, and about 35 meters (115 feet) south of public road on half-section line. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark projects about 1 foot above ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is in SW¼ sec. 14, 19.50 meters (64.0 feet) west of corner post, 6.40 meters (21.0 feet) north of center line of gravel road leading to St. Michael, just inside fence line on north of road, 258.40 meters (847.8 feet) east of beginning of curve in road, and about 1¾ miles from station in azimuth 162°29′01″. No. 2 is 6.50 meters (21.3 feet) north of center line of road, 9.22 meters (30.2 feet) east of center line of driveway leading to group of farm buildings, and 101.60 meters (333.3 feet) from station in azimuth 246°55′32″. In 1935, reference marks further described: No. 1 is on north side of newly graded east-and-west road about 1 mile south and ½ mile west of St. Michael. No. 2 is in small cultivated patch between two roads leading to deserted farm buildings, 60 feet south of 24-inch red-oak tree with deep scar on southeast side, and 42 feet south and a little east of 12-inch elm on east side of the westerly road leading to buildings.

Dayton (Hennepin County, H. W. Hemple, 1927; 1931).—About 2½ miles south and 1¾ miles east of town of Dayton, near south side center of SE¼ sec. 8, T. 120 N., R. 22 W., of the fifth principal meridian, on land owned by Frank Dahlheimer, on prominent knoll about 50 meters (164 feet) north of east-and-west road leading from Anoka to St. Michael and Dayton, and 86 meters (282 feet) northeast of intersection of this road with T-road leading to Maple Grove. To reach from Dayton, go south 2.7 miles along gravel road at east corporate limits and then east 0.8 mile to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is about 12 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is about 4.4 meters (14 feet) west of center line of T-road, 16 meters (52 feet) north of private road leading into farm, which is first farm south of Dayton road along road to Maple Grove, and about one-third mile from station in azimuth 4°59′32″. No. 2 is 7.1 meters (23 feet) north of center line of east-and-west road, 21 meters (69 feet) east of private road leading into farm of L. L. Schumacher, and 288.3 meters (946 feet) from station in azimuth 83°31′01″.

Hamel (Hennepin County, H. W. Hemple, 1927; 1935).—About 3¾ miles west and three-fourths mile south from town of Hamel, in SW¼NW¼ sec. 16, T. 118 N., R. 23 W. of the fifth principal meridian, on farm owned by John N. Fries, on highest point of ground in cultivated field, 75 meters (246 feet) east of center line of west section-line road, and 91.0 meters (299 feet) north of half-section line. To reach from Hamel go west about 2¼ miles to point where highway turns right and gravel road bears left up hill, follow left fork west to second road leading south, then go south about one-half mile to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is about 1 foot below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is in NW¼ sec. 15, 58.40 meters (191.6 feet) east of center line of north-south section-line road, 7.30 meters (24.0 feet) south of center line of east-west section-line road, on knoll at north edge of grove of trees, and 1¼ miles from station in azimuth 246°31′34″. No. 2 is 4.50 meters (14.8 feet) east of center line of west section-line road and 111.63 meters (366.2 feet) from station in azimuth 115°20′21″.

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Maxim (Hennepin County, H. W. Hemple, 1927).—About 3½ miles east and 1 mile north of Hamel, 1.7 miles north of Lake Region Highway, Rockford Road, in SW¼ sec. 3, T. 118 N., R. 22 W. of the fifth principal meridian, on farm of Maxim Pamerleau, 0.36 mile north of Minneapolis, St. Paul & Sault Ste. Marie Railway tracks, and about 660 meters (2,165 feet) west of center line of north-and-south road. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 12 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is at fence line north of station, at edge of woods, and 157.8 meters (518 feet) from station in azimuth 187°57′33″. No. 2 is 6.1 meters (20 feet) west of center line of north-and-south road, 54 meters (177 feet) north of north side of gray stucco house on Pamerleau's farm, and 653.8 meters (2,145 feet) from station in azimuth 273°55′34″. In 1935 reference marks were recovered in good condition, but station mark could not be found.

Hopkins (Hennepin County, W. R. Hoag, 1889; 1931).—About 2¼ miles west and one-fourth mile south of Hopkins, in north half of sec. 27, T. 117 N., R. 22 W. of the fifth principal meridian, on land subdivided into 10-acre lots, and on sand hill covered with small brush and brambles which is highest hill in vicinity. Original mark was stone post with copper bolt in center. Station was re-marked in 1927 with surface and underground marks consisting of standard station disks in concrete, notes 1a and 7a. Disks were stamped "1889–1927." Upper mark is flush with surface of ground. Two standard reference disks in concrete, note 11a, were established in 1927. No. 1 is on first little knoll east of station and 87 meters (285 feet) from station in azimuth 259°25′. No. 2 is 8.5 meters (28 feet) north of center line of Excelsior Avenue (State route 12), 0.2 mile east of Glen Lake School, opposite driveway on south leading to gray stucco house, and about three-fourths mile from station in azimuth 343°25′56″.

Excelsior (Carver County, H. W. Hemple, 1927; 1935).—About 2½ miles southwest from town of Excelsior, one-fourth mile east of State Route 12, in NE¼NE¼ sec. 9, T. 116 N., R. 23 W. of the fifth principal meridian, on land owned by J. E. Swenson, on highest knoll in cleared field, and on ridge about 200 paces to eastward of his house. To reach from Excelsior, follow Route 12 about 2½ miles to Swenson's home. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 1 foot below surface of ground. Reference mark is standard reference disk in concrete, note 11a, flush with surface of ground, 0.55 meter (2 feet) southeast of corner stone for secs. 3, 4, 9, and 10, and 148.55 meters (487.3 feet) from station in azimuth 236°14′08″.

Shakopee (Scott County, H. W. Hemple, 1927; 1935).—About 4 miles south from town of Shakopee, 1 mile north from village of Marystown, on west side of Jordan, Marystown, and Shakopee gravel road, on east side of SE¼ sec. 26, T. 115 N., R. 23 W. of the fifth principal meridian, on highest point of ground in cultivated field on land owned (in 1927) by the Henty Breegermann estate, about one-third mile from section line, 22.7 meters (74 feet) west of center line of north-and-south section-line road, and 40 feet west of top of road cut. To reach from south or east, go to Marystown, thence 1 mile north on Shakopee Road. To reach from post office in Shakopee, go south 0.35 mile, to right (west) 0.7 mile, and to left (south) on gravel road 3.6 miles to top of grade, steep bank, and station site on right. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is about 14 inches below surface of ground. Reference and azimuth marks are standard reference disks in concrete, note 11a. No. 1 is 4 inches above ground, 8.6 meters (28 feet) east of center line of section-line road, and approximately 1,089 meters (3,572 feet) from station in azimuth 185°23′16″. No. 2 projects about 2 inches above ground, is 13.2 meters (43 feet) west of center line of north-and-south section-line road, and 27.66 meters (90.7 feet) from station in azimuth 334°00′. Azimuth mark (1935), stamped "SHAKOPEE AZI. 1935", projects about 6 inches above ground, is 55 meters (180 feet) northwest of large brick farmhouse owned and occupied by H. V. Theis, 3.0 meters (10 feet) south of center line of lane leading to barnyard, 1.2 meters (4 feet) southeast of northwest corner post of yard fence, and about 0.5 mile from station in azimuth 313°32′51″. Azimuth from station to Marystown, brick church, spire, finial below cross, is 358°18′58″.

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Buck (Buck Hill, 1889) (Dakota County, W. R. Hoag, 1889; 1934).—About 4 miles south and 3 miles east of Savage, three-fourths mile east of U. S. Route 65, in west half of sec. 36, T. 115 N., R. 21 W. of the fifth principal meridian, on land owned by F. G. L. Hunt, and on prominent bald hill known as Buck Hill. To reach from intersection of State Routes 55 and 100 at Fort Snelling, go southwest and west 6.0 miles on State Route 5 to its intersection with U. S. Route 65, go south 10.4 miles on U. S. Route 65 to crossroads, turn left and go east 0.3 mile on gravel road to wagon tracks across cultivated field on left, go north 0.6 mile across field to gap in fence at base of hill, and proceed to summit of hill and station site. Original mark was stone post with hole drilled in center. Station was re-marked in 1927 with surface and underground marks consisting of standard station disks in concrete, notes 1a and 7a. Upper mark is flush with surface of ground. Three standard reference disks in concrete, note 11a, flush with surface of ground, were established in 1927. No. 1 is 6.5 meters (21 feet) west of center line of road leading to Buck Hill, 6.7 meters (22 feet) north of center line of east-and-west road, and 992 meters (3,255 feet) from station in azimuth 17°07′20″. No. 2 is along road about 0.1 mile southwest of Orchard Gardens Station on Minneapolis, Northfield & Southern Railway, 4.6 meters (15 feet) south of center line of highway, and 1,113 meters (3,652 feet) from station in azimuth 89°42′48″. No. 3 is on same hill as station and 72.39 meters (237.5 feet) from station in azimuth 53°32′.

Elko (Scott County, H. W. Hemple, 1927; 1935).—About one-half mile southeast of town of Elko, on west side of SE¼ sec. 26, T. 113 N., R. 21 W. of the fifth principal meridian, on land owned and occupied by Peter Knutson, in pasture, on highest point of prominent knoll bare of trees, and 116 meters (381 feet) east of intersection of north-and-south road with road leading into Knutson's farm. To reach from post office in Elko, go east 0.3 mile and to right (south) 0.25 mile, turn left (east) through take-down in wire fence a few yards north of lane leading to Knutson's house on west side of road, and go southeast across pasture about one-fourth mile to highest point of hill and station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark projects about 4 inches above ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 (1927), projecting about 4 inches above ground, is on ridge just south of small group of oak trees and 116.3 meters (382 feet) from station in azimuth 221°55′40″. No. 2 (1927), projecting about 4 inches above ground, is on northwestern edge of town of Elko, 35.44 meters (116.3 feet) east of site of northeast corner of Elko church (which has burned), 25.9 meters (85 feet) north of center of junction of north-and-south gravel road with T-road leading east, which is northeast of schoolhouse, 8.7 meters (29 feet) east of center line of north-and-south gravel road, 1.1 meters (4 feet) north of southwest corner post of cultivated field, and about three-fourths mile from station in azimuth 133°30′10″. No. 3 (1935), projecting about 5 inches above ground, is 42.85 meters (140.6 feet) from station in azimuth 335°12′. Azimuths from station to other points are: *New Market, water tank* 114°05′54″; and *New Market, St. Nicholas Catholic Church, spire,* 119°24′17″.

Veseli (Rice County, H. W. Hemple, 1927; 1935).—About one-half mile north and 1 mile west from village of Veseli, 4½ miles east and 1½ miles south from New Prague, on west side of NW¼ sec. 9, T. 112 N., R. 22 W. of the fifth principal meridian, on land owned by J. S. Novak, about 250 paces north of half-section line, 43.5 feet east of center line of north-south section-line road, and just east of grove of elm trees. To reach from city water tank in New Prague, go east 1.4 miles on State routes 13 and 19, turn right (south) onto gravel T-road and go 0.9 mile, turn left (east) and go 1.0 mile, turn right (south) and go 0.5 mile, turn left (east) and go 2.0 miles to T-road, turn left (north) and go 0.15 mile to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 10 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 (1927), projecting 4 inches above ground, is 24 feet west of center line of gravel road between Veseli and New Prague, 1 foot east of west right-of-way fence, and 502.11 meters (1,647.3 feet) from station in azimuth 2°05′05″. No. 2 (1927) is about 2 inches below surface of ground, 4 feet west of center line of north-south section-line road, and 17.96 meters (58.9 feet) from station in azimuth 125°10′. No. 3 (1935) projecting 9 inches above ground, is 24 feet west of center line of gravel road and 37.90

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meters (124.3 feet) from station in azimuth 33°22′. No. 4 (1935), projecting 8 inches above ground, is 21 feet west of center line of gravel road and 29.30 meters (96.1 feet) from station in azimuth 134°10′.

Shields (Rice County, H. W. Hemple, 1927; 1931).—About 11 miles west and 4 miles north from Faribault, about 3½ miles west from Shieldsville, about 3 miles northwest from Town Hall at forks of road on north side of Hunts Lake, about one-fourth mile southwest of Strebon Catholic (Bohemian) Church and schoolhouse, in NE¼ sec. 8, and on farm occupied by Joe Biskocil. To reach Faribault follow highway to Shieldsville, then Hunt Lake road to Town Hall, and from there take road to right 3 miles to church and school. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Surface mark is 1½ feet below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 7.53 meters (24.7 feet) south of center line of east-west section-line road, on high hill just north of grove of trees, and 808.23 meters (2,651.7 feet) from station in azimuth 213°49′17″. No. 2 is 8.10 meters (26.6 feet) south of center line of east-west section-line road, 14.20 meters (46.6 feet) east of center line of driveway leading to station and to Joe Biskocil's house, and 312.25 meters (1,024.4 feet) from station in azimuth 109°45′27″.

Faribault (Rice County, H. W. Temple, 1927; 1935).—About 1½ miles northeast of town of Faribault, near east side of SE¼ sec. 29, T. 110 N., R. 20 W. of the fifth principal meridian, on land owned by Charles Thonet (or Tonet), 47.57 meters (156.1 feet) south of State Route 21, and 106.7 meters (350 feet) west of eastern city limits of Faribault. To reach from post office, go east 0.5 mile on Route 60 to where it turns south, continue straight ahead 0.15 mile to T-street, thence left (northeast) 0.7 mile to forks, take right fork and go 0.05 mile to station site on right, in cultivated field. In 1935 distance from center of road given as 145 feet. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 12 inches below surface of ground. Reference marks nos. 1 and 2 established in 1927 are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 96.2 meters (316 feet) east of junction of Route 21 with county road leading northeast to Dean, 8.52 meters (28.0 feet) south of center line of highway, in right-of-way fence line and 39.038 meters (128.08 feet) from station in azimuth 175°40′. No. 2 is on farm of J. H. Smith, on extension of Davision Street, 213 meters (699 feet) north of gravel highway, 3.92 meters (12.9 feet) west of center line of north-south highway, and approximately 0.8 mile from station in azimuth 314°52′30″. To reach reference mark no. 2 (azimuth mark) from post office, follow Route 60 east 0.5 mile to right (south) turn. From the station mark may be reached by following pavement 0.8 mile to Route 60, then south and east 1.5 miles on Route 60, then left (north) on dim farm road 0.15 mile to mark on left. Reference marks nos. 3 and 4, established in 1935, are probably standard reference disks in concrete. No. 3 is in same fence as line and about 82 feet west of and in same fence line as reference mark no. 1, and 48.454 meters (158.97 feet) from station in azimuth 146°17′. No. 4 is in same fence line as, and about 80 feet east of reference mark no. 1, and 42.017 meters (137.85 feet) from station in azimuth 200°52′. Azimuth from station to Faribault, Minnesota School for the Blind, water tank, approximately 1.25 miles distant, is 32°40′57″.

Morris (Waseca County, H. W. Hemple, 1927; 1931).—About 4½ miles south from Morristown, near center of NW¼ sec. 14, T. 108 N., R. 22 W. of the fifth principal meridian, in north-and-south fence line, about 50 paces south from small oak grove, on highest point of ground owned by August Wilkowske, and about one-fourth mile southeast of his house. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 1 foot south of south fence line of small oak grove and 49.04 meters (160.9 feet) from station in azimuth 172°38′. No. 2 is 7.14 meters (23.4 feet) east of center line of north-south section-line road and 615.8 meters (2,020.33 feet) from station in azimuth 39°50′22″. In 1930 reference mark no. 2 was reported destroyed in road construction.

Medford (Steele County, H. W. Hemple, 1927; 1931).—About 1 mile southeast of Medford, on hill northeast of farmhouse of Mr. Webb. There are trees to east and north. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is flush with surface of ground.

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Reference marks are standard reference disks in concrete, note 11a. No. 1 is at fence line and 65.95 meters (216.4 feet) from station in azimuth 271°10′. No. 2 is 16.15 meters (53.0 feet) west of route 1, on north tangent of Straight River, 240 meters (787 feet) north of second road to south of Medford leading east, 48.85 meters (160.3 feet) west of center line of Chicago, Milwaukee, St. Paul & Pacific Railroad, and 1,038 meters (3,406 feet) from station in azimuth 50°33′21″.

Meriden (Steele County, H. W. Hemple, 1927; 1935).—About 1 mile south and 3 miles west from Owatonna, 4 miles east from Meriden railroad station, in SW¼ sec. 14, T. 107 N., R. 21 W. of the fifth principal meridian, on highest ground in cultivated field owned by Jacob Karaman, 77.41 meters (254.0 feet) east of center line of north-south section-line road, and about 300 paces north of south section-line road. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 1.5 feet below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 5.80 meters (19.0 feet) east of north-south section road, 1 foot west of east right-of-way fence, and 98.20 meters (322.2 feet) from station in azimuth 45°39′. No. 2 is 7.43 meters (24.4 feet) east of center line of north-south section-line road, on highest ground in vicinity, and 506.92 meters (1,663.1 feet) from station in azimuth 171°30′29″. In 1935 it was reported that reference marks had been removed during road construction and had been reset in new locations: No. 1 is flush with surface of ground, on property-line fence, 33 feet east of center line of north-and-south section-line road along west side of section 14, and 650 feet north of its intersection with east-and-west road. No. 2 is flush with surface of ground, near the west quarter corner, 180 feet south along section-line road from a 6-inch square concrete quarter post that is on east side of road, and 32.5 feet east of center line of north-and-south road.

Hartle (Steele County, H. W. Hemple, 1927; 1935).—About 4½ miles east of town of Owatonna, near center of NW¼ sec. 8, T. 107 N., R. 19 W. of the first principal meridian, on highest ground in field owned by John Hartle, north of his farmhouse, and 0.6 meter (2 feet) east of north-and-south fence line. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 12 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is just north of barns of Hartle's farm, 0.4 meter (1 foot) north of an east-and-west fence line, 9 meters (30 feet) west of a north-and-south fence line, and 141.1 meters (463 feet) from station in azimuth 338°33′17″. No. 2 is 8 meters (26 feet) east of north-and-south road, about 0.2 mile south of east-and-west road, and 902.8 meters (2,962 feet) from station in azimuth 34°22′10″. In 1935, reference marks further described: No. 1 is about 300 feet north of hog barn and in line with its east face. No. 2 has been destroyed by road construction.

Bixby (Steele County, H. W. Hemple, 1927; 1935).—About 2 miles west of town of Bixby, near north side-center of sec. 32, T. 106 N., R. 19 W. of the fifth principal meridian, on north side of farm owned by Joe Plainka, about 120 meters (394 feet) west of bend in road, 12.6 meters (41 feet) south of center line of east-and-west road which runs through 10-foot cut opposite station, and 4.24 meters (13.9 feet) south of fence line. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is about 12 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is on north bank of cut, 252 meters (827 feet) east of first road west of station, 9.7 meters (32 feet) north of center line of east-and-west road, and 2,073 meters (6,800 feet) from station in azimuth 90°37′37″. No. 2 is on north bank of cut, 7.6 meters (25 feet) north of center line of east-and-west road, and 21.62 meters (70.9 feet) from station in azimuth 164°47′. In 1935, it was reported that reference mark no. 2 is in danger of destruction by erosion within the next few years.

Berlin (Steele County, H. W. Hemple, 1927; 1935).—About 2 miles west and 3 miles north from Ellendale, one-third mile southeast of store and school in Berlin, near center of NW¼ sec. 10, T. 105, N., R 21 W. of the fifth principal meridian, in cultivated field owned by William Utpadel, about one-fourth mile east of his house, on highest point in vicinity, and about one-fourth mile south of east-and-west road just north of schoolhouse. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper

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mark is 15 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is in northeast corner of school lot, 9.40 meters (30.8 feet) south of center line of east-west section-line road, and 585.24 meters (1,920.1 feet) from station in azimuth 124°01′39″. No. 2 is 5.80 meters (19.0 feet) south of center line of east-west section-line road and 340.68 meters (1,117.7 feet) from station in azimuth 188°11′38″.

IOWA-MINNESOTA STATE LINE TO ST PAUL ARC (MISSISSIPPI RIVER)

Principal points

Ferry (Crawford County, Wis., H. W. Hemple, 1931).—About 2 miles north of Ferryville, on land owned by Swiggum and Aberg, on top of east-and-west ridge, on highest point in oats field, 66 meters (217 feet) south of east-and-west fence on south side of field which is just south of 2-story white house, and 110 meters (361 feet) east of farm road at edge of cultivation. To reach from Ferryville, follow road north along base of bluffs 1.8 miles to junction with county route O leading to Rising Sun, proceed 1.7 miles on route O to road on right at 20-inch oak tree with triangular blaze, proceed 0.6 mile on this dirt road to 2-story white house on left, and continue 0.1 mile to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 12 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, projecting 8 inches above ground. No. 1 is near country telephone pole, 1 foot east of wire fence on west side of farm road, 100 meters (328 feet) north of Y-intersection of roads, and 141.915 meters (465.60 feet) from station in azimuth 68°49′00″. No. 2 is 7 meters (23 feet) west of center line of road, 14 meters (46 feet) northwest of northwest corner of cement pump platform, 1 foot east of northeast corner of large red barn, and one-fourth mile from station in azimuth 164°40′40″.

Gruber (Allamakee County, Iowa, H. W. Hemple, 1931).—Seven and one-half miles west of Lansing, 8 miles northeast of Waukon, opposite Lansing Ridge Cemetery, on land owner by the Gruber brothers, 85 meters (279 feet) north of center line of route 9, 39 meters (128 feet) east of center line of dirt road leading north directly opposite cemetery, 5.75 meters (18.9 feet) west of northwest corner of old abandoned stone farmhouse, and 4 meters (13 feet) east of northeast corner of old stone smokehouse. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference marks are standard reference disks in concrete, note 11a. No. 1 is just north of small grove of large trees, in fence line between cultivated field and pasture land, 65 meters (213 feet) north of center line of route 9, and approximately one-fourth mile from station in azimuth 229°12′12″. No. 2 is in southwest corner of farmyard, in northeast corner of intersection of route 9 and dirt road leading north of cemetery, 1 meter (3 feet) north of corner post, and 82.4 meters (270 feet) from station in azimuth 246°58′. Azimuth from station to Lycurgus, St. Mary's Catholic Church, lightning rod on dome, is 72°59′21″.

Redmound (Vernon County, Wis., H. W. Hemple, 1931).—In Red Mound, on land owned and occupied by Mr. K. J. Adams, on west side of house, in westernmost end of barnyard, 3.08 meters (10.1 feet) south of woven-wire fence of manure yard, 15.48 meters (50.8 feet) west of pump used for watering cattle, 22.78 meters (74.7 feet) west of southwest corner of large red barn, 12.18 meters (40.0 feet) east of southwest corner of manure yard, 18.65 meters (61.2 feet) north of county route U, and 40 meters (131 feet) west of windmill with pump. To reach from general store in Red Mound, follow county route U 100 yards toward Victory, to Mr. Adams' house on right side of road. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 8 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, projecting 8 inches above ground. No. 1 is 2 meters (7 feet) east of southwest corner of red barn, 16 meters (52 feet) northwest of northwest leg of windmill, 9 meters (30 feet) east of pump used for watering cattle, and 24.635 meters (80.82 feet) from station in azimuth 278°51′. No. 2 is 1 foot west of fence between pasture and cultivated field, 12 meters (39 feet) north of apple tree, 27 meters (89 feet) south of gate to pasture, 50 meters (164 feet) east of road separating hay field and cultivated field and three-eighths mile from station in azimuth

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186°36′21″. Azimuth from station to Red Mound, church, center of white ball on spire, distant three-fourths mile, is 279°54′40″.

Iasota (Allamakee County, Iowa, Houston County, Minn., H. W. Hemple, 1931).—On or very near State line between Iowa and Minnesota, about 4 miles west of New Albin, in fence line between farms of G. H. Meyer on north and A. B. Staggemeir on south, 65.5 meters (215 feet) from gate leading into south field, and 63.5 meters (208 feet) southeast of center line of road at its nearest point. To reach from New Albin, go south 1 mile on Route 182, turn west onto Eitzen road, and continue 4.1 miles to fence line at sharp curve in road from southwest to west. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference marks are standard reference disks in concrete, note 11a. No. 1 is in southeast corner of yard in front of Staggemeir's house, 7 meters (23 feet) north of driveway leading into yard, 9 meters (30 feet) west of center line of road, and approximately three-eighths mile from station in azimuth 73°09′22″. No. 2 is in yard in front of Mr. Breeser's house which is directly opposite station site, 6.75 meters (22.1 feet) north of center line of highway, 6.5 meters (21 feet) east of center line of driveway into yard, and 66.7 meters (219 feet) from station in azimuth 111°55′. Azimuth from station to St. Lukes Evangelical Church spire, is 58°16′04″.

Kapanke (Vernon County, Wis., H. W. Hemple, 1931).—Two and one-half miles south-southwest of Chaseburg, on land owned and occupied by Henry Kapanke, in small triangular pasture strip (old orchard), 3.45 meters (11.3 feet) north of fence on north side of highway, 9.54 meters (31.3 feet) north of center line of county Route K, 21.28 meters (69.8 feet) south of fence on north side of pasture, and 40 yards east of group of old fruit trees. To reach from Chaseburg, follow county route K 2 miles to T intersection, turn right with Route K, and continue 0.4 mile to station site northeast of Kapanke's brick house on left side of road. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark projects 2 inches above ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 projects 12 inches above ground, is on first hill west of station, 1 foot north of fence on south side of road, 3 meters (10 feet) east of gate entering pasture, 5 meters (16 feet) south of center line of route K, and 0.4 mile from station in azimuth 75°57′29″. No. 2 projects 10 inches above ground, is 1 foot south of north fence of pasture, 16 meters (52 feet) west of 12-inch oak tree, 18 meters (59 feet) northeast of 10-inch apple tree which is most northeasterly tree in orchard, and 30.26 meters (99.3 feet) from station in azimuth 130°27′.

White (Houston County, H. W. Hemple, 1931).—About 4 miles southwest of Brownsville, 3 miles northeast of Freeburg, in sec. 9, T. 102 N., R. 4 W. of the fifth principal meridian (Crooked Creek Township), in pasture owned and occupied by John White, 26.0 meters (85 feet) west-southwest of angle in lane where it turns north to Mr. White's house, 8.1 meters (27 feet) southeast of center line of dirt lane, 4.0 meters (13 feet) southeast of wire fence, 9.2 meters (30 feet) east of large oak tree in northwest corner of pasture, and 25.3 meters (83 feet) west-southwest of wire gate. To reach from Freeburg, follow main Brownsville road northeast 4.0 miles (bearing right at 0.15 mile and left at 3.0 miles) to private road turning back sharply to right (south), proceed south 100 yards, and then go east 0.3 mile to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 1 foot below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is at bend in wire fence in pasture, 2.0 meters (7 feet) south of east-and-west wagon road through cultivated field, and 66.07 meters (216.8 feet) from station in azimuth 296°58′. No. 2 is 1.5 meters (5 feet) west of southeast corner of cultivated field, about 50 meters (164 feet) north of grove of trees in pasture, and approximately 200 meters (656 feet) from station in azimuth 3°27′23″.

Robb (Trempealeau County, Wis., H. W. Hemple, 1931).—In old cleared field on top of high wooded ridge, 3½ miles northwest of Galesville, in SW¼ sec. 23, T. 19 N., R. 9 W. of the fourth principal meridian, on land owned by the Robb brothers of Winona, on highest point of ridge, and 7.8 meters (26 feet) north of prolongation of center line of road leading to clearing from foot of bluff. To reach from Galesville, go 4.3 miles on routes 35 and 54 toward Winona, turn right (north) onto dirt road and continue 0.5 mile to T-intersection, turn left and continue 0.3 mile, turn right and follow main-traveled

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road to its end at light-colored brick house. Follow road at back of house to clearing on highest point of ridge and station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 14 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 projects 3 inches above ground, is in extreme southeast corner of clearing, 1 foot north of fence on south side of clearing, 10.0 feet west of 14-inch oak tree which serves as southeast corner fence post, and 165.67 meters (543.5 feet) (slope distance) from station in azimuth 313°22′38″. No. 2 projects 8 inches above ground, is at western edge of clearing, near brow of ridge, 3.70 meters (12.1 feet) north of center line of road leading to clearing, and 32.27 meters (105.9 feet) (slope distance) from station in azimuth 87°10′.

Witoka (Winona County, H. W. Hemple, 1931).—About 7 miles south by east of Winona, 1½ miles northeast of Witoka, near east line of SE¼ sec. 25, T. 106 N., R. 6 W. of the fifth principal meridian (Wilson Township), on land owned and farmed by Adolph Miller, about 100 meters (328 feet) northwest of Mr. Miller's house, in northeast corner of barn lot, 36 meters (118 feet) northeast of northeast corner of old farmhouse, 19 meters (62 feet) south-southwest of southernmost twin oak trees on east fence line, 16 meters (52 feet) south of old granary, and 6 meters (20 feet) northeast of windmill. To reach from Witoka, go north 0.2 mile on gravel road, proceed east and northeast 1.5 miles to Miller's farm on west side of road, turn into lane south of farmhouse, and follow west to barn lot on north and station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference marks are standard reference disks in concrete, note 11a. No. 1 is in northeast corner of field, 6 meters (20 feet) west of center line of gravel road, and approximately one-fourth mile from station in azimuth 229°44′40″. No. 2 is 20 meters (66 feet) southeast of northeast corner of old abandoned farmhouse, in barnyard, 6½ meters (21 feet) west of row of oak trees on east side of lane leading to barn lot, and 49.2 meters (161 feet) from station in azimuth 0°08′.

Johnson (Buffalo County, Wis., H. W. Hemple, 1931).—Four and one-half miles southeast of Fountain City, directly opposite farmhouse and barnyard of Mr. Gerth, on property owned by Andrew Johnson, on prolongation of north lawn fence, in cultivated field, 70 yards west-northwest of white house, 6.0 meters (20 feet) west of fence on west side of dirt road, 9.0 meters (30 feet) west of center line of dirt road, 34.10 meters (111.9 feet) south of 48-inch cottonwood tree, and 24.50 meters (80.4 feet) north-northwest of 12-inch hickory tree (both trees in fence line on west side of road). To reach from Fountain City, follow Wis. Route 95 to intersection with county Route M at top of ridge, turn right onto Route M and follow it 3.3 miles or one-fourth mile beyond Buffalo Ridge School to dirt road on right, and continue 0.3 mile on dirt road to top of ridge and station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 14 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1, projects 4 inches above ground, is 4.0 meters (13 feet) east of center line of dirt road, 2 feet north of east-and-west fence on north side of lawn, 2 meters (7 feet) east and north of northwest corner post of lawn and garden, 3 meters (10 feet) southwest of old well, 6 meters (20 feet) southwest of 12-inch elm tree, and 12.86 meters (42.2 feet) from station in azimuth 265°32′. No. 2 projects 3 inches above ground, is at east apex of triangular yard of Buffalo Ridge School (District No. 1), 1 foot north of fence, 1 foot west of corner post where fence makes angle of 45°, 8 meters (26 feet) south of center line of county Route M, and one-half mile from station in azimuth 157°46′50″.

Gaulke (Winona County, H. W. Hemple, 1931).—About 8 miles west of Winona, 2 miles northwest of Stockton, in fence line between sections 28 and 29, between land owned by the Gaulke brothers on east and Gustav Ellinghuysen on west, and 78.0 meters (256 feet) south of center line of east-and-west road. To reach from Stockton, go west 1.1 miles on route 14 to first gravel road on right, go northwest 0.3 mile, take right fork 0.65 mile to fork just beyond bridge, follow right fork north up steep hill 1.0 mile to corner, go west 0.45 mile to section-line fence, and proceed south to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference marks are standard reference disks in concrete, note 11a. No. 1 is on east side of road leading to farmhouse, 137 meters (449 feet) south

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of east-and-west gravel road, and one-fourth mile from station in azimuth 278°07′27″. No. 2 is in northeast corner of cultivated field, 5.8 meters (19 feet) south of center line of road, and 72.2 meters (237 feet) from station in azimuth 178°17′. Azimuth from station to *Lewiston, water tank*, is 37°52′59″.

Becker (Buffalo County, Wis., H. W. Hemple, 1931).—On highest point of cultivated field, 2½ miles east of Cochrane, on land owned by Mrs. Henry Becker, about one-fourth mile north-northeast of Mrs. Becker's house, and 425 feet west of center line of dirt road. To reach from intersection of Wisconsin route 35 and county route O in southern outskirts of Cochrane, go east 2.9 miles on Route O, then follow dirt road on right 0.5 mile to station site on right. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 10 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, projecting 6 inches above ground. No. 1 is 1 foot west of fence line on west side of road, 21 feet west of center line of road, 123 yards south of northeast corner of cultivated field, 151 yards south of mail box marked "W. Zander", and 123.46 meters (405.1 feet) from station in azimuth 259°23′18″. No. 2 is 2 feet east and 1 foot north of northwest corner of elongated red barn in Mrs. Becker's barnyard, 14 meters (46 feet) west of entrance to straw and manure yard, and 294.53 meters (966.3 feet) from station in azimuth 28°44′00″.

Oak Ridge (Winona County, H. W. Hemple, 1931).—About 15 miles northwest of Winona, 6 miles northwest of Rolling Stone, one-fourth mile east of Oak Ridge church, near southeast corner of section 28, on land owned by Peter Geden, 8 meters (26 feet) north of center line of east-and-west road, 44 meters (144 feet) west of south fence line surrounding house and yard, and 85 meters (279 feet) east of fork in gravel road where one road turns south to Altura and other continues west past Oakridge church. To reach from Rolling Stone, go northwest 1.6 miles on first road west of post office to crossroads and continue straight ahead 4 miles to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference marks are standard reference disks in concrete, note 11a. No. 1 is at fifth telegraph pole from Minneiska road, at corner post between cultivated field and pasture, 6 meters (20 feet) east of center line of Altura road, and approximately one-fourth mile from station in azimuth 25°35′58″. No. 2 is in northeast corner of old graveyard on north side of Minneiska road where fork turns south to Altura and Winona, 12 meters (39 feet) north of center line of east-and-west road, and 85.34 meters (280.0 feet) from station in azimuth 91°20′.

Wautopa 2 (Wabasha County, H. W. Hemple, 1931; 1934).—About 8 miles northwest of Minneiska, 5 miles southwest of Kellogg, in SW¼ sec. 17, T. 109 N., R. 10 W. of the fifth principal meridian (Watopa Township), on highest land in vicinity (owned by Ed Tibesar), 7.3 meters (24 feet) west of center line of lane leading to Mr. Tibesar's house, and 116 meters (381 feet) north of east-and-west road. Station is near station *Wautopa* (see description thereof) which was not found in 1931. To reach from Kellogg, go southwest 8.5 miles on Route 42, proceed east 1.1 miles on gravel road, north one-half mile, east one-half mile, north one-half mile, and east 0.8 mile to graveled lane, and follow it to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 12 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is at fence corner, on south side of gravel road, and approximately one-fourth mile from station in azimuth 64°11′34″. No. 2 is in northeast corner of truck garden in front of Mr. Tibesar's house, 4 meters (13 feet) west of center line of lane, and 914 feet from station in azimuth 178°29′11″.

Iberg (Buffalo County, Wis., H. W. Hemple, 1931; 1934).—About 4 miles east-southeast of Alma, about 1 mile northeast of Herold, in NW¼ sec. 10, T. 21 N., R. 12 W. of the fifth principal meridian, on highest point of cultivated field owned by Mrs. Joe Iberg, about 0.25 mile northwest of farmhouse, 178 feet east of center line of road leading north from county route N, about 500 feet south of house on east side of road, 157 feet east of east right-of-way fence, 270.5 feet northeast of corner post at southwest corner of field, 218 feet north of east-and-west fence, and 399 feet south of north fence that is on south side of house and orchard. To reach from Alma, go east 5.2 miles on county route E to junction with route N and sign "Alma 5 miles—Cream 4" (0.5 mile north

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and 0.5 mile east of Herold church), turn left and go 0.25 mile to station in field on right. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 12 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 projects 5 inches above ground, is in northeast corner of intersection of routes E and N, 45 feet north of center line of route E, 9 meters (30 feet) east of center line of route N, on top of bank, in extreme southwest corner of cultivated field, 24 feet northwest of telephone pole, 1 foot north of post and approximately one-fourth mile from station in azimuth 9°01′04″. No. 2 is flush with surface of ground, 22 feet east of center line of Route N, 1 foot east of east right-of-way fence, 50 meters (164 feet) north of southwest corner of cultivated field, 75 meters (246 feet) south of northwest corner of field, 3 feet southeast of telephone pole, and 47.94 meters (157.3 feet) from station in azimuth 100°31′. No. 3 (1934) projects 4 inches above ground, is at northwest corner of field, 23 feet east of center line of route N, 2 feet east of right-of-way fence, 1 foot east of telephone pole, and 423.36 feet from station in azimuth 157°40′36″. Distance between reference marks no. 2 and no. 3 (1934) is 342.97 feet. Following azimuths and distances are from station: *Herold, Zion Church, tip of rod on spire,* 1,377.2 meters (4,518 feet), 36°39′00″; and *airway beacon no. 27,* about 4 miles, 97°09′46″.

Roemer (Buffalo County, Wis., H. W. Hemple, 1931; 1934).—One mile east of Nelson, in NW¼ sec. 5, T. 22 N., R. 13 W. of the fourth principal meridian, on land owned and occupied by Theodore Roemer, in cultivated field about 18 meters (59 feet) east of western slope of second ridge about 150 meters (492 feet) north of house, 165 feet east of fence separating two fields, and 175 feet east of road along fence line leading to field. To reach from Nelson, go south 1 mile on Wis. Route 35 to cemetery and road on left leading up valley, follow 1.0 mile to Roemer's mail box, turn sharply to left and follow lane one-fourth mile to Roemer's house, and go north about 150 meters (492 feet) to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 18 inches below surface of ground. Reference marks no. 1 and no. 2 are standard reference disks in concrete, note 11a. No. 1 projects 8 inches above ground, is on highest point between two north-and-south fence lines, 1 foot south of east-and-west fence at edge of second-growth timber, and 208.347 meters (683.55 feet) from station is azimuth 213°56′57″. No. 2 projects 4 inches above ground, is 22 feet north of center line of road leading to Roemer's barnyard and house, on south edge of cultivated field, 4 feet above surface of road, 74 feet east-northeast of intersection of center lines of main road and road running west to Roemer's house, 74 feet west of summit of grade where road curves east, about 0.1 mile northeast of Roemer's mail box, 20 meters (66 feet) east of large dead oak tree, and three-eighth mile from station in azimuth 290°07′14″. Reference mark no. 3, established in 1934, is standard reference disk in concrete, note 11b, projecting 8 inches above ground, about 74 feet north of house, about 50 feet west of fence corner, 1 foot north of fence line, and 518.55 feet from station in azimuth 6°41′13″.

Lange (Wabasha County, H. W. Hemple, 1931).—About 10 miles west of Wabasha, 6 miles southeast of Lake City, in northeast corner of sec. 3, T. 110 N., R. 12 W. of the fifth principal meridian (West Albany Township), on land owned by the Lange estate and farmed by A. F. Lange, in northeast corner of yard, 28.3 meters (93 feet) northeast of northeast corner of farmhouse, 9 meters (30 feet) north of lane leading into farmyard, 13 meters (43 feet) west of gravel road, 14 meters (46 feet) north of row of maple trees on south side of lane leading into farmyard, and 8.5 meters (28 feet) south of row of cottonwood trees on north side of farmyard. To reach from Lake City, go south 2.4 miles on route 61 to gravel crossroad, follow gravel road south 2.1 miles to fork and continue straight ahead 2.1 miles to station site site on west side of road. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 8 meters (26 feet) north of center line of east-and-west gravel road, 1 meter (3 feet) east of southeast corner of hog pasture, and approximately one-fourth mile from station in azimuth 230°41′05″. No. 2 is 8.5 meters (28 feet) east of center line of main gravel road, 18 meters (59 feet) east of easternmost of row of maple

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trees on south side of lane leading into the Lange farm, and 26.67 meters (87.5 feet) from station in azimuth 302°56′.

Rask (Pierce County, Wis., H. W. Hemple, 1931).—Five miles east of Maiden Rock, one-half mile north of Lund, 0.4 mile south of Lund school, on cultivated land owned by Adolph Rask, opposite southeast corner of yard in which house is located, 14.40 meters (47.2 feet) east of road, 24.30 meters (79.7 feet) southeast of mail box, and 50 meters (164 feet) east by south of house. To reach from bank building at Maiden Rock, go northeast 2.0 miles on road leading up valley, proceed east (right) 3.3 miles, turn right onto main-traveled road, and go 2.2 miles to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 18 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 projects 6 inches above ground, is on first rise south of station, 7 meters (23 feet) east of center line of road, 3 feet above surface of road 45 meters (148 feet) south of farm road leading to house, and 0.4 mile from station in azimuth 0°23′02″. No. 2 projects 8 inches above ground, is in southeast corner of yard in front of Rask's house, 8 meters (26 feet) west of road, 25 meters (82 feet) southeast of southeast corner of house, and 20.95 meters (68.7 feet) from station in azimuth 90°27′. Station *Maiden Rock* (see description thereof) is 28.75 meters (94.3 feet) from station in azimuth 108°03′. Azimuth from station to *Lund Lutheran Church tip of lightning rod on spire*, distant about 1 mile, is 11°28′08″.

Wabasha (Wabasha County, W. R. Hoag, 1892; 1931).—About 7 miles west-southwest of Lake City, in NE¼ sec. 19, on land owned by Adolph Meincke of Lake City and farmed by H. C. Bruer, on high knoll about one-half mile northwest of farmhouse, 425 meters (1,394 feet) west of center line of north-and-south road at top of ridge one-fourth mile north of farmhouse, 123 meters (404 feet) west of north-and-south fence line, and 22 meters (72 feet) north of line between hay and wheat fields. To reach from intersection of routes 59 and 61 at Lake City, go southwest 4.1 miles on route 59, proceed west 4.2 miles on gravel road to end of gravel at T-intersection, follow narrow dirt road south 0.45 mile to top of knoll, and proceed west 425 meters (1,394 feet) to station site. Originally marked by stone monument, inscribed with cross and letters "U. S. G. S.", as surface mark; and bottle filled with ashes, buried 6 feet below surface of ground, as underground mark. Station was re-marked in 1931 with standard station disks in concrete, notes 1a and 7a. Upper mark is about 12 inches below surface of ground. Two standard reference disks in concrete, note 11a, were established in 1931. No. 1 is just north of gap in fence line at top of ridge where entrance was made to get to station site, 9 meters (30 feet) west of center line of north-and-south road, 5 meters (16 feet) north of gate in fence about one-fourth mile north of tenant's farmhouse, and 416 meters (1,365 feet) from station in azimuth 280°33′58″. No. 2 is at fence line just south of wooded tract of land, 41 meters (135 feet) east of sharp bend in woods from east and west to north and south, 22 meters (72 feet) west of small clearing between two wooded tracts north of fence line, and 193 meters (633 feet) from station in azimuth 184°16′09″.

Peterson (Pierce County, Wis., H. W. Hemple, 1931).—Two and three-fourths miles northeast of Bay City post office, on land owned and occupied by Arthur N. Peterson, in southeast corner of small yard west of large barn and silo, 25 yards northwest of windmill, 5 meters (16 feet) northwest of southeast corner post, 9.55 meters (31.3 feet) north of northwest corner of galvanized-iron chicken house, on prolongation of west side of chicken house, and 12.25 meters (40.2 feet) east of center of road in yard. To reach from Bay City, follow Wis. route 35 direct to A. N. Peterson's farmyard which is 1.6 miles beyond intersection of route 35 and county route E at Oak Ridge School. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 18 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a, projecting 4 inches above ground. No. 1 is in northeast corner of small yard west of large barn and silo, between fourth and fifth maple trees from west in south row of trees, 1 foot west of corner post, and 59.38 meters (194.8 feet) from station in azimuth 184°56′. No. 2 is midway between sixth and seventh maple trees from south in east row of trees on west side of yard, and 25.10 meters (82.3 feet) from station in azimuth 130°18′.

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Strusz (Goodhue County, H. W. Hemple, 1931).—About 6 miles south of Red Wing, in SE¼ sec. 30, T. 112 N., R. 14 W. of the fifth principal meridian (Hay Creek Township), on land owned and occupied by J. H. G. Strusz, on prominent knoll in pasture, 86.0 meters (282 feet) north of center line of east-and-west section-line dirt road, 80.8 meters (265 feet) north of fence on south side of pasture, 106 meters (348 feet) west of fence line on east side of pasture, and about one-fourth mile west of Mr. Strusz's house. To reach from Red Wing, go south via Hay Creek 8.7 miles on county Route C to dirt road leading east (left) up hill just east of small bridge, and follow it east 0.85 mile to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 18 inches below surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 is in fence line on west side of pasture and approximately one-fourth mile from station in azimuth 138°59′11″. No. 2 is in southwest corner of pasture, 1 foot north and east of southwest corner post in fence line, 6 meters (20 feet) north of center line of dirt section-line road, and 178.9 meters (587 feet) from station in azimuth 63°02′35″. Azimuth from station to church spire is 31°02′47″; and to *Goodhue, municipal water tank*, 41°51′34″.

Svea (Pierce County, Wis., H. W. Hemple, 1931).—On wooded hill just east of Wis. route 46, 5½ miles north-northwest of Bay City, 3½ miles north-northeast of Hager City, 1¼ miles north of Svea church, on land owned and occupied by T. M. Anderson, on highest point of ridge timbered with maple trees, 70 meters (230 feet) east of Route 46, 67 meters (220 feet) east of fence on east side of road, and 30 meters (98 feet) northwest of old brick maple-sirup furnace. To reach from intersection of Wis. Route 46 and county Route E at Hager City, proceed 4.2 miles on route 46 to station site near private road leading to T. M. Anderson's house just before reaching crest of ridge. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is flush with surface of ground. Reference marks are standard reference disks in concrete, note 11a. No. 1 projects 1 inch above ground, is on second hill south of ridge timbered with maple trees on which station is located, on west side of cultivated field, 10 meters (33 feet) east of center line of route 46, 0.1 mile south of crossroads, directly opposite house on west side of road owned by U. V. Franzen, on bank 12 feet above surface of road, 1 meter (3 feet) east of edge of bank, 14 meters (46 feet) north of driveway leading into farmyard, and one-half mile from station in azimuth 4°00′50″. No. 2 projects 4 inches above ground, is on top of bank on east side of route 46, 12 feet above surface of road, 1 foot east of fence line, and 66.51 meters (218.2 feet) from station in azimuth 104°53′. *Svea, church spire*, is about 1¼ miles from station in azimuth 1°03′01″.

Lundell (Goodhue County, H. W. Hemple, 1931).—About 10 miles southwest of Red Wing, in SW¼ sec. 11, T. 112 N., R. 16 W. of the fifth principal meridian (Vasa Township), on land owned by A. W. Lundell, on high knoll about 160 meters (525 feet) west-southwest of District School 98 of Goodhue County, about 22½ meters (74 feet) east of large lone cottonwood tree, and 62 meters (203 feet) south of road running east and west past schoolhouse at point 185 meters (607 feet) west of its intersection with north-and-south gravel road northeast of schoolhouse. Station is in immediate vicinity of station *Vasa* (see description thereof) which was not found in 1931. To reach from Red Wing, go west 5.3 miles on Route 61, proceed south 5.9 miles on county Route A to cross roads, and proceed north 1.5 miles to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference marks are standard reference disks in concrete, note 11a. No. 1 is in fence corner of schoolhouse lot, 20 meters (66 feet) west-northwest of northwest corner of schoolhouse, 5 meters (16 feet) south of center line of east-and-west road, 56 meters (184 feet) west of intersection of highways at northeast corner of schoolhouse, and 140 meters (459 feet) from station in azimuth 245°19′55″. No. 2 is about 2 feet east of large lone cottonwood tree on summit of knoll and 21.9 meters (72 feet) from station in azimuth 83°31′. *Vasa, church spire*, is 1½ miles from station in azimuth 35°38′44″.

