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FOURTH GENERAL ADJUSTMENT OF THE PRECISE LEVEL NET IN THE UNITED STATES AND THE RESULTING STANDARD ELEVATIONS

BY

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FOURTH GENERAL ADJUSTMENT OF THE PRECISE LEVEL NET IN THE UNITED STATES AND THE RESULTING STANDARD ELEVATIONS.

By William Bowie, Inspector of Geodetic Work and Chief of the Computing Division, United States Coast and Geodetic Survey, and H. G. Avers, Computer, United States Coast and Geodetic Survey.

GENERAL STATEMENT.

This publication gives the results of the fourth general adjustment of the precise level net in the United States. The other three adjustments were reported on in the publications, Appendix 8, Report of the Superintendent of the United States Coast and Geodetic Survey for 1899, entitled "Precise Leveling in the United States," Appendix 3, Report for 1903, entitled "Precise Leveling in the United States with a readjustment of the level net and resulting elevations," and "Precise Leveling in the United States, 1903–1907." The purpose of each of those three reports was to bring the publication of the results of precise leveling in the United States up to the date of issue. The first one (Appendix 8, 1899) set forth the methods employed in making the general adjustment of the precise level net then existing, and gave what was considered to be the most important items of information and opinions in regard to precise leveling which had been acquired during the course of a long and careful investigation of the problem of making the net adjustment and of securing the highest degree of accuracy in future precise level observations consistent with a reasonable degree of economy and rapidity.

The other two publications furnished such additions and corrections as would bring the information in regard to precise leveling in the United States up to the years in which they were printed.

The purpose of the present publication is to set forth the results of the latest adjustment of the level net which includes all of the precise leveling done previous to the year 1912, except those lines which do not form portions of closed loops, and to present the information regarding precise leveling which has been accumulated since 1907.

This publication differs from the other three reports on level net adjustments in several particulars, the principal of which are: (1) The orthometric correction is applied to the standard elevations to the westward of the Mississippi River, as it has been found necessary to apply this correction to the leveling in high altitudes. The Superintendent decided in 1910 in favor of the orthometric rather than the dynamic correction for *standard* elevations. (2) The elevations are given in feet as well as in meters. This change in the previous practice was made for the reason that practically all the surveyors and engineers in the United States express elevations in feet rather than in meters. (3) The accuracy of the recent leveling of the United States Coast and Geodetic Survey has been computed by formulæ adopted by the Seventeenth General Conference of the International Geodetic Association held at Hamburg in 1912 (see pp. 88 to 90).

Engineers and others intent only upon securing the necessary information to enable them to extend leveling, or upon using the elevations contained in this volume as data for various surveys and engineering projects, will find what they desire on pages 90 to 162, commencing with the *standard* elevations of bench marks. The descriptions and locations of bench marks are given on pages 162 to 294. At the back of the volume, page 295, is an index of bench marks arranged by states which should be consulted. The elevation of each bench mark in the net is given in this volume, but it was found impracticable to include all of the descriptions. All descriptions not found in this volume are contained in the reports of the three previous level net adjustments, viz, Appendix 8, Report 1899; Appendix 3, Report 1903; and "Precise Leveling in

the United States, 1903–1907." The index referred to indicates in which report the descriptions may be found. Any one or all of those reports or copies of certain of their pages will be furnished upon request to the Superintendent. A sketch of the whole net is shown in illustration No. 5.

A number of the members of the Computing Division and several field officers who have been temporarily assigned to that division, assisted in the computation and adjustment of the levels and in the preparation of the results for the printer. The authors desire to express their appreciation of the service rendered by them, and especially that rendered by Mr. W. D. Lambert.

NEW LINES OF LEVELING.

In 1906, 1907, and 1908 a line was run from San Diego, Cal., to Ogden, Utah. Its length is 1558 kilometers (968 miles), of which 731 kilometers (454 miles) were run after 1907.

In 1906, 1907, and 1908 a line was run from Pocatello, Idaho, to Crawford, Nebr., via Butte and Huntley, Mont. The length of this line is 1504 kilometers (935 miles), of which 668 kilometers (415 miles) were run after 1907.

In 1909 and 1911 a line was run from Goffs, Cal., to El Reno, Okla., via Albuquerque, N. Mex. Its length is 1976 kilometers (1228 miles).

In 1910 and 1911 a line was run from Fort Worth, Tex., to El Paso, Tex. Its length is 995 kilometers (618 miles).

In 1911 and 1912 a line was run between Brigham, Utah, and San Francisco, Cal. This line was not completed until late in 1912 and too late for its incorporation in the 1912 level net adjustment. Its length is 1434 kilometers (891 miles). The results of this line are not included in this report. It is expected that they will appear in another publication in the near future.

When the office computation was made of the levels run by the United States Coast and Geodetic Survey from Pocatello, Idaho, to Crawford, Nebr., via Butte and Huntley, Mont., the loop of which this line is a part failed to close by about 2 meters. All efforts in the office failed to locate the error exactly, and in the spring of 1910 a party was sent to Pocatello to begin a single line of check levels. This party was at work about six months and ran levels over 1560 miles of the circuit. At each of two places an error of 1 even meter was found. One of these errors was in the new leveling between Pocatello, Idaho, and Butte, Mont., and the other was in the line between Cheyenne, Wyo., and Ogden, Utah, which was a part of the net adjusted in 1907.* The loop closure was satisfactory after these errors were eliminated.

Besides the above new lines added to the precise level net by the United States Coast and Geodetic Survey, the following lines, forming portions of closed loops, have been added by the United States Geological Survey:

Albuquerque, N. Mex., to El Paso, Tex.—Length 409 kilometers (254 miles). The field work was done in 1905.

Mitchell, Ind., to Oakland, Ill.—Length 214 kilometers (133 miles). The field work was done in 1906 and 1907.

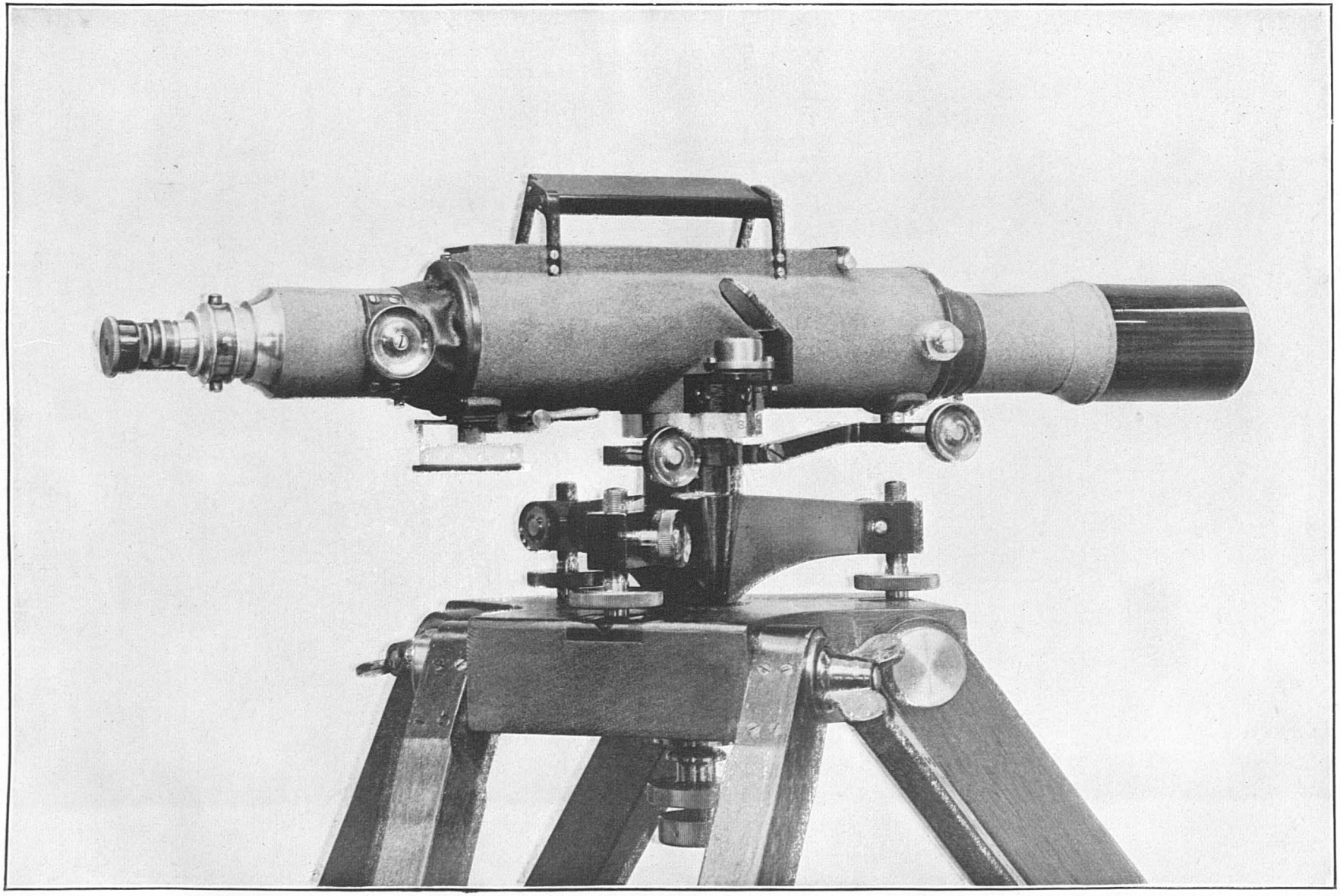
Mitchell, Ind., to Louisville, Ky.—Length 102 kilometers (63 miles). The field work was done in 1911.

Duquoin, Ill., to Shawneetown, Ill.—Length 114 kilometers (71 miles). The field work was done in 1906.

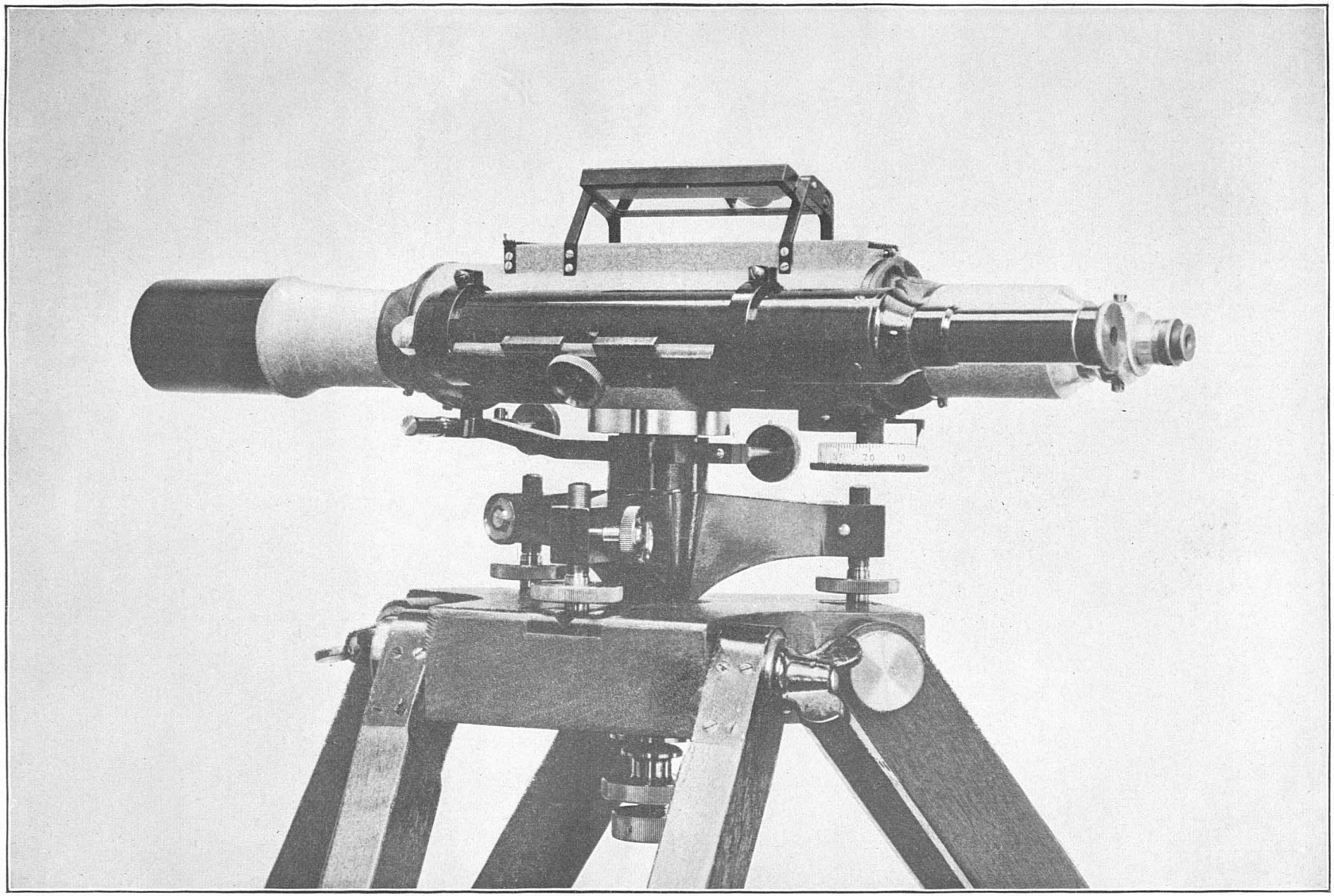
Georgetown, Ky., to Louisville, Ky.—Length 127 kilometers (79 miles). The field work was done in 1906.

