DEPARTMENT OF THE INTERIOR
FRANKLIN K. LANE, SECRETARY
U.S. GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

TOPOGRAPHY

MINNESOTA
WHITE BEAR QUADRANGLE

Henry Gannett, Chief Topographer.
Jno. H. Renshawe, Topographer in charge.
Triangulation by U.S. Coast and Geodetic Survey.
Topography by H.L. Baldwin Jr.
Surveyed in 1894.

Scale 1/62500

Edition of Oct. 1896, reprinted 1928.
Polyconic projection. To place on North American datum move projection lines 100 feet south and 650 feet east.

Minn #2

1

THE TOPOGRAPHIC MAPS OF THE UNITED STATES

The United States Geological Survey is making a topographic atlas of the United States. This work has been in progress since 1882, and more than 38 per cent of the area of the country, excluding outlying possessions, has now been mapped. The areas mapped are widely distributed, every State being represented, as shown on the progress maps accompanying each annual report of the Director.

This atlas is being published in sheets of convenient size, about 16½ by 20 inches. The four-sided area of land represented on an atlas sheet is bounded by parallels and meridians and is called a *quadrangle*. The quadrangles mapped cover 1° of latitude by 1° of longitude, 30′ of latitude by 30′ of longitude, 15′ of latitude by 15′ of longitude, or smaller areas, the size of the area mapped depending on the scale used. Several scales are employed. The smallest scale, that used for quadrangles covering 1°, is 1:250,000, or very nearly 4 miles to an inch—that is, 4 linear miles on the ground is represented by 1 linear inch on the map. This scale is used for maps of the desert regions and some other parts of the far West. For the greater part of the country, which is mapped by quadrangles covering 30′, a larger scale, 1:125,000, or about 2 miles to an inch, is employed. A still larger scale, 1:62,500, or about a mile to an inch, is used for quadrangles covering 15′, the unit selected for mapping thickly settled or industrially important areas. A fourth scale, 1:31,680, or one-half mile to an inch, is employed for maps that are to be used in connection with irrigation or drainage, and a few maps of mining districts are published on still larger scales.

A topographic survey of Alaska has been in progress since 1898 and nearly 30 per cent of its entire area has now been mapped. One-third of the area mapped, or 10 per cent of the Territory, has been covered only by reconnaissance work, the results of which have been mapped on a scale of about 10 miles to an inch. The maps of nearly all the remaining two-thirds of the surveyed area have been published on a scale of 1:250,000, or about 4 miles to an inch. These maps are large, each representing 2° of latitude by 4° of longitude. A few areas that are of economic importance, aggregating about 3,000 square miles, have been surveyed in greater detail and mapped on a scale of 1:62,500, or about a mile to an inch.

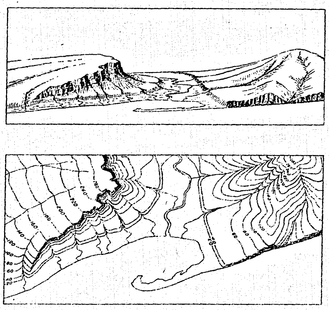
A survey of the Hawaiian Islands was begun in 1910 and the resulting maps are being published on a scale of 1:62,500.

The features shown on these atlas sheets or maps may be classed in three groups—(1) *water*, including seas, lakes, rivers, canals, swamps, and other bodies of water; (2) *relief*, including mountains, hills, valleys, and other elevations and depressions; (3) *culture* (works of man), such as towns, cities, roads, railroads, and boundaries. The conventional signs used for these features are shown below, with explanations. Variations appear on some earlier maps.

All water features are printed in *blue*, the smaller streams and canals in full blue lines and the larger streams, lakes, and the sea in blue water-lining. Intermittent streams—those whose beds are dry at least three months in the year—are shown by lines of dots and dashes.

Relief is shown by contour lines in *brown*. A contour on the ground passes through points that have the same altitude. One who follows a contour will go neither uphill nor downhill but on a level. The contour lines on the map show not only the shapes of the hills, mountains, and valleys but also their elevations. The line of the sea coast itself is a contour line, the datum or zero of elevation being mean sea level. The contour at, say, 20 feet above sea level would be the shore line if the sea were to rise or the land to sink 20 feet. On a gentle slope this contour is far from the present coast; on a steep slope it is near the coast. Where successive contour lines are far apart on the map they indicate a gentle slope; where they are close together they indicate a steep slope; and where they run together in one line they indicate a cliff.

The manner in which contour lines express altitude, form, and grade is shown in the figure below.