Manion (Pierce County, Wis., H. W. Hemple, 1931).—Seven and one-half miles southeast of Prescott, 4 miles north-northwest of Diamond Bluff, 0.5 mile west of intersection of county Routes E and Q, on highest point of cultivated field owned by Mrs. Mike Manion and occupied by Mr. Simon, 70 meters (230 feet) north of Route Q, 60 meters (197 feet) east of third concrete culvert west of road intersection, and 0.2 mile northwest of small red building on

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south side of Route Q. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is 10 inches below surface of ground. Reference marks nos. 1 and 2 are standard reference disks in concrete, note 11a. No. 1 projects 8 inches above ground, is near edge of cultivated field, 6.0 meters (20 feet) west of center line of route E, 0.1 mile north of driveway to farmhouse on west side of road, 0.55 mile north of intersection of Routes E and Q, 0.15 mile south of road leading west, and three-fourths mile from station in azimuth 224°51′09″. No. 2 projects 4 inches above ground, is on top of bank at edge of Route Q, 7 meters (23 feet) north of center line of highway, 90 meters (295 feet) east of third culvert west of intersection of Routes E and Q, and 70.13 meters (230.1 feet) from station in azimuth 329°10′. Reference mark no. 3 is standard reference disk, note 11c, on west end of north side of third concrete culvert west of intersection of routes E and Q, 0.5 mile west of intersection of the two highways, and 77.51 meters (254.3 feet) from station in azimuth 34°06′.

Hampton 2 (Dakota County, H. W. Hemple, 1931).—About 11 miles southwest of Hastings, 3 miles east of Hampton, three-fourths mile northwest of New Trier, in N½ sec. 11, T. 113 N., R. 18 W. of the fifth principal meridian (Hampton Township), on land owned by Anton Doffing, just north of pile of rocks, and on summit of grassy knoll. To reach from Hastings, go south about 1 mile on Route 61 to Vermilion River bridge, turn right at north end of bridge onto gravel road, proceed southwest 9.5 miles to route 55 at Hampton, proceed left 0.6 mile, follow gravel road east 2.1 miles to Doffing's house, go through gate, follow farm road north 0.5 mile, and go east 100 yards and north 280 yards to station site. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference marks are standard reference disks in concrete, note 11a. Station and reference disks are probably stamped "Hampton". No. 1 is in north-and-south fence line on west edge of old gravel pit and one-fourth mile from station in azimuth 272°37′16″. No. 2 is on grassy knoll and 154 meters (505 feet) from station in azimuth 110°50′04″. Azimuth from station to New Trier, spire, is 322°44′13″.

Prescott 2 (Pierce County, Wis., H. W. Hemple, 1931).—Two and one-half miles north-northeast of Prescott, 0.6 miles east of intersection of Wisconsin Route 29 and county Route D, about 200 meters (656 feet) north of county Route D, on land owned by George W. Marphy, on southern tip of bare part of prominent bluff behind barnyard, 18 meters (59 feet) north of south edge of bluff, 21 meters (69 feet) east of west edge of bluff, and in approximately same position as station *Prescott* (see description thereof) which was found with mark thrown upside down in hole. To reach from Prescott, go north to intersections of Routes 29 and D, turn right (east) onto Route D and continue 0.7 mile to private road leading to Mr. Marphy's house. Surface and underground marks are standard station disks in concrete, notes 1a and 7a, in same hole in which old station mark was found. Upper mark is 4 inches below surface of ground. Old mark was completely destroyed. Reference marks are standard reference disks in concrete, note 11a, projecting 6 inches above ground. No. 1 is on bluff, 14 meters (46 feet) west of old fence on east side of bluff, 17 meters (56 feet) west of east edge of bluff, and 28.630 meters (93.93 feet) from station in azimuth 184°45′. No. 2 is 25 meters (82 feet) north of and in northeast corner of intersection of Routes 29 and D, 9 meters (30 feet) east of center line of Route 29, 13 meters (43 feet) north of 36-inch cottonwood tree, 1 foot west of fence line, and three-fourths mile from station in azimuth 76°58′55″.

Wallace (Dakota County, W. R. Hoag, 1892; 1931).—On high and prominent point in West St. Paul, about one-fourth mile west of South Roberts Street, on land owned and occupied by George Malon, on highest part of hill behind house, and in truck-garden plot. To reach from intersection of Dobb Road and Charlton Street, go south 0.1 mile on Charlton Street to road leading east, go east one-fourth mile to T-intersection, and then go to right 1 block to end of street. Surface and underground marks are standard station disks in concrete, notes 1a and 7a, established in 1931 in identical position of original mark. Upper mark is flush with surface of ground. Reference mark is standard reference disk in concrete, note 11a, projecting 6 inches above ground 1 foot south of fence at south end of truck garden, 17 meters (56 feet) east of west side of garden, 2 meters (7 feet) south of road along south end of garden, and 51.93 meters (170.4 feet) from station in azimuth 358°03′. Azimuths from station to

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following objects, distant 3 miles, are: St. Paul Cathedral, cross on dome, 161°16′28″; State Capitol, gold ball on dome, 169°33′49″; City Hall, vane, 175°53′44″; and First National Bank, peak of steel sign scaffold, distant 2 miles, 178°08′35″.

Snelling (Ramsey County, H. W. Hemple, 1931).—In southwest part of St. Paul near south end of Snelling Avenue, on observation platform of Snelling Heights ornamental water tank. Tank is massive octagonal concrete-and-masonry structure. Observation platform is enclosed, has eight large windows, and is 127 feet high. Station mark is standard station disk in tile floor at center of tower and observation platform.

Mississippi River Commission (second order)

Columbus (M. R. C.) (Allamakee County, Iowa, Mississippi River Commission, 1894; H. W. Hemple, 1931).—About 2 miles southeast of Lansing, in section 3, Lafayette Township, 160 meters (525 feet) south of barn on west side of road, at sharp bend in road, on land owned by Matt Hurn, three-fourths mile back on bluff, in cultivated field on high point of ground, 1.3 meters (4 feet) east of north-and-south wire fence, 7.0 meters (23 feet) east of center line of graded dirt road, 1.6 meters (5 feet) southeast of telephone pole, about 50 meters (164 feet) south of junction of dirt road leading east, and 100 meters (328 feet) south of white house on west side of road. To reach from Lansing, go south 0.75 mile on main road along railroad, proceed south (left) 0.45 mile to bridge, follow main road to left (south of bridge) 0.2 mile to fork, take right fork up hill, and continue 1.1 miles to station site. Marked by standard mark of Mississippi River Commission, brass cap on steel pipe above and copper bolt in tile below, note 19. Pipe projects 6 inches above ground. Azimuth from station to Paint Creek Lutheran Church spire, is 39°33′12″; and to Lutheran Church spire, 59°08′02″.

Genoa (M. R. C.) (Vernon County, Wis., Mississippi River Commission, 1894; H. W. Hemple, 1931).—On upper end of first ridge above Genoa, just below ravine coming out at "One mile to station" signboard on railroad, on land owned by Mr. John Malin, 1 meter (3 feet) west of fence line on west edge of bluff, 45 meters (148 feet) south of fence corner at edge of timber on south bank of ravine, and 12.73 meters (41.8 feet) southwest of northwest corner of cultivated field on top of ridge. To reach from Genoa, go north on route 35 to road on right, follow to top of ridge on north side of valley, follow road to left to large white house, pass house, and continue through barnyard to edge of bluff and station site. Marked by standard mark of Mississippi River Commission, brass cap on steel pipe above and copper bolt in tile below, note 19, Reference mark no. 1 is standard reference disk in concrete, note 11a, projecting 9 inches above ground, 5 meters (16 feet) south of narrow dirt road, in northeast corner of small pasture, 1 foot south of fence, 75 meters (246 feet) southwest of barn, and 0.42 mile from station in azimuth 245°35′56″.

Albin (Houston County, H. W. Hemple, 1931).—Near summit of point of first bluff north of Winnebago Creek, west of New Albin-Brownsville Road, about 1 mile north of New Albin, and about one-half mile north of Lee Monument. Point is long, narrow ridge extending down southeast from crest of bluffs, and is clear except for small trees and brush on crest of ridge near top. To reach from New Albin, go north past Lee Monument about 1 mile to foot of bluff just north of Winnebago Creek Bridge and proceed up ridge one-fourth mile to station site. Marked by standard station disk in concrete in top of rock flush with surface of ground. Azimuth from station to New Albin, St. Joseph's Catholic Church spire, is 5°44′50″.

Lee Monument (Allamakee County, Iowa; Houston County, Minn.; H. W. Hemple, 1931).—On boundary between Iowa and Minnesota. Marked by 6-foot hollow iron pyramid weighing about 600 pounds, which was established by Capt. Thomas Lee, of United States Topographic Engineers, in 1849. Concrete base about 25 feet square has been placed recently around original mark. Station was occupied eccentrically at point (not marked) 13.94 meters (45.7 feet) distant in azimuth 319°28′.

Battle Ground (M. R. C.) (Vernon County, Wis., Mississippi River Commission, 1894; H. W. Hemple, 1931).—About 3 miles above De Soto, in cultivated field owned by William Jacobus who lives in house on north side of road running up north side of Battle Hollow on first bluff above Battle

For notes in regard to marking of stations see p. 245.

Hollow, and opposite head of bog along railroad tracks. To reach from De Soto, follow highway north along base of bluffs to Battle Hollow and road leading east at vertical concrete slab in northwest angle of roads which marks battle fought during Black Hawk War, proceed east about 150 yards to Mr. Jacobus' house, and follow up bluff to station site. Marked by standard mark of Mississippi River Commission, brass cap on steel pipe above and copper bolt in title below, note 19. Pipe projects 12 inches above ground. Azimuth from station to Lansing, Black Hawk Bridge, east main vertical over east pier, is 0°57′44″.

Nodine (Winona County, H. W. Hemple, 1927; 1932).—About 1 mile south and one-third mile east of town of Nodine, in NE¼ sec. 21, T. 105 N., R. 5 W. of the fifth principal meridian, on land owned by John Schroeder, 61.77 meters (202.7 feet) east by south of southeast fence corner of German Lutheran Cemetery, 153 meters (502 feet) east of north-and-south road, and 5.6 meters (18 feet) south of center line of east-and-west road. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Upper mark is flush with surface of ground. Reference marks are standard reference disks in concrete, note 11a, flush with surface of ground. No. 1 is 4.7 meters (15 feet) north of center line of east-and-west road and 10.26 meters (33.7 feet) from station in azimuth 180°40′. No. 2 is 613 meters (2,011 feet) east of north-and-south road, 3.7 meters (12 feet) north of center line of east-and-west road, and 460.5 meters (1,511 feet) from station in azimuth 268°20′58″.

Dresbach (M. R. C.) (Winona County, Mississippi River Commission, 1894; H. W. Hemple, 1927).—About 1 mile below Dresbach, 80 meters (262 feet) west of bend in road at crest of bluff on lower side of ravine, nearly due west from corner of bluff on upper side of same ravine which comes out at foot of Dresbach Island on south side of ridge road, 2 meters (7 feet) north of road fence, and 5 meters (16 feet) east of fence corner at northeast corner of yard in front of residence of Joseph Ready. Marked by standard mark of Mississippi River Commission, brass cap on steel pipe above and copper bolt in tile below, note 19.

Root River (M. R. C.) (Houston County, Mississippi River Commission, 1894; H. W. Hemple, 1927).—About 2 miles below La Crescent, nearly on line with Grandfathers Bluff and head of La Plume Island, on slope of narrow bluff point just below first ravine above Root River, 85 meters (279 feet) down center of sharp ridge from point on prolongation of tangent of Chicago, Milwaukee & St. Paul Railway which is across Root River Valley, 6 meters (20 feet) down center of ridge from wire fence, 4 meters (13 feet) upstream from same fence, 3 meters (10 feet) west of prolongation of fence, about 20 meters (66 feet) from top of almost vertical rock cliff, and 5 meters (16 feet) from exposed rock ledge. Surface mark is standard brass cap of Mississippi River Commission on top of 4-inch pipe about 18 inches long. Pipe projects about 4 inches above ground. Underground mark is bolt in rock ledge.

Grandfather (M. R. C.) (La Crosse County, Wis., Mississippi River Commission, 1894; H. W. Hemple, 1927).—On Grandfather Bluff back of La Crosse, on second rocky point, just north of prolongation of Main Street in La Crosse, and 12 meters (39 feet) above quarry on lower face of bluff. Marked by standard mark of Mississippi River Commission, brass cap on steel pipe above and copper bolt in tile below, note 19.

Trempealeau (M. R. C.) (Trempealeau County, Wis., Mississippi River Commission, 1894; H. W. Hemple, 1931).—At east end of Chicken Breast Bluff, one-half mile above and one-half mile back of Trempealeau, and on orchard slope. This bluff is the lower in position of two detached bluffs standing farthest from river. To reach from railroad tracks at river in Trempealeau, follow main street to County Route K. At 0.3 mile turn left at sign "Wisconsin State Park", continue 0.3 mile to crossroads with electric light suspended overhead, turn left and continue to farm road on right just before reaching 3-story concrete house, and follow farm road to station site in orchard. Marked by standard mark of Mississippi River Commission, brass cap on steel pipe above and copper bolt in tile below, note 19. Top of pipe projects about 14 inches above ground. Airway beacon is on continuation of ridge on which station is located and one-half mile from station in azimuth 7°58′49″. Azimuth from station to Onalaska, standpipe, is 310°15′56″.

Gorder (M. R. C.) (Buffalo County, Wis., Mississippi River Commission, 1894; H. W. Hemple, 1931).—Directly opposite Winona, about three-fourths

For notes in regard to marking of stations see p. 245.

mile northwest of Bluff Siding, near line between property of Martin P. Jenney and Mrs. Simon, about 140 meters (459 feet) toward river from small white frame house, 150 meters (492 feet) east of northwest corner of sec. 36, T. 19 N., R. 11 W., about 150 meters (492 feet) back from crest of bluff, just above highest point of ground in fence line, 20 meters (66 feet) below prolongation of center line of Chicago & North Western Railway bridge over Mississippi River, and 0.5 meter (2 feet) toward river from fence line at base of blazed fence post. To reach from Winona, cross Mississippi River, follow routes 35 and 54 south to County Route M, turn right onto route M, continue 1.3 miles to road on left leading down alongside of valley, follow left road 2.0 miles, turn left with main-traveled road, and follow to road on left along cornfield just before reaching end of main road. Follow this road to small white house mentioned above and continue to station site. Marked by standard mark of Mississippi River Commission, brass cap on steel pipe above and copper bolt in tile below, note 19. Top of pipe projects 15 inches above ground. Azimuth from station to Winona, Catholic Church, red spire, is 355°15′00″.

Minneiska (M. R. C.) (Wabasha County, Mississippi River Commission, 1895; H. W. Hemple, 1931).—On summit of timbered bluff overlooking Minneiska, about one-fourth mile northwest of the railroad station, one-fourth mile northwest of metal weather vane known as the "fish", 35 meters (115 feet) back of face of bluff and on land belonging to John Hussar. To reach from Minneiska, go southeast about 0.3 mile on route 61 to point just northwest of concrete retaining walls along highway, go south one-fourth mile on gravel road, follow right-hand main fork 1.0 mile to farm at top of bluff, turn around, and retrace road 0.2 mile to farm road on left (entrance of which is impossible from north). Folow this road 0.5 mile to wagon road on right (one-fourth mile southeast of vacant building), follow 200 yards to right, turn left through gate, and follow wheel tracks across field to the "fish" at edge of bluff. Turn left at northwest corner of cultivated field and proceed northwest one-fourth mile through thick brush on ridge to station site. Marked by standard mark of Mississippi River Commission, brass cap on steel pipe above and copper bolt in tile below, note 19. Azimuth from station to *Cochrane, church spire*, is 208°16′46″. Distances and azimuths to two blazed trees are: 12-inch black oak, 5.6 meters (18 feet), 42°41′; and 15-inch black oak, 3.8 meters (12 feet), 248°41′.

Schwitzer (M. R. C.) (Buffalo County, Wis., Mississippi River Commission, 1895; H. W. Hemple, 1931).—About 2 miles below Alma, on land owned by Mr. Schwitzer, 1 meter (3 feet) back from edge of first prominent bluff above large ravine, about 50 meters (164 feet) down from summit, and 250 meters (820 feet) below concrete culvert on Chicago, Burlington & Quincy Railroad. To reach from Alma, follow Route 35 south to county Route E, go east 1.3 miles up valley on Route E to first gravel road on right, follow gravel road 0.2 mile to gate on right, pass through gate, and continue to end of road at farmhouse. Take road along side of barn and across field to end of truck travel at old hay stack. Proceed to southwest corner of cultivated field and station site. Marked by standard station disk cemented in rock. Azimuth from station to *Cochrane, church spire*, is 334°48′54″.

Nelson (M. R. C.) (Buffalo County, Wis., Mississippi River Commission, 1895; H. W. Hemple, 1931).—About 1 mile southeast of Nelson, directly back of Chicago, Burlington & Quincy Railroad station at Nelson, on pointed projection of lower hill of Twin Bluffs, about 50 meters (164 feet) above upper end of cultivated field on top of bluff, about 1 foot from small depression on either side, about 1 meter (3 feet) from edge of rock on either side, about 3 meters (10 feet) from point, and 0.76 meter (2.5 feet) from 6-inch step-down of rock. To reach from schoolhouse at Nelson, pass through gate with high side posts just beyond school, continue to 2-story white farmhouse and group of red farm buildings at foot of bluff, and follow farm road from barns to station site. Marked by copper bolt leaded into rock, projecting about one-fourth inch above surface. Arrow 6 inches long is scratched on rock and points to bolt. Azimuths from station to following objects are: *Cochrane, church spire* 332°05′22″; Nelson, church spire, 118°26′10″; and Wabasha, brick building, spire, 30°38′27″.

Danielson (M. R. C.) (Pepin County, Wis., Mississippi River Commission, 1895; H. W. Hemple, 1931).—On east bank of Lake Pepin, 2 miles above Maiden Rock Bluff, about 200 meters (656 feet) back from edge of the bluff, in small

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clump of brush at edge of field, 4.1 meters (13 feet) northeast of wagon road, 4.6 meters (15 feet) south of east-and-west wire fence, 11.8 meters (39 feet) south-southeast of lone birch tree, and 6.2 meters (20 feet) southeast of east gatepost. To reach from post office at Maiden Rock, go south 1.7 miles on route 35 to road on left, turn left and go 0.6 mile, turn right onto main-traveled road with four-wire telephone line, proceed 2.1 miles to road on right with one-wire telephone line, turn right and go 1.4 miles to forks at two-story white house trimmed in green, turn right, continue on farm road between barns, and go northwest across field to gateway in east-and-west fence at lone 10-inch birch tree and station site. Marked by standard mark of Mississippi River Commission, brass cap on steel pipe above and copper bolt in tile below, note 19. Top of pipe projects 8 inches above ground. Azimuths from station to following objects are: Catholic Church, spire, 56°59′10″; Ellsworth, water tank, 145°43′55″; and Ellsworth, dome, 145°55′40″.

Red Wing (M. R. C.) (Goodhue County, Mississippi River Commission, 1895; H. W. Hemple, 1931).—On Westerly summit of high detached ridge known as "Barn Bluff", in Red Wing, on property owned by city of Red Wing, 30 meters (98 feet) from brow of bluff, on top and in center of circular earth mound about 20 feet in diameter at top and 6 feet in height, and 2.45 meters (8.0 feet) southeast of American Legion Memorial Flagpole. To reach from Red Wing, go east to end of main east-and-west street at point just south of river bridge. Climb stairway to summit of bluff and proceed southeast 50 meters (164 feet) to station site. Marked by standard mark of Mississippi River Commission, brass cap on steel pipe above and copper bolt in tile below, note 19. Top of pipe projects 1 foot above ground. Azimuth from station to Methodist Church, spire, is 354°11′40″, and to St. Johns Catholic Church, spire, 7°39′13″.

Diamond (M. R. C.) (Pierce County, Wis., Mississippi River Commission, 1895; H. W. Hemple, 1931).—On brow of bluff at southeast corner of timber, about 2 miles above Diamond Bluff, about one-fourth mile below milepost on Chicago, Burlington & Quincy Railroad marked "31 miles to St. Paul", on property owned by J. E. Morgan, in clearing about 15 meters (49 feet) west of upper river corner of cultivated field, and about 10 meters (33 feet) west of north-and-south fence line between cultivated field and timber. To reach from Diamond Bluff railroad station, go northwest 2½ miles on route E to road on left opposite sign "School Zone", turn left across concrete culvert, continue one-fourth mile to Morgan's farm at top of ridge, pass windmill in barnyard, continue through gate at northwest corner of old barn, follow farm road southwest to gate at corner of cornfield, proceed south to road on right, follow this road to end of truck travel at timber line, and proceed southwest 30 meters (98 feet) to station site. Marked by standard mark of Mississippi River Commission, brass cap on steel pipe above and copper bolt in tile below, note 19. Pipe projects 18 inches above surface of ground. Azimuth from station to Welch, Catholic Church, spire, is 34°07′50″; and to blazed 12-inch black oak, distant 13.7 meters (45 feet), 245°17′.

McNamara (M. R. C.) (Dakota County, Mississippi River Commission, 1895; H. W. Hemple, 1931).—About 3½ miles southeast of Hastings, on highest of number of prominent knolls, on land owned by Dennis McNamara, 200 meters (656 feet) south and 400 meters (1,312 feet) east of public roads, one-fourth mile southeast of road intersection, 75 meters (246 feet) south of southwest corner of cemetery, and 75 meters (246 feet) north of frame house at foot of mound. To reach from Hastings, go south on route 61 to Tenth Street at sign "Three Blocks to Golf Course", turn left onto Tenth Street, follow gravel road along foot of bluffs 1.8 miles to road on right, follow this main-traveled road 1.6 miles to farm road on right along barbed-wire fence with steel posts, and turn right and continue to farmhouse at foot of mound. Marked by standard mark of Mississippi River Commission, brass cap on steel pipe above and copper bolt in tile below, note 19. Azimuth from station to *Hastings, Insane Asylum, water tank,* is 117°20′29″.

Red Rock (M. R. C.) (Washington County, Mississippi River Commission, 1895; H. W. Hemple, 1931).—About 8 miles southeast of St. Paul, 11 miles northwest of Hastings, about 1 mile east of Red Rock railroad station, about one-fourth mile southwest of small lake on property of Thomas McGuire, about one-fourth mile west of lone house on west side of road, in cornfield on top of bald knob, about 150 meters (492 feet) northeast of northeast corner of timber, 50 meters (164 feet) east of land line, about 90 meters (295 feet)

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north of center line of east-and-west transmission line, and 3.5 meters (11 feet) southeast of large granite boulder. To reach from Hastings, follow route 61 across bridge, continue northwest 12.4 miles or 0.4 mile north of upper part of Newport to gravel road on right at large signboard, follow gravel road north 0.2 mile to other branch of Y, proceed east (right) 0.6 mile on gravel road to fork, keep right 0.4 mile to dirt road leading south near large pond on left, follow dirt road south 0.2 mile to transmission line, turn west onto track along transmission line, continue 300 yards to top of hill, and proceed north 90 meters (295 feet) across cultivated field to station site. Marked by standard mark of Mississippi River Commission, brass cap on steel pipe above and copper bolt in tile below, note 19. Azimuth from station to South St. Paul, water tank, is 108°42′02″; to St. Paul, Capitol, dome, 126°05′21″; and to church spire, 213°15′40″.

ST. PAUL AND VICINITY

Principal points

Washburn Home (Hennepin County, W. R. Hoag, 1889).—In southwestward Minneapolis, at Nicolett Avenue and Forty-seventh Street. The station is marked below the surface of the ground by a glass bottle filled with ashes and above by a copper bolt set in stone upon which are inscribed the letters "U. S. G. S." A square turret or cupola on the north central side of the roof is used as an observation tower and is in azimuth 273°06′20″.

Snelling Avenue south base (Ramsey County, W. R. Hoag, 1888; 1895).—On west side of Snelling Avenue, St. Paul, three-fourths mile below intersection of Randolph Street and Snelling Avenue, 500 meters (1,640 feet) north of an angle in the avenue, 600 meters (1,968 feet) northeast of the Quincy School, and under a signal tower known as "Snelling Tower" which belongs to the city of St. Paul. Marked by copper bolt, three-fourths inch in diameter, with a cross and drill hole in center of Kasota stone slab, 3 feet square and 2 feet high, the top of which is cut level in the center with wash lines falling an inch on each side and which is mounted on a platform of brick laid in cement 5 feet square at the base, 3 feet square at the top, and 4 feet high, with a hole 1 foot square through the center. Underground mark is a marble post 3 feet long and 7 inches square with its top buried 6 feet below the surface of the ground and which has deep grooves cut in the top and a copper bolt set in the center. A wooded ridge somewhat above the surrounding country is in azimuth 196°28′. A very prominent high ridge 6 or 7 miles southwest of station *Washburn Home* is in azimuth 275°51′. Hopkins station five-eighths mile distant is in azimuth 168°36′.

Snelling Avenue north base (Ramsey County, W. R. Hoag, 1888).—Marked by a copper bolt, three-fourths inch in diameter, with cross and drill hole in center of Kasota stone slab, 3 feet square and 2 feet high, the top of which is cut level in the center with wash lines falling an inch on each side and which is mounted on a platform of brick laid in cement, 5 feet square at the base, 3 feet square at the top, and 4 feet high with a hole 1 foot square through the center. Underground mark is marble post, 3 feet long and 7 inches square, with its top buried 6 feet below the surface of the ground and which has deep grooves cut in the top and a copper bolt set in the center. A 100-step tower in St. Paul is in azimuth 102°30′06″.

Marcotta (Dakota County, W. R. Hoag, 1888; 1895).—About 10 miles by wagon road from Red Wing, 607 feet west of and 191 feet south of the center of T. 112 N., R. 16 W., Vasa Township. The station is marked below the surface of the ground by a glass bottle filled with ashes and above by a copper bolt set in stone upon which are inscribed the letters "U. S. G. S." The cupola on the east end of the schoolhouse, 500 feet distant, is in azimuth 342°59′52″. The chimney on the house, 150 feet distant, is in azimuth 140°19′. The cupola of the brick church, approximately 2 miles distant, is in azimuth 204°21′12″. A windmill tower, approximately two-fifths mile distant, is in azimuth 235°52′52″.

Wautopa (Wabasha County, W. R. Hoag, 1892).—About 8 miles northwest of Minneiska, 5 miles southwest of Kellogg, and 2,323 feet south and 758 feet west of center of section 17, Wautopa Township. Surface mark was copper bolt set in stone post with top inscribed with cross and letters "U. S. G. S."

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Underground mark was bottle filled with ashes and buried 6 feet below surface. Lee's house, eastern chimney, is 1¼ miles from station in azimuth 140°32′23″. Plein's north-and-south barn, center of cupola, is one-fourth mile from station in azimuth 129°30′28″. Station was not recovered in 1931, and station *Wautopa 2* (see description thereof) was established in same vicinity.

Lake City (Wabasha County, W. R. Hoag, 1893).—About 5 miles west by south of Wabasha, in group of farm buildings, 281 feet from center of wagon road, 1,836 feet from section line, about 150 feet from house, about 73 feet from well, and about 50 feet from barn. Type of mark not described. Barn cupola, 2 miles distant, is in azimuth 210°00′30″. Church spire, 4 miles distance, is in azimuth 232°56′06″. Barn cupola, 800 feet distant, is in azimuth 279°12′31″.

Maiden Rock (Pierce County, Wis., W. R. Hoag, 1892; 1931).—About 5 miles east of Maiden Rock, ½ mile north of Lund, in yard in front of house of Mr. Adolph Rask, 4.40 meters (14.4 feet) west of fence on east side of yard, 6.30 meters (20.7 feet) north of south fence of yard, 11.40 meters (37.4 feet) south of center line of driveway, and 10.79 meters (35.4 feet) northwest of reference mark no. 2 of station *Rask*. To reach from bank in Maiden Rock, go northeast 2.0 miles on road leading off main street to crossroads, turn right (east) and go 3.3 miles, turn right with main-traveled road and continue 2.2 miles to Mr. Adolph Rask's house on right side of road and station site. Marked by concrete post with top inscribed with cross and letters "U. S. G. S.", and with ½-inch copper bolt in center. Mark is 1 inch below surface of ground. Station *Rask* (see description thereof) is 28.75 meters (94.3 feet) from station in azimuth 288°03′.

Maxville (Buffalo County, Wis., W. R. Hoag, 1893).—In Maxville Township, 439 feet east and 618 feet north of south quarter post of section 21. Mark not described.

Alma (Buffalo County, Wis., W. R. Hoag, 1893).—In sec. 26, T. 22 N., R. 12 W., 516 feet east and 50 feet north of west quarter-section post. Upper mark is stone post set with top below plow depth. Lower mark is bottle filled with ashes. Post is marked with diagonal cross lines and letters "U. S. G. S."

Hampton (Dakota County, J. E. Davies, 1892).—In immediate vicinity of station *Hampton 2* (see description thereof).

Vasa (Goodhue County, W. R. Hoag, 1892).—About 10 miles by road from Red Wing, in sec. 11, T. 112 N., R. 16 W. of the fifth principal meridian, Vasa Township, 607 feet west and 191 feet south of center of section (assuming that corners at schoolhouse is center as shown on map), and near station *Lundell* (see description thereof). Mark not described. Schoolhouse, east end cupola, is 152.4 meters (500 feet) from station in azimuth 342°59′52″. House chimney is 45.7 meters (150 feet) from station in azimuth 140°19′. Brick church, cupola, about 2 miles distant is in azimuth 204°21′12″. Windmill tower, about two-fifths mile distant, is in azimuth 235°52′52″.

Ellsworth (Pierce County, Wis., W. R. Hoag, 1893).—In northeast corner SW¼NE¼ sec. 30, on land owned by Mr. Leonard, one-fourth mile north of center of section, 129.04 meters (423.4 feet) west of farm division fence line, and 133.3 meters (437 feet) south of farm division fence line. Marked by stone post with top inscribed with cross and letters "U. S. G. S." and with ½-inch copper bolt in center. Top of post is about 1 foot below surface of ground. Mr. Leonard's house, chimney, is in azimuth 242°43′. Church steeple, 12 miles distant, is in azimuth 51°54′59″.

Prospect Park (Ramsey County, W. R. Hoag, 1887; Mississippi River Commission, 1898).—In Prospect Park subdivision of Minneapolis, on highest part of high knoll in block east of Malcolm Avenue and south University Avenue. Marked by square stone post, marked "U. S. G. S." (United States Geodetic Survey) on top, set flush with surface of ground.

IOWA-MINNESOTA STATE LINE TO ST. PAUL TO AITKEN AND BEMIDJI ARC

Principal points

Heytmans (M. R. C.) (Allamakee County, Iowa, Mississippi River Commission, 1894).—On right bank of Mississippi River, on bluff directly back of the post 1 mile above Heytmans Station, Iowa, 60 meters (197 feet) from brow of hill, in open field on highest ground or ridge, ¼ mile above its lower point,

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and 8 meters (26 feet) north of an east-and-west fence. Marked by tile and pipe, note 19, projecting about 18 inches above ground.

Ferryville (M. R. C.) (Crawford County, Wis., Mississippi River Commission, 1894).—On left bank of Mississippi River, on prominent grassy bluff point, between two large ravines, 1 mile below Ferryville, Wis., at edge of timber, on slope of a bald bluff, 25 meters (82 feet) in front of highest ground, and 8 meters (26 feet) west of a 15-inch blazed black-oak tree. Marked by tile and pipe, note 19, projecting 9 inches above ground.

Rush Creek (M. R. C.) (Crawford County, Wis., Mississippi River Commission, 1894).—On left bank of Mississippi River, about 2 miles above Ferryville, Wis., on grassy slope about 20 meters (66 feet) in front of summit of second hill below Rush Creek. Marked by tile and pipe, note 19, projecting about 12 inches above ground. Blazed 18-inch black-oak tree is 4 meters (13 feet) above and 1 meter (3 feet) toward river from station.

Wyburn (M. R. C.) (Crawford County, Wis., Mississippi River Commission, 1894).—On bluffs 2 miles below De Soto, Wis., in sec. 26, T. 11 N., R. 7 W., fourth principal meridian, about 250 meters (820 feet) below prominent grove of cedar trees, about 15 meters (49 feet) west of north-and-south road along top of bluffs, 8 meters (26 feet) north of road running west to residence. Marked by copper bolt set in top of large exposed rock which is surrounded by small clump of trees.

Cowles (M. R. C.) (Allamakee County, Iowa, Mississippi River Commission, 1894).—About 2 miles above Lansing, Iowa, at southeast corner of cultivated field owned by John Bakewell, on bluff point above ravine at Chicago, Milwaukee, St. Paul & Pacific Railroad bridge K 536. Marked by tile and pipe, note 19, projecting 14 inches above ground. Blazed 9-inch oak tree is 22 meters (72 feet) south of station; blazed 8-inch black-oak tree, is on sharp edge of bluff, 6 meters (20 feet) east of station; and blazed 6-inch hickory tree is 3 meters (10 feet) north of station. Azimuth from station to DeSoto, spire is 235°31′02″.

Kains (M. R. C.) (Allamakee County, Iowa, Mississippi River Commission, 1894).—On crest of wooded bluff point, about 700 meters (2,297 feet) above railroad station at Kains, Iowa. Marked by tile and pipe, note 19. Blazed 30-inch oak tree is 13 meters (43 feet) from station in azimuth 104°45′, and blazed 15-inch oak tree is 17 meters (56 feet) from station in azimuth 268°.

De Soto lower base (M. R. C.) (Allamakee County, Iowa, Mississippi River Commission, 1894).—On right bank of Mississippi River, about three-fourths mile above and across river from De Soto, Wis., in lower end of field, and 16 meters (52 feet) from river bank. Marked by copper bolt set in tile and pipe. Blazed oak tree on river bank is 22 meters (72 feet) from station in azimuth 296°40′.

De Soto upper base (M. R. C.) (Allamakee County, Iowa, Mississippi River Commission, 1894).—About 2 miles above De Soto, Wis., on Island No. 140, 10 meters (33 feet) from right bank of main channel of river, 545 meters (1,788 feet) above wire fence extending west from top of bank, and about 200 meters (656 feet) below diamond board on right bank. Marked by tile and pipe, note 19. Blazed 20-inch oak tree is 14 meters (46 feet) from station in azimuth 323°55′, and blazed 30-inch elm tree is 10 meters (33 feet) from station in azimuth 86°48′.

New Albin (M. R. C.) (Houston County, Mississippi River Commission, 1894).—At crest of first bluff point above right bank of Mississippi River, back of schoolhouse at Jefferson, 1.25 miles above New Albin, Iowa, 0.75 mile above Minnesota-Iowa State line, 30 meters (98 feet) in front of highest ground on bluff, about 4.5 meters (15 feet) back from abrupt point of ridge, and about 18 meters (59 feet) east of blazed black-oak tree. Marked by pipe which is centered over copper bolt set in rock. Cap on pipe extends about 2 feet above ground.

Elgar (M. R. C.) (Vernon County, Wis., Mississippi River Commission, 1894).—In cultivated field on high ridge (owned by J. F. Elgar), about 2 miles above Victory, Wis., in sec. 9, T. 12 N., R. 7 W., fourth principal meridian, 30 meters (98 feet) east of northeast corner of cornfield, equidistant from two ravines, and near wagon road leading up ravine from Elgar's residence, which is situated at point where bluff road turns back from railroad along upper side of Bad Ax Ravine. Marked by tile and pipe, note 19.

Reno (M. R. C.) (Houston County, Mississippi River Commission, 1894).—On right bank of Mississippi River, at crest of bluff, about 1 mile below Reno,

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at east edge of cultivated field owned by Albert Richard, about 50 meters (164 feet) above head of drain leading to pipe no. 614 under Chicago, Milwaukee, St. Paul & Pacific Railroad tracks, about 9.1 meters (30 feet) west of old north-and-south fence which runs along bluff below crest, 4.3 meters (14 feet) east of north-and-south fence along edge of field, 22 meters (72 feet) south of fence corner, and 4.6 meters (15 feet) northwest of two 6-inch oak trees 2 feet apart, eastern one of which is blazed. Marked by tile and pipe, note 19, set on mound 5 inches high and 3 feet in diameter. Cap on pipe projects 20 inches above ground.

Brown (M. R. C.) (Houston County, Mississippi River Commission, 1894).—On right bank of Mississippi River, on narrow ridge, 1¼ miles above Reno, three-fourths mile above point where Raft Channel leaves bluffs, on property owned by J. P. Rice, 165 meters (541 feet) above depression in top of bluffs, 75 meters (246 feet) above some exposed rock (formerly quarry), and one-fourth mile above prominent rock at end of ridge above and back of Rice's house. Marked by pipe which is centered over bolt set in rock. Top of pipe projects about 2 feet above ground. A 24-inch oak tree is 4 meters (13 feet) west of station, and 8-inch oak tree is 8 meters (26 feet) southwest of station. Azimuth from station to church tower, is 176°53′35″.

Stoddard (M. R. C.) (Vernon County, Wis., Mississippi River Commission, 1894).—On left bank of Mississippi River, about 1 mile above Stoddard, Wis., and about two-thirds distance from bottom to top of bluff, in small open spot above small draw, opposite lower end of cultivated field and upper end of road across slough, and about 61 meters (200 feet) below house owned by Joe Stellick. Marked by tile and pipe set in small pile of rocks and earth with top of pipe about flush with surface of ground. Small hole has been dug in hillside back of station. Blazed 10-inch oak tree is 15 meters (49 feet) from station in azimuth 195°34′; blazed 14-inch oak tree is 13 meters (43 feet) from station in azimuth 165°15′; another blazed 14-inch oak tree is 10 meters (33 feet) from station in azimuth 134°10′; and blazed 6-inch oak tree is 1 meter (3 feet) from station in azimuth 220°.

Brownsville (M. R. C.) (Houston County, Mississippi River Commission, 1894).—On right bank of Mississippi River, on top of narrow hill about one-fourth mile above mouth of ravine at Brownsville, 6 meters (20 feet) west of eastern edge of small field, 8 meters (26 feet) below wire fence which runs at right angle to river, 10 meters (33 feet) below edge of timber, and 13 meters (43 feet) downstream from blazed 12-inch red-oak tree. Marked by tile and pipe, note 19.

Calvert (M. R. C.) (La Crosse County, Wis., Mississippi River Commission, 1894).—On small mound at edge of sand terrace, 2 meters (7 feet) from edge of sand ridge where it slopes to edge of timber in bottoms 30 meters (98 feet) west, and 300 meters (984 feet) northwest of Calvert railroad station. Marked by tile and pipe, note 19.

Onalaska (M. R. C.) (La Crosse County, Wis., Mississippi River Commission, 1894).—On highest ground of high and prominent bluff 1½ miles north of Onalaska, Wis., on land owned by Peter Bruner. Lower side and face of bluff have been quarried. Marked by tile and pipe, note 19.

Holmen (M. R. C.) (La Crosse County, Wis., Mississippi River Commission, 1894).—On left bank of Mississippi River, at edge of timber on crest of bluff, at second rocky point three-fourths mile above Holmen, Wis., 2.5 meters (8 feet) toward river from wire fence, and about 5 meters (16 feet) toward Trempealeau from highest point on hill. Marked by tile and pipe, note 19.

Dakota (M. R. C.) (Winona County, Mississippi River Commission, 1894).—On right bank of Mississippi River, 1½ miles above Dakota, on property owned by Mrs. Charles Wolfe, 5 meters (16 feet) from edge of bluff, on small projecting point just below where bluff turns back up large ravine, 100 meters (328 feet) above prolongation of dike extending from right bank to former Island No. 90, and about same distance below another dike. Marked by tile and pipe, note 19. A 12-inch white-oak tree is 4 meters (13 feet) from station in azimuth 217°25′.

Beardsley (M. R. C.) (Trempealeau County, Wis., Mississippi River Commission, 1894).—On crest of sand ridge, 4 miles below Trempealeau, Wis., on land owned by Elam Beardsley, 200 meters (656 feet) east of McGilvery Ferry road, 25 meters (82 feet) east of fence, 23 meters (75 feet) south of another

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fence, and 300 meters (984 feet) west of edge of timber in Black River bottoms. Marked by tile and pipe, note 19.

Richmond (M. R. C.) (Winona County, Mississippi River Commission, 1894).—On right bank of Mississippi River, on first bluff below draw spanned by Trestle No. 18L on Chicago, Milwaukee, St. Paul & Pacific Railroad, opposite 1-mile signboard above Richmond station, opposite center of Island No. 86, and 5 meters (16 feet) from edge of second rock ledge from bottom. Marked by copper bolt set in triangular lead plug in bare rock, 1 meter (3 feet) from upstream edge of rock. A 12-inch black-oak tree is 11 meters (36 feet) from station in azimuth 3°57′.

Trempealeau east base=B. M. 221 (M. R. C.) (Trempealeau County, Wis., Mississippi River Commission, 1894).—On left bank of Mississippi River, on timbered property owned by Julius Kramer, 20 meters (66 feet) west of third lake (near its lower end), and just east of meadow land. Marked by copper bolt set in tile and pipe. An 8-inch elm tree is 10 meters (33 feet) from station in azimuth 208°30′; 10-inch elm tree is 11 meters (36 feet) from station in azimuth 42°53′; and 8-inch ash tree is 5 meters (16 feet) from station in azimuth 146°07′. Upstream river corner of house is 80 meters (262 feet) from station in azimuth 206°53′.

Trempealeau west base (M. R. C.) (Trempealeau County, Wis., Mississippi River Commission, 1894).—About 1½ miles below Trempealeau, Wis., on left bank of Mississippi River, opposite foot of Island No. 84, 200 meters (656 feet) above first dike below Trempealeau, and 3 meters (10 feet) from river bank. Marked by tile and pipe, note 19.

Chapin (M. R. C.) (Trempealeau County, Wis., Mississippi River Commission, 1895).—On small bare bluff about one-half height of main bluffs on left bank of Mississippi River, 4 miles north and 2 miles east of Trempealeau, Wis., 2½ miles south of Centerville, Wis., on land owned by Roven Sater. Marked by tile and pipe, note 19.

Atwood (M. R. C.) (Trempealeau County, Wis., Mississippi River Commission, 1895).—At east end of long, narrow, bare point of bluff, three-fourth mile north and one-fourth mile west of house owned by Russel Guscetti, about 3 miles west of Centerville, Wis., on land owned by Archie T. Bert, about 9 meters (30 feet) west of extreme east end of rocky ridge which drops vertically about 6 meters (20 feet), about 1.2 meters (4 feet) west of edge of bare rock which drops vertically in 2-foot step, and 10 inches south of 8-inch crack which runs east and west through rock. Marked by copper bolt leaded in flat natural rock. Bolt extends about one-half inch above surface and is slightly bent.

Martin (M. R. C.) (Winona County, Mississippi River Commission, 1895).—On right bank of Mississippi River, on second bluff below Homer railroad station, in section 32, Homer Township, on land owned by William Martin, on prominent point of bluff, 1.5 meters (5 feet) from edge of rock ledge, about 400 meters (1,312 feet) below upper end of rock ledge, and about 300 meters (984 feet) below point opposite Chicago, Milwaukee, St. Paul & Pacific Railroad trestle no. L 52. Marked by copper bolt leaded in rock surmounted by 2-foot iron pipe. Blazed 24-inch oak tree is 9.4 meters (31 feet) from station in azimuth 12°28′.

Volker (M. R. C.) (Buffalo County, Wis., Mississippi River Commission, 1895).—On left bank of Mississippi River 1½ miles above Marshland, Wis., near section line between sections 27 and 34, 25 meters (82 feet) east of section corner common to sections 27, 28, 33, and 34, Buffalo Township, about 300 meters (984 feet) from crest of hill and line dividing property formerly owned by Henry Volker and that of Fred Risser, at north edge of an open field owned by Sylvester Glisjensky, 30 meters (98 feet) east of southwest corner of patch of timber, 60 meters (197 feet) west of southeast corner of timber, and 10 feet south of wire fence along edge of timber and brush. Marked by tile and pipe, note 19, projecting 18 inches above mound which is 6 inches high and 5 feet in diameter. Azimuth from station to Homer, church spire is 346°56′42″.

Peterman (M. R. C.) (Winona County, Mississippi River Commission, 1895).—On right bank of Mississippi River, on point of first bluff below Gilman Creek, in Winona Township, on land owned by Mrs. C. Peterman, back of Mrs. Peterman's house, 5 meters (16 feet) due south from edge of bluff, oppo-

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site 2-mile post from Winona, and 250 meters (820 feet) west of crossing of road and Winona and Southwestern Railroad track. Marked by tile and pipe, note 19, projecting 18 inches above ground. Blazed 12-inch oak tree is 13.6 meters (45 feet) from station in azimuth 107°41′.

Haussinger (M. R. C.) (Buffalo County, Wis., Mississippi River Commission, 1895).—In sec. 22, T. 19 N., R. 11 W., fourth principal meridian, 1½ miles below Fountain City, Wis., on highest ground of point in field owned by Mrs. Elizabeth Haussinger, 75 meters (246 feet) back of crest of bluff, 80 meters (262 feet) north of half-section line of section 22, 46 meters (151 feet) west of north-and-south half-section line, and 50 meters (164 feet) east of timber. Mrs. Haussinger's house is at mouth of ravine which heads 200 meters (656 feet) north of station and is only house in vicinity. Marked by tile and iron pipe, note 19. Blazed 20-inch white-oak tree is 48 meters (157 feet) from station in azimuth 231°41′, and blazed 12-inch white-oak tree is 65 meters (213 feet) from station in azimuth 171°36′.

Burley (M. R. C.) (Winona County, Mississippi River Commission, 1895).—In sec. 34, T. 108 N., R. 8 W. (Rolling Stone Township), 1½ miles above Minnesota City railroad station one-half mile back of Chicago and Northwestern Railway track, in field owned by J. Q. Burley on northern slope of hill on spur ridge, 75 meters (246 feet) from brow of hill, between cultivated field on top of hill and scattering timber on hillside, about 500 meters (1,640 feet) south of stone quarry and about 500 meters (1,640 feet) southwest of point of hill. Marked by tile and short iron pipe, note 19. Flat boulder 4 or 5 feet across and projecting 6 inches above ground is 2½ meters (8 feet) north of pipe.

Eder (M. R. C.) (Buffalo County, Wis., Mississippi River Commission, 1895).—On summit of hill on left bank of Mississippi River, one-fourth mile back from brow of hill, 1 mile above Fountain City, Wis., in yard owned by Eder brothers, 9 meters (30 feet) west of southwest corner of frame house, about 12 meters (39 feet) northeast of old windmill, and about 20 meters (66 feet) north of fruit trees. Marked by tile and pipe, note 19, projecting 12 inches above ground.

Whitman (M. R. C.) (Winona County, Mississippi River Commission, 1895).—On right bank of Mississippi River, on highest ground on top of bluff known as Chimney Rock, in Rolling Stone Township, on property owned by Henry Whitman, in grove of scattering white-oak trees, about 400 meters (1,312 feet) back (south) of bare face of rock on upstream river side of bluff and 6 meters (20 feet) east of fence line which is at edge of cultivated field. Marked by tile and pipe, note 19. One blazed 20-inch white-oak tree is 12.5 meters (41 feet) from station in azimuth 355°28′, and another blazed 20-inch white-oak tree is in fence line, and 14.3 meters (47 feet) from station in azimuth 157°43′.