The two following lines of precise leveling by the United States Geological Survey are not included in the 1912 adjustment, as they form only spurs, and their results have been published

* The level net of 1907 was composed almost entirely of leveling on the ninety-eighth meridian and eastward. To the westward of that meridian there was one loop, which closed at Cheyenne, and one line of levels, from Cheyenne to Seattle. The observed elevations, as carried from the Gulf and Atlantic to Seattle, agreed within 3 centimeters with mean sea level at that place, as determined by long series of tidal observations. This close agreement was later found to be due to the fact that the 1 meter mistake (and the accumulated accidental and systematic errors) was balanced by the orthometric corrections which had not been applied. After making the correction of 1 meter and applying the orthometric corrections to the various lines, the closing errors are those shown on illustration No. 5 of this publication.



U. S. COAST AND GEODETIC SURVEY PRECISE LEVEL, 1900 TYPE. RIGHT SIDE.



U. S. COAST AND GEODETIC SURVEY PRECISE LEVEL, 1900 TYPE. LEFT SIDE.

in bulletins of that Survey: One line was run in the years 1905 to 1907 from Rincon, N. Mex., to Yuma, Ariz., via Deming, N. Mex., and is 851 kilometers (529 miles) in length; and the other line, 377 kilometers (234 miles) in length, was run in 1906 and 1907 from Crookston, Minn., to International Falls on the Rainy River.

All of the above lines by the United States Geological Survey were run with instruments of the same type as the United States Coast and Geodetic Survey level shown in illustrations Nos. 1 and 2.

The following two lines by the United States Army Engineers have been included, as new lines, in the latest adjustment of the level net:

Lawrenceburg, Ind., to Cairo, Ill., along the Ohio River.—Length 743 kilometers (462 miles). The field work was done in 1903, 1905, and 1906.

Terre Haute, Ind., to Shawneetown, Ill., along the Wabash River.—Length 361 kilometers (224 miles). The field work was done in 1911.

The 1912 adjustment includes 8103 kilometers (5035 miles) of precise leveling more than the adjustment in 1907—6033 kilometers (3749 miles) by the Coast and Geodetic Survey, 966 kilometers (600 miles) by the United States Geological Survey, and 1104 kilometers (686 miles) by the United States Army Engineers.

There were 302 miles run by the United States Coast and Geodetic Survey and 763 miles by the United States Geological Survey between 1907 and the beginning of 1912 which have not been incorporated in the adjusted net, as they did not form parts of closed circuits. The results of those lines are not included in this publication.

INSTRUMENTS USED.

With the exception of a very few miles, all the precise leveling by the United States Coast and Geodetic Survey and the United States Geological Survey added to the level net, since the last adjustment, has been done with the type of instrument designed in the office of the United States Coast and Geodetic Survey, and fully described in Appendix 3, Report for 1903. Very accurate and rapid work has been done with this level in the United States. It has also been adopted for precise leveling by a number of other countries, and it is believed that it will be used to a great extent by surveyors and engineers in general when it becomes better and more widely known. Two views of this instrument are shown in illustrations Nos. 1 and 2. The rods used are of the direct reading type and carry a centimeter graduation on which readings are made to millimeters by estimation. The rods, made of white pine, have been impregnated with paraffin to such an extent that their lengths are apparently not affected by moisture. This type of rod is described in Appendix 8, Report for 1899, pages 418–419 and three views of it are shown in illustration No. 3.

The rods used by the United States Coast and Geodetic Survey were standardized at the office of that bureau just before and just after each field season, and on a number of days during the season the rods were compared in the field with a piece of steel tape on which two marks were made about 3 meters apart. That portion of the rod between the silver plugs at 0.1 and 3.1 meters was used in the comparison.

The index errors of the rods, which are the differences between 1 decimeter and the distance from the foot of the rod to the cross on the silver plug at approximately 0.1 meter, were made the same for each pair of rods, within a very small amount.

ADJUSTMENTS OF INSTRUMENTS.

The adjustment of the instrument is similar to that of the engineers' dumpy level, and the several operations need not be described here. The leveler should have with him a copy of Appendix 3, Report for 1903, in which the precise level used by the United States Coast and Geodetic Survey is described in detail. The adjustments made in the field are: (*a*) Adjust the universal level so that the bubble will remain in the center when the instrument is revolved in azimuth. (*b*) Make the axis of the bubble parallel to the line of sight by raising or lowering one end of the level vial. (*c*) Determine the *reversing point* of the micrometer head.

When the micrometer head is placed in such a position that the index coincides with the reversing point the bubble will remain in the center when the telescope is rotated 180° in azimuth. (*d*) Determine the stadia interval of the instrument. This is done by laying off various distances from the instrument and holding the rod at each and reading the three wires. From the distances and rod readings the stadia interval can be obtained easily. This interval may be furnished by the office, but it should be checked in the field. (*e*) The bubble of the universal level of the rod should be adjusted to the center when the rod is in a vertical position. (*f*) The rod should be tested for curvature. This may be done by directly sighting down its edges, or by placing the vertical wire of the instrument on the edges and noting whether they coincide throughout. (*g*) The vertical wire of the instrument should be tested to see if it is truly vertical, and the horizontal wires should also be tested for horizontality. With the present type of instrument it is extremely seldom that a readjustment of these wires must be made in the field.

INSTRUCTIONS FOR PRECISE LEVELING.

The general instructions issued to the precise leveling parties in 1908 and 1909 were those shown on pages 11–13 of "Precise Leveling in the United States, 1903–1907." After the discovery that mistakes of whole meters had been made on the loop Pocatello-Butte-Crawford-Pocatello, it was realized that certain additional safeguards should be employed in future leveling. After careful consideration of the subject the general instructions given below were issued by the superintendent in March, 1910. They were followed by the leveling parties during the seasons of 1910, 1911, and 1912. It will be noticed that many paragraphs are identical with those of the general instructions given in "Precise Leveling in the United States, 1903–1907."

In order that the reader may comprehend fully the spirit of the general instructions shown below, it may be well to call special attention here to three main points in regard to the instrument used:

First. The instrument is irreversible and as simple as possible. The telescope is supported directly on trunnions between the objective and the middle of the telescope and on the point of a micrometer screw near the eye end. It is therefore not capable of being rotated about its axis of figure. The level vial is fixed relatively to the telescope, except that the small range necessary for adjustment is provided. This makes it necessary to test the adjustment by a modification of the well-known peg method, as indicated later in the instructions. The simple instrument is used, as will be seen later, with an extremely simple program of observation.

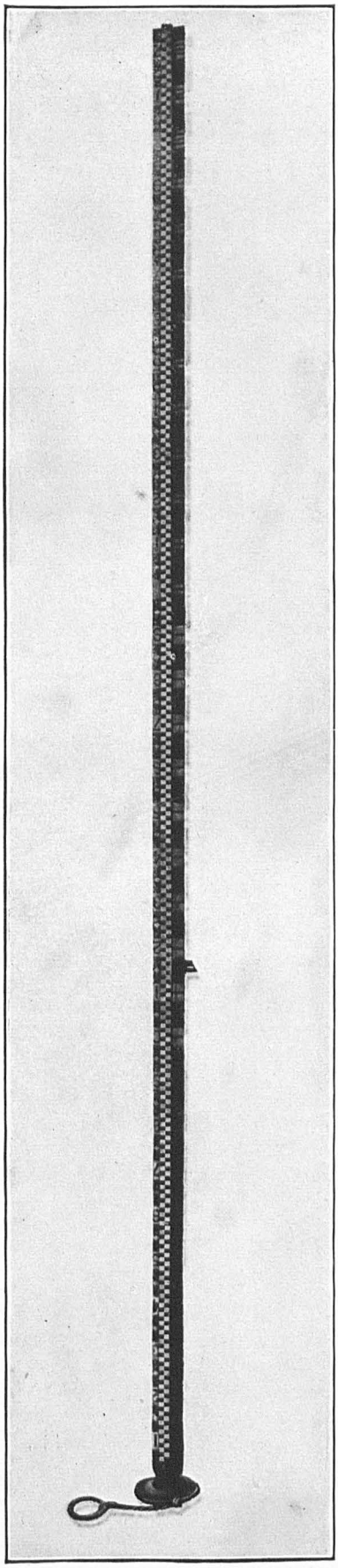
Second. A device for reading the bubble has been supplied which enables the observer to stand erect at all times and see the bubble and the rod alternately in quick succession without moving the eye and without even refocusing the eyes, the only change required being a mere shifting of the attention from one eye to the other.

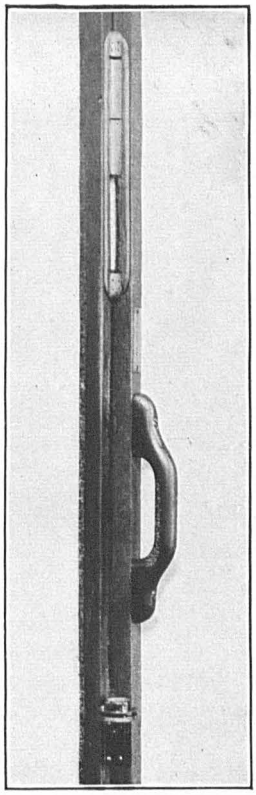
Third. Great care has been taken in all the features in the design of the instrument to prevent errors in observation due to changes in the relative temperature of different parts of the instrument.

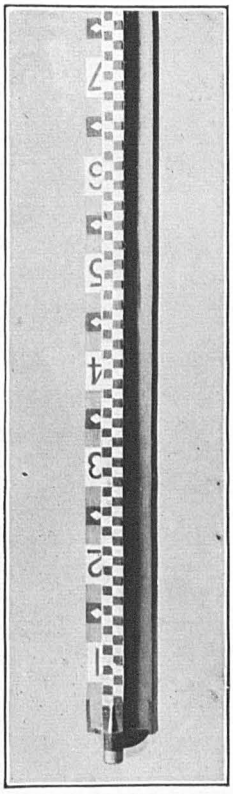
General Instructions for Precise Leveling, March, 1910.

1. Except when specific instructions are given to proceed otherwise, all lines are to be leveled independently in both the forward and backward directions.

2. The distance between successive permanent bench marks shall nowhere exceed 15 kilometers. There shall be no portion of the line 100 kilometers long in which there are not at least 20 permanent bench marks. No permanent bench mark is to be counted in considering these limits unless it is adequately described, nor shall both of two bench marks be counted if they are placed so near to one another and in such similar conditions of exposure as to be likely to be destroyed at the same time. The preceding statements refer to all permanent bench marks with which the leveling is directly connected, regardless of whether they are new bench marks or old ones established by other organizations. The above-stated limits are to be regarded as extreme lower limits. It is desired that the number of bench marks shall, in general, greatly exceed that just necessary to keep within the limits. A good example to emulate is a line run in New York State, in 1902, on which the average distance between bench marks was 2.5 kilometers. It is desired, also, that the bench marks in each general locality shall belong, in part, to each of several classes, such as bolts or other marks on buildings, squares cut or bolts or discs set in railroad masonry, such as bridge piers, water tanks, etc., stone posts, and iron-pipe bench marks.







U. S. COAST AND GEODETIC SURVEY LEVEL ROD.

3. The line of levels is to be broken by temporary bench marks into sections from 1 to 2 kilometers long, except where special conditions make shorter sections advisable.

4. Temporary bench marks should be established in places where they will be free from disturbance by the track hands working along the road or by materials unloaded from cars. This is especially important when the temporary bench mark is expected to hold the line for any considerable time. It is believed, however, that an undetected error caused by disturbance of the bench mark will be exceedingly rare, when two points, one set-up of the instrument apart, are used for holding the line.

5. At each city along the line, the leveling should be connected with at least two stable bench marks which are connected with the city datum. Connection should also be made with all stable bench marks of other organizations which may be found along the route.

6. In general, the top of rail of the railroad track should be used as the rod support. However, footpins should be carried along during the progress of the work and they should be used whenever a train is known to be approaching or when there are special reasons for supposing the rail not to be in a sufficiently stable condition.

