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R. P. LAMONT, Secretary
COAST AND GEODETIC SURVEY
R. S. PATTON, Director

Special Publication No. 176

FIRST-ORDER LEVELING IN MICHIGAN

By

HOWARD S. RAPPLEYE
MATHEMATICIAN



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FIRST-ORDER LEVELING IN MICHIGAN

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GENERAL STATEMENT

This publication contains the descriptions and elevations of all bench marks in Michigan whose elevations have been determined by first-order leveling executed by the Coast and Geodetic Survey. In addition there are included the descriptions and elevations of bench marks, established by the United States Lake Survey and the United States Board of Engineers on Deep Waterways, along certain lines of levels which were included in the 1929 General Adjustment of the combined first-order level nets of the United States and Canada.

There are also included certain groups of bench marks located at or near water gages which were used in connection with the determination of the water levels which were included in the adjustment referred to above.

Approximately 1,300 miles of first-order levels have been run within the State of Michigan, as follows:

Line 1, Gibraltar to Lexington, Mich. (U. S. L. S.)	1898-1901
Line 2, Gibraltar, Mich., to Deshler, Ohio (part)	1899
Line 3, Detour to Iroquois Point, Mich. (U. S. L. S.)	1901
Line 4, Mackinaw to Jackson, Mich.	1916
Line 5, Jackson to Detroit, Mich.	1916
Line 6, Warsaw, Ind., to Jackson, Mich. (part)	1916
Line 7, Marquette to Escanaba, Mich.	1917
Line 8, Algonac to St. Clair Flats, Mich.	1917
Line 9, Elkhart, Ind., to Walton, Mich. (part)	1930
Line 10, Grayling to Detroit, Mich.	1930
Line 11, Rockton, Ill., to Escanaba, Mich. (part)	1930

A short paragraph descriptive of each line will be found at the beginning of the list of descriptions and elevations of bench marks established along the line.

HISTORY OF LEVELING IN MICHIGAN

Apparently the first attempt to place elevations in Michigan on a mean-sea-level datum was made by the United States Lake Survey. In 1875 that organization undertook an extensive series of leveling operations with the object in view of determining the elevations of the water surfaces of the Great Lakes above mean sea level.

From information contained in the Annual Report of the Chief of Engineers, 1876, part 3, pages 70-79; Annual Report of the Chief of Engineers, 1877, part 2, pages 1189-1193; and Professional Paper No. 24 of the Corps of Engineers, U. S. Army, most of the facts for the following brief history of the project were obtained.

In 1875 gages were established at the following places, Oswego and Charlotte, N. Y., Port Dalhousie and Port Colborne, Ont., Cleveland, Ohio, Rockwood, Lakeport, Escanaba and Marquette, Mich.

These gages were referenced to bench marks established nearby, except that at Rockwood, Mich., the reference bench marks were established at Gibraltar, Mich., about $2\frac{1}{2}$ miles distant from the gage. Water level observations were taken during the months of May to August, inclusive, of 1875.

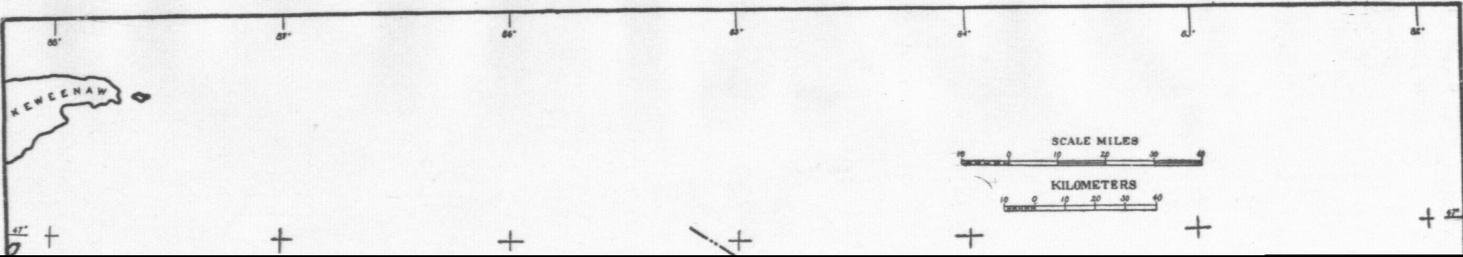
A duplicate line of spirit levels was run to the gage bench marks at Oswego, N. Y., from the Gristmill bench mark at Greenbush (now Rensselaer), N. Y., the elevation of which had previously been established with relation to mean tide level at New York by the Coast and Geodetic Survey.

A duplicate line of spirit levels was run along the Welland Railroad from the gage bench marks at Port Dalhousie, Ont., to the gage bench marks at Port Colborne, Ont.

A single line of spirit levels was run from the reference bench marks for the Rockwood gage to the bench marks at the gage at Lakeport, Mich. The two duplicate lines and the single line mentioned above were run during the summer of 1875.

During the summer of 1876 a duplicate line of spirit levels was run from the gage bench marks at Escanaba, Mich., to the gage bench marks at Marquette, Mich.

In 1877 the line from Gibraltar to Lakeport, Mich., was rerun by two parties starting at opposite ends of the line. This completed the project and served to extend a mean-sea-level datum for eleva-



tions as far west as Lake Superior. The spirit leveling run in connection with the above project could not now be classed as first-order leveling.

In 1883 the Corps of Engineers, United States Army, completed a line of precise leveling from Savanna to Chicago, Ill., and this line, in connection with the precise leveling up the Mississippi Valley, served as a second connection between the Great Lakes region and the sea.

In 1894 the Coast and Geodetic Survey reran the line up the Hudson River Valley as far as Greenbush (now Rensselaer), N. Y.

In 1897 attention was again focused sharply on the matter of mean-sea-level elevations throughout the Great Lakes region by the report of the United States Deep Waterways Commission. On pages 69 to 96 of that report there is a summary of the situation concerning elevations in the Great Lakes region which briefly reviews all work done to the date of the report.

In 1899 the Coast and Geodetic Survey published the results of the first adjustment of the precise level net in the United States and the resulting elevations given in Appendix 8, Report for 1898-99, were the best elevations determinable from the leveling data at hand at the time the adjustment was made.

In 1898 the Board of Engineers on Deep Waterways, in cooperation with the United State Lake Survey, undertook another extensive program of spirit and water leveling in the Hudson and St. Lawrence Valleys and the Great Lakes region. The leveling done in connection with this project was of varying grades of accuracy, suited to the various purposes for which it was run. The results of the work will be found in Appendix No. 22, of the Report of the Board of Engineers on Deep Waterways, published in 1900.

The United States Lake Survey, in connection with its investigation of lake levels, continued the work of spirit leveling in the Great Lakes region and by 1903 had completed a system of precise spirit level and water level lines from Greenbush (now Rensselaer), N. Y., to Lake Superior. This work served to strengthen the leveling in the Great Lakes region. The 1903 adjustment of the precise level net in the United States, by the Coast and Geodetic Survey, included this latest precise leveling by the United States Lake Survey.

Since that time the value of precise leveling has been more and more appreciated and the level net in the eastern part of the United States has been greatly strengthened by the inclusion of numerous additional lines of accurate levels. In 1907 a readjustment of the net became necessary in order to absorb new work. Again, in 1912, the fourth general adjustment of the precise level net in the United States was made and the results published in Special Publication No. 18. This adjustment, strictly speaking, was not a general adjustment since some portions of the net were held fixed as previously adjusted.

THE 1929 GENERAL ADJUSTMENT

By 1929 so much additional leveling had been run that a new general adjustment was needed. It was believed that the net would be considerably strengthened by the introduction of the first-order leveling of Canada. Upon request the Geodetic Survey of Canada

kindly placed at the disposal of this bureau the results of some 20,000 miles of first-order leveling in the Dominion of Canada. This leveling, combined with about 45,000 miles of leveling in the United States, was all adjusted in a single least-squares adjustment in which mean sea level was held at zero as observed at 26 tidal stations (21 in the United States and 5 in Canada). The elevations resulting from this adjustment, which was a strictly general adjustment, are the best elevations obtainable from all the data available at the time of the adjustment.

INSTRUMENTS AND FIELD METHODS

The leveling by the Coast and Geodetic Survey in Michigan for the years 1916, 1917, and 1930 was all done with instrumental equipment similar to that described in Coast and Geodetic Survey Special Publication No. 129, *Geodetic Level and Rod*, and it was all done in accordance with specifications and instructions which are substantially the same as those given in detail in Coast and Geodetic Survey Special Publication No. 140, *Manual of First-order Leveling*.

The line from Trenton to Lexington, by the United States Lake Survey, was run with instrumental equipment described in the publications of that organization and the Corps of Engineers, United States Army, and in accordance with instructions there set forth.

The Coast and Geodetic Survey leveling from Trenton, Mich., to Cincinnati, Ohio, was run with instrumental equipment described in, and under instructions contained in, Coast and Geodetic Survey Report for 1898-99, Appendix 8, pages 414-418, except that some of this line was run in the form of a series of loops rather than as a double line.

COMPUTATIONS AND ADJUSTMENTS

The office computation of all of the Coast and Geodetic Survey leveling of 1916, 1917, and 1930 in Michigan was carried out in accordance with instructions contained in Special Publication No. 140, "*Manual of First-order Leveling*." The older work was computed in accordance with the methods required for field work done with instrumental equipment in use at that time. The computation of the work since 1900 has been greatly simplified as a result of the improved instrumental equipment and field methods which were put into use in 1900.

The 1929 general adjustment of the first-order level net resulted in the adoption of elevations for junction bench marks at the following places in Michigan: Marquette, Escanaba, Sault Sté. Marie, Detour, Mackinaw, Jackson, Detroit, and Trenton.

The lines of leveling between these junction bench marks were fitted to the elevations of the junction bench marks at the places listed above, and to the elevations of junction bench marks at places outside of the State of Michigan for interstate lines, by distributing the correction uniformly in proportion to the distance along the line.

The lines Elkhart, Ind., to Walton, Mich., Grayling to Detroit, Mich., and Rockton, Ill., to Escanaba, Mich., were run after the 1929 general adjustment was made, and so were fitted to the elevations determined by the 1929 general adjustment for the bench marks

to which the new lines were connected at each end. Thus it will be seen that, while the three lines run in 1930 were not included in the actual adjustment of 1929, the elevations of the marks established along those lines and given in this publication have been brought into agreement with the results of that adjustment. All elevations given in this publication are therefore consistent and are based on a mean-sea-level datum as defined by the 1929 general adjustment of the first-order net.

ORTHOMETRIC CORRECTION

Owing to the fact that the earth is an oblate spheroid, level surfaces at different elevations are not parallel but tend to converge slightly toward the poles of the earth. This necessitates the application of an orthometric correction to the observed differences of elevation in order that the resulting elevations of the bench marks may represent their true height above the sea-level surface. The orthometric correction and the methods used in computing it are discussed in detail in Special Publication No. 140, Manual of First-Order Leveling.

The orthometric correction reaches a maximum on north-and-south lines run at high elevations, and it is zero on east-and-west lines. The orthometric correction has been applied to the leveling included in this publication. In order that persons using this publication may form an idea as to the order of size of the orthometric correction, the following example is cited:

The difference in elevation between two bench marks at about the latitude of Grayling, Mich., in such locations that their geographic latitudes would differ by 2 minutes and the average elevation of the line of levels connecting them would be 1,000 feet, would require an orthometric correction of 0.003 foot. This correction varies directly with the average elevation and with the difference in latitude between the marks and depends slightly upon the latitude. Tables for computing the orthometric correction are given in Special Publication No. 140.

BENCH MARKS

The standard bench-mark disk now used by the Coast and Geodetic Survey is shown in Figures 2 and 3. These disks are set in existing structures, in concrete posts cast in place for the special purpose, and in outcrops of rock where such outcrops are available. The concrete posts extend deep enough below the surface of the ground to be reasonably free from disturbance by frost action. They usually project a few inches above ground to aid in their recovery.

In Michigan some of the lines of leveling were run before the use of standard bench-mark disks became general, and many of the older marks consist of chiseled squares or crosses; copper, lead, and brass bolts; or other forms of marks dictated by the conditions at the site or by the personal preferences of the engineers in charge of the work.

In starting new leveling difficulty is sometimes encountered by field parties in connecting with bench marks which are disks set vertically in walls or which are small chiseled squares with the elevations referred to the bottom of the holes. The wall bench marks present no difficulty if the levelman uses a tape instead of a rod in taking the

sight on the bench mark. If the mark is high in the wall a tape can be allowed to hang down from the mark giving a "minus backsight" or a "plus foresight."

In connecting with the bottom of a chiseled square which is too small to admit the foot of an ordinary level rod a small block can be put in the hole. The rod is held on it for the backsight and the same block is carried forward and placed on the first turning point while the foresight is being taken. Then, if the block is removed from the first turning point before the next backsight is taken, the elevation carried forward will be the same as if the rod had been held directly on the bottom of the square.

DESCRIPTIONS AND ELEVATIONS OF BENCH MARKS

In the following pages will be found the descriptions and elevations of all bench marks in Michigan, the elevations of which have been determined by this bureau, as well as the descriptions and elevations of a large number of bench marks established by other organizations in connection with precise or first-order leveling which has been included in the first-order level net as adjusted in 1929 by this bureau. For a mark established by some other organization, there will be found in parenthesis, following the designation of the mark, the initials of the organization which established it. A question mark in parenthesis "(?)" indicates that the organization is not known. The descriptions state the general and specific location of the mark, as well as the character of the mark itself.

The elevations of the bench marks are given in both meters and feet. The value in feet was obtained from the metric elevation by using the conversion factor, 1 meter=3.2808333 feet.

Since the completion of the leveling covered in this publication, a few of the marks are known to have been disturbed or reset and in such cases appropriate notes are appended to the descriptions.

For bench marks known to have been destroyed, the descriptions are omitted, but the elevations based on the 1929 general adjustment are given for the use of the engineers who may have tied systems of level lines to these marks and who may wish to change their elevations to agree with the 1929 general adjustment elevations of these marks.

COOPERATION IN THE PRESERVATION OF BENCH MARKS

A bench mark is useful only as long as it is recoverable. When changes occur, as they often do, in the surrounding natural and cultural features with relation to which the mark is described, it becomes increasingly difficult to find the mark by means of the published description. Engineers and others who have occasion to visit any bench marks established by this bureau or other Government organizations will be doing a public service if they will report the condition of the marks and make suggestions as to needed changes in the descriptions.

Form 685 "Report on Condition of Bench Mark" (see fig. 4) is a 5 by 8 inch card with blanks to be filled in when reporting on a mark. Copies of this form will be furnished on request to anyone who may have occasion to visit any of these marks. Envelopes addressed to The Director, United States Coast and Geodetic Survey,

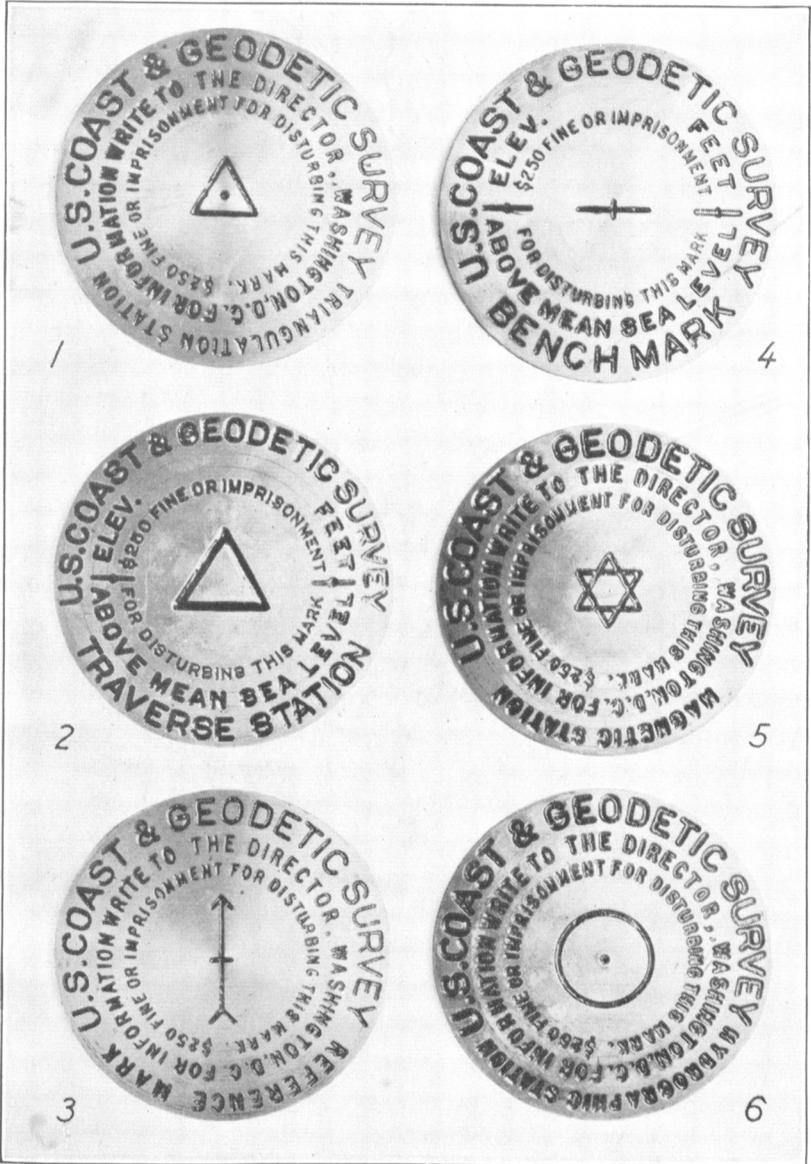


FIGURE 2.—STANDARD MARKS OF THE UNITED STATES COAST AND GEODETIC SURVEY

1. Triangulation station mark.
2. Traverse station mark.
3. Reference mark.

4. Bench mark.
5. Magnetic station mark.
6. Hydrographic station mark.

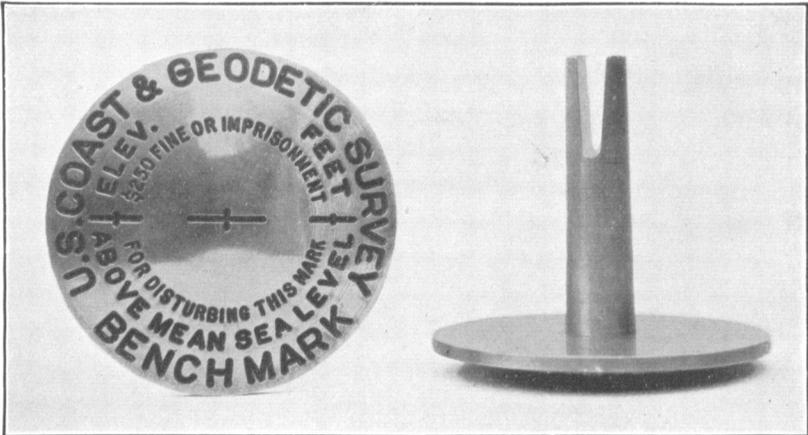


FIGURE 3.—STANDARD BENCH MARK DISK, SHOWING SHANK BY WHICH IT IS FASTENED IN PLACE

Washington, D. C., and requiring no postage, will also be furnished for returning these reports.

The Coast and Geodetic Survey proposes to issue from time to time supplements to this publication in which will be given such changes in descriptions as may be reported to this office by engineers and others who have visited any of the marks and found the descriptions to be in need of revision. Persons or organizations who have copies of this publication and who wish to receive the supplements as they are issued should write to the Director, United States Coast and Geodetic Survey, Washington, D. C., stating the title and number of the publication for which supplements are desired.

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 402
Ed. Oct., 1922

R

REPORT ON CONDITION OF BENCH MARK

Designation of mark F 14 State Texas County Mitchell
Mark searched for or recovered by—(Name) Robert Muldron
Date June 14, 1922 (Occupation) Engineer
(Address) Mims Bldg., Abilene, Tex.
Present condition of the mark Good
Letters or numbers found stamped on (not cast in) the mark None

Use the following space for reporting upon the thoroughness of the search in case mark was not recovered, or for suggesting needed changes in the published description, if the mark was recovered

This mark in good condition and has not been disturbed. The railroad station mentioned in the description has been moved one and one-half miles east.

U. S. DEPARTMENT OF COMMERCE FORM NO. 402—2007

Signed Robert Muldron

FIGURE 4.—Sample report on condition of bench mark

LINE 1, GIBRALTAR TO LEXINGTON, MICH.

This line of leveling was run by the United States Lake Survey during the years 1898 to 1901, inclusive. It extends from bench marks at Gibraltar, Mich., some of which were originally set to reference the Rockwood gage, northward along the west side of Detroit River, Lake St. Clair and St. Clair River to Port Huron, Mich., and then along the shore of Lake Huron to Lexington, Mich. The line passes through Trenton, Wyandotte, Detroit, Mount Clemens, New Baltimore, Algonac, Marine City, St. Clair, Marysville, Port Huron, and Lakeport. Many of the bench marks in this line were established during the course of the field work on the earlier lines of leveling in this locality but the elevations given in this publication were derived from the adjustment of the leveling which was run during the years 1898 to 1901, inclusive.

Gibraltar, 1877 (U. S. L. S.).—At Gibraltar, Wayne County, at the old lighthouse (abandoned and used as a dwelling), in the east face of the southeast corner of the foundation, and in the fourth course of masonry below the cut sandstone water table. The center of a small hole in the end of a copper bolt leaded horizontally in the stone. (177.401 meters or 582.023 feet.)

P. B. M. 2, 1875 (U. S. L. S.).—At Gibraltar, Wayne County, at the old lighthouse (abandoned and used as a dwelling), at the door in the southeast angle of the building, and on the southeast corner of the stone sill. The point is marked by a right-angle cut in the stone. (178.168 meters or 584.540 feet.)

B. M. (U. S. D. W.)=P. B. M. 1 (U. S. L. S.).—At Gibraltar, Wayne County, on the lake front, in the southern part of the town, in the rear of Mr. Edward Hall's dock and boathouse, 75 feet southwest of his house, in the east face of the northeast corner of a stone milk house, 8 inches south of the corner, and 4 feet 4 inches above the ground. The center mark in the end of a brass bolt leaded horizontally in the stone. (178.950 meters or 587.105 feet.)

B. M. (U. S. D. W.)=T. B. M. 4 (U. S. L. S.).—About 2 miles south of Trenton, Wayne County, north of Riverside stock farm, west of the road, and 7 feet east of the west fence, on a low, well-imbedded boulder. The highest point within a chiseled square. (175.596 meters or 576.101 feet.)

Trenton, 1877 (U. S. L. S.).—At Trenton, Wayne County, at the southeast corner of the intersection of Washington Avenue and St. Joseph Street, in the west face of the northwest corner of the Commercial Hotel, in the second stone from the corner, and in the first course below the water table. The center of a small hole in the end of a copper bolt leaded horizontally in the stone. (183.791 meters or 602.988 feet.)

B. M. (U. S. D. W.)=P. B. M. 2 (U. S. L. S.).—At Trenton, Wayne County, at the northwest corner of the intersection of Washington Avenue and St. Joseph Street, in the stone foundation of a store building belonging to Joseph Anderson, 5 feet 4 inches north of the north side of the door, $4\frac{3}{4}$ inches south of the north pillar, and 4 inches back from the face. The top of a brass bolt leaded vertically and marked "U. S. P. B. M." (183.245 meters or 601.196 feet.)

B. M. (U. S. D. W.)=P. B. M. 3 (U. S. L. S.).—About 2 miles north of Trenton, Wayne County, about 2,500 feet north of the crushing plant at Sibley's stone quarry, on the north side of Mud Street, 354 feet west of the center of South Road, in the foundation of F. B. Sibley's residence, 18.9 feet south of the northeast corner, and 1.5 feet above the ground, in the first course below the base board. The center of a punch mark in the end of a brass bolt leaded horizontally in the stone and surrounded by the letters "U. S. P. B. M." (180.733 meters or 592.955 feet.)

B. M. (U. S. D. W.)=T. B. M. 11 (U. S. L. S.).—In the lower part of Wyandotte, Wayne County, at the northwest corner of the intersection of Biddle Avenue and Forest Street, in the east line of the west sidewalk, and on the top immovable rim of a hydrant. The letter "n" in the word "open." (177.781 meters or 583.270 feet.)

B. M. (U. S. D. W.)=T. B. M. 12 (U. S. L. S.).—At Wyandotte, Wayne County, at the northwest corner of the intersection of Biddle Avenue and Elm Street, at the south side of the main entrance to the corner store, and on the southeast corner of the pedestal stone of a pillar. A chiseled square formed by the corner of the stone and two chiseled lines at right angles to each other. (178.521 meters or 585.698 feet.)

B. M. (U. S. D. W.)=P. B. M. 4 (U. S. L. S.).—At Wyandotte, Wayne County, on the west side of Biddle Avenue, 171 feet south of the south side of Oak Street, at the brick store building owned by J. P. Debo and used as a meat market, in the pedestal stone of the south pillar, $8\frac{1}{2}$ inches east of the face of the building, and $4\frac{1}{2}$ inches north of the north face of the pillar. The top of a brass bolt leaded vertically and marked "U. S. P. B. M." (178.378 meters or 585.228 feet.)

Wyandotte, 1877 (U. S. L. S.).—At Wyandotte, Wayne County, on the south side of Oak Street, 2,700 feet west of Biddle Avenue, at the Union School Building, on the north side of the building, in the third course of masonry below the water table. The center of a small hole in the end of a copper bolt leaded horizontally in the stone and marked "U. S. P. B. M." (178.574 meters or 585.872 feet.)

B. M. (U. S. D. W.)=P. B. M. 5 (U. S. L. S.).—At Ecorse, Wayne County, on the east side of the river road, at the foot of Labodie Street, at the residence of Mr. W. B. Smith, in the east face of the foundation, and $10\frac{1}{2}$ inches from the southeast corner, in the seventh course of brick below the base board. The center mark in the end of a brass bolt leaded horizontally in the brick. (178.085 meters or 584.267 feet.)

B. M. (U. S. D. W.)=P. B. M. 7 (U. S. L. S.).—At Delray, Wayne County, at the northeast corner of the intersection of River (now West Jefferson) and Louis (now Post) Streets, west of the first entrance east of Louis (Post) Street, at the west pillar of the doorway, and on the southwest corner of the pedestal stone. A square formed by the corner of the stone and two chiseled lines at right angles to each other. (180.687 meters or 592.804 feet.)

B. M. (U. S. D. W.)=T. B. M. 22 (U. S. L. S.)=O 21.—At Detroit, Wayne County, at the northwest corner of the Fort Wayne grounds, on the south side of River Street (now West Jefferson Street), on the first base stone of the iron fence east of a high stone gatepost, on the north edge of the stone. The highest point within a chiseled square. (178.858 meters or 586.803 feet.)

B. M. (U. S. D. W.)=P. B. M. 8 (U. S. L. S.)=P 21.—At Detroit, Wayne County, at the southwest corner of the Fort Wayne grounds, on the riverward side of building No. 60 (officers' quarters), in the center of the water table course, 20 inches east of the center of the front of the building, and 3½ feet above the ground. The center of a brass bolt leaded horizontally and marked "U. S. P. B. M." (183.182 meters or 600.990 feet.)

B. M. (U. S. D. W.)=T. B. M. 23 (U. S. L. S.)=Q 21.—At Detroit, Wayne County, at the northwest corner of the intersection of River Street (now West Jefferson Street) and Junction Avenue, at the side of fire alarm box No. 815, and 10 feet west of a hydrant. The highest point within a chiseled square on the curb stone. (178.426 meters or 585.386 feet.)

B. M. (U. S. D. W.)=T. B. M. 25 (U. S. L. S.).—At Detroit, Wayne County, at the northeast corner of the intersection of Stanton and River (now West Jefferson) Streets, 28 feet east of the east side of a brick building, on the curb on the prolongation of a property line. The highest point within a chiseled square. (179.946 meters or 590.373 feet.)

B. M. (U. S. D. W.)=Gage B. M. "F" (U. S. L. S.).—At Detroit, Wayne County, at the foot of Eighteenth Street, at the roundhouse of the Pere Marquette Railway, on the extreme southeast corner of the foundation. (176.983 meters or 580.652 feet.)

B. M. (U. S. D. W.)=T. B. M. 26 (U. S. L. S.).—At Detroit, Wayne County, near the northeast corner of the intersection of Seventh and River (now West Jefferson) Streets, at the building of the Avery Preserving Company (No. 316-320), on the window base, 17½ inches east of the east face of the brick pillar at the entrance. The highest point within a chiseled square. (177.384 meters or 581.967 feet.)

B. M. (U. S. D. W.)=T. B. M. 27 (U. S. L. S.).—At Detroit, Wayne County, at the southeast corner of the intersection of Wayne and Woodbridge Streets, at No. 81-89 Woodbridge Street, on the north end of the stone doorstep, and 3 inches from the west face of the east pillar. The highest point within a chiseled square. (177.212 meters or 581.403 feet.)

B. M. (U. S. D. W.)=P. B. M. 9 (U. S. L. S.).—At Detroit, Wayne County, on the south side of Atwater Street East, 1½ blocks east of Woodward Avenue, at the office building of the city electric lighting plant, at the front entrance, on the west end of the door stone, 5 inches east of the west face, and 4 inches north of the south face. The top of a brass bolt leaded vertically in the stone and marked "U. S. P. B. M." (177.544 meters or 582.492 feet.)

B. M. (U. S. D. W.)=T. B. M. 28 (U. S. L. S.).—At Detroit, Wayne County, on Atwater Street, between St. Aubin and Dequindre Streets, at the southeast corner of the boiler shop of the Detroit Dry Dock Co., on the cap stone of the foundation. The highest point within a chiseled square. (177.150 meters or 581.200 feet.)

B. M. (U. S. D. W.)=T. B. M. 29 (U. S. L. S.).—At Detroit, Wayne County, at the northwest corner of the intersection of Mount Elliott Avenue and Wight Street, 90 feet west of Mount Elliott Avenue, 2½ feet east of a prolongation of the east face of the lighthouse depot, and 12 feet east of the inlet, on the curbstone. The highest point within a chiseled square. (179.034 meters or 587.381 feet.)

Detroit, 1871 (U. S. L. S.).—At Detroit, Wayne County, at the foot of Mount Elliott Avenue, on the foundation of the lighthouse depot and 8.2 feet below the outer edge of the water table, on the west jamb of the south door. The center of a cross cut in the stone. (178.094 meters or 584.297 feet.)

B. M. (U. S. D. W.)=P. B. M. 10 (U. S. L. S.).—At Detroit, Wayne County, at the northeast corner of the intersection of Mount Elliott Avenue and Wight Street, at the west entrance to the Ireland & Mathews Manufacturing Co., 5 inches from the north end of the doorstep, and 3¾ inches from the edge of the stone. The top of a brass bolt leaded vertically and marked "U. S. P. B. M." (180.526 meters or 592.276 feet.)

NOTE.—It was reported in 1930, by a field party of the Coast and Geodetic Survey, that the steps show unmistakable signs of having settled. The leveling of 1930 indicates settlement. The elevation given above is based on the leveling of 1930.

B. M. (U. S. D. W.)=T. B. M. 30 (U. S. L. S.).—At Detroit, Wayne County, near the northwest corner of the intersection of the Boulevard and Jefferson Avenue, 115 feet west of the Boulevard, at No. 1389 Jefferson Avenue, at the southwest corner of the building, on top of the stone foundation. The highest point within a chiseled square. (182.439 meters or 598.552 feet.)

B. M. (U. S. D. W.)=T. B. M. 31 (U. S. L. S.).—At Detroit, Wayne County, at the northwest corner of the intersection of Jefferson and Crane Avenues, on the curved portion of the curbing, and 10 inches from the Crane Avenue tangent. The highest point within a chiseled square. (180.912 meters or 593.542 feet.)

B. M. (U. S. D. W.)=T. B. M. 32 (U. S. L. S.).—At Detroit, Wayne County, at the Detroit water works, on the stone foundation of the east gatepost of the east gate of the east driveway entrance from Jefferson Avenue, and 3 inches from a pillar. The highest point within a chiseled square. (177.663 meters or 582.883 feet.)

NOTE.—In 1931 it was reported that the east gatepost had been removed.

B. M. (U. S. D. W.)=P. B. M. 11 (U. S. L. S.).—At Detroit, Wayne County, at the Detroit water works, at the standpipe tower on the side facing the river, at the entrance to the tower, on the southwest end of the door stone, 5 inches northeast of the vertical face, and 4 inches from the edge of the stone. The top of a brass bolt leaded vertically and marked "U. S. P. B. M." (178.932 meters or 587.046 feet.)

B. M. (U. S. D. W.)=T. B. M. 38 (U. S. L. S.).—At Windmill Point, Wayne County, at the lighthouse station, south of the light keeper's house, in the center of the top of the concrete coping of the sea wall, and 27½ inches from the west end. The highest point within a chiseled square. (176.512 meters or 579.106 feet.)

B. M. (U. S. D. W.)=P. B. M. 12 (U. S. L. S.).—At Windmill Point, Wayne County, at the southwest corner of the light keeper's house, 2 feet 5 inches from the sloping corner, in the third course of masonry below the water table, and about 3½ feet above the ground. The center mark in the end of a brass bolt leaded horizontally and marked "U. S. P. B. M." (177.913 meters or 583.703 feet.)

NOTE.—It was reported in 1930, by a field party of the Coast and Geodetic Survey, that, although the mark is probably intact, it could not be positively recovered because a porch prevents the mark from being seen.

W (U. S. L. S.).—At Windmill Point, Wayne County, in the foundation of the northeast face of the lighthouse tower, in the fifth course of masonry below the cut stone water table. The horizontal groove cut in a stone slab 2½ by 1½ inches, set flush with the masonry. (177.468 meters or 582.243 feet.)