The sketch represents a river valley between two hills. In the foreground is the sea, with a bay that is partly inclosed by a hooked sand bar. On each side of the valley is a terrace into which small streams have cut narrow gullies. The hill on the right has a rounded summit and gently sloping spurs separated by ravines. The spurs are truncated at their lower ends by a sea cliff. The hill on the left terminates abruptly at the valley in a steep scarp. It slopes gradually back away from the scarp and forms an inclined table-land, which is traversed by a few shallow gullies. On the map each of these features is indicated, directly beneath its position in the sketch, by contour lines.

The contour interval, or the vertical distance in feet between one contour and the next, is stated at the bottom of each map. This interval differs according to the character of the area mapped; in a flat country it may be as small as 5 feet; in a mountainous region it may be 250 feet. Certain contour lines, every fourth or fifth one, are made heavier than the others and are accompanied by figures stating elevation above sea level. The heights of many points, such as road corners, summits, surfaces of lakes, and bench marks, are also given on the map in figures, which express the elevations to the nearest foot only. More exact elevations of bench marks, as well as geodetic coordinates of triangulation stations, are published in bulletins issued by the Geological Survey. A bulletin pertaining to any State may be had on application.

The works of man are shown in *black*, in which color all lettering also is printed. Boundaries, such as those of a State, county, city, land grant, township, or reservation, are shown by continuous or broken lines of different kinds and weights. Public and through roads are shown by fine double lines; private and poor roads by dashed double lines; trails by dashed single lines.

Each quadrangle mapped for the topographic atlas is designated by the name of a principal town or of some prominent natural feature within the quadrangle, and on the margins of the maps are printed the names of adjoining quadrangles for which atlas sheets have been published or are in preparation. The sheets are sold at 10 cents each in lots of less than 50 copies or at 6 cents each in lots of 50 or more copies, whether of the same or of different sheets.

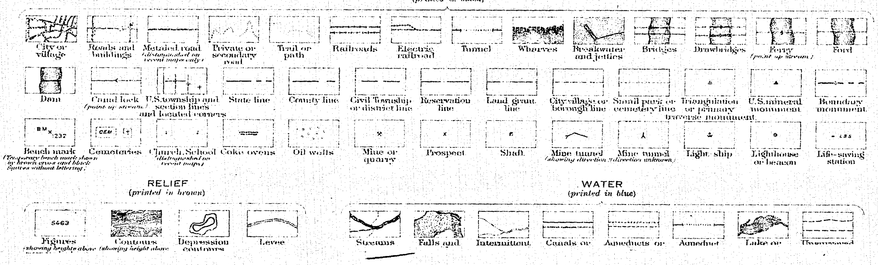
The topographic map is the base on which the geology and the mineral resources of a quadrangle are represented, the maps showing these features being bound together, with a description of the quadrangle, to form a folio of the Geologic Atlas of the United States. Circulars showing by index maps the published topographic atlas sheets and geologic folios covering any State or region will be sent free on application.

Applications for maps or folios should be accompanied by cash—the exact amount—or by post-office money order (not postage stamps), and should be addressed to—

THE DIRECTOR,
United States Geological Survey,
Washington, D. C.

January, 1915.

CONVENTIONAL SIGNS



THE TOPOGRAPHIC MAPS OF THE UNITED STATES

The United States Geological Survey is making a standard topographic atlas of the United States. This work has been in progress since 1882, and its results consist of published maps of more than 40 per cent of the country, exclusive of outlying possessions.

This topographic atlas is published in the form of maps on sheets measuring about 16½ by 20 inches. Under the general plan adopted the country is divided into quadrangles bounded by parallels of latitude and meridians of longitude. These quadrangles are mapped on different scales, the scale selected for each map being that which is best adapted to general use in the development of the country, and consequently, though the standard maps are of nearly uniform size, they represent areas of different sizes. On the lower margin of each map are printed graphic scales showing distances in feet, meters, and miles. In addition, the scale of the map is shown by a fraction expressing a fixed ratio between linear measurements on the map and corresponding distances on the ground. For example, the scale $\frac{1}{62500}$ means that 1 unit on the map (such as 1 inch, 1 foot, or 1 meter) represents 62,500 similar units on the earth's surface.

Although some areas are surveyed and some maps are compiled and published on special scales for special purposes, the standard topographic surveys for the United States proper and the resulting maps have for many years been divided into three types, differentiated as follows:

1. Surveys of areas in which there are problems of great public importance—relating, for example, to mineral development, irrigation, or reclamation of swamp areas—are made with sufficient accuracy to be used in the publication of maps on a scale of $\frac{1}{2500}$ (1 inch = one-half mile), with a contour interval of 1, 5, or 10 feet.