7. When elevations and descriptions of bench marks established by a railroad (over which a line is to be run) are furnished to this office with a request by the officials of the road to have the precise leveling done by this Survey connected with them, as many of the railroad bench marks will be incorporated in our line of levels as can be done without greatly delaying its progress. The railroad bench marks which are of a permanent nature are to be treated in the same manner as new permanent bench marks established by the precise leveling party. If the permanent bench marks of the railroad are chiefly of the same general type they must not be given full weight in deciding whether there are enough bench marks in any section of the line. (See paragraph 2.) Bench marks of the railroad which are not of permanent character may be determined by extra foresights, as in the manner provided for determining the height of rail in front of a railroad station (see paragraph 10). It will not be necessary to connect the precise leveling with the railroad bench marks which are in places not easily accessible. It will not be necessary to connect with each railroad bench mark where they are less than 1 kilometer apart. The benefits derived from connecting a line of precise leveling with railroal bench marks are: (*a*) That time is gained by having some permanent bench marks already established; (*b*) the elevations of the railroad bench marks resulting from the connection with precise leveling are of great value to the railroad concerned; and, (*c*) as the work progresses, a check is obtained on gross mistakes which might escape notice, by comparing the elevations furnished by the railroad with those by the precise leveling party.

8. All old bench marks are to be called by their old names or numbers and are to be described fully by quoting the old description, if one is available, and by making additions or corrections to it.

9. All new bench marks are to be designated by capital letters with numerical subscripts after the alphabet has been exhausted in each State.

10. The elevation of the top of the railroad rail in front of each railroad station along the line of levels is to be determined with a check. This may be done by using the point on the rail as a rod support in either the regular forward or backward running of the line, or by taking an extra foresight to it on both the backward and forward runnings, or by taking extra foresights to it from two instrument stations near it in one of the runnings of the line.

11. When it is desirable to get the elevations by means of which to compare the line of levels with the profile of the railroad, such elevations may be gotten by single readings on the rod held on top of the rail opposite water tanks, and over bridges and culverts. Such structures are usually shown on the railroad profiles.

12. It is desirable that the backward measurement on each section should be made under different atmospheric conditions from those which occur on the forward measurement. It is especially desirable to make the backward measurement in the afternoon if the forward measurement was made in the forenoon, and vice versa. The observer is to secure as much difference of conditions between the forward and backward measurements as is possible without materially delaying the work for that purpose.

13. On all sections upon which the forward and backward measures differ by more than $4^{mm}.0\sqrt{K}$ (in which K is the distance in kilometers leveled between adjacent bench marks) both the forward and backward measures are to be repeated until the difference between two such measures falls within the limit. No one of the questioned measures is to be used with a new measure in order to get this agreement.

14. If any measure over a section gives a result differing by more than 6 millimeters from the mean of all the measures over that section, this measure shall be rejected. No rejection shall be made on account of a residual smaller than 6 millimeters unless there is some other good reason for suspecting an error in this particular measure, and in such cases the reason for rejection must be fully stated in the record.

15. Whenever a mistake, such as a misreading of 1 decimeter or 1 meter, or an interchange of sights (the backsight being recorded as a foresight), is discovered in any measure after its completion and the necessary correction applied, such measure may be retained provided there are at least two other measures over the same section which are not subject to any such uncertainty. Provided, further, that when it is found that the mistake was made on the last instrument station of the second running of a section and it is corrected on the same day and before beginning work on an adjacent section, such measure may be retained and no further measures of the section are to be required on account of the mistake.

16. The program of observation at each station is to be as follows:

Set up and level the instrument. Read the three lines of the diaphragm as seen projected against the front (or rear) rod, each reading being taken to the nearest millimeter (estimated), and the bubble being held continuously in the middle of the tube (i. e., both ends reading the same). As soon as possible thereafter read the three lines of the dia-

phragm as seen projected against the rear (or front) rod, estimating to millimeters as before, and holding the bubble continuously in the middle of the tube.

17. At each rod station the thermometer in the rod is to be read to the nearest degree centigrade and the temperature recorded.

18. At stations of odd numbers the backsight is to be taken before the foresight, and at even stations the foresight is to be taken before the backsight. As the same rod is held on a rod station for both the fore and back sights, the effect of this is that the same rod is read first at each set-up, it being the rod used for the backsight at the first instrument station.

19. The difference in length between a foresight and the corresponding backsight must not exceed 10 meters. The difference is to be made as small on each pair of sights as is feasible by the use of good judgment without any expenditure of time for this particular purpose.

20. The recorder shall keep a record of the rod intervals subtended by the extreme lines of the diaphragm on each backsight, together with their continuous sum between each two contiguous bench marks (temporary or permanent). A similar record shall be kept for the foresights. The two continuous sums shall be kept as nearly equal as is feasible without the expenditure of extra time for that purpose, by setting the instrument beyond (or short of) the middle point between the back and front rods. The two continuous sums for a section shall not be allowed to differ by more than a quantity corresponding to a distance of 20 meters.

21. Once during each day of observation the error of the level should be determined in the regular course of the leveling and recorded in a separate opening of the record book as follows: The ordinary observations at an instrument station being completed, transcribe the last foresight reading as part of the error determination, call up the back rod and have it placed about 10 meters back from the instrument, read the rod, move the instrument to a position about 10 meters behind the front rod, read the front rod and then the back rod. (The two instrument stations are between the two rod points.) The rod readings must be taken with the bubble in the middle of its tube. The required constant C to be determined, namely, the ratio of the required correction to any rod reading to the corresponding subtended interval, is

$$C=\frac{\text{(sum of near rod readings)}-\text{(sum of distant rod readings)}}{\text{(sum of distant rod intervals)}-\text{(sum of near rod intervals)}}.$$

The total correction for curvature and refraction must be applied to the sum of the distant rod readings before using it in this formula. The level should not be adjusted if C is less than 0.005. If C is between 0.005 and 0.010 the observer is advised not to adjust the level, but if C exceeds 0.010 the adjustment must be made. If a new adjustment of the level is made, C should at once be redetermined. It is desirable to have the determination of level error made under the usual conditions as to length of sight, character of ground, elevation of line of sight above ground, etc. The adjustment of the instrument to reduce C must be made by moving the level vial, not by moving the reticle.

22. Notes for future use in studying leveling errors shall be inserted in the record, indicating the time of beginning and ending the work of each section, the weather conditions, especially as to cloudiness and wind, and whether each section of the line is run toward or away from the sun. Such other notes should be made as promise to be of value in studying errors.

23. The instrument shall be shaded from the direct rays of the sun, both during the observations and when moving from station to station.

24. The maximum length of sight shall be 150 meters, and the maximum is to be attained only under the most favorable conditions.

25. At the beginning and end of the season, and at least twice each month during the progress of the leveling, the 3-meter interval between metallic plugs on the face of each level rod shall be measured carefully with a steel tape which shall be kept continuously with the party during the season for that purpose only. The temperatures shown by the thermometer inserted in the rod and by the thermometer attached to the tape at the time of each of these measures must be recorded. The purpose of these measures is to detect changes in the length of the rods and not to determine the absolute lengths. The absolute lengths are determined at the office between field seasons.

26. The tape furnished by the office for measurement of the rods is a piece of steel tape about 3.1 meters long, having near one end a fine line graduation and about 3 meters from it (at the other end of the tape) a series of fine millimeter graduations on a steel rule riveted to the tape. With this special form of tape the measurement of a rod should be made somewhat as follows: The rod should be supported at about the 0.85 meter and 2.45 meter points only (approximately quarter points) to get the least bending of the rod for any two-support system. In making the measurement the single line should be made to coincide with the fine line on the silver plug nearest the bottom of the rod and the reading should be made at the line on the silver plug at the top of the rod. It is possible to estimate the half tenths of millimeters on the rule which is attached to the tape. The tape should be placed on the face of the rod in such a way that the edge of the tape from which the steel rule does not project, coincides with the edge of the face of the rod nearest the meter marks of the rod. Care must be taken that the two edges coincide closely in order that the tape may always assume exactly the same position. The end of the tape at the foot of the rod should be clamped firmly to the rod after the line on the tape and that on the plug have been made to coincide. The tape should then be smoothed down by the hand to make it lie perfectly flat on the face of the rod. With the hand lifted and, consequently, no tension on the tape, the reading should be made from the rule attached to the tape near the upper or top end of the rod.

27. The field computations and abstracts are to be kept up as the work progresses. As soon as each book of the original record is out of use it is to be sent to the office by registered mail. The corresponding abstracts must be retained until an acknowledgement of the receipt of the original record at the office has been received.

28. No duplicates of the original records are to be made except of the descriptions of bench marks, of which duplicates in the form of carbon copies are to be made. At least once during each month such carbon copies as have accumulated are to be sent to the Inspector of Geodetic Work.

29. At least once each month, during the progress of the leveling, a test must be made of the adjustment of the rod levels, and a statement should be inserted in the record showing the manner in which the test was made, whether the error was found to be outside the limit stated below, and whether an adjustment was made. With the bubble of the level rod held at the center, the deviation from the vertical of the plane intersecting the center of the face of the rod throughout its length and normal to the face of the rod, must be determined. The deviation from the vertical of the plane coinciding with the face of the rod, must also be determined. If the deviation from the vertical exceeds 10 millimeters on a 3-meter length of the rod, the rod level must be adjusted.

30. On the left hand page of the record the number of each instrument station at which the instrument is not set up in the railroad track is to be included in parentheses. Similarly, on the right hand page of the record, the designating letter for the foresight rod (V, W, etc.) shall be inclosed in parentheses, if said rod is not supported on the railroad rail. If the length of any portion of the level line run off the railroad is 25 meters or more greater than the railroad distance between the points of departure from and return to the railroad, then the distance along the track between these two points must be shown in the record. The purpose of these requirements is to furnish the office a means of detecting blunders in the leveling, by plotting the level line on the profile of the railroad.

31. When it is expected that the forward and backward runnings of the line are to be completed up to any one place, the elevation at that place should be held by two points, established at least one set-up of the instrument apart. When the leveling is continued from or to such a pair of points, the instrument should be set up between them and readings of the rod taken on each point. The same arrangement of points should be used at the completed end or ends of any detached portion of the line of levels. Either one of the two points may be used for carrying along the elevation, with the other used only as a check against mistakes in reading the rod, or a disturbance of one or both of them. The records should show clearly which one of the two points was used to carry the elevation and it is believed that it is good policy to use the same point (backward or forward) in each case as far as may be practicable. It is believed that, by employing this method, no mistake of a meter or a decimeter made in reading the rod, held on a bench mark, will escape detection.

32. As far as possible, all the permanent bench marks should be in the main line of levels and not on spur or branch lines. One of the exceptions to this rule is where the line runs several miles off the railroad to the mark of a triangulation station. In such a case the spur, or branch line, is the more economical way of doing the work and will be satisfactory. Whenever a permanent bench mark is established by means of a spur or branch line, which has only one set-up, the forward and backward lines of the spur or branch should be run at different times of a day or on different days, if practicable. If it should be necessary to have the two runnings made one immediately after the other, the height of the instrument should be materially changed to make the second measure. This would help to prevent any mistake in the leveling.

33. Except in rare cases, the permanent bench marks should be established before or during the first running of the line. It is believed to be inadvisable to delay the tying in of the permanent bench marks until after the line has been run, even in only one direction. When it is impracticable to establish a permanent bench mark before or during the first measurement of the line, an acceptable manner of tying in the permanent bench mark or including it in the main line of levels is to establish a temporary bench mark on both sides of the proposed location of the permanent bench mark and to leave the distance between them unleveled until the permanent bench mark has been set. The arrangement of the temporary bench marks established for this purpose should be similar to that described in the latter part of paragraph 31 of these instructions. This would provide for two points, the difference in elevation between which are known, on each side of the permanent bench mark and the distance between the two pairs of points makes a section in the main line of levels. A diagram showing the arrangement of the stakes and the permanent bench mark is shown below:

——O——×——O——×——□——×——O——×——O——

The positions of the instrument are shown by ×, the positions of the temporary bench marks by O, and the position of the permanent bench mark by □.

34. Chiefs of party should keep the length of sight great enough to make it necessary to do a moderate amount of rerunning. If an observer is extremely cautious and confines all his observations to sights sufficiently short to insure easy reading of the rod, it is possible to work month after month with almost no rerunning, but the progress will be slow. On the other hand, it is certain that an attempt to take sights of the limiting length, 150 meters, at all times would lead to a very large amount of rerunning and the progress would not be rapid. It is believed that the maximum speed consistent with the required degree of accuracy will be secured by continually keeping the length of sight such that the amount of rerunning will be from 5 to 15 per cent. An extremely small percentage of rerunning would indicate an excess of caution on the part of the observer. The occurrence of a moderate amount of rerunning is due largely to an attempt on the part of the observer to obtain the maximum progress consistent with the required degree of accuracy and not to inability to secure such observations that little or no rerunning would be necessary. Observers have found a convenient rule in fixing the length of sight to be to shorten the sights whenever the upper and lower thread intervals subtended on the rod are found to differ frequently by more than a selected limit. Each observer should fix the limit from his own experience by noting the relation between such a provisional limit and the amount of rerunning found to be necessary while using it. Such a rule is based upon the idea that the additional

errors which are encountered when the length of sight is increased are, in the main, those due to the increasing accidental errors in reading the rods.