B. M. (U. S. D. W.)=P. B. M. 13 (U. S. L. S.).—At Grosse Pointe, Wayne County, at the southwest corner of Mr. Charles Seitz's house, 7½ feet north of the corner, and 4½ inches below the end of a stone window sill. The center of the end of a brass bolt leaded horizontally. (180.309 meters or 591.564 feet.)

T. B. M. 96 (U. S. L. S.).—At Grosse Pointe, Wayne County, ⅝ mile north east of Country Club House, at the intersection of the street fence line and a property line, on the northeast corner of a stone monument marked "Harbor Line Reference Point b." The top of a knob which is the highest point on the stone. (179.508 meters or 588.936 feet.)

P. B. M. 35 (U. S. L. S.).—At Grosse Pointe Farms, Wayne County, on the Lake Shore wagon road, at the Catholic Church, 4 feet above the ground, and 2½ feet west of the corner, in the sandstone water table. The center mark in the end of a ¼-inch brass bolt cemented horizontally. (184.227 meters or 604.418 feet.)

P. B. M. 36 (U. S. L. S.).—At Grosse Pointe Farms, Wayne County, about ¼ mile northeast of Country Club House on the Lake Shore wagon road, at the southeast corner of the Catholic Academy of the Sacred Heart, about 1½ feet north of the corner, and about two-thirds foot above the ground, in the face of the limestone foundation. The center mark in the end of a ¼-inch brass bolt cemented horizontally. (184.583 meters or 605.586 feet.)

P. B. M. 37 (U. S. L. S.).—About 1½ miles south of Milk River Point, Wayne County, about ¾ miles north of Country Club House, about 36 yards S. 40° W. of the southwest corner of Lake Side House, in front of the residence of Mr. Victor Vernier, on the top of 2½ by 5 by 6 foot boulder and near the northwest side. The top of a knob. (178.052 meters or 584.159 feet.)

P. B. M. 38 (U. S. L. S.).—At Milk River Point, Wayne County, on the east side of the north-and-south road, on the prolongation of the south line of the east-and-west road, and on the southeast corner of the stone monument of the Lake St. Clair Harbor Line marked "Harbor Line Reference Point c." The top of a knob. (176.958 meters or 580.570 feet.)

P. B. M. 39 (U. S. L. S.).—At L'Anse Creuse, Macomb County, on the Detroit, Lake Shore and Mount Clemens Railway, $4\frac{1}{4}$ miles southwest of McSweeney's clubhouse, in a foundation stone of the north buttress to the tower of the Catholic Church, about 1 foot above the ground, and about 8 inches from the corner. The center-punch mark in a $\frac{1}{4}$ -inch brass bolt cemented horizontally. (176.938 meters or 580.504 feet.)

P. B. M. 40 (U. S. L. S.).—Near Mount Clemens, Macomb County, about 225 yards west of McSweeney's clubhouse, at the northwest corner of the Detroit, Lake Shore and Mount Clemens Railway power house, in the sandstone foundation, about 1 foot south of the northwest corner, and about 2 inches above the ground. The center-punch mark in a $\frac{1}{4}$ -inch brass bolt cemented horizontally and marked "40 US." (176.694 meters or 579.704 feet.)

P. B. M. 41 (U. S. L. S.).—About 1 mile east of Mount Clemens, Macomb County, on the south bank of Clinton River, on the west side of the brick residence of J. Reimold, in the sandstone water table, about 3 feet above the ground, and about 2 feet north of the bay window. The center-punch mark in a $\frac{1}{4}$ -inch brass bolt cemented horizontally. (180.031 meters or 590.652 feet.)

B. M. (U. S. D. W.)=P. B. M. 34 (U. S. L. S.).—In the southwest part of New Baltimore, Macomb County, on the northwest side of Main Street, at the house owned by the heirs of Edward Rose, in the front face of the foundation, 7 inches west of a cellar window, and 5 inches below the water table. The center mark in a brass bolt leaded horizontally and marked "U. S. P. B. M." (179.749 meters or 589.727 feet.)

B. M. (U. S. D. W.)=P. B. M. 33 (U. S. L. S.).—At New Baltimore, Macomb County, at the southwest corner of Main and Washington Streets, on the north side of the corner building owned by William Baker, in the window base of the west window, 9 inches east of the west end of the stone, and 4 inches from the front edge. The top of a brass bolt leaded vertically and marked "U. S. P. B. M." (179.248 meters or 588.083 feet.)

B. M. (U. S. D. W.)=P. B. M. 32 (U. S. L. S.).—At New Baltimore, Macomb County, on the east side of Main Street, about 1,900 feet north of Washington Street, at the northwest corner of Henry C. Schnoor's residence, in the water table, 6 inches east of the west end. The center mark in a brass bolt leaded horizontally and marked "U. S. P. B. M." (182.742 meters or 599.546 feet.)

B. M. (U. S. D. W.)=P. B. M. 31 (U. S. L. S.).—About 1 mile west of Fair Haven, St. Clair County, about $\frac{1}{2}$ mile east of Swan Creek, at the southwest corner of Mrs. C. Rose's house, in the south face of the foundation, in the fourth course above the ground, in the second course below the water table. The center of a brass bolt leaded horizontally and marked "U. S. P. B. M." (177.783 meters or 583.276 feet.)

B. M. (U. S. D. W.)=P. B. M. 30 (U. S. L. S.).—At Fair Haven, St. Clair County at Henry C. Schnoor's stave mill, near the boiler-room door, in the south face of the brick chimney, in the twenty-second course of brick above the ground, in the tenth brick east of the west face. The center mark in a brass bolt leaded horizontally. (177.689 meters or 582.968 feet.)

B. M. (U. S. D. W.)=P. B. M. 29 (U. S. L. S.).—At Algonac, St. Clair County, at the northeast corner of the east wing of the public-school building, in the foundation, in the north face of the corner stone. The center mark in a brass bolt leaded horizontally and marked "U. S. P. B. M." (178.112 meters or 584.356 feet.)

B. M. (U. S. D. W.)=P. B. M. 28 (U. S. L. S.).—At Algonac, St. Clair County, on the east face of the town hall, in the eighth course of brick above the stone foundation, in the sixth brick south of the northeast corner. The center mark in a brass bolt leaded horizontally. (178.194 meters or 584.625 feet.)

B. M. (U. S. D. W.)=Gage B. M. "R" (U. S. L. S.)=F 23.—At Algonac, St. Clair County, at the northwest corner of River and Smith Streets, on the south side of the foundation of Mr. Moore's house, on the second stone west of the southeast corner, and 2.6 feet from the corner. The center of a hole. (178.079 meters or 584.248 feet.)

B. M. (U. S. D. W.)=P. B. M. 27 (U. S. L. S.).—About one-half mile north of **Roberts Landing**, St. Clair County, on the river front, at the house owned by D. B. Shier and A. S. Freeman, at the northwest corner of the kitchen, in the sixteenth course of brick above the ground, in the north face of the corner brick. The center mark in a brass bolt leaded horizontally. (178.209 meters or 584.674 feet.)

B. M. (U. S. D. W.)=P. B. M. 26 (U. S. L. S.).—At **Marine City**, St. Clair County, at the southeast corner of Water and Union Streets, near the northwest corner of the Marine City Stave Co.'s store, on the stone base under a window, 8 inches south of the north end, and $2\frac{1}{2}$ inches from the front edge. The top of a brass bolt leaded vertically and marked "U. S. P. B. M." (178.591 meters or 585.927 feet.)

B. M. (U. S. D. W.)=Gage B. M. "P" (U. S. L. S.).—At **Marine City**, St. Clair County, in the Backus Block, at the bank of Messrs. G. W. and F. T. Moore, on the north side of the doorsill. A chiseled cross. (178.593 meters or 585.934 feet.)

B. M. (U. S. D. W.)=Gage B. M. "O" (U. S. L. S.).—At **Marine City**, St. Clair County, at the southeast corner of Washington and Water Streets, on the northwest corner of the stone foundation of the building occupied by the "Globe" office, 2 feet below the wood of the building, and 6 inches above the ground. A chiseled square. (177.579 meters or 582.607 feet.)

B. M. (U. S. D. W.)=P. B. M. 25 (U. S. L. S.).—At **Marine City**, St. Clair County, at the northwest corner of Main and Broad Streets, near the southeast corner of the city hall, at the window entrance to the corridor, 2 feet 5 inches above the ground, and 5 inches south of the north jamb. The top of a brass bolt leaded vertically and marked "U. S. P. B. M." (179.110 meters or 587.630 feet.)

B. M. (U. S. D. W.)=P. B. M. 24 (U. S. L. S.).—At **Marine City**, St. Clair County, in the west face of the city waterworks building, $2\frac{1}{2}$ feet above the ground, and 5 inches north of the southwest corner. The center mark in a brass bolt leaded horizontally. (179.625 meters or 589.320 feet.)

B. M. (U. S. D. W.)=P. B. M. 23 (U. S. L. S.).—At **East China**, St. Clair County, on the river front, about $\frac{1}{2}$ mile above Ricors Dock, in the south side of the foundation of Mr. Rankin's house, between the kitchen and cellar doors, 26 inches east of the east jamb of the kitchen door, 18 inches above the ground, and $7\frac{3}{4}$ inches below the weather board. The center mark in a brass bolt leaded horizontally and marked "U. S. P. B. M." (179.928 meters or 590.314 feet.)

B. M. (U. S. D. W.)=P. B. M. 22 (U. S. L. S.).—In the lower part of **St. Clair**, St. Clair County, on the river front, at Mr. John Schlunkert's coal yard, in the east face of the brick wall of the old storehouse, in the twenty-first course of brick below the woodwork of the gable, 4.1 feet above the ground, and $7\frac{1}{4}$ inches north of the southeast corner. The center mark in a brass bolt leaded horizontally. (182.619 meters or 599.142 feet.)

B. M. (U. S. D. W.)=Gage B. M. "N" (U. S. L. S.).—At **St. Clair**, St. Clair County, on the south side of Adam Street, on the north side of the Barron Building which is used as the post office, on the stone window sill of the east basement window, and 1 foot west of the east edge. A chiseled square. (177.788 meters or 583.293 feet.)

B. M. (U. S. D. W.)=Gage B. M. "M" (U. S. L. S.).—At **St. Clair**, St. Clair County, at the foot of Adam Street, at the southwest corner of Schwabins Bros. saloon, on the corner of the water table. A chiseled square. (179.291 meters or 588.224 feet.)

B. M. (U. S. D. W.)=P. B. M. 21 (U. S. L. S.).—At **St. Clair**, St. Clair County, at the city waterworks, at the main entrance, 5 feet $7\frac{1}{2}$ inches south of the south end of the doorstone, in the water table. The top of a brass bolt leaded vertically and marked "U. S. P. B. M." (179.306 meters or 588.273 feet.)

B. M. (U. S. D. W.)=P. B. M. 20 (U. S. L. S.).—At **St. Clair**, St. Clair County, on the west side of Front Street, on top of the north hill, at Mr. Mark Hopkin's residence, in the east face of the foundation, in the top course of masonry, in the second stone south of the northeast corner. The center mark in a brass bolt leaded horizontally and marked "U. S. P. B. M." (191.038 meters or 626.764 feet.)

B. M. (U. S. D. W.)=Gage B. M. "L" (U. S. L. S.).—At **Marysville**, St. Clair County, at the shingle mill chimney which is the lowest one of three tall chimneys, on top of the northwest corner of the stone foundation, and about

1 foot below the surface of the ground. The highest point within a square. (177.462 meters or 582.223 feet.)

B. M. (U. S. D. W.)=P. B. M. 19 (U. S. L. S.).—At Marysville, St. Clair County, diagonally opposite the Marysville Hotel, in the foundation of Mr. N. B. Mills' store, in the seventh course of brick above the stone foundation, in the second brick east of the west corner. The center mark in a brass bolt leaded horizontally. (179.673 meters or 589.477 feet.)

B. M. (U. S. D. W.)=P. B. M. 18 (U. S. L. S.).—At Marysville, St. Clair County, at the upper mill, which is the Sanburn sawmill, on the chimney bearing the stone marked "1871" on its west end, in the seventeenth course of brick above the foundation, in the south face of the corner brick. The center mark in a brass bolt leaded horizontally. (178.804 meters or 586.626 feet.)

B. M. (U. S. D. W.)=P. B. M. 17 (U. S. L. S.).—Near Port Huron, St. Clair County, about 2 miles below the Black River, at Alverson and Dunford's dry dock, in the south face of the boiler house of the pumping station, in the top course of the stone foundation, 10 inches west of the west face of the coal door, and 6 inches below the top of the stone. The center mark in a brass bolt leaded horizontally and marked "U. S. P. B. M." (181.719 meters or 596.190 feet.)

B. M. (U. S. D. W.)=T. B. M. 41 (U. S. L. S.).—At Port Huron, St. Clair County, about $1\frac{3}{8}$ miles below the Black River, about 1,840 feet below the viaduct over the Flint and Pere Marquette Railroad, on the west side of Military Street, in front of No. 2409, and 12 feet north of the horse block, on the curb. The highest point within a chiseled square. (183.794 meters or 602.997 feet.)

B. M. (U. S. D. W.)=T. B. M. 40 (U. S. L. S.).—At Port Huron, St. Clair County, about $\frac{3}{4}$ mile below the Black River, on the west side of Military Street, in front of No. 1915, on the curb at the south side of the carriage walk to the street. The highest point within a chiseled square. (184.454 meters or 605.163 feet.)

B. M. (U. S. D. W.)=Gage B. M. "I" (U. S. L. S.).—At Port Huron, St. Clair County, at the foot of Clyde Street, and about 100 feet from the river, on the brick powder house. The top of the lower hinge bolt. (178.254 meters or 584.822 feet.)

B. M. (U. S. D. W.)=P. B. M. 16 (U. S. L. S.).—At Port Huron, St. Clair County, 290 feet south of the Black River, on the west side of Military Street, at the Opera House block, at the center post of the front entrance, on the extreme southeast corner of an iron plate. The surface within a 1-inch chiseled square. (181.273 meters or 594.726 feet.)

B. M. (U. S. D. W.)=P. B. M. 15 (U. S. L. S.).—At Port Huron, St. Clair County, at the courthouse, at the northeast basement door, on the stone door-step, $4\frac{1}{2}$ inches south of the south jamb and $3\frac{1}{4}$ inches from the front edge. The top of a brass bolt leaded vertically and marked "U. S. P. B. M." (182.539 meters or 598.880 feet.)

B. M. (U. S. D. W.)=P. B. M. 14 (U. S. L. S.).—At Port Huron, St. Clair County, at the city waterworks, 66 feet south of the south face of the main building, at the south end of the coal shed, at the point where the south wall of the shed rises 3 feet to the upper coping, on a coping stone of the south retaining wall, 6 inches from the south face and 6 inches from the east end. The top of a brass bolt leaded vertically and marked "U. S. P. B. M." (182.759 meters or 599.602 feet.)

B. M. Fort Gratiot Lighthouse, 1877 (U. S. L. S.).—At Fort Gratiot, St. Clair County, about $2\frac{1}{4}$ miles above the Black River, at the foot of Lake Huron, at Fort Gratiot Lighthouse, in the south foundation wall of the brick dwelling of the lighthouse, in the upper course of masonry, 2.1 feet from the southeast corner and 0.6 foot below the water table. The center of a small hole in the head of a copper bolt leaded horizontally. (179.772 meters or 589.802 feet.)

T. B. M. 62 (U. S. L. S.).—At Fort Gratiot, St. Clair County, at Fort Gratiot Lighthouse, on the south side of the oil house, which is a round building, on the concrete foundation, 7 inches from the south side of the building and 3 inches north of the south edge of the foundation. The highest point within a small chiseled square. (178.728 meters or 586.377 feet.)

P. B. M. Lakeport (U. S. L. S.).—At Lakeport, St. Clair County, at the intersection of Milwaukee and Second Streets, in the southeast corner of the hotel grounds owned by Mr. John Thoday, in the southeast corner of lot 2, block 2,

20 inches north of the fence on the north side of Milwaukee Street and 14 inches west of the fence on the west side of Second Street. The top of a brass bolt leaded vertically in the top of an 8 by 14 by 14 inch granite stone, buried about 2½ feet below the surface of the ground, over which was set a 6 by 6 inch granite stone projecting about 4 inches above the ground. (181.327 meters or 594.904 feet.)

T. B. M. 86 (U. S. L. S.).—About 3¼ miles south of Lexington, Sanilac County, at the north end of a small steel wagon bridge over Mill Creek, over the west end of the north abutment, the most northerly one of a row of six bolts on the west side of the bridge. The top of a bolt. (184.149 meters or 604.162 feet.)

P. B. M. 1 (U. S. L. S.).—At Lexington, Sanilac County, at the northeast corner of Main and Lake Streets, at the M. E. Church, in the center of the corner stone, about 3 feet above the ground, and 9 inches north of the southwest corner. The center of the period between the letters "M" and "E" on the corner stone which is marked "FIRST M. E. CHURCH 1851-1890." (189.874 meters or 622.945 feet.)

P. B. M. Lexington 2 (U. S. L. S.).—At Lexington, Sanilac County, at the northeast corner of Main and Boynton Streets, on the west side of a 2-story brick building owned by Mr. John L. Fead, on the top of the water table, 25 inches north of the southwest corner of the building, and 3 inches from the edge of the water table. The highest point within a small chiseled square. (188.696 meters or 619.080 feet.)

P. B. M. Lexington 3 (U. S. L. S.).—At Lexington, Sanilac County, on Main Street between Huron Avenue and Simons Street, at the city hall which is a 3-story brick building, about 10 feet south of the northwest corner of the building, in the north end of the stone doorsill of the north door, 3 inches south of the north end of the sill, and 1½ inches from the front edge. The top of a brass bolt leaded vertically. (189.619 meters or 622.108 feet.)

P. B. M. Lexington 4 (U. S. L. S.).—At Lexington, Sanilac County, on the north side of Simons Street, about 140 yards south of the Lexington Woolen Mills, about 45 yards from the high bank of the lake, about 24 yards north of the north end of Dallas Street, in the front yard of Mrs. Martha Henry's property, in the top of a large granite boulder. The top of a brass bolt leaded vertically. (186.626 meters or 612.289 feet.)

LINE 2, GIBALTAR, MICH., TO DESHLER, OHIO

This line was run by the Coast and Geodetic Survey in 1899 and follows the Michigan Central Railroad and the New York Central Railroad through South Rockwood, Newport, Monroe, and Vienna, Mich., into Ohio.

Gibraltar, 1877 (U. S. L. S.).—See page 7.

P. B. M. 2, 1875 (U. S. L. S.).—See page 7.

B. M. (U. S. D. W.)=P. B. M. 1 (U. S. L. S.).—See page 8.

A.—At South Rockwood, Monroe County, 198 feet south of the Michigan Central Railroad station, 17 feet west of the center of the track, on the southeast stone pillar of the water tank, on the northeast corner of the stone. The bottom of a hole 1 inch square and ½ inch deep. (178.866 meters or 586.830 feet.)

B.—At Newport, Monroe County, on the Michigan Central Railroad, about 360 feet from the station, on the south abutment of the bridge over Swan Creek, in the end of the north face, and about 3 feet above the ground. The center of a horizontal mark in the end of a brass bolt leaded horizontally in the abutment. (176.752 meters or 579.894 feet.)

C.—At Monroe, Monroe County, at the Michigan Central Railroad bridge over the Raisin River, on the west face of the south pier, 6 inches north of the south edge and about 4 feet above the ground. A horizontal mark in a brass bolt leaded horizontally in the pier. (176.956 meters or 580.563 feet.)

D.—At Monroe, Monroe County, on the south side of First Street, 345 feet west of Kentucky Avenue, at the northwest corner of the city fire-engine house, on the northeast corner of the pedestal stone, just below the brickwork. The bottom of a hole 1 inch square and ½ inch deep. (179.914 meters or 590.268 feet.)

E.—About 1½ miles below LaSalle station, Monroe County, on the New York Central Railroad, about 125 yards below the Lagerness road crossing, on the

south side of an open stone culvert, on the top stone, 11.1 feet east of the east rail, and about $3\frac{1}{2}$ feet above the ground. The bottom of a hole, 1 inch square and $\frac{3}{8}$ inch deep, surrounded by the letters "USC&GS" cut in the stone. (177.340 meters or 581.823 feet.)

F.—At Vienna station, Monroe County, on the Michigan Central and the New York Central Railroads, about 325 feet west of the track, on the north side of the road to Erie, about 20 rods west of the center of section 16, on the southwest corner of Mrs. William McLain's house, in the east end of the water-table stone on the south side of the building, and about $2\frac{1}{2}$ feet above the ground. A horizontal mark on the end of a $\frac{3}{8}$ -inch brass bolt leaded horizontally into the stone and surrounded by the letters "USC&GS" cut in the stone. (179.324 meters or 588.332 feet.)

The line continues into Lucas Co., Ohio.

LINE 3, DETOUR TO IROQUOIS POINT, MICH.

This leveling was run by the United States Lake Survey in 1901 and follows the west side of St. Marys River from Detour, Mich., through Goetzville, Raber, Stirlingville, Barbeau, Sault Ste. Marie, and Brimley to Iroquois Point, Mich. While many of the bench marks in this line were established in connection with earlier lines of levels the elevations given in this publication were derived from an adjustment of the leveling run in 1901.

P. B. M. Boathouse (U. S. L. S.).—At Detour, Chippewa County, on the gravel beach on the east shore of the bay and the west side of Detour Point, about 330 yards from the Detour Lighthouse, about 70 yards north of the boathouse belonging to the lighthouse, about 80 yards northeast of the outer end of the pier, about 25 feet west of the edge of the brush, and about 10 feet east of the water's edge, in the top of a large well-imbedded bowlder which projects about 1 foot above the ground, about 6 inches from the north edge of the bowlder. The top of a brass bolt leaded vertically and marked "U. S." (177.244 meters or 581.508 feet.)

P. B. M. Detour 5=Detour Point No. 2 (U. S. L. S.).—At Detour, Chippewa County, about 12 yards northwest of the northwest corner of the light keeper's dwelling, in the top of a large well-embedded bowlder which projects about $1\frac{1}{2}$ feet above the ground. The top of a brass bolt, leaded vertically, projecting about $\frac{1}{4}$ inch above the bowlder, and marked "U. S." (179.768 meters or 589.789 feet.)

P. B. M. Detour 4=Detour Point No. 1 (U. S. L. S.).—At Detour, Chippewa County, about 16 feet north and 5 feet east of the northwest corner of the tower of the Detour Lighthouse, in the top of a very large limestone bowlder. The top of a brass bolt leaded vertically at the western point of a cross surrounded by the letters "U. S. P. B. M." (181.145 meters or 594.307 feet.)

P. B. M. Detour 3=Detour Light (U. S. L. S.).—At Detour, Chippewa County, about 6 inches northwest of the northwest corner post of the Detour Lighthouse, on the top of an iron plate. The intersection of a cross flanked by the letters "U. S. B. M." (180.012 meters or 590.589 feet.)

T. B. M. 196 (U. S. L. S.).—At Detour, Chippewa County, about 10 feet west and 3 feet north of the northeast corner of the residence at the Detour Lighthouse, about 10 feet from the northwest corner of the tower, on the top of an embedded limestone bowlder which projects about 5 inches above the ground. The highest point within a small chiseled square. (179.847 meters or 590.048 feet.)

P. B. M. Goetz (U. S. L. S.).—At Detour, Chippewa County, near the center of the foot of St. Marys Street, 1 block north of Anthony's dock, about 75 yards east and 9 yards south of the southwest corner of Hotel Detour, about 40 yards from the water's edge of St. Marys River, and about 25 feet south and 5 feet east of the corner of the sidewalk, in the top of a granite bowlder which projects about 5 inches above the ground. The top of a brass bolt leaded vertically. (183.397 meters or 601.695 feet.)

P. B. M. Detour 2=Detour G (U. S. L. S.).—At Detour, Chippewa County, near Anthony's coal dock, about 95 yards east and 20 yards south of the Huron House, about 60 yards south of Bennett's store and post office, about

25 yards northeast of the northeast corner of Mr. J. T. Bennett's yard, and about 20 yards from the water's edge of St. Marys River, in the top of a granite boulder which is about flush with the ground. The top of an iron bolt, $1\frac{1}{4}$ inches square. (178.570 meters or 585.858 feet.)

P. B. M. Terrett (U. S. L. S.).—At Detour, Chippewa County, at the junction of Superior and Huron Streets, about 85 yards northwest of the water's edge of St. Marys River, about 30 yards southeast of the northeast corner of Mr. Richard Terrett's house, about 25 yards northeast of a log house, about 20 yards east of a fence corner which forms both the southeast corner of a block and also the southeast corner of Mr. Terrett's yard, about 25 feet northwest of a large granite boulder, and about 6 feet west of the east line of Superior Street, at a point where Superior Street angles to the west, in the top of a large limestone boulder. The top of a brass bolt, leaded vertically and marked "U. S. P. B. M." (182.584 meters or 599.028 feet.)

P. B. M. Detour 1=Detour (U. S. L. S.).—At Detour, Chippewa County, at the intersection of Superior and Drummond Streets, about 13 feet north and 10 feet east of the corner of the fence at the southeast corner of the intersection. The top of a $\frac{1}{2}$ -inch iron bolt leaded vertically in the top of a 6 by 6 by 20 inch cut stone, buried $2\frac{1}{2}$ feet below the surface of the ground, over which was set a 4 by 4 inch cedar post projecting about 3 feet above the ground and marked "U. S. B. M." on the sides. (186.296 meters or 611.206 feet.)

T. B. M. 190 (U. S. L. S.).—About $2\frac{1}{4}$ miles west of Detour, Chippewa County, about 25 yards east of the crest of a large hill, and about 12 yards east of a very large limestone boulder lying on the north side of the road, in the bank on the south side of the county road, on top of an embedded limestone boulder 2 feet from its north edge. The highest point within a small chiseled square flanked by the letters "U. S." (200.112 meters or 656.534 feet.)

P. B. M. Caribou=Caribou Lake (U. S. L. S.).—About $4\frac{1}{2}$ miles west of Detour, Chippewa County, about 400 yards east of the point where the wagon road leaves the water's edge of Caribou Lake, about 55 yards south of the lake, and 8 feet north of the center of the wagon road. The top of an iron bolt leaded in the top of a 6 by 6 by 20 inch cut stone, buried $2\frac{1}{2}$ feet below the surface of the ground, over which was set a 4 by 4 inch cedar post marked "U. S. B. M." on the sides. (194.698 meters or 638.772 feet.)

P. B. M. Schlessler (U. S. L. S.).—About 1 mile west and 1 mile north of the post office at Schlessler, Chippewa County, 1 mile north of Camerons Corners, at Rusks Corners, about 200 yards east of the creek crossing the road, 63 yards northeast of the northeast corner of the schoolhouse, 19 yards northwest of a fence corner, and 17 yards southwest of another fence corner, near the west fence line of the north-and-south road, in the center of the road leading west. The top of a $\frac{3}{8}$ -inch iron bolt, flanked by the letters "U. S." and leaded vertically in the top of a 6 by 6 by 20 inch cut stone, buried $2\frac{1}{2}$ feet below the surface of the ground, over which was set vertically a 6 by 8 by 14 inch stone projecting $2\frac{1}{2}$ inches above the ground and marked "U. S. P. B. M." (214.048 meters or 702.256 feet.)

T. B. M. 173 (U. S. L. S.).—At Goetzville (Gatesville), Chippewa County, about 140 yards north of the intersection of the roads at the post office, in a small ditch west of the wagon road running north, about 5 yards east of the north-and-south fence, on the highest point of an embedded limestone boulder. The highest point within a small chiseled square. (224.852 meters or 737.702 feet.)

P. B. M. Gatesville (U. S. L. S.).—About 1 mile north of the post office at Goetzville (Gatesville), Chippewa County, on the north side of the county road, and 7 feet west of a large hemlock stump at the corner of the road. The top of a $\frac{3}{8}$ -inch iron bolt, flanked by the letters "U. S." and set in the top of a 6 by 6 by 20 inch cut stone, buried 3 feet below the surface of the ground, over which was set a 4 by 4 inch cedar post projecting about $2\frac{1}{2}$ feet above the ground and marked "U. S. B. M." on the sides. (218.489 meters or 716.826 feet.)

P. B. M. Raber (U. S. L. S.).—At Raber, Chippewa County, on the south line of the main street, about 85 yards east of the crossing of a narrow-gauge railroad, about 80 yards from the entrance of a church, about 70 yards west of the water's edge of St. Marys River, and about 40 yards from the southwest corner of the Mud Lake Lumber Company's general store. The top of a $\frac{1}{4}$ -inch iron bolt leaded in the top of a 6 by 6 by 20 inch cut stone, buried $2\frac{1}{2}$ feet below the surface of the ground, over which was set a 4 by 4 inch cedar

post projecting about 2 feet above the ground and marked "U. S. B. M." on the sides. (177.325 meters or 581.774 feet.)

P. B. M. Hudson—**Hudson's Corner (U. S. L. S.)**.—Near **Raber**, Chippewa County, at the SE. corner of sec. 27, T. 43 N., R. 2 E., about 1 mile north of the county road, about 165 yards east of a point in the road opposite Mr. Frank Huber's house, about 135 yards north of the creek crossing the road in the bottom of a large ravine, 14 yards northwest of a section-corner stake, and 10 feet south of the east-and-west fence which is the south line of Mr. Huber's property. The top of a $\frac{1}{4}$ -inch iron bolt, flanked by the letters "U. S." and leaded in the top of a 6 by 6 by 20 inch cut stone, buried vertically $2\frac{1}{2}$ feet below the surface of the ground, over which was set a 4 by 4 inch cedar post projecting about 2 feet above the ground and marked "U. S. B. M." on the sides. (207.131 meters or 679.562 feet.)

T. B. M. 164 (U. S. L. S.).—Near **Raber**, Chippewa County, at the SE. corner of sec. 27, T. 43 N., R. 2 E., about 150 yards east of a point on the road opposite Mr. Frank Huber's house, about 135 yards north of a creek which crosses the road at the bottom of a large ravine, 23 yards west and 5 yards north of a section-corner stake, 14 yards west of *P. B. M. Hudson*, and 6 yards south of the fence on the north side of the east-and-west road, on the highest point of an embedded granite boulder projecting about $\frac{1}{2}$ foot above the ground. The highest point within a small chiseled square flanked by the letters "U. S." (208.124 meters or 682.820 feet.)

P. B. M. Tripp (U. S. L. S.).—Near **Stalwart**, Chippewa County, at the NE. corner of sec. 21, T. 43 N., R. 2 E., on the east side of the road at the turn by the bluff, and about 14 yards south of the section corner. The top of a $\frac{3}{8}$ -inch iron bolt, flanked by the letters "U. S." and set in the top of a 6 by 6 by 20 inch cut stone, buried $2\frac{1}{2}$ feet below the surface of the ground, over which was set a 4 by 4 inch cedar post projecting about $1\frac{1}{2}$ feet above the ground and marked "U. S. B. M." on the sides. (207.306 meters or 680.136 feet.)

P. B. M. Fairview (U. S. L. S.).—Near **Stirlingville**, Chippewa County, at the SE. corner of sec. 1, T. 43 N., R. 1 E., about 42 yards south of the south-west corner of Fairview schoolhouse, and about 29 yards north of the junction of the roads at the section corner, on the east fence line of the county road. The top of a $\frac{1}{2}$ -inch bolt leaded vertically in the top of a 6 by 6 by 24 inch cut stone, buried about $2\frac{1}{2}$ feet below the surface of the ground, over which was set a 4 by 4 inch cedar post projecting about $2\frac{1}{2}$ feet above the ground and marked "U. S. B. M." on the sides. (209.269 meters or 686.577 feet.)

P. B. M. Campbell (U. S. L. S.).—About 1 mile east and $\frac{1}{4}$ mile south of **Stirlingville**, Chippewa County, about 450 yards south of the road intersection, about 450 yards north of Mr. Robert Campbell's house which stands on a high bluff about 2 miles south of the Big Munuscong River, in a field belonging to Mr. Campbell, about 45 yards east of the east fence line of the north-and-south road, in the top of a very large embedded boulder projecting about 4 feet above the ground. The top of a brass bolt leaded in the boulder and marked "U. S." (191.154 meters or 627.144 feet.)

P. B. M. Munuscong (U. S. L. S.).—At **Kelden**, Chippewa County, about 1,000 yards north of the Big Munuscong River, about 480 yards south of the center of the wagon bridge over the Little Munuscong River, about 460 yards south of the Kelden post office, about 100 yards north of the north end of the large barn on the east side of the road, and about 13 feet east of the east fence line of the north-and-south road. The top of a $\frac{1}{2}$ -inch iron bolt cemented in the top of a 6 by 6 by 24 inch cut stone, buried about 3 feet below the surface of the ground, over which was set a 4 by 4 inch cedar post projecting about 1 foot above the ground and marked "U. S. B. M." on the sides. (183.136 meters or 600.839 feet.)

P. B. M. Barbeau (U. S. L. S.).—At **Barbeau**, Chippewa County, about 360 yards east of the post office which stands at the southeast corner of the junction of the roads, on the top of a hill, in front of Mr. Alex. Scales's house, about 65 yards west of an 8-inch lone oak tree standing in the road, about 100 feet east of a point in the road opposite the east line of a small schoolhouse which stands north of the road, and about 3 feet north of the south fence of the east-and-west road. The top of a $\frac{1}{2}$ -inch iron bolt, leaded vertically in the top of a 6 by 6 by 24 inch cut stone, buried vertically about 3 feet below the surface of the ground, over which was set a 4 by 4 inch cedar post projecting about 1 foot above the ground and marked "U. S. B. M." on the sides. (201.234 meters or 660.215 feet.)