Klein (M. R. C.) (Buffalo County, Wis., Mississippi River Commission, 1895).—On left bank of Mississippi River, opposite Minneiska, Minn., about 1 mile below Cochrane, Wis., on first bluff above farm road which crosses railroad and leads back from large two-story brick house on Fountain City road, 2 meters (7 feet) from crest of bluff, on highest point of bare rock cliff, and about 30 meters (98 feet) below 18-inch birch tree with white trunk. Marked by copper bolt leaded in solid rock ledge.

Erding (M. R. C.) (Wabasha County, Mississippi River Commission, 1895).—On right bank of Mississippi River, on long, narrow, rocky ridge extending toward river and known as "Rattlesnake Ridge", in Wautopa Township, on property owned by Frank Galway, and 150 meters (492 feet) back from point of ridge. Marked by tile and short iron pipe, note 19. A 14-inch birch tree is 16 meters (52 feet) from station in azimuth 173°35′, and 16-inch burr-oak tree is 32 meters (105 feet) from station in azimuth 11°35′. Azimuth from station to Alma, spire no. 2 is 205°38′15″.

Huber (M. R. C.) (Wabasha County, Mississippi River Commission, 1895).—On narrow north-and-south ridge on right bank of Mississippi River, 2½ miles below Wabasha, on property owned by Christopher Schurhammer, 2 meters (7 feet) from crest of bluff near edge of small bare rock cliff which is exposed rock on ridge, and 200 meters (656 feet) above stone quarry on lower end of ridge from which road leads north down side of bluff. Marked by copper bolt leaded in solid rock. Top of bolt is one-half inch above surface of rock and lead. Letters "U. S." and four-inch triangle are cut in rock around bolt. Azimuth from station to Alma, schoolhouse is 290°42′40″.

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Beef Slough (M. R. C.) (Buffalo County, Wis., Mississippi River Commission, 1895).—On left bank of Mississippi River, on Wisconsin Bluffs, about 2 miles above mouth of Beef River, on property owned by Charles N. Skreif, on prominent bluff point about ½ mile above Mr. Skreif's residence, and 15 meters (49 feet) back of crest of bluff, directly opposite opening in Beef Slough behind Island no. 32. Marked by tile and short iron pipe, note 19. Blazed 16-inch white-oak tree with top broken off is 23 meters (75 feet) from station in azimuth 189°53′.

Wabasha east base=B. M.$\frac{235}{3}$ (M. R. C.) (Wabasha County, Mississippi River Commission, 1895).—On right bank of Mississippi River, in low ground which is thickly covered with small willows, about 500 meters (1,640 feet) below upper end of willows, 100 meters (328 feet) from right bank of Coat's Island chute, on property owned by Jacob Florin, on small rise in upper point of opening between two marshes, and 3 meters (10 feet) from extreme point of opening. Marked by copper bolt set in tile and pipe. Pipe is 3 feet long, and cap on pipe is 20 inches above the surface of ground.

Wabasha west base (M. R. C.) (Wabasha County, Mississippi River Commission, 1895).—On River Street in lower part of Wabasha, Minn., at top of bank of Mississippi River, in sec. 33, T. 111 N., R. 10 W., 6 meters (20 feet) northeast of fence, and 26 meters (85 feet) northwest of southeast corner of fence around pasture lot owned by Lucas Kuehn. Marked by tile and iron pipe, note 19.

Bottom (M. R. C.) (Buffalo County, Wis., Mississippi River Commission, 1895).—On left bank of Mississippi River, opposite Reads Landing, Minn., 220 meters (722 feet) from river bank, in tall grass on property owned by Mrs. S. F. Richards, about 35 meters (115 feet) east of small pond, 58 meters (190 feet) north of north end of trestle, about 47 meters (154 feet) west of track of Chicago, Milwaukee, St. Paul & Pacific railroad. Marked by copper bolt set in tile and pipe, projecting 15 inches above ground. *Reads Landing, church spire* is 1,053.3 meters (3,456 feet) from station in azimuth 32°38′07″, and *Reeds Landing schoolhouse* is 1,055.8 meters (3,464 feet) from station in azimuth 35°55′59″.

Chippewa (M. R. C.) (Pepin County, Wis., Mississippi River Commission, 1895).—On right bank of Chippewa River, on Five Mile Bluff which is about 3 miles above Chicago, Burlington & Quincy Railroad bridge across Chippewa River, 530 meters (1,739 feet) from right bank of Chippewa River, on James Nash estate, 2 meters (7 feet) back from face of bluff, and 10 meters (33 feet) in front of timber. Marked by copper bolt leaded in rock. Bolt is about 3.2 meters (10 feet) from outer edge and 1 inch below surface of flat rock, in center of hole 1½ inches in diameter.

Guthrie (M. R. C.) (Pepin County, Wis., Mississippi River Commission, 1895).—On bare-faced bluff on left bank of Lake Pepin, about 1 mile northeast of Pepin, Wis., in timber on property owned by Rudolph Wilhelmy, back of old quarry, back of Sandridge, on crest of ridge which slopes upward to northwest and downward to east, and one-quarter mile above windmill and red barn. Small ridge or nose slopes to south toward Lake Pepin from station. In approaching bluff from Pepin, station is directly back of gray barn with two silos at home of Mr. Wilhelmy. Marked by tile and pipe, note 19, projecting 8 inches above ground. *Reeds Landing, church spire* is 7,494.2 meters (24,587 feet) from station in azimuth 324°24′23″. *Reeds Landing schoolhouse* is 7,438.1 meters (24,403 feet) from station in azimuth 324°35′08″.

Knud (M. R. C.) (Wabasha County, Mississippi River Commission, 1895).—On right bank of Lake Pepin, near brow of bluff known as "Rattlesnake Hill", opposite Pepin, Wis., one-half mile below Kings Coulee flag station, in edge of timber on land owned by Knud Johnson, on slope of bluff about 3 meters (10 feet) south of vertical cliff, 2 meters (7 feet) north of edge of wheat field, approximately 3.7 meters (12 feet) lower and 30 meters (98 feet) downstream from summit of hill, and about 75 meters (246 feet) west of ravine extending toward river from Mr. Johnson's house. Marked by tile and pipe, note 19, projecting 10 inches above ground. Blazed 16-inch basswood tree is 10.8 meters (35 feet) from station in azimuth 245°05′, and blazed 8-inch white oak tree is 2.25 meters (7.4 feet) in approximate azimuth 255°. Azimuth from station to Pepin spire is 185°29′57″.

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Lakeport (M. R. C.) (Pepin County, Wis., Mississippi River Commission, 1895).—In Lakeport, Wis., one-fourth mile below mouth of Deer Creek, 100 meters (328 feet) from left bank of Lake Pepin, 6 meters (20 feet) west of small ravine, 10 meters (33 feet) north of right-of-way of Chicago, Burlington & Quincy Railroad, and 21 meters (69 feet) southeast of southeast corner of O. W. Heineman's small frame house. Marked by copper bolt set in tile and pipe. Corner of street is 20 meters (66 feet) from station in azimuth 227°08′, and *Lake City water tower* is 7,139.2 meters (23,423 feet) from station in azimuth 88°02′45″.

Loon (M. R. C.) (Wabasha County, Mississippi River Commission, 1895).—On rock point at foot of third hill below Lake City, in sec. 14, T. 111 N., R. 12 W., 2½ miles below Government breakwater at Lake City, one-half mile above mouth of Rileys Coulee, 5 meters (16 feet) from shore of Lake Pepin, 7 meters (23 feet) north of Chicago, Milwaukee, St. Paul and Pacific Railroad, and 100 meters (328 feet) below milepost 71–69. Marked by tile and iron pipe, note 19.

Carlson (M. R. C.) (Pepin County, Wis., Mississippi River Commission, 1895).—On left bank of Lake Pepin, on Bogus Bluff, about 2½ miles below Stockholm, Wis., about one-half mile above Bogus Creek, on property owned by James White, at edge of timber on brow of bluff which is between two depressions on side extending toward lake. Marked by tile and pipe, note 19. Blazed 20-inch dead white-oak tree is 1.6 meters (5 feet) from station in azimuth 204°49′. *Lake City, church spire,* is 4,372.0 meters (14,344 feet) from station in azimuth 60°59′02″, and *Lake City water tower* is 4,517.4 meters (14,821 feet) from station in azimuth 59°52′51″.

Sugar Loaf (M. R. C.) (Goodhue County, Mississippi River Commission, 1895).—On right bank of Lake Pepin, on extreme top of Sugar Loaf Bluff, about 1½ miles above Lake City, about one-fourth mile above Gould Creek, on property owned by R. M. Merrill, 175 meters (574 feet) above Wabasha-Goodhue county line. Marked by tile and pipe, note 19, projecting 18 inches above ground.

Moline (M. R. C.) (Pepin County, Wis., Mississippi River Commission, 1895).—On left bank of Lake Pepin, on first bluff above Stockholm, Wis., about three-fourth mile above Chicago, Burlington & Quincy Railroad station, about three-fourths mile below Maiden Rock, about 250 meters (820 feet) below Erickson Point, at edge of cultivated field owned by Charles Moline, on brow of bluff at upper riverside end of bluff, and 4 meters (13 feet) back of wire fence which runs parallel to brow of bluff. Marked by tile and pipe, note 19.

Girard (M. R. C.) (Goodhue County, Mississippi River Commission, 1895).—On right bank of Lake Pepin, on mound in timber, about 1¼ miles below Frontenac, three-fourths mile south of Villa Maria Academy, on property owned by Jim Monroe, about 450 meters (1,476 feet) east of Wells Creek, 60 meters (197 feet) south of east-and-west road through timber, and about 150 meters (492 feet) south of point in east-and-west highway which is about 225 meters (738 feet) west of junction with north-and-south highway. Marked by tile and pipe, note 19.

Frontenac (M. R. C.) (Goodhue County, Mississippi River Commission, 1895).—On bluffs ½ mile above lower end of Point No Point Bluff, 1 mile north of Frontenac railroad station, 1 mile above Lakeside, in sec. 3, T. 112 N., R. 13 W., on property owned by Herman Scherf, 200 meters (656 feet) back from brow of bluff. Marked by tile and iron pipe, note 19.

Rush (M. R. C.) (Pierce County, Wis., Mississippi River Commission, 1895).—On left bank of Lake Pepin, on wooded bluff about 1¼ miles above Maiden Rock, Wis., just above Rush River, ¼ mile west of highway bridge across Rush River, on property owned by Thomas Pritchard, back of prominent point jetting out into Lake Pepin, at brow of bluff and edge of timber, about 45 meters (148 feet) upstream from extreme point of bluff which forms west side of ravine through which Rush River flows, and about 80 meters (262 feet) southeast of fence corner. Mark by tile and pipe, note 19.

Bowles (M. R. C.) (Pierce County, Wis., Mississippi River Commission, 1895).—On Bowler Bluff, on left bank of Lake Pepin, 2½ miles below Bay City, Wis., in cultivated field owned by John D. Jacobson, 10 meters (33 feet) southwest of ruins of frame house, 400 meters (1,313 feet) back from brow of bluff, 350 meters (1,148 feet) east of section line between sections 10 and 11, about 300 meters (984 feet) east-northeast of frame house and red silo, and

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about 550 meters (1,804 feet) south-southeast of group of white buildings (including large barn with galvanized-iron roof). Marked by tile and pipe, note 19.

Wacouta (M. R. C.) (Goodhue County, Mississippi River Commission, 1895).—About ½ mile below Wacouta, ¼ mile below point of bluff, known as Rattlesnake Bluff, in sec. 5, T. 112 N., R. 13 W., on property owned by John Staiger, 50 meters (164 feet) back from brow of bluff. Marked by tile and iron pipe, note 19.

Hoard (M. R. C.) (Goodhue County, Mississippi River Commission, 1895).—On bluff 4 miles below Red Wing, 2 miles above railroad station at Wacouta, in sec. 26, T. 113 N., R. 14 W., 125 meters (410 feet) back from brow of bluff, on line between properties owned by C. J. Anderson and E. H. Hoard, and ¼ mile above head of south channel of river. Marked by tile and iron pipe, note 19. A 10-inch birch tree is on property line, 21 meters (69 feet) north of station.

Webster (M. R. C.) (Pierce County, Wis., Mississippi River Commission, 1895).—On left bank of Mississippi River, on sand prairie 2 miles northwest of Bay City, on line between properties owned by A. W. Parker and W. L. Webster, 300 meters (984 feet) north of Bay City-Red Wing road, about ¾ mile south of bluffs, about 200 meters (656 feet) east of break in bluff, about ¾ mile southeast of red brick house, red barn, and windmill; and about ½ mile southwest of white frame house, red barn, and windmill. Marked by tile and pipe, note 19.

Trenton (M. R. C.) (Pierce County, Wis., Mississippi River Commission, 1895).—On left bank of Mississippi River, in old town of Trenton, Wis., about 3 miles above Red Wing, Minn., about three-fourths mile above head of North Channel, and 150 meters (492 feet) below mouth of Trenton Slough, on west line of street extending north from river, on top of sand bank, 6 meters (20 feet) from edge, 55 meters (180 feet) below red brick house facing river, and 75 meters (246 feet) from river bank. Marked by copper bolt set in tile and pipe.

Red Wing upper base (M. R. C.) (Pierce County, Wis., Mississippi River Commission, 1895).—On left bank of Mississippi River, on sand prairie, three-fourths mile below Hager City, about three-fourths mile directly south of break in line of bluffs, on line between properties owned by Ed Sprague (on north) and H. J. Myers (on south), 65 meters (213 feet) back from edge of sand bluff, 11 meters (36 feet) east of fence corner, and about one-fourth mile northwest of Mr. Myers' house, which stands at foot of sand bluff on Bay City-Red Wing Road. Marked by tile and pipe, note 19.

Red Wing lower base (M. R. C.) (Pierce County, Wis., Mississippi River Commission, 1895).—On left bank of Mississippi River, 1¾ miles below Hager City, 200 meters (656 feet) below foot of Upper Lake, on property owned by Ed Wetzel, on top of sand bank, 4 meters (13 feet) from edge, 50 meters (164 feet) north of Chicago, Burlington & Quincy Railroad, 25 meters (82 feet) west of small ravine, and 55 meters (180 feet) east of conduit tower. Marked by copper bolt set in tile and pipe. Blazed 8-inch black-oak tree is 10 meters (33 feet) west of station, and blazed 15-inch black-oak tree is 16 meters (52 feet) north of station.

Peterson (M. R. C.) (Goodhue County, Mississippi River Commission, 1895).—On sharp point 4 miles above Red Wing, in sec. 27, T. 113 N., R. 15 W., on property owned by Gus Peterson, on first point below Spring Creek, one-half mile southeast of buildings at poor farm, and 400 meters (1,312 feet) east of schoolhouse. Marked by copper bolt leaded in rock.

Cannon (M. R. C.) (Goodhue County, Mississippi River Commission, 1895).—On right bank of Mississippi River, 1 meter (3 feet) from edge of steep bluff on north brow of Mount Carmel Bluffs, one-half mile above lower end of bluff, three-fourths mile above Cannon Junction, one-half mile south of Vermilion River, on property owned by John Hasselblad, about 50 meters (164 feet) upstream along brow of bluff from east-and-west line between properties owned by William Gustafson and John Hasselblad. Marked by tile and pipe, note 19.

Mero=B. M. $\frac{248}{1}$ (M. R. C.) (Pierce County, Wis., Mississippi River Commission, 1895).—On top at extreme western point of sand ridge, on left bank

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of Mississippi River, about 1 mile below Diamond Bluff, Wis., and one-half mile south of break in bluffs, on large Indian mound, on property owned by P. H. Martinson, one-fourth mile west of Mr. Martinson's house. Marked by copper bolt set in tile and pipe. Blazed 10-inch black-oak tree is 7 meters (23 feet) northeast of station, another blazed 10-inch black-oak tree is 10 meters (33 feet) southwest of station, and blazed 8-inch black-oak tree is 13 meters (43 feet) south of station.

Rosby (M. R. C.) (Goodhue County, Mississippi River Commission, 1895).—On right bank of Mississippi River, in edge of scattering timber in field owned by John J. Johnson, one-fourth mile south of public road, one-half mile north of Vermilion River, 1 meter (3 feet) north of wire fence in timber, and 50 meters (164 feet) south of land line. Marked by tile and pipe, note 19.

Yanz (M. R. C.) (Dakota County, Mississippi River Commission, 1895).—On right bank of Mississippi River, on point of sand bluff below Hastings (third point below house and large red barn with tall windmill), on land owned by E. M. Vesseth, 1¼ miles above Etter railroad station, 200 meters (656 feet) back of Chicago, Milwaukee, St. Paul and Pacific Railroad trestle, and 25 meters (82 feet) south of north line of fence in scattering timber. Marked by tile and pipe, note 19.

Lucky (M. R. C.) (Pierce County, Wis., Mississippi River Commission, 1895).—On left bank of Mississippi River, on brow of bluff about 4 miles below Prescott, Wis., on property owned by Adolph Meyers, about 7 meters (23 feet) in front of wire fence at edge of wheat field, about 200 meters (656 feet) above prominent valley leading back from river, about 250 meters (820 feet) below another prominent valley, and almost opposite center of lake in bottoms on right bank. Railroad track about 1,000 meters (3,281 feet) upstream forms letter "S" which is plainly visible from station. Marked by tile and pipe, note 19, projecting about 14 inches above ground. One blazed 8-inch white-oak tree is 20 meters (66 feet) southwest of station, and another blazed 8-inch white-oak tree is 50 meters (164 feet) northwest of station.

Prescott (Pierce County, Wis., W. R. Hoag, 1891; Mississippi River Commission, 1895).—On narrow bluff 3 miles northeast of Prescott, three-fourths mile east of St. Croix River, 300 meters (984 feet) west of Prescott public road, and 300 meters (984 feet) southwest of land owned by M. T. Dill, in sec. 3, T. 26 N., R. 20 W., fourth principal meridian. Marked by copper bolt leaded in rock.

Crossing (M. R. C.) (Washington County, Mississippi River Commission, 1895).—On right bank of Mississippi River, on bluff 1½ miles above Hastings highway bridge, on property owned by W. M. Morey, on brow of bluff, 100 meters (328 feet) above point where bluff makes an abrupt turn from west to north, and 300 meters (984 feet) above junction of Chicago, Burlington & Quincy Railroad and Chicago, Milwaukee, St. Paul & Pacific Railroad. Marked by tile and pipe, note 19.

Hastings (M. R. C.) (Dakota County, Mississippi River Commission, 1895).—On right bank of Mississippi River, on right-of-way of Chicago, Milwaukee, St. Paul & Pacific Railroad, 1 mile above Vermilion Falls, 250 meters (820 feet) south of corporation line of Hastings, 1 meter (3 feet) south of north right-of-way fence, 250 meters (820 feet) west of grove of maple trees, and 34¼ rail lengths west of west end of trestle no. 08 over small ravine. Land on each side of right-of-way is owned by Frank Hubbard. Marked by tile and pipe, note 19, and circular mound of earth 5 feet in diameter has been thrown up around pipe leaving cap about 2 inches above surface of ground.

Simmons (M. R. C.) (Dakota County, Mississippi River Commission, 1895).—On right bank of Mississippi River, 3 miles above Hastings, on property owned by William Simmons, in edge of timber, 2 meters (7 feet) from line between properties owned by William Simmons and E. D. Wilson, 150 meters (492 feet) west of corner of timber, one-fourth mile south and 300 meters (984 feet) east of county roads, and one-fourth mile southeast of frame house. Marked by tile and pipe, note 19. Pipe was gone in 1924, but tile was probably still in place.

Daly (M. R. C.) (Washington County, Mississippi River Commission, 1895).—Three-fourths mile south of Langdon station in T. 27 N., R. 21 W., on line between sections 21 and 28, on property owned by John Daly, 350 meters (1,148 feet) west of Chicago, Milwaukee, St. Paul & Pacific Railroad, and 50

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meters (164 feet) east of intersection of east-and-west fence and north-and-south fence. Marked by tile and iron pipe, note 19.

Brown (M. R. C.) (Dakota County, Mississippi River Commission, 1895).—On right bank of Mississippi River, on bluffs 7 miles west of Hastings, on land belonging to Thomas Brown Estate, at road intersection, 150 meters (492 feet) from edge of bluffs, 150 meters (492 feet) southeast of two-story brick house, at east end of north row of box-elder trees along road to house, and 3 meters (10 feet) from line between properties belonging to P. H. Rowe and Brown Estate. Marked by tile and pipe, note 19.

Dayton (M. R. C.) (Ramsey County, Mississippi River Commission, 1895).—On Dayton Bluff, on left bank of Mississippi River, in lower part of St. Paul, on largest Indian mound in Dayton Park, between street and face of bluff on south side of mound, about 60 meters (197 feet) east of concrete tennis court which is on brow of bluff, 25 meters (82 feet) south of angle in Mound Street, 53 meters (174 feet) west of intersection of Mound and Earle Streets, and about 50 meters (164 feet) west of small red brick pavilion. Marked by copper bolt set in tile and pipe. A 12-inch white-oak tree is 5 meters (16 feet) from station in azimuth 200°.

Mendota (M. R. C.) (Dakota County, Mississippi River Commission, 1895).—On prominent point known as "Pilot Knob", one-half mile above Mendota Catholic Church, in sec. 27, T. 28 N., R. 23 W., on property owned by Alexander Perron, 200 meters (656 feet) back from brow of bluff, 100 meters (328 feet) west of north-and-south wagon road, 250 meters (820 feet) southwest of brick house, and 300 meters (984 feet) northeast of section corner. Marked by tile and iron pipe, note 19.

St. Paul front base (M. R. C.) (Hennepin County, Mississippi River Commission, 1895).—On right bank of Mississippi River, at Fort Snelling Reservation, on top of bluff, 4 meters (13 feet) back from edge, on prolongation of line along southeast side of Bloomington Road, 10 meters (33 feet) directly in front of masonry powder magazine, and about 7 meters (23 feet) above and about 40 meters (131 feet) in front of upstream edge of large red stable (upper one of four large stables in line parallel to river). Marked by copper bolt set in tile and pipe. Because of character of soil and depths to which frosts penetrate, precaution was taken to put additional tile and bolt 3 feet under upper one in case upper one should be disturbed.

Boshart (M. R. C.) (Hennepin County, Mississippi River Commission, 1895).—On prominent point ¼ mile south of Minneapolis city limits, 1 mile south of Soldiers' Home, 1½ miles west of Fort Snelling Bridge, in sec. 19, T. 28 N., R. 23 W., on property belonging to Haywood & Boshart, real-estate agents at Minneapolis, on highest point of sand mound, about 450 meters (1,476 feet) west of west line and 200 meters (656 feet) south of north line of Fort Snelling Reservation. Marked by tile and iron pipe, note 19. Lone tree is 58.8 meters (193 feet) south of station. Azimuth from station to Mendota, spire is 286°44′08″.

Powder Horn (M. R. C.) (Hennepin County, Mississippi River Commission, 1898).—In Minneapolis, in southwest corner of Powder Horn Park, 80 feet east and 18 feet north of intersection of centers of Tenth Avenue South and Thirty-fourth Street. Marked by tile and pipe, note 19.

Guaranty Loan Tower (M. R. C.) (Hennepin County, Mississippi River Commission, 1898).—In Minneapolis, in southwest corner of intersection of Second Avenue and Third Street South, on center of northeast (tallest) tower of Northwestern Guaranty Loan Co's. building. Marked by round iron pole carrying wind gage of U. S. Weather Bureau.

Windom (M. R. C.) (Anoka County, Mississippi River Commission, 1898).—In northeast section of Minneapolis, on east line of Silver Lake Road leading northeast from northeast corner of Windom Park. Marked by tile and pipe, note 19. Northeast corner of Windom Park is 157 meters (515 feet) from station in azimuth 33°57′.

Peck (M. R. C.) (Hennepin County, Mississippi River Commission, 1898).—On highest part of high ridge, about 400 meters (1,312 feet) west of river, and 4 meters (13 feet) south of north line of Thirty-sixth Avenue North. Pasture owned by G. W. Peck adjoins street on north. Marked by tile and pipe, note 19. Blazed six-inch oak tree is 12.8 meters (42 feet) from station in azimuth 252°, and another blazed six-inch oak tree is 9.4 meters (31 feet) from station in azimuth 107°.

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Mulcara (M. R. C.) (Anoka County, Mississippi River Commission, 1898).—On left bank of river, about 2 miles north of northern limits of Minneapolis, on highest point of knoll, in NW¼ sec. 25, T. 30 N., R. 24 W., of the fourth principal meridian, on property owned by Thomas Mulcara, about 400 meters (1,312 feet) northeast of Mulcara's house which is on east side of road which is prolongation of Central Avenue. Marked by tile and pipe, note 19. Lone blazed six-inch scrub-oak tree is 69 meters (226 feet) from station in azimuth 16°03′.

Palmer (M. R. C.) (Hennepin County, Mississippi River Commission, 1898).—Two miles north of northern limits of Minneapolis, in road passing on south side of Palmer Lake, opposite point 250 meters (820 feet) east of west end of Palmer Lake, about 2 miles west of river, 12 meters (39 feet) north of south fence of east-and-west road, and about 175 meters (574 feet) northeast of house. Marked by tile and pipe, note 19. Northwest corner of pasture (corner common to secs. 26, 27, 34, and 35) is 43 meters (141 feet) from station in azimuth 67°03′. Blazed 5-inch oak tree is 5.4 meters (18 feet) from station in azimuth 102°, and blazed 6-inch oak tree is 17.2 meters (56 feet) from station in azimuth 217°40′.

Dunn (M. R. C.) (Anoka County, Mississippi River Commission, 1898).—About 9 miles above upper limits of Minneapolis, in SW¼SE¼ sec. 26, T. 31 N., R. 24 W., in oak timber, on land owned by John Dunn, 250 meters (820 feet) west of river road on left bank of river, and opposite first angle in road 120 meters (394 feet) above Dunn's brick schoolhouse. Marked by tile and pipe, note 19. Blazed 12-inch oak tree is 7.4 meters (24 feet) from station in azimuth 298°, blazed 10-inch oak tree is 3.4 meters (11 feet) from station in azimuth 353°, blazed 12-inch oak tree is 3.8 meters (12 feet) from station in azimuth 67°, and blazed 8-inch oak tree is 3.4 meters (11 feet) from station in azimuth 143°.

Kilmer (M. R. C.) (Hennepin County, Mississippi River Commission, 1898).—Five miles below Champlin, 2¼ miles east and ½ mile north of Osseo, on west side of Middle Road, 2 miles west of river, in NW¼SW¼ sec. 8, T. 119 N., R. 21 W. of the fifth principal meridian, directly in front of Charles Kilmer's house and about 50 meters (164 feet) southeast of large red barn. Marked by tile and pipe, note 19. Blazed 16-inch oak tree is 9.2 meters (30 feet) from station in azimuth 143°.

Powell (M. R. C.) (Anoka County, Mississippi River Commission, 1898).—About 3½ miles below Anoka, on south side of river road on left bank of river, on section line between sections 16 and 21, T. 31 N., R. 24 W. of the fourth principal meridian, on line between properties owned by George Smith and Lewis Greenwald, directly south of S. J. Powell's residence, 2 meters (7 feet) north of south road fence, and one-half mile below district school no. 2. Marked by tile and pipe, note 19. Blazed 10-inch scrub-oak tree is 12.5 meters (41 feet) from station in azimuth 101°, and blazed 24-inch scrub-oak tree is 12.3 meters (40 feet) from station in azimuth 352°25′.

Howard (M. R. C.) (Hennepin County, Mississippi River Commission, 1898).—About 2 miles below Champlin, on high knoll on south side of farm road, one-fourth mile west of main road between Champlin and Osseo, in NE¼NE¼ sec. 31, T. 120 N., R. 21 W. of the fifth principal meridian, on land owned by A. D. Howard, 22.6 meters (74.1 feet) west of northwest corner of pasture. Marked by tile and pipe, note 19.

Carvel (M. R. C.) (Anoka County, Mississippi River Commission, 1898).—About 1 mile northwest of Anoka, on high ground, in cultivated field, in NW¼SW¼ sec. 36, T. 32 N., R. 25 W. of the fourth principal meridian, on property owned by R. D. Carvel, 400 meters (1,312 feet) north of Great Northern Railway, 500 meters (1,640 feet) west of north-and-south State road, 250 meters (820 feet) north of B. Nue's residence, and 8.1 meters (27 feet) east of southeast corner of small vacant house used as granary. Marked by tile and pipe, note 19. Blazed 24-inch double oak tree is 10.8 meters (35 feet) from station in azimuth 190°, and blazed 10-inch double oak tree is 8.4 meters (28 feet) from station in azimuth 137°.

Johnson (M. R. C.) (Hennepin County, Mississippi River Commission, 1898).—Three miles above Champlin, about 180 meters (591 feet) south of Hassan Road, one-fourth mile above junction with river road on right bank, in section 18, near west end of high ridge in meadow land owned by Frank A. Johnson,

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200 meters (656 feet) southwest of Johnson's house, and 14 meters (46 feet) east of corner of cultivated field. Marked by tile and pipe, note 19.

Carpenter (M. R. C.) (Anoka County, Mississippi River Commission, 1898).—On highest part of ridge on west side of north-and-south road which joins river road about 3 miles above Anoka, about 700 meters (2,297 feet) north of residence of L. J. Carpenter, and on section line between secs. 21 and 22, T. 32 N., R. 25 W. of the fourth principal meridian. Mrs. Rogers owns property east of road and L. J. Carpenter west of road. Marked by tile and pipe, note 19. Southwest corner of pasture fence is 107.6 meters (353 feet) from station in azimuth 187°53′.

Diegel (M. R. C.) (Hennepin County, Mississippi River Commission, 1898).—Three-fourths mile south of Dayton, one-half mile east of Dayton-Shakopee road, one-half mile west of river road on right bank, in NW¼SE¼ sec. 6, T. 120 N., R. 22 W. of the fifth principal meridian, on land owned by Frank Diegel, 1 meter (3 feet) south and 1 meter (3 feet) west of junction of northeast and west fence at edge of meadow land. Clearing is northwest and cultivated field is northeast of station. Marked by tile and pipe, note 19.

Clark (M. R. C.) (Sherburne County, Mississippi River Commission, 1898).—About 1½ miles north of Itasca railroad station, on quarter-section line of N½ sec. 18, T. 32 N., R. 25 W. of the fourth principal meridian, in edge of pasture owned by G. M. Clark, 15 meters (49 feet) west and 4 meters (13 feet) south of fence corner at southeast corner of cultivated field, one-half mile east of county line between Anoka and Sherburne Counties, and about 1,000 meters (3,281 feet) northeast of Clark's house. Marked by tile and pipe, note 19.

Carrow (M. R. C.) (Wright County, Mississippi River Commission, 1898).—About 1 mile above Dayton, in sec. 25, T. 121 N., R. 26 W. of the fifth principal meridian, in edge of timber on high ridge, on land owned by Gasper Carrow, about 300 meters (984 feet) back of river road on right bank, directly opposite head of Dayton Island, 2 meters (7 feet) west of north-and-south fence between timber and cultivated field, and 75 meters (246 feet) south of south fence of wagon road. Marked by tile and pipe, note 19.

Castle (M. R. C.) (Sherburne County, Mississippi River Commission, 1898).—About 2 miles below Elk River, in scrub-oak timber on high gravel knoll (southwestern one of series of high knolls and ridges), one-half mile back of Northern Pacific Railway, in SE¼SE¼ sec. 2, T. 32 N., R. 26 W. of the fourth principal meridian, on property owned by Castle and Houlton, 17 meters (56 feet) east of north-and-south fence, and 75 meters (246 feet) north of junction of fences at edge of cultivated field. Marked by tile and pipe, note 19. Blazed 6-inch scrub-oak tree is 8.3 meters (27 feet) from station in azimuth 77°, another blazed 6-inch scrub-oak tree is 8 meters (26 feet) from station in azimuth 263°, and blazed 8-inch scrub-oak tree is 15.3 meters (50 feet) from station in azimuth 13°45′.

Fritz (M. R. C.) (Wright County, Mississippi River Commission, 1898).—Two miles southwest of Elk River, in scattering scrub-oak timber and grass, on property owned by Fred Johanning, 2.3 meters (8 feet) north of east-and-west section-line fence between secs. 16 and 21, T. 121 N., R. 23 W. of the fifth principal meridian, about 600 meters (1,969 feet) west of point where wagon road between Otsego and Dayton turns northwest off section line. Marked by tile and pipe, note 19.

Elk River (M. R. C.) (Sherburne County, Mississippi River Commission, 1898).—About 1½ miles northwest of Elk River, in SE¼NW¼ sec. 28, T. 33 N., R. 26 W. of the fourth principal meridian, on south end of ridge, in scattering scrub-oak timber, on property owned by Albert Nicholson, 32 meters (105 feet) east of east right-of-way fence of Milaca branch of Great Northern Railway, and 120 meters (394 feet) north of east-and-west wagon road. Marked by tile and pipe, note 19.

Davis Island (M. R. C.) (Wright County, Mississippi River Commission, 1898).—On left bank of Mississippi River, three-fourths mile above Otsego ferry landing, 100 meters (328 feet) below point opposite foot of Davis Island, in sec. 6, T. 32 N., R. 26 W. of the fourth principal meridian, on property owned by E. E. Scott, 2 meters (7 feet) from crest of sand ridge, and 20 meters (66 feet) below sharp turn at upper end of ridge. Marked by tile and pipe, note 19.

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Williams (M. R. C.) (Sherburne County, Mississippi River Commission, 1898).—Five miles above Elk River, on north side of wagon road between Elk River and Big Lake, 1½ miles from river bank, in SE¼ sec. 26, T. 33 N., R. 27 W. of the fourth principal meridian, one-half meter (2 feet) south of north line of road, and 35 meters (115 feet) east of prolongation of east side of W. K. Williams' residence. Marked by tile and pipe, note 19.

Baker (M. R. C.) (Wright County, Mississippi River Commission, 1898).—About 3 miles above Otsego, in growth of young poplar, oak, and brush directly opposite head of Demicks Islands, in sec. 11, T. 121 N., R. 24 W. of the fifth principal meridian, on property owned by N. E. Baker, 2 meters (7 feet) back of crest of bluff on right bank of river, and one-half mile north and one-half mile east of Lily Pond schoolhouse. Marked by tile and pipe, note 19. Blazed 6-inch oak tree is 2 meters (7 feet) toward river from station.

Varley (M. R. C.) (Sherburne County, Mississippi River Commission, 1898).—About 1½ miles below Big Lake, in sec. 28, T. 33 N., R. 27 W., of the fourth principal meridian, 7.4 meters (24 feet) south of south right-of-way fence of Northern Pacific and Great Northern Railways and on fence line between cultivated field owned by Christopher Varley on west and wooded pasture on east. Marked by tile and pipe, note 19.

Lambert (M. R. C.) (Wright County, Mississippi River Commission, 1898).—Four miles below Monticello, about one-half mile from river bank, near section line between secs. 16 and 17, T. 121 N., R. 24 W., of the fifth principal meridian, on property owned by Mrs. Lambert, on east slope of high knoll covered with second-growth poplar, brush, and few scattering large oaks, 2 meters (7 feet) west of north-and-south wire fence, about 400 meters (1,312 feet) southwest of yellow house, and 200 meters (656 feet) northwest of two small ponds. Marked by tile and pipe, note 19. Blazed 30-inch double oak tree is 27.7 meters (91 feet) from station in azimuth 70°40′, and blazed 24-inch oak tree is 42.7 meters (138 feet) from station in azimuth 36°15′.

Telephone (M. R. C.) (Sherburne County, Mississippi River Commission, 1898).—About one-half mile from Big Lake, 1 meter (3 feet) north of southeast fence of Monticello-Big Lake road, 56.7 meters (186 feet) northeast of junction of north-and-south fence with road fence, on second ridge from Monticello which crosses road, and about 300 meters (984 feet) west of timber. Marked by tile and pipe, note 19.

Monticello (M. R. C.) (Wright County, Mississippi River Commission, 1898).—On top of small bluff back of upper end of Monticello, about one-half mile west of depot, north of row of cottonwood trees about 80 meters (262 feet) above point where wagon road leading southwest crosses low bluff, and 25 meters (82 feet) north of old house. Marked by tile and pipe, note 19. Blazed 12-inch cottonwood tree is 5 meters (16 feet) from station in azimuth 345° (magnetic), and another blazed 12-inch cottonwood tree is 5 meters (16 feet) from station in azimuth 43° (magnetic).

Monticello east base (M. R. C.) (Wright County, Mississippi River Commission, 1898).—On north side of Mississippi River, in east-and-west public road, about 1 mile below point opposite lower limits of Monticello, 1 meter (3 feet) south of fence on north line of road and adjoining property owned by Mr. McAllester. Marked by tile and pipe, note 19.

Monticello west base (M. R. C.) (Wright County, Mississippi River Commission, 1898).—On north side of Mississippi River, in east-and-west public road opposite lower end of Monticello, about 200 meters (656 feet) below turn in road at river bank, 1 meter (3 feet) south of fence on north side of road and adjoining property owned by Mr. Taft. Marked by tile and pipe, note 19.

Big Lake (M. R. C.) (Sherburne County, Mississippi River Commission, 1898).—One and one-half miles above Big Lake, 1½ meters (5 feet) north of south right-of-way fence of Great Northern and Northern Pacific Railways, and 19 meters (62 feet) west of center of farm road which crosses railways near center of long curve. Marked by tile and pipe, note 19.

Shenton (M. R. C.) (Sherburne County, Mississippi River Commission, 1898).—About 4½ miles above Big Lake, in NW¼ sec. 16, on property line of land owned by Mr. Shenton, 600 meters (1,969 feet) southwest of Great Northern and Northern Pacific Railways, one-half mile west of schoolhouse at Salida siding, on top of small ridge, and on north fence line of east-and-west wagon road. Marked by tile and pipe, note 19.

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Ackerman (M. R. C.) (Wright County, Mississippi River Commission, 1898).—About 7 miles above Monticello, on quarter-section line, 150 meters (492 feet) east of section line between secs. 23 and 24, T. 122 N., R. 26 W. of the fifth principal meridian, at south edge of timber, opposite large cultivated field adjacent to Clearwater-Monticello road on river side, one-half mile back of road, and about 30 meters (98 feet) back of road through timber on line between properties owned by Mr. Nelson (on north) and Mrs. Ackerman (on south). Marked by tile and pipe, note 19. Blazed 6-inch oak tree is 6 meters (20 feet) from station in azimuth 265°, and blazed 8-inch oak tree is 8 meters (26 feet) from station in azimuth 180°.

Becker (M. R. C.) (Sherburne County, Mississippi River Commission, 1898).—One-half mile below Becker, in Becker-Big Lake wagon road which runs parallel and adjacent to railroad tracks, 300 meters (984 feet) below road crossing, 81.1 meters (266 feet) below junction of road fence with east-and-west fence, and 1½ meters (5 feet) from fence on northeast side of wagon road. Marked by tile and pipe, note 19.

Parks (M. R. C.) (Sherburne County, Mississippi River Commission, 1898).—About 3 miles northwest of Becker, three-fourths mile north of Becker-Clearwater road, 600 meters (1,969 feet) north of Mr. Park's residence, in east-and-west fence line, 1 meter (3 feet) east of fence on west side of lane which is on section line between secs. 26 and 27, T. 34 N., R. 29 W. of the fourth principal meridian. Marked by tile and pipe, note 19.

River Bank (M. R. C.) (Wright County, Mississippi River Commission, 1898).—Ten miles above Monticello, in sec. 16, T. 122 N., R. 26 W. of the fifth principal meridian, on property owned by Mr. Clark, on high sand ridge in scrub-oak timber where river makes sharp bend to north, near lower end of low marshy ground along river (evidently old river bed) opposite point 150 meters (492 feet) above point where Monticello-Clearwater wagon road enters timber, 100 meters (328 feet) north of wagon road, and 120 meters (394 feet) back from right bank of river. Marked by tile and pipe, note 19. Blazed 10-inch scrub-oak tree is 17.8 meters (58 feet) from station in azimuth 195°25′; blazed 8-inch scrub-oak tree is 7.4 meters (24 feet) from station in azimuth 358°; and another blazed 8-inch scrub-oak tree is 22.9 meters (75 feet) from station in azimuth 64°25′.

Benson (M. R. C.) (Wright County, Mississippi River Commission, 1898).—About 3½ miles below Clearwater, in sec. 7, T. 122 N., R. 29 W., of the fifth principal meridian, on property belonging to Walter Benson, on lower side of old cut-off, about 100 meters (328 feet) south of end of boom across mouth of cut-off, 10 meters (33 feet) back from right bank of river, about 40 meters (131 feet) south of row of bulldog piers, and 2 meters west of fence. Marked by tile and pipe, note 19. Blazed 30-inch white-oak tree is 7.6 meters (25 feet) from station.

Clear Lake (M. R. C.) (Sherburne County, Mississippi River Commission, 1898).—In lower end of Clear Lake, about 400 meters (1,312 feet) east of Northern Pacific Railway station, in northeast corner of pasture lot owned by James Brooks, on south side of Clear Lake-Becker wagon road, which is on south side of railway tracks (telephone line along road), 80 meters (262 feet) east of Mr. Brooks' residence, and 3 meters (10 feet) south and 1½ meters (5 feet) west of fence intersection. Marked by tile and pipe, note 19.

Clearwater (M. R. C.) (Wright County, Mississippi River Commission, 1898).—One mile above Clearwater, in NW¼SE¼ sec. 27, T. 123 N., R. 27 W., of the fifth principal meridian, in oak timber land owned by P. A. Leme, 15 meters (49 feet) back from right bank of river near lower end of sharp bend to left, 20 meters (66 feet) north of prolongation of right bank of reach below, and about 200 meters (656 feet) west of northwest corner of cultivated field which reaches within 50 meters (164 feet) of river bank. Marked by tile and pipe, note 19. Blazed 8-inch white-oak tree is 3.8 meters (12 feet) from station in azimuth 309°, blazed 12-inch white-oak tree is 3.4 meters (11 feet) from station in azimuth 103°, and blazed 6-inch white-oak tree is 4.8 meters (16 feet) from station in azimuth 212°.

Cater (M. R. C.) (Sherburne County, Mississippi River Commission, 1898).—About 9 miles below St. Cloud and 3½ miles above Clear Lake, in sec. 35, T. 35 N., R. 30 W., of the fourth principal meridian, on property owned by D. A. Cater, in scrub-oak timber, about 200 meters (656 feet) northeast of Clear Lake–St. Cloud wagon road (telephone line along road), about 25 meters

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(82 feet) from front and 15 meters (49 feet) from upper slope of prominent mound. Marked by tile and pipe, note 19.

St. Augusta (M. R. C.) (Stearns County, Mississippi River, 1898).—Five miles below St. Cloud, about 1½ miles northeast of St. Augusta Church, 250 meters (820 feet) below mouth of Johnson Creek, directly on line of white schoolhouse 1 mile from left bank of river and State Reformatory stack, in SW¼NE¼ sec. 7, T. 123 N., R. 27 W. of the fifth principal meridian, in scrub-oak timber, on property owned by V. L. Wilson, 5 meters (16 feet) back of right bank of river, 150 meters (492 feet) above northwest corner of cultivated field on river bank. Marked by tile and pipe, note 19. Blazed 6-inch scrub-oak tree is 3.8 meters (12 feet) from station in azimuth 353°; and blazed 8-inch scrub-oak tree is 3.7 meters (12 feet) from station in azimuth 103°.

Reformatory (M. R. C.) (Sherburne County, Mississippi River Commission, 1898).—About 3 miles southeast of St. Cloud, in SE¼NE¼ sec. 7, T. 35 N., R. 30 W. of the fourth principal meridian, on property owned by the State, in scattering scrub-oak timber on highest point on east side of bluffs, between heads of second and third draws below one up which wagon road turns, and 500 meters (1,640 feet) southeast of State Reformatory. Marked by tile and pipe, note 19. Blazed 5-inch scrub-oak tree is 13.7 meters (44.9 feet) from station in azimuth 256°; another blazed 5-inch scrub-oak tree is 14.8 meters (49 feet) from station in azimuth 313°; third blazed 5-inch scrub-oak tree is 9.2 meters (30 feet) from station in azimuth 16°; and blazed 4-inch scrub-oak tree is 13.2 meters (43 feet) from station in azimuth 92°.

North Star (M. R. C.) (Stearns County, Mississippi River Commission, 1898).—One and one-half miles southwest of St. Cloud, in sec. 22, T. 124 N., R. 28 W. of the fifth principal meridian, on property owned by Margaret Brady, on top of highest ridge, one-half meter (2 feet) west of north-and-south fence on west side of North Star cemetery. Marked by tile and pipe, note 19. Blazed 8-inch red-oak tree is 6.7 meters (22 feet) from station in azimuth 160°; another blazed 8-inch red-oak tree is 7.3 meters (24 feet) from station in azimuth 9°; and third blazed 8-inch red-oak tree is 6.1 meters (20 feet) from station in azimuth 263°.

Sauk Rapids (M. R. C.) (Benton County, Mississippi River Commission, 1898).—Near center of section 15, on west side of abandoned north-and-south road which turns to right over bluff from river road 1½ miles above Sauk Rapids, about 20 meters (66 feet) back of crest of bluff, opposite point about 150 meters (492 feet) above lower end of cultivated field on river bank, and ¼ mile below crossing of river road over railroad. Marked by tile and pipe, note 19. Blazed 10-inch black-oak tree is 14 meters (46 feet) from station in azimuth 221°; blazed 8-inch black-oak tree is 13.7 meters (45 feet) from station in azimuth 100°.

Heinen (M. R. C.) (Stearns County, Mississippi River Commission, 1898).—About 5½ miles northwest of St. Cloud, at south end of rail fence, at junction of south and west roads, on township line between St. Cloud and St. Joseph Townships and about 250 meters (820 feet) south of their north line, 75 meters (246 feet) north of farm residence of Mathias Heinen and 18 meters (59 feet) north of north side of barn. Marked by tile and pipe, note 19.

Gartner (M. R. C.) (Stearns County, Mississippi River Commission, 1898).—On right bank of Mississippi River, about 7 miles above St. Cloud, about 400 meters (1,312 feet) south of section corner, on line between secs. 19 and 20, R. 125 N., R. 28 W. of the fifth principal meridian, 1½ meters (5 feet) west of east side of public road (third wagon road west of river) and 50 meters (164 feet) above point opposite farmhouse of Peter Gartner. Marked by tile and pipe, note 19. Blazed 15-inch oak tree is 15.1 meters (50 feet) from station in azimuth 125°; blazed 24-inch oak tree is 13.4 meters (44 feet) from station in azimuth 60°; and blazed 13-inch oak tree is 6.5 meters (21 feet) from station in azimuth 344°.

Watab (M. R. C.) (Benton County, Mississippi River Commission, 1898).—On extreme southern end of large granite mound known as "Little Rock", between left bank of river road and river, just below mouth of Little Rock River, about 8 miles above St. Cloud and about 3 meters (10 feet) from southern end of highest part of ridge. Marked by copper bolt leaded vertically in solid rock.

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Perry (M. R. C.) (Stearns County, Mississippi River Commission, 1898).—On east edge of high ridge on right bank of Mississippi River, about 10 miles above St. Cloud, in oak timber, on land owned by J. N. Perry, about 250 meters (820 feet) below southeast corner of cultivated field on ridge, about 1 mile west of Brockaway schoolhouse no. 7, and three-fourths mile northwest of farm buildings on upper farm owned by Mr. Clark. Marked by tile and pipe, note 19. Blazed 12-inch oak tree is 17.4 meters (57 feet) from station in azimuth 349°30′; and blazed 12-inch oak tree is 24.1 meters (79 feet) from station in azimuth 146°30′.