2. Surveys of areas in which there are problems of average public importance, such as most of the basin of the Mississippi and its tributaries, are made with sufficient accuracy to be used in the publication of maps on a scale of $\frac{1}{250}$ (1 inch = nearly 1 mile), with a contour interval of 10 to 25 feet.

3. Surveys of areas in which the problems are of minor public importance, such as much of the mountain or desert region of Arizona or New Mexico, are made with sufficient accuracy to be used in the publication of maps on a scale of $\frac{1}{125000}$ (1 inch = nearly 2 miles), with a contour interval of 25 to 100 feet.

A topographic survey of Alaska has been in progress since 1898, and nearly 37 per cent of its area has now been mapped. About 10 per cent of the Territory has been covered by reconnaissance maps on a scale of $\frac{1}{625000}$, or about 10 miles to an inch. Most of the remaining area surveyed in Alaska has been mapped on a scale of $\frac{1}{250000}$, but about 4,000 square miles has been mapped on a scale of $\frac{1}{62500}$.

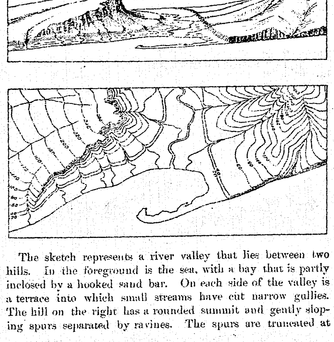
About half of the Hawaiian Islands has been surveyed, and the resulting maps are published on a scale of $\frac{1}{62500}$.

The features shown on these maps may be arranged in three groups—(1) water, including seas, lakes, rivers, canals, swamps, and other bodies of water; (2) relief, including mountains, hills, valleys, and other features of the land surface; (3) culture (works of man), such as towns, cities, roads, railroads, and boundaries. The conventional signs used to represent these features are shown and explained below. Variations appear on some earlier maps, and additional features are represented on some special maps.

All the water features are represented in blue, the smaller streams and canals by single blue lines and the larger streams, the lakes, and the sea by blue water lining or blue tint. Intermittent streams—those whose beds are dry for a large part of the year—are shown by lines of blue dots and dashes.

Relief is shown by contour lines in brown, which on some maps are supplemented by shading showing the effect of light thrown from the northwest across the area represented, for the purpose of giving the appearance of relief and thus aiding in the interpretation of the contour lines. A contour line represents an imaginary line on the ground (a contour) every part of which is at the same altitude above sea level. Such a line could be drawn at any altitude, but in practice only the contours at certain regular intervals of altitude are shown. The line of the seacoast itself is a contour, the datum or zero of altitude being mean sea level. The 20-foot contour would be the shore line if the sea should rise 20 feet. Contour lines show shore line, the shape of the hills, mountains, and valleys, as well as their altitude. Successive contour lines that are far apart on the map indicate a gentle slope; lines that are close together indicate a steep slope; and lines that run together indicate a cliff.

The manner in which contour lines express altitude, form, and grade is shown in the figure below.



The sketch represents a river valley that lies between two hills. In the foreground is the sea, with a bay that is partly inclosed by a hooked sand bar. On each side of the valley is a terrace into which small streams have cut narrow gullies. The hill on the right has a rounded summit and gently sloping spurs separated by ravines. The spurs are truncated at their lower ends by a sea cliff. The hill on the left terminates abruptly at the valley in a steep scarp, from which it slopes gradually away and forms an inclined table-land that is traversed by a few shallow gullies. On the map each of these features is represented directly beneath its position in the sketch, by contour lines.

The contour interval, or the vertical distance in feet between one contour and the next, is stated at the bottom of each map. This interval differs according to the topography of the area mapped; in a flat country it may be as small as 1 foot; in a mountainous region it may be as great as 250 feet. Certain contour lines, every fourth or fifth one, are made heavier than the others and are accompanied by figures showing altitude. The heights of many points—such as road corners, summits, surfaces of lakes, and bench marks—are also given on the map in figures, which show altitudes to the nearest foot only. More exact altitudes—those of bench marks—as well as the geodetic coordinates of triangulation stations, are published in bulletins issued by the Geological Survey.

Lettering and the works of man are shown in black. Boundaries, such as those of a State, county, city, land grant, township, or reservation, are shown by continuous or broken lines of different kinds and weights. Metaled roads are shown by double lines, one of which is accentuated. Other public roads are shown by fine double lines, private and poor roads by dashed double lines, trails by dashed single lines.