T. B. M. 133 (U. S. L. S.).—Near **McCarron**, Chippewa County, near the mouth of Charlotte River, about 550 yards west of the center of the Hay Lake road, about 60 yards west of the Greg schoolhouse, 10 yards west of the west line of Mr. James Greg's house on the south side of the road, in line with the west side of Mr. Dyer's house on the north side of the road, and about 10 feet north of the center of the east-and-west road just south of Charlotte River, on the top of a large sandstone boulder. The highest point within a small chiseled square. (189.361 meters or 621.262 feet.)

P. B. M. Charlotte=Charlotte River (U. S. L. S.).—Near **McCarron**, Chippewa County, near the mouth of Charlotte River, at the Hay Lake road crossing, about 140 feet south of the river, and 3 feet east of the road. A 4 by 4 inch stone, projecting 5 inches above the ground and marked "U. S.," is 59 feet S. 64° 00' W. of the mark; the northeast corner of the house on the east side of the road is S. 1° 10' E.; and the southeast corner of the house west of the road is S. 20° 40' W. The top of a 5/8-inch iron bolt, flanked by the letters "U. S." and set in the top of a 6 by 6 by 24 inch cut stone, buried about 3 feet below the surface of the ground, over which was set a 4 by 4 inch cedar post projecting about 1 foot above the ground and marked "U. S. B. M." on the sides. (183.344 meters or 601.521 feet.)

P. B. M. Hinds (U. S. L. S.).—Near **Rosedale**, Chippewa County, 10 1/2 miles south of the "Soo" locks, 3 miles due north of Charlotte River, 3/4 mile west of St. Marys River, at the junction of the Hay Lake and Rosedale roads, at the southwest corner of the property of Mrs. John Hinds, and 2 feet east and 1 foot south of the fence corner. The top of a brass bolt, leaded vertically in the top of a 2 by 1 1/2 by 1/2 foot sandstone boulder, buried 2 1/2 feet below the surface of the ground, over which was set a small boulder projecting 4 inches above the ground. (180.297 meters or 591.524 feet.)

P. B. M. Newcomb (U. S. L. S.).—Near **Rosedale**, Chippewa County, about 7 miles below the "Soo" locks, on the Hay Lake road, in the south end of an ash grove belonging to Mrs. Newcomb on the right bank of St. Marys River, about 10 yards from the top of the bank, about 16 feet south of the south fence line of the lane leading from the house to the river, and 10 feet south of the line of the north side of the large barn. The top of an iron bolt, cemented in the top of a boulder buried 15 inches below the surface of the ground, over which was set a 5 by 5 inch pine post projecting 6 inches above the ground. (178.041 meters or 584.123 feet.)

P. B. M. Riverside (U. S. L. S.).—Near **Sault Ste. Marie**, Chippewa County, about 4 1/2 miles below the "Soo" locks, at the south end of the gateway to the Riverside Cemetery, in the center of the east face of the sixth course of masonry above the ground. The center of a brass bolt leaded horizontally and marked "U. S. P. B. M." (179.664 meters or 589.448 feet.)

P. B. M. Little=Little Rapids=Gage B. M. (U. S. L. S.).—Near **Sault Ste. Marie**, Chippewa County, about 2 1/2 miles below the "Soo" locks, on the upper island of Little Rapids, on the right shore of the main channel of St. Marys River, about 10 yards back of the Government light, in the top of a sandstone boulder set flush with the surface of the ground. The top of a square iron bolt. (178.489 meters or 585.593 feet.)

P. B. M. Soo (U. S. L. S.).—At **Sault Ste. Marie**, Chippewa County, in the northeast corner of the Chippewa County courthouse, 2 1/2 feet above the ground, and 6 inches west of the corner, in the north face of the third red sandstone above the ground. The center of a brass bolt leaded horizontally. (188.702 meters or 619.100 feet.)

T. B. M. 117 (U. S. L. S.).—At **Sault Ste. Marie**, Chippewa County, in the northeast corner of the Chippewa County courthouse, 6 inches above the ground, 5 inches west of the corner, on top of the first stone above the ground, and 2.15 feet directly below *P. B. M. Soo*. The highest point within a 1-inch chiseled square. (188.048 meters or 616.954 feet.)

P. B. M. A (U. S. L. S.).—At **Sault Ste. Marie**, Chippewa County, about 165 yards west of the Government building, at the upper end of the Weitzel Lock, directly in the line of the lower gate, on the north side of the lock, on top of the masonry, and 10 inches south of the north edge. The highest point within a 2-inch chiseled square. (184.526 meters or 605.399 feet.)

P. B. M. B (U. S. L. S.).—At **Sault Ste. Marie**, Chippewa County, at the foot of the Poe Lock, 5 inches south of the south side of the steps leading down on the north side of the lock, directly in line with the front edge of the second step from the bottom, on the top of the masonry. The highest point within a 1 1/2-inch chiseled square. (179.210 meters or 587.958 feet.)

T. B. M. 90 (U. S. L. S.).—At Sault Ste. Marie, Chippewa County, about 1,000 yards west of the west end of the Weitzel Lock, about 125 yards east of the railroad, on the south side of the Sault Ste. Marie Canal, at the movable dam, on top of the southwest corner of the masonry, 8 inches from the west side, and 6 inches from the south side. The highest point within 1-inch chiseled square. (184.827 meters or 606.387 feet.)

P. B. M. Meridian (U. S. L. S.).—At Sault Ste. Marie, Chippewa County, in the line of the center of Meridian Street which bounds Fort Brady on the west, 12 feet north and 4 feet east of the southeast corner of the stone abutment of the plate girder bridge which carries the Minneapolis, St. Paul & Sault Ste. Marie Railway over a wagon road, in the top of a stone monument marking the intersection of the principal meridian and the south line of the Sault Ste. Marie grant. The monument is set 2 feet below the surface of the ground and the hole is walled up and covered with large stones. The top of the square head of an iron bolt. (185.064 meters or 607.164 feet.)

P. B. M. Neaseville (U. S. L. S.).—At Sault Ste. Marie, Chippewa County, in a small cut on the Minneapolis, St. Paul & Sault Ste. Marie Railway, about 200 yards east of the smokestack of the Northwestern Leather Co.'s tannery, about 70 yards east of the point of a curve, about 115 feet west of a road crossing, and 6.4 feet south of the south rail, in the top of a large, well-embedded sandstone boulder. The top of a brass bolt leaded vertically and marked "U. S." in 3-inch letters. (195.390 meters or 641.042 feet.)

T. B. M. 94 (U. S. L. S.).—About 2½ miles west of Sault Ste. Marie, Chippewa County, about 2,000 yards west of a prominent point of bluff near the Northwestern Leather Co.'s buildings on the north side of the railroads, about 275 yards east of a prominent point of bluff on the south side of the tracks where the two railroads separate, 23 yards south of the Duluth, South Shore & Atlantic Railway, and 16 feet north of the Minneapolis, St. Paul & Sault Ste. Marie Railway, on top of a 6 by 10 foot boulder. The highest point within a 1-inch chiseled square flanked by the letters "U. S." (194.904 meters or 639.448 feet.)

P. B. M. Solomon (U. S. L. S.).—Near Sault Ste. Marie, Chippewa County, about 1,000 yards along the shore of St. Marys River below Brush Point, in Solomon's clearing, about 50 feet south of the top of the river bank, in line with an old fence running back from the river, and 12 feet west of a 15-inch white-pine tree with a 9-inch triangular blaze. The top of a brass bolt, leaded vertically in the top of a 6 by 12 by 15 inch sandstone, buried about 3 feet below the surface of the ground, over which was set a 6 by 6 by 15 inch stone projecting 6 inches above the ground and marked "U. S." on top. (185.217 meters or 607.666 feet.)

P. B. M. Brush=Brush Point (U. S. L. S.).—Near Sault Ste. Marie, Chippewa County, at Brush Point, on the south shore of St. Marys River, about 115 feet west of the northwest corner of a large boathouse, on top of a low bank, and about 16 feet back of the staff gage. The top of the center one of 5 wire spikes driven in the top of a very large hub. (183.810 meters or 603.050 feet.)

P. B. M. 1 (U. S. L. S.).—About 3 miles west of Sault Ste. Marie, Chippewa County, on the Duluth, South Shore & Atlantic Railway, about 220 yards north of milepost 3, and 12 feet west of the center of the track, in the top of a large boulder marked "U. S. B. M." on the east face. The top of a copper bolt. (195.505 meters or 641.419 feet.)

P. B. M. 2 (U. S. L. S.).—About 6 miles west of Sault Ste. Marie, Chippewa County, on the Duluth, South Shore & Atlantic Railway, 29 feet north of milepost 6, and 41 feet west of the center of the track. The top of a copper bolt, leaded vertically in the top of a boulder, buried about 4 feet below the surface of the ground, over which was set a red sandstone projecting about 1 foot above the ground and marked "U. S. B. M." on top. (195.282 meters or 640.638 feet.)

P. B. M. 3 (U. S. L. S.).—About 3 miles east of Brimley, Chippewa County, on the Duluth, South Shore & Atlantic Railway, 21½ feet north of milepost 9, and 31 feet west of the center of the track. The top of a copper bolt, leaded vertically in the top of a stone monument buried about 4 feet below the surface of the ground, over which was set a 6 by 6 inch cedar post projecting about 16 inches above the ground. (204.119 meters or 669.680 feet.)

P. B. M. 4 (U. S. L. S.).—At Brimley, Chippewa County, about 200 feet east of the Duluth, South Shore & Atlantic Railway station, 192 feet west of the west end of the Waiska River railroad bridge, due north of the frog for the

branch railroad across Waiska Bay, $34\frac{1}{2}$ feet north of the center of the track, and 1 foot east of an old cedar post carved with the letters "U. S. B. M." The top of a copper bolt, leaded vertically in the top of an 18 by 18 inch stone monument buried about 4 feet below the surface of the ground, over which was set a 6 by 8 by 20 inch red sandstone projecting about 8 inches above the ground and marked "U. S. B. M. No. 4." (197.318 meters or 647.367 feet.)

P. B. M. Bay Mills (U. S. L. S.).—At Bay Mills, Chippewa County, on the southeast foundation for the steel water tower which stands on the south side of Hall & Munson's factory power house, and 8 inches from the west side and 7 inches from the north side of the pedestal marked "U. S." The top of a brass bolt leaded vertically. (185.594 meters or 608.903 feet.)

P. B. M. Mission (U. S. L. S.).—About $2\frac{1}{2}$ miles above Bay Mills, Chippewa County, about 1 mile above a store at the lower end of the mission, in the upper end of the mission, on top of a point of a sand terrace, on the west side of a broad ravine running back from St. Marys River, about 155 yards north of a small bridge over a small creek crossing the road in the bottom of a ravine, about 45 yards east of a log house owned by Duel Cameron, about 50 feet northeast of a spruce tree blazed with a 4-inch triangle, and 13 feet back from the crest of the high bank of the river. The top of a brass bolt, leaded vertically in the top of a 6 by 10 by 14 inch sandstone buried about 3 feet below the surface of the ground, over which was set an 8 by 10 by 15 inch sandstone projecting about 5 inches above the ground and marked "U. S. P. B. M." (193.856 meters or 636.009 feet.)

P. B. M. Δ (U. S. L. S.).—At Iroquois Point, Chippewa County, at the east side of the lighthouse yard, $37\frac{1}{2}$ feet east of the northeast corner of the lighthouse building, about on line with the north side of the building, and 2 feet west of the north-and-south fence. The top of a brass bolt leaded vertically in the top of a 6 by 6 inch stone monument marked "U. S." (188.289 meters or 617.745 feet.)

P. B. M. Iroquois (U. S. L. S.).—At Iroquois Point, Chippewa County, about 65 yards south of the shore of St. Marys River, about 100 feet north of a high bank, about 95 feet south of the east entrance of the engine house, and about 13 feet east of the walk from the lighthouse to the engine house, in the top of a bowlder. The top of a 1-inch square iron bolt. (185.129 meters or 607.377 feet.)

P. B. M. Iroquois 1 (U. S. L. S.).—At Iroquois Point, Chippewa County, in the southeast corner of the lighthouse yard, about 20 yards south and 13 yards east of the extreme southeast corner of the lighthouse building, 2 feet from the east fence, and 1 foot from the south fence. The top of a brass bolt leaded vertically in the top of an 8 by 8 by 20 inch stone buried about $2\frac{1}{2}$ feet below the surface of the ground, over which was set an 8 by 8 by 18 inch stone projecting about 6 inches above the ground and marked "U. S. P. B. M." (187.274 meters or 614.415 feet.)

P. B. M. Iroquois Lighthouse (U. S. L. S.).—At Iroquois Point, Chippewa County, on the north side of the brick Iroquois lighthouse, which was built in 1870, in the top course of masonry of the foundation, in the center of a large stone, and 5 feet east of *Old B. M.* The center of a brass bolt leaded horizontally. (189.389 meters or 621.354 feet.)

P. B. M. Old B. M. (U. S. L. S.).—At Iroquois Point, Chippewa County, on the north side of the brick Iroquois lighthouse, which was built in 1870, in top of the foundation and 5 feet west of *P. B. M. Iroquois Lighthouse*. A square notch marked "B. M." (189.594 meters or 622.026 feet.)

LINE 4, MACKINAW TO JACKSON, MICH.

This line follows the Michigan Central Railroad from Mackinaw to Grayling, the abandoned line of the Manistee & Northeastern Railroad from Grayling to Walton Junction, the Pennsylvania Railroad from Walton Junction to Big Rapids, the Pere Marquette Railway from Big Rapids to Lansing, and the Michigan Central Railroad from Lansing to Jackson. The field work was done during the late summer and fall of 1916 by J. H. Peters, assistant.

S 11.—At Mackinaw City, Cheboygan County, on the south side of the monument marking the junction of the East Michigan and West Michigan pikes. The

top of the letter "k" in the inscription "Terminus East Michigan Pike." (180.729 meters or 592.942 feet.)

T 11.—At **Mackinaw City**, Cheboygan County, at the Huron Avenue Fire Engine House, in the concrete machine-gun foundation, inscribed "Michellimas State Park." The highest point of the center shield of the Michigan State Seal. (179.372 meters or 588.490 feet.)

R (U. S. L. S.)=U 11.—At **Mackinaw City**, Cheboygan County, at the west edge of the west sidewalk on Huron Avenue, and 58 feet north of the Michigan Central Railroad main line to the docks. The highest point of a section of rail set vertically and projecting about 1 foot above the ground. (179.609 meters or 589.267 feet.)

No. 3 (U. S. L. S.)=V 11.—At **Mackinaw City**, Cheboygan County, 2 feet west of the west sidewalk on Huron Avenue, 13 feet north of the Michigan Central Railroad main line to the docks, and 7 feet south of the Grand Rapids & Indiana Railway branch line to the docks. The highest point of the brass tube set in concrete about 2 feet below the surface of the ground, access to which is had through a section of 8-inch sewer pipe placed over the mark and surmounted by a large bowlder. (178.695 meters or 586.269 feet.)

W 11.—At **Freedom**, Cheboygan County, northeast of the Michigan Central Railroad station, and about 7 feet northwest of the the gate in the right-of-way fence. A standard disk, set in the top of a concrete post. (191.269 meters or 627.522 feet.)

X 11.—About 0.6 mile northwest of the station at **Nelsons**, Cheboygan County, on the Michigan Central Railroad, at milepost 7, at the east right-of-way fence. A standard disk, set in the top of a concrete post. (187.343 meters or 614.641 feet.)

Y 11.—At **Nip-I-Gon**, Cheboygan County, between the Michigan Central Railroad station and the tracks, in a flower bed. A standard disk, set in the top of a concrete post. (190.411 meters or 624.707 feet.)

Z 11.—About 1.7 miles southeast of the station at **Nip-I-Gon**, Cheboygan County, on the Michigan Central Railroad, 0.3 mile north of milepost 11, at the west right-of-way fence. A standard disk, set in the top of a concrete post. (185.895 meters or 609.891 feet.)

A 12.—At **Cheboygan**, Cheboygan County, at the courthouse, on the step at the west entrance. A standard disk. (185.155 meters or 607.463 feet.)

B 12.—At **Mullet Lake**, Cheboygan County, about 25 yards south of the Michigan Central Railroad station, at the west right-of-way fence. A standard disk, set in the top of a concrete post. (184.070 meters or 603.903 feet.)

C 12.—At **Silver Beach**, Cheboygan County, at the Michigan Central Railroad station. A spike in the semaphore. (185.805 meters or 609.595 feet.)

D 12.—At **Birchwood**, Cheboygan County, at the Michigan Central Railroad station. A spike in the semaphore. (187.698 meters or 615.806 feet.)

E 12.—At **Long Point**, Cheboygan County, at the fence west of the Michigan Central Railroad station, and about 4 feet higher than the tracks. A standard disk, set in the top of a concrete post. (189.480 meters or 621.652 feet.)

F 12.—At **Topinabee**, Cheboygan County, in the park about 100 yards north of the Michigan Central Railroad station, at milepost 28, and about 10 yards east of the tracks. A standard disk, set in the top of a concrete post. (186.348 meters or 611.377 feet.)

G 12.—At **Grand View**, Cheboygan County, about 10 yards north of the Michigan Central Railroad station. A standard disk, set in the top of a concrete post. (187.383 meters or 614.772 feet.)

H 12.—At **Indian River**, Cheboygan County, on the north abutment of the Michigan Central Railroad bridge across Indian River. A chiseled square. (187.840 meters or 616.272 feet.)

I 12.—At **Indian River**, Cheboygan County, 0.4 mile south of the Michigan Central Railroad station, at the crossing of a dirt road, in the southeast fence angle. A standard disk, set in the top of a concrete post. (186.917 meters or 613.244 feet.)

J 12.—At **Hamby**, Cheboygan County, about 25 yards south of the end of a Michigan Central Railroad siding, in the southeast fence angle. A standard disk, set in the top of a concrete post. (201.377 meters or 660.684 feet.)

K 12.—About 0.6 mile north of the station at **Rondo**, Cheboygan County, on the Michigan Central Railroad, at a small bridge, on the west end of the north abutment. A chiseled square. (215.266 meters or 706.252 feet.)

L 12.—At **Rondo**, Cheboygan County, about 20 yards northwest of the Michigan Central Railroad station, in a fence angle. A standard disk, set in the top of a concrete post. (220.318 meters or 722.827 feet.)

M 12.—At **Haakwood**, Cheboygan County, at the Michigan Central Railroad station. A spike in the semaphore. (228.746 meters or 750.477 feet.)

N 12.—Destroyed. (237.711 meters or 779.890 feet.)

O 12.—About 0.9 mile south of the station at **Wolverine**, Cheboygan County, on the Michigan Central Railroad, at the crossing of a dirt road, in the north-east fence angle. A standard disk, set in the top of a concrete post. (243.311 meters or 798.263 feet.)

P 12.—At **Trowbridge**, Cheboygan County, 0.3 mile north of the Michigan Central Railroad station, on the east end of the north abutment of a railroad bridge. A chiseled square. (247.964 meters or 813.529 feet.)

Q 12.—At **Trowbridge**, Cheboygan County, east of the Michigan Central Railroad station, at the fence. A standard disk, set in the top of a concrete post. (249.016 meters or 816.980 feet.)

R 12.—At **Vanderbilt**, Otsego County, on the Michigan Central Railroad, about 50 yards south of the main street crossing, and about 20 yards east of the track, between the fence and a half-mile post. A standard disk, set in the top of a concrete post. (334.602 meters or 1,097.773 feet.)

S 12.—About 2.0 miles south of the station at **Vanderbilt**, Otsego County, about 50 yards south of the Michigan Central Railroad siding at the sawmill, and about 30 yards south of the crossing, at the west fence. A standard disk, set in the top of a concrete post. (340.852 meters or 1,118.279 feet.)

T 12.—About 4.3 miles south of the station at **Vanderbilt**, Otsego County, on the Michigan Central Railroad, north of a potato storehouse, at the north fence. A standard disk, set in the top of a concrete post. (373.452 meters or 1,225.234 feet.)

U 12.—About 1.6 miles north of the station at **Gaylord**, Otsego County, on the Michigan Central Railroad, at a road crossing, at the south end of the deep cut on a curve. A standard disk, set in the top of a concrete post. (410.722 meters or 1,347.510 feet.)

V 12.—At **Gaylord**, Otsego County, 0.3 mile north of the Michigan Central Railroad station, at a half-mile post, and about 10 yards east of the tracks. A standard disk, set in the top of a concrete post. (412.830 meters or 1,354.426 feet.)

W 12.—At **Gaylord**, Otsego County, at the northwest corner of the courthouse. A standard disk. (411.101 meters or 1,348.754 feet.)

X 12.—At **Gaylord**, Otsego County, one block south and three blocks east of the Michigan Central Railroad station, at the entrance to the school building. A standard disk. (412.024 meters or 1,351.782 feet.)

Y 12.—About 1.7 miles south of the station at **Gaylord**, Otsego County, on the Michigan Central Railroad, at the crossing of a dirt road, in the southeast fence angle. A standard disk, set in the top of a concrete post. (403.422 meters or 1,323.560 feet.)

Z 12.—At **Salling**, Otsego County, east of the station, at the fence. A standard disk, set in the top of a concrete post. (391.331 meters or 1,283.892 feet.)

A 13.—At **Arbutus Beach**, Otsego County, about 500 feet south of the station, at the east right-of-way fence. A standard disk, set in the top of a concrete post. (394.489 meters or 1,294.253 feet.)

B 13.—At **Otsego Lake**, Otsego County, about 100 yards north of the Michigan Central Railroad station, east of a cattle guard, in a fence angle. A standard disk, set in the top of a concrete post. (390.971 meters or 1,282.711 feet.)

C 13.—At **Waters**, Otsego County, about 100 yards north of the Michigan Central Railroad station, opposite milepost 73, at the east right-of-way fence. A standard disk, set in the top of a concrete post. (385.661 meters or 1,265.289 feet.)

L 13.—About 3.0 miles south of the station at **Waters**, Otsego County, about 25 yards north of milepost 76, at the east fence line. A standard disk, set in the top of a concrete post. (380.886 meters or 1,249.623 feet.)

D 13.—About 2.0 miles north of the station at **Frederic**, Crawford County, at Michigan Central Railroad milepost 79. A standard disk, set in the top of a concrete post. (374.399 meters or 1,228.341 feet.)

E 13.—At **Frederic**, Crawford County, about 800 feet south of the Michigan Central Railroad station, and about 50 feet east of the tracks, east of a cattle

guard, in a fence angle. A standard disk, set in the top of a concrete post. (366.637 meters or 1,202.875 feet.)

F 13.—About 3.0 miles south of the station at **Frederic**, Crawford County, at Michigan Central Railroad milepost 84, at the east right-of-way fence. A standard disk, set in the top of a concrete post. (360.619 meters or 1,183.131 feet.)

G 13.—About 4.0 miles south of the station at **Frederic**, Crawford County, on the Michigan Central Railroad, at milepost 85, at the east right-of-way fence. A standard disk, set in the top of a concrete post. (359.042 meters or 1,177.957 feet.)

H 13.—About 3.1 miles north of the station at **Grayling**, Crawford County, on the Michigan Central Railroad, at milepost 86, at the east right-of-way fence. A standard disk, set in the top of a concrete post. (354.110 meters or 1,161.776 feet.)

I 13.—About 2.2 miles north of the station at **Grayling**, Crawford County, on the Michigan Central Railroad, at milepost 87, at the east right-of-way fence. A standard disk, set in the top of a concrete post. (352.653 meters or 1,156.996 feet.)

J 13.—About 1.2 miles north of the station at **Grayling**, Crawford County, on the Michigan Central Railroad, at milepost 88, at the east right-of-way fence. A standard disk, stamped "J 13" and set in the top of a concrete post. (350.414 meters or 1,149.650 feet.)

K 13.—Destroyed. (345.768 meters or 1,134.407 feet.)

M 13.—About 0.7 mile west of **Grayling**, Crawford County, along the abandoned Manistee & Northeastern Railroad, about 400 feet west of a road crossing, about 50 feet south of the former location of the tracks, and about 5 yards south of a pole. A standard disk, stamped "M 13" and set in the top of a concrete post. (349.800 meters or 1,147.635 feet.)

N 13.—About 1.9 miles west of **Grayling**, Crawford County, along the abandoned Manistee & Northeastern Railroad, 0.6 mile east of the east point of the old wye to the Portage Lake branch, and about 500 feet west of a cut through a sand hill, south of the former location of the tracks, at about the middle of the curve. A standard disk, stamped "N 13" and set in the top of a concrete post. (349.626 meters or 1,147.065 feet.)

O 13.—About 2.8 miles west of **Grayling**, Crawford County, along the abandoned Manistee & Northeastern Railroad, about 20 yards southwest of the west point of the old wye to the Portage Lake branch. A standard disk, stamped "O 13" and set in the top of a concrete post. (349.682 meters or 1,147.248 feet.)

P 13.—About 1.0 mile east of **Resort**, Crawford County, along the abandoned Manistee & Northeastern Railroad, 0.2 mile east of a cut through a small sand hill, and about 15 yards south of the former location of the tracks. A standard disk, set in the top of a concrete post. (348.878 meters or 1,144.611 feet.)

Q 13.—At **Resort**, Crawford County, about 50 yards west of the former location of the Manistee & Northeastern Railroad station, and about 10 yards south of the old location of the tracks. A standard disk, set in the top of a concrete post. (348.634 meters or 1,143.810 feet.)

R 13.—About 0.6 mile east of **Riverview**, Kalkaska County, about 15 yards south of the former location of the tracks of the abandoned Manistee & Northeastern Railroad, and about 10 yards west of the crossing of a dirt road. A standard disk, set in the top of a concrete post. (343.280 meters or 1,126.244 feet.)

S 13.—About 0.9 mile east of **O'Leary**, Kalkaska County, along the abandoned Manistee & Northeastern Railroad, at a small bridge at the east point of the first curve east of the former location of the station, on the north guard rail. The westernmost bolt head. (343.682 meters or 1,127.563 feet.)

T 13.—At **Angling**, Kalkaska County, about 35 yards east of the former location of the Manistee & Northeastern Railroad station, on the north guard rail of the old railroad bridge. The westernmost bolt head. (334.395 meters or 1,097.094 feet.)

U 13.—At **Angling**, Kalkaska County, about 20 yards north of the former location of the Manistee & Northeastern Railroad station. A standard disk, set in the top of a concrete post. (335.273 meters or 1,099.975 feet.)

V 13.—At **Sigma**, Kalkaska County, about 100 feet west of the former location of the Manistee & Northeastern Railroad station, in the angle originally formed by the tracks. A standard disk, set in the top of a concrete post. (340.179 meters or 1,116.071 feet.)

W 13.—About 1.4 miles west of **Sigma**, Kalkaska County, along the abandoned Manistee & Northeastern Railroad, at a sharp curve, about 20 yards east of a dense wood, at the south fence line. A standard disk, set in the top of a concrete post. (331.348 meters or 1,087.098 feet.)

X 13.—At **O'Neil**, Kalkaska County, about 25 yards west of the former location of the Manistee & Northeastern Railroad station, between the highway and the abandoned railroad. A standard disk, set in the top of a concrete post. (339.061 meters or 1,112.403 feet.)

Y 13.—At **McGee**, Kalkaska County, at a crossing of the abandoned Manistee & Northeastern Railroad, about 20 yards south of the former location of the tracks. A spike in a telephone pole. (348.110 meters or 1,142.091 feet.)

Z 13.—At **Rowley**, Kalkaska County, about 50 yards east of the former location of the Manistee & Northeastern Railroad station, at a road crossing, about 10 yards south of the former location of the tracks. A standard disk, set in the top of a concrete post. (348.874 meters or 1,144.597 feet.)

A 14.—About 1.2 miles east of **Springfield**, Kalkaska County, along the abandoned Manistee & Northeastern Railroad, about 20 yards west of the crossing of a dirt road, and about 15 yards south of the former location of the tracks, in a fence angle. A standard disk, set in the top of a concrete post. (331.399 meters or 1,087.265 feet.)

B 14.—About 3.1 miles east of **Walton Junction**, Grand Traverse County, at the east end of a long shallow cut in sand, and about 15 yards south of the former location of the Manistee & Northeastern Railroad track. A standard disk, set in the top of a concrete post. (315.447 meters or 1,034.929 feet.)

C 14.—About 5½ rails north of the station at **Walton Junction**, Grand Traverse County, at a concrete mixing plant, 56.0 feet east of the east rail of the main track of the Pennsylvania Railroad, and 35.5 feet southwest of the nearest outside part of a small water tank located about 50 feet northwest of the concrete mixer. In 1930 the mark was found under a large pile of gravel and protected from damage by three cross-ties piled over it. A standard disk, stamped "C 14 PRIM. TRAV. STA. NO. 11, 1916" and set in the top of a concrete post. (311.102 meters or 1,020.674 feet.)

D 14.—About 1.7 miles south of **Walton Junction**, Grand Traverse County, on the Pennsylvania Railroad, about 220 yards north of milepost 351, and about 15 yards west of the track. A standard disk, stamped "D 14" and set in the top of a concrete post. (293.168 meters or 961.835 feet.)

E 14.—In Wexford County, about 3.7 miles south of the station at **Walton Junction**, Grand Traverse County, about 1.9 miles south of the Pennsylvania Railroad bridge over Manistee River, at milepost 349, and about 20 yards west of the tracks. A standard disk, set in the top of a concrete post. (303.187 meters or 994.706 feet.)

NOTE.—It was reported in 1930 that this mark had apparently been hit by a tractor and was loose in the ground. This mark should not be used to control important leveling without checking on additional bench marks which have not been disturbed.

F 14.—About 3.0 miles north of the station at **Manton**, Wexford County, on the Pennsylvania Railroad, 0.6 mile south of **Haire**, at milepost 347, and about 50 feet east of the tracks. A standard disk, set in the top of a concrete post. (324.568 meters or 1,064.847 feet.)

G 14.—About 1.2 miles north of the station at **Manton**, Wexford County, on the Pennsylvania Railroad, at a dirt-road crossing, in the northwest fence angle. A standard disk, set in the top of a concrete post. (331.945 meters or 1,089.056 feet.)

H 14.—At **Manton**, Wexford County, in the wall of the Hotel Piper, near the northwest corner. A standard disk. (344.637 meters or 1,130.697 feet.)

I 14.—At **Manton**, Wexford County, in the west face of the northwest corner of the high-school building. A standard disk. (345.579 meters or 1,133.787 feet.)

J 14.—About 0.9 mile south of the station at **Manton**, Wexford County, on the Pennsylvania Railroad, at a concrete culvert, on the northwest corner of the west head wall. A chiseled square. (349.701 meters or 1,147.311 feet.)

K 14.—At **Gilbert**, Wexford County, 0.3 mile south of the Pennsylvania Railroad station, on the high fill, at milepost 341. The highest point of a section of rail set vertically. (391.030 meters or 1,282.904 feet.)

L 14.—About 1.3 miles south of the station at **Gilbert**, Wexford County, on the Pennsylvania Railroad, at milepost 340. The highest point of a section of rail set vertically. (410.637 meters or 1,347.232 feet.)

M 14.—About 1.8 miles south of the station at **Gilbert**, Wexford County, on the Pennsylvania Railroad, at a road crossing, at the southeast fence angle. A standard disk, set in the top of a concrete post. (420.399 meters or 1,379.259 feet.)

N 14.—About 7.3 miles north along the Pennsylvania Railroad from the station at **Cadillac**, Wexford County, 0.9 mile north of the north end of the siding at **Bond's Mill**, about 500 feet north of the summit between Cadillac and Manton, at milepost 339, and about 20 yards south of a road crossing. The highest point of a section of rail set vertically. (430.178 meters or 1,411.342 feet.)

O 14.—About 5.9 miles north of the station at **Cadillac**, Wexford County, about 1.6 miles north of **Missaukee Junction**, on the Pennsylvania Railroad, at the east right-of-way fence. A standard disk, set in the top of a concrete post. (419.944 meters or 1,377.766 feet.)

P 14.—About 3.7 miles north of the station at **Cadillac**, Wexford County, 0.6 mile south of **Missaukee Junction**, on the Pennsylvania Railroad, about 250 feet west of Haring Township Hall, at a dirt-road crossing, in the northeast fence angle. A standard disk, set in the top of a concrete post. (404.804 meters or 1,328.094 feet.)

Q 14.—About 2.3 miles north of the station at **Cadillac**, Wexford County, on the Pennsylvania Railroad, at milepost 334. The highest point of a section of rail set vertically. (395.218 meters or 1,296.644 feet.)

R 14.—At **Cadillac**, Wexford County, at the Pennsylvania Railroad station, in the front wall of the ticket office. A standard disk. (398.062 meters or 1,305.942 feet.)

S 14.—About 1.9 miles south of the station at **Cadillac**, Wexford County, on the Pennsylvania Railroad, at milepost 330. The highest point of a section of rail set vertically. (399.445 meters or 1,310.512 feet.)

T 14.—About 2.9 miles south of the station at **Cadillac**, Wexford County, on the Pennsylvania Railroad, about 500 feet south of the summit on the gravel-pit hill, east of milepost 329, at the right-of-way fence. A standard cap, screwed on the top of a 3½-inch iron pipe. (409.373 meters or 1,343.085 feet.)

U 14.—About 0.6 mile north of the station at **Hobart**, Wexford County, on the Pennsylvania Railroad, opposite a culvert at a road crossing, about 100 feet east of the track, at the south fence. A standard cap, screwed on the top of a 3½-inch iron pipe. (392.146 meters or 1,286.566 feet.)

V 14.—At **Hobart**, Wexford County, about 50 yards north of the Pennsylvania Railroad station, at milepost 326. The highest point of a section of rail set vertically. (401.432 meters or 1,317.081 feet.)

W 14.—At **Osceola Junction**, Osceola County, about 250 feet north of the Pennsylvania Railroad station, about 50 feet west of the track, behind the operator's dwelling, in the fence angle. A standard cap, screwed on the top of a 3½-inch iron pipe. (375.176 meters or 1,230.890 feet.)