35. It is not thought advisable to state definitely in these instructions the allowable limit on the rate of divergence between the forward and backward lines, but this should be kept small.

36. The record and the preliminary or field computation of precise levels must conform to the examples given on pages 22 to 26 of this publication, except that in the computation shown on page 25 the five corrections for curvature and refraction, level, index, length of rod, and temperature are not to be applied in the field.

37. Should the experience of a chief of party indicate to him that a change or changes in these instructions would facilitate the work in the field, he is urged to communicate with this office regarding such changes.

38. When cases arise which are not provided for by these general instructions or by specific instructions, the chief of party will use his own judgment in the matter.

COMMENTS UPON THE GENERAL INSTRUCTIONS.

These instructions do not change the essential features of carrying on the field work of precise leveling done under the general instructions as published in Precise Leveling in the United States, 1903–1907. They do, however, provide for greater safeguards against mistakes in reading the rod, which might remain undiscovered until the closure of the circuit of which the line is a part.

The instructions, in general, have been written in sufficient detail for their proper understanding by the party carrying on the field work, but there are given below some comments which may be of value both in the field and office.

Referring to paragraph 6 of the General Instructions: All the precise leveling by the United States Coast and Geodetic Survey has been along railroads and through the towns and cities on them, except short spur lines out to triangulation stations. Since 1903 the rail has been used as the rod support except when a train was known to be approaching, when a pin was used. Since adopting the rail for the rod support, the accumulation of the discrepancy between the two runnings of a line, backward minus forward (B – F), has been within reasonable limits, and the speed and accuracy have been greater than when pins or plates were used exclusively.

Two uncertainties in connection with this method of rod support will occur to anyone who considers it carefully, namely, the uncertainty as to whether the rodman holds the foot of the rod for both foresight and backsight on precisely the same point on the slightly rounding and sometimes inclined surface of the top of the rail, and the uncertainty as to the recovery by the rail of its former elevation after a train has passed over it.

The first of these uncertainties is very small, provided the rodman is careful. No difficulty has been found in marking with chalk or keel the exact spot on the rail in such a way that the mark is recoverable, even after a train has passed over it. Besides, the lines nearly always follow main lines of the railroad where, in general, the roadbed is well constructed and the rails are held firmly to the ties. The rails are usually heavy, with large heads having broad top surfaces, so that even if a rodman fails to place his rod for the backsight exactly on the spot used for the foresight the error introduced would be small. If the rail is light in weight, badly worn, and sloping on the top of the rail head, then the rodman must be especially careful to have his rod in exactly the same position for the two sights.

When the roadbed is in good condition, the rodman standing on the ties does not seem to disturb the rail on which the rod is supported.

With regard to the second objection to the use of the rail as a rod support, that it will not recover its original position after the passage of a train, it should be remembered that it is only occasional (not so much as once each day, if the observer is at all careful) that a train goes over the rod support between the fore and back sights. Besides, each of several observers has reported that tests were made which show that rod readings, with the rod held on the rail, were the same after the passage of a train as before, within the limits of reading the rods. In making these tests the leveling instrument was set up some meters from the track.

With the binocular type of instrument, accurate leveling can be carried over trestles or bridges. Rod points should be established on or over the piers.

Paragraph 7 is an addition to the previous instructions, and it is in sufficient detail to make its meaning entirely clear.

The height of the rail in front of the railroad station at a town is usually given by the railroad and in dictionaries of altitudes as the elevation of the town. As there should be no gross

error in such elevations, a paragraph (No. 10) was added to the previous general instructions which requires that these elevations should be determined with a check.

Paragraph 12 provides that the forward and backward runnings of a section should be made under different atmospheric conditions, if possible without materially delaying the progress of the work. In future leveling the chiefs of party will be directed to make the two runnings on different days if possible, this being one of the requirements for *leveling of high precision,* adopted by the Seventeenth General Conference of the International Geodetic Association in 1912. If the two runnings of a section are made on different days, and one is made in the forenoon and the other in the afternoon, it is believed that any systematic errors due to atmospheric causes will be largely eliminated.

A large portion of the rerunning, made necessary by a failure of the forward and backward measures to agree within the prescribed limit, has occurred on rather steep grades and especially when the observer made his sights as long as the slope would permit. This would bring the line of sight close to the ground on one side and high in the air on the other. The greatest difficulty was encountered on clear days when the ground and air had temperatures differing by varying amounts, depending on the time of day. Under this condition it is natural to expect that the effect of refraction on the upper sight will be different from that on the lower one. Where the two runnings of a section were made on a cloudy day very little trouble was found in making the two lines agree within the required amount. During the season of 1912 the line of precise leveling along the railroad from San Francisco eastward ran through one snowshed which was about 37 miles (60 kilometers) in length. The grade of this portion of the road was between 2.0 and 2.5 per cent. The chief of party reported that only three sections, of a total of 60 sections through this shed, failed to close within the requirements and that, in his opinion, these failures were due to insufficient light in the tunnels. On the clear line for a distance of 51 kilometers before reaching the snowsheds great difficulty was experienced in making the two runnings check and ten of the total of 49 sections were remeasured, the rerunning amounting to about 20 per cent. After having passed through the shed the rerunning, on a portion of the line with steep grades and 51 kilometers in length, again became high with 10 per cent, or 4 sections of the total of 42.

If a line on a steep grade is leveled in opposite directions under the same or approximately the same atmospheric conditions, no great difficulty should be found in making the two runnings agree. But on clear days there would be, no doubt, systematic errors of considerable size.

In future precise leveling by the United States Coast and Geodetic Survey the observer will be directed to be careful that, on clear days, the line of sight from the lower wire does not come closer to the ground than about 3 decimeters. This may require shortening of the sights on steep grades and the progress will be slower than if there were no minimum limit to rod readings, but it will keep the line of sight above the badly disturbed layers of air close to the ground. On cloudy days this precaution probably will not be necessary.

The second sentence of paragraph 15 permits the observer to retain without rerunning a measure on which a mistake has been made, if the mistake is corrected immediately. It is considered unsatisfactory to do so some days, or even hours, later for it may be impossible to replace the instrument to make the test of the rod readings at any particular set-up.

By carrying out the program of paragraph 18 any systematic effect due to falling or rising temperatures, or to changing atmospheric conditions, is practically eliminated.

It has been found that the tape described in paragraph 26 has given excellent results when used as a straightedge in measuring the rods in the field. The measurements previously made with a pocket steel tape with or without a constant tension were not entirely satisfactory.

The progress of a leveling party is partially dependent on the amount of office work which must be done in the field. No duplicates are made of the record of observations or of the computations. The abstract, properly prepared and checked, is assumed to be a sufficient guard against the loss of a line of levels. Only such computations are made in the field as may be necessary to indicate the accuracy of the work done. A duplicate is required of the descriptions of stations, a carbon copy being satisfactory. (Consult paragraphs 27, 28, and 36.)

Paragraphs 31 to 33 describe methods of establishing bench marks and connecting with them which should greatly lessen the danger of having a serious mistake, such as one meter or a decimeter, occur in the line and not be detected. Comments on paragraph 35 will be found in connection with errors of leveling on page 19.

ORGANIZATION AND EQUIPMENT OF PARTY.

It has been the practice in the United States Coast and Geodetic Survey during a number of years to have a prospective chief of party attached to the party of an experienced officer for a short time, usually about a month, in order that the former may become acquainted with the management of the party, manipulation of the instrument, and the proper way of making out records, computations, etc. By this method, the work done by different observers is remarkably uniform in character and accuracy. Occasionally the training is done by an older officer who assists the new one to equip and organize the party of the latter. It is believed to be the better plan to have the new chief of party serve a short time with the experienced officer.

The instructions require that the records be sent to the office as soon as they are abstracted. These records are inspected under the direction of the Inspector of Geodetic Work who calls the attention of the chief of party to any departure from what are considered the best methods of observing and computing. It is usually the case that the letters which go directly from the inspector to the observer, during the first month or two, touch upon most of the causes of trouble to the new leveler. The latter should follow the general instructions very carefully, both as to observing and computing.

It has been found advisable to furnish the new leveler with copies of reports made by older observers, which are of great assistance to him. Several excellent detailed reports on the field work have been submitted by chiefs of parties. There is given below certain information which may be of assistance to the new man. This is based largely on the special reports by Assistant J. H. Peters and former Aid Ford Kurtz.

Besides the chief, the party usually consists of five men. They should be young and active, and it is usual to employ men who live in the general locality of the work. There is not very much advantage in having men of previous experience, except in the case of the recorder. Men of the proper kind will soon learn their duties. The recorder should have at least a high-school education and, in fact, it is well that the other men should have had sufficient education to enable them to assist in checking the books and abstracts. The chief of party should replace any man as soon as he shows inaptitude for the work. The party must work as a team and its rate of progress is dependent on each man. As a rule, men should be selected who weigh from 130 to 150 pounds. Those weighing over 160 pounds should not be employed on account of the extra weight which they would add to the load of the velocipede cars.

One man does the recording, two act as rodmen, one is the sunshade man, and one is the wind-shield man.

The outfit of instruments consists of the following:

1 geodetic level and tripod.
2 geodetic level rods.
2 rod foot pins or plates.
1 special 3-meter tape for measuring rods.
2 thermometers.
1 15-meter tape.
1 watch for recording purposes.
2 fountain pens for recording purposes.

The height of the tripod should be such that the observer may stand without strain while reading the rods.

The other equipment will depend largely on the country to be traversed.

Along all railroads except those on which the traffic is very heavy the leveling party works with hand velocipede cars. During the latter part of the season of 1911 and all of the season of 1912 on the Southern Pacific Railway between Brigham, Utah, and San Francisco, Cal., the

party also used a motor velocipede car. In some parts of the country it is necessary to live in tents or freight cars fitted with mess and sleeping arrangements. Whether the party should live in hotels, camp, or cars is left almost entirely to the judgment of the chief of party, if there is a choice among several ways of living. A sunshade, a wind shield, a few tools for repairing the velocipede cars, metal bench marks (see illustration No. 3), a stationery case, besides any necessary tents, bedding, and mess equipment will complete the party outfit. Chiefs of party are advised to keep the amount of property as small as is consistent with the comfort of the members as the care, packing, and shipping of a large camp outfit greatly retards the progress of the leveling and adds much unnecessary labor.

MANAGEMENT OF PARTY AND PROCEDURE IN FIELD.

After receiving instructions to run a line of leveling, the chief of party should ascertain if permission has been secured from the railroad company over whose road the leveling is to be done for the operation of velocipede cars. If this has not been obtained or if permission has been refused by letter, he should interview the general manager of the railway in person, if practicable, and explain the purpose of the work and the manner of using the cars. It is probable that the permit will then be given. The company will prepare a form of agreement that is to be signed by the members of the party, releasing the company from any damages to such members in case of injury while using the cars.

The chief of party is directed by the office to use every precaution practicable to avoid accident to his party and obstruction to the traffic of the road over which the leveling is done. When the road has numerous curves and steep grades, he is advised to have an extra man in his party who will keep several hundred yards above the instrument and act as flagman. It is frequently difficult to hear an approaching train which is running down grade with little or no steam.

The chief of party should obtain from the chief engineer of the railway copies of elevations and descriptions of the railroad bench marks and also profiles, if possible.

He should arrange with some stonecutter to prepare and ship to designated points stone posts to be used as bench marks. The practice now is to have the cutter set a metal disk bench mark in the top of the post. The chief of party should secure from the railway agent a list of stations along the line of the leveling to which shipments may be made, and the firm furnishing the bench marks should be given a copy of the list with directions for distributing the stones. When the chief is not familiar with the country through which the line will run, he should go over it by train and take such notes as may be of value to him in planning the season's work.

In the special report by Mr. J. H. Peters, referred to above, he made the statements which follow. Mr. Peters used one 4-horsepower motor velocipede car and one hand velocipede car. Usually the hand car was left out beside the track near where the next day's work would begin, and the party went to and from their headquarters on the motor car. The hand car was pulled from one section of the road to another by the motor car when the leveling on any one day was not continuous:

* * * During the process of leveling, the motor car is used as the forward or instrument car while the hand car is used as a rear or rod car. One rod is designated as the head rod and the man carrying it is known as the head rodman. The other rod is designated as the rear rod and the man carrying it is known as the rear rodman. The rods retain their designations throughout the season, but the men may be changed from rear to head rodmen at will. The "head rod" and the "rear rod" should not be confused with the "front rod" and "back rod." One rod is always the "head rod" but it alternates from the "front" to the "back" rod or "back" to "front" rod with successive instrument stations.