Anderson (M. R. C.) (Benton County, Mississippi River Commission, 1898).—About 3 miles southeast of Rice, in SW¼ sec. 10, on east side of sand hill, in scattering scrub-oak trees on property owned by Taylor and Calhoun, about 50 meters (164 feet) north of land line between grass and cultivated fields, and 400 meters (1,312 feet) southwest of farmhouse owned by Mr. Anderson. Marked by tile and pipe, note 19. Blazed 14-inch oak tree is 4.3 meters (14 feet) from station in azimuth 314°, blazed 8-inch oak tree is 7 meters (23 feet) from station in azimuth 253°, and another blazed 8-inch oak tree is 11.3 meters (37 feet) from station in azimuth 178°.

Rice River base (M. R. C.) (Benton County, Mississippi River Commission, 1898).—On left bank of Mississippi River, about 2 miles below Rice, in public road, about one-half mile above ferry, and 8 meters (26 feet) below section line. Marked by tile and pipe, note 19.

Kipp (M. R. C.) (Benton County, Mississippi River Commission, 1898).—On sand mound 1½ miles east of Mississippi River, 2½ miles southeast of Rice, in SW¼ sec. 3, on property owned by Mr. Kipp, one-half mile west of Little Rock Lake, ½ mile northeast of point where north-and-south road crosses railroad, and on line with church spire on eastern horizon and house on bank of lake. Marked by tile and pipe, note 19.

North Prairie (M. R. C.) (Morrison County, Mississippi River Commission, 1898).—Three-fourths mile south of North Prairie church, in SE¼SW¼ sec. 20, T. 127 N., R. 29 W., of the fifth principal meridian, on property owned by J. Gamrath, in north-and-south fence line, between cultivated field on west and timber on east, and 47 meters (154 feet) north of east-and-west wagon road. Marked by tile and pipe, note 19.

Muncy (M. R. C.) (Morrison County, Mississippi River Commission, 1898).—Three-fourths mile above Royalton, on ridge in oak timber on property owned by G. W. Muncy, 120 meters (394 feet) northeast of wagon bridge just below dam across Platte River, 5 meters (16 feet) east of north-and-south fence, 43 meters (141 feet) south of junction of fences. Marked by tile and pipe, note 19. Blazed 10-inch red-oak tree is 16.9 meters (55 feet) from station in azimuth 358°, blazed 8-inch red-oak tree is 15 meters (49 feet) from station in azimuth 273°, and blazed 10-inch red-oak tree is 4.2 meters (14 feet) from station in azimuth 163°.

Hay Creek (M. R. C.) (Morrison County, Mississippi River Commission, 1898).—About 8 miles below Little Falls, on high ridge one-half mile west of river road on right bank, on land owned by A. Trofas, on line between cultivated field on east and brush on west, about opposite middle of field, and about 300 meters (984 feet) west of farmhouse. Farm road to house branches to northwest from river road at old dilapidated house and barn. Marked by tile and pipe, note 19.

Hole-In-The-Day (M. R. C.) (Morrison County, Mississippi River Commission, 1898).—On highest knoll on Hole-In-The-Day Bluff (named after Indian chief whose grave is on bluff), 1¾ miles northeast of Little Falls courthouse, directly east of point 100 meters (328 feet) north of grandstand at race track, and in brush on top of bluff. Marked by tile and pipe, note 19. Farmhouse on prairie above is 300 meters (984 feet) N. 45° W. from station.

Little Elk (M. R. C.) (Morrison County, Mississippi River Commission, 1898).—About 2½ miles above Little Falls, 1¼ miles west of Mississippi River, on high ridge, 400 meters (1,312 feet) north of Little Elk River, opposite upper end of marshy ground north of ridge, and 200 meters (656 feet) south of first well-traveled road branching to left from river road above Little Elk River. Ridge is 20 feet higher and 200 meters (656 feet) east of station. Marked by tile and pipe, note 19. Blazed 8-inch pine tree is 9.3 meters (31 feet) from station in azimuth 286°, blazed 10-inch pine tree is 6.9 meters (23 feet) from station in azimuth 38°, and another blazed 8-inch pine tree is 18.1 meters (59 feet) from station in azimuth 168°.

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Belle Prairie (M. R. C.) (Morrison County, Mississippi River Commission, 1898).—One mile northeast of Belle Prairie church, three-fourths mile east of Mississippi River, on south side of east-and-west wagon road, and 70 meters (230 feet) west of north-and-south wagon road. Marked by tile and pipe, note 19.

Fish Lake (M. R. C.) (Morrison County, Mississippi River Commission, 1898).—Eight miles northwest of Little Falls, 1½ miles west of Green Prairie post office, at edge of grove of pine trees on front end of high ridge north of west end of Fish Lake. Road leading west from Green Prairie post office branches on bank of lake and right-hand road passes 40 meters (131 feet) south of station. Marked by tile and pipe, note 19.

Laforce (M. R. C.) (Morrison County, Mississippi River Commission, 1898).—Three miles below Fort Ripley post office, three-fourths mile back of front range of hills, on prominent bare knoll, on land owned by Peter Laforce, one-half mile south of his house, on western end of very narrow east-and-west gravel ridge between cultivated fields, and one-half mile west of north-and-south road. Marked by tile and pipe, note 19.

Fort Ripley (M. R. C.) (Morrison County, Mississippi River Commission, 1898).—On right bank of Mississippi River, near center of large concave bend in crest of bluff, at lower side of grove of black-oak trees, 1 mile west of blockhouses at old Fort Ripley, 5 meters (16 feet) from crest of bluff, and about 50 meters (164 feet) east of mouth of large ravine. Marked by tile and pipe, note 19.

Vallee (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—About 3 miles northwest of Lenox siding, one-half mile north of Clute Schoolhouse (district no. 8), on small knoll on top of large brush-covered ridge, on property owned by Louis Vallee, 50 meters (164 feet) west of north-and-south wire fence, and 400 meters (1,312 feet) west of Fort Ripley—St. Mathias wagon road. Marked by tile and pipe, note 19.

Crow Wing (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—Three miles back from right bank of Mississippi River, about 2 miles below Crow Wing River, 1 mile north of first road leading west below Crow Wing River, 1½ miles northwest of schoolhouse, 150 meters (492 feet) west of road crossing ridge to small shanty on upper side of hill, on highest part of isolated ridge, and opposite east end of large open lake which terminates in tamarack swamp extending around west end and along north side of ridge. Marked by tile and pipe, note 19.

Hardy (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—Eight miles southwest of Brainerd, in NW¼ sec. 22, T. 133 N., R. 29 W. of the fifth principal meridian, on property owned by Park Hardy, on extreme upper end of brush-covered ridge (highest and most prominent in vicinity), 1½ miles back from right bank of river, 600 meters (1,969 feet) southwest of Island Lake, and 600 meters (1,969 feet) southeast of John W. Robert's farm residence. Marked by tile and pipe, note 19.

Brainerd (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—Two miles above Brainerd, on highest point on Ahrends Hill (very conspicuous hill on right bank of Mississippi River), one-half mile above sawmill in North Brainerd, at end of wagon road which branches west from river road and leads to summit of hill. Marked by tile and pipe, note 19. Blazed 24-inch black-oak tree is 33.2 meters (109 feet) from station in azimuth 194° and blazed 12-inch black-oak tree is 20.4 meters (67 feet) from station in azimuth 125°.

Mille Lac (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—Five miles southeast of Brainerd, in scattering trees, brush, and grass, ¾ mile south and ¾ mile east of county poorhouse, and 4 meters (13 feet) south of Mille Lac wagon road. Marked by tile and pipe, note 19. Blazed 10-inch red-oak tree is 34.2 meters (112 feet) from station in azimuth 177°25′, and 9-inch double red-oak tree which is beside 3-foot boulder at roadside, is 102.7 meters (337 feet) from station in azimuth 309°.

Pegg (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—Three miles east of sawmill in North Brainerd, in grass and brush on ridge, on property owned by Mr. Pegg, 400 meters (1,312 feet) south of Deerwood-Brainerd wagon road, 400 meters (1,312 feet) southeast of Enoch Jennings' residence, about 80 meters (262 feet) southeast of fence corner, and 5 meters (16 feet) south of 20-inch black-oak tree. Marked by tile and pipe, note 19.

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Brainerd south base (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—In northeast Brainerd, on south side of jack-pine grove, on prolongation of north-and-south street (Mill Street) leading south from sawmill, in alley in newly surveyed addition, 20 meters (66 feet) from edge of high ground, and about 20 feet east of line of ditch running south across meadow lands. Marked by tile and pipe, note 19. Blazed 8-inch jack-pine tree is 11.2 meters (37 feet) from station in azimuth 188°, and blazed 6-inch jack-pine tree is 15.1 meters (50 feet) from station in azimuth 261°.

Rice Lake (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—Five miles above Brainerd, on east side of Rice Lake, on brush-covered ridge between two roads (old road along bank of lake and Aitken River road), directly east of sawmill, and about 300 meters (984 feet) from bank of lake or bay. Marked by tile and pipe, note 19. Blazed 6-inch red-oak tree is 2.9 meters (10 feet) from station in azimuth 327°.

Brainerd north base (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—In northeast Brainerd, in center of Mill Street, opposite east-and-west roadway through Brainerd Lumber Co.'s lumber yard, about 150 meters (492 feet) from left bank of Mississippi River, 11 meters (36 feet) nearly south of switch block on Brainerd and Northern Minnesota Railway, and 40 meters (131 feet) northeast of road crossing. Marked by tile and pipe, note 19.

Necessity (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—On eastern end of very high and partly timbered ridge, about 4 miles above upper part of Brainerd, in sec. 4, T. 45 N., R. 30 W., of the fourth principal meridian, on homestead of Henry Grosman, about 1 mile back from left bank of river, and ½ mile northeast of farm residence of John Leckshiedt. Road nearest to river passes at foot of ridge about 200 meters (656 feet) east of station. Marked by tile and pipe, note 19.

Parker (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—On right bank of Mississippi River, 5 miles above Brainerd, on highest ground of high knoll which is covered with jack pines, oaks, and poplars, on land owned by Solomon Markee, near largest pine tree on hill, 200 meters (656 feet) west of crest of bluff, and 400 meters (1,312 feet) west of Markee's house. Marked by tile and pipe, note 19. Blazed 12-inch jack-pine tree is 7.4 meters (24 feet) from station in azimuth 138°.

Snag (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—Nine miles above Brainerd, one-half mile south of left bank of river, 1½ miles below mouth of Rabbit River, about 300 meters (984 feet) northeast of Rabbit Lake wagon road, and on highest mound in vicinity. Marked by tile and pipe, note 19. Dead 50-foot pine snag is 41.6 meters (136 feet) from station in azimuth 60°14′.

Cranberry (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—On high ridge about 1 mile east of river, 14 miles above Brainerd, in N½ sec. 12, 600 meters (1,969 feet) east of Cranberry Lake, 1 mile northwest of Mr. Anderson's house, and about 2 miles above mouth of Rabbit River. Hill is bare except for small brush and grass, and is about 400 meters (1,312 feet) north of deep hollow in which are marsh and pond. Marked by tile and pipe, note 19.

Wixon (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—On south bank of Rabbit River, on timbered ridge at end of bay formed by backwaters, 300 meters (984 feet) west of Rabbit Lake Road three-fourths mile below point where it crosses Rabbit River at ford, on north line and near northwest corner of sec. 8, T. 46 N., R. 27 W., of the fourth principal meridian, on property owned by Phelander Wixon, 200 meters (656 feet) northeast of lone clump of pine trees, and one-fourth mile northwest of Mr. Wixon's house. Marked by tile and pipe, note 19. Blazed 6-inch black-oak tree is 16.2 meters (53 feet) from station in azimuth 61°, and blazed 8-inch poplar tree is 9.2 meters (30 feet) from station in azimuth 205°.

Rabbit (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—On knoll which is covered with short brush and is otherwise bare except for eight small Norway-pine trees on east end, 200 meters (656 feet) west of Rabbit Lake Road, and 1 mile above upper Rabbit River Ford. Wagon road forks about one-half mile above ford, left one passing near station. Marked by tile and pipe, note 19. Blazed 14-inch Norway-pine tree is 49.7 meters (163 feet) from station in azimuth 313°18′.

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Camp (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—On land owned by the State, one-half mile northwest of Dr. Camp's house (formerly old Indian mission) which is on right bank of river, at gate on east side of wagon road, one-half mile east of Mission Lake, and 2 meters (7 feet) north of junction of east, west, and south fences at northwest corner of pasture. Marked by tile and pipe, note 19.

Mission (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—Among scattering Norway-pine trees on Mission Ridge (high ridge one-half mile north of upper end of Mission Lake), one-half mile below mouth of Pine River, 600 meters (1,969 feet) west of Mississippi River, at head of large ravine running toward river, 200 meters (656 feet) west of thick pine-tree grove, and 16 meters (52 feet) northwest of large boulder. Marked by tile and pipe, note 19. Blazed 12-inch Norway-pine tree is 4 meters (13 feet) from station in azimuth 90°, and blazed 10-inch Norway-pine tree is 19.5 meters (64 feet) from station in azimuth 134°.

Mud Lake (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—On west end of southwest or last knoll or ridge of series of knolls and ridges below Mud Lake, opposite foot of Rabbit Lake, and about 2 miles back from left bank of Mississippi River. A trail leaving the wagon road at lower end of pass between Mud and Rabbit Lakes at log shanty follows around foot of Mud Lake and passes about one-half mile southwest of another log shanty. Marked by tile and pipe, note 19. Blazed 6-inch black-oak tree is 7.6 meters (25 feet) from station in azimuth 94°, and blazed 8-inch black-oak tree is 2.9 meters (10 feet) from station in azimuth 275°.

Surre (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—About 15 miles below Aitkin, on knoll in timber, opposite small shanty on river bank in bend of Tow Head Rapids, about 600 meters (1,969 feet) back from right bank of river, and on property owned by Mr. Surre. Indian trail leaves road leading back from shanty, about 300 meters (984 feet) from river, and leads directly to station. Marked by tile and pipe, note 19. Blazed 12-inch poplar tree is 6.6 meters (22 feet) from station in azimuth 112°, blazed 12-inch black-oak tree is 14.2 meters (47 feet) from station in azimuth 198°, and blazed 30-inch red-oak tree is 18.3 meters (60 feet) from station in azimuth 258°.

Dahning (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—Four miles west of Cedar Lake, opposite head of Rabbit Lake, in sec. 28, T. 47 N., R. 28 W. of the fourth principal meridian, on land owned by Fred Dahning, 1 mile west of large white schoolhouse on timbered ridge, and one-half mile southwest of Dahning's house. Wagon road branching from Deerwood-Aitkin Road 1 mile below Cedar Lake passes Dahning's house and turns south around foot of ridge 300 meters (984 feet) from station. Marked by tile and pipe, note 19. Blazed 24-inch red-oak tree is 26.3 meters (86 feet) from station in azimuth 315°, blazed 10-inch red-oak tree is 11 meters (36 feet) from station in azimuth 35°, and blazed 8-inch red-oak tree is 21.3 meters (70 feet) from station in azimuth 127°.

Kemres (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—Eight miles below Aitkin, about 200 meters (656 feet) from left bank of Mississippi River, in SW¼NE¼ sec. 10, on property owned by G. Kemres, one-fourth mile below Kemres' residence, one-fourth mile below abandoned ferry at mouth of Deans Brook, 50 meters (164 feet) north of wagon road, and 25 meters (82 feet) east of north-and-south fence. Marked by tile and pipe, note 19. Blazed white-pine tree is 14 meters (46 feet) from station in azimuth 289°, another blazed white-pine tree is 17.7 meters (58 feet) from station in azimuth 353°, and blazed Norway-pine tree is 4 meters (13.1 feet) from station in azimuth 72°.

Cedar Lake (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—In lower end of Cedar Lake, at south side of wagon road (main road leading northwest from town), 40 meters (131 feet) northwest of creamery, and 15 meters (49 feet) west and 3 meters (10 feet) north of fence corner. Marked by tile and pipe, note 19.

Pine Knoll (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—Five miles below Aitkin, in section of country known as "Pine Knoll", on lower side of bend in Mississippi River where general course of river changes from north to southwest, in sec. 13, T. 136 N., R. 25 W. of the fifth principal meridian, on property owned by James Welton, about 80 meters (262 feet)

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from right bank of river, about three-fourths mile below Mr. Welton's residence, and one-fourth mile below Indian wigwam. Marked by tile and pipe, note 19. Blazed 18-inch white-pine tree is 19.2 meters (63 feet) from station in azimuth 22°, and blazed 36-inch white-pine tree is 2 meters (7 feet) from station in azimuth 199°.

Aitkin (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—One mile southeast of Aitkin, in sec. 25, T. 45 N., R. 27 W. of the fourth principal meridian, 8 meters (26 feet) south of center of road paralleling Northern Pacific Railway, one-half mile south of railway, and 70 meters (230 feet) west of point where road forks on east-and-west half-section line at quarter-section line west of range line. Marked by tile and pipe, note 19. Blazed 10-inch red-oak tree is 33 meters (108 feet) from station in azimuth 139°15′, another blazed 10-inch red-oak tree is 16.6 meters (54 feet) from station in azimuth 46°, and 9-inch poplar tree is 25 meters (82 feet) from station in azimuth 4°15′.

Seeley (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—Three miles northeast of Aitkin, on north-and-south section line between secs. 7 and 8, T. 47 N., R. 26 W. of the fourth principal meridian, 300 meters (984 feet) from left bank of Mississippi River, 200 meters (656 feet) south of Seeley schoolhouse which is at corner of road, and 2 meters (7 feet) west of east fence of wagon road. Marked by tile and pipe, note 19.

Stewart (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—Two and one-half miles east of Aitkin, in deadening on land owned by Northern Pacific Railway, 300 meters (984 feet) north of railway track, 50 meters (164 feet) east of junction of two old logging roads, on south branch of road, and 500 meters (1,640 feet) east of Mr. Stewart's residence. Marked by tile and pipe, note 19.

Aitkin upper base (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—One and one-half miles above Aitkin, at angle in public road, on half-section line in sec. 19, T. 47 N., R. 26 W. of the fourth principal meridian, one-fourth mile south of section line, 5 meters (16 feet) north of fence intersection, and on line with north ditch in east-and-west wagon road. Marked by tile and pipe, note 19.

Aitkin lower base (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—About 1,500 meters (4,921 feet) above wagon bridge over river at Aitkin, at extreme lower end of point of timber, on line with east-and-west road, 650 meters (2,133 feet) west of angle in road, about 20 meters (66 feet) back from left bank of Mississippi River, at township line, one-fourth mile south of section line between sections 13 and 24, T. 47 N., R. 27 W. of the fourth principal meridian. Marked by tile and pipe, note 19.

Gull Lake (M. R. C.) (Cass County, Mississippi River Commission, 1898).—About 11 miles northwest of Brainerd, on highest knoll in group of hills and ridges along west side of Gull Lake, in SW¼SE¼ sec. 6, T. 134 N., R. 29 W. of the fifth principal meridian, on land owned by E. J. Ware, one-half mile west of lake, and one-eighth mile west of house. Wagon road along west side of lake turns northeast down ravine to bank of lake just above station. Marked by tile and pipe, note 19.

Pelican Lake (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—Thirteen miles north of Brainerd, on highest knoll on south end of timbered ridge, 400 meters (1,312 feet) north and 600 meters (1,969 feet) west of south end of Pelican Lake, in lot 3, NE¼ sec. 4, T. 135 N., R. 28 W. of the fifth principal meridian, on land owned by Pasquale Cimino, about 200 meters (656 feet) west of Cimino's house. Marked by tile and pipe, note 19. A 14-inch snag tree is 4.7 meters (15 feet) from station in azimuth 318°40′, 8-inch Norway-pine tree is 17.0 meters (56 feet) from station in azimuth 317°, and 12-inch jack-pine tree is 17.8 meters (58 feet) from station in azimuth 93°55′.

Maple Hill (M. R. C.) (Cass County, Mississippi River Commission, 1898).—Six miles southwest of Pine River, on southwest end of very prominent hill or ridge known as "Maple Hill" (covered on north and east ends with dense growth of maple, oak, poplar, and few white pines, and on south and west ends with brush), in NW¼SW¼ sec. 28, T. 137 N., R. 30 W. of the fifth principal meridian, 40 meters (131 feet) from top of steep slope on southwest end of ridge, one-half mile northeast of Peter Anderson's residence, and 1 mile northeast of Schaeffer Brook schoolhouse. Marked by tile and pipe, note 19. A 30-inch white-pine tree is 65.0 meters (213 feet) from station in azimuth 199°50′,

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and 10-inch black-oak tree is 45.0 meters (148 feet) from station in azimuth 322°40′.

Indian Creek (M. R. C.) (Crow Wing County, Mississippi River Commission, 1898).—Three miles north of Whitefish Lake, one-half mile west of Indian Creek, in brush and dead timber on spur ridge which extends southwest about 150 meters (492 feet) from timbered ridge, in sec. 21, T. 138 N., R. 28 W. of the fifth principal meridian, 120 meters (394 feet) southwest of edge of timber, and one-half mile west of point where road leading up Indian Creek Valley crosses from right to left bank of creek. Marked by tile and pipe, note 19. Blazed 14-inch black-oak tree is 118.5 meters (389 feet) from station in azimuth 200°20′.

Pine Mountain Lake (M. R. C.) (Cass County, Mississippi River Commission, 1898).—Three miles northwest of Backus, 2 miles west of center of Pine Mountain Lake, on center of high knoll which is covered with birch and poplar brush, in sec. 27, T. 139 N., R. 31 W. of the fifth principal meridian, and about one-half mile southwest of C. A. Smith's old (abandoned) lumber camp. Marked by tile and pipe, note 19.

Spider Lake (M. R. C.) (Cass County, Mississippi River Commission, 1898).—About 12 miles west of Pine River, on top of very high and prominent knoll which is covered with birch and poplar brush, near center of SE¼ sec. 7, T. 137 N., R. 31 W. of the fifth principal meridian, 20 meters (66 feet) from east end of knoll, 1 mile northeast of Spider Lake, and one-half mile southeast of Frey's lumber camp. Marked by tile and pipe, note 19.

Hubbard (M. R. C.) (Hubbard County, Mississippi River Commission, 1898).—Four and one-half miles east of Hubbard, on range line between sec. 24, T. 139 N., R. 34 W., and sec. 19, T. 139 N., R. 33 W. of the fifth principal meridian, about one-half mile south of William P. Miller's residence, 150 meters (492 feet) south of quarter-section corner, and 6 meters (20 feet) west of north-and-south wagon road. Property on west side of road belongs to William Wilson and on east side to E. Rutherford. Marked by tile and pipe, note 19.

Chamberlin (M. R. C.) (Hubbard County, Mississippi River Commission, 1898).—One mile west of Chamberlin post office, 5 miles south by southwest of Akeley, 1 mile east of Ham Lake, in SE¼NE¼ sec. 20, T. 140 N., R. 32 W., of the fifth principal meridian (White Oak Township), on land owned by J. B. Darr, in edge of clearing, 80 meters (262 feet) northeast of Darr's house, and 15 meters (49 feet) south of wagon road which turns west at Darr's house. Marked by tile and pipe, note 19. Corner of Darr's house is 80 meters (262 feet) (paced) from station in azimuth 333°10′, 8-inch jack-pine tree is 20.7 meters (68 feet) from station in azimuth 313°40′, and 8-inch aspen tree is 19.8 meters (65 feet) from station in azimuth 203°10′.

Dorset (M. R. C.) (Hubbard County, Mississippi River Commission, 1898).—One thousand meters (3,281 feet) north of Dorset, in SE¼ sec. 3, T. 140 N., R. 34 W. of the fifth principal meridian, on land owned by August Welge, 90 meters (295 feet) north of section line, 400 meters (1,312 feet) west of north-and-south wagon road, and 20 meters (66 feet) west of east edge of ridge which is covered with jack pine and poplar brush. Marked by tile and pipe, note 19. A 14-inch jack pine is 16.7 meters (55 feet) from station in azimuth 96°, and 10-inch jack pine is 13.5 meters (44 feet) from station in azimuth 325°55′.

Mantrap (M. R. C.) (Hubbard County, Mississippi River Commission, 1898).—Nine miles north and 5 miles east of Dorset, 3 miles northeast of Mantrap Lake, on highest point of most southwesterly of series of very high knolls and ridges, in sec. 22, T. 142 N., R. 33 W. of the fifth principal meridian, at end of wagon road, about 2 miles northeast of Reuben Thorpe's house, and 310 meters (1,017 feet) north and 55 meters (180 feet) east of section corner. Knoll is covered with Norway pines and poplars, with scattering of white and jack pines. Marked by tile and pipe, note 19. A 16-inch Norway-pine tree is 5.1 meters (17 feet) from station in azimuth 55°20′, 15-inch Norway-pine tree is 7.0 meters (23 feet) from station in azimuth 348°, 13-inch jack-pine tree is 9.3 meters (31 feet) from station in azimuth 301°, and 6-inch aspen tree is 13.8 meters (45 feet) from station in azimuth 207°45′.

Eagle Lake (M. R. C.) (Hubbard County, Mississippi River Commission, 1898).—On high, brush-covered knoll one-half mile southwest of Eagle Lake, 250 meters (820 feet) west of Park Rapids-Itasca State Road, 7¾ miles (by road) north of Park Rapids, in SE¼ sec. 21, T. 141 N., R. 35 W. of the fifth

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principal meridian, on land owned by F. Weyerhauser, about 400 meters (1,312 feet) west of W. C. Butcler's house. Marked by tile and pipe, note 19. A 6-inch jack-pine tree is 18.4 meters (60 feet) from station in azimuth 114°10′.

Ockerson Heights (M. R. C.) (Hubbard County, Mississippi River Commission, 1898).—On highest part of knoll in southeast part of Itasca State Park and near north end of series of knolls and ridges known as "Ockerson Heights", in grove of large Norway-pine trees in Lind Saddle Trail, 240 meters (787 feet) west of Deming Lake, 175 meters (574 feet) west of old Turnbull wagon road, and about 300 meters (984 feet) northwest of section corner secs. 25, 30, 36, and 31. Marked by tile and pipe, note 19. An 18-inch Norway-pine tree is 6.8 meters (22 feet) from station in azimuth 342°, 15-inch Norway-pine tree is 5.4 meters (18 feet) from station in azimuth 115°35′, and 14-inch Norway-pine tree is 7.5 meters (25 feet) from station in azimuth 224°30′.

School Craft (M. R. C.) (Beltrami County, Mississippi River Commission, 1898).—Ten miles south of Bemidji, on ridge covered with brush and snag trees, three-fourths mile northeast of Carver Bros.' lumber camp, 2 miles east of ford across Schoolcraft River, in NW¼SE¼ sec. 32, T. 145 N., R. 33 W. of the fifth principal meridian, on highest part of knoll one-half mile east of prominent knob, which is covered with hardwood timber, and about 3 miles east of bridge across Schoolcraft River on Bemidji-Park Rapids wagon road. Marked by tile and pipe, note 19.

Prospect Hill P. B. M. (M. R. C.) (Hubbard County, Mississippi River Commission, 1898).—On high hill known as "Prospect Hill", 5 miles north of Itasca State Park, about 20 meters (66 feet) east of bank, where it slopes down abruptly to west into valley of the Mississippi River, in SW¼SW¼ sec. 1, T. 144 N., R. 36 W. Mark is about 120 meters (394 feet) west of Itasca Road, which runs north and south over hill and one-fourth mile northwest of junction of Itasca Road with road from Smith's lumber camp. Marked by tile and pipe, note 19.

Squaw Lake (M. R. C.) (Clearwater County, Mississippi River Commission, 1898).—On high ridge covered with scattering Norway-pine trees, about 275 meters (902 feet) southwest of northwest corner of Itasca State Park, in NE¼ sec. 5, T. 143 N., R. 36 W. of the fifth principal meridian, 25 meters (82 feet) southeast of wagon road which turns southwest from corner of park toward Squaw Lake. Marked by tile and pipe, note 19. A 23-inch Norway pine tree is 10.5 meters (34 feet) from station in azimuth 83°40′, 21-inch Norway pine tree is 30.2 meters (99 feet) from station in azimuth 166°, and 11-inch black-oak tree is 11.7 meters (38 feet) from station in azimuth 211°20′.

Christensen (M. R. C.) (Clearwater County, Mississippi River Commission, 1898).—In Itasca State Park, between east and west arms of Lake Itasca, in NE¼SE¼ sec. 14, T. 143 N., R. 36 W. of the fifth principal meridian, on small knoll covered with small birch and aspen trees, three-fourths mile north of Lind Saddle Trail, 500 meters (1,640 feet) northwest of Lyndecker Lake, 900 meters (2,953 feet) west of east arm of Lake Itasca, 150 meters (492 feet) south of small lake, and 75 meters (246 feet) west of grass marsh. Marked by tile and pipe, note 19.

Itasca P. B. M. (M. R. C.) (Clearwater County, Mississippi River Commission, 1898).—On low knoll in dense growth of aspen trees, about 600 meters (1,969 feet) northeast of Itasca Park commissioner's house, about 50 meters (164 feet) east of center of west line of sec. 1, T. 143 N., R. 36 W. of the fifth principal meridian. Knoll is on edge of ridge which slopes rapidly to southeast toward Floating Bog Creek, and is about 50 meters (164 feet) west of deep ravine. Marked by tile and pipe, note 19. Lone 18-inch Norway-pine tree is on south slope of ridge, 26.3 meters (86 feet) from station in azimuth 346°25′.

Itasca west base (M. R. C.) (Clearwater County, Mississippi River Commission, 1898).—On small knoll covered with white birch trees, near east-and-west line through center of sec. 10, T. 143 N., R. 36 W. of the fifth principal meridian, 40 feet above surface of Lake Itasca, 100 meters (328 feet) west of west shore of lake, and 800 meters (2,625 feet) southwest of Schoolcraft Island. Marked by tile and pipe, note 19.

Itasca east base (M. R. C.) (Clearwater County, Mississippi River Commission, 1898).—On most easterly projecting point on north shore of east arm of Lake Itasca in Itasca State Park, directly north of Rhodes Hill, and about 6 meters (20 feet) from shore of lake. Marked by copper bolt leaded in top

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of granite boulder, and projects 6 inches above ground. An 18-inch Norway-pine tree is 13.2 meters (43 feet) from station in azimuth 104°25′.

County Line P. B. M. (M. R. C.) (Hubbard County, Mississippi River Commission, 1898).—Ten miles southwest of Bemidji, 2½ miles northwest of Maltby post office, 1½ miles southeast of Mississippi River, on ridge covered with low brush and scattering pine and snag trees, about 8 meters (26 feet) south of north line of Hubbard County, and about 500 meters (1,640 feet) northwest of Albert Nelson's house. Marked by tile and pipe, note 19. Section corner secs. 5, 6, 31, and 32 is 45.8 meters (150 feet) from station in azimuth 258°58′, and 22-inch Norway-pine tree is 60.9 meters (200 feet) from station in azimuth 250°33′.

Marquette (M. R. C.) (Beltrami County, Mississippi River Commission, 1898).—About 3 miles (by road) south of Bemidji, on highest point of very prominent bare mound about 300 meters (984 feet) northwest of Marquette Lake, in SE¼ sec. 19, T. 146 N., R. 33 W. of the fifth principal meridian, 250 meters (820 feet) north of Bemidji–Park Rapids wagon road, and 900 meters (2,953 feet) west of mouth of Schoolcraft River. Marked by tile and pipe, note 19.

Phillippi (M. R. C.) (Beltrami County, Mississippi River Commission, 1898).—Five miles northwest of Bemidji, 1 mile south of Great Northern Railway, 500 meters (1,640 feet) southwest of schoolhouse, on highest point of ridge covered with small brush and scattering jack-pine trees, on land owned by Mr. Phillippi, 400 meters (1,312 feet) southwest of Mr. Phillippi's house, and near center of south line of SE¼ sec. 3, T. 146 N., R. 33 W. of the fifth principal meridian. Marked by tile and pipe, note 19.

Bemidji (M. R. C.) (Beltrami County, Mississippi River Commission, 1898).—One-half mile east of Bemidji, on north side of deep cut on north line of right-of-way of Great Northern Railway, one-third mile east of point where Mississippi River empties into Lake Bemidji, in SE¼NE¼ sec. 16, T. 146 N., R. 33 W. of the fifth principal meridian, at west end of small garden, 75 meters (246 feet) east of west end of cut, 50 meters (164 feet) south of Brainerd and Northern Minnesota Railway, and 200 meters (656 feet) south of south end of Lake Bemidji. Marked by tile and pipe, note 19.

Outlet (M. R. C.) (Beltrami County, Mississippi River Commission, 1898).—About 3 miles (by road around east side of lake) from Bemidji, on small mound over which wagon road passes, 250 meters (820 feet) east of east side of Lake Bemidji, 30 meters (98 feet) west of wagon road, about 600 meters (1,969 feet) south of outlet to lake, at northwest corner of Norway-pine timber. Marked by tile and pipe, note 19. An 18-inch Norway-pine tree is 2.7 meters (9 feet) from station in azimuth 230°05′, and another 18-inch Norway-pine tree is 8.9 meters (29 feet) from station in azimuth 340°.

AITKIN TO BEMIDJI TRAVERSE

Principal points

Cutoff P. B. M. (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—About 5 miles above Aitkin, on right (north) bank of Rice River cut-off, and 11 meters (36 feet) north of cut-off center of narrow strip of bank. Marked by tile and pipe, note 19. Triangle-blazed, 22-inch basswood tree is 5 feet north of station.

Strand P. B. M. (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—About 17.5 miles above Aitkin, 1 meter (3 feet) from fence, 3 meters (10 feet) from center of State road, 4 meters (13 feet) above angle in fence at end of lane leading east from front of Nelson Strand's house, 14 meters (46 feet) from right bank of river, 380 meters (1,247 feet) below James White's house, and 700 meters (2,297 feet) east of Strand's house. Marked by tile and pipe, note 19. Triangle-blazed, 30-inch elm tree is 27.7 meters (91 feet southwest of station.

Carlson P. B. M. (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—About 20 miles above Aitkin, on east side of State road, on high sand point at lower edge of balsam thicket, 49 meters (161 feet) from right bank of river, 125 meters (410 feet) below three log houses on right bank, and on opposite side of river from line between properties owned by Carlson Hendricks and Toby Carlson. Marked by tile and pipe, note 19.

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Big Lagoon P. B. M. (M. R. C.) Aitkin County, Mississippi River Commission, 1898).—About 30.3 miles above Aitkin, on top of right bank of creek draining swamp, 20 meters (66 feet) below center of bridge across creek, 5 meters (16 feet) east of State road, 60 meters (197 feet) above junction of State and Doray's roads, and 120 meters (394 feet) from right bank of Big Lagoon. Marked by tile and pipe, note 19. Triangle-blazed, 8-inch spruce is 3 meters (10 feet) northeast of station.

Fiessen P. B. M. (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—About 45 miles above Aitkin, between State road and right bank of river, 12 meters (39 feet) from road, 20 meters (66 feet) from river, 402 meters (1,319 feet) below John Fiessen's house, and 100 meters (328 feet) below cedar-pole bridge across ravine. Marked by tile and pipe, note 19. Blazed charred stumps are 22 feet north, 6 feet 8 inches east, 8.5 feet southeast, and 11.5 feet west of station. This station is also called Tiessen P. B. M.

Split Hand P. B. M. (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—About 52 miles above Aitkin, about 1,090 meters (3,576 feet) above Split Hand Creek, 6 meters (20 feet) from top of high bank, 105 meters (344 feet) above right bank of river where high bank ends, 40 meters (131 feet) from road, and 800 meters (2,625 feet) above John Erwin's house. Marked by tile and pipe, note 19.

Five Pines P. B. M. (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—About 57 miles above Aitkin, on knoll 45 meters (148 feet) from State road, northeast of and near cluster of five white-pine trees, one-half mile above junction of State and Pokegama Lake roads, 13 meters (43 feet) north of fence corner, and 375 meters (1,230 feet) above Edward Heinke's house. Marked by tile and pipe, note 19. One blazed, 30-inch, white-pine tree is 21 feet west of station and another blazed, 30-inch, white-pine tree is 35 feet south of station.

Porcupine (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—On high ridge 1 mile from right bank of river (large pond at foot of hill on upper side and another on lower side) and 60 meters (197 feet) northeast of two tall, dead snags. Marked by tile and pipe, note 19.

Blackberry B. M. (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—About 6½ miles east of Grand Rapids, 10 meters (33 feet) north of track of Eastern Railway of Minnesota (Great Northern Railway), and about 70 meters (230 feet) west of road crossing near schoolhouse which is north of track. Marked by tile and pipe, note 19. Blazed, 24-inch, white-pine tree is 11 meters (36 feet) from station in azimuth 267° and schoolhouse is 80 meters (262 feet) from station in azimuth 287°.

La Prairie (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—At first curve east of La Prairie, 10 meters (33 feet) north of track of Eastern Railway of Minnesota (Great Northern Railway), and about half-way between mileposts 108 and 109. Marked by tile and pipe, note 19.

Grand Rapids B. M. (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—About 580 meters (1,903 feet) east of Grand Rapids railway station, in southeast corner of garden, at north side of right-of-way of Eastern Railway of Minnesota (Great Northern Railway), and about 350 meters (1,148 feet) west of milepost 111. Marked by tile and pipe, note 19.

Race Track (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—In Grand Rapids, on south side of Mississippi River, south of race track at fairgrounds, about 150 meters (492 feet) east of exhibition building, and near northeast corner of old cemetery. Marked by tile and pipe, note 19.

Grand Rapids (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—About 1¼ miles west of Grand Rapids railway station, at intersection of tangents of railway curve, and about 100 meters (328 feet) south of track of Eastern Railway of Minnesota (Great Northern Railway). Marked by tile and pipe, note 19.

Deer River (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—Twenty-two and one-half meters (74 feet) south of track of Eastern Railway of Minnesota (Great Northern Railway), about 100 meters (328 feet) east of crossing of Itasca County Railway, and nearly south (across track) from Itasca Hotel. Marked by tile and pipe, note 19.

Old Road (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—One mile west of Deer River railway station, on old railroad grade, north of

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track of Eastern Railway of Minnesota (Great Northern Railway), at first curve west of Deer River, on line of north rail of tangent to eastward, 1,084 meters (3,456 feet) west of milepost 126, and 244 meters (801 feet) west of beginning of curve. Marked by tile and pipe, note 19.

Starke (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—At Starke's spur, 6 meters (20 feet) north of ditch on north side of track of Eastern Railway of Minnesota (Great Northern Railway), 8.5 meters (28 feet) south of tangent to westward, 8 meters (26 feet) north of tangent to eastward, and 46 meters (151 feet) west of head block of switch. Marked by tile and pipe, note 19.

Wigwam B. M. (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—In northeast corner of small cultivated patch of ground south of track at first curve east of Ball Club siding, about 1½ miles west of Ball Club drawbridge, about 40 meters (131 feet) south of railway track, about 64 meters (210 feet) east of milepost 132, and 8.5 meters (28 feet) south of tangent to eastward. Marked by tile and pipe, note 19.

Tomahawk B. M. (M. R. C.) (Cass County, Mississippi River Commission, 1898).—Ten and one-half meters (34 feet) south of track of Eastern Railway of Minnesota (Great Northern Railway), three-fourths mile west of section house at Ball Club siding, and 34 meters (112 feet) west of milepost 133. Marked by tile and pipe, note 19.

Mississip B. M. (M. R. C.) (Cass County, Mississippi River Commission, 1898).—Five-eighths mile west of bridge over Mississippi River, 523 meters (1,716 feet) east of milepost 135, 10.5 meters (34 feet) south of track of Eastern Railway of Minnesota (Great Northern Railway), and on top of bank of cut. Marked by tile and pipe, note 19.

Divide (M. R. C.) (Cass County, Mississippi River Commission, 1898).—On summit of high ground between Nashka siding and Mississippi Bridge, 130 meters (427 feet) east of milepost 137, and 10 meters (33 feet) south of track of Eastern Railway of Minnesota (Great Northern Railway). Marked by tile and pipe, note 19.

Norway Grove (M. R. C.) (Cass County, Mississippi River Commission, 1898).—About 2 miles east of Bena railway station, 10 meters (33 feet) south of track of Eastern Railway of Minnesota (Great Northern Railway), and 196 meters (643 feet) east of milepost 144. Marked by tile and pipe, note 19. Blazed 14-inch Norway-pine tree is 17 meters (56 feet) from station in azimuth 316°; blazed 12-inch Norway-pine tree is 5.5 meters (18 feet) from station in azimuth 12°; and blazed 16-inch Norway-pine tree is 18.25 meters (59.9 feet) from station in azimuth 78°.

Bena (M. R. C.) (Cass County, Mississippi River Commission, 1898).—About 620 meters (2,034 feet) west of Bena railway station, about one-half mile south of extreme southern point of Lake Winnibigoshish, 10 meters (33 feet) south of track of Eastern Railway of Minnesota (Great Northern Railway), and 232 meters (761 feet) west of milepost 146. Marked by tile and pipe, note 19.

Bigosh (M. R. C.) (Cass County, Minn., Mississippi River Commission, 1898).—About 1 mile south of south shore of Lake Winnibigoshish, about 1 mile west of Bena railway station, 10 meters (33 feet) south of track of Eastern Railway of Minnesota (Great Northern Railway), and 171 meters (561 feet) east of milepost 157. Marked by tile and pipe, note 19. Blazed, 24-inch Norway-pine tree is 9 meters (30 feet) from station in azimuth 351° and another blazed 24-inch Norway-pine tree is 7 meters (23 feet) from station in azimuth 15°.

Portage (M. R. C.) (Cass County, Mississippi River Commission, 1898).—Near northeast end of Portage Lake, about 3½ miles west of Bena, 10 meters (33 feet) south of track of Eastern Railway of Minnesota (Great Northern Railway), and 442 meters (1,450 feet) west of milepost 149. Marked by tile and pipe, note 19.

Schley (M. R. C.) (Cass County, Mississippi River Commission, 1898).—About one-half mile east of section house at Schley, 10 meters (33 feet) south of track of Eastern Railway of Minnesota (Great Northern Railway), 37 meters (121 feet) east of switch block at east end of Schley siding, and 586 meters (1,923 feet) east of milepost 153. Marked by tile and pipe, note 19.

Cuba (M. R. C.) (Cass County, Mississippi River Commission, 1898).—About one-half mile east of Cuba, 8 meters (26 feet) north of track of Eastern Railway

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of Minnesota (Great Northern Railway), and 224 meters (735 feet) west of milepost 159. Marked by tile and pipe, note 19. Blazed 24-inch Norway-pine tree is 17 meters (56 feet) from station in azimuth 173°; blazed 30-inch Norway-pine tree is 18 meters (59 feet) from station in azimuth 182°; and another blazed 30-inch Norway-pine tree is 21 meters (69 feet) from station in azimuth 225°.

Lamond (M. R. C.) (Cass County, Mississippi River Commission, 1898).—South of track of Eastern Railway of Minnesota (Great Northern Railway), at first curve west of Cuba siding, and on line of south rail of tangent to eastward. Marked by tile and pipe, note 19. Blazed 30-inch Norway-pine tree is 18 meters (59 feet) from station in azimuth 285°; blazed 36-inch white-pine tree is 16 meters (52 feet) from station in azimuth 11°; and blazed 20-inch Norway-pine tree is 10 meters (33 feet) from station in azimuth 65°.

Pike Bay (M. R. C.) (Cass County, Mississippi River Commission, 1898).—Seventeen meters (59 feet) north of track of Eastern Railway of Minnesota (Great Northern Railway), near third curve east of Cass Lake, and on line with north rail of tangent running west. (Track may be taken up at this point, and tangent from east extended to westward.) Marked by tile and pipe, note 19. Blazed 24-inch Norway-pine tree is 23 meters (75 feet) from station in azimuth 111° and another blazed 24-inch Norway-pine tree is 28 meters (92 feet) from station in azimuth 133°.

Chippewa (M. R. C.) (Cass County, Mississippi River Commission, 1898).—At first curve east of Cass Lake, 23 meters (75 feet) north of track of Eastern Railway of Minnesota (Great Northern Railway), and 11 meters (36 feet) south of line of tangent to westward. (Curve in track may be taken out and tangent extended eastward.) Marked by tile and pipe, note 19. Blazed 24-inch Norway-pine tree is 2 meters (7 feet) from station in azimuth 166° and blazed 20-inch Norway-pine tree is 4.5 meters (15 feet) from station in azimuth 47°.

Wye (M. R. C.) (Cass County, Mississippi River Commission, 1898).—About one-half mile west of Cass Lake railway station and 12 meters (39 feet) south of Great Northern Railway track. Marked by tile and pipe, note 19.

Spring (M. R. C.) (Cass County, Mississippi River Commission, 1898).—About 1½ miles west of Cass Lake railway station, 11 meters (36 feet) south of Eastern Railway of Minnesota (Great Northern Railway) track, and 63 meters (207 feet) east of milepost 104 (from Foreston). Marked by tile and pipe, note 19. Blazed 26-inch Norway-pine tree is 9 meters (30 feet) from station in azimuth 344°, and blazed 15-inch Norway-pine tree is 24 meters (79 feet) from station in azimuth 58°.

Supplementary points

U. S. E. 202 B. M. (Aitkin County, U. S. Engineers, ——).—About 4½ miles above Aitkin, in center of road, 10 meters (33 feet) north of gate to river, southwest of corner of house, and opposite gate in front of Gasper Vallencourt's house. Marked by iron pipe.

Biggar P. B. M. (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—About 7 miles above Aitkin, on east side of State road, 1 meter (3 feet) from fence, 10 meters (33 feet) south of junction of private road at northwest corner of the Biggar brothers' field, midway between two triangle-blazed elm trees, 125 meters (410 feet) from right bank of river, and 120 meters (394 feet) west of Biggar's house. Marked by tile and pipe, note 19.

Sutton P. B. M. (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—Ten miles above Aitkin, 16 meters (52 feet) north of northwest corner of Sutton's house, 1 meter (3 feet) west of fence along east side of State road, 6 meters (20 feet) east of center of road, 28 meters (92 feet) from right bank of river, and 20 meters (66 feet) below gulley on east side of road. Marked by tile and pipe, note 19.

U. S. E. 209 B. M. (Aitkin County, U. S. Engineers, ——).—About 11 miles above Aitkin, 3 meters (10 feet) from right bank of river, near middle of first bend below Waldeck post office, 39 meters (128 feet) west of Dan Smith's house (small white frame house), and 9 meters (30 feet) east of east fence along State road near point where road turns west. Marked by iron pipe.

Waldeck P. B. M. (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—Twelve miles above Aitkin, 1 meter (3 feet) west of east fence along State road, on line with east-and-west fence, 4 meters (13 feet) north of

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Waldeck's house and post office, 30 meters (98 feet) northwest of house, and 52 meters (171 feet) from right bank of river. Marked by tile and pipe, note 19.

Foulds P. B. M. (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—Fifteen and two-tenths miles above Aitkin, 21 meters (69 feet) from right bank of river, 66 meters (217 feet) northeast of Mrs. Bertha Foulds' house, 8 meters (26 feet) southwest of State road, 0.5 meter (2 feet) east of fence in front of Mrs. Foulds' house, and near angle at intersection of fences. Marked by tile and pipe, note 19.

School P. B. M. (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—About 23 miles above Aitkin, at lower edge of some small poplars, 400 meters (1,312 feet) from right bank of river, 14 meters (46 feet) north of State road, 40 meters (131 feet) above schoolhouse no. 21, and 290 meters (951 feet) north of Fred Anderson's house. Marked by tile and pipe, note 19.

Pat P. B. M. (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—Twenty-six and one-half miles above Aitkin, 5 meters (16 feet) from State road, 7 meters (23 feet) from right bank of river, at log landing owned by Pat Sanders, and 1 mile above Sanders' house. Marked by tile and pipe, note 19. A 24-inch elm tree is 15 feet east of station, and 10-inch elm tree is 7 feet south of station. Both trees are blazed with triangles on side facing station.

Midway P. B. M. (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—About 33.8 miles above Aitkin, on top of knoll covered with boulders, 30 meters (98 feet) from right bank of river, 179.9 meters (590 feet) from State road, 60 meters (197 feet) above mouth of creek, and 1,300 meters (4,265 feet) below what is known as high bank on river. Land on opposite side of river is high. Marked by tile and pipe, note 19.