X 14.—About 1.4 miles south of the station at **Osceola Junction**, Osceola County, on the Pennsylvania Railroad, at milepost 322. The highest point of a section of rail set vertically. (375.188 meters or 1,230.929 feet.)

Y 14.—About 1.6 miles north of the station at **Tustin**, Osceola County, on the Pennsylvania Railroad, about 800 feet south of the north end of a long tangent, at the west right-of-way fence. A standard cap, screwed on the top of a 3½-inch iron pipe. (366.915 meters or 1,203.787 feet.)

Z 14.—About 1.2 miles north of the station at **Tustin**, Osceola County, on the Pennsylvania Railroad, at milepost 321. The highest point of a section of rail set vertically. (365.203 meters or 1,198.170 feet.)

A 15.—At **Tustin**, Osceola County, 0.3 mile north of the Pennsylvania Railroad station, about one-eighth mile north of a cattle guard, about 500 feet north of milepost 320, at the west fence. A standard cap, screwed on the top of a 3½-inch iron pipe. (371.919 meters or 1,220.204 feet.)

B 15.—About 1.2 miles south of the station at **Tustin**, Osceola County, on the Pennsylvania Railroad, about one-eighth mile south of the second deep cut south of Tustin, about 100 yards north of a wooded tract, at the east fence. A standard cap, screwed on the top of a 3½-inch iron pipe. (380.240 meters or 1,247.504 feet.)

C 15.—About 1.6 miles south of the station at **Tustin**, Osceola County, on the Pennsylvania Railroad, at milepost 318. The highest point of a section of rail set vertically. (380.917 meters or 1,249.725 feet.)

D 15.—About 0.9 mile north of the station at **Le Roy**, Osceola County, on the Pennsylvania Railroad, about one-eighth mile north of the north end of "MY"

siding, at milepost 316, at the west right-of-way fence. A standard cap, screwed on the top of a 3½-inch iron pipe. (371.614 meters or 1,219.204 feet.)

E 15.—At **Le Roy**, Osceola County, about ½ mile south of the Pennsylvania Railroad station, at milepost 315. The highest point of a section of rail set vertically. (379.033 meters or 1,243.544 feet.)

F 15.—About 2.3 miles south of **Le Roy**, Osceola County, on the Pennsylvania Railroad, opposite Meadow Ridge Farm, at a dirt-road crossing, in the south-west fence angle. A standard cap, screwed on the top of a 3½-inch iron pipe. (373.409 meters or 1,225.093 feet.)

G 15.—About 2.5 miles north of the station at **Ashton**, Osceola County, on the Pennsylvania Railroad, at milepost 312. The highest point of a section of rail set vertically. (364.543 meters or 1,196.005 feet.)

H 15.—At **Ashton**, Osceola County, 0.5 mile south of the Pennsylvania Railroad station, at a dirt road crossing, in the southeast fence angle. A standard cap, screwed on the top of a 3½-inch iron pipe. (346.367 meters or 1,136.372 feet.)

I 15.—About 2.5 miles south of **Ashton**, Osceola County, on the Pennsylvania Railroad, at milepost 307. The highest point of a section of rail set vertically. (334.433 meters or 1,097.219 feet.)

J 15.—About 2.3 miles north of **Reed City**, Osceola County, on the Pennsylvania Railroad, at milepost 305. The highest point of a section of rail set vertically. (322.001 meters or 1,056.432 feet.)

K 15.—At **Reed City**, Osceola County, 0.3 mile north of the Pennsylvania Railroad station, on the east guard rail of the bridge. The northernmost bolt head. (312.442 meters or 1,025.070 feet.)

L 15.—At **Reed City**, Osceola County, at the Union Station, in the front wall about 3 feet above the pavement. A standard disk. (315.885 meters or 1,036.366 feet.)

M 15.—At **Reed City**, Osceola County, at the **Hotel King**, in the wall to the right of the entrance. A standard disk. (316.598 meters or 1,038.705 feet.)

N 15.—About 1.6 miles south of the station at **Reed City**, Osceola County, on the Pennsylvania Railroad, about 500 feet south of the crossing of the **Dixie Highway**, at milepost 301. The highest point of a section of rail set vertically. (329.962 meters or 1,082.550 feet.)

O 15.—About 2.2 miles south of **Reed City**, Osceola County, on the Pennsylvania Railroad, at a road crossing, in the southeast fence angle. A standard cap, screwed on the top of a 3½-inch iron pipe. (335.553 meters or 1,100.893 feet.)

P 15.—About 0.6 mile north of **Crapo**, Mecosta County, on the Pennsylvania Railroad, at milepost 299. The highest point of a section of rail set vertically. (312.767 meters or 1,026.136 feet.)

Q 15.—At **Crapo**, Mecosta County, 0.3 mile south of the Pennsylvania Railroad station, at milepost 298. The highest point of a section of rail set vertically. (297.474 meters or 975.963 feet.)

R 15.—About 1.3 miles south of the station at **Crapo**, Mecosta County, on the Pennsylvania Railroad, 0.6 mile north of the Michigan State Fish Hatchery, at milepost 297. The highest point of a section of rail set vertically. (291.509 meters or 956.392 feet.)

S 15.—About 0.7 mile north of the station at **Paris**, Mecosta County, on the Pennsylvania Railroad, 0.4 mile south of the Michigan State Fish Hatchery, at milepost 296, between the main track and a siding. The highest point of a section of rail set vertically. (288.356 meters or 946.048 feet.)

T 15.—At **Paris**, Mecosta County, 0.3 mile north of the Pennsylvania Railroad station, at a bridge, on the northwest corner of the south bridge seat. A faintly chiseled square. (284.650 meters or 933.889 feet.)

U 15.—About 1.6 miles south of the station at **Paris**, Mecosta County, on the Pennsylvania Railroad, at a road crossing, at milepost 294. The highest point of a section of rail set vertically. (287.253 meters or 942.429 feet.)

V 15.—About 1.9 miles north of the station at **Big Rapids**, Mecosta County, at the Pennsylvania Railroad bridge over Muskegon River, on the northeast corner of the south bridge seat. A chiseled square. (280.057 meters or 918.820 feet.)

W 15.—About 0.9 mile north of the station at **Big Rapids**, Mecosta County, on the Pennsylvania Railroad, at milepost 291. The highest point of a section of rail set vertically. (283.828 meters or 931.192 feet.)

X 15.—At **Big Rapids**, Mecosta County, about 40 yards northeast of the crossing of the Pennsylvania Railroad and the Pere Marquette Railway. A standard disk, set in the top of a concrete post. (281.269 meters or 922.797 feet.)

A 16.—About 2.8 miles east of the station at **Big Rapids**, Mecosta County, on the Pere Marquette Railway, at a dirt-road crossing, about 50 yards north of the tracks, beside a stone fence north of the road. A standard disk, set in the top of a concrete post. (299.217 meters or 981.681 feet.)

B 16.—About 6.2 miles east of the station at **Big Rapids**, Mecosta County, on the Pere Marquette Railway, between mileposts 6 and 7, about 100 yards east of a road crossing, between the track and the north fence. The highest point of a section of rail projecting about 2 feet above the ground and stamped "57." (314.608 meters or 1,032.176 feet.)

C 16.—About 0.6 mile west of the station at **Rodney**, Mecosta County, on the Pere Marquette Railway, about 50 feet north of the track, in the fence angle west of a road crossing. A standard disk, set in the top of a concrete post. (320.471 meters or 1,051.412 feet.)

D 16.—At **Rodney**, Mecosta County, about $\frac{1}{8}$ mile west of the Pere Marquette Railway station, in the fence angle north of the crossing of an east-and-west highway, northeast of the tracks. A standard disk, set in the top of a concrete post. (330.522 meters or 1,084.388 feet.)

E 16.—About 2.7 miles southeast of the station at **Rodney**, Mecosta County, on the Pere Marquette Railway, 0.3 mile southeast of milepost 11, in the fence angle north of a dirt-road crossing, northeast of the track. A standard disk, set in the top of a concrete post. (316.638 meters or 1,038.836 feet.)

F 16.—About 3.1 miles west of **Mecosta**, Mecosta County, on the Pere Marquette Railway, 0.3 mile east of milepost 13, about 400 yards west of the summit, west of a shallow cut, and east of a low fill, at the north fence. A standard disk, set in the top of a concrete post. (311.272 meters or 1,021.232 feet.)

G 16.—At **Mecosta**, Mecosta County, about $\frac{1}{8}$ mile west of the Pere Marquette Railway station, about 100 feet west of a street crossing, and about 20 yards north of the track. A standard disk, set in the top of a concrete post. (298.547 meters or 979.483 feet.)

H 16.—About 3.1 miles east of the station at **Mecosta**, Mecosta County, on the Pere Marquette Railway, at the southeast end of the first curve east of a 2-mile tangent, at the north fence. A standard disk, set in the top of a concrete post. (312.377 meters or 1,024.857 feet.)

I 16.—At **Remus**, Mecosta County, 0.3 mile southeast of the Pere Marquette Railway station, at a highway crossing, south of the track. A standard disk, set in the top of a concrete post. (311.887 meters or 1,023.249 feet.)

J 16.—About 1.2 miles southeast of **Remus**, Mecosta County, on the Pere Marquette Railway, at a dirt-road crossing, in the northwest fence angle. A standard disk, set in the top of a concrete post. (313.389 meters or 1,028.177 feet.)

K 16.—About 2.1 miles southeast of the station at **Remus**, Mecosta County, on the Pere Marquette Railway, at a dirt-road crossing, directly in front of a white frame farm dwelling located about 100 feet south of the track, on a hill about 23 feet higher than the track, in the southeast fence angle. A standard disk, set in the top of a concrete post. (306.519 meters or 1,005.638 feet.)

L 16.—About 1.3 miles northwest of the station at **Blanchard**, Isabella County, on the Pere Marquette Railway, 0.2 mile southeast of a road crossing, 0.2 mile northwest of milepost 25, south of a low fill, and north of a shallow cut, at the northeast fence. A standard disk, set in the top of a concrete post. (288.408 meters or 946.219 feet.)

M 16 (U. S. G. S.).—At **Blanchard**, Isabella County, across the track from the north end of the Pere Marquette Railway station, and about 2 yards from the nearest rail. A United States Geological Survey standard cap, stamped "952" and riveted on the top of a $3\frac{1}{2}$ -inch iron pipe. (289.802 meters or 950.792 feet.)

N 16.—About 3.1 miles south of **Blanchard**, Isabella County, on the Pere Marquette Railway, about 50 yards south of the south point of a siding, at the east fence. A standard disk, set in the top of a concrete post. (297.091 meters or 974.706 feet.)

O 16.—About 3.4 miles south of **Blanchard**, Isabella County, on the Pere Marquette Railway, at the first bridge south of a siding, on the west guard rail. The northernmost bolt. (292.110 meters or 958.364 feet.)

P 16.—At **Wyman**, Montcalm County, 0.2 mile north of the Pere Marquette Railway station, and about 200 feet south of a road crossing, at the east

fence. A standard disk, set in the top of a concrete post. (296.073 meters or 971.366 feet.)

Q 16.—About 1.0 mile north of **Edmore**, Montcalm County, on the Pere Marquette Railway, at a dirt-road crossing, in the northwest fence angle. A standard disk, set in the top of a concrete post. (293.382 meters or 962.537 feet.)

R 16.—At **Edmore**, Montcalm County, in the triangular grass park northeast of the Pere Marquette Railway station. A standard disk, set in the top of a concrete post. (294.112 meters or 964.932 feet.)

S 16.—About 1.0 mile south of the station at **Edmore**, Montcalm County, on the Pere Marquette Railway, at a dirt-road crossing, in the northwest fence angle. A standard disk, set in the top of a concrete post. (300.464 meters or 985.772 feet.)

T 16.—About 2.0 miles south of the station at **Edmore**, Montcalm County, on the Pere Marquette Railway, at a dirt-road crossing, in the northeast fence angle. A standard disk, set in the top of a concrete post. (295.298 meters or 968.824 feet.)

U 16.—At **McBrides**, Montcalm County, 0.3 mile north of the Pere Marquette Railway station, at a dirt-road crossing, in the southeast fence angle. A standard disk, set in the top of a concrete post. (293.954 meters or 964.414 feet.)

V 16.—About 1.9 miles north of the station at **Stanton**, Montcalm County, on the Pere Marquette Railway, at a dirt-road crossing, in the northwest fence angle. A standard disk, set in the top of a concrete post. (238.199 meters or 945.533 feet.)

W 16.—About 0.7 mile north of the station at **Stanton**, Montcalm County, on the Pere Marquette Railway, at a dirt-road crossing, in the southwest fence angle. A standard disk, set in the top of a concrete post. (290.994 meters or 954.703 feet.)

X 16.—At **Stanton**, Montcalm County, 123 feet south of the south line of the Pere Marquette Railway station, 115 feet west of the center line of the main track, on the north side of East Pine Street, and 2.2 feet north of the north edge of the concrete sidewalk. A standard disk, set in the top of a concrete post. (280.210 meters or 919.322 feet.)

Y 16.—About 0.9 mile south of **Stanton**, Montcalm County, on the Pere Marquette Railway, about 800 feet north of milepost 44, at the west fence, in a small level spot between two stumps. A standard disk, set in the top of a concrete post. (266.994 meters or 875.963 feet.)

Z 16.—About 1.9 miles south of the station at **Stanton**, Montcalm County, on the Pere Marquette Railway, at a dirt-road crossing at Colby's Ranch, in the southeast fence angle. A standard disk, set in the top of a concrete post. (262.389 meters or 860.855 feet.)

A 17.—About 2.7 miles south of the station at **Stanton**, Montcalm County, on the Pere Marquette Railway, 0.8 mile south of Colby's Ranch, at a dirt-road crossing, in the southeast fence angle. A standard disk, set in the top of a concrete post. (260.050 meters or 853.181 feet.)

B 17.—About 1.7 miles north of **Sheridan**, Montcalm County, on the Pere Marquette Railway, in a low swamp east of a ranch house, at the east fence, about 25 yards south of a walnut tree. A standard disk, set in the top of a concrete post. (254.686 meters or 835.582 feet.)

C 17 (U. S. G. S.).—At **Sheridan**, Montcalm County, about 250 feet southeast of the Pere Marquette Railway station, at the northeast corner of the intersection of Railroad and Main Streets. A United States Geological Survey standard cap, stamped "846" and riveted on the top of a 3½-inch iron pipe. (257.524 meters or 844.893 feet.)

D 17.—About 2.2 miles south of the station at **Sheridan**, Montcalm County, 2.0 miles north of Fenwick, on the Pere Marquette Railway, at a dirt-road crossing near a ranch house, at the west right-of-way fence. A standard disk, set in the top of a concrete post. (261.564 meters or 858.148 feet.)

E 17.—At **Fenwick**, Montcalm County, opposite the south end of the Pere Marquette Railway station, at the east right-of-way fence. (253.772 meters or 832.584 feet.)

852 (U. S. G. S.).—At **Fenwick**, Montcalm County. Not described. (259.349 meters or 850.881 feet.)

F 17.—About 1.8 miles north of the station at **Shiloh**, Ionia County, on the Pere Marquette Railway, about 100 yards north of a road crossing at the top

of the grade, at the north end of a cut, at the west right-of-way fence. A standard disk, set in the top of a concrete post. (255.150 meters or 837.105 feet.)

G 17 (U. S. G. S.).—At **Shiloh**, Ionia County, about 250 feet south of the Pere Marquette Railway station, about 100 feet west of the track, in a triangular grass plot, beneath a large pine tree. A United States Geological Survey standard cap, stamped "835" and riveted on the top of a 3½-inch iron pipe. (254.312 meters or 834.355 feet.)

H 17.—About 1.5 miles south of the station at **Shiloh**, Ionia County, on the Pere Marquette Railway, about ¼ mile north of milepost 58, at the intersection of the west right-of-way fence and an east-and-west property line which separates a cultivated field to the south from a heavily wooded tract to the north. (254.058 meters or 833.522 feet.)

839.5 (U. S. G. S.).—Not described. (255.600 meters or 838.581 feet.)

I 17.—About 2.8 miles south of the station at **Shiloh**, Ionia County, on the Pere Marquette Railway, at the crossing of a dirt road which is bordered on the south with maple trees, in the southeast fence angle. A standard disk, set in the top of a concrete post. (255.806 meters or 839.257 feet.)

835.4 (U. S. G. S.).—About 3¼ miles south of **Shiloh**, Ionia County, on the Pere Marquette Railway, at a prominent road crossing. A spike in the crossing sign. (254.382 meters or 834.585 feet.)

J 17 (U. S. G. S.).—About 3.1 miles north of the station at **Haynor**, Ionia County, at **Henderson**, on the Pere Marquette Railway, about 50 feet northeast of the spur, about 10 yards east of the track, in an angle of the fence. A United States Geological Survey standard cap, stamped "842" and riveted on the top of a 3½-inch iron pipe. (256.550 meters or 841.698 feet.)

838.7 (U. S. G. S.).—About 1½ miles north of **Haynor**, Ionia County, on the Pere Marquette Railway, 115 feet south of milepost 61, at a road crossing. A spike in the root of a large oak tree. (255.354 meters or 837.774 feet.)

K 17.—At **Haynor**, Ionia County, about 250 feet northwest of the Pere Marquette Railway station, at the intersection of the right-of-way fences of the two lines of the Pere Marquette Railway. A standard disk, set in the top of a concrete post. (245.445 meters or 805.264 feet.)

L 17.—At **Haynor**, Ionia County, across the track from the northeast entrance to the Pere Marquette Railway station. The highest point of a section of rail set vertically. (246.809 meters or 809.739 feet.)

M 17.—About 2.2 miles northwest of **Ionia**, Ionia County, on the Pere Marquette Railway, at the second bridge northwest of milepost 2, about 25 yards north of a road crossing, on a corner of the bridge seat. A chiseled square. (223.038 meters or 731.750 feet.)

N 17.—About 1.9 miles northwest of the station at **Ionia**, Ionia County, on the Pere Marquette Railway, about 100 yards southeast of milepost 2, and about 20 yards west of the track, at the fence. A standard disk, set in the top of a concrete post. (220.090 meters or 722.079 feet.)

O 17.—About 1.1 miles west of **Ionia**, Ionia County, on the Pere Marquette Railway, at an overhead street crossing, on the northwest corner of the east bridge seat. A chiseled square. (204.989 meters or 672.535 feet.)

P 17.—At **Ionia**, Ionia County, at the Grand Trunk Railway station, on the step at the north entrance to the waiting room. A chiseled square. (193.722 meters or 645.412 feet.)

Q 17.—At **Ionia**, Ionia County, in front of the courthouse, on the southeast corner of the base of the Soldier's Monument. A chiseled square. (200.620 meters or 658.201 feet.)

R 17 (U. S. G. S.).—At **Ionia**, Ionia County, at the southeast corner of the courthouse. A United States Geological Survey standard cap, stamped "660.745" and riveted on the top of a 3½-inch iron pipe. (201.232 meters or 660.209 feet.)

S 17.—About 1.7 miles east of the station at **Ionia**, Ionia County, at the Pere Marquette Railway bridge over the Grand River, on the south end of the west abutment. A chiseled square. (198.838 meters or 652.354 feet.)

T 17.—About 1.7 miles west of the station at **Lyons**, Ionia County, on the Pere Marquette Railway, at a farm-road crossing, about 100 yards west of milepost 42, about 50 feet south of the track, about 10 yards west of an offset in the right-of-way fence, and about 10 feet west of a gate, at the fence. A standard disk, set in the top of a concrete post. (198.005 meters or 649.621 feet.)

U 17.—At **Lyons**, Ionia County, about 400 feet west of the Pere Marquette Railway station, at a small bridge, on the north end of the east bridge seat. A chiseled square. (215.775 meters or 707.922 feet.)

V 17.—At **Lyons**, Ionia County, at the point of a spur about 50 yards west of the Pere Marquette Railway station, and about 10 yards north of the track, in a fence angle. A standard disk, set in the top of a concrete post. (217.661 meters or 714.109 feet.)

W 17.—About 1.4 miles south of the station at **Lyons**, Ionia County, on the Pere Marquette Railway, at a dirt-road crossing, in the northeast fence angle. A standard disk, set in the top of a concrete post. (232.942 meters or 764.244 feet.)

X 17.—About 1.0 mile north of the station at **Collins**, Ionia County, on the Pere Marquette Railway, at a dirt-road crossing, in the southwest fence angle. A standard disk, set in the top of a concrete post. (230.396 meters or 755.891 feet.)

Y 17.—At **Collins**, Ionia County, about 260 feet south of the Pere Marquette Railway station, at a road crossing, south of the road and east of the cattle guard, in the fence angle. A standard disk, set in the top of a concrete post. (234.511 meters or 769.391 feet.)

Z 17.—About 2.0 miles south of **Collins**, Ionia County, at the Gibb's School, in the northeast corner of the yard. A standard disk, set in the top of a concrete post. (236.558 meters or 776.107 feet.)

A 18.—About 0.7 mile northwest of the station at **Portland**, Ionia County, on the Pere Marquette Railway, at a prominent highway crossing, southwest of the track and east of the highway, in the fence angle. A standard disk, set in the top of a concrete post. (231.189 meters or 758.493 feet.)

B 18.—At **Portland**, Ionia County, across the tracks from the Pere Marquette Railway station, at the right-of-way fence. A standard disk, set in the top of a concrete post. (218.741 meters or 717.653 feet.)

C 18 (U. S. G. S.)—At **Portland**, Ionia County, 0.3 mile southeast of the Pere Marquette Railway station, and about 250 feet north along the highway from the first crossing east of the steel bridge, in line with the trees east of the street. A United States Geological Survey standard cap, stamped "MICH 719 1916" and riveted on the top of a 3½-inch iron pipe. (219.065 meters or 718.716 feet.)

D 18.—About 3.1 miles southeast of the station at **Portland**, Ionia County, on the Pere Marquette Railway, about 400 feet northwest of the Ionia-Lansing highway crossing, at the crossing of a north-and-south road, in the northeast fence angle. A standard disk, set in the top of a concrete post. (235.151 meters or 771.491 feet.)

E 18.—About 4.0 miles southeast of the station at **Portland**, Ionia County, on the Pere Marquette Railway, at a crossing, in the northeast fence angle. A standard disk, set in the top of a concrete post. (250.527 meters or 821.937 feet.)

822.3 (U. S. G. S.)—About 4 miles southeast of **Portland**, Ionia County. Not described. (250.394 meters or 821.501 feet.)

F 18.—At **Eagle**, Clinton County, about ¼ mile west of the Pere Marquette Railway station, about 250 feet west of a road crossing, and about 10 yards east of a cattle guard, between the railway and a highway. A standard disk, set in the top of a concrete post. (256.100 meters or 840.221 feet.)

H 18.—In Clinton County, about 2.0 miles northwest of the station at **Grand Ledge**, Eaton County, and ¼ mile northwest of the point where the power line comes tangent to the Pere Marquette Railway, at a prominent road crossing, in the southwest fence angle. A standard disk, set in the top of a concrete post. (252.974 meters or 829.966 feet.)

I 18.—At **Grand Ledge**, Eaton County, about 800 feet west of the Pere Marquette Railway station, at the Ionia branch, and about 20 yards south of the track, at the fence. A standard disk, stamped "I 18 16" and set in the top of a concrete post. (259.716 meters or 852.085 feet.)

J 18.—About 0.6 mile east of the station at **Grand Ledge**, Eaton County, on the Pere Marquette Railway, near the east end of the yards, at the crossing of an east-and-west road, in the southwest fence angle. A standard disk, set in the top of a concrete post. (261.402 meters or 857.616 feet.)

K 18.—In Clinton County, about 1.6 miles east of the station at **Grand Ledge**, Eaton County, on the Pere Marquette Railway, at a road crossing, about 100 feet north of the track, in the angle of the fence at the northeast corner of a

crossroad. A standard disk, set in the top of a concrete post. (257.655 meters or 845.323 feet.)

L 18.—In Clinton County, about 3.4 miles east of the station at **Grand Ledge**, Eaton County, 1.1 miles west of **Delta**, on the Pere Marquette Railway, about 25 yards east of a farm-road crossing, and about 10 yards north of the track. A standard disk, set in the top of a concrete post. (254.535 meters or 835.087 feet.)

M 18.—At **Delta**, Eaton County, about 50 yards west of the Pere Marquette Railway station, and about 15 yards south of the track, in a fence angle. A standard disk, set in the top of a concrete post. (259.104 meters or 850.077 feet.)

N 18.—In Clinton County, about 2.0 miles east of the station at **Delta**, Eaton County, on the Pere Marquette Railway, at the crossing of the Grand Rapids-Lansing highway, in the southwest fence angle. A standard disk, set in the top of a concrete post. (257.737 meters or 845.592 feet.)

O 18.—Near the Clinton-Ingham County line, about 3.1 miles east of the station at **Delta**, Eaton County, on the Pere Marquette Railway, $\frac{1}{4}$ mile west of the east end of a $1\frac{1}{4}$ -mile tangent, at the north fence. A standard disk, set in the top of a concrete post. (258.826 meters or 849.165 feet.)

P 18.—About 1.9 miles northwest of **North Lansing**, Ingham County, at the first road crossing west of the Pere Marquette Railway yards, in the southwest fence angle. A standard disk, set in the top of a concrete post. (258.869 meters or 849.306 feet.)

Q 18.—About 0.9 mile northwest of the station at **North Lansing**, Ingham County, at the east end of the Pere Marquette Railway yards, at a prominent highway crossing, at the fence angle north of the highway. A standard disk, set in the top of a concrete post. (259.162 meters or 850.267 feet.)

R 18.—At **Lansing**, Ingham County, about 2 blocks west of the Michigan Central Railroad station, in the east wall of the Larch School. A standard disk. (261.179 meters or 856.885 feet.)

S 18.—At **Lansing**, Ingham County, at the Michigan Central Railroad station, in the east wall, about 4 feet above the pavement. A standard disk. (258.801 meters or 849.083 feet.)

T 18.—About 2.8 miles south of the station at **Lansing**, Ingham County, on the Michigan Central Railroad, at the point of the spur leading to the Burwell gravel pit, at the east fence. A standard disk, set in the top of a concrete post. (252.409 meters or 828.112 feet.)

U 18.—About 2.2 miles north of the station at **Holt**, Ingham County, on the Michigan Central Railroad, about 100 yards north of the spur to Holbrook and Skinner's gravel pit, at a dirt-road crossing, in the southwest fence angle. A standard disk, set in the top of a concrete post. (260.360 meters or 854.198 feet.)

V 18.—At **Holt**, Ingham County, in the lawn about 10 yards south of the Michigan Central Railroad station. A standard disk, set in the top of a concrete post. (268.519 meters or 880.966 feet.)

W 18.—About 0.6 mile south of the station at **Holt**, Ingham County, on the Michigan Central Railroad, about 50 yards north of a whistle post, at the east fence. A standard disk, set in the top of a concrete post. (266.066 meters or 869.637 feet.)

X 18.—About 2.2 miles north of the station at **Mason**, Ingham County, on the Michigan Central Railroad, at an east-and-west road crossing, in the northwest fence angle. A standard disk, set in the top of a concrete post. (266.525 meters or 874.424 feet.)

Y 18.—At **Mason**, Ingham County, at the southwest corner of the Michigan Central Railroad station, in the concrete foundation. A standard disk. (271.577 meters or 890.999 feet.)

Z 18.—At **Mason**, Ingham County, in the lawn about 50 yards south of the Michigan Central Railroad station. A standard disk, set in the top of a concrete post. (271.372 meters or 890.326 feet.)

A 19 (U. S. G. S.).—At **Mason**, Ingham County, about $\frac{1}{8}$ mile southeast of the Michigan Central Railroad station, at the concrete bridge over Cedar River, on the northeast corner of the northwest abutment. A United States Geological Survey standard disk, stamped "695." (272.344 meters or 893.515 feet.)

B 19.—At **Mason**, Ingham County, about 800 feet south of the Michigan Central Railroad station, on the west head wall of a stone culvert. A chiseled square. (271.129 meters or 889.529 feet.)

C 19.—At **Mason**, Ingham County, 0.5 mile south of the Michigan Central Railroad station, at a street crossing, on the north concrete head wall of the highway culvert. The highest point of a bolt, flanked by the letters "U. S." chiseled in the adjacent concrete surface. (271.812 meters or 891.770 feet.)

D 19.—About 1.2 miles south of the station at **Mason**, Ingham County, on the Michigan Central Railroad, on the south end of the east head wall of a stone culvert. A chiseled square. (275.060 meters or 902.426 feet.)

E 19.—At **Eden**, Ingham County, about 100 yards north of the Michigan Central Railroad station, in the northwest corner of the park. A standard disk, set in the top of a concrete post. (294.918 meters or 967.577 feet.)

F 19.—About 2.0 miles north of the station at **Leslie**, Ingham County, on the Michigan Central Railroad, at a dirt-road crossing, in the northwest fence angle. A standard disk, set in the top of a concrete post. (295.786 meters or 970.425 feet.)

971 (U. S. G. S.).—About 2.0 miles north of the station at **Leslie**, Ingham County, on the Michigan Central Railroad, at the crossing of a dirt road, in a fence angle about 100 feet east of bench mark *F 19*, described above. A United States Geological Survey standard cap, riveted on the top of a 3½-inch iron pipe. (295.627 meters or 969.903 feet.)

G 19.—At **Leslie**, Ingham County, at the Michigan Central Railroad station, on the door sill at the entrance to the smoking room. A chiseled square. (285.599 meters or 937.003 feet.)

H 19.—At **Leslie**, Ingham County, about 50 yards south of the Michigan Central Railroad station, in the southwest corner of the lawn. A standard disk, set in the top of a concrete post. (285.137 meters or 935.487 feet.)

I 19.—About 2.5 miles south of the station at **Leslie**, Ingham County, on the Michigan Central Railroad, about 800 feet south of a small bridge located south of a road crossing, at a farm-road crossing, near the north end of a deep cut, at the east right-of-way fence. A standard disk, set in the top of a concrete post. (278.422 meters or 913.456 feet.)

908 (U. S. G. S.).—About 2.5 miles south of **Leslie**, Ingham County, on the Michigan Central Railroad, at a small bridge, on the east guard rail. The northernmost bolt head. (276.457 meters or 907.009 feet.)

J 19.—At **Rives Junction**, Jackson County, about 50 yards southeast of the Michigan Central Railroad station, between the Michigan Central Railroad and the Michigan Electric Railway. A standard disk, set in the top of a concrete post. (276.780 meters or 908.069 feet.)

K 19.—About 1.2 miles south of the station at **Rives Junction**, Jackson County, on the Michigan Central Railroad, at a road crossing near the north end of a deep cut, at the fence between the Michigan Central Railroad and the Michigan Electric Railway. A standard disk, set in the top of a concrete post. (284.384 meters or 933.016 feet.)

L 19.—About 1.5 miles north of **Van Horn**, Jackson County, on the Michigan Central Railroad, south of a dirt-road crossing, in the fence angle between the Michigan Central Railroad and the Michigan Electric Railway. A standard disk, set in the top of a concrete post. (292.236 meters or 958.778 feet.)

M 19.—At **Van Horn**, Jackson County, about 100 yards south of the Michigan Central Railroad station, between the Michigan Central Railroad and the Michigan Electric Railway. A standard disk, set in the top of a concrete post. (290.567 meters or 953.302 feet.)

N 19.—About 2.4 miles southeast of the station at **Van Horn**, Jackson County, on the Michigan Central Railroad, at the west end of a curve, about 100 yards east of a farm-road crossing, at the north fence. A standard disk, set in the top of a concrete post. (286.845 meters or 941.091 feet.)

928 (U. S. G. S.).—About 3.3 miles southeast of **Van Horn**, Jackson County. Not described. (282.511 meters or 926.871 feet.)

926.2 (U. S. G. S.).—At **Jackson**, Jackson County, between Trail and Mechanic Streets, at a small railroad bridge, on the south guard rail. The easternmost bolt head. (282.152 meters or 925.694 feet.)

T. B. M. 175.—At **Jackson**, Jackson County. Not described. This mark is at the junction of lines of levels to Mackinaw and Detroit, Mich., and Warsaw, Ind. (284.205 meters or 932.429 feet.)

LINE 5. JACKSON TO DETROIT, MICH.

This line follows the Michigan Central Railroad from Jackson to Detroit. The field work was done in the fall of 1916 by J. H. Peters, assistant.

T. B. M. 175.—See page 32.

O 19.—About 1.9 miles east of **Jackson**, Jackson County, on the Michigan Central Railroad, near the east end of the yards, west of a fill and east of a high bank, at the north fence line. A standard disk, set in the top of a concrete post. (288.678 meters or 947.104 feet.)

P 19.—About 2.8 miles east of the station at **Jackson**, Jackson County, on the Michigan Central Railroad, 0.7 mile east of the east end of the yards, and 0.6 mile west of the Frost Refrigerator Plant, in the southwest angle of a dirt-road crossing. A standard disk, set in the top of a concrete post. (285.999 meters or 938.315 feet.)

Q 19 (U. S. G. S.).—At **Michigan Center**, Jackson County, on the Michigan Central Railroad, at the Main Street crossing, in the northwest fence angle. A United States Geological Survey standard cap, stamped "946" and riveted on the top of a 3½-inch iron pipe. (288.113 meters or 945.251 feet.)

R 19.—About 0.7 mile east of **Michigan Center**, Jackson County, on the Michigan Central Railroad, at the interurban railway overhead crossing, on the concrete pier nearest the south side of the track. A chiseled square. (292.172 meters or 958.568 feet.)

S 19.—About 2.2 miles east of the station at **Michigan Center**, Jackson County, on the Michigan Central Railroad, at a farm-road crossing, about 400 feet east of a half-mile post, at the north fence. A standard disk, set in the top of a concrete post. (297.802 meters or 977.039 feet.)

T 19.—At **Leoni**, Jackson County, on the Michigan Central Railroad, at a dirt-road crossing near the west edge of the village, in the northwest fence angle. A standard disk, set in the top of a concrete post. (300.725 meters or 986.629 feet.)