On beginning work in the morning the procedure would be as follows: The instrument would be set up between the rails, at a distance from the bench mark at which the line starts depending on the observing conditions. The head rod is sent to the bench. The rear rodman goes ahead a distance equal to that between the bench mark and the instrument, where he makes a cross (with chalk, keel, or some other material) on which he holds the rod, on the right-hand rail. While this is being done, the observer levels the instrument which has been set up behind the head car and in front of the rear car. He then sights on the rod held at the bench mark and reads the three cross wires, calling out the three readings to the recorder thus, "one, nine, one, seven; two, one, two, nine; two, three, four, one." Then for a check he calls out the first two figures of the middle wire thus, "twenty-one." This is done in a voice

loud enough to be heard by the rodmen. The head rodman then takes his rod down, reads the rod thermometer, comes forward to the cars and gives the recorder the temperature of his rod. The rear rodman perfects the leveling of his rod, when it is read likewise. The recorder sees that there is no error in the readings and says "check." The observer picks up the instrument and gets on the rear seat of the head car. The umbrella man and wind-shield man (the latter acting as engineer) start the car, then the run is made to the next station.

Before passing the rear rodman, who remains at the position where the foresight was taken, the observer tells the engineer the number of rails which he desires to proceed beyond the rear rodman, thus: "Take ten." The engineer then stops the car just beyond the tenth rail joint where the observer gets off the car and sets up the instrument at station No. 2. The rear car on which are the recorder and rodman comes up behind the head car and stops just short of the tenth rail joint. The head rodman, who has also counted the rails, goes forward, calling out "ten" as he passes the instrument. If this happens to be the correct number of rails in the backsight the observer replies "check." The head rodman then goes forward 10 rails where he places a cross on the right-hand rail opposite the joint in the left-hand rail. This will be the second foresight and as the head rod is in foresight, it will be read first, after which the rear rod is read. The instrument car then moves forward to the next station and is followed by the rod car after the rear rodman has come forward to it.

When the head rod is in backsight, the head rodman will be able to reach the cars while the rear rod, which is in foresight, is being read. The recorder will then be able to catch hold of the motor car and be trailed to the next station. This may be done with advantage when the length of sight exceeds about eight rails. Thus the man who carries the head rod will have very little working of the hand car to do. For this reason the rodmen are directed to change rods each day at noon, to make the work equally hard for each rodman. It should be borne in mind that the same rod is to be read first at each station. This rod will be held part of the time by one rodman and part of the time by the other rodman. On cloudy days, when a 15-rail (150 meters) sight can be taken throughout the day, it will be found advantageous to use only the head car, waiting at each alternate station for the rear rodman to come forward. The sunshade man may then be put to setting bench marks and the rodman may occupy his seat on the head car, the recorder also taking a seat on that car.

In setting up the instrument the tripod should be placed with two legs in a line parallel to the track, and the other at right angles to this line. In standing at the instrument looking at the head rod the two legs should be next to the right-hand rail. Setting up in this way places the telescope in position for lifting the instrument to the shoulder after reading the rear rod. Other instruments, however, may require that they be set up exactly opposite to this method.

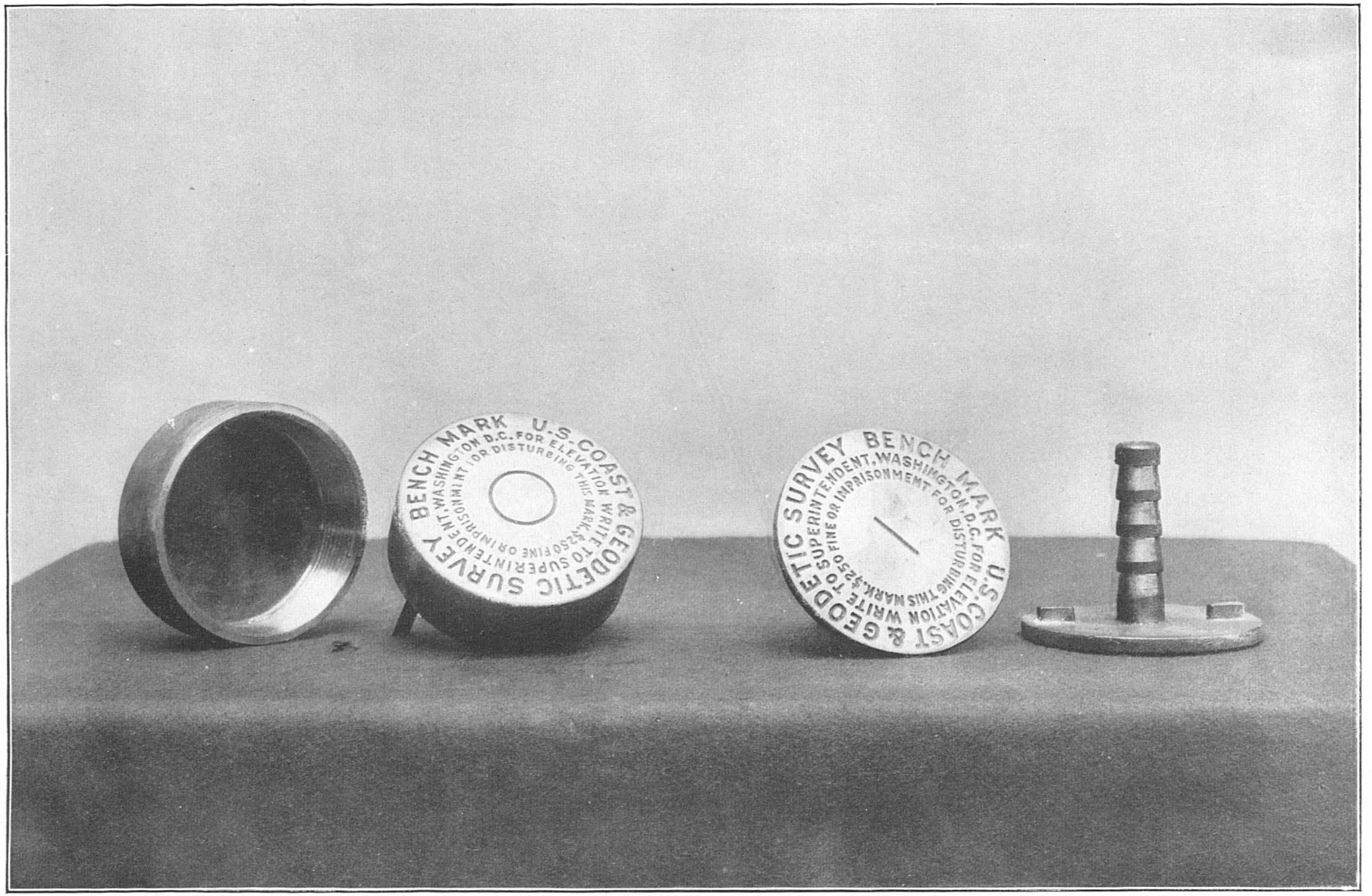
The leveling of the instrument is made approximately with the small universal level attached to the side of the telescope, after which it is perfected with the level proper. The point on the head of the micrometer screw (the reversing point) which indicates the position in which the screw must be in order that the line of sight may be revolved in a horizontal plane when the instrument is leveled, has been determined and marked on the head with a soft pencil. In leveling at a station the head of the micrometer screw is placed in that position and the telescope is turned at right angles to the direction of progress with the eyepiece over the leg of the tripod that is at right angles to the railway track. The bubble of the universal level is then brought to the center, after which the adjustment in a plane perpendicular to the track is perfected with the leveling screw nearest the eye end of the telescope, by bringing the bubble of the level proper near the middle of the tube. The telescope is then turned parallel to the track, directed toward the head rod, and the adjustment perfected in that direction, using the two leveling screws that are in a line parallel to the track. The telescope is now nearly in position to read the head rod, and as stated above will be in a position for lifting the instrument when the rear rod has been read. If this method of setting up the instrument be followed, the number of separate motions will be a minimum, and thereby the least time will be required at each station. The beginner need only remember that the tripod should be set with two legs in a line parallel to the track and next to the right-hand rail when looking toward the head rod. By following this practice there is less liability of reading the rear rod first, since to do so will seem awkward to the observer.

The method of accommodating the party will depend greatly on the nature of the country through which the work is done. If rooms and board can be secured along the line, tents and cooking outfit will not be needed, thereby greatly reducing the cost of moving the outfit and giving more agreeable accommodations for the party. Such accommodations can not always be secured, however, in which case two tents, each 10 feet wide and 12 feet long, will be sufficient for sleeping quarters. An old tent should be carried in which to do the cooking. Each man should be provided with a cot and bedding. The chief should bear in mind that the movement of his party will be greatly facilitated if nothing is carried that can possibly be dispensed with.

The hand velocipede car is locked and left overnight at the end of the day's leveling. The motor car on which the party returns from work may be placed in the tool house of the railroad section crew or in some storehouse near the track and should be locked for the night.

Repair parts for the motor and hand cars are secured from the company making them. They should be ordered by number, as given in the catalogue furnished by the company. The following extra repair parts and tools for replacing them should be carried in the tool box of the motor car:

1 spark plug.
1 exhaust valve.
1 intake valve.
1 driving chain.
1 axle for drive wheel.



U. S. COAST AND GEODETIC SURVEY BENCH MARKS.

The field procedure will be nearly the same as the above should there be two hand cars instead of one hand and one motor car.

Each chief of party will use his own judgment as to the best method of moving his party and equipment from one town to another. It is frequently the case that the party can make the move on the cars used, especially if one be a motor car, and do some leveling en route. The equipment not used in the actual leveling can be shipped forward by express or freight. It is well to have one member of the party detailed to make the shipment, accompany it to the next headquarters of the party, and arrange for a storeroom, hotel accommodations, etc.

Whenever possible the permanent bench marks should be set before the leveling, and the chief of party can usually arrange his work so as to send one or more men out to do this.

Each man in the party should be given a certain part of the work to do (aside from rodding and recording or similar work) and he should be held responsible for its proper execution. Such work consists of care of instruments and other property, getting equipment ready for work in the morning, storing it at night, keeping cars in repair, etc.

The chief of party should caution each man to be extremely careful with the leveling rods. No undue strain should be placed on them and they should be kept straight. (The rods are so constructed that they may be bent and given a permanent set; but they are easily straightened without injury or change of length.)

When holding a rod for observations the rodman should not bring any weight to bear on it; otherwise he might disturb the support when it is a pin or plate.

The rodman should be directed not to place the foot of the rod on the ground. He should not lean the graduated face of the rod against his clothing nor have it come in contact with his arms or hands. This is necessary if the graduations are to be kept bright and clean. The rod should be handled so carefully that the face will not be broken or chipped or the level bubble disturbed.

BENCH MARKS.

The various types of bench marks used by this and other organizations are described in detail in the notes on pages 162 to 166 of this publication. The pipe bench marks (note 2, page 162) were used very little on the line of levels between San Francisco, Cal., and Brigham, Utah, stone posts having been used in their place. The difference in cost is not great, and the pipe marks, when set without concrete, can not be expected to remain stable and free from rust for any great length of time. In the center of the top of each stone post on the San Francisco-Brigham line was set one of the inscribed disk bench marks shown in illustration No. 4.

It has been found that the inscribed bench marks are very much less disturbed from curiosity or vandalism than those which consist of only bolts or marks cut into rock. Besides, the location of a mark of the inscribed type is known by most of the people living in its vicinity and is easily recovered.

Stone posts placed in the grounds of public buildings and disks set into the buildings themselves make excellent bench marks.

Care should be taken in selecting the places, buildings, or grounds on which to place permanent bench marks. It is important that the mark be placed where the bench mark itself will not be removed as a result of building or other engineering operations, and it is even more important that the character of the structure or ground in which the mark is placed is such that it will not settle and change the elevation of the mark. Made ground and marshy ground are dangerous, as are also new buildings and other masonry structures whose foundations are not on bedrock.

A temporary bench mark, found to be very satisfactory, is a stake 2 inches by 3 inches in cross section and about 12 inches long. The length will depend upon the nature of the ground. Into the stake should be driven a nail (8-penny has been found to be a satisfactory size) with its head about one-fourth of an inch above the stake. If the nail is not driven down all the way, swelling of the battered top of the stake will not disturb its elevation. The rod is held on the top of the nail. The nail should be driven vertically even if the stake is in an inclined position.

ERRORS OF LEVELING.

The General Instructions for Precise Leveling by the United States Coast and Geodetic Survey, shown on pages 8 to 12, are designed to minimize or eliminate from a line of levels the effect of all known sources of accidental and systematic errors. Under the heading "Comments on the General Instructions," the reasons for adopting certain methods are given in order to supplement the instructions where they are not considered to be in sufficient detail to show clearly the object sought.

Many of the sources of errors in leveling of any kind are self-evident, and the observer will guard against them by properly adjusting his instrument and rods and by the use of firm rod supports.

MISTAKES OR BLUNDERS.

Mistakes or blunders are especially to be guarded against, as they may cause great expense and annoyance on engineering projects before they are discovered. Such mistakes are usually caused by—

(1) Reading a rod 1 meter or decimeter wrong on both the forward and the backward runnings of a section.

(2) Undetected disturbance of a temporary bench mark.

(3) The recorder reversing the backsights and foresights at a station on each of the two runnings of a section.

(4) Not connecting a permanent bench mark with the line of levels until after the two runnings have been made.