Each quadrangle is designated by the name of a city, town, or prominent natural feature within it, and on the margins of the map are printed the names of adjoining quadrangles of which maps have been published. Over 3,000 quadrangles in the United States have been surveyed, and maps of them similar to the one on the other side of this sheet have been published.

The topographic map is the base on which the geology and mineral resources of a quadrangle are represented, and the maps showing these features are bound together with a descriptive text to form a folio of the Geologic Atlas of the United States. More than 200 folios have been published.

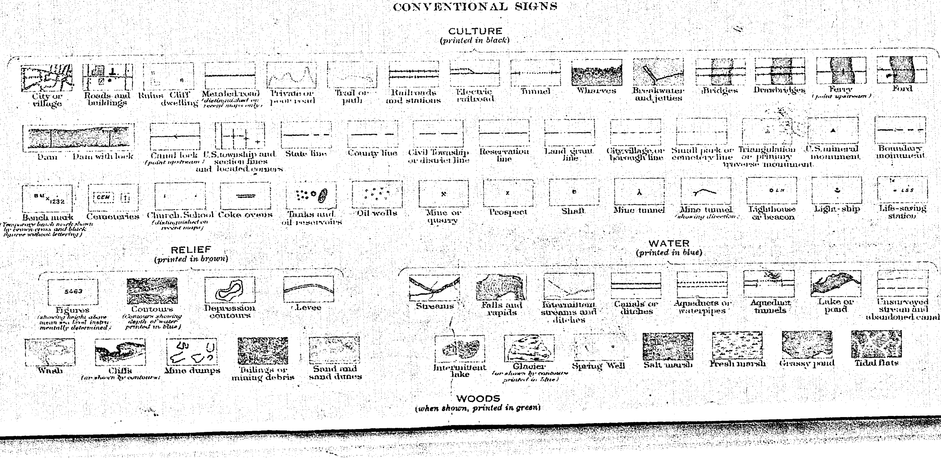
Index maps of each State and of Alaska and Hawaii showing the areas covered by topographic maps and geologic folios published by the United States Geological Survey may be obtained free. Copies of the standard topographic maps may be obtained for 10 cents each; some special maps are sold at different prices. A discount of 40 per cent is allowed on an order for maps amounting to $5 or more at the retail price. The geologic folios are sold for 25 cents or more each, the price depending on the size of the folio. A circular describing the folios will be sent on request.

Applications for maps or folios should be accompanied by cash, draft, or money order (not postage stamps) and should be addressed to

THE DIRECTOR,
United States Geological Survey,
Washington, D. C.

January, 1924.