Wells P. B. M. (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—About 36.3 miles above Aitkin, on land owned by E. B. Wells, 10 meters (33 feet) from right bank of river, 1 meter (3 feet) north and 1 meter (3 feet) east of northeast corner of Mr. Wells' house (Verdon post office), and 1.5 meters (5 feet) southeast of 20-inch stump (3 feet high) near corner of house. Marked by tile and pipe, note 19.

Stone P. B. M. (M. R. C.) (Aitkin County, Mississippi River Commission, 1898).—Thirty-nine miles above Aitkin, in edge of meadow, 3 meters (10 feet) from right bank of river, and 196 meters (643 feet) above site of Frank Stone's old house, which was 30 meters (98 feet) above mouth of creek and 125 meters (410 feet) east of State road. Marked by tile and pipe, note 19. Triangle-blazed 30-inch white-oak tree is 21 meters (69 feet) south of station.

Vicinity P. B. M. (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—Near line between Aitkin and Itasca Counties, 47.5 miles above Aitkin, and 4 meters (13 feet) from top of old lagoon. Marked by tile and pipe, note 19. Blazed 5-inch oak tree is 25 feet northeast of station, blazed 9-inch oak tree is 42 feet north of station, and blazed 12-inch oak tree is 60 feet north of station.

Slip P. B. M. (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—About 50 miles above Aitkin, 1¾ miles below Split Hand Creek, on high bank, 24 meters (79 feet) from State road, and 5 meters (16 feet) from right bank of river. Marked by tile and pipe, note 19. Blazed 30-inch white-pine stump is 18 feet north of station, and blazed 24-inch white-pine stump is 15 feet west of station. This station is also called Shep P. B. M.

Hamilton P. B. M. (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—About 54 miles above Aitkin, 28 meters (92 feet) east of road crossing State road and road from Little Cowhorn Lake, Cowhorn Lagoon, and Hamilton's Ranch, and 4 meters (13 feet) from crossing of these roads. Marked by tile and pipe, note 19.

Strawberry P. B. M. (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—On knoll 150 meters (492 feet) from right bank of river, three-fourths mile east of hill that station *Porcupine* is on, about three-fourths mile south of Phil Zwick's house and about opposite *Blackberry B. M.* Marked by tile and pipe, note 19.

Zwick (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—Near east end of high ridge, about 400 meters (1,312 feet) from right bank of river, one-half mile above *Blackberry B. M.* (on left bank), and 400 meters (1,312 feet) northwest of house owned by Phil Zwick. Marked by tile and pipe, note 19.

Dam B. M. (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—On north side of right-of-way of Eastern Railway of Minnesota (Great North-

For notes in regard to marking of stations see p. 245.

ern), 13 meters (43 feet) west of intersection of tangents at curve opposite Pokegama Dam, and 46 meters (151 feet) east of road crossing. Marked by tile and pipe, note 19.

Cohasset B. M. (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—In low ground about 14 meters (46 feet) south of track of Eastern Railway of Minnesota (Great Northern), about 180 meters (591 feet) west of mail-bag crane at Cohasset, and on line with north rail of tangent to eastward. Marked by tile and pipe, note 19.

Round House B. M. (M. R. C.) (Itasca County, Mississippi River Commission, 1898).—Nine meters (30 feet) west of track of Itasca County Railway, 1 meter (3 feet) west of railway fence, nearly across track from locomotive shed, and about 900 meters (2,953 feet) south of crossing of Eastern Railway of Minnesota (Great Northern). Marked by tile and pipe, note 19.

Fanbel B. M. (M. R. C.) ((U. S. E.) B. M. 342) (Cass County, U. S. Engineers, ——).—On north bank of Pike Bay, on slope of sand hill between bay and track of Eastern Railway of Minnesota (Great Northern). (Track at this point may be taken up and moved back from shore of bay.) Marked by stone and pipe, note 19.

U. S. E. 347 B. M. (Cass County, U. S. Engineers, ——.)—In southeast section of town of Cass Lake, on top of high bank at east end of ridge on northwest side of Pike Bay, and about 500 meters (1,640 feet) south of track of Eastern Railway of Minnesota (Great Northern Ry.). Marked by stone and pipe, note 19.

Cass Lake (M. R. C.) (Cass County, Mississippi River Commission, 1898).—In south edge of jack-pine grove lying northwest of Cass Lake and about one-fourth mile north of Cass Lake railway station. Marked by tile and pipe, note 19.

Wye P. B. M. (M. R. C.) (Cass County, Mississippi River Commission, 1898).—In south fork of Y at junction of Park Rapids division of Great Northern Railway and main line at Cass Lake, on line of south tangent produced, 113 meters (371 feet) north of head block of switch at south point of Y, 12.6 meters (41 feet) west of track of east leg, and 234 meters (768 feet) east of track of west leg of Y. Marked by tile and pipe, note 19.

Midge P. B. M. (M. R. C.) (Hubbard County, Mississippi River Commission, 1898).—In scattering jack-pine trees on slope of south bank of Lake Midge, 22 meters (72 feet) north of Great Northern Railway track, 19 meters (62 feet) south of water of Lake Midge, 62 meters (203 feet) east of point where water approaches nearest to railway, and 170 meters (558 feet) west of milepost 100 (from Foreston). Marked by tile and pipe, note 19. Two blazed jack-pine trees are east of station; one is 3.1 meters (10 feet) and other 4.7 meters (15 feet) distant. Two other blazed jack-pine trees are west of station; one is 3.3 meters (11 feet) and other 4.8 meters (16 feet) distant. This station is also called Midge Lake P. B. M.

Wolf Lake (M. R. C.) (Beltrami County, Mississippi River Commission, 1898).—About 5 miles northwest of Cass Lake, on east bank of Wolf Lake, about 60 meters (197 feet) from top of bank, and ½ mile south of outlet. Marked by tile and pipe, note 19. Blazed 30-inch Norway-pine tree is 27 meters (89 feet) from station in azimuth 191°, blazed 24-inch Norway-pine tree is 43 meters (141 feet) from station in azimuth 300°, and 30-inch Norway-pine tree is distant 38 meters (125 feet).

SUPERIOR NATIONAL FOREST

Principal points

Fernberg (Lake County, J. P. Lushene, 1934).—About 16 miles east-northeast of Ely, directly under base of Fernberg fire lookout tower. To reach from Ely, go 23 miles on Ely-Fernberg road to end of road and tower. Marked by standard station disk in bedrock, note 2c. Azimuth mark is standard reference disk in outcropping bedrock, about 12 feet from center line of road leading to station, and approximately 0.2 mile from station in azimuth 239°35′01″.

Ely Lookout Tower (St. Louis County, J. P. Lushene. 1934).—Just south of Ely and approximately at center of base of Ely fire lookout tower. Tower is 90 feet high, constructed of steel and maintained by the United States Forest Service. Marked by standard station disk in bedrock, note 2a, stamped "Ely

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L.T." Azimuth from station to Ely, water tank, is 159°44′39″; and to Ely, old high school cupola, 200°37′04″.

Angleworm Lookout Tower (St. Louis County, J. P. Lushene, 1934).—About 14 miles north-northwest of Ely, on west side of Angleworm Lake, on top of steep, rocky, and well-wooded hill, and approximately at center of base of Angleworm fire lookout tower. Tower is 90 feet high, constructed of steel, and maintained by the United States Forest Service. To reach from Ely, go north around Lake Shawaga to point northwest across lake from Ely, follow La Croix District road north-northwest about 11 miles to marker "Angleworm Lookout Tower" on north side of road, and follow trail 3 miles to tower. To reach from Winton, follow tracks of the General Logging Co. northwest about 20 miles to east side of Angleworm Lake, from which point tower is visible. Marked by standard station disk in bedrock, note 2a. Reference mark no. 1 is standard reference disk in bedrock, note 12a, 186.21 feet from station in azimuth 222°17′.

Jack Pine (Lake County, J P. Lushene, 1934).—About 18 miles southeast of Ely, on heavily wooded hill known as "Jack Pine Mountain", which breaks away sharply to north and west and slopes less abruptly to south and east, near center of base of United States Forest Service lookout tower Jack Pine, 12.32 feet from northeast leg, 12.80 feet from southeast leg, 13.51 feet from southwest leg, and 13.05 feet from northwest leg (distances from tower legs are measured from top of angles on legs). To reach from Ely, go east about 20 miles on State Route 1 (Ely-Finland Road) to marker "Jack Pine Tower" on north side of road and follow trail 5½ miles to tower. Marked by 3-foot iron stake with cross on top, 1 foot below surface of ground. Reference mark is standard reference disk in large boulder 199.71 feet from station in azimuth 246°42′. Wooden stake established by an aerial-survey party is 0.6 foot west of station.

Babbitt (St. Louis County, J. P. Lushene, 1934).—On top of water tank in Babbitt. To reach from Ely, follow Ely-Babbitt Road 19 miles to Babbitt. Marked by drill hole in top of fire-control table maintained by Minnesota Forest Service. Mark is not permanent.

Isabella (Lake County, J. P. Lushene, 1934).—About 34 miles east-southeast of Ely, 6 miles southwest of Isabella, near center of base of United States Forest Service look-out tower Isabella, 12.34 feet from northeast leg, 14.24 feet from southeast leg, 14.89 feet from southwest leg, and 14.65 feet from northwest leg (distances from tower legs are measured from chisel marks in concrete bases of legs). To reach from Isabella, go 3 miles on State Route 1 to Isabella tower road, turn left and go 3 miles to short side road leading to tower. Marked by standard station disk in concrete, note 1a. Azimuth mark is standard reference disk in boulder, note 12c, 70.8 feet south-southwest of edge of fork in roads leading to tower, 56.75 feet south-southeast of triangle-blazed 8-inch birch tree, 13.35 feet north of east-and-west gravel woods road, and approximately 0.2 mile from station in azimuth 12°16′08″.

Wanless (Lake County, J. P. Lushene, 1934).—About 39 miles west-southwest of Grand Marais, near center of base of Wanless fire lookout tower (112-foot steel tower), 15.60 feet from northeast leg, 15.36 feet from southeast leg, 15.30 feet from southwest leg, and 15.51 feet from northwest leg (distances measured from top of angle brackets at base of tower). Marked by standard station disk in concrete, note 7a, 3 feet below surface of ground. Reference mark is standard reference disk in boulder, note 12c, 50 feet south of spring and 300.83 feet from station in azimuth 5°09′07″.

Mount Weber (Lake County, J. P. Lushene, 1934).—About 36 miles southeast of Ely, 13 miles southwest of Isabella, on top of prominent ridge known as "Mount Weber", and under fire lookout tower. To reach from Isabella, follow State Route 1 southeast about 8 miles to viaduct of General Logging Co.'s railroad, go south about 17 miles on railroad to Mount Weber railroad station, go right (north) 7 miles on abandoned railroad grade to Minnesota Forest Service look-out tower and station site. Marked by standard station disk in bedrock, note 8a, 1 foot below surface of ground. Azimuth mark is standard reference disk in outcropping bedrock, 150 feet northwest of 3-inch white pine, 140 feet northwest of trail leading from Mount Weber railroad station, 35.1 feet due west of 18-inch cedar stump, 10.6 feet north of triangle-blazed 3-inch poplar tree, and approximately 0.4 mile from station in azimuth 331°16′19″.

For notes in regard to marking of stations see p. 245.

Kelso Mountain (Cook County, J. P. Lushene, 1934).—On Kelso Mountain, about 30 miles west-northwest of Grand Marais, near center of base of Kelso Mountain 90-foot steel fire lookout tower, 14.35 feet from northeast leg, 14.75 feet from southeast leg, 14.60 feet from southwest leg, and 14.21 feet from northwest leg (distances measured from the steel just above stiffener angles at base on legs of tower). To reach from Sawbill ranger station, follow portage trail through Sawbill, Alton, and Kelso Lakes; from north end of Kelso Lake, follow channel through swamp about 1 mile to dock, and follow trail about 1¼ miles up Kelso Mountain to tower and station site. Marked by standard station disk in bedrock, note 8a, stamped "Kelso Mt. 1934", about 2½ feet below surface of ground. Reference mark is standard reference disk in bedrock, note 12a, 164.23 feet from station in azimuth 59°04′. Wooden stake established by an aerial-survey party is about 3 inches south-southeast of station.

Lundeen (Cook County, J. P. Lushene, 1934).—About 22 miles west-northwest of Grand Marais, in sec. 26, T. 62 N., R. 4 W. of the fourth principal meridian, and on west knob of hill known as "Lundeen Mountain." To reach from Grand Marais, go 27 miles to Tofte, follow Sawbill Road 17 miles to Jaysee railroad siding of General Logging Co., go north 5½ miles on railroad to west end of Rudolph's Lake, turn right (east) at small rock cut and follow blazed trail to top of mountain and station site. Marked by standard station disk in bedrock, note 2. Reference marks are standard reference disks in bedrock, note 12a. No. 1 is 40.35 feet from station in azimuth 223°49′. No. 2 is 17.41 feet from station in azimuth 353°. No. 3 is 18.54 feet from station in azimuth 136°45′. Trout Lake and Wanless fire lookout towers are visible from ground at station.

Brule (Cook County, J. P. Lushene, 1934).—About 18 miles northwest of Grand Marais, on prominent high knob known locally as "Brule Mountain", at approximate center of base of fire lookout tower Brule, 7.90 feet from northeast leg, 7.47 feet from southeast leg, 7.57 feet from southwest leg, and 8.00 feet from northwest leg. To reach from Grand Marais, go south 25 miles on U. S. Route 61 (North Shore Drive) to Lakeview Garage (about one-fourth mile north of Tofte), turn right (up hill) on Sawbill Trail and go 17 miles to Jaysee ranger station, follow General Logging Co. railroad 18 miles to Cascade, follow left (Brule) spur 6 miles to base of Brule Mountain, and follow dim trail to right one-half mile up hill to summit and station site. Marked by standard station disk in bedrock, note 8a, 6 inches below surface of ground. Azimuth mark is standard reference disk in red granite outcrop, on ledge overlooking deep valley, 46.15 feet west of dead 4-inch birch tree with triangular blaze, 19.35 feet northeast of charred 17-inch hollow jack-pine stump, 18 feet southwest of charred 15-inch cedar stump, and 291.2 feet from station in azimuth 34°15′.

Paulsen (Gunflint) Fire Lookout Tower (Cook County, J. P. Lushene, 1934).—To reach from Grand Marais, follow Gunflint Trail to point 2 miles north from Gunflint Lodge (resort) to trail marked "Gunflint Lookout 1½ miles", and go up hill to tower and station. Station is unmarked except as being center of tower. Station *Paulsen* (*G. S. of C.*) (see description thereof) is 11.015 meters (36.14 feet) from station in azimuth 125°39′.

Onion Mountain (Cook County, J. P. Lushene, 1934).—About 18 miles southwest of Grand Marais, 4 miles northeast of Tofte, on high prominent hill, known as "Onion Mountain", overlooking Lake Superior, near center of base of United States Forest Service fire lookout tower, Onion. To reach from Grand Marais, follow U. S. Route 61 south 21 miles to North Shore Hotel and follow trail to right up hill 1½ miles to tower and station site. Marked by steel rod 1 inch in diameter and 3½ feet long, with cross stamped in top, flush with surface of ground. Wanless fire lookout tower is visible from ground at station.

Trout Lake (Cook County, J. P. Lushene, 1934).—About 12 miles west of Grand Marais, near center of base of Trout Lake fire lookout tower (also known as "New Cascade"), 16.15 feet from northeast leg, 14.60 feet from southeast leg, 14.78 feet from southwest leg, and 16.29 feet from northwest leg (measurements from legs of tower taken from steel angles, inside, and just above the gusset (tie) plates at base of tower). To reach from Grand Marais, go west 5 miles on old U. S. Route 61, turn north onto Pike Lake road and go 6 miles to T-intersection, turn left (west) and go to end of road at tower and station site. Marked by standard station disk in bedrock, note 8a, 2 feet below surface of

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ground. Reference mark is standard reference disk in bedrock, note 12a, 267.32 feet from station in azimuth 187°48′.

Pine Mountain (Cook County, J. P. Lushene, 1934).—About 10 miles due north of Grand Marais, on high prominent peak, near center of base of United States Forest Service lookout tower Pine Mountain, 10.92 feet from northeast leg, 10.00 feet from southeast leg, 8.80 feet from southwest leg, and 9.70 feet from northwest leg. To reach from Grand Marais, follow Gunflint Trail 19 miles to T-road left and sign "Pine Mountain Lookout 3 miles", turn left and go to end of road and tower. Marked by standard station disk in bedrock, note 8a, 4½ feet below surface of ground. Azimuth mark is standard reference disk in bedrock, on peak of rocky knoll, 28 paces northeast of 30-inch white-pine stump with triangular blaze, and approximately 0.5 mile from station in azimuth 182°39′51″.

Gaskin (Cook County, J. P. Lushene, 1934).—About 18 miles north-northwest of Grand Marais, 1 mile east of Misquah Lake, and on second and most prominent knoll of long high rock ridge rising out of and extending normal to Misquah Lake. To reach from Grand Marais, follow Gunflint Trail about 30 miles to Rockwood Lodge, take canoe trail through following lakes: Poplar, Lizz, Caribou, Horseshoe, Vista, and Misquah; proceed about 500 yards along east shore of Misquah Lake to first prominent break in shore line and well-blazed trail starting from largest rock along shore in vicinity, and follow trail due east about 1 mile to 50-foot wooden tower at station site. Marked by standard station disk in boulder, note 4. Reference mark no. 1 is standard reference disk in boulder, note 12c, 71.14 feet from station in azimuth 1°33′. Reference mark no. 2 is standard reference disk in bedrock, note 12a, 41.52 feet from station in azimuth 243°21′. Reference mark no. 3 is standard reference disk in boulder, note 12c, 35.13 feet from station in azimuth 95°53′. The name Gaskin is misleading, as there is a Gaskin Lake in nearby vicinity.

Bearskin (Cook County, J. P. Lushene, 1934).—About 22 miles north-northwest of Grand Marais and at approximate center of base of 90-foot steel fire lookout tower West Bearskin. To reach from Grand Marais, go north 27.1 miles on Gunflint Trail to sign "Clearwater Lake Lodge", follow road east 3.1 miles to point just before reaching sign "Superior National Forest Boundary", follow east road 200 yards to railroad track, go north on track 100 yards, and follow trail east (up hill) to lookout tower of U. S. Forest Service and station site. Marked by standard station disk in ledge rock, note 8a, 1 foot below surface of ground. Distances from station to steel just above stiffener angles on legs at base of tower are: Northwest leg, 10.69 feet; northeast leg, 10.38 feet; southeast leg, 10.07 feet; and southwest leg, 10.35 feet.

Eliason (Cook County, J. P. Lushene, 1934).—About 7 miles northeast of Grand Marais, on summit of high, densely wooded hill owned by the Hedstrom Lumber Co., and under 45-foot wooden double tower erected by United States Forest Service. To reach from Grand Marais, follow Gunflint Trail about 5 miles to Maple Hill (main sawmill of the Hedstrom Lumber Co.), turn right onto side road at point where Gunflint Trail curves sharply to left and go about 3 miles on road paralleling U. S. Route 61 to second road to left, follow rough woods road 1¼ miles to point about ¼ mile south of sawmill, turn sharp left and go up grade on dim woods trail about ¾ mile to station site. Marked by standard station disk in bedrock, note 8a, about 2½ feet below surface of ground.

Devilfish Fire Lookout Tower (Cook County, J. P. Lushene, 1934).—About 14 miles northwest of Hovland, in lot 31, T. 64 N., R. 3 E., of the fourth principal meridian, on summit of high wooded hill which slopes gently to south and breaks abruptly to north, ½ mile south and 2 miles east of east end of Devilfish Lake, near center of base of Devilfish fire lookout tower, 10.64 feet from northeast leg, 10.86 feet from southeast leg, 10.20 feet from southwest leg, and 9.92 feet from northwest leg (measurements taken from just above angle brackets on legs at base of tower). To reach from Hovland, follow McFarland Lake road about 12 miles, take new (1934) road to left (west), and go 6 miles to tower. Point is not marked. Station *Devilfish* (*G. S. of C.*) (see description thereof) is 7.932 meters (26.02 feet) from station in azimuth 274°51′.

Overbys (Cook County, J. P. Lushene, 1934).—About 8 miles northeast of Grand Marais, on northwest slope (near abrupt break) of prominent well-wooded hill (property of the Hedstrom Lumber Co.). To reach from Grand

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Marais, follow Gunflint Trail about 5 miles to Maple Hill, turn right onto side road at point where Gunflint Trail makes sharp bend to left and go 3 miles (road parallels U. S. Route 61), take second road to left (north) and follow rough woods road 1½ miles to sawmill of the Hedstrom Lumber Co., and follow blazed trail northerly about ½ mile to 15-foot wooden tower and station site. Marked by standard station disk in concrete, note 7a, 3 feet below surface of ground. Reference marks are standard reference disks in trees, note 15c. No. 1 is 6 feet above ground, in 2.6-foot white pine, and 64.16 feet from station, in azimuth 270°58′. No. 2 is 2.7 feet above ground, in 1.7-foot white spruce, and 64.32 feet from station, in azimuth 38°55′. No. 3 is 4.3 feet above ground, in 0.8-foot cedar, and 30.03 feet from station in azimuth 158°44′.

Gabimichigami (Lake County, J. P. Lushene, 1934).—About 40 miles northeast of Ely, 40 miles northwest of Grand Marais, and on summit of highest hill in vicinity known as Gabimichigami Mountain. To reach from Grand Marais, follow Gunflint Trail north 78 miles to Sea Gull Lodge on Sea Gull Lake, take canoe route through the following lakes: Sea Gull, Rog, Alpine, Jasper, small pond, Ogiskemuncie, small pond, Agonac, and Gabimichigami (total distance of canoe route is 24 miles); from portage on Gabimichigami Lake, go to left to first large bay and large white pine with triangular blaze lying parallel to shore, and follow blazed trail northerly about 1½ miles up steep grade to top of mountain and station site. Marked by standard station disk in bedrock, note 2c.

For notes in regard to marking of stations see p. 245.

FIGURE 10.—Arcs included in the eastern adjustment and loop closures.

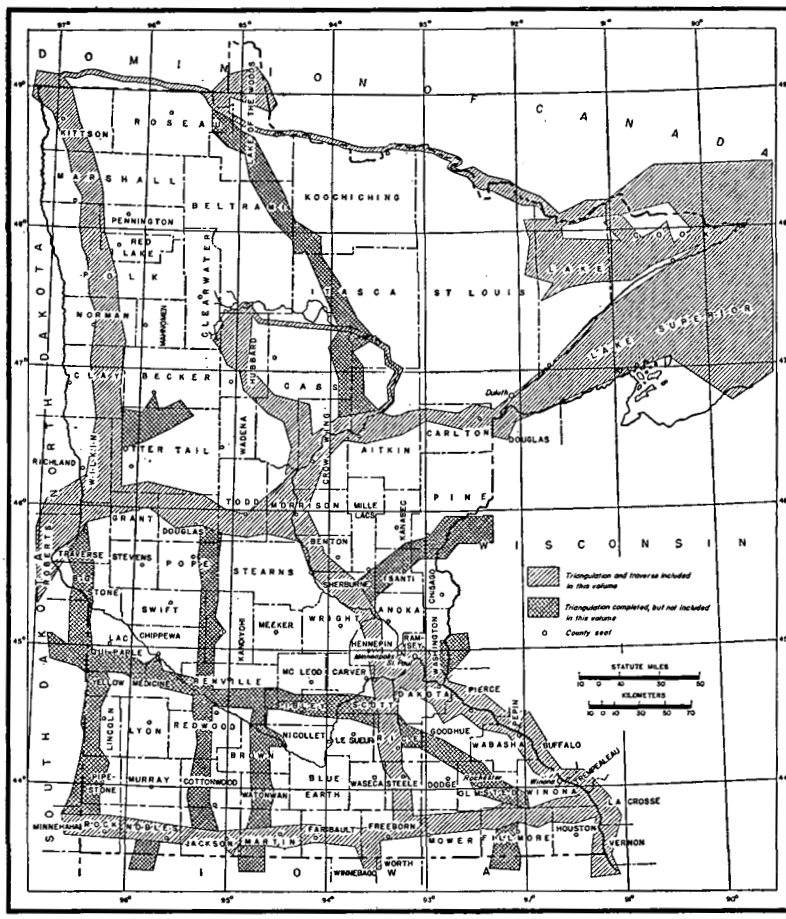

FIGURE 11.—Map of Minnesota showing triangulation and traverse published in this volume and triangulation to be published in the future.

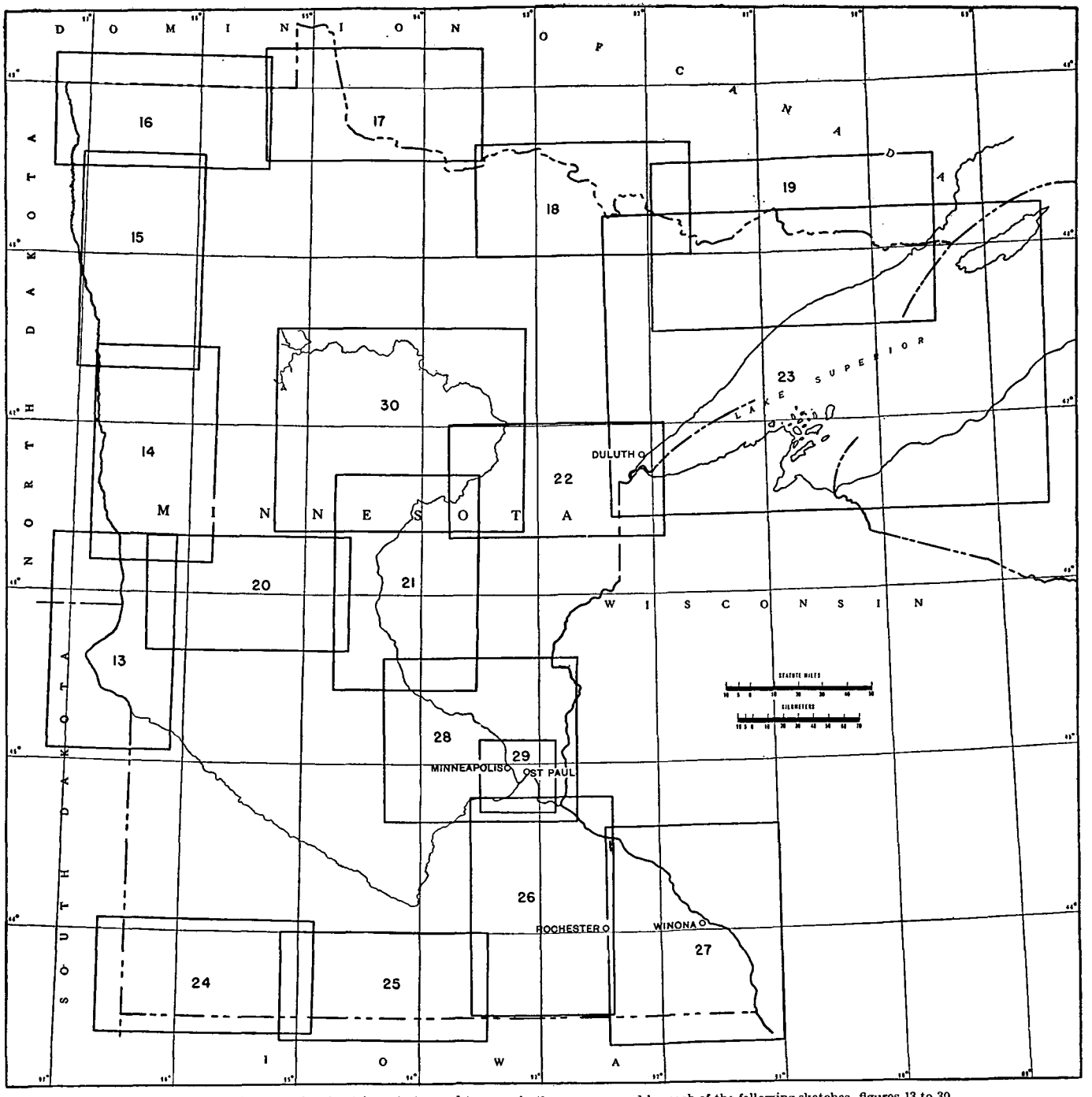

FIGURE 12.—Index map of Minnesota showing triangulation and traverse in the areas covered by each of the following sketches, figures 13 to 30.

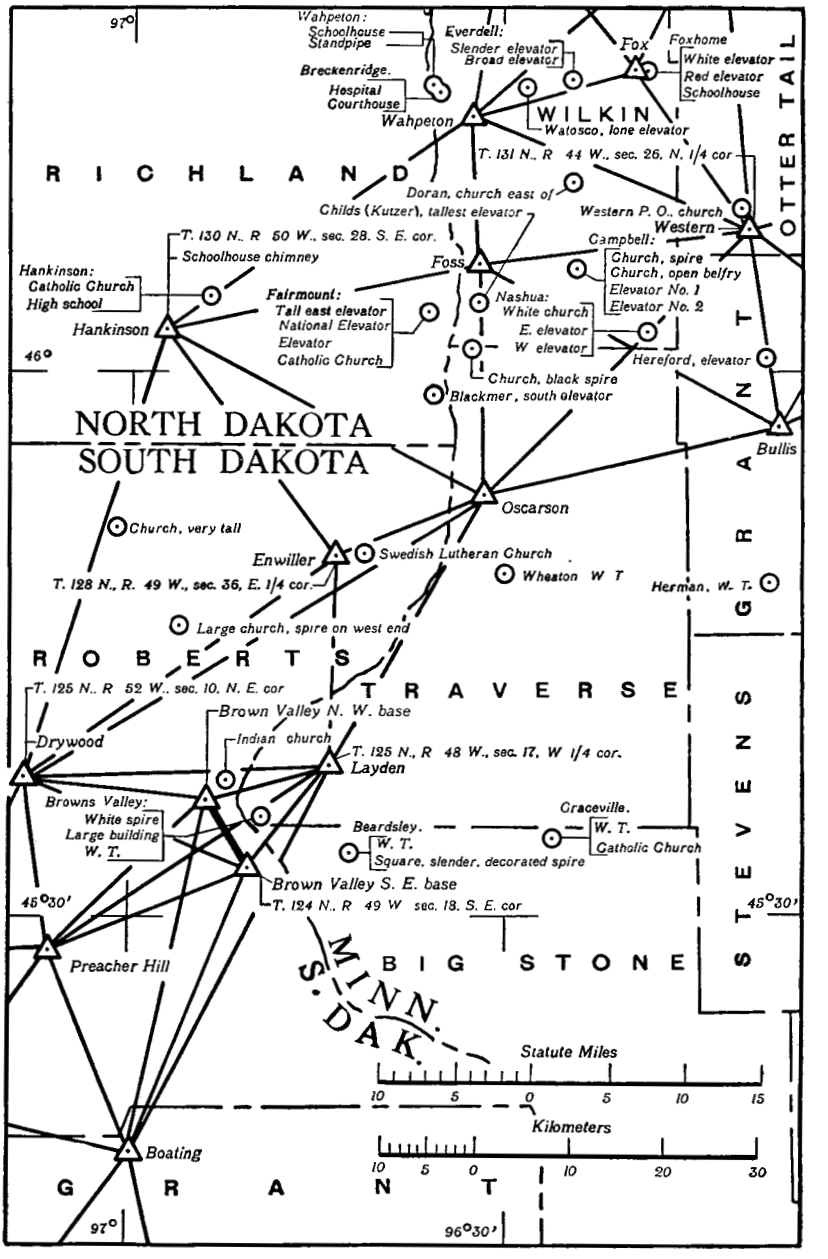

FIGURE 13.—Ninety-eighth meridian arc, south, and its junction with the ninety-eighth meridian to Royalton arc.

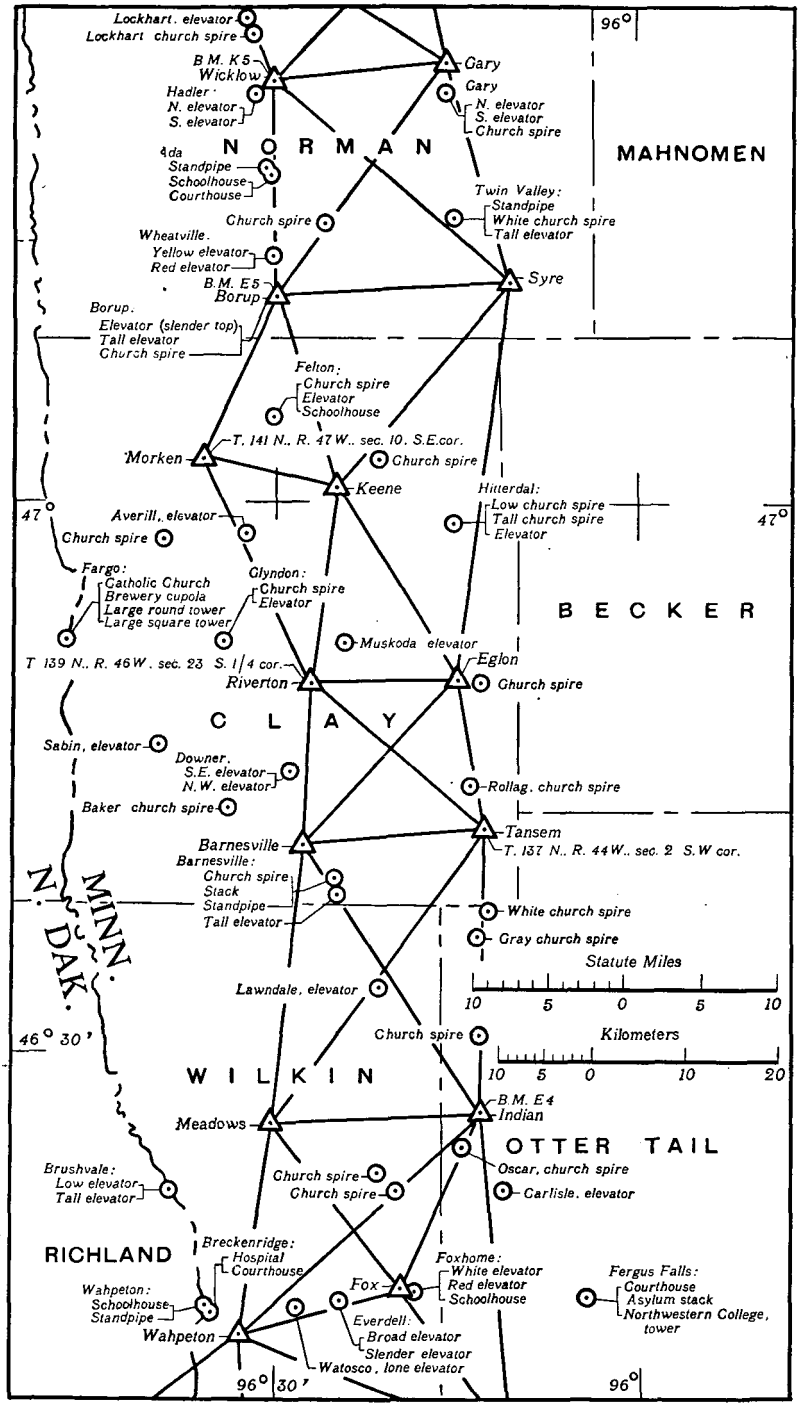

FIGURE 14.—Ninety-eighth meridian arc, central section.

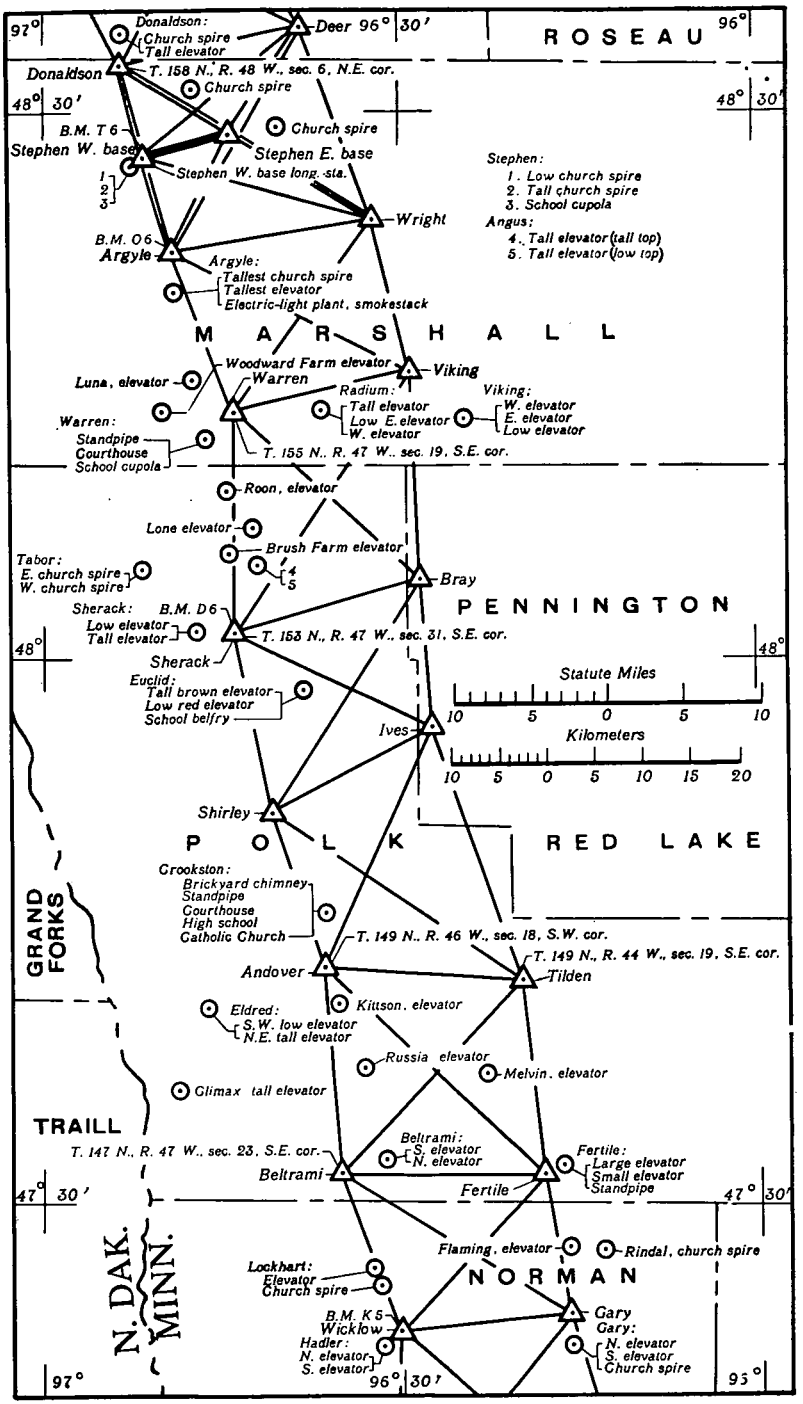

FIGURE 15.—Ninety-eighth meridian arc, north.

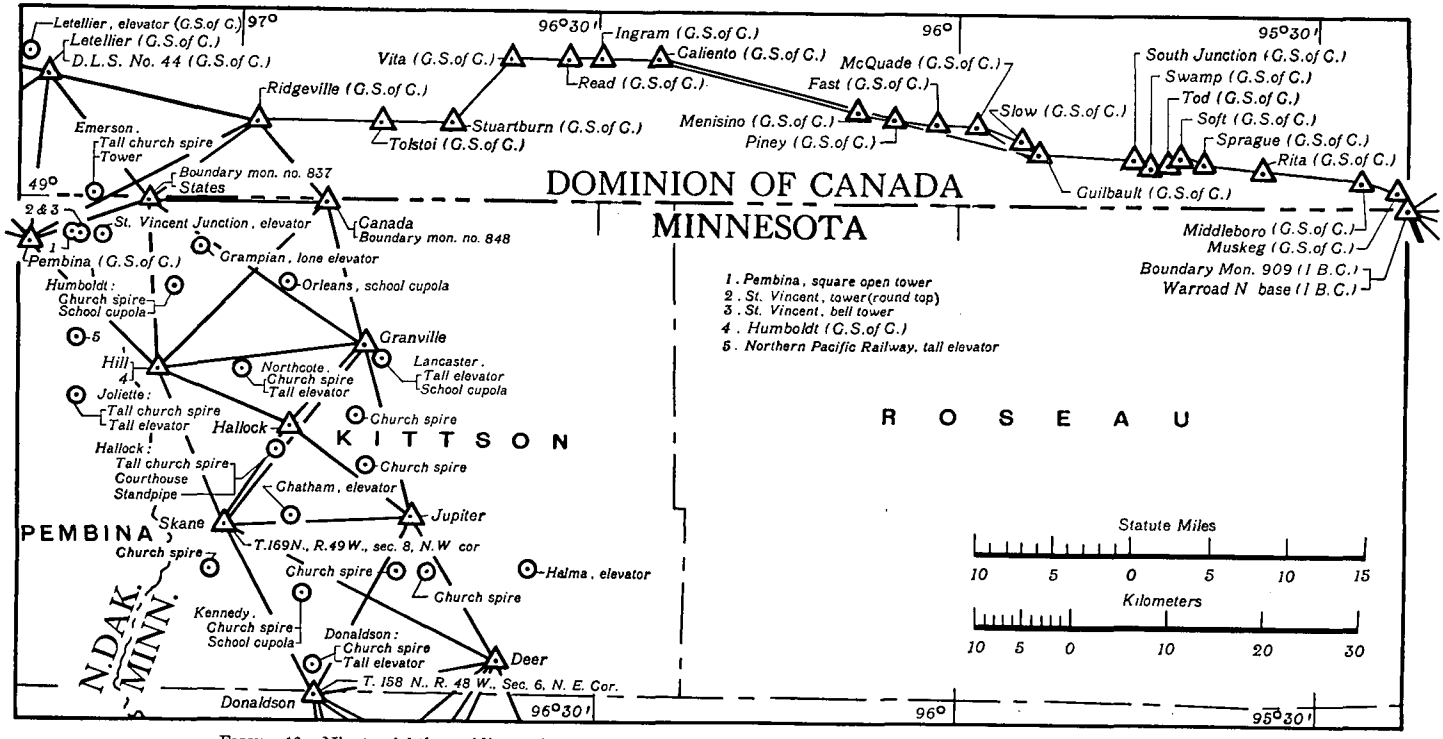

FIGURE 16.—Ninety-eighth meridian to forty-ninth parallel to the Lake of the Woods and along the International Boundary.

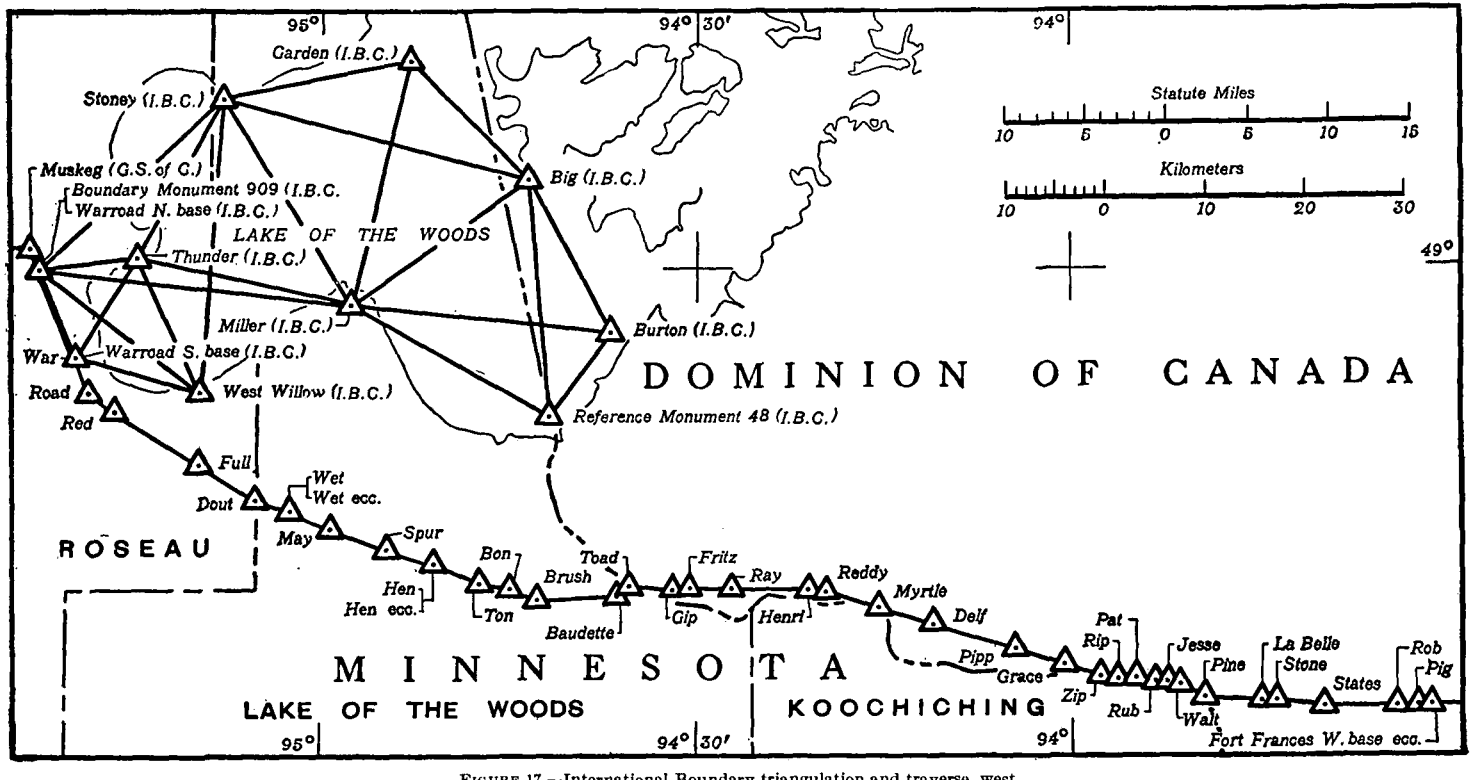

FIGURE 17.—International Boundary triangulation and traverse, west.