The mistake in rod reading is most likely to occur when changing at a bench mark from the forward to the backward running or vice versa, or at a decided change in grade. The instructions provide that after the first running to a bench mark the second must not be immediately started back from that mark. While running on a long even grade both the observer and the recorder should be on the alert for a change of grade when the reading for the foresight and probably the backsight also may fall on a different meter space on the rod from what it had been during a number of previous stations. The mistake of a whole meter is the only one likely to occur at the change of grade. The probability of an undetected mistake of a decimeter or meter occurring in a line run in accordance with the general instructions is so small that it has been deemed inadvisable to have two faces of the rod graduated with different scales and have both of them read, on account of the greater amount of work involved and the slower progress in consequence.

The instructions, page 11, state that any temporary bench mark which is required to hold the elevation of the forward end of the line must consist of two stakes or other objects set apart the distance between two rod points. These two objects are connected with when the leveling is advanced from them later and any discrepancy between their original and new differences in elevation is noted before proceeding. With this method any disturbance of the mark is detected.

The transposition of backsight and foresight will probably never be undetected in Coast and Geodetic Survey leveling, for it is not customary on the second running for the rods to be held at the same points as on the first running. Consequently, should such an error be made on each of the two runnings of a section, it is most improbable that the two errors would be so nearly the same that the two runnings would agree within the prescribed limit $4^{mm}.0\sqrt{K}$, K being the distance in kilometers.

Paragraph 33 (page 11) of the general instructions provides a method of tying in a bench mark to a completed line, which should prevent blunders. A mistake made in the elevation of a bench mark connected with a completed line will not affect the elevation as carried ahead, but it may cause serious trouble in any future leveling based on that mark.

ACCIDENTAL AND SYSTEMATIC ERRORS.

With accurately adjusted instrument and rods, firm rod supports, and an instrument of the type of the Coast and Geodetic Survey level, which is made almost entirely of nickel-iron alloy of low coefficient of expansion, there would appear to be no source of systematic error in the mean of the forward and backward runnings of a line of levels if the observing is done in

accordance with the general instructions shown on pages 8 to 12. The closing errors of circuits show, however, that the systematic errors are not entirely eliminated.

The accidental errors will be present under any method of operation, and other things being equal they will increase with the increase in the rapidity of the progress of the work beyond a certain normal amount. The observers in the United States Coast and Geodetic Survey are directed to do as much leveling as possible of a certain accuracy (as indicated by the agreement of the two separate measures of each section of a line) rather than a smaller amount of a greater accuracy. They make the lines of sight as long as the atmospheric conditions will permit, up to a maximum of 150 meters. The greatest sources of accidental errors are believed to be in bisecting the centimeter graduations on the rod and the varying vertical refraction on the backsights and foresights. Another source of error (probably entirely accidental under the method of leveling prescribed) is the inertia of the liquid in the level vial. The observer should bring the bubble to rest at the center and then wait a few seconds to see whether or not it creeps to another position. If it moves away from the central position it should be brought back before making the reading of the rod. An error, probably mostly accidental, may be caused by refocusing the rod image between the two sights at an instrument station. This would probably change the relation between the axis of the bubble and the line of collimation.

Paragraph 35 of the instructions refers to the accumulation of the discrepancy or the divergence between the elevations as carried by the forward and backward runnings of a line of levels. It is rarely the case that both runnings are made on the same day, but the interval of time between them is very seldom more than one week.

It is evident that early in a line of levels run by a new party the value of the discrepancy between the backward and forward measures (B–F) in millimeters per kilometer tends to be large, but after about the first 20 kilometers it settles down. About 0.25 millimeter per kilometer, as the line progresses, is a good value, tending to decrease to the end of the line. Any noticeable tendency of the discrepancy to be of one sign is a thing to be guarded against, studied, and, if possible, counteracted.

There is no reason for the office computations to affect the value of the B–F systematically in either direction. The two principal corrections for rod length and for temperature are usually about equal on the backward and forward lines and of the same sign as the difference of elevation and, therefore, do not affect the B–F.

The effects of the sun, the grade of the line, the average temperature, and the azimuth of the line on the accumulation of B–F are not known. Therefore, the methods are designed to eliminate them from the observations or at least to reduce them by providing that the running of the backward and forward lines shall be under different conditions. The rapid accumulation, in most cases, has been found to be due to the habits of the rodman or to the methods of supporting the rods.

When the accumulation is large the observer should make various experiments, such as (1) the occasional use of the foot pins for a few miles; (2) a change of rodmen; (3) requiring the rodmen to try various changes in their methods of locating and holding their rods and especially requiring them to be unusually careful in placing the rod in its horizontal location on the rail and in the amount of pressure placed on the rod by leaning on it or by bracing against wind pressure; (4) changing the program of running forward in the forenoon and backward in the afternoon to backward in the forenoon and forward in the afternoon. Then he should study the relation of the accumulated discrepancy, first, to each of the above-mentioned changes; second, to the weather; third, to changes in the character of the ballast; fourth, to changes of grade of the railroad. By such studies the source of the trouble will probably be located or else the accumulation will cease without the reason for its doing so being discovered.

The rodmen should be especially careful when the railroad is in poor condition, with the top of the rail irregular and not flat. A shifting of the horizontal position of the rod of 1 millimeter between the foresight and backsight might easily cause an error of 0.1 millimeter for the top surface of the rail may slope as much as 10 per cent.

It is believed that the larger accumulated discrepancies can not possibly arise from any systematic error in reading the rods. Especially is this true in leveling, such as that called

for by the General Instructions (par. 18, p. 10), where the back sight is read first at stations of odd numbers and the foresight first at the remaining stations. This makes it practically a symmetrical process in so far as the observer is concerned. (The primary purpose of this feature of the program is to eliminate from the final computation of elevations the effect of any systematic tendency of the instrument to rise or settle during observations.)

There is a possibility of an accumulated discrepancy being produced by refraction on lines having steep grades. If the conditions in regard to refraction be the same on the two runnings of a line, there would be no divergence from that cause; but it is probable that the refraction is different on the higher sight than the lower one and that this difference changes during the day as the relative temperatures of the ground and air vary. The refraction on the higher sight (up the slope) is no doubt different in the morning with a rising temperature from what it is in the afternoon with a falling temperature, while the lower sight (down the slope) which comes well above the surface of the ground will not vary so much between the forenoon and afternoon. Consequently, if the observer systematically leveled forward early in the day and backward late in the day, refraction might cause an accumulated discrepancy. If it does, there should be a change of sign in the discrepancy when the program is reversed by leveling backward in the morning and forward in the afternoon. Also, without a change of program a change of sign should occur after passing a summit or the lowest point in a valley.

It is difficult to see how a large accumulated discrepancy could be caused by errors due to a difference in the appearance of the rods, one being more brightly illuminated than the other, but if such is the case a change in the program of forward in the morning and backward in the afternoon to forward in the afternoon and backward in the morning would tend to change the sign. (See also third paragraph under Accidental and Systematic Errors, p. 19.) The discrepancy, if due to the appearance of the rods, would not increase on portions of a line run in both directions on cloudy days, and the change of program would probably not be effective on a line running north and south.

A test similar to that mentioned above might be made to show whether the accumulation is due to the tendency of the bubble to crawl toward the source of heat—the sun.

Among the cases of large accumulations of discrepancy between the two runnings of a line are: (1) A section of the line from Ogden, Utah, to Pocatello, Idaho, where a discrepancy of 63.4 millimeters occurred on 138.4 kilometers, a rate of 0.46 millimeter per kilometer. (2) On the line Red Desert to Azusa, Wyo., there was an accumulated discrepancy of 89.1 millimeters on 170.4 kilometers, or 0.52 millimeter per kilometer.

If there is a systematic error due to the direction of running which causes the accumulated discrepancy, it is probable that this error, with different signs in the two runnings, is practically eliminated from the mean of the two runnings.

If there is a systematic error in a line due to its having been run in the forenoon, which is of the same size but of different sign from a systematic error in the same line, caused by its having been run in the afternoon, then if there are no other sources of error the two lines will differ by twice the systematic error in the single line, but the mean will be free from this error. Now, if one-half of the above line is measured forward in the forenoon and the other half forward in the afternoon, and if the backward running is made half in the forenoon and half in the afternoon, then the difference in elevation of the ends of the line from each of the two runnings will be free from systematic error and they will give the same difference in elevation for the two ends of the line. It seems to be reasonably certain that in so far as the errors due to forenoon and afternoon runnings and to the direction in which the line is run are concerned, the amount of the accumulated discrepancy is not an indication of the size of the systematic error which may be present in the line, for the systematic errors in each of the backward and the forward runnings due to these causes may be made to accumulate or eliminate themselves by a change of program without affecting the difference in elevation as given by the mean of the two lines. (See also discussion under Relation between the systematic error and the value of B − F, p. 22.)

In making certain astronomic observations where extreme accuracy is required it has been found that most observers have a personal equation in bisecting a star with the wire.

This may be called the "bisection error." This error is eliminated from the results by means of a reversing prism, which if turned 90° reverses the image formed on the retina of the eye and one-half the observations are made in each of the two positions. It is no doubt true that there is a "reversing error" for some observers in reading the fractions of a division of the level rod, but as the same error would presumably be made on both the front and back rods these errors would not come into the line of levels. It may be the case, however, that the "bisection error" on a rod illuminated by the direct rays of the sun is different from that on a rod the face of which is in shadow. It is possible that this phenomenon is one of the causes or the cause of the accumulation of the difference (B−F) between the forward and backward runnings of a line when one of the runnings has been made entirely toward the sun, while the other has been made in a direction away from the sun. On an east and west line the effect of this error (if it exists) will probably be eliminated from the mean of the two runnings, but this would not be the case on a line which is nearer north and south than east and west. It may be desirable where extreme accuracy is required to have a reversing prism on the level and readings made on the rod in both positions of the prism.

After an observer has taken every known precaution to eliminate the effect of errors on the elevations of a line it will usually be found that the closing error of the loop or loops involving the line is greater than can be attributed to the purely accidental errors. There must be systematic errors in the leveling which affect the mean of the forward and backward runnings, although the instrument may be in perfect adjustment, the constants of the rods accurately determined, the rod supports entirely satisfactory, and the two runnings made on different days and under different atmospheric conditions as far as rising and falling temperatures are concerned.

ERRORS DUE TO ATMOSPHERIC CONDITIONS.

There is usually some systematic error in a single running of a line, the size and sign of which probably depend upon the direction of the running with respect to the sun, the time of day, or the movement of the air or possibly upon all of these three causes combined. Observers have reported that the two runnings of a section on a clear day or days agree more closely when the wind has a decided velocity than when the wind is very light or it is calm. This seems to be possible, for when the air is in motion the temperature is more likely to be uniform throughout the layers through which the line of sight passes, and the refraction should be more nearly the same on the back and forward sights.

The errors outside of the instrument and the observer which may affect a single running in a systematic manner can be made to act as accidental errors by running the second measure under the opposite conditions. For instance, if the first running has been made in the forenoon with a rising temperature and with the sun to the eastward the second measure should be made in the afternoon with a falling temperature and with the sun to the westward. This does not apply to cloudy days, when it is believed the systematic errors due to atmospheric conditions are negligible.

It is possible that there is an error in the mean of the two measures of a section where one running is made on a clear and the other on a cloudy day, but it would be difficult to show that this is true, for any systematic error on a short section of a line (say 1 kilometer) is very small compared with the accidental errors.

SYSTEMATIC ERRORS ON SLOPES.

It is believed that systematic errors are more likely to occur on steep grades if the observing is done at times when the surface of the ground and the air have different temperatures. If the air has a uniform temperature, or temperatures varying uniformly with the height above sea level, then the density of any layer of air at a certain elevation above sea level will be the same throughout the layer. The effect of barometric pressure and the hygrometric condition of the atmosphere at different points within the distance considered (300 meters between the two rods) may be considered as having no effect in causing a different density in the layer. Under this condition of uniform temperature, or temperatures varying uniformly with regard to elevation above sea level, there will be the same amount of refraction on the backsights

and foresights when these are of equal length. But when the air and the surface of the ground have different temperatures the layer of air in contact with the surface will assume a temperature nearly that of the ground and consequently the density of the air will tend to vary with its distance from the surface of the ground instead of with the elevation above sea level. (This will of course be true for only a short distance from the ground, say 1 or 2 meters.) If the ground is level there will be no difference in the amount of refraction on the two sights, but if the ground is sloping the sight up the slope will pass through layers of air of different densities, while the lower sight will go through air in a normal state so far as the arrangement of its densities is concerned. The effect of the refraction on the rod reading on the upper sight will be of one sign if the surface of the ground is colder than the air, and the opposite sign if the surface is warmer than the air. These errors are no doubt smaller when the wind is blowing and the air stirred. On cloudy days the temperature of the air and the surface of the ground are supposed to be more nearly the same and consequently the refraction error on the slope would not be so large as on a clear day. The refraction error on a clear day should be at a minimum during the several hours in the middle of the day when the temperatures of the air and the surface of the ground are nearly the same, and greatest in the morning and the late afternoon, but should have opposite signs during those two periods.