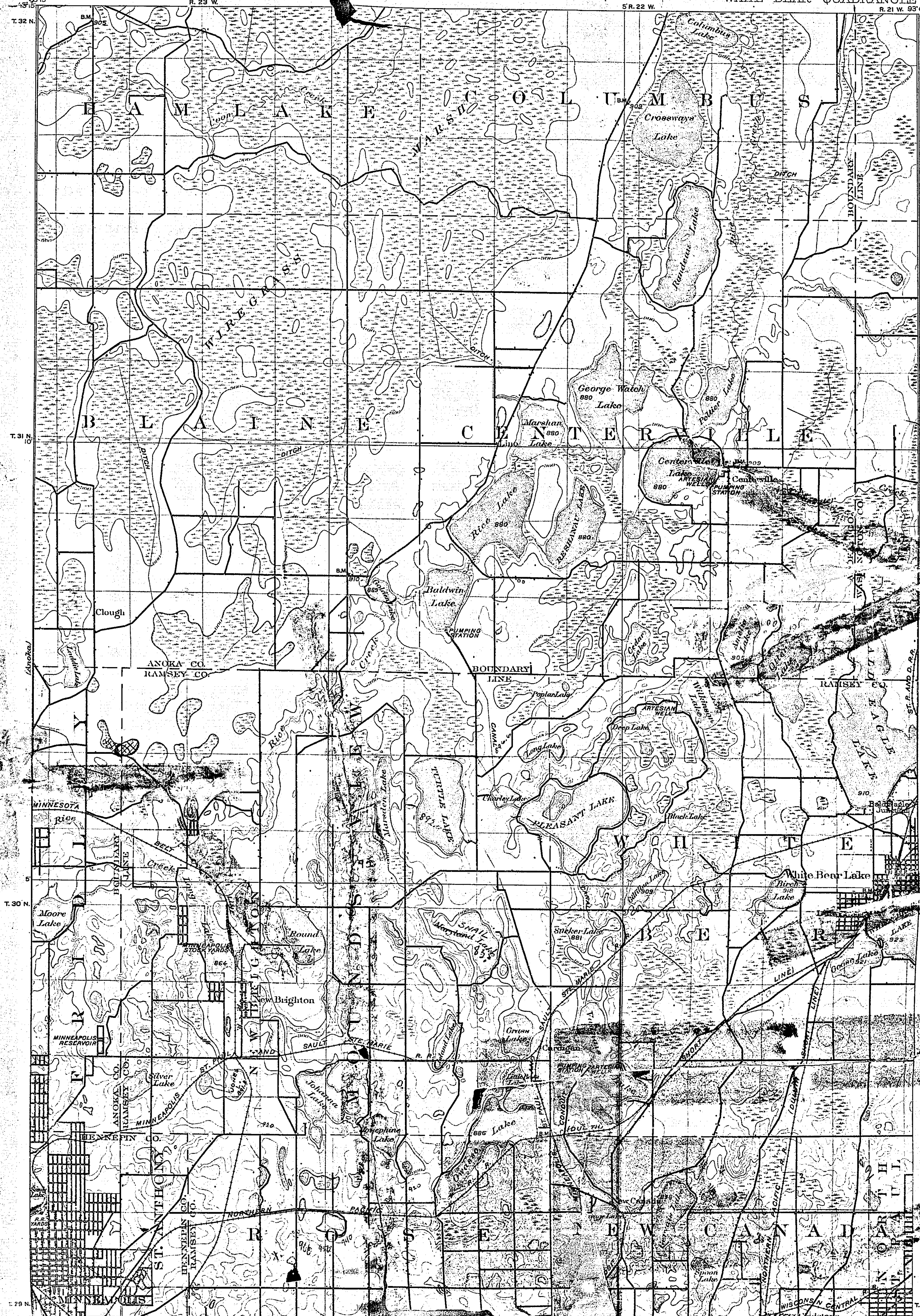
CONVENTIONAL SIGNS



U.S. GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

TOPOGRAPHY

MINNESOTA
WHITE BEAR QUADRANGLE



in charge. ENGRAVED JAN. 1902 BY U.S.G.S.

Scale

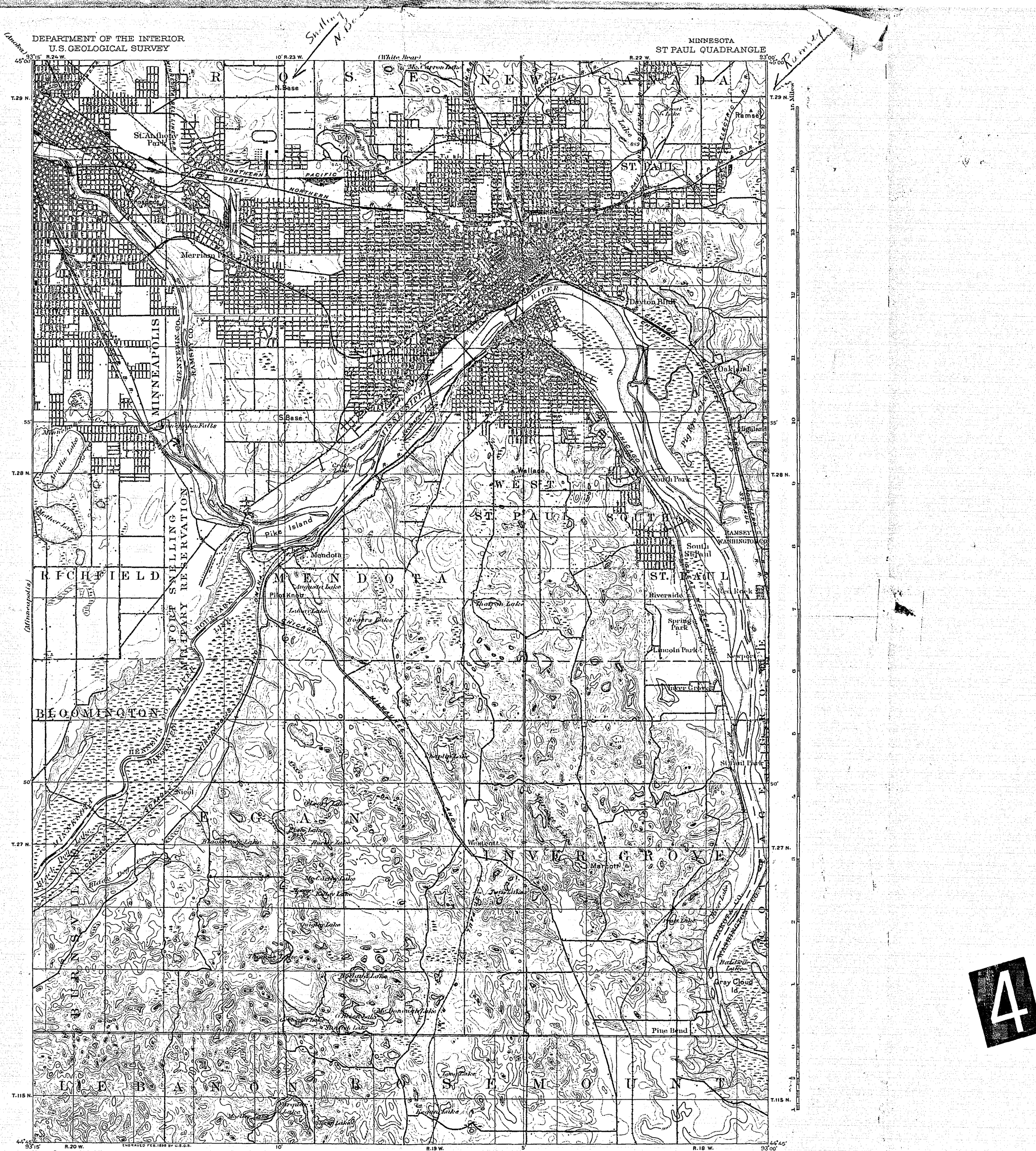
Edition of May 1902, reprinted Apr. 1910.