U 19.—About 2.4 miles west of the station at **Grass Lake**, Jackson County, 0.6 mile east of **Leoni**, on the Michigan Central Railroad, north of a farm house, at the north right-of-way fence. A standard disk, set in the top of a concrete post. (303.607 meters or 996.084 feet.)

V 19.—About 1.2 miles west of the station at **Grass Lake**, Jackson County, on the Michigan Central Railroad, at a dirt-road crossing, in the northeast fence angle. A standard disk, set in the top of a concrete post. (302.872 meters or 993.673 feet.)

W 19.—About 0.6 mile west of the station at **Grass Lake**, Jackson County, on the Michigan Central Railroad, about 100 yards west of the point of the **Grass Lake** siding, at a crossing, at the fence between the Michigan Central Railroad and the interurban railway. A standard disk, set in the top of a concrete post. (302.547 meters or 992.606 feet.)

X 19.—At **Grass Lake**, Jackson County, at the Michigan Central Railroad station, at the entrance to the women's waiting room, on the door sill. A chiseled square. (303.554 meters or 995.910 feet.)

Y 19.—Destroyed. (302.673 meters or 993.020 feet.)

Z 19.—About 1.4 miles east of the station at **Grass Lake**, Jackson County, on the Michigan Central Railroad, near the east end of **Grass Lake** siding, at **Schoerming** on the interurban railway, at a dirt-road crossing, in the northeast fence angle. A standard disk, set in the top of a concrete post. (305.773 meters or 1,003.190 feet.)

A 20.—At **Francisco**, Jackson County, 0.5 mile west of the Michigan Central Railroad station, at a farm-road crossing, in the northwest fence angle. A standard disk, set in the top of a concrete post. (311.230 meters or 1,021.123 feet.)

B 20.—In Washtenaw County, about 1.2 miles east of the station at **Francisco**, Jackson County, on the Michigan Central Railroad, at a farm-road crossing, at the fence between the Michigan Central Railroad and the interurban railway. A standard disk, set in the top of a concrete post. (309.445 meters or 1,015.237 feet.)

C 20.—In Washtenaw County about 2.7 miles east of the station at **Francisco**, Jackson County, on the Michigan Central Railroad, at **Sylvan** on the interurban

railway, at a dirt-road crossing, in the northeast fence angle. A standard disk, set in the top of a concrete post. (299.179 meters or 981.556 feet.)

D 20.—About 2.9 miles west of the station at **Chelsea**, Washtenaw County, on the Michigan Central Railroad, at **West Guthrie** on the interurban railway, at the crossing, about 10 yards north of the east cattle guard. A standard disk, set in the top of a concrete post. (289.262 meters or 949.020 feet.)

E 20.—About 1.9 miles west of the station at **Chelsea**, Washtenaw County, on the Michigan Central Railroad, near the west end of the long tangent through Chelsea, in front of a farmhouse to the northward, at the east end of a gate. A standard disk, set in the top of a concrete post. (280.491 meters or 920.244 feet.)

F 20.—At **Chelsea**, Washtenaw County, about 75 yards east of the Michigan Central Railroad station, in the southeast corner of the station park. A standard disk, set in the top of a concrete post. (281.021 meters or 921.983 feet.)

G 20.—About 2.2 miles east of the station at **Chelsea**, Washtenaw County, on the Michigan Central Railroad, at a crossing, at the entrance to the Michigan Portland Cement Co.'s grounds, in the northeast fence angle. A standard disk, set in the top of a concrete post. (276.830 meters or 908.233 feet.)

H 20.—About 1.7 miles west of the station at **Dexter**, Washtenaw County, on the Michigan Central Railroad, 0.5 mile east of the spur to **Prospect Pit**, south of the tracks and west of a dirt-road crossing, in an angle of a fence. A standard disk, set in the top of a concrete post. (267.884 meters or 878.883 feet.)

I 20.—At **Dexter**, Washtenaw County, about 80 yards west of the Michigan Central Railroad station, in the southwest corner of the station park. A standard disk, set in the top of a concrete post. (262.733 meters or 861.983 feet.)

J 20.—About 1.9 miles east of the station at **Dexter**, Washtenaw County, on the Michigan Central Railroad, near the river bend to the north, one-fourth mile west of the first bridge east of Dexter, about 10 yards west of a dirt road, and about 15 yards north of the track. A standard disk, set in the top of a concrete post. (258.571 meters or 848.328 feet.)

K 20.—About 2.2 miles east of the station at **Dexter**, Washtenaw County, on the Michigan Central Railroad, at a small settlement, in an angle of a fence about 50 feet north of the track. A standard disk, set in the top of a concrete post. (259.565 meters or 851.589 feet.)

L 20.—About 1.0 mile west of the station at **Delhi**, Washtenaw County, on the Michigan Central Railroad. A spike in half-mile post 43.5. (255.696 meters or 838.896 feet.)

M 20.—At **Delhi**, Washtenaw County, at the Michigan Central Railroad station, about 100 feet south of the tracks, and about 10 feet east of a dirt road. A standard disk, set in the top of a concrete post. (252.220 meters or 827.492 feet.)

N 20.—At **Delhi**, Washtenaw County, about 800 feet east of the Michigan Central Railroad station, on the northwest corner of the concrete railroad bridge. A chiseled square. (251.377 meters or 824.726 feet.)

O 20.—About 0.6 mile east of **Delhi**, Washtenaw County, on the Michigan Central Railroad, about 100 yards east of a crossover, on the northeast corner of the bridge over Huron River. A chiseled square. (249.588 meters or 818.857 feet.)

P 20.—About 1.4 miles east of the station at **Delhi**, Washtenaw County, on the Michigan Central Railroad, on the southeast corner of the bridge over Huron River. A chiseled square. (246.384 meters or 808.345 feet.)

Q 20.—About 2.1 miles east of the station at **Delhi**, Washtenaw County, on the Michigan Central Railroad, at the overhead approach to the Huron River highway bridge, in the southwest angle of a fence. A standard disk, set in the top of a concrete post. (246.283 meters or 808.013 feet.)

R 20.—About 2.7 miles west of the station at **Ann Arbor**, Washtenaw County, on the Michigan Central Railroad, at the west end of a 1.9-mile tangent, at the east end of a deep cut, at the south fence, about 3 feet higher than the track. A standard disk, set in the top of a concrete post. (247.127 meters or 810.782 feet.)

S 20.—About 1.9 miles west of the station at **Ann Arbor**, Washtenaw County, at the Michigan Central Railroad bridge over Huron River, on the south end of the east abutment. A chiseled square. (242.604 meters or 795.943 feet.)

T 20.—About 1.3 miles west of the station at **Ann Arbor**, Washtenaw County, about 200 yards southeast of the Michigan Central Railroad bridge over Huron River, about 300 yards south of a highway bridge, at a prominent highway crossing, about 30 yards south of the track, and about 5 yards south of the railroad property line, at the fence east of the crossing. A standard disk, set in the top of a concrete post. (240.914 meters or 790.399 feet.)

U 20.—About 0.7 mile west of **Ann Arbor**, Washtenaw County, on the Michigan Central Railroad, on the base of a switch stand east of milepost 38. The head of a spike. (238.364 meters or 782.033 feet.)

V 20.—Destroyed, January 1929. (237.454 meters or 779.047 feet.)

V 20 (Reset).—At **Ann Arbor**, Washtenaw County, at the east end of the eighth pier from the north end of the Broadway Street Bridge, in the top of the wheel guard, nearly in the center of Depot Street. The original tablet and upper six inches of the concrete post were imbedded in the concrete wheel guard. (781.047 feet.) This mark was reset by the Michigan Central Railroad Co.

W 20 (U. S. G. S.).—At **Ann Arbor**, Washtenaw County, at the northeast corner of the courthouse. A United States Geological Survey standard disk, stamped "843." (256.936 meters or 842.964 feet.)

X 20.—At **Ann Arbor**, Washtenaw County, at the southwest corner of the intersection of Huron Avenue and Fourth Street. The top of a fire hydrant. (256.257 meters or 840.736 feet.)

Y 20.—About 0.8 mile east of the station at **Ann Arbor**, Washtenaw County, at the Michigan Central Railroad Bridge over Huron River, on the south end of the east abutment. A chiseled square. (233.234 meters or 765.202 feet.)

Z 20.—About 1.6 miles east of the station at **Ann Arbor**, Washtenaw County, on the Michigan Central Railroad, at the east end of the first curve east of the second bridge over Huron River east of **Ann Arbor**, about 50 feet north of the tracks, in line with the telegraph poles and nearly in line with the high-tension poles. A standard disk, set in the top of a concrete post. (231.096 meters or 758.187 feet.)

A 21.—At **Geddes**, Washtenaw County, on the Michigan Central Railroad, about 60 yards west of the crossing, and about 35 yards south of the tracks, in line with the high-tension poles. A standard disk, set in the top of a concrete post. (228.807 meters or 750.678 feet.)

B 21.—About 1.7 miles west of the station at **Ypsilanti**, Washtenaw County, at the Michigan Central Railroad Bridge over Huron River, on the north end of the east abutment. A chiseled square. (220.636 meters or 724.034 feet.)

C 21.—About 0.9 mile west of the station at **Ypsilanti**, Washtenaw County, on the Michigan Central Railroad, at a street crossing, at the northeast fence corner. A standard disk, set in the top of a concrete post. (218.823 meters or 717.922 feet.)

D 21.—At **Ypsilanti**, Washtenaw County, in the park across the track from the east end of the Michigan Central Railroad station, and about 15 yards south of the tracks. A standard disk, set in the top of a concrete post. (218.938 meters or 718.299 feet.)

G 21.—About 1.1 miles east of **Ypsilanti**, Washtenaw County, on the Michigan Central Railroad, 0.3 mile east of the former overhead crossing of the Detroit, Jackson & Chicago Railway, at the west end of a gate in the south fence. A standard disk, set in the top of a concrete post. (226.648 meters or 743.594 feet.)

H 21.—About 2.7 miles east of the station at **Ypsilanti**, Washtenaw County, on the Michigan Central Railroad, 0.7 mile east of **Wiard**, northeast of a crossing. A standard disk, set in the top of a concrete post. (225.521 meters or 739.897 feet.)

I 21.—At **Denton**, Wayne County, at the northwest corner of the American Express Co.'s office. A standard disk, set in the top of a concrete post. (215.262 meters or 706.239 feet.)

J 21.—About 1.1 miles east of **Longworthy's Crossing**, Wayne County, on the Michigan Central Railroad, at a dirt-road crossing, in the northeast fence angle. A standard disk, set in the top of a concrete post. (203.741 meters or 668.440 feet.)

K 21.—At **Wayne**, Wayne County, 0.3 mile east of the Michigan Central Railroad station, at the easternmost (Third St.) street crossing, in the southeast fence angle. A standard disk, stamped "K 21 1916," and set in the top of a concrete post. (200.450 meters or 657.643 feet.)

L 21 (U. S. G. S.).—At **Inkster**, Wayne County, at a road crossing, about 4 yards north of the Michigan Central Railroad tracks, in the east edge of a roadway. A United States Geological Survey standard cap, riveted on the top of a 3½-inch iron pipe. (193.871 meters or 636.058 feet.)

M 21.—At **Dearborn**, Wayne County, in a park about 20 yards west of the Michigan Central Railroad station. A standard disk, set in the top of a concrete post. (186.968 meters or 613.411 feet.)

N 21.—Destroyed. (181.455 meters or 595.324 feet.)

O 21=**B. M. (U. S. D. W.)**=**T. B. M. 22 (U. S. L. S.)**.—See page 9.

P 21=**B. M. (U. S. D. W.)**=**P. B. M. 8 (U. S. L. S.)**.—See page 9.

Q 21=**B. M. (U. S. D. W.)**=**T. B. M. 23 (U. S. L. S.)**.—See page 9.

LINE 6, WARSAW, IND., TO JACKSON, MICH.

This line follows the New York Central Railroad from the crossing of the Indiana-Michigan boundary to Kalamazoo and the Michigan Central Railroad from Kalamazoo to Jackson. The field work was done during the summer of 1916 by J. H. Peters, assistant.

F 9.—About 2.5 miles west of the station at **White Pigeon**, St. Joseph County, on the New York Central Railroad, at a highway crossing between mileposts 422 and 423, at the southeast fence angle. A standard disk set in the top of a concrete post. (246.191 meters or 807.712 feet.)

G 9.—About 0.6 mile west of the station at **White Pigeon**, St. Joseph County, on the New York Central Railroad, about 100 yards west of the west end of the **Y** to the Kalamazoo Branch, on the north end of the east abutment of a bridge. A chiseled square. (246.569 meters or 808.952 feet.)

H 9.—About 0.6 mile northwest of the station at **White Pigeon**, St. Joseph County, on the New York Central Railroad, about 100 yards northwest of the northwest point of the **Y**, at the northeast right-of-way fence, about 3 feet west of a gate to a field. A standard disk set in the top of a concrete post. (248.304 meters or 814.644 feet.)

I 9.—At **White Pigeon**, St. Joseph County, in the northeast corner of the park at the New York Central Railroad station. A standard disk set in the top of a concrete post. (249.419 meters or 818.302 feet.)

J 9 (U. S. G. S.).—At **White Pigeon**, St. Joseph County, in the southeast corner of the public school yard. A United States Geological Survey standard cap, stamped "819 MICH" and riveted on the top of a 3½-inch iron pipe. (249.578 meters or 818.824 feet.)

K 9.—At **Constantine**, St. Joseph County, in the northwest corner of the park at the New York Central Railroad station. A standard disk set in the top of a concrete post. (243.237 meters or 798.020 feet.)

NOTE.—It was reported in 1931 that the post was loose and broken on the sides and that there was no disk in the top.

L 9.—About 1.2 miles south of the station at **Three Rivers**, St. Joseph County, on the New York Central Railroad, at a highway crossing, in the northeast fence angle. A square cut in the top of a concrete post. (248.269 meters or 814.529 feet.)

M 9 (U. S. G. S.).—Destroyed. (243.226 meters or 797.984 feet.)

N 9.—Destroyed. (250.094 meters or 820.517 feet.)

O 9.—About 1.2 miles south of **Moorepark**, St. Joseph County, on the New York Central Railroad, at a farm-road crossing at milepost 15, and about 10 yards west of the track. A standard disk set in the top of a concrete post. (252.234 meters or 827.538 feet.)

P 9 (U. S. G. S.).—At **Moorepark**, St. Joseph County, about 500 feet south of the New York Central Railroad station, at the west right-of-way fence. A United States Geological Survey standard cap, stamped "833" and riveted on the top of a 3½-inch iron pipe. (253.649 meters or 832.180 feet.)

Q 9.—At **Moorepark**, St. Joseph County, about 200 yards north of the New York Central Railroad station, behind the section-car house. A standard disk set in the top of a concrete post. (254.928 meters or 836.376 feet.)

R 9.—At **Flowerfield**, St. Joseph County, about 200 yards north of the New York Central Railroad station, and about 250 feet northeast of milepost 20, at a dirt-road crossing, in the northeast fence angle. A standard disk set in the top of a concrete post. (262.869 meters or 862.429 feet.)

S 9 (U. S. G. S.).—About 0.6 mile south of the station at **Schoolcraft**, Kalamazoo County, on the New York Central Railroad, about 500 feet south of the crossing of the Grand Trunk Railway, on the concrete base of a caution signal. A chiseled square. (266.463 meters or 874.221 feet.)

T 9 (U. S. G. S.).—At **Schoolcraft**, Kalamazoo County, about 25 yards north of the New York Central Railroad station, at the west fence. A United States Geological Survey standard cap, stamped "879" and riveted on the top of a 3½-inch iron pipe. (267.936 meters or 879.053 feet.)

U 9 (U. S. G. S.).—About 1.9 miles north of **Schoolcraft**, Kalamazoo County, on the New York Central Railroad, at a highway crossing, at the north edge of the roadway, and about 5 yards west of the track. A spike in a stump. (264.214 meters or 866.842 feet.)

V 9.—About 1.9 miles north of **Schoolcraft**, Kalamazoo County, on the New York Central Railroad, at a highway crossing, in the northwest fence angle. A standard disk, set in the top of a concrete post. (264.554 meters or 867.958 feet.)

W 9 (U. S. G. S.).—About 3.1 miles south of the station at **Portage**, Kalamazoo County, on the New York Central Railroad, about 100 yards north of a crossing, at the west right-of-way fence. A United States Geological Survey standard cap, stamped "882" and riveted on the top of a 3½-inch iron pipe. (268.873 meters or 882.127 feet.)

X 9 (U. S. G. S.).—At **Portage**, Kalamazoo County, about 100 feet north of New York Central Railroad station, at a crossing, about 5 yards west of the track. A United States Geological Survey standard cap, stamped "866" and riveted on the top of a 3½-inch iron pipe. (264.034 meters or 866.252 feet.)

Y 9 (U. S. G. S.).—About 2.2 miles north of the station at **Portage**, Kalamazoo County, on the New York Central Railroad, about 20 yards south of a road crossing, at the south end of a rail rack. The top of a section of rail set vertically. (259.635 meters or 851.819 feet.)

Z 9 (U. S. G. S.).—About 3.1 miles south of the station at **Kalamazoo**, Kalamazoo County, on the New York Central Railroad, about 100 yards southwest of a park, at a crossing, at the edge of the road, and midway between the tracks and the west right-of-way fence. A United States Geological Survey standard cap, stamped "822" and riveted on the top of a 3½-inch iron pipe. (250.670 meters or 822.406 feet.)

A 10 (U. S. G. S.).—At **Kalamazoo**, Kalamazoo County, in the southeast angle of the crossing of the New York Central and Pennsylvania Railroads, on the concrete base of a signal tower. A chiseled square. (232.034 meters or 761.265 feet.)

B 10.—At **Kalamazoo**, Kalamazoo County, in the east face of the Michigan Central Railroad station. A standard disk. (238.028 meters or 780.930 feet.)

C 10 (U. S. G. S.).—At **Kalamazoo**, Kalamazoo County, at the front entrance to the courthouse. A United States Geological Survey standard disk, stamped "793 MICH." (241.804 meters or 793.319 feet.)

D 10.—At **Comstock**, Kalamazoo County, 0.3 mile east of the Michigan Central Railroad station, at the Euclid Avenue crossing, at the northeast property line intersection. A standard disk, set in the top of a concrete post. (242.006 meters or 793.981 feet.)

E 10.—At **Galesburg**, Kalamazoo County, one block west of the Michigan Central Railroad station, one-half block south of the track, and behind the interurban station. A standard disk. (242.175 meters or 794.536 feet.)

F 10.—At **Galesburg**, Kalamazoo County, 0.4 mile east of the Michigan Central Railroad station, at the interurban overhead crossing, on a concrete pier. A chiseled square. (243.198 meters or 797.892 feet.)

G 10.—At **Augusta**, Kalamazoo County, about 200 feet west of the Michigan Central Railroad station, behind the section-car houses. The top of a section of rail set vertically. (243.118 meters or 797.630 feet.)

H 10.—At **Augusta**, Kalamazoo County, 0.4 mile east of the Michigan Central Railroad station, on the south end of the west abutment of a bridge. A chiseled square. (242.987 meters or 797.200 feet.)

I 10.—About 2.2 miles east of the station at **Augusta**, Kalamazoo County, on the Michigan Central Railroad, at the interurban overhead crossing, on the south face of the north concrete abutment, 4 feet higher than the track. A standard disk. (244.490 meters or 802.160 feet.)

XG 10.—About 1.6 miles west of the station at **Battle Creek**, Calhoun County, on the Michigan Central Railroad, at Kendall Street, in the northeast fence

angle. A standard disk, stamped "G 10 1916" and set in the top of a concrete post. (250.412 meters or 821.560 feet.)

XH 10.—At **Battle Creek**, Calhoun County, at the intersection of Washington Avenue and Hamblin Street, in the northwest corner of the small triangular grass plot. A standard disk, stamped "H 10 1916" and set in the top of a concrete post. (250.395 meters or 821.504 feet.)

NOTE.—This mark may be covered with mud and dirt.

XI 10.—At **Battle Creek**, Calhoun County, one block west of the Michigan Central Railroad station, and about 10 yards east of a street crossing, in a grass plot located between the tracks and the river. A standard disk, stamped "I 10 1916" and set in the top of a concrete post. (251.054 meters or 823.666 feet.)

NOTE.—In 1931 it was reported that the concrete post seemed slightly loose.

J 10.—At **Battle Creek**, Calhoun County, one block north and one-half block west of the Michigan Central Railroad station, at the left of the entrance to the Battle Creek High School, at the outer edge of a stone balustrade. A chiseled square. (256.729 meters or 842.285 feet.)

K 10.—About 3.5 miles east of the station at **Battle Creek**, Calhoun County, on the Michigan Central Railroad, at the southwest corner of the intersection of Potter and Spencer Streets, and about 800 feet west of the Kellogg cereal factory. A standard disk, set in the top of a concrete post. (258.594 meters or 848.404 feet.)

L 10.—About 4.6 miles east of the station at **Battle Creek**, Calhoun County, on the Michigan Central Railroad, at a road crossing, at milepost 117, at the east end of a gate in the north right-of-way fence. A standard disk, set in the top of a concrete post. (263.978 meters or 866.068 feet.)

M 10.—About 5.5 miles east of the station at **Battle Creek**, Calhoun County, on the Michigan Central Railroad, at a dirt-road crossing, near a farm house, in the southwest fence angle. A standard disk, stamped "M 10 1916" and set in the top of a concrete post. (271.492 meters or 890.720 feet.)

N 10.—About 2.4 miles west of the station at **Ceresco**, Calhoun County, on the Michigan Central Railroad, east of a cut, at the intersection of the north right-of-way fence and a north-and-south property line. A standard disk, set in the top of a concrete post. (273.227 meters or 896.412 feet.)

O 10.—About 1.6 miles west of **Ceresco**, Calhoun County, on the Michigan Central Railroad, at a crossing, about 80 feet south of the track, in the south-west fence angle. A standard disk, set in the top of a concrete post. (275.799 meters or 904.851 feet.)

P 10.—At **Ceresco**, Calhoun County, about 0.3 mile west of the Michigan Central Railroad station, at a dirt-road crossing, in the northwest fence angle. A standard disk, set in the top of a concrete post. (272.321 meters or 893.440 feet.)

Q 10.—About 0.9 mile east of the station at **Ceresco**, Calhoun County, on the Michigan Central Railroad, at a farm-road crossing, at the intersection of the north right-of-way fence and a tree-lined fence. A standard disk, set in the top of a concrete post. (273.225 meters or 896.406 feet.)

R 10.—About 1.9 miles west of the station at **Marshall**, Calhoun County, at a road crossing, between the Michigan Central Railroad and the electric railway, at the east edge of a road. A standard disk, set in the top of a concrete post. (274.022 meters or 899.021 feet.)

S 10.—At **Marshall**, Calhoun County, about 100 yards west of the Michigan Central Railroad station, in the west edge of the park. A standard disk, set in the top of a concrete post. (276.292 meters or 906.468 feet.)

T 10.—About 2.1 miles east of **Marshall**, Calhoun County, on the Michigan Central Railroad, 0.5 mile east of a water tank, at a farm-road crossing, at the south fence. A standard disk, set in the top of a concrete post. (279.028 meters or 915.444 feet.)

U 10.—About 1.2 miles west of the station at **Marengo**, Calhoun County, on the Michigan Central Railroad, near the west end of a long tangent, at a farm-road crossing, at the south fence. A standard disk, set in the top of a concrete post. (282.733 meters or 927.600 feet.)

V 10.—About 0.6 mile west of the station at **Marengo**, Calhoun County, on the Michigan Central Railroad, at a farm-road crossing, at the north fence. A standard disk, set in the top of a concrete post. (282.719 meters or 927.554 feet.)

W 10.—At **Marengo**, Calhoun County, about 100 yards west of the Michigan Central Railroad station, about 50 yards south of a church, at a dirt-road crossing, in the northwest fence angle. A standard disk, set in the top of a concrete post. (282.071 meters or 925.428 feet.)

X 10.—At **Marengo**, Calhoun County, 0.6 mile east of the Michigan Central Railroad station, about 100 yards east of a farm house, and 3 feet east of a gate in the north fence. A standard disk, set in the top of a concrete post. (285.788 meters or 937.623 feet.)

Y 10.—About 1.5 miles east of the station at **Marengo**, Calhoun County, on the Michigan Central Railroad, at the west end of a shallow cut, at a farm-road crossing, in the southwest fence angle. A standard disk, set in the top of a concrete post. (285.856 meters or 937.846 feet.)

Z 10.—About 3.0 miles west of the station at **Albion**, Calhoun County, on the Michigan Central Railroad, at a road crossing, about 20 yards west of a high-tension transmission-line tower, at the south fence, west of the road. A standard disk, set in the top of a concrete post. (285.973 meters or 938.230 feet.)

A 11.—About 1.9 miles west of the station at **Albion**, Calhoun County, on the Michigan Central Railroad, in the middle of a short tangent, at a dirt-road crossing, about 10 yards southeast of a high-tension transmission-line tower, in the southwest fence angle. A standard disk, set in the top of a concrete post. (287.651 meters or 943.735 feet.)

B 11.—At **Albion**, Calhoun County, about 200 yards east of the Michigan Central Railroad station, at a street crossing, in the corner of a grass plot south of the track. A standard disk, set in the top of a concrete post. (288.657 meters or 947.035 feet.)

C 11.—About 0.8 mile east of the station at **Albion**, Calhoun County, on the Michigan Central Railroad, at the northeast corner of the Mingo Street crossing. A standard disk, set in the top of a concrete post. (292.702 meters or 960.306 feet.)

D 11.—About 1.9 miles east of the station at **Albion**, Calhoun County, on the Michigan Central Railroad, 0.3 mile east of a crossing, about 35 yards north of the track and about 5 yards east of a property line, at the north edge of a highway. A standard disk, set in the top of a concrete post. (290.516 meters or 953.135 feet.)

E 11.—About 2.8 miles east of the station at **Albion**, Calhoun County, on the Michigan Central Railroad, 0.7 mile west of the Bath Mills crossing, at the intersection of the north right-of-way fence and a north-and-south tree-lined fence. A standard disk, set in the top of a concrete post. (292.112 meters or 958.371 feet.)

F 11.—About 3.7 miles east of the station at **Albion**, Calhoun County, on the Michigan Central Railroad, about 100 yards west of the Bath Mills crossing, at the south fence south of a cattle guard. A standard disk, set in the top of a concrete post. (293.027 meters or 961.373 feet.)

G 11.—About 4.7 miles west of the station at **Parma**, Jackson County, on the Michigan Central Railroad, 0.8 mile east of the Bath Mills crossing, at G. W. Ray's crossing, and about 10 feet east of the gate in the north fence. A standard disk, set in the top of a concrete post. (294.943 meters or 967.659 feet.)

H 11.—About 4.0 miles west of the station at **Parma**, Jackson County, on the Michigan Central Railroad, at Humphrey's crossing, at the east end of the gate in the fence adjacent to the railroad. A standard disk, set in the top of a concrete post. (294.870 meters or 967.419 feet.)

I 11.—About 3.4 miles west of the station at **Parma**, Jackson County, on the Michigan Central Railroad, at a curve rounding a heavily wooded tract, at the north fence. A standard disk, set in the top of a concrete post. (295.189 meters or 968.466 feet.)

J 11.—About 2.8 miles west of the station at **Parma**, Jackson County, on the Michigan Central Railroad, at the east edge of a dirt road, at the fence adjacent to the railroad. A standard disk, set in the top of a concrete post. (297.022 meters or 974.480 feet.)

K 11.—About 1.4 miles west of the station at **Parma**, Jackson County, on the Michigan Central Railroad, about 100 yards west of a road crossing located at the east end of a cut, and about 2 yards east of a 12-inch oak, at the north fence. A standard disk, set in the top of a concrete post. (299.103 meters or 981.307 feet.)

L 11.—At **Parma**, Jackson County, about 50 yards west of the Michigan Central Railroad station, in the southeast angle of the intersection of the track and the sidewalk. A standard disk, set in the top of a concrete post. (302.118 meters or 991.199 feet.)

M 11.—About 1.7 miles east of the station at **Parma**, Jackson County, on the Michigan Central Railroad, at a dirt-road crossing, in the northeast fence angle, about 50 feet east of a 30-inch oak. A standard disk, set in the top of a concrete post. (300.144 meters or 984.722 feet.)

N 11.—At **Sandstone**, Jackson County, 0.3 mile east of the Michigan Central Railroad station, at a road crossing, near the west end of a gate in the north fence. A standard disk, set in the top of a concrete post. (291.349 meters or 955.868 feet.)

O 11.—About 3.0 miles west of the station at **Jackson**, Jackson County, about 75 yards west of the crossing of the Chicago-Detroit highway, and about 50 feet north of the Michigan Central Railroad tracks. A standard disk, set in the top of a concrete post. (302.174 meters or 991.383 feet.)

P 11.—At **Jackson**, Jackson County, at the Michigan Central Railroad overhead crossing at Mechanics Street, on the south end of the east bridge-seat. The top of a bolt, with the letters "U. S." on the adjacent concrete. (285.116 meters or 935.418 feet.)

Q 11 (City of Jackson).—At **Jackson**, Jackson County, on the northeast corner of Main and Mechanics Streets, at the entrance to the bank. A city bench mark tablet. (285.660 meters or 937.203 feet.)

R 11.—At **Jackson**, Jackson County, in the northeast corner of the post office. A standard disk. (288.694 meters or 947.157 feet.)

T. B. M. 175.—See page 32.

LINE 7, MARQUETTE TO ESCANABA, MICH.

This line follows the Duluth, South Shore & Atlantic Railway from Marquette to Negaunee and the Chicago & North Western Railway from Negaunee to Escanaba. The field work was done during the early summer of 1917 by G. D. Cowie, assistant.

B. M. 11 (1896) (U. S. L. S.).—At **Marquette**, Marquette County, at the City Water Works, on the south side of the pumphouse, 10 inches from the southwest corner on the water table. (188.905 meters or 619.766 feet.)

R 21 (U. S. G. S.).—At **Marquette**, Marquette County, about 100 feet west of the City Water Works, near the former location of the Marquette Monument, in natural rock. A United States Geological Survey standard disk. (190.186 meters or 623.969 feet.)

B. M. 6 (1876) (U. S. L. S.).—At **Marquette**, Marquette County, at the southwest corner of the intersection of Main and Lake Streets, at the shipping office of the Duluth, South Shore & Atlantic Railway Co., 1 foot west of the northeast corner, in the third course of masonry above the water table. The center of a small hole in the end of a brass bolt leaded horizontally into the masonry. (191.263 meters or 627.502 feet.)

S 21.—At **Marquette**, Marquette County, at the Duluth, South Shore & Atlantic Railway passenger station, in the east face, near the southeast corner, about 5 feet above the pavement. A standard disk. (198.439 meters or 651.045 feet.)

T 21.—About $1\frac{1}{2}$ miles west of **Marquette**, Marquette County, on the right of way of the Duluth, South Shore & Atlantic Railway, about $\frac{1}{4}$ mile southeast of the building of the Upper Peninsula Brewing Co., near a switchman's house, in the north side of a sandstone culvert under the tracks. A standard disk. (235.147 meters or 771.478 feet.)

U 21 (U. S. G. S.).—About 3 miles west of **Marquette**, Marquette County, on the Duluth, South Shore & Atlantic Railway, about 100 yards west of mile-post 158, about 80 feet north of the tracks, and about 35 feet west of a county road. A United States Geological Survey standard disk. (301.710 meters or 989.860 feet.)

V 21 (U. S. G. S.).—About $\frac{1}{4}$ mile northeast of **Bagdad**, Marquette County, on the Duluth, South Shore & Atlantic Railway, about 650 feet south of a plate-girder bridge over the tracks, and about 13 feet east of the track of the Lake Superior & Ishpeming Railroad, in a ledge of rock about 3 feet higher

than the track. A United States Geological Survey standard disk. (383.750 meters or 1,259.020 feet.)

W 21.—At **Eagle Mills**, Marquette County, on the Duluth, South Shore & Atlantic Railway, about 250 feet west of the telegraph station, about 35 feet south of the main track, and about 3 feet from the fence. A standard disk, set in the top of a concrete post. (390.541 meters or 1,281.300 feet.)

X 21.—At **Negaunee**, Marquette County, at the Land Department Building of the Cleveland Cliffs Iron Co., in the west face of the building, near the southwest corner. A standard disk. (423.171 meters or 1,388.354 feet.)

Y 21.—At **Negaunee**, Marquette County, at the City Hall, in the north face of the building, near the northwest corner. A standard disk. (418.996 meters or 1,374.656 feet.)

Z 21.—At **Negaunee**, Marquette County, at the Duluth, South Shore & Atlantic Railway station, in the west face of the building, near the northwest corner. A standard disk. (422.467 meters or 1,386.044 feet.)

A 22.—About 2¼ miles southeast of **Negaunee**, Marquette County, on the Chicago & North Western Railway, ¾ mile northwest of **Partridge**, about 65 feet south of the section foreman's house, about 50 feet west of the track, and about 3 feet from the fence. A standard disk, set in the top of a concrete post. (386.529 meters or 1,268.137 feet.)

B 22.—At **Cascade Junction**, Marquette county, about 100 yards southeast of the Chicago & North Western Railway station, about 50 feet northeast of the main track, and about 3 feet east of a pole. A standard disk, set in the top of a concrete post. (372.818 meters or 1,223.154 feet.)

C 22.—At **Gentian**, Marquette County. No elevation for this mark.

D 22.—At **Sands**, Marquette County, on the Chicago & North Western Railway, opposite the station signboard, about 260 feet east of the section foreman's house, about 15 feet northeast of the main track, and about 15 feet southwest of a siding, near a pole. A standard disk, set in the top of a concrete post. (364.521 meters or 1,195.933 feet.)