As stated above, this refraction error should be entirely absent if the ground is level or nearly so and the backsights and foresights at a station are equal in length. It should reach a maximum on steep grades where the line of sight up the slope comes very close to the bottom of the rod. This error may be made small by never letting the line of sight come near the ground. It is impossible to predict what the safe height is, but it is believed that if the lower one of the three wires reads more than 30 centimeters above the ground most of the trouble will be avoided.

RELATION BETWEEN THE SYSTEMATIC ERROR AND THE VALUE OF B—F.

The value of the accumulated difference between the two runnings of a line does not, in the writers' opinion, give an accurate idea of the size of the systematic error in the line. This value of B—F as a rule can be controlled by the observer varying the program of his work. It might be possible to hold the value of B—F nearly to zero, or the value might be very large, yet the mean of the two runnings would be the same in each case. The best measure of the systematic error is believed to be in the loop closures, and for this purpose small loops are better than large ones. In that portion of the United States to the west of the Mississippi River the loops in the precise level net are, as a rule, very large at present. The leveling planned for the future will cut up those large loops into a number of smaller ones.

For additional remarks on the errors of leveling, see "Comments on the General Instructions," on pages 12 to 14.

EXAMPLES OF RECORD AND COMPUTATION.

A specimen * of the determination of *C* as actually made in the field in accordance with paragraph 12 of the General Instructions is given below, together with suggestions which were furnished to the observers.

Determination of C, 8.20 a. m., August 28, 1900.

Left-hand page.

Number of station.	Thread reading, backsight.	Mean.	Thread interval.
A	1515 1528 1542	1528.3	13 14 27
B	2252 2357 2462	2357.0	105 105 210
		0461.7	419
		2818.7	52
Cor. for curv. and ref.		−0.8	367
		2817.9	

Right-hand page.

Rod.	Thread reading, foresight.	Mean.	Thread interval.
W	0357 0462 0566	0461.7	105 104 209
W	1276 1288 1301	1288.3	12 13 25
		1528.3	
		2816.6	
		2817.9	
		367) −1.3	(−0.004=C

* The unit of length used in this specimen is the millimeter.

Only the distant rod readings need be corrected for curvature and refraction, and the two corrections for the two distant rods may be combined as indicated.

Note that if the transfers of figures across from page to page are made as indicated all subtractions are made right side up.

Do not carry C to more than three decimal places.

When the instrument must be adjusted, due to too large a value for C, do it by raising or lowering one end of the level vial and *not by moving the reticle.*

The adjustment is made as follows: Point to a distant rod with the bubble in the middle of its tube, and read. Move the telescope so as to raise the middle line by an amount equal to C times the rod interval. While holding the telescope in this position bring the bubble to the middle of the tube by raising or lowering one end of the level vial. If C is negative the middle line must of course be lowered on the rod.

The following examples of the record and computation will serve to explain the method of observation still further:

Left-hand page. *Spirit leveling.* Right-hand page.

Date: August 29, 1900. Forward-Backward. From B. M.: 68 To B. M.: G.
Sun: C. (Strike out one word.) Wind: S. T

No. of station.	Thread reading, backsight.	Mean.	Thread interval.	Sum of intervals.	Rod and temp.	Thread reading, foresight.	Mean.	Thread interval.	Sum of intervals.
43	0674		99		V	2683		99	
	0773	0773.0	99		33	2782	2782.3	100	
	0872		198			2882		199	
44	0925		106		W	2415		103	
	1031	1030.3	104		35	2518	2518.0	103	
	1135		210	408		2621		206	405
45	0484		98		V	2510		96	
	0582	0582.3	99		35	2606	2606.0	96	
	0681		197	605		2702		192	597
46	0398		97		W	2859		96	
	0495	0495.0	97		34	2955	2954.7	95	
	0592		194	799		3050		191	788
47	1027		26		V	1006		29	
	1053	1053.3	27		34	1035	1034.7	28	
	1080		53	852		1063		57	845
		3933.9					11895.7 -7961.8		
								2:25 p. m	

The explanation of the symbols used after the words "Sun" and "Wind" is printed on the bottom of the computation form shown later. The unit in the record is the millimeter. The instrument stations (not turning points) are numbered consecutively throughout the day. A rod once placed at a point stays there, both for the foresight and backsight, each rodman thus being front and back rodman alternately. To carry out the requirement of the general directions, that at stations of odd numbers the backsight is to be taken before the foresight, and at even stations the foresight is to be taken first, it is only necessary to remember that this is equivalent to the statement that one particular rodman must always show his rod first after each placing of the instrument. The position of the rod is indicated in the record on the foresight only. The temperature is read by the back rodman just before he moves forward, and is called out to the recorder when the rodman passes.

The columns headed "Thread interval" show the intervals between the lower and middle threads as seen projected on the rod, and the middle and the upper, and finally the total interval. The columns headed "Sum of intervals" show the continuous sum of the total intervals, and as these values are proportional to the sums of the backsight distances and foresight distances, respectively, they enable the observer to keep these two sums nearly equal at all times, as required by the instructions, for the purpose of eliminating instrumental errors.

Such portions of the computation as are shown as forming a part of the record are kept up by the recorder as the work progresses. The instrument is not moved forward from any station until the recorder announces that the readings at that station check properly. The recorder uses, as a short method of computing the mean of the three thread readings, the fact that the difference of the upper and lower intervals divided by 3 is the correction to be applied with the proper sign to the middle thread reading to give the mean of the three.

But little explanation is needed in connection with the computation form shown on page 25. The forward line from B. M. 68 to B. M. G. on this form is that for which the record is given.

The fifth column on the left-hand page is derived from the fourth by using the sufficiently exact relation that 287 millimeters subtended on the rod corresponds to 100 meters along the line, regardless of the lengths of the separate sights.

The corrections for curvature and refraction shown in the first column of the right-hand page are those due to the slight differences of corresponding foresights and backsights, no correction being necessary when the corresponding sights are exactly equal. The correction is usually inappreciable and seldom exceeds 0.1 millimeter under actual conditions. It may be applied very quickly by the use of tables (see pp. 26 to 29) and a rapid inspection of the record books. It is important to note that this is, in the main, a correction for curvature, a quantity which is not uncertain, the uncertain refraction being upon an average about one-eighth as great as the curvature.

The level correction shown in the second column of the right-hand page is equal to the constant C (defined in paragraph 21 of the general instructions) times the value in the sixth column of the left-hand page. Its sign is fixed by the signs of the two factors. This correction will very seldom exceed 0.3 millimeter under actual conditions and will not sensibly differ from zero on most sections, since the instructions require (par. 11) that the sum of the foresight rod intervals on any section shall be nearly equal to the sum of the backsight rod intervals.

The third column is for the index error which takes account of the fact that the zero of graduation and the foot of the rod are not exactly coincident. As the index errors of two rods forming a pair are made the same this correction is necessary only when a metal tape is used on a bench mark that is not accessible with a rod.

The fourth column gives the correction due to the excess of length of the rod at zero degrees, this particular rod being 0.28 millimeter too long on each meter. The examinations of the rods made at the office show that the error of graduation is, with sufficient accuracy, proportional to the distance along the rod. The next column gives the correction due to the expansion of the rod from zero to the temperature of observation, computed with the known coefficient of expansion of the rods, namely, 0.000004 per degree Centigrade. The sum of the quantities in the fourth and fifth columns in any line gives the correction due to the excess of length of the rod at the temperature of observation. For these particular rods, which are long, even at zero, the correction in each of these columns will always have the same sign as the measured difference of elevation.

The last four columns on this form are for use whenever special studies are to be made to determine, if possible, the sources of the principal errors of leveling. It should be noted that the times of the backward and forward runnings of any section, as indicated in the last column, have no fixed relation to each other. The two runnings are sometimes made on the same day, sometimes on different days, and in some instances they both occur in the forenoon, at other times both in the afternoon, and frequently they occur in opposite halves of the day. Any long portion of the line will show corresponding forward and backward measurements having all possible relations to each other as to the time of day.*

* The present practice is to have the two runnings on different days and at different times of the day if practicable.

Left-hand page. *Computation of precise levels.* Right-hand page.

Line: Somerset, Ky., to Knoxville, Tenn. Observer: W. H. B. Year: 1900.

Bench marks.	Forward or backward.	Number of stations.	Sum of rod intervals.	Distance in kilometers.	Rod intervals ΣB−ΣF.	Mean rod readings. ΣB	Mean rod readings. ΣF	Approximate difference of elevation.	Mean temperature of rods.	Corrections. Curvature and refraction.	Corrections. Level error.	Corrections. Index error.	Corrections. Length of rod.	Corrections. Temperature of rod.	Difference of elevation. Each line.	Difference of elevation. Mean.	Divergence B−F.	Toward or from sun.	Sunshine or cloudy.	Wind.	Date and hour.
			mm.		*mm.*	*m.*	*m.*	*m.*		*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*m.*	*m.*	*mm.*				
65–66	F	9	3669	1.279	+ 5	10.6532	19.0087	− 8.3555	37			0.0	−2.4	−1.2	− 8.3591	− 8.3593	−0.4	L.	S	C	8/28– 9:15
	B	7	3675		+ 9	15.1650	6.8087	+ 8.3563	26	+0.1	−0.1		+2.4	+0.8	+ 8.3595				C	C	8/29– 9:00
66–67	F	8	3738	1.302	+12	17.6667	10.4370	+ 7.2297	32		−0.1		+2.1	+0.9	+ 7.2326	+ 7.2332	+1.2		C	C	8/29–11:05
	B	7	3739		−23	7.8223	15.0537	− 7.2314	23	+0.1	+0.2		−2.1	−0.6	− 7.2338				C	C	8/29– 7:45
67–68	F	13	4198	1.464	+ 4	15.5276	31.8222	−16.2946	33				−4.6	−2.1	−16.3013	−16.3008	+1.0	T.	S & C	C	8/29– 1:30
	B	8	4206		−24	21.5524	5.2587	+16.2937	28	+0.1	+0.1		+4.6	+1.8	+16.3003				C	C	8/28– 5:00
68–G	F	5	1697	0.590	+ 7	3.9339	11.8957	− 7.9618	35		−0.1		−2.3	−1.1	− 7.9653	− 7.9647	+1.2		C	S	8/29– 2:15
	B	6	1691		− 5	12.5587	4.5979	+ 7.9608	31				+2.3	+1.0	+ 7.9641				C	C	8/31– 9:10
G–69	F	11	5126	1.785	− 2	28.4990	5.8171	+22.6819	30				+6.5	+2.7	+22.6911	+22.6910	−0.3	R.	S & C	T S	8/29– 3:15
	B	11	5120		+14	6.3550	29.0368	−22.6818	27				−6.5	−2.5	−22.6908				C	F M	8/31– 8:30
69–70	F	12	4589	1.602	−23	17.7855	22.7719	− 4.9864	22	+0.1	−0.1		−1.4	−0.4	− 4.9882	− 4.9901	−3.8		C	C	8/30– 7:15
	B	9	4607		− 9	17.5312	12.5410	+ 4.9902	22				+1.4	+0.4	+ 4.9920				C	C	8/30– 4:30
70–71	F	10	5000	1.740	+ 6	6.9331	27.1772	−20.2441	25				−5.8	−2.0	−20.2519	−20.2530	−2.2		C	C	8/30– 8:15
	B	10	4987		− 5	26.9183	6.6720	+20.2463	24	+0.1			+5.8	+1.9	+20.2541				C	C	8/30– 3:30
71–72	F	10	4076	1.420	+ 2	10.5955	26.0830	−15.4875	33				−4.4	−2.0	−15.4939	−15.4932	+1.4	L.	S	C	8/30– 9:15
	B	8	4073		+ 3	21.0375	5.5510	+15.4865	26				+4.4	+1.6	+15.4925				C	C	8/30– 2:40

Abbreviations: S=sunshine. C=cloudy. S & C=alternate sunshine and shade.
Abbreviations, strength of wind: S=strong. M=moderate. C=calm.
Abbreviations, direction of progress relative to sun:
$\frac{T}{F}$=within 45° of directly $\frac{\text{toward}}{\text{from}}$ sun. $\frac{Tr}{Fr}$=$\frac{\text{toward}}{\text{from}}$ sun, but at an angle of more than 45° to right. $\frac{Tl}{Fl}$=ditto with sun to left.
$\frac{R}{L}$=sun to $\frac{\text{right}}{\text{left}}$ and nearly at right angles to line. The same abbreviations also apply to the direction of progress relative to the wind

The following abstract of results is the form actually used in collecting the results of the computation indicated above. It is essentially a summary and combination of the values derived on the computation form. The computation is discontinuous, showing results from separate sections, while this abstract is continuous.

Left-hand page. Right-hand page.

Abstract of spirit-level results.

State: Tennessee. Instrument: Level No. 8. Rods: V. & W. Observer: W. H. B. Computers: W. H. D. W. H. B.