30-

3

DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MINNESOTA
ST PAUL QUADRANGLE



Henry Gannett, Chief Topographer.
Jno. H. Renshawe, Topographer in charge.
Triangulation by U.S. Coast and Geodetic Survey.
Topography by H.L. Baldwin Jr.
Surveyed in 1894.

ENGRAVED FEB. 1898 BY U.S.G.S.

Scale 1/62500

1 ½ 0 1 2 3 4 Miles

1 ½ 0 1 2 3 4 5 Kilometers

Contour interval 20 feet.
Datum is mean sea level.

Edition of Oct. 1896, reprinted 1928.

Polyconic projection. To place on North American datum move projection lines 100 feet south and 650 feet east.

ST. PAUL, MINN.

4

TOPOGRAPHY

STATE OF MINNESOTA

DEPARTMENT OF THE INTERIOR
FRANKLIN K. LANE, SECRETARY
U.S. GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

W. S. HAMMOND, GOVERNOR
J. A. O. PREUS, STATE AUDITOR
JULIUS A. SCHMAHL, SEC. OF STATE
} STATE DRAINAGE COMMISSION
E. V. WILLARD, ACTING STATE DRAINAGE ENGINEER

MINNESOTA
ST. FRANCIS QUADRANGLE

ENGRAVED 1918 BY U.S.G.S.

W. H. Herron, Acting Chief Geographer.
Glenn S. Smith, Topographic Engineer in charge.
Topography by F. B. Barrett and W. S. Gehres.
Control by Mississippi River Commission.
J. H. Wilson, and C. E. Mills.
Surveyed in 1915-1916.

Barrett | Gehres

Scale $\frac{1}{62500}$

1 ½ 0 1 2 3 4 Miles

1 ½ 0 1 2 3 4 5 Kilometers

Contour interval 10 feet.
Datum is mean sea level.

TRUE NORTH / MAGNETIC NORTH 8¼°
APPROXIMATE MEAN DECLINATION, 1916

Edition of 1919.

SURVEYED IN COOPERATION WITH THE STATE OF MINNESOTA.

ST. FRANCIS

5

Henry Gannett, Chief Topographer.
Jno. H. Renshawe, Topographer in charge.
Triangulation by U.S. Coast and Geodetic Survey.
Topography by H.L. Baldwin Jr.
Surveyed in 1894.

Scale 1/62500

Contour interval 20 feet.
Datum is mean sea level.

Edition of Oct. 1896, reprinted 1938

Polyconic projection. To place on North American datum move projection lines 100 feet south and 650 feet east.