E 22.—At **Plains**, Marquette County, on the Chicago & North Western Railway, about 100 feet north of the station sign, and about 50 feet northeast of the main track, near a pole, about 10 feet east of a road at the place where it turns to cross the track. A standard disk, set in the top of a concrete post. (354.592 meters or 1,163.357 feet.)

F 22.—At **Swanzy**, Marquette County, on the Chicago & North Western Railway, opposite the southeast end of the station, about 40 feet northeast of the main track, and about 7 feet from a pole. A standard disk, set in the top of a concrete post. (349.925 meters or 1,148.046 feet.)

G 22.—At **Little Lake**, Marquette County, on the Chicago & North Western Railway, opposite the station, about 3 feet from a pole, on range with the poles west of the tracks. A standard disk, set in the top of a concrete post. (343.240 meters or 1,126.113 feet.)

H 22.—At **Cyr**, Marquette County, on the Chicago & North Western Railway, about 7 feet north of the station signboard, about 10 feet west of the main track, and about 1 foot lower than the rails. A standard disk, set in the top of a concrete post. (338.010 meters or 1,108.954 feet.)

I 22.—At **Helena**, Marquette County, on the Chicago & North Western Railway, about 15 feet east of the main track, about 15 feet west of a spur track, and about 10 feet southeast of the station. A standard disk, set in the top of a concrete post. (342.048 meters or 1,122.202 feet.)

J 22.—At **McFarland**, Marquette County, on the Chicago & North Western Railway, opposite the station, about 65 feet west of the track, about 35 feet north of a road, and about 3 feet east of a fence, near a fence corner. A standard disk, set in the top of a concrete post. (331.757 meters or 1,088.439 feet.)

K 22.—At **Lathrop**, Delta County, about 65 feet northwest of the Chicago & North Western Railway station, about 35 feet north of a road, and about 15 feet west of the tracks, near a pole. A standard disk, set in the top of a concrete post. (316.302 meters or 1,037.734 feet.)

L 22.—About 2 miles southeast of **Lathrop**, Delta County, on the Chicago & North Western Railway, about 260 feet northwest of culvert No. 320, about 50 feet east of the track, and about 3 feet from the fence. A standard disk, set in the top of a concrete post. (304.058 meters or 997.564 feet.)

M 22.—At **Maple Ridge**, Delta County, about 130 feet east of the Chicago & North Western Railway station, about 15 feet east of the fence around the

Excelsior Mill, and about 15 feet north of a road. A standard disk, set in the top of a concrete post. (293.062 meters or 961.488 feet.)

N 22.—At **Trombly**, Delta County, about 80 feet south of the Chicago & North Western Railway station, and about 35 feet west of the main track. A standard disk, set in the top of a concrete post. (276.557 meters or 907.337 feet.)

O 22.—At **Campbell**, Delta County, about 230 feet south of the Chicago & North Western Railway station signboard, and about 35 feet east of the main track. A standard disk, set in the top of a concrete post. (265.200 meters or 870.077 feet.)

P 22.—At **Beaver**, Delta County, about 100 feet south of the Chicago & North Western Railway station, and about 25 feet east of the main track. A standard disk, set in the top of a concrete post. (249.778 meters or 819.480 feet.)

Q 22.—At **Winde**, Delta County, about 100 feet southeast of the Chicago & North Western Railway station, and about 15 feet east of the main track. A standard disk, set in the top of a concrete post. (242.113 meters or 794.332 feet.)

R 22.—At **Brampton**, Delta County, about 60 feet south of the Chicago & North Western Railway station, and about 25 feet east of the main track. A standard disk, set in the top of a concrete post. (226.790 meters or 744.060 feet.)

S 22.—At **West Gladstone**, Delta County, about 60 feet southwest of the Chicago & North Western Railway station, and about 25 feet west of the main track. A standard disk, set in the top of a concrete post. (217.402 meters or 713.260 feet.)

T 22.—At **Larch**, Delta County, about 60 feet south of the Chicago & North Western Railway station, and about 20 feet west of the main track. A standard disk, set in the top of a concrete post. (193.538 meters or 634.966 feet.)

U 22.—At **Escanaba**, Delta County, about 65 feet east of the Chicago & North Western Railway station, near the west fence of the railway park, midway between the trolley tracks and the main track of the railway. A standard disk, set in the top of a concrete post. (187.010 meters or 613.549 feet.)

NOTE.—It was reported in 1930 that this mark is in a cinder drive used by freight vehicles and is constantly being struck by them. No longer useful as an accurate bench mark.

V 22=Depot 1905 (U. S. L. S.).—At **Escanaba**, Delta County, in the east face of the Chicago & North Western Railway station, 3 inches from the southeast corner, in the water table. A brass bolt cemented into the masonry. (188.262 meters or 617.656 feet.)

W 22=Gage B. M. 1905 (U. S. L. S.).—At **Escanaba**, Delta County, in the east masonry wing wall on the north side of the overhead railroad crossing approach to the Chicago & North Western Railroad Ore Dock No. 1, 18 inches above the ground, and 3 inches from the face of the abutment. The center of a copper bolt cemented horizontally into the masonry. (180.664 meters or 592.728 feet.)

X 22.—At **Escanaba**, Delta County, in the west face of the Escanaba Bank building, and about 15 feet from the northwest corner. A standard disk. (182.868 meters or 599.959 feet.)

Y 22.—At **Escanaba**, Delta County, on Ludington Street, in the north face of the First National Bank building. A standard disk. (182.350 meters or 598.260 feet.)

Z 22=B. M. 1 1874 (U. S. L. S.).—At **Escanaba**, Delta County, at the northwest corner of the intersection of Ludington and Fourth Streets, at the southeast corner of the building of the Delta Hardware Co. An unmarked point on the top of the extreme southeast corner of the water table. (180.721 meters or 592.915 feet.)

A 23=Courthouse 1905 (U. S. L. S.).—At **Escanaba**, Delta County, at the courthouse, 14 inches east of the northwest corner, in the fourth layer of cut stone below the red water table. The center of a brass bolt cemented in the stone. (180.793 meters or 593.152 feet.)

B 23 (U. S. G. S.).—At **Escanaba**, Delta County, in the west face of the lighthouse, near the entrance, in the water table. A United States Geological Survey standard disk. (178.957 meters or 587.128 feet.)

C 23=Magnetic Station.—At Escanaba, Delta County, about 200 feet southeast of the Sand Point Lighthouse, about 235 feet from the southwest corner of the fog bell station, and 83.2 feet south of the concrete walk leading to the fog bell. A standard magnetic station disk, set in the top of a concrete post. (177.663 meters or 582.883 feet.)

LINE 8, ALGONAC TO ST. CLAIR FLATS, MICH.

This line extends from Algonac to Old Club and was run by the Coast and Geodetic Survey over old bench marks previously established by the United States Lake Survey. The field work was done by G. D. Cowie, assistant, during June 1917.

B. M. (U. S. D. W.)=P. B. M. 29 (U. S. L. S.).—See page 11.

B. M. (U. S. D. W.)=P. B. M. 28 (U. S. L. S.).—See page 11.

B. M. (U. S. D. W.)=Gage B. M. "R" (U. S. L. S.)=F 23.—See page 11.

P. B. M. Water Street (U. S. L. S.)=G 23.—At Algonac, St. Clair County, at the junction of Water Street and Pearl Beach Road, 4 yards west of the west side of Water Street, and 1½ feet north of the fence on the south side of the road. The top of the iron cap on a length of 2-inch iron pipe set vertically in the ground. (177.852 meters or 583.503 feet.)

P. B. M. North Channel (U. S. L. S.)=H 23.—About 1½ miles southwest of Algonac, St. Clair County, on the south side of a road running along the south bank of the North Channel, back of a large boathouse, about 2 yards west of a fence line on the west side of a north-and-south road across Herson Island, and about 2 yards north of a fence line on the south side of the road along the river. The top of the iron cap on a length of 2-inch iron pipe set vertically in the ground. (176.761 meters or 579.923 feet.)

P. B. M. Sans Souci (U. S. L. S.)=I 23.—About 3 miles southwest of Algonac, St. Clair County, directly back of the Sans Souci dock on the east side of Herson Island, in line with the northeast side of William La Croix's store, 2.8 feet south of the east corner of an ice house, and 2 feet from the southeast side of the ice house. The top of the iron cap on a length of 2-inch iron pipe set vertically in the ground. (176.698 meters or 579.717 feet.)

P. B. M. Muir (U. S. L. S.)=J 23.—About 5¼ miles southwest of Algonac, St. Clair County, on the east side of Herson Island, 15 yards southwest of the south corner of the Muir house, about 10 yards from the water's edge and midway between the Muir house and the first cottage southwest. The top of the iron cap on a length of 2-inch iron pipe set vertically in the ground. (176.656 meters or 579.579 feet.)

P. B. M. Weber (U. S. L. S.)=K 23.—About 7 miles southwest of Algonac, St. Clair County, about 1,000 yards northeast of the Star Island House, about 820 yards southwest of Riverside Hotel, about 160 yards northeast of the Maybury highway, about 90 yards northeast of Mr. J. F. Weber's cottage, and about 20 feet northeast of the sheet piling along the right bank of the St. Clair River. The top of the iron cap on a length of 2-inch iron pipe set vertically in the ground. (176.474 meters or 578.982 feet.)

P. B. M. Old Club (U. S. L. S.)=L 23.—At Old Club, St. Clair County, about 550 yards above the head of the St. Clair Flats Canal, near a building constructed over the canal and having a porch with four white wooden pillars, under a cement walk from the building to the bridge over the canal, about 45 feet from the south corner of the porch, and about 2 feet northwest of the south edge of the walk, under a point on the walk lettered "U. S." The top of a copper bolt in a cement block, 18 inches square and 4 inches thick, set in a flat position under the walk. (175.512 meters or 575.826 feet.)

NOTE.—The original surface mark was broken to give way for the walk.

P. B. M. Upper Light (U. S. L. S.)=M 23.—Near Old Club, St. Clair County, at the upper end of the St. Clair Flats Canal, on the north side of the Upper Lighthouse, in the northeast corner of the second step of the stone stairway. A ¾-inch brass bolt, marked "U. S. B. M." and leaded vertically in the stone. (176.885 meters or 580.330 feet.)

P. B. M. Pipe (U. S. L. S.)=N 23.—Near Old Club, St. Clair County, about 11 yards from the face of the east pier of the canal, about 20 feet southwest of the corner of the old gage house, and 7 feet upstream from a blazed willow tree. The top of a plug screwed and riveted to the end of a 1½-inch gas pipe. (176.661 meters or 579.595 feet.)

P. B. M. Lower Light (U. S. L. S.)=O 23.—About $1\frac{1}{2}$ miles south of **Old Club**, St. Clair County, at the lighthouse at the lower end of the St. Clair Flats Canal, in the center of the stone over the middle cellar window on the east side of the lighthouse. The center punch mark in a $\frac{3}{8}$ -inch brass bolt leaded horizontally in the stone. (176.844 meters or 580.196 feet.)

LINE 9, ELKHART, IND., TO WALTON, MICH.

This line follows the Cleveland, Cincinnati, Chicago & St. Louis Railway from the crossing of the Indiana-Michigan boundary to Benton Harbor; the Pere Marquette Railway from Benton Harbor to Pentwater; United States Highway No. 31 from Pentwater to a point about 1.7 miles east of Ludington; the Pere Marquette Railway from that point to Custer; highways from Custer to Free Soil; the Pere Marquette Railway from Free Soil to Manistee; the Manistee & Northeastern Railroad from Manistee to Interlochen; the Pere Marquette Railway from Interlochen to a junction with the Pennsylvania Railroad about 7 miles south of Traverse City; and the Pennsylvania Railroad from that point to Walton. The field work was done during the summer of 1930 by John Bowie, jr., junior hydrographic and geodetic engineer, assisted by A. L. Wardwell, aide.

P 23.—In Cass County, Mich., about 2.6 miles northwest along the Cleveland, Cincinnati, Chicago & St. Louis Railway from **Granger**, St. Joseph County, Ind., 85 feet south of the center line of a road, 29.2 feet west of the west rail, 25 feet south of pole No. 3240, and 2.3 feet east of the west right-of-way fence. A standard disk, stamped "P 23 1930" and set in the top of a concrete post. (246.998 meters or 810.359 feet.)

Q 23.—In Cass County, about 3.0 miles southeast along the Cleveland, Cincinnati, Chicago & St. Louis Railway from **Niles**, Berrien County, at a road crossing, $53\frac{1}{2}$ feet east of the center line of the road, and 16.4 feet north of the north rail, directly opposite pole No. 2922. A standard disk, stamped "Q 23 1930" and set in the top of a concrete post. (224.118 meters or 735.294 feet.)

R 23.—About 1.6 miles south along the Cleveland, Cincinnati, Chicago & St. Louis Railway from the Main Street crossing at **Niles**, Berrien County, at the double overhead crossing of the Michigan Central Railroad and the N. I. Ry. Inc. (electric), 10 feet south of the south rail of the Cleveland, Cincinnati, Chicago & St. Louis Railway, in the east pier of the N. I. Ry. bridge. A standard disk, stamped "R 23 1930" and set in concrete. (218.874 meters or 711.527 feet.)

S 23.—At **Niles**, Berrien County, southeast of the intersection of the Cleveland, Cincinnati, Chicago & St. Louis Railway and Broadway Street, at the city jail, in the north end of the west face of the concrete foundation, 16 feet east of the east rail of the track. A standard disk, stamped "S 23 1930" and set about 2.0 feet above the ground. (200.538 meters or 657.932 feet.)

P. T. S. 55 Y (U. S. G. S.).—At **Niles**, Berrien County, at the east entrance to the post office, in the north end of the top step. A United States Geological Survey standard disk, stamped "P. T. Sta. 55 Y 1925" and set in concrete. (209.838 meters or 688.443 feet.)

T 23.—At **Niles**, Berrien County, about 150 yards north of the Cleveland, Cincinnati, Chicago & St. Louis Railway station, and about 12 feet west of the west rail, beside pole No. 2515, in the south end of the concrete pier supporting the Michigan Central Railroad bridge over St. Joseph River, the Cleveland, Cincinnati, Chicago & St. Louis Railway and Front Street. A standard disk, stamped "T 23 1930." (197.889 meters or 649.241 feet.)

U 23.—About 3.0 miles north along the Cleveland, Cincinnati, Chicago & St. Louis Railway from **Niles**, Berrien County, between poles No. 2225 and No. 2226, 24.2 feet west of the west rail, and 2.5 feet east of the west right-of-way fence. A standard disk, stamped "U 23 1930" and set in the top of a concrete post. (218.901 meters or 718.178 feet.)

V 23.—About 6.8 miles north along the Cleveland, Cincinnati, Chicago & St. Louis Railway from Niles, Berrien County, 53.5 feet south of the center line of a road which crosses the track, 35.4 feet west of the west rail, and 2.0 feet east of the west right-of-way fence, between poles No. 1836 and No. 1837 and nearer to pole No. 1836. A standard disk, stamped "V 23 1930" and set in the top of a concrete post. (235.358 meters or 772.170 feet.)

W 23.—At **Berrien Center**, Berrien County, across the tracks from the Cleveland, Cincinnati, Chicago & St. Louis Railway station, 84.5 feet south of the center line of a gravel road which crosses the track, 32.0 feet west of the west rail, and 6 feet west of pole No. 1627. A standard disk, stamped "W 23 1930" and set in the top of a concrete post. (230.178 meters or 755.176 feet.)

X 23.—At **Eau Claire**, Berrien County, on the right of way of the Cleveland, Cincinnati, Chicago & St. Louis Railway, 7 rails south of the station, 5 rails north of section house No. 2, and 13.5 feet west of the west rail, in the north end of the west head wall of a concrete culvert. A standard disk, stamped "X 23 1930." (216.888 meters or 711.573 feet.)

Y 23.—About 2.5 miles north along the Cleveland, Cincinnati, Chicago & St. Louis Railway from **Eau Claire**, Berrien County, 33.0 feet northeast of the center line of the road which crosses the track about 3 rails north of the flag station **Hartman**, and 22.1 feet east of the east rail, diagonally across the track from pole No. 1130. A standard disk, stamped "Y 23 1930" and set in the top of a concrete post. (219.606 meters or 720.491 feet.)

Z 23.—At **Sodus**, Berrien County, 35.0 feet south of the south end of the Cleveland, Cincinnati, Chicago & St. Louis Railway station, and 17.5 feet east of the east rail, beside pole No. 828. A standard disk, stamped "Z 23 1930" and set in the top of a concrete post. (204.721 meters or 671.655 feet.)

A 24.—About $3\frac{1}{4}$ miles north along the Cleveland, Cincinnati, Chicago & St. Louis Railway from **Sodus**, Berrien County, 26 rails south of a road crossing, in the south end of the west head wall of culvert No. 13, and 8.7 feet west of the west rail, beside pole No. 513. A standard disk, stamped "A 24 1930." (193.461 meters or 634.713 feet.)

B 24.—About $\frac{1}{4}$ mile southward along the Cleveland, Cincinnati, Chicago & St. Louis Railway from the station at **Benton Harbor**, Berrien County, about 100 feet south of the J. W. Lucas & Co. coal yard, and 27.2 feet west of the west rail, in the concrete foundation of the loading room of the Remington Rand Co. The building is a 3-story brick building and, in 1930, had a green water tank on the top of the southwest part of the building. The building was reported vacant in January, 1931. A standard disk, stamped "B 24 1930" and set vertically, about 3 feet above the ground. (180.114 meters or 590.924 feet.)

C 24.—At **Benton Harbor**, Berrien County, at the railroad station which is used jointly by the Cleveland, Cincinnati, Chicago & St. Louis and the Pere Marquette Railways, at the north side of the northeast entrance, and 3.6 feet above the sidewalk. A standard disk, stamped "C 24 1930" and set in stone masonry. (180.428 meters or 591.954 feet.)

11.362 (P. M. Ry.).—At **Benton Harbor**, Berrien County, at the northeast corner of the railroad station, on the "belt course" of masonry, about 3 feet above the pavement. The mark is cut on the masonry and resembles a double cross. (180.529 meters or 592.286 feet.)

D 24.—At the northeast edge of **Benton Harbor**, Berrien County, $\frac{1}{2}$ mile east of the Pere Marquette Railway station, across the tracks of the Pere Marquette Railway from the brick building of the Mamer Co., 43.0 feet northwest of the northwest rail, at the concrete highway bridge over Paw Paw River, on top of the south end of the northeast banister. A highway crosses the railroad at this point. A standard disk, stamped "D 24 1930." (181.863 meters or 596.662 feet.)

E 24.—About 3.3 miles northeast along the Pere Marquette Railway from **Benton Harbor**, Berrien County, 8 rails north of the crossing of a private road, 2 rails south of a country-road crossing, across the track from pole No. 2041, and 29.5 feet east of the east rail. A standard disk, stamped "E 24 1930" and set in the top of a concrete post. (196.866 meters or 645.885 feet.)

F 24.—At **Riverside**, Berrien County, opposite the east end of the Pere Marquette Railway station, and 44.5 feet north of the north rail of the main track, beside pole No. 1028. A standard disk, stamped "F 24 1930" and set in the top of a concrete post. (195.129 meters or 640.186 feet.)

G 24.—At **Coloma**, Berrien County, 29.5 feet east of the east end of the Pere Marquette Railway station, and 27.1 feet north of the north rail. A standard

disk, stamped "G 24 1930" and set in the top of a concrete post. (197.734 meters or 648.732 feet.)

H 24.—At **Watervliet**, Berrien County, about 125 yards east of the east end of the Pere Marquette Railway station, and 37.4 feet south of the south rail of the main track, in an old concrete block which at one time was used as a support for the railroad water tank. A standard disk, stamped "H 24 1930." (196.792 meters or 645.642 feet.)

J 24.—About 2.0 miles south along the Pere Marquette Railway from **Hartford**, Van Buren County, 10 rails south of a road crossing, across the track from pole No. 1559, 41.9 feet east of the east rail, and 5.0 feet west of the east right-of-way fence. A standard disk, stamped "J 24 1930" and set in the top of a concrete post. (203.882 meters or 668.903 feet.)

K 24.—At **Hartford**, Van Buren County, 7 rails north of the north end of the Pere Marquette Railway station, and 41.4 feet west of the west rail of the main track, opposite pole No. E 28. A standard disk, stamped "K 24 1930" and set in the top of a concrete post. (202.082 meters or 662.997 feet.)

L 24.—About 1.6 miles south along the Pere Marquette Railway from **McDonald**, Van Buren County, 42½ feet west of the center line of a road which crosses the track, and 40.0 feet west of the west rail, beside the right-of-way fence. A standard disk, stamped "L 24 1930" and set in the top of a concrete post. (201.137 meters or 659.897 feet.)

M 24.—At **McDonald**, Van Buren County, 21.8 feet east of the east rail of the Pere Marquette Railway at a point opposite the north end of the station. A standard disk, stamped "M 24 1930" and set in the top of a concrete post. (203.394 meters or 667.302 feet.)

N 24.—About 0.5 mile south along the Pere Marquette Railway from the station at **Bangor**, Van Buren County, at the southwestern edge of the town, at a highway underpass, on top of the west end of the south abutment, and about 6 feet west of the west rail. A standard disk, stamped "N 24 1930" and set in concrete. (200.829 meters or 658.886 feet.)

P 24.—At the northern edge of **Bangor**, Van Buren County, on the right of way of the Pere Marquette Railway, about 5 rails north of the north end of the building of the Freestone Cider & Vinegar Co., in the east end of the south abutment of the bridge across "Milk Pond," and about 6 feet east of the east rail. A standard disk, stamped "P 24 1930" and set in concrete. (199.011 meters or 652.922 feet.)

Q 24.—At **Breedsville**, Van Buren County, 84.0 feet north of the north end of the Pere Marquette Railway station, and 20.8 feet east of the east rail of the main track, between the main track and a siding. A standard disk, stamped "Q 24 1930" and set in the top of a concrete post. (204.206 meters or 669.966 feet.)

R 24.—About 0.5 mile south along the Pere Marquette Railway from **Grand Junction**, Van Buren County, 6½ rails north of the north side of the water tank south of the junction, 35.3 feet east of the east rail, and 8.4 feet west of the east right-of-way fence. A standard disk, stamped "R 24 1930" and set in the top of a concrete post. (207.361 meters or 680.317 feet.)

S 24.—At **Grand Junction**, Van Buren County, on the right of way of the Pere Marquette Railway, 3 rails south of the railroad crossing, and 35.3 feet west of the west rail. A standard disk, stamped "S 24 1930" and set in the top of a concrete post. (207.612 meters or 681.140 feet.)

T 24.—At **Grand Junction**, Van Buren County, on the right of way of the Pere Marquette Railway, near the first block signal north of the railroad crossing, and 42.3 feet west of the west rail. A standard disk, stamped "T 24 1930" and set in the top of a concrete post. (206.680 meters or 678.083 feet.)

U 24.—At **Lee**, Allegan County, on the right of way of the Pere Marquette Railway, 4 rails south of semaphore No. 504, and 25.8 feet east of the east rail. A standard disk, stamped "U 24 1930" and set in the top of a concrete post. (198.012 meters or 649.644 feet.)

V 24.—At **Pullman**, Allegan County, in the east wall of the Pere Marquette Railway station, between the door to the waiting room and the door to the express room. A standard disk, stamped "V 24 1930" and set about 2.1 feet above the ground. (199.424 meters or 654.277 feet.)

W 24.—At **Bravo**, Allegan County, on the right of way of the Pere Marquette Railway, between the station and the west right-of-way fence, about 42 feet west of the west rail, and 10 feet south of the north end of the station. A standard disk, stamped "W 24 1930" and set in the top of a concrete post. (201.443 meters or 660.901 feet.)

X 24.—At **Pearle**, Allegan County, $7\frac{1}{2}$ rails south of milepost C 140—GR 44, 42.7 feet west of the west rail of the Pere Marquette Railway, and 113 feet north of the center line of a gravel road. A standard disk, stamped “X 24 1930” and set in the top of a concrete post. (199.132 meters or 653.319 feet.)

Y 24.—At **Fennville**, Allegan County, on the right of way of the Pere Marquette Railway, 7 rails south of the door to the waiting room of the station, east of the Fennville Milling Co. building, between the main track and the west sidetrack. A standard disk, stamped “Y 24 1930” and set in the top of a concrete post. (201.694 meters or 661.724 feet.)

Z 24.—About $\frac{1}{4}$ mile north along the Pere Marquette Railway from the station at **New Richmond**, Allegan County, in the east end of the south abutment of the bridge over Kalamazoo River, 2 rails north of milepost GR 36, 4.8 feet east of the east rail, and 3.0 feet lower than the top of the rail. A standard disk, stamped “Z 24 1930” and set in concrete. (183.060 meters or 600.589 feet.)

22.167 (P. M. Ry.)—At **New Richmond**, Allegan County, at the Pere Marquette Railway bridge over Kalamazoo River, on the southeast corner of the back wall of the north abutment. A chiseled square. (183.801 meters or 603.020 feet.)

A 25.—At **East Saugatuck**, Allegan County, on the right of way of the Pere Marquette Railway, 4 rails north of the north end of the station, 63.4 feet north of the center line of a gravel road, and 26.6 feet east of the east rail. A standard disk, stamped “A 25 1930” and set in the top of a concrete post. (224.217 meters of 735.619 feet.)

B 25.—In Allegan County, about 3.3 miles south along the Pere Marquette Railway from the East Eleventh Street crossing at **Holland**, Ottawa County, 17 rails north of milepost GR 29—C 155, 40.0 feet west of the west rail, and 40.0 feet north of the center line of a roadway. A standard disk, stamped “B 25 1930” and set in the top of a concrete post. (208.592 meters or 684.356 feet.)

C 25.—At **Holland**, Ottawa County, on the right of way of the Pere Marquette Railway, $\frac{1}{4}$ mile south of the station, 97.4 feet north of the center line of East Eleventh Street, and 55.8 feet east of the east rail of the main track. A standard disk, stamped “C 25 1930” and set in the top of a concrete post. (185.918 meters or 609.966 feet.)

B 1 (U. S. G. S.)—At **Holland**, Ottawa County, at the south entrance of the post office, in the head of the west banister, about 3 feet above the ground. A United States Geological Survey standard disk. (186.112 meters or 610.602 feet.)

D 25.—At **Holland**, Ottawa County, at the Pere Marquette Railway station, at the southeast corner, in the wall facing the tracks, about 3.6 feet above the brick platform. A standard disk, stamped “D 25 1930” and set vertically. (187.372 meters or 614.736 feet.)

E 25.—About 3.3 miles north along the Pere Marquette Railway from **Holland**, Ottawa County, $9\frac{1}{4}$ rails south of milepost P 73, 65.0 feet south of the center line of a country road which crosses the tracks, and 32.4 feet west of the west rail. A standard disk stamped “E 25 1930” and set in the top of a concrete post. (187.958 meters or 616.659 feet.)

F 25.—At **Harlem**, Ottawa County, on the Pere Marquette Railway, $9\frac{1}{2}$ rails south of milepost P 70, 10 rails north of the Heinz Pickle works, 4 rails north of the grinding mill and general store, 3 rails south of the flag post, between the railroad and a side road leading to the pickle works, and 18.2 feet east of the east rail. A standard disk, stamped “F 25 1930” and set in the top of a concrete post. (193.044 meters or 633.345 feet.)

G 25.—At **West Olive**, Ottawa County, on the Pere Marquette Railway, 6 $\frac{1}{2}$ rails north of the north end of the station, 4 rails south of milepost P 66, in line with the row of poles, and 25.5 feet east of the east rail of the main track. A standard disk, stamped “G 25 1930” and set in the top of a concrete post. (187.489 meters or 615.120 feet.)

H 25.—At **Agnew**, Ottawa County, on the Pere Marquette Railway, 46 rails north of milepost P 63, about 40 feet south of the flag stop at Agnew, between the railroad and United States Highway No. 31, and 30.2 feet east of the east rail. A standard disk, stamped “H 25 1930” and set in the top of a concrete post. (190.590 meters or 625.294 feet.)

J 25.—About 3.3 miles north along the Pere Marquette Railway from **Agnew**, Ottawa County, between the railroad and United States Highway No. 31,

about 125 yards southwest of District No. 6 schoolhouse, 8 rails north of the crossing of the gravel road to "The Dunes," and 30.9 feet east of the east rail. A standard disk, stamped "J 25 1930" and set in the top of a concrete post. (183.882 meters or 603.286 feet.)

K 25.—At **Grand Haven**, Ottawa County, near the intersection of Franklin and South Seventh Streets, at the north entrance on the east side of the high school, at the north side of the entrance, about 2 feet above the door step. A standard disk, stamped "K 25 1930" and set vertically. (186.411 meters or 611.583 feet.)

L 25.—At **Grand Haven**, Ottawa County, on the Pere Marquette Railway, about 100 yards south of the station, directly west of the water tank, and 29.5 feet west of the west rail. A standard disk, stamped "L 25 1930" and set in the top of a concrete post. (179.725 meters or 589.648 feet.)

M 25.—At **Grand Haven**, Ottawa County, at the north end of the Pere Marquette Railway station, in the foundation wall, about 3.2 feet above the brick platform. A standard disk, stamped "M 25 1930" and set vertically. (180.348 meters or 591.692 feet.)

N 25.—About 2.7 miles north along the Pere Marquette Railway from **Grand Haven**, Ottawa County, 8 rails north of a country-road crossing, opposite an abandoned side track on which the old station "**Kirk**" used to be located, across the track from a rail bracket, 41.2 feet west of the west rail, and 2.5 feet east of the west right-of-way fence. A standard disk, stamped "N 25 1930" and set in the top of a concrete post. (185.021 meters or 607.023 feet.)

P 25.—About 4.0 miles south along the Pere Marquette Railway from **Muskegon Heights**, Muskegon County, 5 rail lengths south of milepost P 49, 43 feet south of the center line of a road which crosses the tracks, and 37.7 feet west of the west rail. A standard disk, stamped "P 25 1930" and set in the top of a concrete post. (191.309 meters or 627.653 feet.)

Q 25.—At **Muskegon Heights**, Muskegon County, on the Pere Marquette Railway, about 50 yards north of the intersection of the main line and a spur track just north of the building of the Alaska Refrigerator Co., beside milepost P 45, and 20.3 feet west of the west rail. A standard disk, stamped "Q 25 1930" and set in the top of a concrete post. (191.097 meters or 626.957 feet.)

R 25.—At **Muskegon**, Muskegon County, about 0.4 mile south along the Pere Marquette Railway from the station, 46.0 feet south of the south rail of the Pennsylvania Railroad track to the Shaw-Walker factory, and 13.4 feet west of the west rail of the Pere Marquette Railway track. A standard disk, stamped "R 25 1930" and set in the top of a concrete post. (183.195 meters or 601.032 feet.)

S 25.—At **Muskegon**, Muskegon County, at the Pere Marquette Railway station, in the southwest face of the bay-window projection, and about 3.0 feet above the brick platform in the stone foundation of the brick station. A standard disk, stamped "S 25 1930" and set vertically. (181.110 meters or 594.192 feet.)

T 25.—At **Muskegon**, Muskegon County, at the intersection of Western Avenue and First Street, at the post office, 41 inches south of the northwest corner of the building, and 39 inches above the sidewalk. A standard disk, stamped "T 25 1930" and set vertically in the limestone wall. (186.715 meters or 612.581 feet.)

U 25.—About 3.5 miles north along the Pere Marquette Railway from **Muskegon**, Muskegon County, at the viaduct carrying State Highway No. M-20 over the Pere Marquette Railway, in the foundation of the first row of columns west of the track, between the north and center columns, about 7½ feet west of and about 2½ feet higher than the top of the west rail. A standard disk, stamped "U 25 1930" and set in the concrete foundation. (187.773 meters or 616.052 feet.)

V 25.—About 5.1 miles north along the Pere Marquette Railway from the station at **Muskegon**, Muskegon County, about 10 rails north of the switch for a spur track leading eastward, and 48.2 feet west of the west rail. The switch stand for the spur track is between two posts, one marked "BR 1" and the other marked "MU 7." The bench mark is about 200 yards northwest of one fox ranch and about 500 yards northeast of another. A standard disk, stamped "V 25 1930" and set in the top of a concrete post. (196.251 meters or 643.867 feet.)

W 25.—About 6.9 miles south along the Pere Marquette Railway from **Whitehall**, Muskegon County, about 2 rails north of the center line of a gravel road

which crosses the tracks, and 41.5 feet east of the east rail. About $\frac{1}{4}$ mile eastward is a large red barn which is the only landmark in the vicinity. A standard disk, stamped "W 25 1930" and set in the top of a concrete post. (201.623 meters or 661.491 feet.)

X 25.—About 3.1 miles southeast along the Pere Marquette Railway from **Whitehall**, Muskegon County, at the first crossing of United States Highway No. 31 and the Pere Marquette Railway in going from Whitehall to Muskegon, 44.7 feet north of the north rail, and 36.6 feet east of the center line of the highway. A standard disk, stamped "X 25 1930" and set in the top of a concrete post. (208.003 meters or 682.423 feet.)

Y 25.—At **Whitehall**, Muskegon County, 18 rails south of the **Whitehall-Montague** station of the Pere Marquette Railway, at the overhead crossing of United States Highway No. 31, in the west retaining wall, 49 inches above the ground, and 51 inches north of the south end of the retaining wall. A standard disk, stamped "Y 25 1930" and set vertically. (180.849 meters or 593.335 feet.)

Z 25.—About 2.4 miles south along the Pere Marquette Railway from **Rothbury**, Oceana County, 43.6 feet east of the east rail, and 51.0 feet north of the center line of a sandy road which crosses the tracks and leads to the **Rochdale Inn**. A sign on a tree on United States Highway No. 31 directs one to the **Rochdale Inn** via the road which passes the bench mark. A standard disk, stamped "Z 25 1930" and set in the top of a concrete post. (208.662 meters or 684.585 feet.)