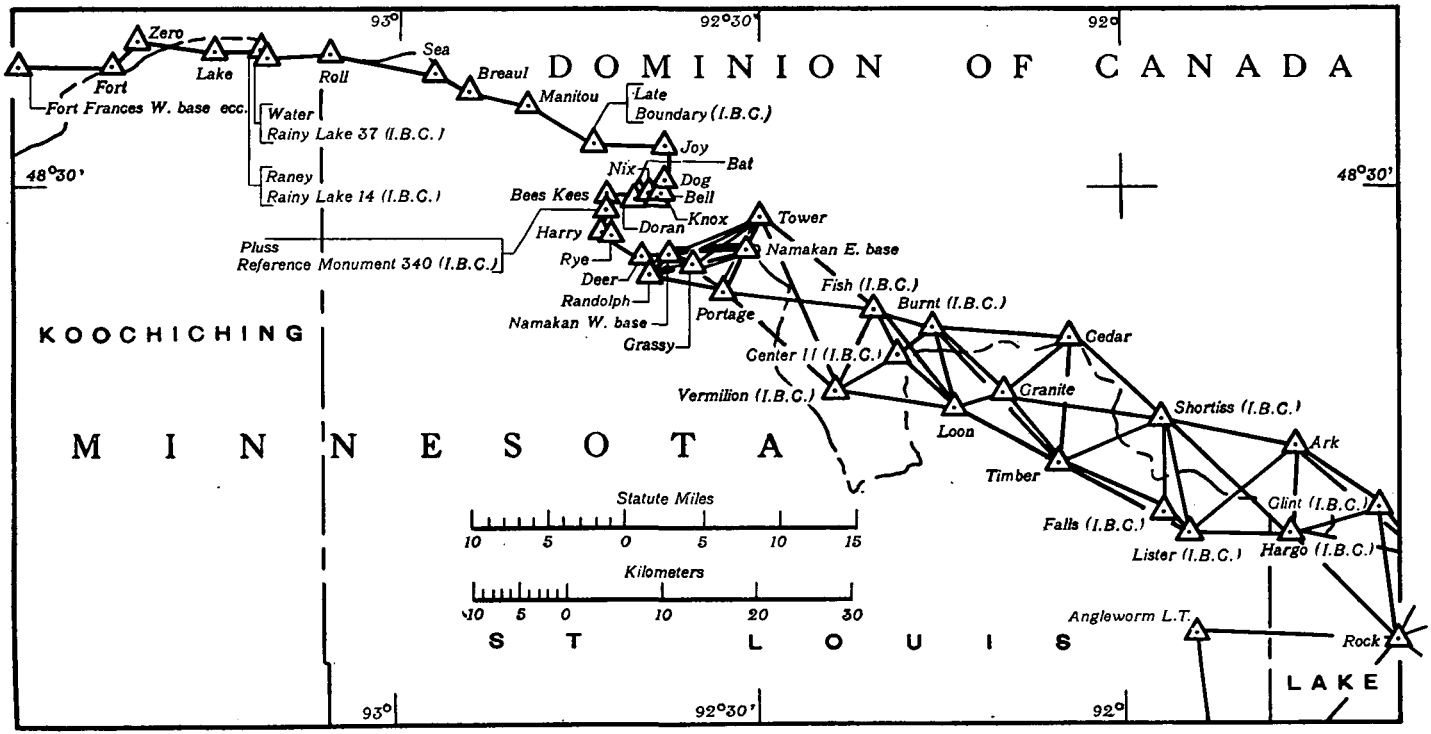

FIGURE 18.—International Boundary triangulation and traverse, central section.

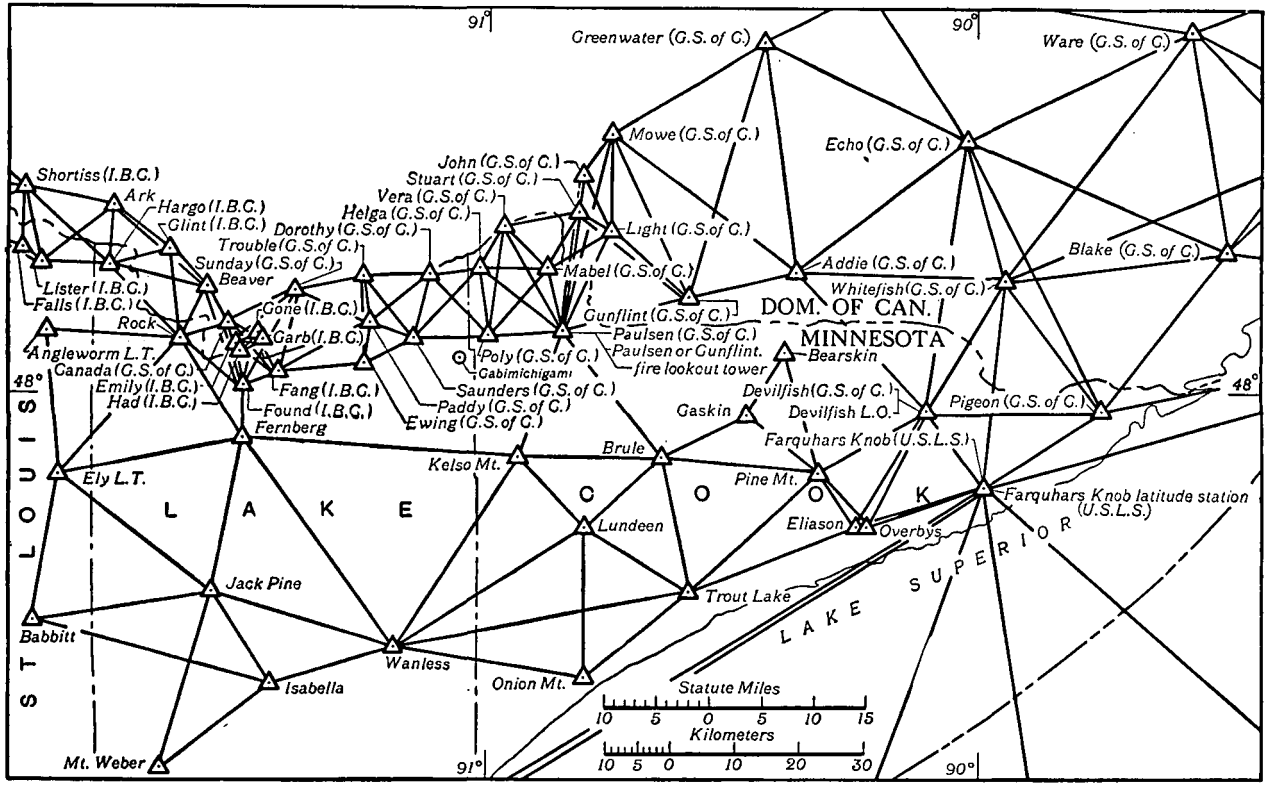

FIGURE 19.—International Boundary triangulation and traverse, east.

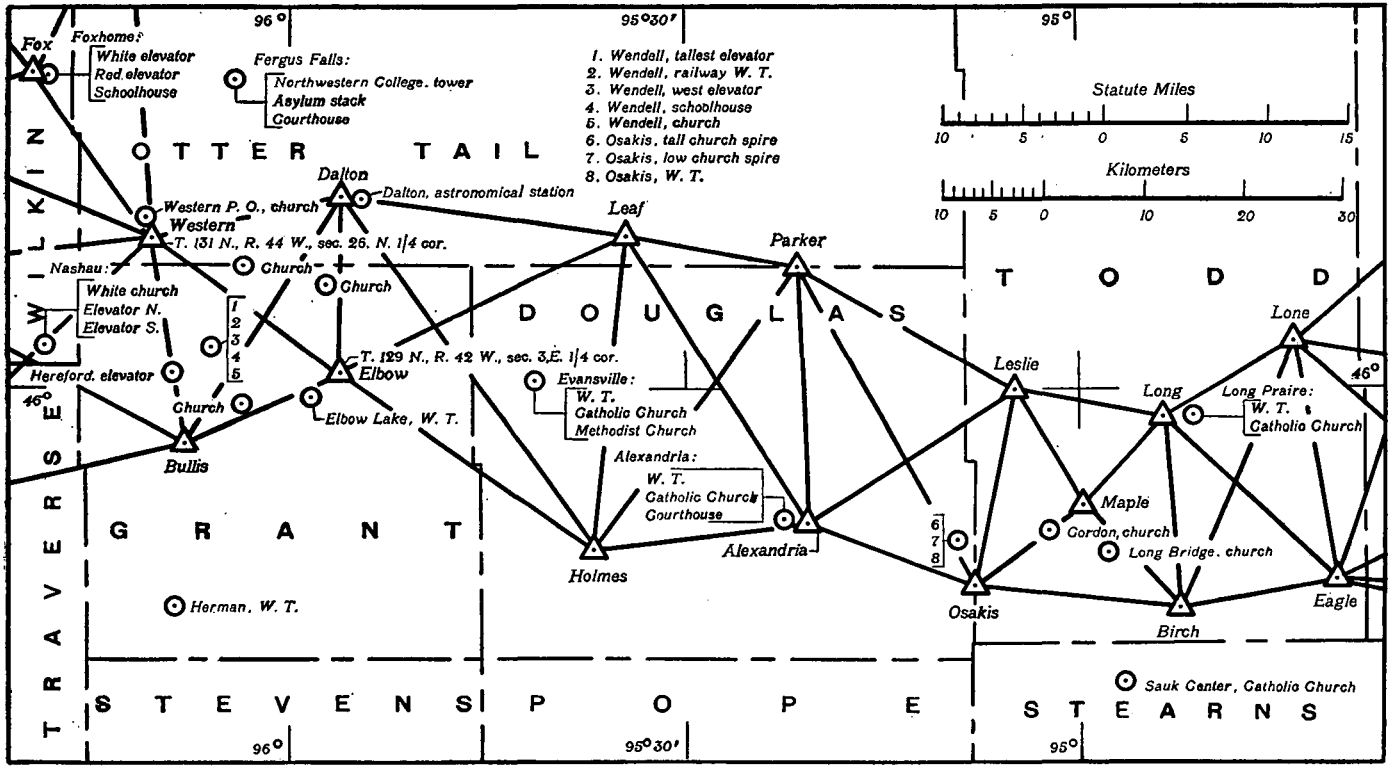

FIGURE 20.—Ninety-eighth meridian to Royalton arc.

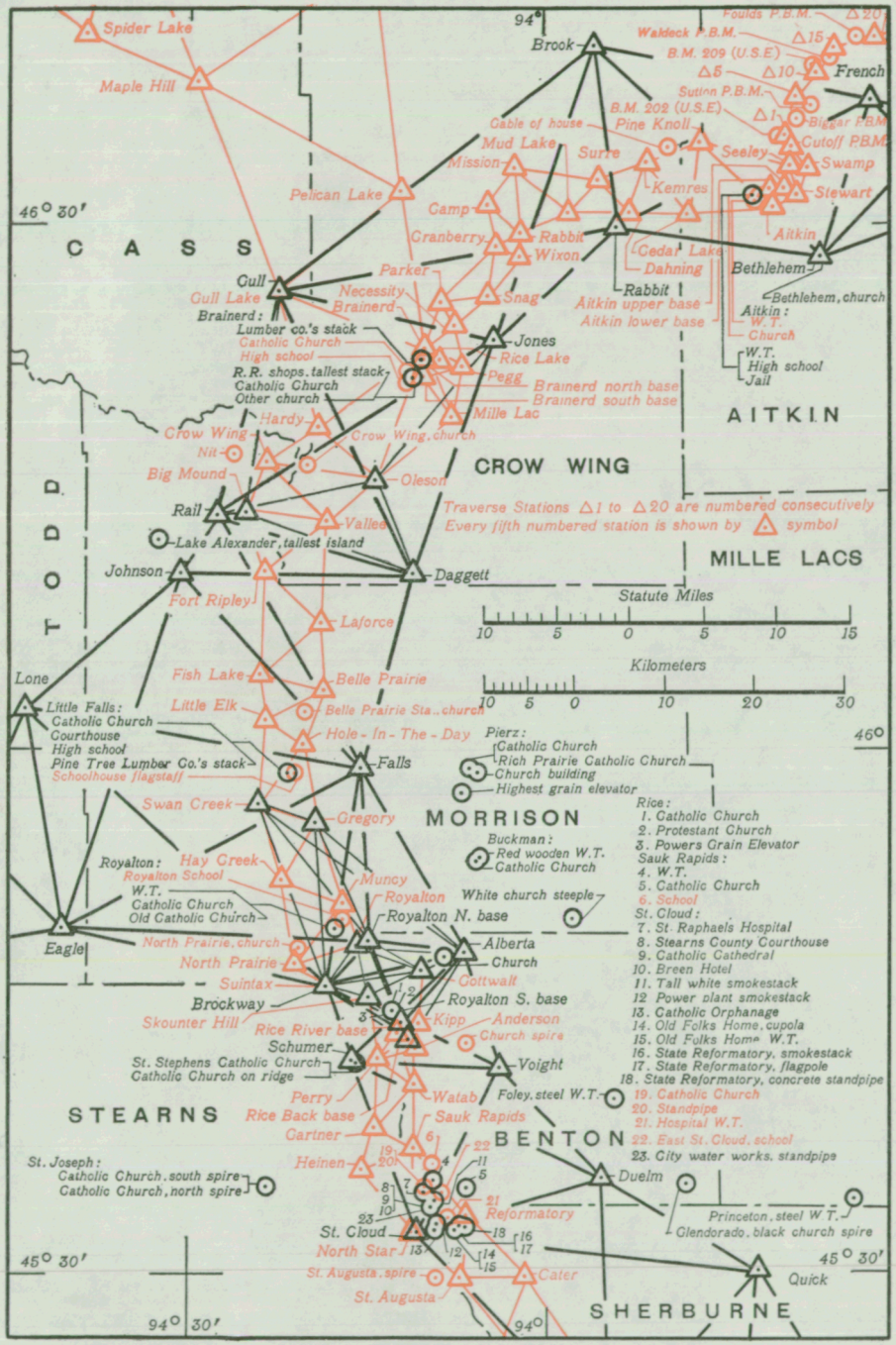

FIGURE 21.—Royalton to Duluth and Royalton to Albert Lea arc.

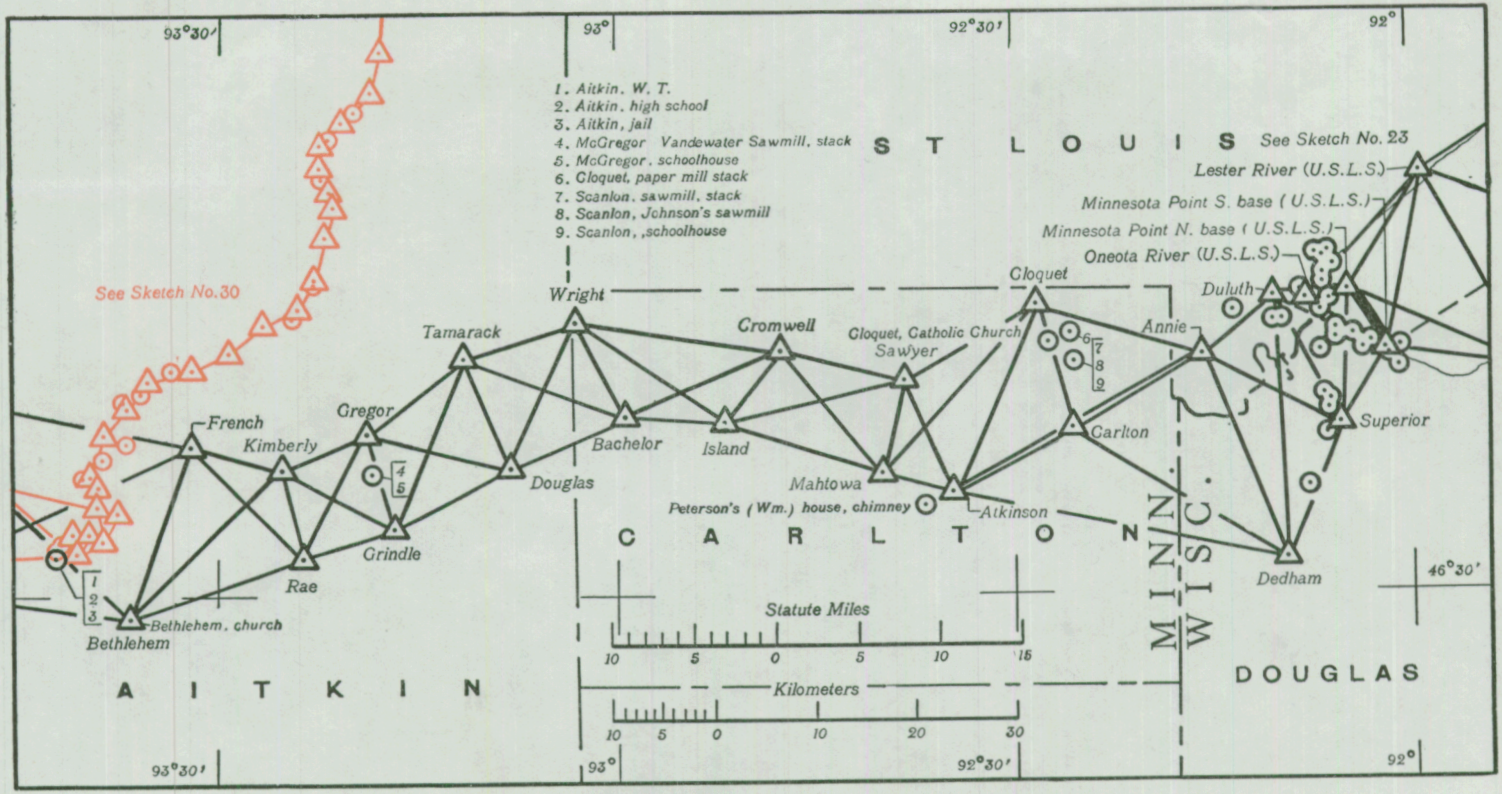

FIGURE 22.—Royalton to Duluth arc.

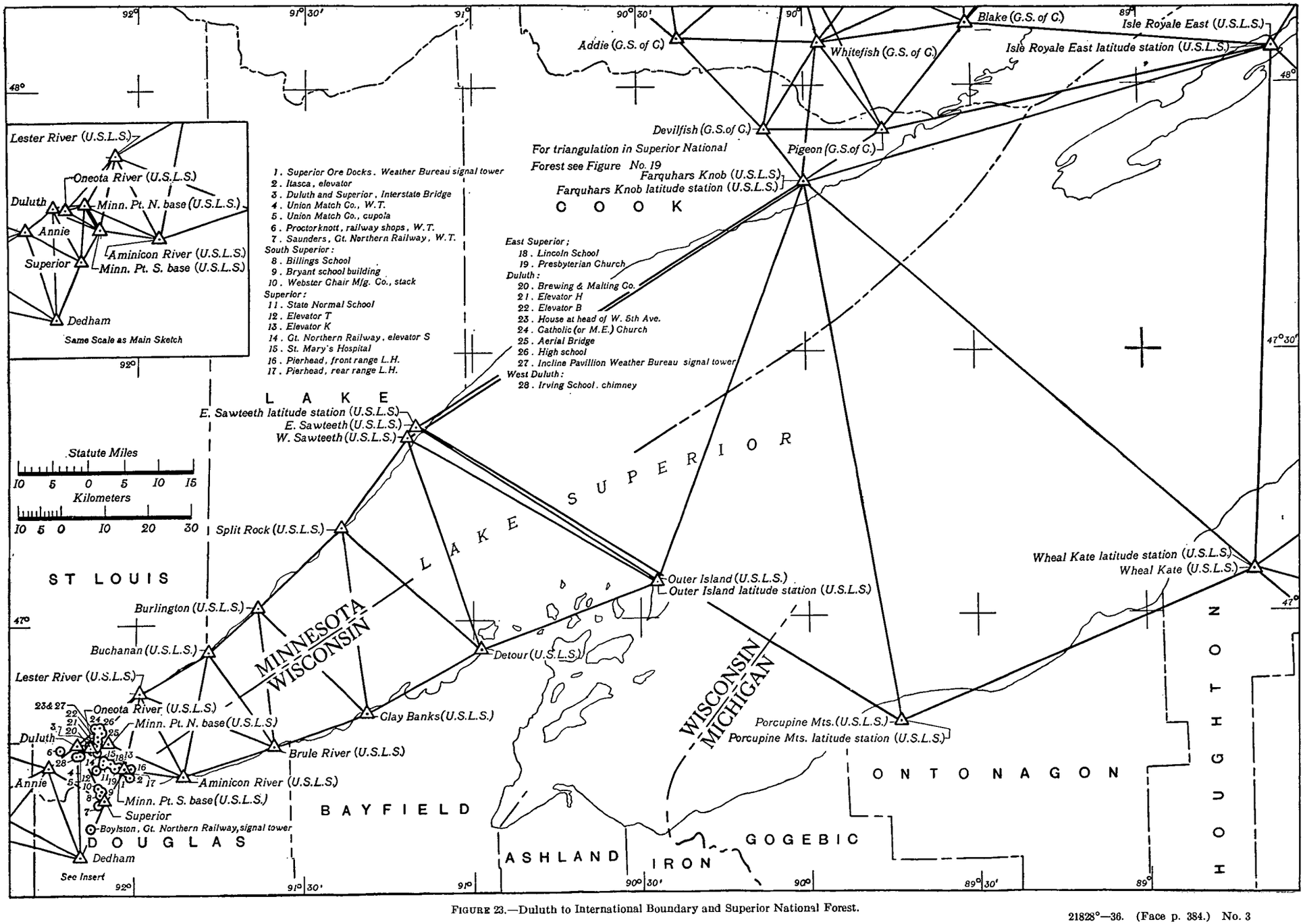

FIGURE 23.—Duluth to International Boundary and Superior National Forest.

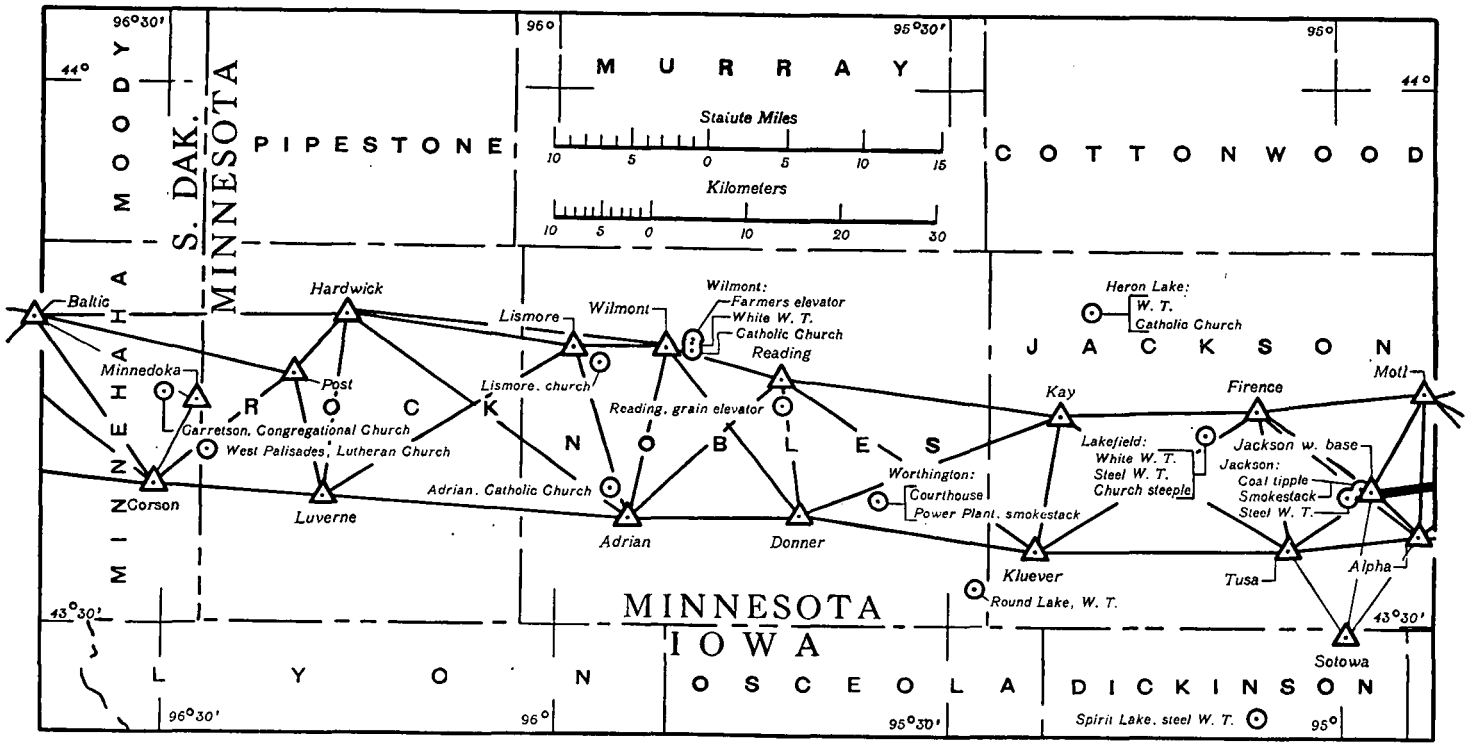

FIGURE 24.—Ninety-eighth meridian to Albert Lea arc, west.

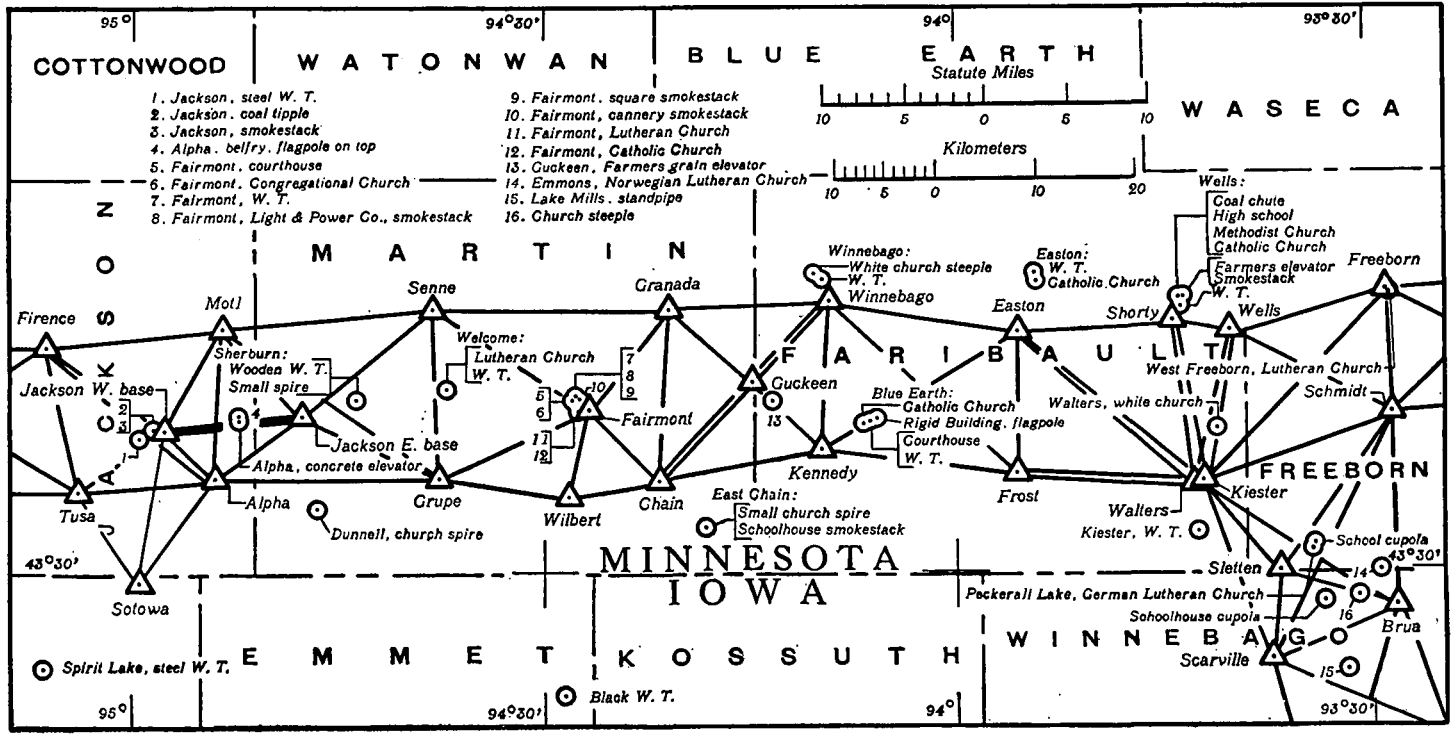

FIGURE 25.—Ninety-eighth meridian to Albert Lea arc, central section.

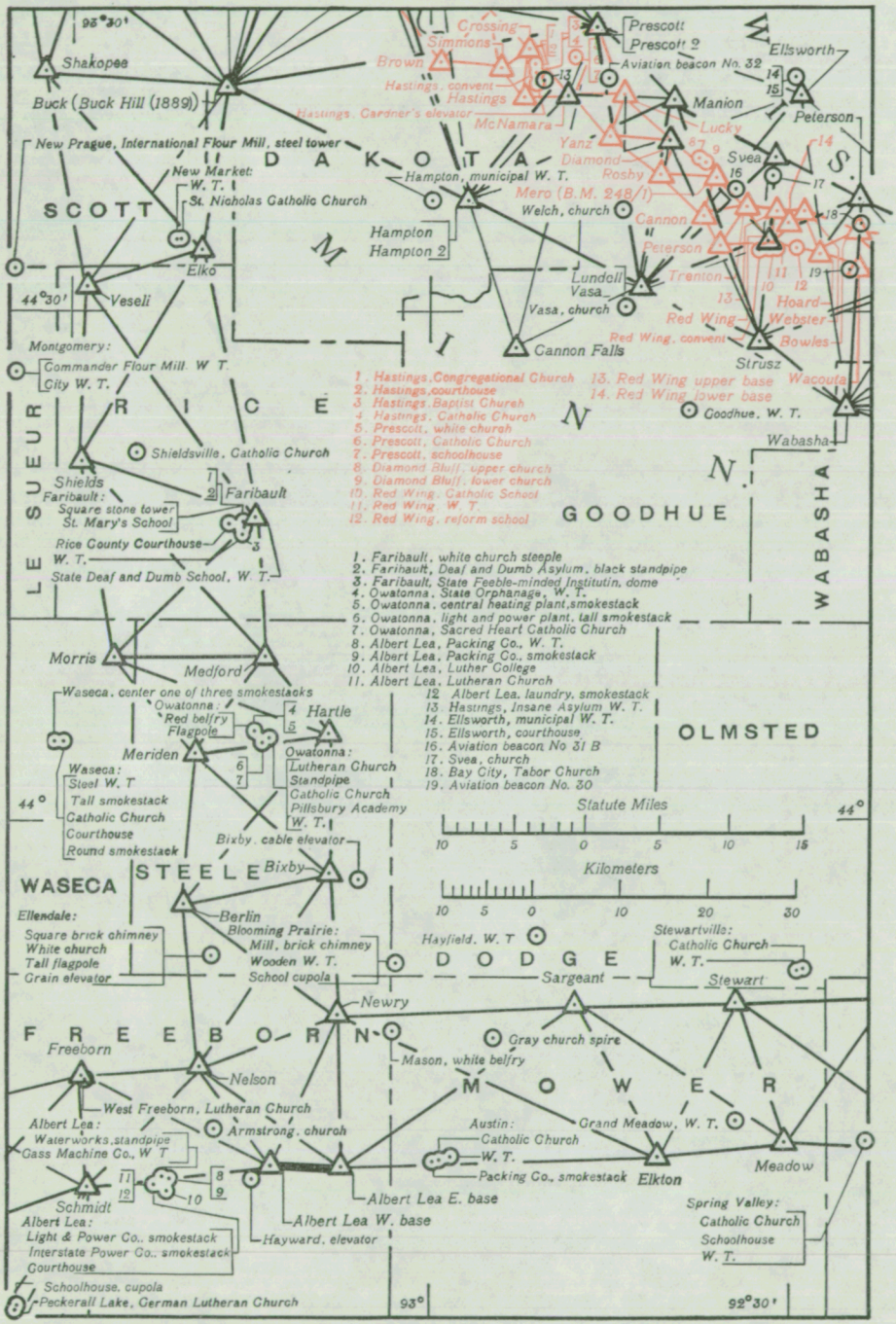

FIGURE 26.—Ninety-eighth meridian to Albert Lea to Fond du Lac and Royalton to Albert Lea arc.

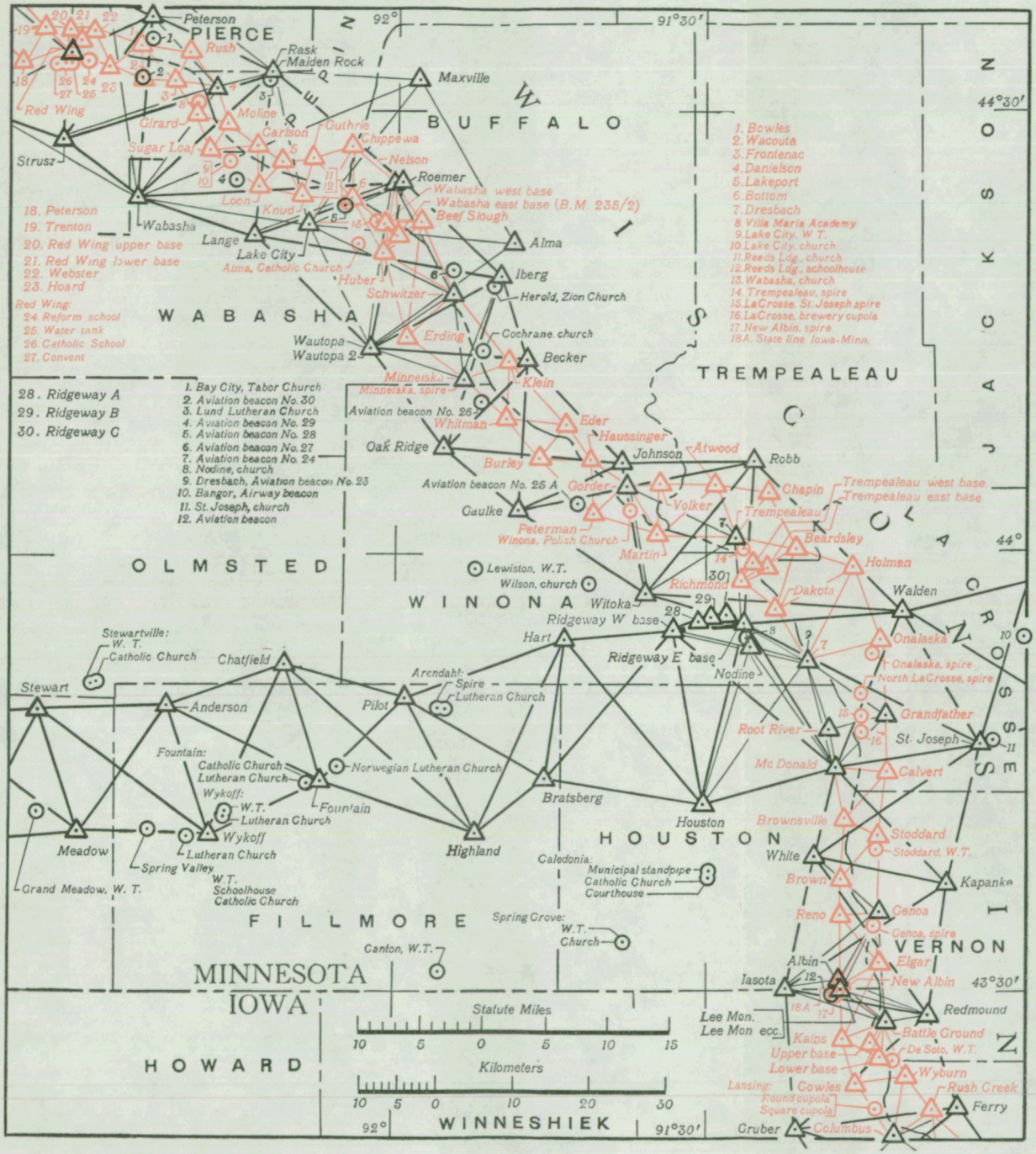

FIGURE 27.—Albert Lea to Fond du Lac and Mississippi River arc.

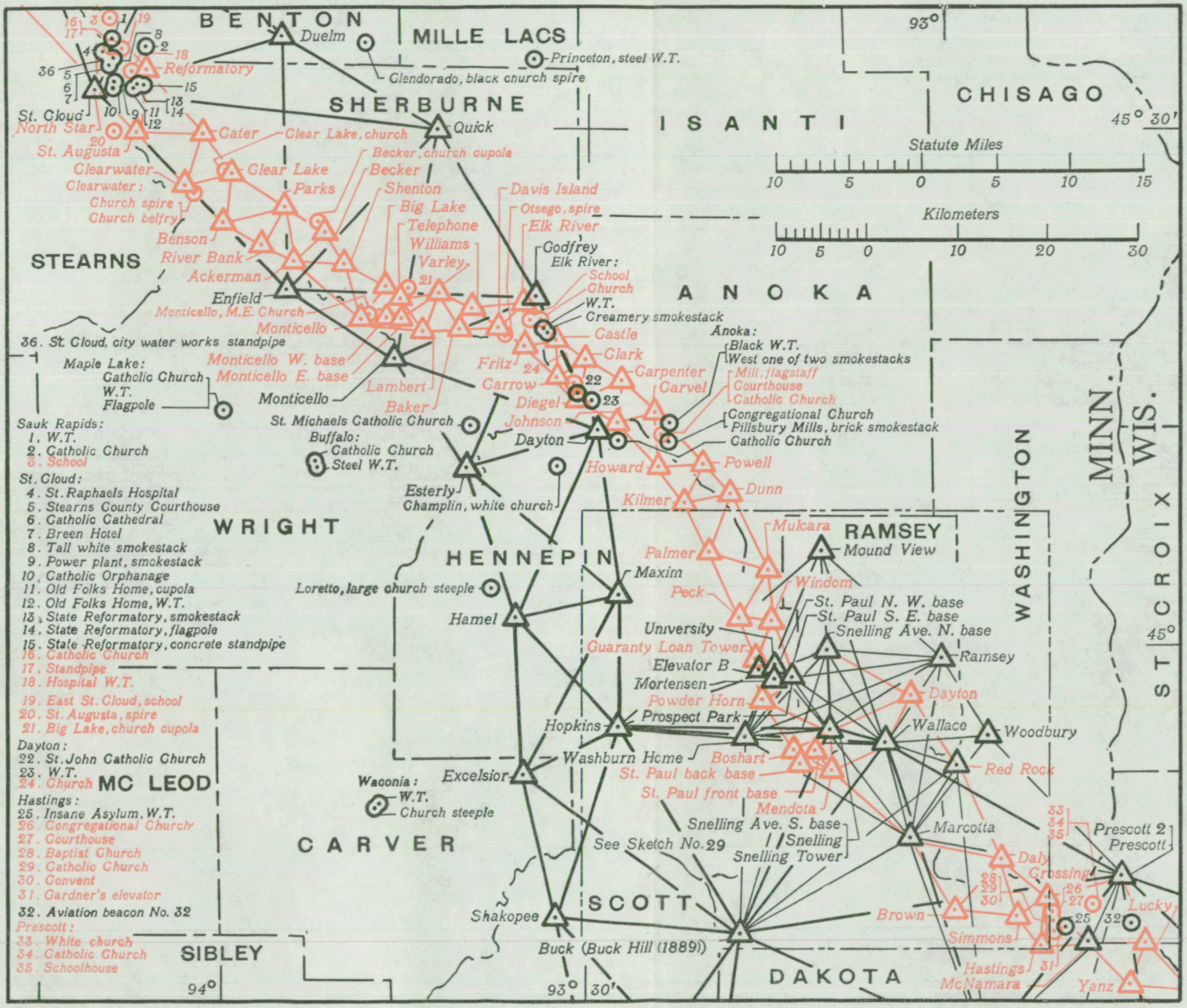

FIGURE 28.—Royalton to Albert Lea and St. Paul and vicinity arc.

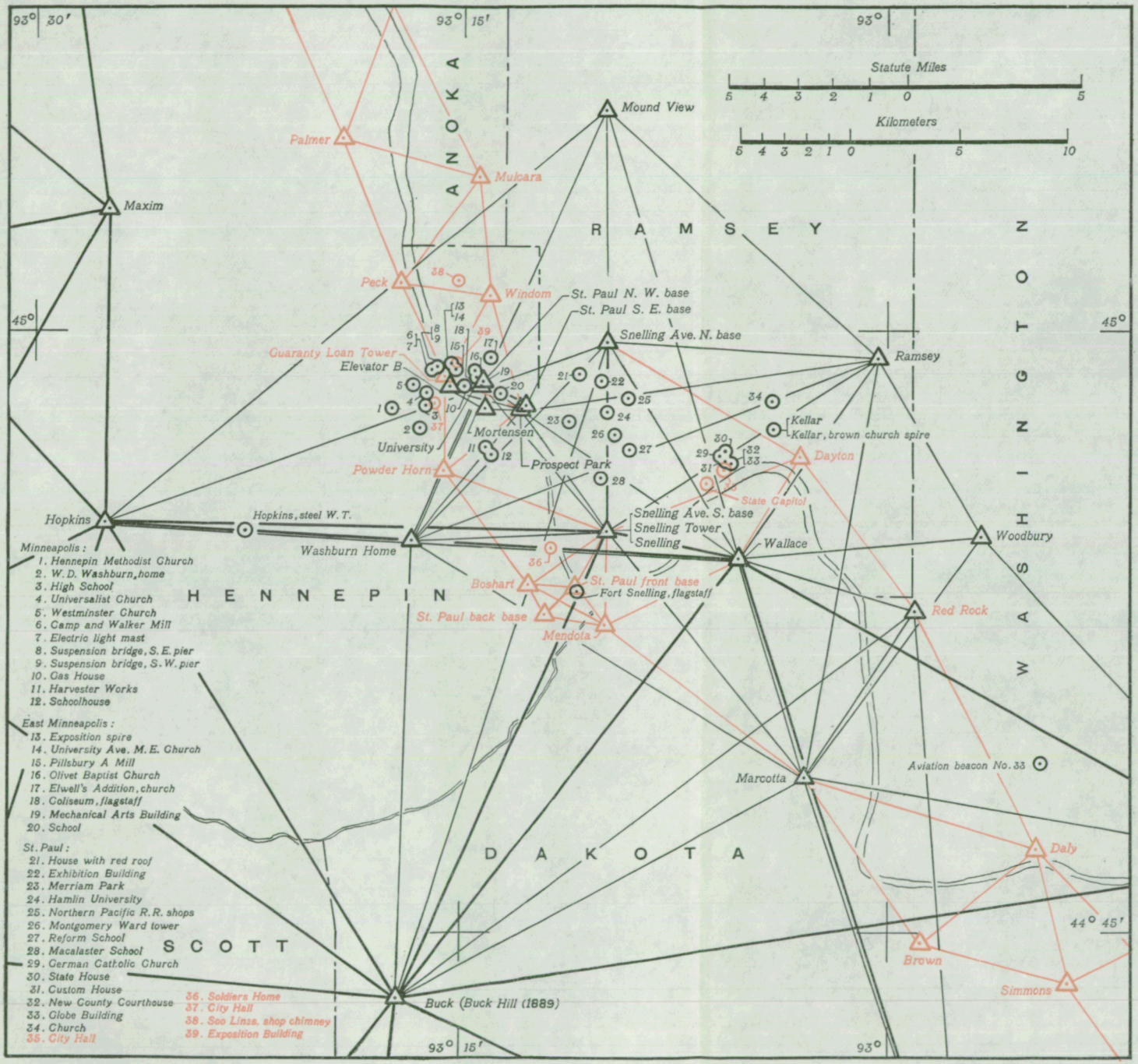

FIGURE 29.—St. Paul and vicinity arc.

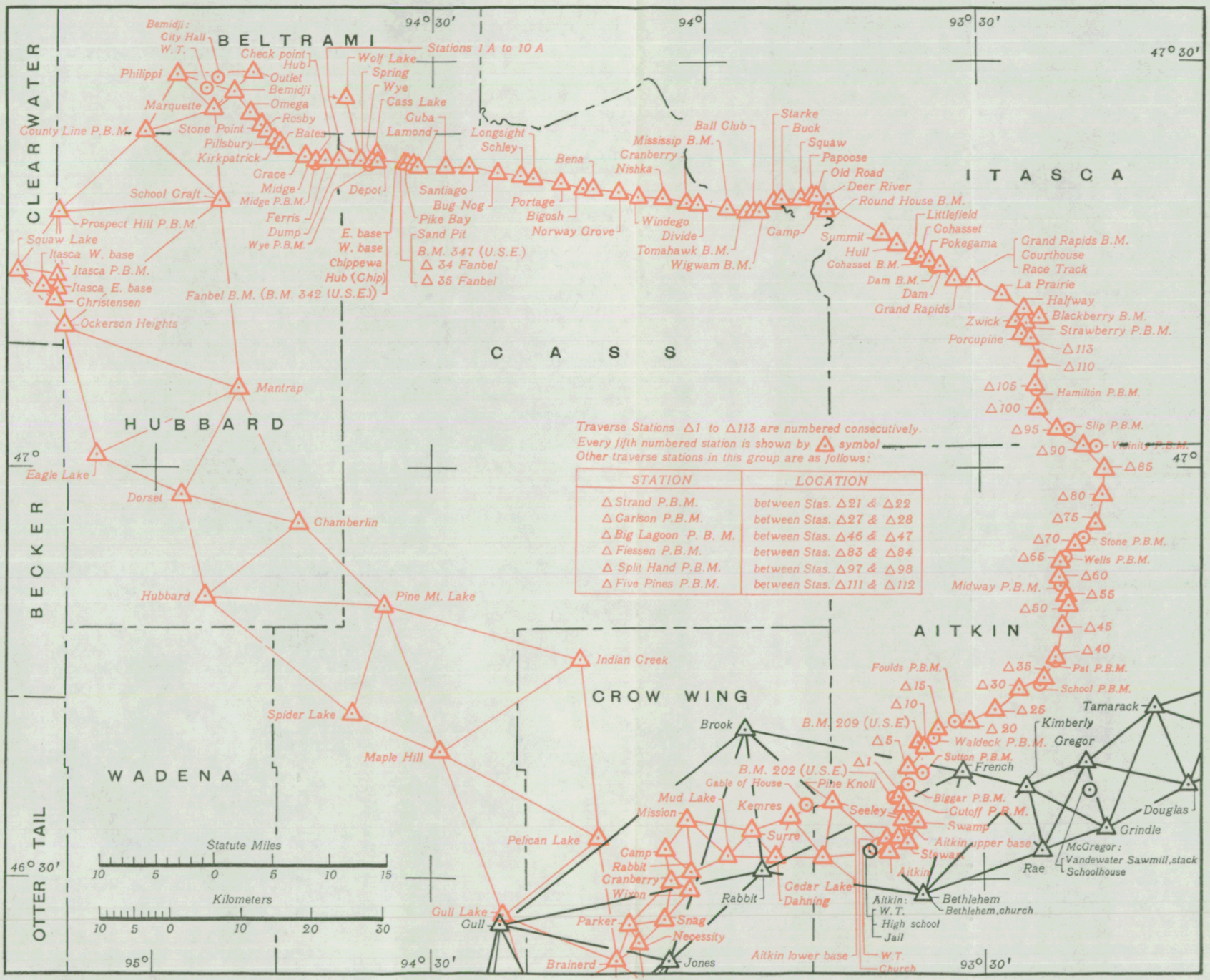

FIGURE 30.—Mississippi River, Aitkin to Bemidji arc.