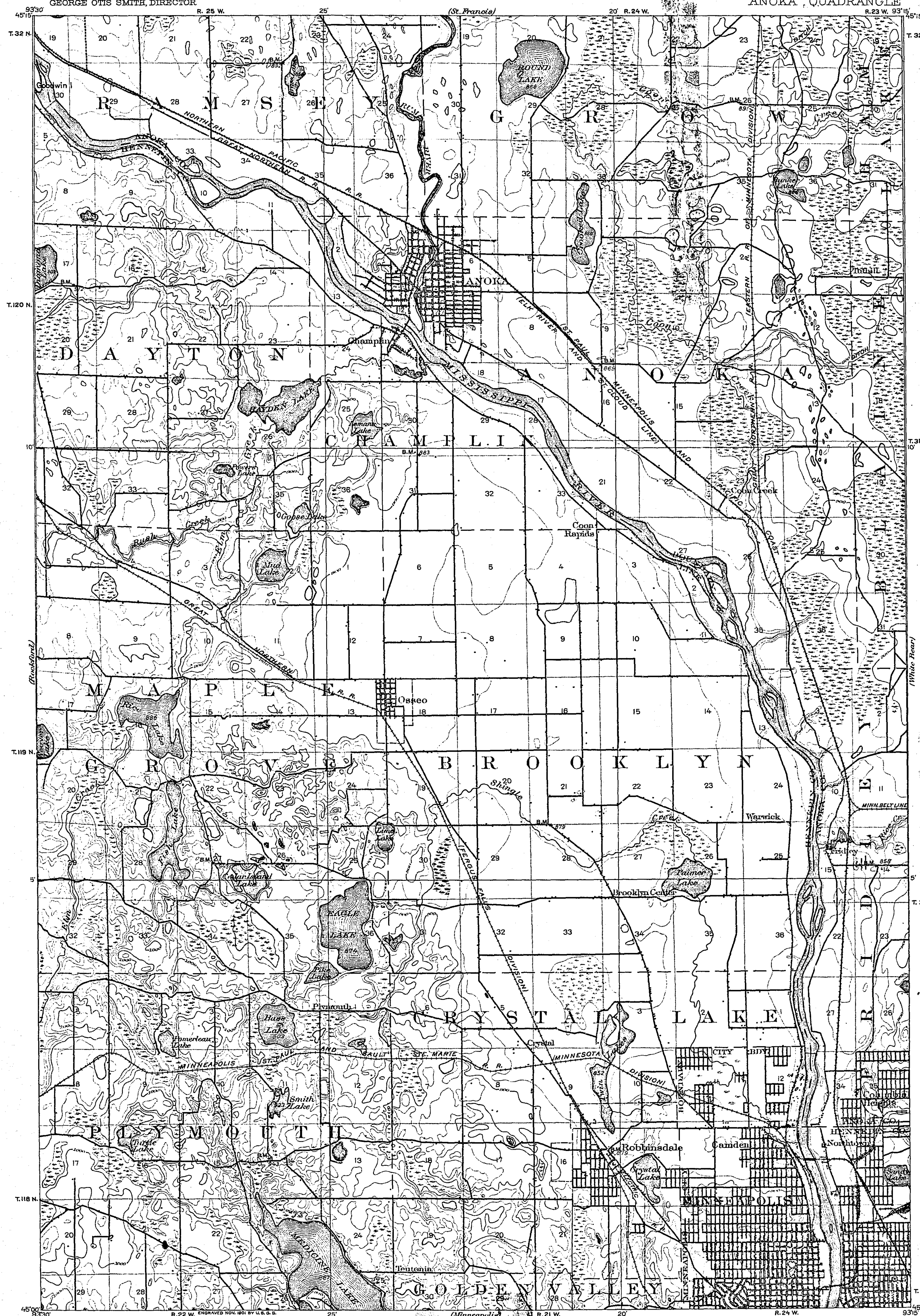
Surveyed by reconnaissance methods

ST. PAUL, MINN.

DEPARTMENT OF THE INTERIOR
ALBERT B. FALL, SECRETARY
U.S. GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

TOPOGRAPHY

MINNESOTA
ANOKA QUADRANGLE



ENGRAVED NOV. 1901 BY U.S.G.S.

Jno. H. Renshawe, Geographer in charge.
Control by Geo. T. Hawkins.
Topography by Wm. H. Griffin.
Surveyed in 1899.

Scale $\frac{1}{62500}$

1 0 1 2 3 4 Miles

1 0 1 2 3 4 5 Kilometers

Edition of Mar. 1902, reprinted 1921.

ANOKA

7

ES D. WALCOTT, DIRECTOR

ST. PAUL SHEET

Henry Gannett, Chief Topographer.
Jno. H. Renshawe, Topographer in charge.

ENGRAVED FEB. 1896 BY U.S.G.S.

Scale 62500

Edition of Oct. 1896, reprinted May 1906.