A 26.—At **Rothbury**, Oceana County, on the Pere Marquette Railway, opposite three large billboards which are adjacent to the station, 24.1 feet east of the east rail, and 4.3 feet north of the north end of the station. A standard disk, stamped "A 26 1930" and set in the top of a concrete post. (210.235 meters or 689.746 feet.)

B 26.—At **New Era**, Oceana County, about 225 feet south of the south end of the Pere Marquette Railway station, 27.5 feet east of the east rail, and 23.6 feet south of the center line of a gravel road which is the first road to cross the tracks to the northward of the water tank. A standard disk, stamped "B 26 1930" and set in the top of a concrete post. (229.717 meters or 753.663 feet.)

C 26.—At **Shelby**, Oceana County, 141.5 feet north of the north end of the Pere Marquette Railway station, and 14.2 feet east of the east rail of the main track, in line with the poles. A standard disk, stamped "C 26 1930" and set in the top of a concrete post. (245.267 meters or 804.680 feet.)

D 26.—About 1.9 miles north along the Pere Marquette Railway from the station at **Shelby**, Oceana County, 19.5 rails north of the center of a public road, about 100 yards northeast of a white farmhouse owned by Chas. A. Johnson and occupied by Emil Johnson, 44.0 feet east of the east rail, and 3.5 feet west of the east right-of-way fence. A standard disk, stamped "D 26 1930" and set in the top of a concrete post. (234.359 meters or 768.893 feet.)

E 26.—At **Mears**, Oceana County, about 60 feet north of the center line of a gravel road leading from **Main Street** to **Downing's** warehouse, 20.4 feet east of the east rail of the Pere Marquette Railway in line with the row of power-line poles which parallel the track in **Mears**. A standard disk, stamped "E 26 1930" and set in the top of a concrete post. (236.943 meters or 777.370 feet.)

F 26.—About 3.0 miles south along the Pere Marquette Railway from **Pentwater**, Oceana County, 2 rails north of the center line of a country road which crosses the Pere Marquette Railway, and 19.2 feet east of the east rail. A standard disk stamped "F 26 1930" and set in the top of a concrete post. (201.097 meters or 659.766 feet.)

G 26.—At **Pentwater**, Oceana County, 5 rails north of the Pere Marquette Railway station, about midway between the station and the canal bridge and beside the second pole north of the station. A standard disk stamped "G 26 1930" and set in the top of a concrete post. (179.515 meters or 588.969 feet.)

H 26.—About 2.0 miles north along United States Highway No. 31 from **Pentwater**, Oceana County, in the edge of a pine wood, 15.8 feet east of the east edge of the highway, beside a sign "Teapot Dome $\frac{1}{2}$ mile." The **Teapot Dome** is a filling station and lunchroom and is 0.4 mile north of the bench mark. A standard disk stamped "H 26 1930" and set in the top of a concrete post. (181.467 meters or 595.363 feet.)

J 26.—In **Mason** County, about 5.2 miles north along United States Highway No. 31 from the post office in **Pentwater**, Oceana County, and 19.0 feet east of

the edge of the highway, beside the fence dividing the highway from the property and residence of Mrs. John Yurgilas. A standard disk stamped "J 26 1930" and set in the top of a concrete post. (195.773 meters or 642.299 feet.)

35 TFX (U. S. G. S.).—In Mason County, about 5.7 miles north along United States Highway No. 31 from the post office at **Pentwater**, Oceana County, and about 100 yards southeast of a public school, in line with a row of trees on the east side of the highway. A United States Geological Survey standard disk stamped "BM TT 35 TFX 1930" and set in the top of a concrete post. (197.499 meters or 647.961 feet.)

K 26.—In Mason County, about 8.0 miles north along United States Highway No. 31 from the post office at **Pentwater**, Oceana County, about 150 yards south of a filling station and a crossroad, in line with a row of walnut trees on the edge of property belonging to John Kistler, and 17.2 feet west of the west edge of the concrete pavement. A standard disk stamped "K 26 1930" and set in the top of a concrete post. (229.369 meters or 752.521 feet.)

L 26.—About 3.5 miles south along United States Highway No. 31 from **Ludington**, Mason County, about 50 yards north of the Kozy Korner filling station and store and 4.8 feet east of the east edge of the concrete pavement, in the south end of the east head wall of a small culvert. A standard disk stamped "L 26 1930." (207.212 meters or 679.828 feet.)

M 26.—About 1.7 miles east along the Pere Marquette Railway from **Ludington**, Mason County, on a spur track leading south and west and crossing United States Highway No. 31 about $\frac{1}{2}$ mile south of the main line of the railway, 37.5 feet south of the center line of a dirt road which crosses the spur, and three rails south of the south switch of a wye which is about 250 yards south of the main track. The mark is 27.2 feet west of the west rail of the spur track. A standard disk stamped "M 26 1930" and set in the top of a concrete post. (191.283 meters or 627.568 feet.)

N 26.—About 3.0 miles west along the Pere Marquette Railway from **Scottsville**, Mason County, 8 rails south of a dirt road crossing, beside a double switch, 30.3 feet south of the south rail, in line with the poles, and beside pole No. 4949. A standard disk stamped "N 26 1930" and set in the top of a concrete post. (204.148 meters or 669.776 feet.)

P 26.—At **Scottsville**, Mason County, 83.0 feet northeast of the northeast corner of the Pere Marquette Railway station, at the southeast corner of the fence around the bulk station of the Standard Oil Co., and 7.5 feet north of the north rail of the north switch. A standard disk stamped "P 26 1930" and set in the top of a concrete post. (206.668 meters or 678.043 feet.)

Q 26.—At **Custer**, Mason County, 4 rails west of the west end of the station, 40.0 feet east of the center of a street crossing and 15.9 feet south of the south rail of the Pere Marquette Railway. A standard disk stamped "Q 26 1930" and set in the top of a concrete post. (203.754 meters or 668.483 feet.)

R 26.—At **Custer**, Mason County, 4 rails east of the east end of the Pere Marquette Railway station, 38.0 feet west of the center of a street crossing, and 16.0 feet south of the south rail. A standard disk stamped "R 26 1930" and set in the top of a concrete post. (204.226 meters or 670.031 feet.)

S 26.—At **Custer**, Mason County, at the Custer High School, 14.0 feet south of the northwest corner of the building and 4.0 feet above the ground. A standard disk stamped "S 26 1930" and set vertically in the brick wall. (212.800 meters or 698.161 feet.)

T 26.—About 3.5 miles north along a gravel road from **Custer**, Mason County, 47.0 feet north of the center line of an east-and-west gravel road from **Bachelor** to a junction with United States Highway No. 31, and 31.0 feet west of the center line of the north-and-south gravel road between **Custer** and **Free Soil**. A standard disk stamped "T 26 1930" and set in the top of a concrete post. (209.738 meters or 688.115 feet.)

U 26.—About 4.0 miles south along a gravel road from **Free Soil**, Mason County, 93 feet north of the center line of an east-and-west gravel road which extends from **Fountain** to a junction with United States Highway No. 31, and 36 feet west of the center line of the north-and-south gravel road between **Custer** and **Free Soil**. A standard disk, stamped "U 26 1930" and set in the top of a concrete post. (206.362 meters or 677.039 feet.)

V 26.—At **Free Soil**, Mason County, at the Pere Marquette Railway station, about in the middle of the west side, and 2.5 feet out from the wall. A standard disk, stamped "V 26 1930" and set in the top of a concrete post. (206.229 meters or 676.603 feet.)

W 26.—About 3.2 miles south along the Pere Marquette Railway from **Stronach**, Manistee County, about 16 poles south of a sandy-road crossing which in turn is about 1 mile south of a switch. The mark is 43.2 feet east of the east rail and beside the east right-of-way fence. There is nothing in the vicinity of the mark except sand and second-growth timber. A standard disk, stamped "W 26 1930" and set in the top of a concrete post. (210.668 meters or 691.167 feet.)

X 26.—At **Stronach**, Manistee County, on the right of way of the Pere Marquette Railway, 14.8 feet west of the west rail, and 12.0 feet north of the northeast corner of the abandoned railway station, directly west of the flag post. A standard disk, stamped "X 26 1930" and set in the top of a concrete post. (185.044 meters or 607.099 feet.)

Y 26.—At **East Lake**, Manistee County, on the right of way of the Pere Marquette Railway, about 75 yards south of the abandoned railway station, about 75 yards south of a large deserted brick office building, near the first pole south of this office building, and about 25 feet east of the east rail. A standard disk, stamped "Y 26 1930" and set in the top of a concrete post. (180.297 meters or 591.524 feet.)

Z 26.—About 2.0 miles northeast along United States Highway No. 31 from **Manistee**, Manistee County, about 250 yards north of United States Highway No. 31, 44.9 feet south of the south rail of the Manistee and Northeastern Railroad, and 30.6 feet west of the center line of a sandy road leading north-and-south across United States Highway No. 31 and past a schoolhouse located about 100 yards south of the intersection of the road and the highway. A standard disk, stamped "Z 26 1930" and set in the top of a concrete post. (184.711 meters or 606.006 feet.)

A 27.—About 5.7 miles northeast along the Manistee & Northeastern Railroad from **Manistee**, Manistee County, 88.0 feet south of the center line of State Highway No. 22, and 41.7 feet west of the west rail. This crossing is the first crossing on State Highway No. 22 to the northward of its intersection with United States Highway No. 31. A standard disk, stamped "A 27 1930" and set in the top of a concrete post. (220.072 meters or 722.020 feet.)

B 27.—About 1.5 miles south along the Manistee & Northeastern Railroad from **Onekama Junction**, Manistee County, 120 yards north of the north end of the brick warehouse on the east side of the tracks, 16.4 feet east of the east rail and 14.0 feet southeast of the north switch post for the siding at **Lake View Orchards**. A standard disk, stamped "B 27 1930" and set in the top of a concrete post. (244.981 meters or 803.742 feet.)

C 27.—About 1.5 miles east along the Manistee & Northeastern Railroad from **Onekama Junction**, Manistee County, on the main line of the Manistee & Northeastern Railroad, 37.0 feet east of the east side of a greenhouse, 8.7 feet west of the west rail, and 3.0 feet south of the flag post. A standard disk, stamped "C 27 1930" and set in the top of a concrete post. (230.208 meters or 755.274 feet.)

D 27.—At **Norwalk**, Manistee County, 3.3 feet northwest of the northwest corner of the station, and 20.7 feet south of the south rail of the main track of the Manistee & Northeastern Railroad, between the station and a siding. A standard disk, stamped "D 27 1930" and set in the top of a concrete post. (220.596 meters or 723.739 feet.)

E 27.—At **Chief Lake**, Manistee County, on the Manistee & Northeastern Railroad, directly opposite the ticket office window, and 31.0 feet north of the north rail of the main track. A standard disk, stamped "E 27 1930" and set in the top of a concrete post. (233.937 meters or 767.508 feet.)

F 27.—About 2.1 miles northeast along the Manistee & Northeastern Railroad from **Chief Lake**, Manistee County, 48 rails south of the south end of the bridge over Bear Creek, 54 feet south of the center line of a sandy road, 35.7 feet east of the east rail, and 5.0 feet west of the east right-of-way fence. A standard disk, stamped "F 27 1930" and set in the top of a concrete post. (213.869 meters or 701.669 feet.)

G 27.—At **Kaleva**, Manistee County, at the station used jointly by the Pere Marquette Railway and the Manistee & Northeastern Railroad, 2.5 feet above the ground, and 2.0 feet west of the door to the express room. A standard disk, stamped "G 27 1930" and set vertically in the wall of the station. (228.015 meters or 748.079 feet.)

H 27.—At **Kaleva**, Manistee County, at the Kaleva State Bank Building, in the west end of the concrete foundation on the north side of the building, 30

inches above the sidewalk, and 2 feet east of the corner. A standard disk, stamped "H 27 1930." (228.922 meters or 751.055 feet.)

16 W (U. S. G. S.).—At **Kaleva**, Manistee County, 47.0 feet west of the west rail of the Manistee & Northeastern Railroad, and 23.9 feet north of the center line of the first road north of the station. A United States Geological Survey standard disk, stamped "TT 16 W 1930" and set in the top of a concrete post. (226.909 meters or 744.451 feet.)

J 27.—About 3.0 miles northeast along the Manistee & Northeastern Railroad from **Kaleva**, Manistee County, 55.0 feet north of the center line of a sandy road which leads from a schoolhouse to a farmhouse, 31.5 feet west of the west rail, and 15.0 feet east of the west right-of-way fence. A standard disk, stamped "J 27 1930" and set in the top of a concrete post. (238.544 meters or 782.623 feet.)

K 27.—About 4.0 miles south along the Manistee & Northeastern Railroad from **Copemish**, Manistee County, 4 rails south of the crossing of a county road which is the first crossing south of Copemish, and 42.5 feet east of the east rail of the main track, beside a power-line pole. The switch at this place is locally known as "**Lemon Lake**." A standard disk, stamped "K 27 1930" and set in the top of a concrete post. (241.374 meters or 791.908 feet.)

L 27.—At **Copemish**, Manistee County, at the intersection of the Ann Arbor Railroad and the Manistee & Northeastern Railroad, 34.2 feet northeast of the northeast rail of the former railroad, beside the northeast corner of the baggage room which is a small building just south of the station. A standard disk, stamped "L 27 1930" and set in the top of a concrete post. (245.767 meters or 806.321 feet.)

M 27.—At **Copemish**, Manistee County, about 125 yards north of the junction of the Ann Arbor and the Manistee & Northeastern Railroads, and 52.4 feet east of the east rail of the Manistee & Northeastern Railroad. A standard disk, stamped "M 27 1930" and set in the top of a concrete post. (245.180 meters or 804.395 feet.)

N 27.—At **Copemish**, Manistee County, on the Manistee & Northeastern Railroad, 2 rails south of the tool house, 160 feet north of a coal shed which has a concrete foundation, and 34.5 feet west of the west rail of the main track. A standard disk, stamped "N 27 1930" and set in the top of a concrete post. (246.215 meters or 807.790 feet.)

P 27.—At **Nessen City**, Benzie County, on the Manistee & Northeastern Railroad, 65.0 feet south of the waiting-room door at the station and 25.3 feet west of the west rail of the main track. A standard disk, stamped "P 27 1930" and set in the top of a concrete post. (260.141 meters or 853.479 feet.)

Q 27.—About 2.7 miles south along the Manistee & Northeastern Railroad from **Karlin**, Grand Traverse County, about one-fourth mile northeast by north from a white farmhouse, 2 rails south of the center line of a sandy road which crosses the tracks, and 35.0 feet east of the east rail. A standard disk, stamped "Q 27 1930" and set in the top of a concrete post. (267.341 meters or 877.101 feet.)

R 27.—At **Karlin**, Grand Traverse County, at the southwest corner of the Manistee & Northeastern Railroad station, 10 feet southeast of the east rail of the main track. A standard disk, stamped "R 27 1930" and set in the top of a concrete post. (270.310 meters or 886.842 feet.)

S 27.—About 1.6 miles south along the Manistee & Northeastern Railroad from **Interlochen**, Grand Traverse County, 65 feet north of the center line of a gravel road which leads into the State Park from the gravel road between Interlochen and **Karlin**, and 40.0 feet west of the west rail. A standard disk, stamped "S 27 1930" and set in the top of a concrete post. (263.418 meters or 864.231 feet.)

T 27.—At **Interlochen**, Grand Traverse County, 2,380 feet north of the junction of the Pere Marquette Railway and the Manistee & Northeastern Railroad, 44 feet east of the center line of a gravel road through Interlochen, and 37.8 feet west of the west rail of the Manistee & Northeastern Railroad. A standard disk, stamped "T 27 1930" and set in the top of a concrete post. (256.395 meters or 841.189 feet.)

U 27.—At **Interlochen**, Grand Traverse County, 122.0 feet south of the junction of the Pere Marquette Railway and the Manistee & Northeastern Railroad, and 21.5 feet east of the east rail of the latter road. A standard disk, stamped "U 27 1930" and set in the top of a concrete post. (257.860 meters or 845.966 feet.)

V 27.—At **Interlochen**, Grand Traverse County, 131.4 feet east of the junction of the Pere Marquette Railway and the Manistee & Northeastern Railroad and 23.6 feet south of the south rail of the former road. A standard disk, stamped "V 27 1930" and set in the top of a concrete post. (257.915 meters or 846.176 feet.)

W 27.—At **Grawn**, Grand Traverse County, 64.2 feet west of the west end of the Pere Marquette Railway station, and 24.2 feet south of the south rail of the main track. A standard disk, stamped "W 27 1930" and set in the top of a concrete post. (268.772 meters or 881.796 feet.)

X 27.—About 3.2 miles east along the Pere Marquette Railway from **Grawn**, Grand Traverse County, 18 rails north of milepost P 84, 42 feet north of the center of a road crossing locally known as **Beitner's**, and 31.6 feet east of the east rail, beside a pole. A standard disk, stamped "X 27 1930" and set in the top of a concrete post. (221.678 meters or 727.289 feet.)

Y 27.—About 7 miles south along the Pennsylvania Railroad from **Traverse City**, Grand Traverse County, at a crossing locally known as **Keystone Crossing**, about 75 yards east of the house of Mr. C. T. Cedersten, 37 rails north of milepost WJ 19, 59 feet south of the center line of the road, and 44.7 feet west of the west rail. A standard disk, stamped "Y 27 1930" and set in the top of a concrete post. (209.422 meters or 687.079 feet.)

Z 27.—About 3 miles north of **Mayfield**, Grand Traverse County, directly opposite Pennsylvania Railroad milepost WJ 16, and 38.2 feet north of the north rail. A standard disk, stamped "Z 27 1930" and set in the top of a concrete post. (226.313 meters or 742.495 feet.)

A 28.—At **Mayfield**, Grand Traverse County, 10 rails north of the Pennsylvania Railroad station, 10 rails south of the railroad water tank, in line with the row of poles, and 18.0 feet east of the east rail. A standard disk, stamped "A 28 1930" and set in the top of a concrete post. (251.455 meters or 824.982 feet.)

B 28.—At **Kingsley**, Grand Traverse County, 6 rails north of the north end of the Pennsylvania Railroad station, opposite the north end of Snyder's potato warehouse, in a small grove of cottonwoods which lies between the railroad and the adjacent street, and 23.3 feet west of the west rail. A standard disk, stamped "B 28 1930" and set in the top of a concrete post. (303.683 meters or 996.333 feet.)

C 28.—At **Summit City**, Grand Traverse County, 16 rails west of the Pennsylvania Railroad station, 10 rails east of a road crossing, and 37.0 feet east of the east rail of the main track, beside a pole. A standard disk, stamped "C 28 1930" and set in the top of a concrete post. (326.160 meters or 1,070.077 feet.)

D 28.—About 3.2 miles west along the Pennsylvania Railroad from **Walton Junction**, Grand Traverse County, 30 rails west of milepost WJ 3, 4 rails east of the center of a country-road crossing, and 42.5 feet north of the north rail, beside the right-of-way fence. A standard disk, stamped "D 28 1930" and set in the top of a concrete post. (324.236 meters or 1,063.764 feet.)

C 14.—See page 24.

E 28.—At **Walton Junction**, Grand Traverse County, 82 feet south of the south end of the railroad station, between the main track which is east of the station and a sidetrack which is west of the station, and 22.6 feet west of the west rail of the main track of the Pennsylvania Railroad. A standard disk, stamped "E 28 1930" and set in the top of a concrete post. (310.570 meters or 1,018.928 feet.)

LINE 10, GRAYLING TO DETROIT, MICH.

This line follows the Michigan Central Railroad from Grayling to Detroit. The field work was done during the summer of 1930 by John Bowie, jr., junior hydrographic and geodetic engineer, assisted by A. L. Wardwell, aide.

M 13.—See page 23.

F 28.—At **Grayling**, Crawford County, 2.5 feet west of the west fence surrounding the Standard Oil Co. bulk station, 116 feet west of the center line of Michigan Highway Nos. 76 and 93, and 92.7 feet south of the south rail of the main track of the Michigan Central Railroad. A standard disk, stamped

"F 28 1930" and set in the top of a concrete post. (346.592 meters or 1,137.111 feet.)

G 28.—About 3.0 miles south along the Michigan Central Railroad from Grayling, Crawford County, directly across the track from milepost BC 89-M 93, and 2.0 feet west of the west right-of-way fence. A standard disk, stamped "G 28 1930" and set in the top of a concrete post. (369.781 meters or 1,213.190 feet.)

H 28.—About 6.0 miles south along the Michigan Central Railroad from Grayling, Crawford County, 39 feet southeast of milepost BC 86, 35.0 feet east of the east rail, and 4 feet south of the first pole south of the milepost. A standard disk, stamped "H 28 1930" and set in the top of a concrete post. (376.974 meters or 1,236.789 feet.)

J 28.—About 9.0 miles south along the Michigan Central Railroad from Grayling, Crawford County, 7½ rails south of milepost BC 83, 32.1 feet east of the east rail, and 15.2 feet west of the east right-of-way fence. A standard disk, stamped "J 28 1930" and set in the top of a concrete post. (369.153 meters or 1,211.146 feet.)

K 28.—In Crawford County, about 2¼ miles north along the Michigan Central Railroad from Roscommon, Roscommon County, about 40 feet southeast of milepost BC 79-M 103, and 31.7 feet east of the east rail. A standard disk, stamped "K 28 1930" and set in the top of a concrete post. (348.046 meters or 1,141.881 feet.)

L 28.—At Roscommon, Roscommon County, on the right of way of the Michigan Central Railroad, and directly across the track from the ticket-office window. A standard disk, stamped "L 28 1930" and set in the top of a concrete post. (344.282 meters or 1,129.532 feet.)

M 28.—About 3.0 miles southeast along the Michigan Central Railroad from Roscommon, Roscommon County, directly across the tracks from milepost BC 74, and 24.6 feet southwest of the southwest rail. A standard disk, stamped "M 28 1930" and set in the top of a concrete post. (349.657 meters or 1,147.166 feet.)

N 28.—About 6.0 miles southeast along the Michigan Central Railroad from Roscommon, Roscommon County, northeast of milepost BC 71, in line with the row of poles, and 31.5 feet northeast of the northeast rail. A standard disk, stamped "N 28 1930" and set in the top of a concrete post. (353.936 meters or 1,161.205 feet.)

P 28.—About 9.0 miles southeast along the Michigan Central Railroad from Roscommon, Roscommon County, 4 rails southeast of milepost BC 68, and 26.2 feet southwest of the southwest rail. A standard disk, stamped "P 28 1930" and set in the top of a concrete post. (352.602 meters or 1,156.828 feet.)

Q 28.—At St. Helen, Roscommon County, 41.6 feet southeast of the southeast end of the Michigan Central Railroad station, and 21.7 feet southwest of the southwest rail. A standard disk, stamped "Q 28 1930" and set in the top of a concrete post. (356.893 meters or 1,170.906 feet.)

R 28.—In Ogemaw County, about 2½ miles southeast along the Michigan Central Railroad from St. Helen, Roscommon County, 18 rails southeast of a dirt-road crossing, northeast of milepost BC 62, and 29.5 feet northeast of the northeast rail. A standard disk, stamped "R 28 1930" and set in the top of a concrete post. (372.786 meters or 1,223.049 feet.)

S 28.—In Ogemaw County, about 5½ miles southeast along the Michigan Central Railroad from St. Helen, Roscommon County, northeast of milepost BC 59, and 28.5 feet northeast of the northeast rail. A standard disk, stamped "S 28 1930" and set in the top of a concrete post. (375.879 meters or 1,232.540 feet.)

T 28.—About 4½ miles northwest along the Michigan Central Railroad from West Branch, Ogemaw County, 48 rails northwest of milepost BC 57, 30 feet northwest of the center line of a trail crossing, and 33.5 feet northeast of the northeast rail. A standard disk, stamped "T 28 1930" and set in the top of a concrete post. (350.760 meters or 1,150.785 feet.)

U 28.—At West Branch, Ogemaw County, 89 feet east of the northeast corner of the Michigan Central Railroad station, in line with a row of poles, and 39.2 feet northeast of the northeast rail of the main track. A standard disk, stamped "U 28 1930" and set in the top of a concrete post. (291.423 meters or 956.110 feet.)

V 28.—About 2.8 miles southeast along the Michigan Central Railroad from West Branch, Ogemaw County, at a dirt-road crossing 12 rails from milepost

BC 50, at a fence corner, and 27.0 feet northeast of the northeast rail. A standard disk, stamped "V 28 1930" and set in the top of a concrete post. (272.299 meters or 893.368 feet.)

W 28.—About 5.8 miles southeast along the Michigan Central Railroad from **West Branch**, Ogemaw County, at milepost BC 47, in line with a row of poles, and 33.0 feet northeast of the northeast rail. A standard disk, stamped "W 28 1930" and set in the top of a concrete post. (257.136 meters or 843.620 feet.)

X 28.—About 3.2 miles northwest along the Michigan Central Railroad from **Alger**, Arenac County, at milepost BC 44, in line with a row of poles, and 34.7 feet northeast of the northeast rail. A standard disk, stamped "X 28 1930" and set in the top of a concrete post. (253.352 meters or 831.206 feet.)

Y 28.—At **Alger**, Arenac County, 3½ rails northwest of the northwest end of the Michigan Central Railroad station, and 29.6 feet northeast of the northeast rail. A standard disk, stamped "Y 28 1930" and set in the top of a concrete post. (238.992 meters or 784.093 feet.)

Z 28.—About 2.9 miles southeast along the Michigan Central Railroad from **Alger**, Arenac County, 18 rails southeast of milepost BC 38, on a small knoll, and 43.2 feet northeast of the northeast rail, beside the northeast right-of-way fence. A standard disk, stamped "Z 28 1930" and set in the top of a concrete post. (235.761 meters or 773.493 feet.)

A 29.—About 2.4 miles northwest along the Michigan Central Railroad from **Sterling**, Arenac County, 5½ rails southeast of milepost BC 35, 33 feet southeast of the center line of a private-road crossing, in line with a row of poles, and 39.3 feet northeast of the northeast rail. A standard disk, stamped "A 29 1930" and set in the top of a concrete post. (238.908 meters or 783.817 feet.)

B 29.—At **Sterling**, Arenac County, 29 rails northwest of the northwest end of the Michigan Central Railroad station, 12 rails northwest of the section house, 1 rail southeast of a cattle guard, almost opposite the northwest end of a side track, and 28.8 feet northeast of the northeast rail. A standard disk, stamped "B 29 1930" and set in the top of a concrete post. (231.230 meters or 758.627 feet.)

C 29.—About 2.3 miles southeast along the Michigan Central Railroad from **Sterling**, Arenac County, 43 rails northwest of milepost BC 30, and 9.4 feet southwest of the southwest rail, in the northwest end of the southwest head wall of a concrete culvert. A standard disk, stamped "C 29 1930." (200.007 meters or 656.190 feet.)

D 29.—At **Standish**, Arenac County, at the Michigan Central Railroad station, in the window sill south of the west entrance, and about 3½ feet above the level of the pavement. A standard disk, stamped "D 29 1930." (192.356 meters or 631.088 feet.)

E 29.—About 2.3 miles south along the Michigan Central Railroad from **Standish**, Arenac County, about 60 yards west of a concrete-block farmhouse, 38.0 feet east of the east rail, and about 40 feet west of a roadway which parallels the tracks on the east and which ends at the farmhouse. A standard disk, stamped "E 29 1930" and set in the top of a concrete post. (187.746 meters or 615.963 feet.)

F 29.—About 3¾ miles north along the Michigan Central Railroad from **Pinconning**, Bay County, 43 feet south of the center line of the county-line road between Arenac and Bay Counties, and 40.0 feet east of the east rail, in a fence angle. A standard disk, stamped "F 29 1930" and set in the top of a concrete post. (188.571 meters or 618.670 feet.)

G 29.—At the northern edge of **Pinconning**, Bay County, on the right of way of the Michigan Central Railroad, in the south end of the west wall of the concrete bridge over the Pinconning River, and immediately north of the junction of railroad sections 4 and 5. A standard disk, stamped "G 29 1930" and set in the top of a concrete post. (182.129 meters or 597.535 feet.)

H 29.—At **Pinconning**, Bay County, in the northeast concrete footing of the Michigan Central Railroad water tank, directly across the tracks from the Golden Pickle Co.'s plant, and 18.8 feet west of the west rail of the main track. A standard disk, stamped "H 29 1930." (183.121 meters or 600.789 feet.)

J 29.—At **Pinconning**, Bay County, 15 rails south of the south end of the Michigan Central Railroad station, 23.3 feet west of the west rail of the main track, and 54 feet east of the center line of the street which parallels the

railroad on the west. A standard disk, stamped "J 29 1930" and set in the top of a concrete post. (183.041 meters or 600.527 feet.)

K 29.—About $3\frac{3}{4}$ miles south along the Michigan Central Railroad from Pinconning, Bay County, and about 15 rails north of milepost BC 15, in the west end of the south abutment of the concrete bridge over Coon Creek. A standard disk, stamped "K 29 1930." (182.796 meters or 599.723 feet.)

L 29.—About 1.9 miles north along the Michigan Central Railroad from Linwood, Bay County, at the railroad-survey station 6680+00, about 45 feet south of the center line of the first roadway which crosses the tracks south of milepost BC 13, and 34 feet east of the east rail. A standard disk, stamped "L 29 1930" and set in the top of a concrete post. (178.394 meters or 585.281 feet.)

M 29.—At Linwood, Bay County, approximately 12 rails north of the north end of the Michigan Central Railroad station, in the east end of the southeast wall of a concrete culvert. A standard disk, stamped "M 29 1930." (179.018 meters or 587.328 feet.)

N 29.—About 2.8 miles south along the Michigan Central Railroad from Linwood, Bay County, at the first road crossing south of milepost BC 8, 85.6 feet south of the south fence line, and 35.3 feet east of the east rail. A standard disk, stamped "N 29 1930" and set in the top of a concrete post. (178.352 meters or 585.143 feet.)

P 29.—At Kawkawlin, Bay County, 8 rails south of the south end of the Michigan Central Railroad bridge over Kawkawlin River, 3 rails north of the north end of the stock yards, 35 feet east of the east rail of the main track, and 1 foot west of the line of poles. A standard disk, stamped "P 29 1930" and set in the top of a concrete post. (182.632 meters or 599.185 feet.)

Q 29.—At Bay City, Bay County, at the viaduct immediately north of the west station of the Michigan Central Railroad, in the center of the west pier. A standard disk, stamped "Q 29 1930." (181.926 meters or 596.869 feet.)

R 29.—At Bay City, Bay County, at the Michigan Central Railroad bridge over Saginaw River, in the north end of the west wall, about 6 feet north of the north rail, inside the railing of the bridge. A standard disk, stamped "R 29 1930." (180.550 meters or 592.354 feet.)

S 29.—At Bay City, Bay County, at the west station of the Michigan Central Railroad, in the window sill at the northwest corner of the ladies' waiting room. A standard disk, stamped "S 29 1930." (181.244 meters or 594.631 feet.)

T 29.—About $3\frac{1}{4}$ miles south along the Michigan Central Railroad from Bay City, Bay County, 35 feet south of the center line of the first roadway south of the South Water Street junction, and 22 feet east of the east rail. A standard disk, stamped "T 29 1930" and set in the top of a concrete post. (182.711 meters or 599.444 feet.)

U 29.—About $2\frac{1}{4}$ miles north along the Michigan Central Railroad from Munger, Bay County, southeast of a section line crossing which is the second crossing south of milepost BC 5, 31 rails north of milepost BC 6, 24.0 feet west of the west rail, and 2.0 feet west of the west right-of-way fence. A standard disk, stamped "U 29 1930" and set in the top of a concrete post. (182.845 meters or 599.884 feet.)

V 29.—At Munger, Bay County, 8.0 feet north of the northwest corner of the Michigan Central Railroad station, and about 18 feet west of the west rail of the main track. A standard disk, stamped "V 29 1930" and set in the top of a concrete post. (181.673 meters or 596.039 feet.)

W. 29.—At Arn, Bay County, 1 rail north of the switch frog for the siding, and 28 feet east of the east rail of the main track, just outside a division fence north of the side track. A standard disk, stamped "W 29 1930" and set in the top of a concrete post. (180.501 meters or 592.194 feet.)

X 29.—At Reese, Tuscola County, on the right of way of the Michigan Central Railroad, directly across the tracks from the D. Donaldson & Co. elevator and mill, at the southeast corner of the fence surrounding the Standard Oil Co.'s bulk-station yard, and about 75 feet west of the west rail of the main track. A standard disk, stamped "X 29 1930" and set in the top of a concrete post. (191.527 meters or 628.368 feet.)

Y 29.—At Reese, Tuscola County, 45 feet north of the crossing of the Michigan Central Railroad and the Pere Marquette Railway, and 12 feet north of the coal house in the north corner of the intersection of the railroads. A standard disk, stamped, "Y 29 1930" and set in the top of a concrete post. (190.896 meters or 626.298 feet.)

Z 29.—At **Reese**, Tuscola County, on the right of way of the Michigan Central Railroad, south of the first street crossing south of the station, opposite a feed mill and coal yard, at a corner of the ball park, 42 feet west of the west rail of the main track. A standard disk, stamped "Z 29 1930" and set in the top of a concrete post. (190.780 meters or 625.917 feet.)

B 31.—About 0.6 mile east along the Michigan Central Railroad from **Denmark Junction**, Tuscola County, and 13 rails south of the east switch of the side track, in the south end of the west wall of a concrete bridge. A standard disk, stamped "B 31 1930." (200.022 meters or 656.239 feet.)

C 31.—At **Vassar**, Tuscola County, about 12 rails east of the east end of the Michigan Central Railroad bridge over Cass River, directly opposite the frog at the junction of the Bay City line and the Caro Branch, in the south end of the east wall of a concrete-and-steel underpass. A standard disk, stamped "C 31 1930." (196.578 meters or 644.940 feet.)