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Station	Geographic position	Plane coordinates	Elevation	Description	Sketch
	Page	*Page*	*Page*	*Page*	*Figure*
Ackerman (M. R. C.)	108	163, 178	240	355	28
Ada:					
Courthouse, tower	31	170, 193	235		14
Schoolhouse, cupola	31	170, 193	235		14
Standpipe	31	170, 193	235		14
Addie (G. S. of C.) (Canada)	48	203		283	19, 23
Adrian	64	142		306	24
Adrian, Catholic Church, spire	70	145			24
Aerial bridge, southwest column of north pier, Duluth	60	176, 205	239		23
Airway beacon, Bangor (Wis.)	77	149			27
Aitkin (M. R. C.)	112	180	240	361	21, 30
Aitkin:					
Church spire (M. R. C.)	120	182			21, 30
High school	58	174	238		21, 22, 30
Jail	58	174	238		21, 22, 30
Lower base (M. R. C.)	112	180	240	361	21, 30
Upper base (M. R. C.)	112	180	240	361	21, 30
Water tank (M. R. C.)	120	182			21, 30
Water tower	58	174	238		21, 22, 30
Albert Lea:					
Albert Lea Packing Co., smokestack	75	147			26
Albert Lea Packing Co., water tank	75	147			26
Courthouse, spire	75	147			26
East base	67	144		315	26
Gass Machine Co., water tank	75	147			26
Interstate Power Co., smokestack	74	147			26
Laundry smokestack	75	147			26
Light & Power Co., smokestack	75	147			26
Luther College, spire	75	147			26
Lutheran Church, steeple	75	147			26
Water works, standpipe	75	147			26
West base	67	144		314	26
Alberta	50	171	238	289	21
Alberta, church (1 mile west of)	57	174			21
Albin	91	155		337	27
Alexandria	49	171	238	285	20
Alexandria:					
Catholic Church, spire	55	173		301	20
Courthouse, spire	55	173	238		20
Water tower	55	173	238		20
Alexandria reference mark (*see also* station Alexandria)			238		
Alma (Wis.)	95	157		342	27
Alma, Catholic Church, spire (M. R. C.) (Wis.)	115	164			27
Alpha	65	143		309	24, 25
Alpha:					
Belfry, flagpole on top	71	146			25
Concrete elevator	71	146			25
Aminicon River (U. S. L. S.) (Wis.)	61	176, 205		302	23
Anderson	68	144		316	27
Anderson (M. R. C.)	109	179	240	357	21
Andover	22	191	234	257	15
Angleworm Lookout Tower	136	215		370	18, 19
Angus:					
Lone elevator (3 miles north of)	33	195	237		15
Tall elevator (low top)	33	195	235		15
Tall elevator (tall top)	33	195	235		15
Annie	53	172, 203	238	297	22, 23
Anoka:					
Black water tank	84	151			28
Catholic Church, gold cross on top	84	151, 178			28
Catholic Church, spire (M. R. C.)	117	165			28
Congregational Church, gray spire	84	151			28
Courthouse (M. R. C.)	117	165			28
Pillsbury Mills, brick smokestack	84	152			28
Smokestack (west one of two)	84	152			28

Index to geographic positions, plane coordinates, elevations, descriptions, and sketches—Continued

Station	Geographic position	Plane coordinates	Elevation	Description	Sketch
	Page	*Page*	*Page*	*Page*	*Figure*
Arendahl:					
Arendahl, spire	77	148			27
Lutheran Church, spire	77	148		321	27
Argyle	22	191	234	259	15
Argyle:					
Electric light plant, smokestack	35	196	235		15
Tallest church, spire	35	196	235		15
Tallest elevator	35	196	235		15
Ark (Canada)	45	202		279	18, 19
Armstrong, church steeple, ball on top	75	148			26
Asylum. (*See* name of town.)					
Atkinson	52	172, 203	238	296	22
Atwood (M. R. C.) (Wis.)	102	160	240	345	27
Austin:					
Catholic Church, spire	75	148		321	26
Packing Co., smokestack	76	148		321	26
Water tank	75	148			26
Averill, elevator	29	170, 193			14
Aviation beacon:					
Near Lee Monument (Iowa)	92	155			27
No. 23 (old no. 27), Dresbach	92	155			27
No. 24 (old no. 28) (Wis.)	93	155			27
No. 25A (old no. 29A)	93	156			27
No. 26 (old no. 30)	93	156			27
No. 27 (old no. 31) (Wis.)	93	156			27
No. 28 (old no. 32B)	93	156			27
No. 29 (old no. 33)	93	156			27
No. 30 (old no. 34)	93	156			26, 27
No. 31B (old no. 35) (Wis.)	94	156			26
No. 32 (old no. 36) (Wis.)	94	156			26, 28
No. 33 (old no. 37)	94	156			29
Babbitt	136	215		370	19
Bachelor	52	172, 203	238	295	22
Baker (M. R. C.)	107	162	240	354	28
Baker, church spire	28	169			14
Ball Club (M. R. C.)	130	188, 212			30
Baltic (S. Dak.)	63	142		304	24
Bandette	41	199		270	17
Bangor, airway beacon (Wis.)	77	149			27
Baptist Church. (*See* name of town.)					
Barnesville	21	166	234	253	14
Barnesville:					
Church spire	28	169	235		14
Stack	28	169	235		14
Standpipe	28	169	235		14
Tall elevator	28	169	235		14
Bat	43	201		275	18
Bates (M. R. C.)	132	189, 213			30
Battle Ground (M. R. C.) (Wis.)	91	155		337	27
Bay City, Tabor Church, spire (Wis.)	93	156			26, 27
Beacon. (*See* Aviation beacon.)					
Beardsley (M. R. C.) (Wis.)	101	159	240	344	27
Beardsley:					
Square, slender decorated spire	24	142, 167	235	262	13
Water tank	24	142, 167	235		13
Bearskin	137	216		372	19
Beaver (Canada)	46	202		279	19
Becker (M. R. C.)	108	163, 178	240	355	28
Becker (Wis.)	89	154		332	27
Becker, church cupola (M. R. C.)	118	165, 181			28
Beef Slough (M. R. C.) (Wis.)	103	160	240	347	27
Bees Kees	44	201		275	18
Belfry. (*See* name of town.)					
Bell (Canada)	43	201		275	18
Bell tower. (*See* name of town.)					
Belle Prairie (M. R. C.)	110	179	240	358	21
Belle Prairie Station, church (M. R. C.)	119	182			21
Beltrami	21	191	234	256	15
Beltrami:					
North elevator	32	194	235	264	15
South elevator (slender top)	32	194	235		15
Bemidji (M. R. C.)	114	181, 207	240	364	30
Bemidji:					
City Hall (M. R. C.)	120	182, 207			30
Water tank (M. R. C.)	120	182, 207			30
Bena (M. R. C.)	131	188, 212	240	366	30
Bench mark. (*See* B. M.)					
Bench mark, determined by precise levels. (*See* P. B. M.)					
Benson (M. R. C.)	108	163, 178	240	355	28

Index to geographic positions, plane coordinates, elevations, descriptions, and sketches—Continued

Station	Geographic position	Plane coordinates	Elevation	Description	Sketch
	Page	*Page*	*Page*	*Page*	*Figure*
Berlin	80	150		328	26
Bethlehem	51	172	238	292	21, 22, 30
Bethlehem, church spire	58	174	238		21, 22, 30
Big (I. B. C.) (Canada)	40	199		269	17
Big Lagoon, △, P. B. M. (M. R. C.)	124	184, 209		365	30
Big Lake (M. R. C.)	108	163, 178	240	354	28
Big Lake, church cupola (M. R. C.)	118	165			28
Big Mound (M. R. C.)	54	173		300	21
Bigosh (M. R. C.)	131	188, 213	240	366	30
Biggar P. B. M. (M. R. C.)	132	189, 213	240	367	21, 30
Billings School, belfry, South Superior (Wis.)	60	176, 205	239		23
Birch	49	171	238	287	20
Bixby	80	150		328	26
Bixby, cable elevator	87	153			26
Black water tank (Iowa)	72	146			25
Blackberry B. M. (M. R. C.)	129	187, 211	240	365	30
Blackmer, south elevator (N. Dak.)	25	168	235		13
Blake (G. S. of C.) (Canada)	48	203		283	19, 23
Blooming Prairie:					
Mill, brick chimney	87	153			26
School cupola	87	153			26
Wooden water tank	87	153			26
Blue Earth:					
Catholic Church, spire	73	146			25
Courthouse spire	73	146			25
Rigid building flagpole	73	146			25
Water tank	73	146			25
B. M.:					
$\frac{221}{1}$=Trempealeau east base (M. R. C.) (Wis.)	102	160	243	345	27
$\frac{235}{3}$=Wabasha east base (M. R. C.)	103	160	244	347	27
$\frac{248}{1}$=Mero (M. R. C.) (Wis.)	105	161	242	349	26
202, U. S. E	132	189, 213	243	367	21, 30
209, U. S. E	132	189, 214	243	367	21, 30
342 (U. S. E.) (Fanbel B. M.) (M. R. C.)	134	190, 214		369	30
347, U. S. E	134	190, 214	243	369	30
Blackberry (M. R. C.)	129	187, 211	240	365	30
Cohasset (M. R. C.)	133	190, 214	240	369	30
D 6	33	195	234	264	15
Dam (M. R. C.)	133	189, 214	241	368	30
E 4	28	169	234	263	14
E 5	30	170, 193	234	263	14
Grand Rapids (M. R. C.)	129	187, 212	241	365	30
K 5	31	193	234	264	14, 15
Mississip (M. R. C.)	130	188, 212		366	30
O 6	35	196	234	264	15
Round House (M. R. C.)	133	190, 214	243	369	30
T 6	35	196	234	265	15
Tomahawk (M. R. C.)	130	188, 212	243	366	30
Wigwam (M. R. C.)	130	188, 212	244	366	30
Boating (S. Dak.)	19	141, 166	234	247	13
Bon	41	199		270	17
Borup	21	167, 191	234	255	14
Borup:					
Church spire	30	170, 193	235		14
Church spire (5 miles northeast of)	30	170, 193	235		14
Elevator (slender top)	30	170, 193	235		14
Tall elevator	30	170, 193	235		14
Boshart (M. R. C.)	106	161	240	351	28, 29
Bottom (M. R. C.) (Wis.)	103	160	240	347	27
Boundary (I. B. C.) (Late) (Canada)	43	200		274	18
Boundary Monument:					
No. 837, United States-Canada	37	197		265	16
No. 848, United States-Canada	37	197		265	16
No. 909 (I. B. C.) (Warroad north base (I. B. C.)) (Minn.-Canada)	39	198		267	16, 17
Bowles (M. R. C.) (Wis.)	104	161	240	348	26, 27
Boylston, Great Northern Railway, signal tower (Wis.)	59	175, 204	238		23
Brainerd (M. R. C.)	110	179	240	358	21, 30
Brainerd:					
Brainerd Lumber Co., stack	57	174	238		21
Catholic Church (M. R. C.)	120	182			21
Catholic Church, spire	57	174	238	301	21
High School (M. R. C.)	120	182			21
North base (M. R. C.)	111	180	240	359	21
Other church spire	58	174	238		21

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Station	Geographic position	Plane coordinates	Elevation	Description	Sketch
Brainerd—Continued.	*Page*	*Page*	*Page*	*Page*	*Figure*
Railroad shops, tallest stack	57	174	238	301	21
South base (M. R. C.)	111	180	240	359	21
Bratsberg	69	144		318	27
Bray	22	191	234	258	15
Breaul	43	200		274	18
Breckenridge:					
Courthouse, cupola	27	168	235		13, 14
Hospital, cupola	27	168	235		13, 14
Breen Hotel, chimney, St. Cloud	82	151, 178			21, 28
Brewery. (*See* name of town.)					
Brewing & Malting Co., dome, Duluth	60	175, 204	239		23
Brickyard. (*See* name of town.)					
Brockway (Suintax (M. R. C.), 1898)	50	171	243	288	21
Brook	51	171	238	291	21, 30
Brown (M. R. C.) (Dakota County)	105	161	240	351	26, 28, 29
Brown (M. R. C.) (Houston County)	101	159	240	344	27
Brown Valley, northwest base (S. Dak.)	19	141, 166	234	249	13
Brown Valley, southeast base (S. Dak.)	19	141, 166	234	248	13
Browns Valley:					
Large building, high spire	24	142, 167	235	262	13
Water tower	24	142, 167	235	262	13
White spire	24	142, 167	235	262	13
Brownsville (M. R. C.)	101	159	240	344	27
Brua (Iowa)	67	144		314	25
Brule	136	216		371	19
Brule River (U. S. L. S.) (Wis.)	62	176, 205		302	23
Brush	41	199		270	17
Brush Farm Elevator	33	195	235		15
Brushvale:					
Low elevator, center	27	169	235		14
Tall elevator, center	27	169	235		14
Bryant School, northeast corner of northwest chimney, South Superior (Wis.)	60	176, 205	239		23
Buchanan (U. S. L. S.)	62	205		302	23
Buck (Buck Hill, 1889)	79	149		326	26, 28, 29
Buck (M. R. C.)	130	188, 212			30
Buck Hill, 1889 (Buck)	79	149		326	26, 28, 29
Buckman:					
Catholic Church, spire	57	174	238		21
Red wooden water tank	81	150, 177			21
Buffalo:					
Catholic Church	83	151			28
Steel water tank	83	151			28
Bug Nog (M. R. C.)	131	188, 213			30
Building. (*See* name of town.)					
Bullis	20	166	234	251	13, 20
Burley (M. R. C.)	102	160	240	346	27
Burlington (U. S. L. S.)	62	205		303	23
Burnt (I. B. C.)	45	201		277	18
Burton (I. B. C.) (Canada)	40	199		269	17
Cable elevator, Bixby	87	153			26
Caledonia:					
Catholic Church, spire	92	155			27
Courthouse, spire	77	149		321	27
Municipal standpipe	92	155			27
Caliento (G. S. of C.) (Canada)	38	198		266	16
Calvert (M. R. C.) (Wis.)	101	159	240	344	27
Camp (M. R. C.) (Crow Wing County)	111	180	240	360	21, 30
Camp (M. R. C.) (Itasca County)	133	190, 214			30
Camp and Walker Mill, Minneapolis	97	157			29
Campbell:					
Church, open belfry	26	168	235	263	13
Campbell, church spire	26	168		263	13
Campbell, elevator no. 1 (Campbell Grain Co.'s elevator)	26	168			13
Campbell, elevator no. 2 (Farmers' Elevator)	26	168			13
Canada	23	192	234	261	16
Canada (G. S. of C.) (Canada)	46	202		280	19
Cannery. (*See* name of town.)					
Cannon (M. R. C.)	105	161	240	349	26
Cannon Falls	96	157			26
Canton, water tank	77	148			27
Carlisle, elevator, north gable	27	169	235		14
Carlson (M. R. C.) (Wis.)	103	160	240	348	27
Carlson, △, P. B. M. (M. R. C.)	123	184, 208	240	364	30
Carlton	53	172, 203	238	297	22
Carpenter (M. R. C.)	107	162	240	353	28

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Carrow (M. R. C.)	107	162	240	353	28
Carvel (M. R. C.)	107	162	240	352	28
Cass Lake (M. R. C.)	134	190, 214		369	30
Castle (M. R. C.)	107	162	240	353	28
Cater (M. R. C.)	109	163, 179	240	355	21, 28
Catholic Cathedral (M. R. C.)	119	165, 182			
Catholic Cathedral, tower, St. Cloud	82	151, 177			21, 28
Catholic Church. (*See* name of town.)					
Catholic Church on ridge, tall spire	57	174			21
Catholic Church, spire (M. R. C.)	119	165, 182			21, 28
Catholic Orphanage, cross on tower, St. Cloud	82	150, 177			21, 28
Catholic School. (*See* name of town.)					
Cedar (Canada)	45	201		278	18
Cedar Lake (M. R. C.)	112	180	240	360	21, 30
Center II (I. B. C.) (Canada)	45	201		277	18
Chain	65	143		311	25
Chamberlin (M. R. C.)	113	181	240	362	30
Chapin (M. R. C.) (Wis.)	102	160	240	345	27
Chatfield	68	144		317	27
Chatham, elevator	36	196	235		16
Check point (M. R. C.)	134	190, 215			30
Chicago, St. Paul, Minneapolis and Omaha Railway, elevator stack, Itasca (Wis.)	61	176, 205	239		23
Childs (Kutzer), church, black spire, near	25	168	235	263	13
Childs (Kutzer), tallest elevator	25	168	235		13
Chimney. (*See* name of town.)					
Chip (Hub) (M. R. C.)	134	190, 214			30
Chippewa (M. R. C.)	131	188, 213		367	30
Chippewa (M. R. C.) (Wis.)	103	160	240	347	27
Christensen (M. R. C.)	113	181, 206	240	363	30
Church. (*See* name of town.)					
Church (1 mile west of Alberta)	57	174			21
Church (5 miles north of station Indian)	28	169	235		14
Church (5 miles west of Elbow Lake)	55	173			20
Church (6 miles southwest of Dalton)	55	173	239		20
Church, black spire (near Childs (Kutzer))	25	168	235	263	13
Church spire (M. R. C.)	119	182			21
Church spire (2 miles east of station Eglon)	29	169, 192	236		14
Church spire (3 miles northeast of station Keene)	29	170, 193	236		14
Church spire (3 miles south of station Skane)	36	196	236		16
Church spire (4 miles east of station Hallock)	36	197	236		16
Church spire (5 miles northeast of Borup)	30	170, 193	235		14
Church spire (5 miles northeast of station Stephen west base)	35	196	236		15
Church spire (6 miles north of station Fox)	27	169	236		14
Church spire (6 miles east-southeast of station Hallock)	36	196	236		16
Church spire (7 miles northwest of station Deer)	35	196	235		16
Church spire (7 miles southwest of Dalton)	55	173			20
Church spire (8 miles northeast of Fargo)	29	170, 193	235		14
Church spire (8 miles northwest of Foxhome)	27	169	235		14
Church spire (8 miles northwest of station Wright)	35	196	235		15
Church spire (9 miles northwest of station Deer)	36	196	235		16
Church spire (east of Doran)	26	168	236		13
Church steeple (Iowa)	74	147			25
Church spire, St. Paul	100	159			29
Church, very tall, black (S. Dak.)	25	142, 167	236	263	13
City Hall (M. R. C.)	117	165			29
City Hall (M. R. C.), Bemidji	120	182, 207			30
City Hall (M. R. C.), St. Paul	117	165			29
Clark (M. R. C.)	107	162	240	353	28
Clay Banks (U. S. L. S.) (Wis.)	62	205		303	23
Clear Lake (M. R. C.)	108	163, 179	240	355	28
Clear Lake, church (M. R. C.)	118	165, 181		355	28
Clear Water (M. R. C.)	108	163, 179	240	355	28
Clear Water:					
Church spire (M. R. C.)	118	165, 181			28
Church belfry (M. R. C.)	118	165, 181			28
Climax, tall elevator	32	194	236		15
Cloquet	52	172, 203	238	297	22
Cloquet:					
Catholic Church, spire	58	175, 204	239		22
Paper mill, stack	58	175, 204	239		22
Coal chute. (*See* name of town.)					
Coal tipple. (*See* name of town.)					
Cochrane, church spire (Wis.)	93	156			27
Cohasset (M. R. C.)	129	187, 212			30
Cohasset B. M. (M. R. C.)	133	190, 214	240	369	30

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Coliseum, flagstaff, East Minneapolis	98	158			29
Columbus (M. R. C.) (Iowa)	90	155		337	27
Commander Flour Mill, water tank, Montgomery	85	152			26
Congregational Church. (*See* name of town.)					
Convent. (*See* name of town.)					
Corson (S. Dak.)	63	142		305	24
County Line P. B. M. (M. R. C.)	113	181, 207	241	364	30
Courthouse (M. R. C.) (Itasca County)	129	187, 212			30
Courthouse (M. R. C.) (Morrison County)	119	182			
Courthouse. (*See* name of town.)					
Cowles (M. R. C.) (Iowa)	100	159	241	343	27
Cranberry (M. R. C.) (Cass County)	130	188, 212			30
Cranberry (M. R. C.) (Crow Wing County)	111	180	241	359	21, 30
Creamery. (*See* name of town.)					
Cromwell	52	172, 203	238	295	22
Crossing (M. R. C.)	105	161	241	350	26, 28
Crow Wing (M. R. C.)	110	179	241	358	21
Crow Wing, church (M. R. C.)	120	182			21
Crookston:					
Brickyard chimney	33	194	236		15
Catholic Church, spire	33	194	236		15
Courthouse dome	33	194	236		15
High school, cupola	33	194	236		15
Standpipe	32	194	236		15
Cuba (M. R. C.)	131	188, 213		366	30
Cupola. (*See* name of town.)					
Customhouse. (*See* name of town.)					
Cut-off P. B. M. (M. R. C.)	121	182, 207	241	364	21, 30
Daggett	50	171	238	290	21
Dahning (M. R. C.)	111	180	241	360	21, 30
Dakota (M. R. C.)	111	159	241	344	27
Dalton	49	171	238	284	20
Dalton, astronomical station	55	173	238	301	20
Dalton, church (6 miles southwest of)	55	173	239		20
Dalton, church spire (7 miles southwest of)	55	173			20
Daly (M. R. C.)	105	161	241	350	28, 29
Dam (M. R. C.)	129	187, 212			30
Dam B. M. (M. R. C.)	133	189, 214	241	368	30
Danielson (M. R. C.) (Wis.)	92	155		339	27
Davis Island (M. R. C.)	107	162	241	353	28
Dayton	79	149		324	28
Dayton (M. R. C.)	105	161	241	351	28, 29
Dayton:					
Church spire (M. R. C.)	118	165			28
St. John Catholic Church, spire	83	151, 178			28
Water tank	84	151, 178			28
Deaf and Dumb Asylum, black standpipe, Faribault	85	152			26
Dedham (Wis.)	53	172, 203	238	298	22, 23
Deer	23	192	234	260	15, 16
Deer (Canada)	44	201		276	18
Deer, church spire (7 miles northwest of station)	35	196	235		16
Deer, church spire (9 miles northwest of station)	36	196	235		16
Deer River (M. R. C.)	129	187, 212	241	365	30
Delf (Canada)	41	199		271	17
Depot (M. R. C.)	131	188, 213			30
De Soto:					
Lower base (M. R. C.) (Iowa)	101	159	241	343	27
Upper base (M. R. C.) (Iowa)	101	159	241	343	27
Water tank (M. R. C.) (Wis.)	114	163			27
Detour (U. S. L. S.) (Wis.)	62	206		303	23
Devilfish (G. S. of C.)	48	203		283	19, 23
Devilfish Fire Lookout Tower	137	216		372	19
Diamond (M. R. C.) (Wis.)	92	155		340	26
Diamond Bluff:					
Lower church (M. R. C.)	116	164			26
Upper church (M. R. C.)	116	164			26
Diegel (M. R. C.)	107	162	241	353	28
Divide (M. R. C.)	130	188, 212	241	366	30
D. L. S. No. 44 (G. S. of C.) (Canada)	37	197		265	16
Dog (Canada)	43	200		275	18
Dome. (*See* name of town.)					
Dominion Land Survey. (*See* D. L. S.)					
Donaldson	23	191	234	259	15, 16
Donaldson:					
Church spire	35	196	236		15, 16
Tall elevator	35	196	236		15, 16

Index to geographic positions, plane coordinates, elevations, descriptions, and sketches—Continued

Station	Geographic position	Plane coordinates	Elevation	Description	Sketch
	Page	*Page*	*Page*	*Page*	*Figure*
Donner	64	143		307	24
Doran (Canada)	43	201		275	18
Doran, church spire, east of	26	168	236		13
Dorothy (G. S. of C.) (Canada)	47	202		281	19
Dorset (M. R. C.)	113	181	241	362	30
Douglas	51	172	238	294	22, 30
Dout	40	199		270	17
Downer:					
Northwest elevator	28	169, 192	236		14
Southeast elevator	29	169, 192	236		14
Dresbach (M. R. C.)	91	155	241	338	27
Dresbach, Aviation beacon No. 23 (old no. 27)	92	155			27
Drywood (S. Dak.)	19	141, 166	234	248	13
Duelm	78	149, 177		322	21, 28
Duluth	53	172, 203	238	298	22, 23
Duluth:					
Aerial bridge, southwest column of north pier	60	176, 205	239		23
Brewing & Malting Co., dome	60	175, 204	239		23
Church spire	60	175, 204	239		23
Elevator B, stack	60	175, 204	239	301	23
Elevator H, stack	60	176, 205	239	301	23
High-school cupola, spire	60	175, 204	239		23
House at head of West Fifth Avenue (chimney in center of 4-pitch roof)	60	175, 204	239		23
Incline Pavilion, Weather Bureau, signal tower	60	176, 205	239		23
Union Match Co., cupola	59	175, 204	238		23
Union Match Co., water tank	59	175, 204	238	301	23
Duluth & Superior Interstate Bridge, operator's tower, center of draw span	59	175, 204	239		23
Dump (M. R. C.)	131	189, 213			30
Dunn (M. R. C.)	106	162	241	352	28
Dunnell, slender black church spire	71	146			25
Eagle	50	171	238	288	20, 21
Eagle Lake (M. R. C.)	113	181, 206	241	362	30
East Base (M. R. C.)	134	190, 214			30
East Chain:					
Schoolhouse, smokestack	72	146			25
Small church, spire	72	146			25
East Minneapolis:					
Coliseum, flagstaff	98	158			29
Elwell's Addition, church	98	158			29
Exposition, spire	98	158			29
Mechanical Arts Building	98	158			29
Olivet Baptist Church	98	158			29
Pillsbury A. Mill	98	158			29
School	99	158			29
University Avenue Methodist Episcopal Church	98	158			29
East St. Cloud, school (M. R. C.)	119	165, 182			21, 28
East Sawteeth (U. S. L. S.)	62	206		303	23
East Sawteeth, latitude station (U. S. L. S.)	63	206		304	23
East Superior:					
Lincoln School, flagstaff in center of tower (Wis.)	61	176, 205	239		23
Presbyterian Church, spire (Wis.)	61	176, 205	239		23
Easton	66	143		312	25
Easton:					
Catholic Church, spire	73	147			25
Water tank	73	146			25
Echo (G. S. of C.) (Canada)	48	203		283	19
Eder (M. R. C.) (Wis.)	102	160	241	346	27
Eglon	21	166, 191	234	254	14
Eglon, church spire (2 miles east of station)	29	169, 192	236		14
Elbow	49	171	238	284	20
Elbow Lake:					
Church (5 miles west of)	55	173			20
Water tower	54	173	239		20
Eldred:					
Northeast tall elevator	32	194	236		15
Southwest low elevator	32	194	236		15
Electric-light mast, Minneapolis	97	158			29
Electric-light plant. (*See* name of town.)					
Elevator. (*See* name of town.)					
Elevator B	97	157			28, 29
Elgar (M. R. C.)	101	159	241	343	27
Eliason	137	216		372	19
Elk River (M. R. C.)	107	162	241	353	28

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Station	Geographic position	Plane coordinates	Elevation	Description	Sketch
Elk River:	*Page*	*Page*	*Page*	*Page*	*Figure*
Creamery smokestack	83	151, 178			28
School (M. R. C.)	118	165			28
Water tank (white roof)	83	151, 178			28
Elko	79	149		326	26
Elkton	67	144		315	26
Ellendale:					
Grain elevator	87	153			26
Square brick chimney	87	153			26
Tall flagpole	87	153			26
White church (gray steeple)	87	153			26
Ellsworth (Wis.)	96	157		342	26
Ellsworth:					
Courthouse dome (Wis.)	94	156			26
Municipal water tank (Wis.)	93	156			26
Elwell's Addition, church, East Minneapolis	98	158			29
Ely Lookout Tower	136	215		369	19
Emerson:					
Tall church spire (Canada)	37	197	236		16
Tower (flat top) (Canada)	37	197	236		16
Emily (I. B. C.) (Canada)	46	202		280	19
Emmons, Norwegian Lutheran Church, steeple	74	147			25
Enfield	78	149, 177		322	28
Enwiller (S. Dak.)	19	141, 166	234	249	13
Enwiller, Swedish Lutheran Church, spire (2 miles east of station) (S. Dak.)	25	142, 167	237	263	13
Erding (M. R. C.)	103	160	241	346	27
Esterly	79	149		324	28
Euclid:					
Low red elevator	33	195	236		15
School belfry	33	195	236		15
Tall brown elevator	33	195	236		15
Evansville:					
Catholic Church, spire	55	173			20
Methodist Church, spire	55	173			20
Water tower	55	173	239		20
Everdell:					
Broad elevator	27	168	236		13, 14
Slender elevator	27	168	236		13, 14
Ewing (G. S. of C.)	47	202		281	19
Excelsior	79	149		325	28
Exhibition Building, St. Paul	99	158			29
Exposition Building (M. R. C.)	117	165			29
Exposition, spire, East Minneapolis	98	158			29
Fairmont	65	143		310	25
Fairmont:					
Cannery, smokestack	72	146			25
Catholic Church, spire	72	146			25
Congregational Church, spire	72	146			25
Courthouse, spire	72	146			25
Light & Power Co., smokestack	72	146			25
Lutheran Church, spire	72	146			25
Square smokestack	72	146			25
Water tank	72	146			25
Fairmount:					
Catholic Church, spire (N. Dak.)	25	167			13
Elevator (N. Dak.)	25	168			13
National Elevator (N. Dak.)	25	167			13
Tall east elevator (N. Dak.)	25	167	236		13
Falls	50	171	238	288	21
Falls (I. B. C.)	45	201		278	18, 19
Fanbel, △34 (M. R. C.)	133	190, 214			30
Fanbel, △35 (M. R. C.)	134	190, 214			30
Fanbel, B. M. (M. R. C.) (B. M. 342 (U. S. E.))	134	190, 214		369	30
Fang (I. B. C.)	46	202		280	19
Fargo:					
Brewery, cupola (N. Dak.)	29	170, 192			14
Catholic Church, spire (N. Dak.)	29	169, 192	236		14
Church spire (8 miles northeast of)	29	170, 193	235		14
Large round tower (N. Dak.)	29	170, 192			14
Large square tower (N. Dak.)	29	170, 192			14
Faribault	79	150		327	26
Faribault:					
Deaf and Dumb Asylum, black standpipe	85	152			26
Rice County Courthouse, spire	85	152			26
St. Mary's School, spire with open columns in belfry	85	152			26
Square stone tower with open coping	85	152			26
State Deaf and Dumb School, water tank	85	152			26

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Station	Geographic position	Plane coordinates	Elevation	Description	Sketch
	Page	*Page*	*Page*	*Page*	*Figure*
Faribault—Continued.					
State Feeble-minded Institution, dome	85	152			26
Water tank (white top)	85	152			26
White church steeple	85	152			26
Farmers' Elevator, elevator no. 2, Campbell	26	168			13
Farmers' Elevator, Wells	73	147			25
Farmers' Elevator, Wilmont	70	145			24
Farmers' grain elevator, Guckeen	73	146			25
Farquhars Knob (U. S. L. S.)	62	206		303	19, 23
Farquhars Knob latitude station (U. S. L. S.)	63	206		304	19, 23
Fast (G. S. of C.) (Canada)	38	198		266	16
Felton:					
Church spire	30	170, 193	236		14
Elevator	30	170, 193	236		14
Schoolhouse cupola	30	170, 193	236		14
Fergus Falls:					
Asylum stack	27	168	236		14, 20
Courthouse cupola	27	168			14, 20
Northwestern College, tower	27	168	236		14, 20
Fernberg	136	215		369	19
Ferris (M. R. C.)	132	189, 213			30
Ferry (Wis.)	88	153		329	27
Ferryville (M. R. C.) (Wis.)	100	159	241	343	
Fertile	21	191	234	256	15
Fertile:					
Large elevator	31	194	236		15
Small elevator	31	194	236		15
Standpipe	31	194	236		15
Fiessen, △, P. B. M. (M. R. C.)	126	186, 210	241	365	30
Firence	64	143		308	24, 25
Fish (I. B. C.) (Canada)	45	201		277	18
Fish Lake (M. R. C.)	110	179	241	358	21
Five Pines, △, P. B. M. (M. R. C.)	128	187, 211	241	365	30
Flagpole. (*See* name of town.)					
Flagstaff. (*See* name of town.)					
Flaming, elevator	31	194	236		15
Foley, steel water tank	81	150, 177			21
Fort (Canada)	43	200		273	18
Fort Frances west base eccentric (Canada)	42	200		273	17, 18
Fort Ripley (M. R. C.)	110	179	241	358	21
Fort Snelling, flagstaff	99	158			29
Foss	20	166	234	250	13
Foss reference mark. (*See* station Foss.)			234		
Foulds, P. B. M. (M. R. C.)	133	189, 214	241	368	21, 30
Found (I. B. C.)	46	202		280	19
Fountain	68	144		317	27
Fountain:					
Catholic Church, spire	77	148		321	27
Lutheran Church, black spire	77	148			27
Fox	20	166	234	252	13, 14, 20
Fox, church spire (6 miles north of station)	27	169	236		14
Foxhome:					
Church spire (8 miles northwest of)	27	169	235		14
Red elevator	26	168	236		13, 14, 20
Schoolhouse cupola	26	168	236		13, 14, 20
White elevator	26	168	236		13, 14, 20
Freeborn	67	144		314	25, 26
French	51	172	238	292	21, 22, 30
Fritz (Canada)	41	199		271	17
Fritz (M. R. C.)	107	162	241	353	28
Frontenac (M. R. C.)	104	161	241	348	27
Frost	66	143		312	25
Full	40	199		269	17
Gabimichigami	137	216		373	19
Garb (I. B. C.) (Canada)	46	202		281	19
Garden (I. B. C.)	40	199		269	17
Gardners Elevator (M. R. C.), Hastings	117	164			26, 28
Garretson, Congregational Church, short steeple (white building) (S. Dak.)	69	145			24
Gartner (M. R. C.)	109	163, 179	241	356	21
Gary	21	191	234	256	14, 15
Gary:					
Church spire	31	194	236		14, 15
North elevator	31	194	236		14, 15
South elevator	31	194	236		14, 15
Gas house. (*See* name of town.)					
Gaskin	137	216		372	19
Gass Machine Co., water tank, Albert Lea	75	147			26

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Gaulke	89	154		331	27
Genoa (M. R. C.) (Wis.)	90	155		337	27
Genoa, spire (M. R. C.) (Wis.)	114	163			27
German Catholic Church. (*See* name of town.)					
German Lutheran Church. (*See* name of town.)					
Gip (Canada)	41	199		271	17
Girard (M. R. C.)	104	161	241	348	27
Glendorado, black church spire (white belfry)	83	151, 178			21, 28
Glint (I. B. C.) (Canada)	45	202		279	18, 19
Globe Building, St. Paul	99	159			29
Glyndon:					
Church spire	29	169, 192	236		14
Elevator	29	169, 192	236		14
Godfrey	78	149, 177		323	28
Gone (I. B. C.) (Canada)	46	202		280	19
Goodhue, water tank	94	156			26
Gorder (M. R. C.) (Wis.)	91	155		338	27
Gordon, church spire	56	174			20
Gottwalt (M. R. C.)	53	172	239, 241	299	21
Grace (Canada)	41	200		272	17
Grace (M. R. C.)	132	189, 213			30
Graceville:					
Catholic Church, spire	24	142, 167	236		13
Water tower	24	142, 167	236	262	13
Grampian, lone elevator	37	197	236		16
Granada	65	143		311	25
Grand Meadow, water tank	76	148			26, 27
Grand Rapids (M. R. C.)	129	187, 212	241	365	30
Grand Rapids B. M. (M. R. C.)	129	187, 212	241	365	30
Grandfather (M. R. C.) (Wis.)	91	155	241	338	27
Granite	45	201		278	18
Granville	23	192	234	261	16
Grassy	44	201		276	18
Gray church spire (7 miles south of station Tansem)	28	169			14
Gray church spire, white belfry	76	148			26
Great Northern Railway, Elevator S, south gable, Superior (Wis.)	59	175, 204	239		23
Great Northern Railway, signal tower, Boylston (Wis.)	59	175, 204	238		23
Great Northern Railway, water tank, Saunders (Wis.)	61	176, 205	239		23
Greenwater (G. S. of C.) (Canada)	48	203		283	19
Gregor	51	172	238	294	22, 30
Gregory (M. R. C.)	54	173	239, 241	300	21
Grindle	51	172		293	22, 30
Gruber (Iowa)	88	153		329	27
Grupe	65	143		310	25
Guaranty Loan Tower (M. R. C.)	106	162	241	351	28, 29
Guckeen	65	143		311	25
Guckeen, farmers grain elevator	73	146			25
Guilbault (G. S. of C.) (Canada)	38	198		267	16
Gull	51	171	238	291	21, 30
Gull Lake (M. R. C.)	112	180	241	361	21, 30
Gunflint (G. S. of C.) (Canada)	48	203		283	19
Gunflint, (Paulsen) Fire Lookout Tower	137	216		371	19
Guthrie (M. R. C.) (Wis.)	103	160	241	347	27
Had (I. B. C.)	46	202		280	19
Hadler:					
North elevator	31	193	236		14, 15
South elevator	31	193	236		14, 15
Halfway (M. R. C.)	129	187, 211			30
Hallock	23	192	235	261	16
Hallock:					
Church spire (4 miles east of station)	36	197	236		16
Church spire (6 miles east-southeast of station)	36	196	236		16
Courthouse tower	36	196	236		16
Standpipe	36	196	236		16
Tall church spire	36	196	236		16
Halma, elevator	36	196	236		16
Hamel	79	149		324	28
Hamilton P. B. M. (M. R. C.)	133	189, 214	241	368	30
Hamlin University, St. Paul	99	158			29
Hampton	96	157		342	26
Hampton 2	90	154		336	26
Hampton, municipal water tank	94	152			26
Hankinson (N. Dak.)	20	166	235	250	13

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Hankinson:	*Page*	*Page*	*Page*	*Page*	*Figure*
Catholic church, spire (N. Dak.)	25	167	236		13
High school, spire (N. Dak.)	25	167	236		13
Schoolhouse chimney (½ mile north of station) (N. Dak.)	25	167			13
Hardwick	63	142		305	24
Hardy (M. R. C.)	110	179	241	358	21
Hargo (I. B. C.)	45	202		279	18, 19
Harry	44	201		275	18
Hart	68	144		318	27
Hartle	80	150		328	26
Harvester Works, Minneapolis	98	158			29
Hastings (M. R. C.)	105	161	241	350	26, 28
Hastings:					
Baptist Church (M. R. C.)	116	164			26, 28
Catholic Church (M. R. C.)	116	164			26, 28
Congregational Church (M. R. C.)	116	164			26, 28
Convent (M. R. C.)	116	164			26, 28
Courthouse (M. R. C.)	116	164			26, 28
Gardners Elevator (M. R. C.)	117	164			26, 28
Insane Asylum, water tank	94	156			26, 28
Haussinger (M. R. C.) (Wis.)	102	160	241	346	27
Hay Creek (M. R. C.)	110	179	241	357	21
Hayfield, water tank	76	148			26
Hayward, elevator	75	148			26
Heinen (M. R. C.)	109	163, 179	241	356	21
Helga (G. S. of C.)	47	202		281	19
Hen	41	199		270	17
Hen, eccentric	41	199		270	17
Hennepin Methodist Church, spire, Minneapolis	84	152			29
Henri (Canada)	41	199		271	17
Hereford, elevator	54	173	239	301	13, 20
Herman, water tower	25	167	236		13, 20
Herold, Zion Church, spire (Wis.)	93	156			27
Heron Lake:					
Catholic Church, north steeple	70	145			24
Water tank (white top)	70	145			24
Heytmans (M. R. C.) (Iowa)	100	159	241	342	
High school. (*See* name of town.)					
Highland	68	144		318	27
Hill	23	192	235	261	16
Hitterdal:					
Elevator	29	170, 193	236		14
Low church spire	29	170, 193	236		14
Tall church spire	29	170, 193	236		14
Hoard (M. R. C.)	104	161	241	349	26, 27
Hole-In-The-Day (M. R. C.)	110	179	241	357	21
Holmen (M. R. C.) (Wis.)	101	159	241	344	27
Holmes	49	171	238	284	20
Home. (*See* name of town.)					
Hopkins	79	149		325	28, 29
Hopkins, steel water tank	84	152			29
Hospital. (*See* name of town.)					
Hospital, water tank (M. R. C.)	119	165, 182			21, 28
House. (*See* name of town.)					
Houston	69	144		319	27
Howard (M. R. C.)	107	162	241	352	28
Hub (Chip) (M. R. C.)	134	190, 214			30
Hub (M. R. C.)	134	190, 215			30
Hubbard (M. R. C.)	113	181	241	362	30
Huber (M. R. C.)	103	160	241	346	27
Hull (M. R. C.)	129	187, 212			30
Humboldt (G. S. of C.)	23	192		262	16
Humboldt:					
Church spire	37	197	236		16
School cupola	37	197	236		16
Iasota (Iowa-Minn.)	88	154		330	27
Iberg (Wis.)	89	154		332	27
Incline Pavilion, Weather Bureau, signal tower, Duluth	60	176, 205	239		23
Indian	20	166	234	252	14
Indian, church (5 miles north of station)	28	169	235		14
Indian church, spire (S. Dak.)	24	142, 167	236	262	13
Indian Creek (M. R. C.)	112	181	242	362	30
Ingram (G. S. of C.) (Canada)	38	198		266	16
Insane Asylum, water tank, Hastings	94	156			26, 28
International Flour Mill, steel tower, New Prague	85	152			26

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Interstate Bridge, Duluth and Superior, operator's tower, center of draw span	59	175, 204	239		23
Interstate Power Co., smokestack, Albert Lea	74	147			26
Irving School, chimney, West Duluth	59	175, 204			23
Isabella	136	215		370	19
Island	52	172, 203	238	295	22
Isle Royale East (U. S. L. S.) (Mich.)	63	206		304	23
Isle Royale East latitude station (U. S. L. S.) (Mich.)	63	206		304	23
Itasca, Chicago, St. Paul, Minneapolis and Omaha Railway, elevator stack (Wis.)	61	176, 205	239		23
Itasca east base (M. R. C.)	113	181, 207	242	363	30
Itasca, P. B. M. (M. R. C.)	113	181, 206	242	363	30
Itasca west bsae (M. R. C.)	113	181, 206	242	363	30
Ives	22	191	235	257	15
Jack Pine	136	215		370	19
Jackson:					
Coal tipple	71	145			24, 25
East base	65	143		309	25
Smokestack	71	145			24, 25
Steel water tank	71	146			24, 25
West base	65	143		308	24, 25
Jail. (*See* name of town).					
Jesse (Canada)	42	200		272	17
John (G. S. of C.) (Canada)	47	202		282	19
Johnson	50	171	238	290	21
Johnson (M. R. C.)	107	162	242	352	28
Johnson (Wis.)	88	154		231	27
Johnson's saw-mill, stack (½ mile southeast of Scanlon)	58	175, 204			22
Joliette:					
Tall church spire (N. Dak.)	37	197	236		16
Tall elevator (N. Dak.)	37	197	236		16
Jones	51	171	238	291	21, 30
Joy (Canada)	43	200		274	18
Jupiter	23	192	235	260	16
Kains (M. R. C.) (Iowa)	100	159	242	343	27
Kapanke (Wis.)	88	154		330	27
Kay	64	143		307	24
Keene	21	166, 191	235	255	14
Keene, church spire (3 miles northeast of station)	29	170, 193	236		14
Kellar	100	159			29
Kellar, brown church spire	100	159			29
Kelso Mountain	136	215		371	19
Kemres (M. R. C.)	111	180	242	360	21, 30
Kennedy	66	143		312	25
Kennedy:					
Church spire	35	196	237		16
School cupola	35	196	237		16
Kiester	66	144		313	25
Kiester, water tank	74	147			25
Kilmer (M. R. C.)	107	162	242	352	28
Kimberly	51	172	238	293	22, 30
Kipp (M. R. C.)	109	179	242	357	21
Kirkpatrick (M. R. C.)	132	189, 213			30
Kittson, elevator	32	194	237		15
Klein (M. R. C.) (Wis.)	103	160	242	346	27
Kluever	64	143		308	24
Knox (Canada)	43	201		275	18
Knud (M. R. C.)	103	160	242	347	27
La Belle (Canada)	42	200		272	17
La Crosse:					
Brewery, cupola (M. R. C.) (Wis.)	114	163			27
St. Josephs Church, spire (M. R. C.) (Wis.)	115	163			27
La Prairie (M. R. C.)	129	187, 212	242	365	30
Laforce (M. R. C.)	110	179	242	358	21
Lake (Canada)	43	200		273	18
Lake Alexander, tallest island, highest point	57	174			21
Lake City	95	157		342	27
Lake City:					
Church spire (M. R. C.)	115	164			27
Water tower (M. R. C.)	115	164			27
Lake Mills, standpipe (Iowa)	74	147			25
Lakefield:					
Church steeple	71	145			24
Steel water tank	71	145			24
White water tank	70	145			24

Index to geographic positions, plane coordinates, elevations, descriptions, and sketches—Continued

Station	Geographic position	Plane coordinates	Elevation	Description	Sketch
	Page	*Page*	*Page*	*Page*	*Figure*
Lakeport (M. R. C.) (Wis.)	103	160	242	348	27
Lambert (M. R. C.)	107	162	242	354	28
Lamond (M. R. C.)	131	188, 213		367	30
Lancaster:					
School cupola	36	197	237		16
Tall elevator	36	197	237		16
Lange	89	154		333	27
Lansing:					
Cupola (round) (M. R. C.) (Iowa)	114	163			27
Cupola (square) (M. R. C.) (Iowa)	114	163			27
Large Church, spire on west end (S. Dak.)	25	142, 167	237		13
Late (Boundary (I. B. C.)) (Canada)	43	200		274	18
Latitude station. (*See* geographic location.)					
Laundry. (*See* name of town.)					
Lawndale, elevator	28	169	237		14
Layden	19	141, 166	235	248	13
Leaf	49	171	238	284	20
Lee Monument (Iowa-Minn.)	91	155		337	27
Lee Monument, eccentric (Iowa)	91	155			27
Leslie	49	171	238	286	20
Lester River (U. S. L. S.)	61	176, 205		302	22, 23
Letellier (G. S. of C.) (Canada)	24	192		262	16
Letellier, elevator (G. S. of C.) (Canada)	37	197		265	16
Lewiston, water tank	77	148			27
Light (G. S. of C.) (Canada)	47	202		282	19
Light & Power Co., smokestack, Albert Lea	75	147			26
Light & Power Co., smokestack, Fairmont	72	146			25
Lincoln School, flagstaff in center of tower, East Superior (Wis.)	61	176, 205	239		23
Lismore	64	142		306	24
Lismore, church, north steeple	70	145			24
Lister (I. B. C.)	45	201		279	18, 19
Little Elk (M. R. C.)	110	179	242	357	21
Little Falls:					
Catholic Church, spire	56	174	239		21
Courthouse, spire	56	174	239		21
High school, spire	56	174	239	301	21
Pine Tree Lumber Co., stack	57	174	239		21
Littlefield (M. R. C.)	129	187, 212			30
Lockhart:					
Church spire	31	194	237		14, 15
Elevator	31	194	237		14, 15
Lone	50	171	238	287	20, 21
Lone elevator (3 miles north of Angus)	33	195	237		15
Long	49	171		287	20
Long Bridge, church spire	56	174	239		20
Long Prairie:					
Catholic Church, spire	56	174			20
Water tank	56	174	239		20
Longsight (M. R. C.)	131	188, 213			30
Loon	45	201		277	18
Loon (M. R. C.)	103	160	242	348	27
Loretto, large church steeple	84	152			28
Lucky (M. R. C.) (Wis.)	105	161	242	350	26, 28
Luna, elevator	34	195	237		15
Lund, Lutheran Church, spire (Wis.)	93	156			27
Lundeen	136	216		371	19
Lundell	90	154		335	26
Luther College, spire, Albert Lea	75	147			26
Lutheran Church. (*See* name of town.)					
Luverne	63	142		305	24
McDonald (M. R. C.)	69	144		319	27
McGregor, schoolhouse belfry	58	175	239		22, 30
McGregor, Vandewater Sawmill, stack	58	174			22, 30
McNamara (M. R. C.)	92	155		340	26, 28
McQuade (G. S. of C.) (Canada)	38	198		266	16
Mabel (I. B. C.)	47	202		282	19
Macalaster School, St. Paul	99	158			29
Mahtowa	52	172, 203	238	296	22
Maiden Rock (Wis.)	95	157		342	27
Manion (Wis.)	90	154		335	26
Maniton (Canada)	43	200		274	18
Mantrap (M. R. C.)	113	181, 206	242	362	30
Maple	49	171	238	286	20
Maple Hill (M. R. C.)	112	180	242	361	21, 30