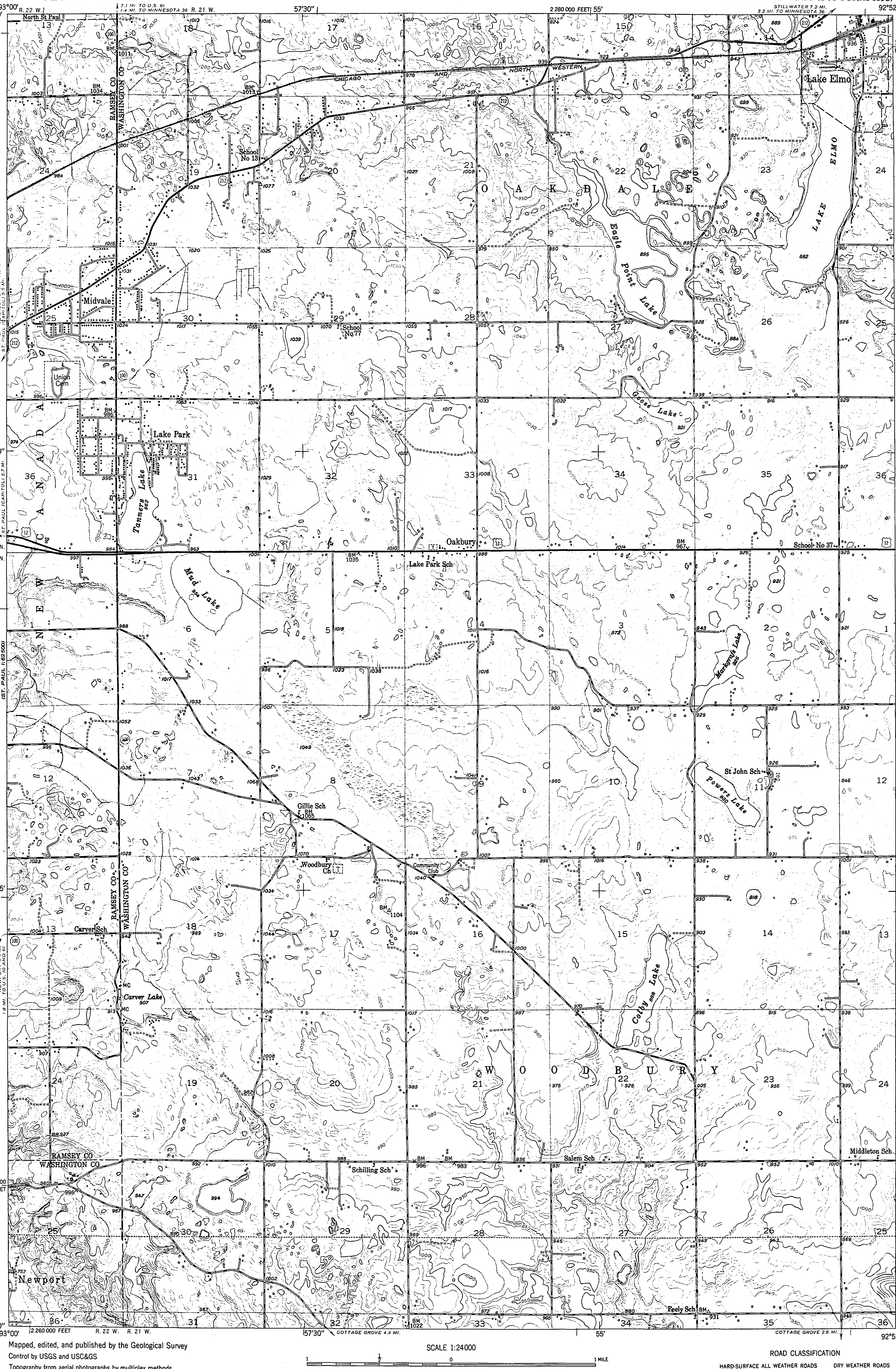
FILE COPY

8

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF MINNESOTA
DEPARTMENT OF CONSERVATION
CHESTER S. WILSON, COMMISSIONER

LAKE ELMO QUADRANGLE
MINNESOTA
7.5 MINUTE SERIES (TOPOGRAPHIC)



(ST. PAUL 1:62500)

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography from aerial photographs by multiplex methods
Aerial photographs taken 1947. Field check 1949

Polyconic projection. 1927 North American datum
10,000-foot grid based on Minnesota coordinate system, south zone

TRUE NORTH
MAGNETIC NORTH
6°

SCALE 1:24000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION

HARD-SURFACE ALL WEATHER ROADS — DRY WEATHER ROADS

Heavy-duty — 4 LANE 6 LANE — Improved dirt

Medium-duty — 4 LANE 6 LANE — Unimproved dirt

Loose-surface, graded, or narrow hard-surface

U. S. Route — State Route

LAKE ELMO, MINN.