D 31.—At **Vassar**, Tuscola County, at the southeast corner of the Michigan Central Railroad station, in the window sill of the ticket office, 3.7 feet above the brick platform. A standard disk, stamped "D 31 1930." (197.540 meters or 648.096 feet.)

E 31.—In the southern part of **Vassar**, Tuscola County, at the intersection of the Michigan Central Railroad and the Pere Marquette Railway, 45.0 feet east of the east rail of the former and 65.0 feet south of the south rail of the latter. A standard disk, stamped "E 31 1930" and set in the top of a concrete post. (197.795 meters or 648.932 feet.)

F 31.—About 3.3 miles south along the Michigan Central Railroad from **Vassar**, Tuscola County, 40 rails south of milepost D 83, 12 rails south of the switch for a track leading north into a sand pit, 76 feet north of the center line of a road which crosses the tracks, and 45.3 feet west of the west rail. A standard disk, stamped "F 31 1930" and set in the top of a concrete post. (206.645 meters or 677.968 feet.)

G 31.—About 0.3 mile north along the Michigan Central Railroad from **Millington**, Tuscola County, 7 rails north of milepost D 80 and 4.8 feet east of the east rail, in the south end of the east headwall of a concrete culvert. A standard disk, stamped "G 31 1930." (224.498 meters or 736.541 feet.)

H 31.—In Tuscola County, about 2.3 miles north along the Michigan Central Railroad from **Otter Lake**, Lapeer County, directly across the track from milepost D 76, 56 feet north of the center line of a dirt road which crosses the track and 35.0 feet west of the west rail. A standard disk, stamped "H 31 1930" and set in the top of a concrete post. (245.749 meters or 806.262 feet.)

J 31.—At **Otter Lake**, Lapeer County, 76.0 feet west-northwest of the north-west corner of the Michigan Central Railroad station, beside the west right-of-way fence and 44.7 feet west of the west rail. A standard disk, stamped "J 31 1930" and set in the top of a concrete post. (264.115 meters or 866.517 feet.)

K 31.—About 2.2 miles south along the Michigan Central Railroad from **Otter Lake**, Lapeer County, 16 rails south of the ½-mile post between mileposts D 71 and D 72, beside the west right-of-way fence, and 46.0 feet west of the west rail. A standard disk, stamped "K 31 1930" and set in the top of a concrete post. (253.718 meters or 832.406 feet.)

L 31.—At **Columbiaville**, Lapeer County, at the Michigan Central Railroad station, in the window still just north of the men's entrance, 4.2 feet above the brick platform. A standard disk, stamped "L 31 1930." (237.777 meters or 780.107 feet.)

M 31.—About 3.4 miles south along the Michigan Central Railroad from **Columbiaville**, Lapeer County, 112 rails north of milepost D 65, in front of the residence of Mr. R. H. Deitrich, beside the right-of-way fence, and 27.8 feet west of the west rail. A standard disk, stamped "M 31 1930" and set in the top of a concrete post. (243.932 meters or 800.300 feet.)

N 31.—About 2.8 miles north along the Michigan Central Railroad from **Lapeer**, Lapeer County, 34 rails north of milepost D 63, 32 feet south of the center line of a highway which crosses the railroad, and 34.2 feet west of the west rail, beside a pole, in a fence corner. A standard disk, stamped "N 31 1930" and set in the top of a concrete post. (247.832 meters or 813.095 feet.)

P 31.—At **Lapeer**, Lapeer County, in the belt course of the Michigan Central Railroad station, 15.1 feet north of the southeast corner of the station, and 3.4 feet above the brick platform. A standard disk, stamped "P 31 1930." (251.371 meters or 824.706 feet.)

Q 31.—At **Lapeer**, Lapeer County, 27½ rails south of the waiting-room door of the Michigan Central Railroad station, in the north end of the east wall of the concrete bridge over Farmers Creek. A standard disk, stamped "Q 31 1930." (249.910 meters or 819.913 feet.)

R 31.—At **Lapeer**, Lapeer County, in the southwest concrete footing of the railroad water tank immediately south of the Michigan Central freight station. The water tank is between the Michigan Central Railroad station and the junction of the Michigan Central Railroad and the Grand Trunk Western Railway. A standard disk, stamped "R 31 1930." (251.826 meters or 826.199 feet.)

S 31.—About 3 miles south along the Michigan Central Railroad from **Lapeer**, Lapeer County, 16 rails south of milepost D 57, 34 feet north of the center of a road, and 27 feet east of the east rail. A standard disk, stamped "S 31 1930" and set in the top of a concrete post. (261.312 meters or 857.321 feet.)

T 31.—At **Hunters Creek**, Lapeer County, 26 feet north of the north end of the Michigan Central Railroad station, and 17.9 feet west of the west rail of the main track. A standard disk, stamped "T 31 1930" and set in the top of a concrete post. (275.026 meters or 902.314 feet.)

U 31.—At **Metamora**, Lapeer County, at the Michigan Central Railroad station, in the sill of the east window of the ticket office, 13.0 feet west of the west rail of the main track, and 3.8 feet above the brick pavement. A standard disk, stamped "U 31 1930." (318.701 meters or 1,045.605 feet.)

V 31.—At **Thomas**, Oakland County, 25 feet north of the north end of the Michigan Central Railroad station, and 20 feet west of the west rail of the main track. A standard disk, stamped "V 31 1930" and set in the top of a concrete post. (330.849 meters or 1,085.460 feet.)

W 31.—At **Oxford**, Oakland County, in the east wall of the Michigan Central Railroad station, between the south window of the waiting room and the ticket-office window, 34 feet south of the crossing, 17.9 feet west of the west rail of the main track, and 4.5 feet above the brick pavement. A standard disk, stamped "W 31 1930." (324.315 meters or 1,064.023 feet.)

X 31.—At **Oxford**, Oakland County, 12¾ rails south of the Michigan Central Railroad station, 85 feet north of the center of a street, 20.3 feet east of the east rail, and 11.5 feet east of block signal No. B 653. A standard disk, stamped "X 31 1930" and set in the top of a concrete post. (322.264 meters or 1,057.294 feet.)

Y 31.—About 0.9 mile south along the Michigan Central Railroad from **Oxford**, Oakland County, near the south end of the railroad yard, near the southeast corner of a football field, 35 feet north of a wagon-road crossing, and 21.8 feet west of the west rail. A standard disk, stamped "Y 31 1930" and set in the top of a concrete post. (320.283 meters or 1,050.795 feet.)

Z 31.—At **Orion**, Oakland County, in the sill of the front window of the Michigan Central Railroad station, 23.0 feet east of the east rail, and 3.2 feet above the brick pavement. A standard disk, stamped "Z 31 1930." (302.772 meters or 993.344 feet.)

A 32.—About 2.2 miles north along the Michigan Central Railroad from **Goodison**, Oakland County, 9 rails north of milepost D 37, 6 rails south of a highway crossing, beside the west right-of-way fence, and 40.7 feet west of the west rail. A standard disk, stamped "A 32 1930" and set in the top of a concrete post. (275.792 meters or 904.828 feet.)

B 32.—At **Goodison**, Oakland County, 7 rails north of the Michigan Central Railroad station, in line with a row of poles, and 39.0 feet west of the west rail of the main track. A standard disk, stamped "B 32 1930" and set in the top of a concrete post. (256.544 meters or 841.678 feet.)

C 32.—At **Rochester**, Oakland County, about 50 yards north of the Michigan Central Railroad, in the top of the northwest concrete wing wall of the highway bridge on Main Street. A standard disk, stamped "C 32 1930." (228.243 meters or 748.827 feet.)

D 32.—At **Rochester**, Oakland County, at the southwest corner of the intersection of Main and Fourth Streets, at the First National Bank, in the concrete ledge at the base of the window in the northeast corner of the building, and 3.4 feet above the sidewalk. A standard disk, stamped "D 32 1930" and set horizontally. (231.699 meters or 760.166 feet.)

756 (U. S. G. S.).—At **Rochester**, Oakland County, at the southeast corner of the intersection of Main and Fifth Streets, in the foundation of the Royal Café building, at the west end of the north side of the building and 1 foot

above the sidewalk. A United States Geological Survey standard disk, stamped "MICHIGAN 756." (230.306 meters or 755.596 feet.)

E 32.—About 1.2 miles south along the Michigan Central Railroad from Rochester, Oakland County, at the first concrete bridge south of the crossing of the Michigan Central Railroad and the Grand Trunk Western Railway at Rochester Junction, in the west end of the north abutment. A standard disk, stamped "E 32 1930." (212.869 meters or 698.388 feet.)

F 32.—About 4.2 miles south along the Michigan Central Railroad from Rochester, Oakland County, 41½ feet east of the center line of a public roadway which crosses the railroad between mileposts D 27 and D 27½, and 42.3 feet north of the north rail. A standard disk, stamped "F 32 1930" and set in the top of a concrete post. (209.839 meters or 688.447 feet.)

G 32.—At Utica, Macomb County, 25 rails north of the Michigan Central Railroad station, at milepost D 24-BC 85, and 20.6 feet east of the east rail. A standard disk, stamped "G 32 1930" and set in the top of a concrete post. (196.057 meters or 643.230 feet.)

H 32.—About 2¼ miles north along the Michigan Central Railroad from Warren, Macomb County, 3 rails north of milepost D 20-BC 89, and 22.0 feet west of the west rail. A standard disk, stamped "H 32 1930" and set in the top of a concrete post. (189.809 meters or 622.732 feet.)

J 32.—At Warren, Macomb County, north of the Michigan Central Railroad station, at the center of the transmission-line tower and 36.0 feet west of the west rail of the main track. A standard disk, stamped "J 32 1930" and set in the top of a concrete post. (187.325 meters or 614.582 feet.)

K 32.—About 3.0 miles south along the Michigan Central Railroad from Warren, Macomb County, 28 rails south of milepost D 14, 3 rails south of transmission-line tower No. 1916, 75 feet north of the center line of a highway, and 16 feet east of the east rail of the main track. A standard disk, stamped "K 32 1930" and set in the top of a concrete post. (192.152 meters or 630.419 feet.)

L 32.—About 1.3 miles north along the Michigan Central Railroad from the station at North Detroit, Wayne County, at milepost D 11, and about 20 feet east of the east rail. A standard disk, stamped "L 32 1930" and set in the top of a concrete post. (189.799 meters or 622.699 feet.)

M 32.—About ¼ mile south along the Michigan Central Railroad from the station at North Detroit, Wayne County, at the junction of the Michigan Central Railroad and the Detroit Terminal Railroad, in the concrete foundation of the North Yards signal tower, 36 inches above the ground, and 20 inches north of the southwest corner. A standard disk, stamped "M 32 1930." (191.573 meters or 628.519 feet.)

N 32.—About 1 mile south along the Michigan Central Railroad from the station at North Detroit, Wayne County, at the junction of the Grand Trunk Railway and the Michigan Central Railroad, in the west face of the concrete foundation of the Forest Lawn signal tower, 45 inches north of the southwest corner, and 22 inches above the ground. A standard disk, stamped "N 32 1930." (190.776 meters or 625.904 feet.)

P 32.—About 1 mile south along the Michigan Central Railroad from the station at North Detroit, Wayne County, 11½ rails south of the Forest Lawn signal tower which is located at the junction of the Grand Trunk Western Railway and the Michigan Central Railroad, 72 feet south of the main track of the former railway, and 10 feet east of the east rail of the latter railroad, in the east head wall of the first concrete culvert under the Michigan Central railroad tracks south of the signal tower. A standard disk, stamped "P 32 1930." (189.652 meters or 622.217 feet.)

Q 32.—At Detroit, Wayne County, at the Packard aircraft building No. 82 which is located at the northwest corner of the intersection of the Michigan Central Railroad and Grand Boulevard, in the foundation of the building, 33½ inches above the ground, and 30½ inches from the southeast corner. A standard disk, stamped "Q 32 1930." (192.551 meters or 631.728 feet.)

R 32.—At Detroit, Wayne County, at the foot of Mount Elliott Street, near the Detroit River, on the property of the United States Lighthouse Service, in the east face of the brick building known as the lamp shop, 3.8 feet above the ground, and 1 foot south of the northeast corner. A standard disk, stamped "R 32 1930." (179.276 meters or 588.175 feet.)

Detroit, 1871 (U. S. L. S.).—See page 9.

LINE 11, ROCKTON, ILL., TO ESCANABA, MICH.

This line follows the Chicago & North Western Railway from Menominee through Powers to Escanaba. The field work was done during the summer of 1930 by J. P. Lushene, junior hydrographic and geodetic engineer, assisted by J. E. Waugh, junior engineer.

A 30.—At **Menominee**, Menominee County, about 0.2 mile east of the Chicago & North Western Railway station, southeast of the Grand Avenue grade crossing, 32 feet east of the street, 28 feet south of the tracks, and 3 feet east of the sidewalk. A standard disk, stamped "A 30 1930" and set in the top of a concrete post. (179.767 meters or 589.786 feet.)

B 30.—At **Menominee**, Menominee County, about 0.8 mile west of the Chicago & North Western Railway station, southwest of the Spencer Street grade crossing, 33 feet west of the center of Spencer Street, 23 feet south of the tracks, and 1 foot north of the Menominee Lumber Co.'s fence. A standard disk, stamped "B 30 1930" and set in the top of a concrete post. (180.918 meters or 593.562 feet.)

C 30.—About 3.3 miles north along the Chicago & North Western Railway from the station at **Menominee**, Menominee County, west of Kew's siding, northwest of a grade crossing at the siding, 47 feet west of the tracks, 26 feet north of the center of the road, and 1 foot northeast of the railroad fence. A standard disk, stamped "C 30 1930" and set in the top of a concrete post. (188.339 meters or 617.909 feet.)

D 30.—About 6.7 miles north along the Chicago & North Western Railway from the station at **Menominee**, Menominee County, at the Birch Creek crossroads, southeast of the grade crossing of county road No. 320, 83 feet west of United States Highway No. 41, 43 feet east of the tracks, and 41 feet south of the center of the county road. A standard disk, stamped "D 30 1930" and set in the top of a concrete post. (197.854 meters or 649.126 feet.)

E 30.—About 4.6 miles south along the Chicago & North Western Railway from the station at **Wallace**, Menominee County, about 0.8 mile north of **Hansen**, southeast of a grade crossing, 47 feet east of the tracks, and 23 feet south of the center of the road. A standard disk, stamped "E 30 1930" and set in the top of a concrete post. (194.473 meters or 638.033 feet.)

F 30.—About 3.5 miles south along the Chicago & North Western Railway from the station at **Wallace**, Menominee County, at **Carbondale**, southwest of a grade crossing, 200 feet west of United States Highway No. 41, 30 feet west of the loading platform, 15 feet west of the tracks, and 15 feet south of the center of the road. A standard disk, stamped "F 30 1930" and set in the top of a concrete post. (201.715 meters or 661.793 feet.)

G 30.—About 0.7 mile south along the Chicago & North Western Railway from the station at **Wallace**, Menominee County, northeast of a grade crossing, 29 feet north of the center of the road which runs along the north boundary of the Menominee County Park, and 21 feet east of the tracks. A standard disk, stamped "G 30 1930" and set in the top of a concrete post. (209.506 meters or 687.354 feet.)

H 30.—About 1.6 miles south along the Chicago & North Western Railway from the station at **Ingalls**, Menominee County, about 850 feet south of culvert No. 141, northwest of a wagon-road crossing, 43 feet west of the tracks, 18 feet north of the center of the road, and 7 feet east of the railroad fence. A standard disk, stamped "H 30 1930" and set in the top of a concrete post. (215.509 meters or 707.049 feet.)

J 30.—About $\frac{1}{2}$ mile north along the Chicago & North Western Railway from the station at **Ingalls**, Menominee County, about 100 yards north of the switch for a spur track, southwest of a grade crossing, 26 feet west of the tracks, and 21 feet south of the center of the road. A standard disk, stamped "J 30 1930" and set in the top of a concrete post. (208.528 meters or 684.146 feet.)

K 30.—About 0.8 mile north along the Chicago & North Western Railway from the station at **Stephenson**, Menominee County, at bridge No. 157, 14 feet west of the track, in the south side of the west abutment. A standard disk, stamped "K 30 1930." (209.326 meters or 686.764 feet.)

L 30.—At **Daggett**, Menominee County, about 72 feet northeast of the Chicago & North Western Railway station, 42 feet west of the center line of United States Highway No. 41, and 36 feet east of the tracks. A standard disk,

stamped "L 30 1930" and set in the top of a concrete post. (213.276 meters or 699.723 feet.)

M 30.—At **Talbot**, Menominee County, on the Chicago & North Western Railway, 20 yards northeast of the box car which is used as the railway station, 35 feet east of the most easterly rail, and 20 feet north of the road passing near the station. A standard disk, stamped "M 30 1930" and set in the top of a concrete post. (221.147 meters or 725.546 feet.)

N 30.—About 0.8 mile south along the Chicago & North Western Railway from the station at **Bagley**, Menominee County, southwest of the crossing of a private wagon road, 28 feet south of the road, and 26 feet west of the most westerly rail. A standard disk, stamped "N 30 1930" and set in the top of a concrete post. (238.010 meters or 780.871 feet.)

P 30.—About $\frac{1}{2}$ mile south along the Chicago & North Western Railway from **Carney**, Menominee County, in the grass plot southwest of a section house, 29 feet south of the south end of the house, and 27.7 feet west of the most westerly rail. A standard disk, stamped "P 30 1930" and set in the top of a concrete post. (240.362 meters or 788.588 feet.)

Q 30.—At **Nadeau**, Menominee County, at the Chicago & North Western Railway station, in line with the north side of the station, 58.1 feet east of the northeast corner of the station and 23 feet east of the most easterly rail. A standard disk, stamped "Q 30 1930" and set in the top of a concrete post. (246.797 meters or 809.700 feet.)

R 30.—About 3.2 miles south along the Chicago & North Western Railway from **Powers**, Menominee County, at the Kloman siding, 26 feet north of the private road crossing to the Fulchicks property, and 25.6 feet west of the west rail of the main line. A standard disk, stamped "R 30 1930" and set in the top of a concrete post. (257.909 meters or 846.156 feet.)

S 30.—At **Powers**, Menominee County, near the Chicago & North Western Railway station, in the grass plot between the station and the lunch room, 26 feet north of the northeast corner of the lunch room, 24 feet south of the southeast corner of the station, and 20 feet west of the most westerly rail. A standard disk, stamped "S 30 1930" and set in the top of a concrete post. (264.794 meters or 868.745 feet.)

T 30.—At **Spalding**, Menominee County, near the Chicago & North Western Railway station, southeast of a road crossing just south of the station, 76.3 feet south of the station, 20 feet south of the road, and 22.3 feet east of the most easterly rail. A standard disk, stamped "T 30 1930" and set in the top of a concrete post. (259.936 meters or 852.807 feet.)

U 30.—At **Wilson**, Menominee County, near the Chicago & North Western Railway station, in the grass plot just west of the station, about 100 feet west of the station, and 26.5 feet south of the most southerly rail. A standard disk, stamped "U 30 1930" and set in the top of a concrete post. (242.156 meters or 794.473 feet.)

V 30.—At **Indian Town**, Menominee County, about 150 yards west of the Chicago & North Western Railway station, northwest of a wagon-road crossing, 68.3 feet south of United States Highway No. 41, 18.3 feet north of the most northerly rail, and 17 feet west of the road crossing. A standard disk, stamped "V 30 1930" and set in the top of a concrete post. (236.202 meters or 774.939 feet.)

W 30.—At **Harris**, Menominee County, about 46 feet east of the box car used as the Chicago & North Western Railway station, 56 feet south of United States Highway No. 41, and 23 feet north of the most northerly rail. A standard disk, stamped "W 30 1930" and set in the top of a concrete post. (242.301 meters or 794.949 feet.)

X 30.—At **Bark River**, Delta County, about 78 feet west of the Chicago & North Western Railway station, and 11 feet south of the most southerly rail. A standard disk, stamped "X 30 1930" and set in the top of a concrete post. (226.722 meters or 743.837 feet.)

P. T. S. No. 51 (U. S. G. S.).—At **Bark River**, Delta County, about 53 yards east of the Chicago & North Western Railway station, 12 yards northwest of the Bark River Feed and Produce Warehouse, 4 yards south of the most southerly rail, and 5 feet west of a mail crane. A United States Geological Survey standard cap, stamped "Prim. Trav. Sta. No. 51" and riveted on the top of a $3\frac{1}{2}$ -inch iron pipe. (226.608 meters or 743.463 feet.)

Y 30.—At **Narenta**, Delta County, near the Chicago & North Western Railway station, 30.6 feet west of the west end of the station, and 19 feet north of the

most northerly rail. A standard disk, stamped "Y 30 1930" and set in the top of a concrete post. (213.590 meters or 700.753 feet.)

Z 30.—About 2.1 miles east along the Chicago & North Western Railway from **Narenta**, Delta County, near the box-car station marked "Ford River," 23 feet east of the east end of the car, 20 feet west of the gravel road crossing the tracks just east of the station, and 16 feet south of the most southerly rail. A standard disk, stamped "Z 30 1930" and set in the top of a concrete post. (210.812 meters or 691.639 feet.)

A 31.—About 4.2 miles west along the Chicago & North Western Railway from **Escanaba**, Delta County, about 0.5 mile east of the box-car station marked "Pine Ridge," northeast of a private road crossing known as the Kromer Crossing, 23.1 feet east of the crossing, and 25.6 feet north of the most northerly rail. A standard disk, stamped "A 31 1930" and set in the top of a concrete post. (208.174 meters or 682.984 feet.)

P. T. S. No. 53 (U. S. G. S.).—At **Escanaba**, Delta County, about 200 feet east of the Chicago & North Western Railway station, and near the northwest corner post of the railway park. A United States Geological Survey standard cap, stamped "Prim. Trav. Sta. No. 53" and riveted on the top of a 3½-inch iron pipe. (186.830 meters or 612.958 feet.)

MISCELLANEOUS BENCH MARKS

A number of bench marks of the United States Lake Survey were not included in the numbered lines either because they were not touched upon in subsequent lines of leveling or because they were connected to the level net only by water leveling. The elevations of the marks in this group were determined by treating them as if they were on spur lines from adjacent bench marks.

B. M. 3 1876 (U. S. L. S.).—At **Escanaba**, Delta County, at the lighthouse, in the west side of the foundation, near the northwest corner. The center of a small hole in the end of a copper bolt leaded into the masonry. (178.743 meters or 586.426 feet.)

B. M. 1 1871 (U. S. L. S.).—At **Marquette**, Marquette County. Destroyed. (185.799 meters or 609.576 feet.)

B. M. 2 1874 (U. S. L. S.).—At **Marquette**, Marquette County. Destroyed. (185.647 meters or 609.077 feet.)

B. M. 3 1874 (U. S. L. S.).—At **Marquette**, Marquette County. Destroyed. (185.622 meters or 608.995 feet.)

B. M. (U. S. L. S.).—At **Sand Beach**, Huron County, about ¾ mile from the custodian's office, at the edge of the bluff and nearly in line with the north side of the west pier, on a granite boulder. A 3-inch square about ¾ inch higher than the surrounding surface of the stone and lettered "U. S. B. M." (178.990 meters or 587.236 feet.)

B. M. A (U. S. L. S.).—At **Sand Beach**, Huron County, at the west end of the boat house in front of the United States Engineer office, in the rock. The top of a 1-inch round iron bolt slightly sharpened at the top and wedged into the rock. (177.693 meters or 582.981 feet.)

B. M. B (U. S. L. S.).—At **Sand Beach**, Huron County, just south of the United States boat house, near the east end. The top of a mill shaft 1½ inches in diameter with a head turned on at the top and wedged into the rock. (177.576 meters or 582.597 feet.)

B. M. E (U. S. L. S.).—At **Sand Beach**, Huron County, about ¼ mile from the United States Engineer office, under the dock and about 250 feet from the outer end, in the rock. The top of a bar driven into the rock. (177.586 meters or 582.630 feet.)

B. M. Jenks (U. S. L. S.).—At **Sand Beach**, Huron County, at the southwest corner of the brick store of J. Jenks & Co., on the water table. A marked point. (185.922 meters or 609.979 feet.)

B. M. Boulder in Harbor (U. S. L. S.).—At **Sand Beach**, Huron County, about 350 feet south of the United States Engineer office, on a boulder. The center of a square cut. (177.424 meters or 582.099 feet.)

B. M. 1 (U. S. L. S.).—At **Mackinaw**, Cheboygan County, at the Old Point Mackinaw Lighthouse, on the north side of the lighthouse, 2 feet west of the center of a slot window facing the water, and 1½ feet above the ground, in the

first course of masonry. The top of a 1-inch square raised above the surface of a 1 by 2 inch shelf cut in the rough face of the stone. The letter "B" is cut above the east end of the shelf. (179.906 meters or 590.242 feet.)

B. M. 2 (U. S. L. S.).—At **Mackinaw**, Cheboygan County, at the light keeper's house nearest the lighthouse tower, at the east side of the door, at the middle of the 8-foot stone the west half of which forms the doorsill. The top of the edge of the level part of the stone next to the bevel of the sill. (180.588 meters or 592.479 feet.)

B. M. 4 (U. S. L. S.).—At **Mackinaw**, Cheboygan County, on the east side of Huron Avenue, 119.4 feet west of the northwest corner of the pump house, in line with its north face. The top of a brass tube set in concrete about 2 feet below the surface of the ground. (177.841 meters or 583.467 feet.)

B. M. Detroit Junction 1877 (U. S. L. S.).—At **Detroit Junction**, Wayne County, at the Michigan Central Railroad planing mill and machine shop, on the east side of the foundation, and about 10 feet from the southeast corner. The center of a small hole in the head of a copper bolt leaded into the cap stone. (180.534 meters or 592.302 feet.)

B. M. New Haven 1877 (U. S. L. S.).—At **New Haven**, Maconb County, at the Grand Trunk Railway station, in the water table on the north side of the station, and 2.9 feet from the northwest corner. The center of a small hole in the head of a copper bolt set horizontally. (192.168 meters or 630.471 feet.)

B. M. Pine River 1877 (U. S. L. S.).—In St. Clair County, at the Grand Trunk Railway bridge over Pine River, at the south end of the west abutment, in the center of the upper surface of the capstone. The top of a copper bolt set vertically. (191.566 meters or 628.496 feet.)

B. M. 2 1875 (U. S. L. S.).—At **Lakeport**, St. Clair County, at the engine house of the gristmill, in the stone on the east side of the southeast corner. A chiseled cross. (180.063 meters or 590.757 feet.)

B. M. 3 1875 (U. S. L. S.).—At **Lakeport**, St. Clair County, on Second Street, at the milk house belonging to Mr. Cole, on the top stone of the foundation at the southeast corner. The highest point of the stone. (182.438 meters or 598.549 feet.)

RAIL ELEVATIONS

The elevations in the following list were determined during the course of the leveling and refer to the top of the rail opposite the railroad station. These elevations are approximate only, since the track does not accurately maintain a constant elevation for any great length of time.

Approximate rail elevations, in feet

LINE 4, MACKINAW TO JACKSON, MICH.

Station	Elevation	Station	Elevation
<i>Michigan Central Railroad</i>		<i>Michigan Central Railroad—Continued</i>	
Mackinaw City.....	588.2	Oak Grove Crossing.....	1,292.0
Freedom.....	628.8	Otsego Lake.....	1,285.4
Nelson.....	606.2	Waters.....	1,266.7
Cheboygan.....	600.8	Frederic.....	1,205.3
Mullet Lake.....	603.2	<i>Manistee & Northeastern Railroad</i>	
Long Point.....	616.8	Grayling ¹	1,137
Topinabee.....	608.8	Resort ²	1,144
Grand View.....	615.7	Riverview ³	1,127
Indian River.....	613.9	Sigma ³	1,116
Wolverine.....	778.2	O'Neil ³	1,111
Vanderbilt ²	1,096.9	Rowley ³	1,142
Vanderbilt.....	1,094.9	Deiberts ³	1,102
Gaylord.....	1,347.4	Springfield ³	1,056
Wah Wah Soo.....	1,284.5	Walton Junction ³	1,019
Arbutus Beach.....	1,295.0		

¹ On this line the elevations refer to the top of the spike which holds the rails to the cross-ties.

² At the Main Street crossing.

³ The Manistee & Northeastern Railroad has been abandoned between Grayling and Walton Junction. For this reason the elevations are given to the nearest foot only.

Approximate rail elevations, in feet—Continued
 LINE 4, MACKINAW TO JACKSON, MICH.—Continued

Station	Elevation	Station	Elevation
<i>Pennsylvania Railroad</i>		<i>Pere Marquette Railway—Continued</i>	
Haire.....	1,046.3	McBrides.....	956.2
Mo Siding.....	1,080.9	Stanton.....	915.3
Gilbert.....	1,267.7	Sheridan.....	845.3
Missaukee Junction.....	1,340.1	Sheridan ⁶	844.9
Cadillac ⁴	1,297.9	Fenwick.....	834.3
Osceola Junction.....	1,230.5	Shiloh.....	836.1
Leroy.....	1,237.7	Haynor.....	810.0
Ashton.....	1,161.0	Ionia.....	644.4
Orono.....	1,100.3	Lyons.....	713.4
Reed City.....	1,033.0	Collins.....	769.2
Crapo.....	985.3	Delta.....	853.4
Paris.....	930.3	Lansing.....	846.3
<i>Pere Marquette Railway</i>		<i>Michigan Central Railroad</i>	
Big Rapids ⁴	1,000.0	Lansing ⁷	833.9
Rodney.....	1,084.1	Holt.....	879.0
Mecosta.....	980.5	Mason.....	890.0
Remus.....	1,023.1	Eden.....	969.5
Millbrook.....	957.9	Leslie.....	934.4
Blanchard.....	949.3	Rives Junction.....	909.5
Edmore.....	964.7	Jackson ⁸	923.0

⁴ At the crossing of the P. R. R. and the A. A. R. R.

⁵ At a highway crossing, about $\frac{1}{2}$ mile east of Big Rapids.

⁶ At the crossing of the P. M. Ry. and the G. T. Ry., about 1 mile south of Sheridan.

⁷ At the crossing of the M. C. R. R. and the G. T. Ry. about 1 mile south of Lansing.

⁸ At the crossing of the M. C. R. R. and the G. T. Ry.

LINE 5, JACKSON TO DETROIT, MICH.

<i>Michigan Central Railroad</i>		<i>Michigan Central Railroad—Contd.</i>	
Jackson ¹	931.3	Ann Arbor.....	776.3
Grass Lake.....	993.8	Ypsilanti.....	717.5
Francisco.....	1,025.4	Wayne.....	663.5
Dexter.....	863.2		

¹ At the Main Street crossing.

LINE 6, WARSAW, IND., TO JACKSON, MICH. (PART)

<i>New York Central Railroad</i>		<i>Michigan Central Railroad</i>	
Indiana-Michigan State Line.....	793.8	Kalamazoo.....	778.8
White Pigeon.....	817.4	Cornstock.....	789.2
Florence.....	804.1	Galesburg.....	794.2
Bridge No. 12 ³ / ₂ ¹	806.5	Augusta.....	794.8
Three Rivers ²	800.5	Battle Creek.....	823.7
Three Rivers.....	798.9	Battle Creek ⁴	835.1
Moorepark.....	836.4	Albion ⁵	849.4
Schoolcraft ³	876.6	Albion.....	947.5
Schoolcraft.....	873.4	Parma.....	889.4
Portage.....	864.4	Sandstone.....	962.0

¹ At Florence.

² At the crossing of the M. C. R. R. and the N. Y. C. R. R., about 1.2 miles south of Three Rivers

³ At the crossing of the G. T. Ry. and the N. Y. C. R. R., about 0.5 mile south of Schoolcraft.

⁴ At the crossing of the G. T. Ry. and the M. C. R. R.

⁵ At the crossing of the N. Y. C. R. R. and the M. C. R. R.

Approximate rail elevations, in feet—Continued

LINE 7, MARQUETTE TO ESCANABA, MICH.

Station	Elevation	Station	Elevation
<i>Duluth, South Shore & Atlantic Railway</i>		<i>Chicago & North Western Railway—Con.</i>	
Eagle Mills.....	1,280.3	Helena.....	1,122.4
Negaunee.....	1,380.5	McFarland.....	1,087.6
<i>Chicago & North Western Railway</i>		Lathrop.....	1,038.4
Partridge.....	1,249.2	Maple Ridge.....	962.6
Cascade Junction.....	1,224.8	Trombly.....	907.6
Gentian.....	1,240.4	Campbell.....	808.9
Sands.....	1,197.3	Beaver.....	819.0
Plains.....	1,163.5	Winde.....	796.4
Swanzy.....	1,145.9	Brampton.....	742.2
Little Lake.....	1,124.5	Chaison.....	731.2
Cyr.....	1,109.6	West Gladstone.....	716.0
Stack.....	1,121.6	Bay Siding.....	703.0
		Larch.....	637.7

LINE 11, ROCKTON, ILL., TO ESCANABA, MICH. (PART)

<i>Chicago & North Western Railway</i>		<i>Chicago & North Western Railway—Con.</i>	
Menominee ¹	586.6	Nadeau.....	808.0
Menominee.....	590.2	Powers.....	867.9
Menominee ²	590.9	Spalding.....	854.9
Hansen.....	644.6	Wilson.....	794.5
Wallace.....	606.1	Indian Town.....	776.4
Ingalls.....	604.8	Bark River.....	743.2
Stephenson.....	685.6	Narenta.....	701.5
Daggett.....	701.1	Ford River.....	690.5
Talbot.....	726.9	Pine Ridge.....	688.3
Bagley.....	774.8	Escanaba.....	613.0
Carney.....	796.2		

¹ At the crossing of the C. M. St. P. & P. R. R. and the C. & N. W. Ry.² At the crossing of U. S. Highway No. 41.

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