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Station	Geographic position	Plane coordinates	Elevation	Description	Sketch
Maple Lake:	*Page*	*Page*	*Page*	*Page*	*Figure*
Catholic Church	83	151, 178			28
Flagpole	83	151, 178			28
Water tank	83	151, 178			28
Marcotta	95	157		341	28, 29
Marquette (M. R. C.)	113	181, 207	242	364	30
Martin (M. R. C.)	102	160	242	345	27
Mason, white belfry, red spire	76	148			26
Maxim	79	149		325	28, 29
Maxville (Wis.)	95	157		342	27
May	40	199		270	17
Meadow	68	144		316	26, 27
Meadows	20	166	235	253	14
Mechanical Arts Building, East Minneapolis	98	158			29
Medford	80	150		327	26
Melvin, elevator	32	194	237		15
Mendota (M. R. C.)	106	161	242	351	28, 29
Menisino (G. S. of C.) (Canada)	38	198		266	16
Meridian	80	150		328	26
Mero=B. M. $\frac{248}{1}$ (M. R. C.) (Wis.)	105	161	242	349	26
Merriam Park, St. Paul	99	158			29
Methodist Church. (*See name of town.*)					
Methodist Episcopal Church. (*See* name of town.)					
Middleboro (G. S. of C.) (Canada)	39	198		267	16
Midge (M. R. C.)	132	189, 213			30
Midge Lake P. B. M. (M. R. C.) (*See* station Midge P. B. M. (M. R. C.).)					
Midge P. B. M. (M. R. C.)	134	190, 215	242	369	30
Midway P. B. M. (M. R. C.)	133	189, 214	242	368	30
Mill. (*See* name of town.)					
Mill, flagstaff (M. R. C.)	117	165			28
Mille Lac (M. R. C.)	111	180	242	358	21
Miller (I. B. C.)	39	198		269	17
Minneapolis:					
Camp and Walker Mill	97	157			29
Electric-light mast	97	158			29
Gas house	98	158			29
Harvester Works	98	158			29
Hennepin Methodist Church, spire	84	152			29
High school	97	157			29
Schoolhouse	98	158			29
Suspension bridge, southeast pier	97	158			29
Suspension bridge, southwest pier	97	158			29
Universalist Church	97	157			29
W. D. Washburn, home	97	157			29
Westminster Church	97	157			29
Minnedoka (S. Dak.)	69	145		321	24
Minneiska (M. R. C.)	91	155		339	27
Minneiska, spire (M. R. C.)	115	164			27
Minnesota Point north base (U. S. L. S.)	61	176, 205		302	22, 23
Minnesota Point south base (U. S. L. S.)	61	176, 205		301	22, 23
Mission (M. R. C.)	111	180	242	360	21, 30
Mississip B. M. (M. R. C.)	130	188, 212		366	30
Moline (M. R. C.) (Wis.)	104	160	242	348	27
Montgomery:					
City water tank	85	152			26
Commander Flour Mill, water tank	85	152			26
Montgomery Ward, tower, St. Paul	84	152			29
Monticello	78	149		323	28
Monticello (M. R. C.)	108	162	242	354	28
Monticello:					
East base (M. R. C.)	108	162	242	354	28
Methodist Episcopal Church (M. R. C.)	118	165			28
West base (M. R. C.)	108	163	242	354	28
Morken	21	166, 191	235	255	14
Morris	80	150		327	26
Mortensen	97	157			28, 29
Motl	65	143		309	24, 25
Mound View	96	157			28, 29
Mount Weber	136	215		370	19
Mowe (G. S. of C.) (Canada)	47	202		282	19
Mud Lake (M. R. C.)	111	180	242	360	21, 30
Mulcara (M. R. C.)	106	162	242	352	28, 29
Muney (M. R. C.)	109	179	242	357	21
Muskeg (G. S. of C.) (Canada)	39	198		267	16, 17
Muskoda, elevator	29	169, 192	237		14
Myrtle (Canada)	41	199		271	17

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Station	Geographic position	Plane coordinates	Elevation	Description	Sketch
	Page	*Page*	*Page*	*Page*	*Figure*
Namakan east base	44	201		276	18
Namakan west base (Canada)	44	201		276	18
Nashua:					
East elevator	26	168			13, 20
West elevator	26	168		263	13, 20
White church	26	168	237	263	13, 20
National Elevator, Fairmount (N. Dak.)	25	167			13
Necessity (M. R. C.)	111	180	242	359	21, 30
Nelson	67	144		314	26
Nelson (M. R. C.) (Wis.)	91	155		339	27
New Albin (M. R. C.)	101	159	242	343	27
New Albin, spire (M. R. C.) (Iowa)	114	163			27
New Market:					
St. Nicholas Catholic Church, spire	84	152			26
Water tank	85	152			26
New Prague International Flour Mill, steel tower	85	152			26
Newry	67	144		315	26
Nishka (M. R. C.)	130	188, 212			30
Nit (M. R. C.)	120	182			21
Nix (Canada)	43	201		275	18
Nodine	91	155		338	27
Nodine, church spire	77	149			27
North La Crosse, spire (M. R. C.) (Wis.)	115	164			27
North Prairie (M. R. C.)	109	179	242	357	21
North Prairie, church (M. R. C.)	119	182			21
North Star (M. R. C.)	109	163, 179	242	356	21, 28
Northcote:					
Church spire	37	197	237		16
Tall elevator	36	197	237		16
Northern Pacific Railway, shops, St. Paul	99	158			29
Northern Pacific Railway, tall elevator (N. Dak.)	37	197	237		16
Northwestern College, tower, Fergus Falls	27	168	236		14, 20
Norway Grove (M. R. C.)	131	188, 212	242	366	30
Norwegian Lutheran Church. (*See* name of town.)					
Norwegian Lutheran Church, spire	77	148			27
Oak Ridge	89	154		332	27
Ockerson Heights (M. R. C.)	113	181, 206	242	363	30
Old Folks Home:					
Cupola, St. Cloud	82	150, 177			21, 28
Water tank, St. Cloud	83	151, 178			21, 28
Old Road (M. R. C.)	130	187, 212	242	365	30
Oleson (M. R. C.)	54	173		300	21
Olivet Baptist Church, East Minneapolis	98	158			29
Omega (M. R. C.)	132	189, 213			30
Onalaska (M. R. C.) (Wis.)	101	159	242	344	27
Onalaska, spire (M. R. C.) (Wis.)	115	164			27
Oneota River (U. S. L. S.)	61	176, 205		302	22, 23
Onion Mountain	137	216		371	19
Ore docks, Weather Bureau, signal tower, Superior (Wis.)	61	176, 205	239		23
Orleans, school cupola	37	197	237		16
Osakis	49	171	238	286	20
Osakis:					
Low church spire	56	173			20
Tall church spire	56	173			20
Water tower	55	173	239		20
Oscar, church spire	27	169	237		14
Oscarson	19	166	234	249	13
Oscarson reference mark. (*See also* station Oscarson)			234		
Otsego, spire (M. R. C.)	118	165			28
Outer Island (U. S. L. S.) (Wis.)	62	206		303	23
Outer Island latitude station (U. S. L. S.) (Wis.)	63	206		304	23
Outlet (M. R. C.)	114	181, 207	242	364	30
Overbys	137	216		372	19
Owatonna:					
Catholic Church, steeple	86	152			26
Central heating plant, smokestack	86	153			26
Flagpole	86	153			26
Light and power plant, tall smokestack	86	153			26
Lutheran Church, gray spire (cross on top)	86	153			26
Pillsbury Academy, tall gray spire	85	152			26
Red belfry	86	153			26
Sacred Heart Catholic Church, cupola	86	153			26
Standpipe	86	153			26
State Orphanage, water tank (conical top)	86	152			26
Water tank	85	152			26

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Station	Geographic position	Plane coordinates	Elevation	Description	Sketch
Packing Company. (*See* name of town.)	*Page*	*Page*	*Page*	*Page*	*Figure*
Paddy (G. S. of C.) (Canada)	47	202		281	19
Palmer (M. R. C.)	106	162	242	352	28, 29
Paper mill. (*See* name of town.)					
Papoose (M. R. C.)	130	188, 212			30
Parker	49	171	238	285	20
Parker (M. R. C.)	111	180	242	359	21, 30
Parks (M. R. C.)	108	163, 178	242	355	28
Pat (Canada)	42	200		272	17
Pat P. B. M. (M. R. C.)	133	189, 214	242	368	30
Paulsen (G. S. of C.)	47	202		281	19
Paulsen (Gunflint) Fire Lookout Tower	137	216		371	19
P. B. M., Biggar (M. R. C.)	132	189, 213	240	367	21, 30
P. B. M., County line (M. R. C.)	113	181, 207	241	364	30
P. B. M., Cut-off (M. R. C.)	121	182, 207	241	364	21, 30
P. B. M., Foulds (M. R. C.)	133	189, 214	241	368	21, 30
P. B. M., Hamilton (M. R. C.)	133	189, 214	241	368	30
P. B. M., Itasca (M. R. C.)	113	181, 206	242	363	30
P. B. M., Midge (M. R. C.)	134	190, 215	242	369	30
P. B. M., Midway (M. R. C.)	133	189, 214	242	368	30
P. B. M., Pat (M. R. C.)	133	189, 214	242	368	30
P. B. M., Prospect Hill (M. R. C.)	113	181, 206	243	363	30
P. B. M., School (M. R. C.)	133	189, 214	243	368	30
P. B. M., Slip (M. R. C.)	133	189, 214	243	368	30
P. B. M., Stone (M. R. C.)	133	189, 214	243	368	30
P. B. M., Strawberry (M. R. C.)	133	189, 214	243	368	30
P. B. M., Sutton (M. R. C.)	132	189, 214	243	367	21, 30
P. B. M., △ Big Lagoon (M. R. C.)	124	184, 209		365	30
P. B. M., △ Carlson (M. R. C.)	123	184, 208	240	364	30
P. B. M., △ Fiessen (M. R. C.)	126	186, 210	241	365	30
P. B. M., △ Five Pines (M. R. C.)	128	187, 211	241	365	30
P. B. M., △ Split Hand (M. R. C.)	127	186, 211	243	365	30
P. B. M., △ Strand (M. R. C.)	122	183, 208	243	364	30
P. B. M., Vicinity (M. R. C.)	133	189, 214	244	368	30
P. B. M., Waldeck (M. R. C.)	133	189, 214		367	21, 30
P. B. M., Wells (M. R. C.)	133	189, 214	244	368	30
P. B. M., Wye (M. R. C.)	134	190, 215	244	369	30
Peck (M. R. C.)	106	162	242	351	28, 29
Peckerall Lake, German Lutheran Church, steeple	74	147			25, 26
Pegg (M. R. C.)	111	180	242	358	21
Pelican Lake (M. R. C.)	112	180	242	361	21, 30
Pembina (G. S. of C.) (N. Dak.)	23	192		262	16
Pembina, square open tower (N. Dak.)	37	197	237		16
Perry (M. R. C.)	109	179	242	357	21
Peterman (M. R. C.)	102	160	242	345	27
Peterson (Wis.)	89	154		334	26, 27
Peterson (M. R. C.)	105	161	242	349	26, 27
Peterson's (Wm.) house, chimney	58	175, 204			22
Phillippi (M. R. C.)	114	181, 207	242	364	30
Pierhead. (*See* name of town.)					
Pierz:					
Catholic Church	80	150, 177			21
Church building (dark top)	81	150, 177			21
Highest grain elevator	81	150, 177			21
Pig (Canada)	42	200		273	17
Pigeon (G. S. of C.)	48	203		283	19, 23
Pike Bay (M. R. C.)	131	188, 213		367	30
Pillsbury (M. R. C.)	132	189, 213			30
Pillsbury A. Mill, East Minneapolis	98	158			29
Pillsbury Academy, tall gray spire, Owatonna	85	152			26
Pillsbury Mills, brick smokestack, Anoka	84	152			28
Pilot	68	144		317	27
Pine (Canada)	42	200		272	17
Pine Knoll (M. R. C.)	112	180	242	360	21, 30
Pine Mountain	137	216		372	19
Pine Mountain Lake (M. R. C.)	112	181	242	362	30
Pine Tree Lumber Co., stack, Little Falls	57	174	239		21
Piney (G. S. of C.) (Canada)	38	198		266	16
Pipp (Canada)	41	200		271	17
Pluss (Reference Monument 340 (I. B. C.))	44	201		275	18
Pokegama (M. R. C.)	129	187, 212			30
Polish Church, spire (M. R. C.), Winona	115	164			27
Poly (G. S. of C.)	47	202		281	19
Porcupine (M. R. C.)	129	187, 211		365	30
Porcupine Mountains (U. S. L. S.) (Mich)	62	206		303	23
Porcupine Mountains latitude station (U. S. L. S.) (Mich.)	63	206		304	23
Portage	44	201		276	18
Portage (M. R. C.)	131	188, 213		366	30
Post	63	142		305	24

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Powder Horn (M. R. C.)	106	162	242	351	28, 29
Powell (M. R. C.)	107	162	242	352	28
Power plant. (*See* name of town.)					
Powers Grain Elevator, Rice	81	150, 177			21
Preacher Hill (S. Dak.)	19	141, 166	235	247	13
Presbyterian Church. (*See* name of town.)					
Prescott (Wis.)	105	161	242	350	26, 28
Prescott 2 (Wis.)	90	154		336	26, 28
Prescott:					
Catholic Church (M. R. C.) (Wis.)	117	164			26, 28
Schoolhouse (M. R. C.) (Wis.)	117	164			26, 28
White church (M. R. C.) (Wis.)	117	164			26, 28
Princeton, steel water tank	83	151, 178			21, 28
Proctorknott, railway shops, water tank (Wis.)	59	175, 204	239		23
Prospect Hill P. B. M. (M. R. C.)	113	181, 206	243	363	30
Prospect Park	96	157	243	342	28, 29
Protestant Church. (*See* name of town.)					
Quick	78	149, 177		323	21, 28
R. (*See* T. (Township).)					
Rabbit	51	172	238	291	21, 30
Rabbit (M. R. C.)	111	180	243	359	21, 30
Race Track (M. R. C.)	129	187, 212	243	365	30
Radium:					
Low east elevator	34	195	237		15
Tall elevator	34	195	237		15
West elevator (large top)	34	195	237		15
Rae	51	172	238	293	22, 30
Rail	51	171	238	290	21
Railroad shops. (*See* name of town.)					
Railway shops. (*See* name of town.)					
Rainy Lake 14 (I. B. C.) (Raney) (Canada)	43	200		273	18
Rainy Lake 37 (I. B. C.) (Water) (Canada)	43	200		274	18
Ramsey	95	157			28, 29
Randolph	44	201		276	18
Raney (Rainy Lake 14 (I. B. C.)) (Canada)	43	200		273	18
Rask (Wis.)	89	154		334	27
Ray (Canada)	41	199		271	17
Read (G. S. of C.) (Canada)	38	198		266	16
Reading	64	143		307	24
Reading, grain elevator	70	145			24
Red	40	199		269	17
Red Rock (M. R. C.)	92	155		340	28, 29
Red Wing (M. R. C.)	92	155		340	26, 27
Red Wing:					
Catholic School (M. R. C.)	116	164			26, 27
Convent spire (M. R. C.)	116	164			26, 27
Lower base (M. R. C.) (Wis.)	105	161	243	349	26, 27
Reform school (M. R. C.)	115	164			26, 27
Upper base (M. R. C.) (Wis.)	104	161	243	349	26, 27
Water tank (M. R. C.)	116	164			26, 27
Reddy (Canada)	41	199		271	17
Redmound (Wis.)	88	153		329	27
Reeds Landing:					
Church spire (M. R. C.)	115	164			27
Schoolhouse (M. R. C.)	115	164			27
Reference Monument 48 (I. B. C.)	40	199		269	17
Reference Monument 340 (I. B. C.) (Pluss)	44	201		275	18
Reform school. (*See* name of town.)					
Reformatory (M. R. C.)	109	163, 179	243	356	21, 28
Reno (M. R. C.)	101	159	243	343	27
Rice back base (M. R. C.)	53	172	243	299	21
Rice County Courthouse, spire, Faribault	85	152			26
Rice river base (M. R. C.)	109	179	243	357	21
Rice:					
Catholic Church, spire	57	174	239		21
Church spire (M. R. C.)	119	182			21
Powers Grain Elevator	81	150, 177			21
Protestant Church	57	174			21
Rice Lake (M. R. C.)	111	180	243	359	21
Rich Prairie, Catholic Church, spire	57	174	239		21
Richmond (M. R. C.)	101	159	243	345	27
Ridgeville (G. S. of C.) (Canada)	23	192		262	16
Ridgeway "A"	69	145		320	27
Ridgeway "B"	69	145		320	27
Ridgeway "C"	69	145		320	27
Ridgeway east base	69	144		319	27

Index to geographic positions, plane coordinates, elevations, descriptions, and sketches—Continued

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	Page	*Page*	*Page*	*Page*	*Figure*
Ridgeway west base	69	144		319	27
Rindal, church spire	31	194	237		15
Rip (Canada)	42	200		272	17
Rita (G. S. of C.) (Canada)	39	198		267	16
River Bank (M. R. C.)	108	163, 178	243	355	28
Riverton	21	166, 191	235	254	14
Road	40	199		269	17
Rob (Canada)	42	200		273	17
Robb (Wis.)	88	154		330	27
Rock	46	202		280	18, 19
Roemer (Wis.)	89	154		333	27
Rogers, white church, gray spire	83	151			
Roll (Canada)	43	200		274	18
Rollag, church spire	28	169, 192	237		14
Roon, elevator	34	195	237		15
Root River (M. R. C.)	91	155	243	338	27
Rosby (M. R. C.) (Beltrami County)	132	189, 213			30
Rosby (M. R. C.) (Goodhue County)	105	161	243	350	26
Round House B. M. (M. R. C.)	133	190, 214	243	369	30
Round Lake, water tank	70	145			24
Royalton (M. R. C.)	53	172	239, 243	299	21
Royalton:					
Catholic Church, spire	81	150, 177			21
North base	50	171	238	289	21
Old Catholic Church, cross	57	174	239		21
School (M. R. C.)	119	182			21
South base	50	171	238	289	21
Water tank	81	150, 177			21
Rub (Canada)	42	200		272	17
Rush (M. R. C.) (Wis.)	104	161	243	348	27
Rush Creek (M. R. C.) (Wis.)	100	159	243	343	27
Russia, elevator	32	194	237		15
Rye (Canada)	44	201		275	18
Sabin, elevator	29	169, 192			14
Sacred Heart Catholic Church cupola, Owatonna	86	153			26
St. Augusta (M. R. C.)	109	163, 179	243	356	21, 28
St. Augusta, spire (M. R. C.)	118	165, 181			21, 28
St. Cloud	78	149, 177		322	21, 28
St. Cloud:					
Breen Hotel, chimney	82	151, 178			21, 28
Catholic Cathedral, tower	82	151, 177			21, 28
Catholic Orphanage, cross on tower	82	150, 177			21, 28
City water works standpipe	82	151, 178			21, 28
Old Folks Home, cupola	82	150, 177			21, 28
Old Folks Home, water tank	83	151, 178			21, 28
Power plant smokestack	82	151, 178			21, 28
St. Raphaels Hospital, chimney	82	151, 177			21, 28
State Reformatory, concrete standpipe	81	150, 177			21, 28
State Reformatory, flagpole	82	150, 177			21, 28
State Reformatory, smokestack	82	150, 177			21, 28
Stearns County Courthouse, dome	82	151, 177			21, 28
Tall white smokestack	82	151, 178			21, 28
St. John Catholic Church, spire, Dayton	83	151, 178			28
St. Joseph (Wis.)	69	145		320	27
St. Joseph:					
Catholic Church, north spire	81	150, 177			21
Catholic Church, south spire	81	150, 177			21
St. Joseph Church, spire (Wis.)	77	149			27
St. Joseph Church, spire (M. R. C.), La Crosse	115	163			27
St. Marys:					
Hospital, spire, Superior (Wis.)	59	175, 204	239		23
School, spire with open columns in belfry, Faribault	85	152			26
St. Michaels, Catholic Church, clock on tower	83	151			28
St. Nicholas Catholic Church, spire, New Market	84	152			26
St. Paul:					
Back base (M. R. C.)	106	161			28, 29
Church spire	100	159			29
City Hall (M. R. C.)	117	165			29
Customhouse	99	158			29
Exhibition Building	99	158			29
Front base (M. R. C.)	106	161	243	351	28, 29
German Catholic Church	99	158			29
Globe Building	99	159			29
Hamlin University	99	158			29
House, with red roof	99	158			29
Macalaster School	99	158			29
Merriam Park	99	158			29

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St. Paul—Continued.	*Page*	*Page*	*Page*	*Page*	*Figure*
Montgomery Ward, tower	84	152			29
New county courthouse	99	158			29
Northern Pacific Railway, shops	99	158			29
Northwest base	97	157			28, 29
Reform School	99	158			29
Southeast base	97	157			28, 29
State House	99	158			29
St. Raphaels Hospital, chimney, St. Cloud	82	151, 177			21, 28
St. Stephens Catholic Church, spire	81	150, 177			21
St. Vincent, bell tower	37	197	237		16
St. Vincent Junction, elevator	37	197	237		16
St. Vincent, tower (round top)	37	197	237		16
Sand Pit (M. R. C.)	131	188, 213			30
Santiago (M. R. C.)	131	188, 213			30
Sargent	67	144		315	26
Sauk Center, Catholic Church, spire	56	174	239	301	20
Sauk Rapids (M. R. C.)	109	163, 179	243	356	21
Sauk Rapids:					
Catholic Church	83	151, 178			21, 28
School (M. R. C.)	119	165, 182			21, 28
Water tank	83	151, 178			21, 28
Saunders (G. S. of C.)	47	202		281	19
Saunders, Great Northern Railway, water tank (Wis.)	61	176, 205	239		23
Saw-mill. (*See* name of town.)					
Sawyer	52	172, 203	238	296	22
Scanton:					
Johnson's saw-mill, stack (½ mile southeast of)	58	175, 204			22
Saw-mill stack (southeast edge of town)	59	175, 204	239		22
Schoolhouse cupola	59	175, 204	239	301	22
Scarville (Iowa)	67	144		314	25
Schley (M. R. C.)	131	188, 213		366	30
Schmidt	67	144		313	25, 26
School. (*See* name of town.)					
School Craft (M. R. C.)	113	181, 206	243	363	30
School cupola	74	147			25, 26
School P. B. M. (M. R. C.)	133	189, 214	243	368	30
Schoolhouse. (*See* name of town.)					
Schoolhouse chimney (½ mile north of station Hankinson) (N. Dak.)	25	167			13
Schoolhouse cupola (Iowa)	74	147			25
Schoolhouse flagstaff (M. R. C.)	119	182			21
Schumer	78	149, 176		321	21
Schwitzer (M. R. C.) (Wis.)	91	155		339	27
Sea (Canada)	43	200		274	18
Section corner. (*See* T. (Township).)					
Seeley (M. R. C.)	112	180	243	361	21, 30
Senne	65	143		310	25
Shakopee	79	149		325	26, 28
Shenton (M. R. C.)	108	163, 178	243	354	28
Shep P. B. M. (M. R. C.). (*See* station Slip P. B. M. (M. R. C.).)					
Sherack	22	191	234	258	15
Sherack:					
Low elevator	33	195	237		15
Tall elevator	33	195	237		15
Sherburn:					
Small spire	71	146			25
Wooden water tank	71	146			25
Shields	79	150		327	26
Shieldsville, Catholic Church, black cross	85	152			26
Shirley	22	191	235	257	15
Shop chimney, Soo Lines (M. R. C.)	117	165			29
Shortiss (I. B. C.) (Canada)	45	201		278	18, 19
Shorty	66	143		312	25
Signal tower. (*See* name of town.)					
Simmons (M. R. C.)	105	161	243	350	26, 28, 29
Skane	23	192	235	260	16
Skane, church spire (3 miles south of station)	36	196	236		16
Skounter Hill (M. R. C.)	53	173	239, 243	299	21
Sletten	67	144		313	25
Slip P. B. M. (M. R. C.)	133	189, 214	243	368	30
Slow (G. S. of C.) (Canada)	38	198		266	16
Smokestack. (*See* name of town.)					
Snag (M. R. C.)	111	180	243	359	21, 30
Snelling	90	154		337	28, 29
Snelling Avenue north base	95	156		341	28, 29
Snelling Avenue south base	95	156		341	28, 29
Snelling Tower	96	157			28, 29

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Soft (G. S. of C.) (Canada)	39	198		267	16
Soldiers Home (M. R. C.)	117	165			29
Soo Line, shop chimney (M. R. C.)	117	165			29
Sotowa (Iowa)	71	145		321	24, 25
South Junction (G. S. of C.) (Canada)	38	198		267	16
South Superior:					
Billings School, belfry (Wis.)	60	176, 205	239		23
Bryant School, northeast corner of northwest chimney (Wis.)	60	176, 205	239		23
Webster Chair Manufacturing Co. stack (Wis.)	60	176, 205	239		23
Spider Lake (M. R. C.)	112	181	243	362	21, 30
Spire. (*See* name of town.)					
Spirit Lake, steel water tank (Iowa)	71	145			24, 25
Split Hand, △, P. B. M. (M. R. C.)	127	186, 211	243	365	30
Split Rock (U. S. L. S.)	62	205		303	23
Sprague (G. S. of C.) (Canada)	39	198		267	16
Spring (M. R. C.)	131	188, 213		367	30
Spring Grove:					
Church spire	77	148			27
Water tank	77	149			27
Spring Valley:					
Catholic Church, spire	76	148		321	26, 27
Lutheran Church, spire (2 miles east of)	76	148		321	27
Schoolhouse spire	76	148			26, 27
Water tank	76	148			26, 27
Spur	41	199		270	17
Squaw (M. R. C.)	130	188, 212			30
Squaw Lake (M. R. C.)	113	181, 206	243	363	30
Stack. (*See* name of town.)					
Standpipe. (*See* name of town.)					
Standpipe (M. R. C.)	119	165, 182			21, 28
Starke (M. R. C.)	130	188, 212	243	366	30
State Capitol (M. R. C.)	117	165			29
State Deaf and Dumb School, water tank, Faribault	85	152			26
State Feeble-minded Institution, dome, Faribault	85	152			26
State House, St. Paul	99	158			29
State Line (M. R. C.) (Iowa-Minn.)	114	163			27
State Normal School, smaller and higher tower, Superior (Wis.)	59	175, 204	239		23
State Reformatory, concrete standpipe, St. Cloud	81	150, 177			21, 28
State Reformatory, flagpole, St. Cloud	82	150, 177			21, 28
State Reformatory, smokestack, St. Cloud	82	150, 177			21, 28
States	23	192	235	261	16
States (Canada)	42	200		273	17
Stearns County Courthouse, dome, St. Cloud	82	151, 177			21, 28
Stephen:					
Church spire (5 miles northeast of station Stephen west base)	35	196		236	15
East base	22	191	234	259	15
Low church spire	35	196	237		15
School cupola	35	196	237		15
Tall church spire	35	196	237		15
West base	23	191	234	260	15
West base longitude station	35	196		265	15
Stewart	68	144		316	26, 27
Stewart (M. R. C.)	112	180	243	361	21, 30
Stewartville:					
Catholic Church, spire	76	148			26, 27
City water tank	76	148			26, 27
Stoddard (M. R. C.) (Wis.)	101	159	243	344	27
Stoddard, water tank (M. R. C.) (Wis.)	114	163			27
Stone (Canada)	42	200		273	17
Stone P. B. M. (M. R. C.)	133	189, 214	243	368	30
Stone Point (M. R. C.)	132	189, 213			30
Stoney (I. B. C.)	39	198		268	17
Strand, △, P. B. M. (M. R. C.)	122	183, 208	243	364	30
Strawberry P. B. M. (M. R. C.)	133	189, 214	243	368	30
Strusz	89	154		335	26, 27
Stuart (G. S. of C.) (Canada)	47	202		282	19
Stuartburn (G. S. of C.) (Canada)	38	198		266	16
Sugar Loaf (M. R. C.)	104	160	243	348	27
Suintax (M. R. C.), 1898, Brockway	50	171	243	288	21
Summit (M. R. C.)	129	187, 212			30
Sunday (G. S. of C.) (Canada)	46	202		281	19
Superior (Wis.)	53	172, 203	238	298	22, 23

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Superior:	*Page*	*Page*	*Page*	*Page*	*Figure*
Elevator K, stack (Wis.)	59	175, 204	239		23
Elevator S, Great Northern Railway, south gable (Wis.)	59	175, 204	239		23
Elevator T, south gable (Wis.)	59	175, 204	239		23
Ore docks, weather bureau, signal tower (Wis.)	61	176, 205	239		23
Pierhead, Front Range Lighthouse Wis.)	59	175, 204			23
Pierhead, Rear Range Lighthouse (Wis.)	59	175, 204	239		23
St. Marys Hospital, spire (Wis.)	59	175, 204	239		23
State Normal School, smaller and higher tower (Wis.)	59	175, 204	239		23
Surre (M. R. C.)	111	180	243	360	21, 30
Suspension bridge, southeast pier, Minneapolis	97	158			29
Suspension bridge, southwest pier, Minneapolis	97	158			29
Sutton P. B. M. (M. R. C.)	132	189, 214	243	367	21, 30
Svea (Wis.)	89	154		335	26
Svea, church spire (Wis.)	94	156			26
Swamp (G. S. of C.) (Canada)	39	198		267	16
Swamp (M. R. C.)	121	182, 207			21, 30
Swan Creek (M. R. C.)	53	173	239, 243	300	21
Swedish Lutheran Church, spire (2 miles east of station Enwiller) (S. Dak.)	25	142, 167	237	263	13
Syre	21	166, 191	235	255	14
T. 124 N., R. 49 W., sec. 18, southeast corner	24	142, 167	237	262	13
T. 125 N., R. 48 W., sec. 17, west ¼ corner	24	142, 167	237	262	13
T. 125 N., R. 52 W., sec. 10, northeast corner (S. Dak.)	24	142, 167		262	13
T. 128 N., R. 49 W., sec. 36, east ¼ corner (S. Dak.)	25	142, 167		263	13
T. 129 N., R. 42 W., sec. 3, east ¼ corner	55	173			20
T. 130 N., R. 50 W., sec. 28, southeast corner (N. Dak.)	25	167		263	13
T. 131 N., R. 44 W., sec. 26, north ¼ corner	26	168		263	13, 20
T. 137 N., R. 44 W., sec. 2 southwest corner	28	169		263	14
T. 139 N., R. 46 W., sec. 23, south ¼ corner	29	169, 192		263	14
T. 141 N., R. 47 W., sec. 10, southeast corner	30	170, 193		263	14
T. 147 N., R. 47 W., sec. 23, southeast corner	32	194		264	15
T. 149 N., R. 44 W., sec. 19, southeast corner	32	194		264	15
T. 149 N., R. 46 W., sec. 18, southwest corner	32	194		264	15
T. 153 N., R. 47 W., sec. 31, southeast corner	33	195		264	15
T. 155 N., R. 47 W., sec. 19, southeast corner	34	195		264	15
T. 158 N., R. 48 W., sec. 6, northeast corner	35	196		265	15, 16
T. 160 N., R 49 W., sec. 8, northwest corner (*see also* T. 169 N., R. 49 W., sec. 8, northwest corner)	36	196		265	16
Tabor Church, spire, Bay City (Wis.)	93	156			26, 27
Tabor:					
East church spire	33	195	237		15
West church spire	33	195	237		15
Tamarack	52	172, 203	238	294	22, 30
Tansem	21	166	235	254	14
Tansem:					
Gray church spire (7 miles south of station)	28	169			14
White church spire (5 miles south of station)	28	169			14
Telephone (M. R. C.)	108	162	243	354	28
Tertiary triangulation (M. R. C.) (*See* △.)					
△ 1 (M. R. C.)	121	182, 207			21, 30
△ 1a (M. R. C.)	134	190, 215			30
△ 2 (M. R. C.)	121	183, 207			21, 30
△ 2a (M. R. C.)	134	190, 215			30
△ 3 (M. R. C.)	121	183, 207			21, 30
△ 3a (M. R. C.)	135	190, 215			30
△ 4 (M. R. C.)	121	183, 207			21, 30
△ 4a (M. R. C.)	135	190, 215			30
△ 5 (M. R. C.)	121	183, 207			21, 30
△ 5a (M. R. C.)	135	190, 215			30
△ 6 (M. R. C.)	121	183, 207			21, 30
△ 6a (M. R. C.)	135	190, 215			30
△ 7 (M. R. C.)	121	183, 207			21, 30
△ 7a (M. R. C.)	135	190, 215			30
△ 8 (M. R. C.)	121	183, 207			21, 30
△ 8a (M. R. C.)	135	190, 215			30
△ 9 (M. R. C.)	121	183, 207			21, 30
△ 9a (M. R. C.)	135	190, 215			30
△ 10 (M. R. C.)	121	183, 207			21, 30
△ 10a (M. R. C.)	135	190, 215			30
△ 11 (M. R. C.)	121	183, 207			21, 30
△ 12 (M. R. C.)	121	183, 207			21, 30
△ 13 (M. R. C.)	121	183, 207			21, 30
△ 14 (M. R. C.)	121	183, 207			21, 30
△ 15 (M. R. C.)	122	183, 208			21, 30
△ 16 (M. R. C.)	122	183, 208			21, 30
△ 17 (M. R. C.)	122	183, 208			21, 30

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△ 18 (M. R. C.)	122	183, 208			21, 30
△ 19 (M. R. C.)	122	183, 208			21, 30
△ 20 (M. R. C.)	122	183, 208			21, 30
△ 21 (M. R. C.)	122	183, 208			30
△ 22 (M. R. C.)	122	183, 208			30
△ 23 (M. R. C.)	122	183, 208			30
△ 24 (M. R. C.)	122	153, 208			30
△ 25 (M. R. C.)	122	183, 208			30
△ 26 (M. R. C.)	122	183, 208			30
△ 27 (M. R. C.)	123	184, 208			30
△ 28 (M. R. C.)	123	184, 208			30
△ 29 (M. R. C.)	123	184, 208			30
△ 30 (M. R. C.)	123	184, 208			30
△ 31 (M. R. C.)	123	184, 208			30
△ 32 (M. R. C.)	123	184, 208			30
△ 33 (M. R. C.)	123	184, 208			30
△ 34 (M. R. C.)	123	184, 208			30
△ 34 Fanbel (M. R. C.)	133	190, 214			30
△ 35 (M. R. C.)	123	184, 208			30
△ 35 Fanbel (M. R. C.)	134	190, 214			30
△ 36 (M. R. C.)	123	184, 208			30
△ 37 (M. R. C.)	123	184, 208			30
△ 38 (M. R. C.)	123	184, 208			30
△ 39 (M. R. C.)	123	184, 208			30
△ 40 (M. R. C.)	123	184, 209			30
△ 41 (M. R. C.)	123	184, 209			30
△ 42 (M. R. C.)	123	184, 209			30
△ 43 (M. R. C.)	124	184, 209			30
△ 44 (M. R. C.)	124	184, 209			30
△ 45 (M. R. C.)	124	184, 209			30
△ 46 (M. R. C.)	124	184, 209			30
△ 47 (M. R. C.)	124	184, 209			30
△ 48 (M. R. C.)	124	184, 209			30
△ 49 (M. R. C.)	124	184, 209			30
△ 50 (M. R. C.)	124	184, 209			30
△ 51 (M. R. C.)	124	184, 209			30
△ 52 (M. R. C.)	124	185, 209			30
△ 53 (M. R. C.)	124	185, 209			30
△ 54 (M. R. C.)	124	185, 209			30
△ 55 (M. R. C.)	125	185, 209			30
△ 56 (M. R. C.)	125	185, 209			30
△ 57 (M. R. C.)	125	185, 209			30
△ 58 (M. R. C.)	125	185, 209			30
△ 59 (M. R. C.)	125	185, 209			30
△ 60 (M. R. C.)	125	185, 209			30
△ 61 (M. R. C.)	125	185, 209			30
△ 62 (M. R. C.)	125	185, 209			30
△ 63 (M. R. C.)	125	185, 209			30
△ 64 (M. R. C.)	125	185, 209			30
△ 65 (M. R. C.)	125	185, 209			30
△ 66 (M. R. C.)	125	185, 210			30
△ 67 (M. R. C.)	125	185, 210			30
△ 68 (M. R. C.)	125	185, 210			30
△ 69 (M. R. C.)	125	185, 210			30
△ 70 (M. R. C.)	125	185, 210			30
△ 71 (M. R. C.)	125	185, 210			30
△ 72 (M. R. C.)	126	185, 210			30
△ 73 (M. R. C.)	126	185, 210			30
△ 74 (M. R. C.)	126	185, 210			30
△ 75 (M. R. C.)	126	185, 210			30
△ 76 (M. R. C.)	126	185, 210			30
△ 77 (M. R. C.)	126	185, 210			30
△ 78 (M. R. C.)	126	185, 210			30
△ 79 (M. R. C.)	126	186, 210			30
△ 80 (M. R. C.)	126	186, 210			30
△ 81 (M. R. C.)	126	186, 210			30
△ 82 (M. R. C.)	126	186, 210			30
△ 83 (M. R. C.)	126	186, 210			30
△ 84 (M. R. C.)	127	186, 210			30
△ 85 (M. R. C.)	127	186, 210			30
△ 86 (M. R. C.)	127	186, 210			30
△ 87 (M. R. C.)	127	186, 210			30
△ 88 (M. R. C.)	127	186, 210			30
△ 89 (M. R. C.)	127	186, 210			30
△ 90 (M. R. C.)	127	186, 210			30
△ 91 (M. R. C.)	127	186, 210			30
△ 92 (M. R. C.)	127	186, 211			30
△ 93 (M. R. C.)	127	186, 211			30

Index to geographic positions, plane coordinates, elevations, descriptions, and sketches—Continued

Station	Geographic position	Plane coordinates	Elevation	Description	Sketch
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△ 94 (M. R. C.)	127	186, 211			30
△ 95 (M. R. C.)	127	186, 211			30
△ 96 (M. R. C.)	127	186, 211			30
△ 97 (M. R. C.)	127	186, 211			30
△ 98 (M. R. C.)	127	186, 211			30
△ 99 (M. R. C.)	127	186, 211			30
△ 100 (M. R. C.)	128	186, 211			30
△ 101 (M. R. C.)	128	186, 211			30
△ 102 (M. R. C.)	128	186, 211			30
△ 103 (M. R. C.)	128	186, 211			30
△ 104 (M. R. C.)	128	187, 211			30
△ 105 (M. R. C.)	128	187, 211			30
△ 106 (M. R. C.)	128	187, 211			30
△ 107 (M. R. C.)	128	187, 211			30
△ 108 (M. R. C.)	128	187, 211			30
△ 109 (M. R. C.)	128	187, 211			30
△ 110 (M. R. C.)	128	187, 211			30
△ 111 (M. R. C.)	128	187, 211			30
△ 112 (M. R. C.)	129	187, 211			30
△ 113 (M. R. C.)	129	187, 211			30
△ Big Lagoon P. B. M. (M. R. C.)	124	184, 209		365	30
△ Carlson P. B. M. (M. R. C.)	123	184, 208	240	368	30
△ Fiessen P. B. M. (M. R. C.)	126	186, 210	241	365	30
△ Five Pines P. B. M. (M. R. C.)	128	187, 211	241	365	30
△ Split Hand P. B. M. (M. R. C.)	127	186, 211	243	365	30
△ Strand P. B. M. (M. R. C.)	122	183, 208	243	364	30
Thunder (I. B. C.) (Canada)	39	198		268	17
Tilden	21	191	235	257	15
Timber	45	201		278	18
Tissen P. B. M. (M. R. C.). (*See* station Fiessen P. B. M. (M. R. C.).)					
Toad (Canada)	41	199		271	17
Tod (G. S. of C.) (Canada)	39	198		267	16
Tolstoi (G. S. of C.) (Canada)	38	198		265	16
Tomahawk B. M. (M. R. C.)	130	188, 212	243	366	30
Ton	41	199		270	17
Tower (Canada)	44	201		276	18
Tower. (*See* name of town.)					
Township. (*See* T.)					
Trempealeau (M. R. C.) (Wis.)	91	155		338	27
Trempealeau east base=B. M. $\frac{221}{1}$ (M. R. C.) (Wis.)	102	160	243	345	27
Trempealeau, spire (M. R. C.) (Wis.)	115	164			27
Trempealeau west base (M. R. C.) (Wis.)	102	160	243	345	27
Trenton (M. R. C.) (Wis.)	104	161	243	349	26, 27
Trouble (G. S. of C.) (Canada)	47	202		281	19
Trout Lake	137	216		371	19
Tusa	64	143		308	24, 25
Twin Valley:					
Standpipe	30	170, 193	237		14
Tall elevator (slender top)	31	170, 193	237		14
White church spire	30	170, 193	237		14
Union Match Co.:					
Cupola, Duluth	59	175, 204	238		23
Water tank, Duluth	59	175, 204	238	301	23
United States-Canada Boundary Monument No. 837	37	197		265	16
United States-Canada Boundary Monument No. 848	37	197		265	16
U. S. E. 202 B. M.	132	189, 213	243	367	21, 30
U. S. E. 209 B. M.	132	189, 214	243	367	21, 30
U. S. E. 347 B. M.	134	190, 214	243	369	30
U. S. E., B. M. 342 (Fanbel B. M. (M. R. C.))	134	190, 214		369	30
Universalist Church. (*See* name of town.)					
University	97	157			28, 29
University Avenue Methodist Episcopal Church, East Minneapolis	98	158			29
Vallee (M. R. C.)	110	179	244	358	21
Vandewater Sawmill, stack, McGregor	58	174			22, 30
Varley (M. R. C.)	107	162	244	354	28
Vasa	96	157		342	26
Vasa, church spire	94	156			26
Vera (I. B. C.) (Canada)	47	202		282	19
Vermilion (I. B. C.) (Canada)	45	201		277	18
Veseli	79	149		326	26
Vicinity P. B. M. (M. R. C.)	133	189, 214	244	368	30
Viking	22	191	235	258	15

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Station	Geographic position	Plane coordinates	Elevation	Description	Sketch
	Page	*Page*	*Page*	*Page*	*Figure*
Viking:					
East Elevator (large top)	34	195	237		15
Low elevator	34	195	237		15
West elevator (slender top)	34	195	237		15
Villa Maria Academy (M. R. C.)	115	164			27
Vita (G. S. of C.) (Canada)	38	198		266	16
Voight	78	149, 176		322	21
Volker (M. R. C.) (Wis.)	102	160	244	345	27
Wabasha	89	154		344	26, 27
Wabasha, church spire (M. R. C.)	115	164			27
Wabasha east base=B. M. $\frac{235}{3}$ (M. R. C.)	103	160	244	347	27
Wabasha west base (M. R. C.)	103	160	244	347	27
Waconia, church steeple	84	152			28
Waconia, water tank	84	152			28
Wacouta (M. R. C.)	104	161	244	349	26, 27
Wahpeton	20	166	235	352	13, 14
Wahpeton:					
Schoolhouse cupola (N. Dak.)	27	168	237		13, 14
Standpipe (N. Dak.)	27	168	237		13, 14
Waldeck P. B. M. (M. R. C.)	133	189, 214		367	21, 30
Walden (Wis.)	69	145		320	27
Wallace	90	154		336	28, 29
Walt (Canada)	42	200		272	17
Walters	66	143		312	25
Walters, white church, gray steeple	74	147			25
Wanless	136	215		370	19
War	40	199		269	17
Warren	22	191	235	258	15
Warren:					
Courthouse tower	34	195	237		15
School cupola	34	195	237		15
Standpipe	34	195	237		15
Warroad north base (I. B. C.) (Boundary Monument 909 (I. B. C.)) (Minn.-Canada)	39	198		267	16, 17
Warroad south base (I. B. C.)	39	198		268	17
Waseca:					
Catholic Church, steeple	87	153			26
Courthouse	87	153			26
Round smokestack	87	153			26
Smokestack (center one of three)	87	153			26
Steel water tank	86	153			26
Tall smokestack	86	153			26
Washburn Home	95	156		341	28, 29
Watab (M. R. C.)	109	179	244	356	21
Water (Rainy Lake 37 (I. B. C.)) (Canada)	43	200		274	18
Water tank. (*See* name of town.)					
Water tower. (*See* name of town.)					
Water works. (*See* name of town.)					
Watosco, lone elevator	27	168	237		13, 14
Wautopa	95	157		341	27
Wautopa 2	89	154		332	27
W. D. Washburn, home, Minneapolis	97	157			29
Weather Bureau. (*See* name of town.)					
Webster (M. R. C.) (Wis.)	104	161	244	349	26, 27
Webster Chair Manufacturing Co., stack, South Superior (Wis.)	60	176, 205	239		23
Welch, church spire	94	156			26
Welcome:					
Lutheran Church, spire	71	146			25
Water tank	71	146			25
Wells	66	143	313		25
Wells P. B. M. (M. R. C.)	133	189, 214	244	368	30
Wells:					
Catholic Church, spire	73	147			25
Coal chute	74	147			25
Farmers Elevator	73	147			25
Highschool cupola	74	147			25
Methodist Church, spire	73	147			25
Smokestack	73	147			25
Water tank	73	147			25
Wendell:					
Church spire	55	173			20
Railway water tank	54	173			20
Schoolhouse spire	54	173			20
Tallest elevator	54	173	239		20
West elevator	54	173			20

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Station	Geographic position	Plane coordinates	Elevation	Description	Sketch
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West Base (M. R. C.)	134	190, 214			30
West Duluth, Irving School, chimney	59	175, 204			23
West Freeborn, Lutheran Church, spire	75	148			25, 26
West Palisades, Lutheran Church, spire	69	145			24
West Sawteeth (U. S. L. S.)	62	206		303	23
West Willow (I. B. C.)	39	198		268	17
Western	20	166	235	251	13, 20
Western Post Office, church spire	26	168	237		13, 20
Westminster Church, Minneapolis	97	157			29
Wet	40	199		270	17
Wet, eccentric	40	199		270	17
Wheal Kate (U. S. L. S.) (Mich.)	62	206		303	23
Wheal Kate latitude station (U. S. L. S.) (Mich.)	63	206		304	23
Wheaton, water tank	25	142, 167	237		13
Wheatville, red elevator (slender top)	30	170, 193	237		14
Wheatville, yellow elevator	30	170, 193	237		14
White	88	154		330	27
White church spire (5 miles south of station Tansem)	28	169			14
White church steeple (gray top)	81	150, 177			21
Whitefish (G. S. of C.) (Canada)	48	203		283	19, 23
Whitman (M. R. C.)	102	160	244	346	27
Wicklow	21	191	234	255	14, 15
Wigwam B. M. (M. R. C.)	130	188, 212	244	366	30
Wilbert	65	143		311	25
Williams (M. R. C.)	107	162	244	354	28
Wilmont	64	143		306	24
Wilmont:					
Catholic Church, spire	70	145			24
Farmers Elevator	70	145			24
White water tank	70	145			24
Wilson, church spire	93	156			27
Windego (M. R. C.)	130	188, 212			30
Windom (M. R. C.)	106	162	244	351	28, 29
Winnebago	66	143		311	25
Winnebago:					
Water tank	73	146			25
White church steeple	73	146			25
Winona, Polish Church, spire (M. R. C.)	115	164			27
Witoka	88	154		331	27
Wixon (M. R. C.)	111	180	244	359	21, 30
Wolf Lake (M. R. C.)	135	190, 215		369	30
Woodbury	96	157			28, 29
Woodward Farm Elevator	34	195	237		15
Worthington:					
Courthouse spire	70	145			24
Powerplant smokestack	70	145			24
Wright (Carlton County)	52	172, 203	238	295	22
Wright (Marshall County)	22	191	235	259	15
Wright, church spire (8 miles northwest of station)	35	196	235		15
Wyburn (M. R. C.) (Wis.)	100	159	244	343	27
Wye (M. R. C.)	131	188, 213		367	30
Wye P. B. M. (M. R. C.)	134	190, 215	244	369	30
Wykoff	68	144		316	27
Wykoff:					
Lutheran Church, spire	77	148			27
Water tank	76	148			27
Yanz (M. R. C.)	105	161	244	350	26, 28
Zero (Canada)	43	200		273	18
Zion Church, spire, Herold (Wis.)	93	156			27
Zip (Canada)	42	200		272	17
Zwick (M. R. C.)	133	189, 214		368	30

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