Date.	From B. M. to B. M.	Distance in kilometers.	Difference of elevation.			Discrepancy.		No. of B. M.	Distance from B. M. A_5 at Ludlow, Ky.	Elevation above mean sea level.	Locality.
			Forward line.	Backward line.	Mean.	Partial.	Total accumulated.				
			m.	*m.*	*m.*	*mm.*	*mm.*		*km.*	*m.*	
Aug. 28-29	65-66	1.279	− 8.3591	+ 8.3595	− 8.3593	−0.4	+108.7	66	365.848	424.5262	Stone post at Sunbright, Morgan County, Tenn.
29	66-67	1.302	+ 7.2326	− 7.2338	+ 7.2332	+1.2	+109.9	67	367.150	431.7594	
28-29	67-68	1.464	−16.3013	+16.3003	−16.3008	+1.0	+110.9	68	368.614	415.4586	
29-31	68-G	0.590	− 7.9653	+ 7.9641	− 7.9647	+1.2	+112.1	G	369.204	407.4939	
29-31	G-69	1.785	+22.6911	−22.6908	+22.6910	−0.3	+111.8	69	370.989	430.1849	
30	69-70	1.602	− 4.9882	+ 4.9920	− 4.9901	−3.8	+108.0	70	372.591	425.1948	
30	70-71	1.740	−20.2519	+20.2541	−20.2530	−2.2	+105.8	71	374.331	404.9418	
30	71-72	1.420	−15.4939	+15.4925	−15.4932	+1.4	+107.2	72	375.751	389.4486	

CORRECTION TABLES.

For convenience there are inserted here three tables which are useful in making the foregoing computations.

The table of total correction for curvature and refraction is for use in computing C, in making river crossings, and in general wherever the total correction is required. In computing this table the refraction was assumed to be equal to one-eighth the curvature.

Total correction for curvature and refraction.

Distance.	Correction to rod reading.	Distance.	Correction to rod reading.
m. *m.*	*mm.*	*m.*	*mm.*
0 to 27	0.0	160	−1.8
28 to 47	−0.1	170	−2.1
48 to 60	−0.2	180	−2.3
61 to 72	−0.3	190	−2.6
73 to 81	−0.4	200	−2.8
82 to 90	−0.5	210	−3.0
91 to 98	−0.6	220	−3.3
99 to 105	−0.7	230	−3.7
106 to 112	−0.8	240	−4.0
113 to 118	−0.9	250	−4.3
119 to 124	−1.0	260	−4.7
125 to 130	−1.1	270	−5.0
131 to 136	−1.2	280	−5.4
137 to 141	−1.3	290	−5.8
142 to 146	−1.4	300	−6.2
147 to 150	−1.5		

The table for the differential correction for curvature and refraction is for use in deriving the corrections shown in the first column of the right-hand page of the computation indicated on page 25. The table was computed upon the assumption that the refraction is one-eighth of the curvature, and that the stadia interval for the instrument is such that the distance from the instrument to the rod in meters is one-third of the interval subtended on the rod in millimeters. An inspection of the table will show that it is sufficiently accurate for use even though the stadia interval differs from that stated by 10 per cent or more.

Differential correction for curvature and refraction.

Mean length of sight in rod interval in millimeters.	Difference of sights in rod interval in millimeters.																												
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58
10	.0	.0	.0	.0	.0																								
20	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0																			
30	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0														
40	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0									
50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0				
60	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1
70	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1
80	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1
90	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
100	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
110	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
120	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
130	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
140	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
150	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
160	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
170	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2
180	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2
190	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2
200	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2
210	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2
220	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2
230	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2
240	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2
250	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
260	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
270	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
280	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
290	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.3
300	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.3	.3
310	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.3	.3	.3
320	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3
330	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3	.3
340	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3	.3
350	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3	.3	.3
360	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3	.3	.3	.3
400	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3	.3	.3	.3	.3	.4
440	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3	.3	.3	.3	.3	.4	.4	.4
480	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3	.3	.3	.4	.4	.4	.4	.4	.4
520	.0	.0	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3	.3	.3	.3	.4	.4	.4	.4	.4	.4	.4

The sign of this correction is positive when the foresight is the longer, that is, when the stadia interval subtends more divisions on the rod for the foresight than for the backsight.

The differential correction for curvature and refraction may also be taken from the following table, which is sometimes more convenient. It gives, for a given difference of rod intervals, the lower limiting values of the mean rod interval for which the correction is (to the nearest tenth of a millimeter) 0.1 millimeter, 0.2 millimeter, etc.

Thus, for a difference of rod intervals of 37 millimeters, there are given in the table the numbers 88.6, 265.8, and 442.9, under the respective headings 0.1 millimeter, 0.2 millimeter, 0.3 millimeter. This means that up to 88.6 millimeters the correction is 0.0 millimeter to the nearest tenth, from that point up to 265.8 the correction is 0.1 millimeter to the nearest tenth, and between 265.8 and 442.9 it must be taken as 0.3 millimeter.

The table is computed on the same assumptions as the preceding table, and the rule for the sign of the correction is the same, namely, positive when the foresight is the longer of the two sights, negative when it is the shorter. Numbers over 460 are omitted from the table.

Differential correction for curvature and refraction.

LIMITING VALUES OF THE MEAN ROD INTERVAL.

Difference of rod intervals.	Correction.				Difference of rod intervals.	Correction.			
	0.1 mm.	0.2 mm.	0.3 mm.	0.4 mm.		0.1 mm.	0.2 mm.	0.3 mm.	0.4 mm.
mm.					*mm.*				
8	409.7				35	93.7	281.0		
9	364.2				36	91.0	273.2	455.2	
10	327.8				37	88.6	265.8	442.9	
11	298.0				38	86.3	258.8	431.3	
12	273.2				39	84.0	252.1	420.2	
13	252.1				40	81.9	245.8	409.7	
14	234.1				41	79.9	239.8	399.7	
15	218.5				42	78.0	234.1	390.2	
16	204.9				43	76.2	228.7	381.1	
17	192.8				44	74.5	223.5	372.5	
18	182.1				45	72.8	218.5	364.2	
19	172.5				46	71.3	213.8	356.3	
20	163.9				47	69.7	209.2	348.7	
21	156.1				48	68.3	204.9	341.4	
22	149.0	447.0			49	66.9	200.7	334.5	
23	142.5	427.5			50	65.6	196.7	327.8	458.9
24	136.6	407.9			51	64.3	192.8	321.4	449.9
25	131.1	393.3			52	63.0	189.1	315.2	441.2
26	126.1	378.2			53	61.8	185.5	309.2	432.9
27	121.4	364.2			54	60.7	182.1	303.5	424.9
28	117.1	351.2			55	59.6	178.8	298.0	417.2
29	113.0	339.1			56	58.5	175.6	292.7	409.7
30	109.3	327.8			57	57.5	172.5	287.5	402.5
31	105.7	317.2			58	56.5	169.5	282.6	395.6
32	102.4	307.3			59	55.6	166.7	277.8	388.9
33	99.3	298.0			60	54.6	163.9	273.2	382.4
34	96.4	289.2							

The table of temperature corrections is for use in deriving the values shown in the fifth column of the right-hand page of the computation indicated on page 25, the length of the rod at zero degrees Centigrade having been used in deriving the third column. The table is computed on the assumption that the coefficient of expansion of the rod is four parts in a million per degree Centigrade. The sign of the correction is always the same as the sign of the measured difference of elevation unless the temperature is below the Centigrade zero.

Correction for temperature (in millimeters).

Temp. C.	Difference of elevation in meters.													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
2	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1
3	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2
4	.0	.0	.0	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2
5	.0	.0	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.3	.3
6	.0	.0	.1	.1	.1	.1	.2	.2	.2	.2	.3	.3	.3	.3
7	.0	.1	.1	.1	.1	.2	.2	.2	.2	.3	.3	.3	.4	.4
8	.0	.1	.1	.1	.2	.2	.2	.3	.3	.3	.4	.4	.4	.4
9	.0	.1	.1	.1	.2	.2	.2	.3	.3	.4	.4	.4	.5	.5
10	.0	.1	.1	.2	.2	.2	.3	.3	.4	.4	.4	.5	.5	.6
11	.0	.1	.1	.2	.2	.3	.3	.4	.4	.4	.5	.5	.6	.6
12	.0	.1	.1	.2	.2	.3	.3	.4	.4	.5	.5	.6	.6	.7
13	.0	.1	.2	.2	.3	.3	.4	.4	.5	.5	.6	.6	.7	.7
14	.1	.1	.2	.2	.3	.3	.4	.4	.5	.6	.6	.7	.7	.8
15	.1	.1	.2	.2	.3	.4	.4	.5	.5	.6	.7	.7	.8	.8
16	.1	.1	.2	.3	.3	.4	.4	.5	.6	.6	.7	.8	.8	.9
17	.1	.1	.2	.3	.3	.4	.5	.5	.6	.7	.8	.8	.9	.9
18	.1	.1	.2	.3	.4	.4	.5	.6	.6	.7	.8	.9	.9	1.0
19	.1	.2	.2	.3	.4	.5	.5	.6	.7	.8	.8	.9	1.0	1.1
20	.1	.2	.2	.3	.4	.5	.6	.6	.7	.8	.9	1.0	1.0	1.1
21	.1	.2	.2	.3	.4	.5	.6	.7	.8	.8	.9	1.0	1.1	1.2
22	.1	.2	.3	.4	.4	.5	.6	.7	.8	.9	1.0	1.1	1.1	1.2
23	.1	.2	.3	.4	.5	.6	.6	.7	.8	.9	1.0	1.1	1.2	1.3
24	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.2	1.3
25	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4
26	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.5
27	.1	.2	.3	.4	.5	.6	.8	.9	1.0	1.1	1.2	1.3	1.4	1.5
28	.1	.2	.3	.4	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4	1.6
29	.1	.2	.4	.5	.6	.7	.8	.9	1.0	1.2	1.3	1.4	1.5	1.6
30	.1	.2	.4	.5	.6	.7	.8	1.0	1.1	1.2	1.3	1.4	1.6	1.7
31	.1	.2	.4	.5	.6	.7	.9	1.0	1.1	1.2	1.4	1.5	1.6	1.7
32	.1	.3	.4	.5	.6	.8	.9	1.0	1.2	1.3	1.4	1.5	1.7	1.8
33	.1	.3	.4	.5	.7	.8	.9	1.1	1.2	1.3	1.4	1.6	1.7	1.8
34	.1	.3	.4	.5	.7	.8	1.0	1.1	1.2	1.4	1.5	1.6	1.8	1.9
35	.1	.3	.4	.6	.7	.8	1.0	1.1	1.3	1.4	1.5	1.7	1.8	2.0

Correction for temperature (in millimeters)—Continued.

Temp. C.	Difference of elevation in meters.													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
36	.1	.3	.4	.6	.7	.9	1.0	1.2	1.3	1.4	1.6	1.7	1.9	2.0
37	.1	.3	.4	.6	.7	.9	1.0	1.2	1.3	1.5	1.6	1.8	1.9	2.1
38	.1	.3	.5	.6	.8	.9	1.1	1.2	1.4	1.5	1.7	1.8	2.0	2.1
39	.2	.3	.5	.6	.8	.9	1.1	1.2	1.4	1.6	1.7	1.9	2.0	2.2
40	.2	.3	.5	.6	.8	1.0	1.1	1.3	1.4	1.6	1.8	1.9	2.1	2.2
41	.2	.3	.5	.7	.8	1.0	1.1	1.3	1.5	1.6	1.8	2.0	2.1	2.3
42	.2	.3	.5	.7	.8	1.0	1.2	1.3	1.5	1.7	1.8	2.0	2.2	2.3
43	.2	.3	.5	.7	.9	1.0	1.2	1.4	1.5	1.7	1.9	2.1	2.2	2.4
44	.2	.3	.5	.7	.9	1.1	1.2	1.4	1.6	1.8	1.9	2.1	2.3	2.5
45	.2	.3	.5	.7	.9	1.1	1.3	1.4	1.6	1.8	2.0	2.2	2.3	2.5

STATISTICS OF LINES.

The principal items of information in regard to the Coast and Geodetic Survey level lines are given in the tables below in the same form as the tables on pages 224–225 of Appendix 3, Report for 1903, and pages 14 and 15 of "Precise Leveling in the United States, 1903–1907," arranged in such a manner as to be conducive to comparison between lines.

The number of permanent bench marks includes all with which the leveling was directly connected, regardless of whether they are new bench marks or bench marks previously established by some other party or organization.

The average distance between bench marks was obtained by dividing the total length of the main line by the number of permanent bench marks.

The speed was obtained by dividing the total length of the line by the interval in months from the date of the first leveling to the date of the last, inclusive. The expression "total length" refers to the completed line. Each completed section of the line was leveled at least twice, and in some cases four or more times. To obtain the speed in terms of single line one must therefore multiply the speed here given by a factor somewhat greater than two.

The discrepancy in millimeters per kilometer was obtained by dividing the total discrepancy on the main line by the length of the main line.

The probable error of the mean result for a section was computed by the formula

$$r'' = 0.674\sqrt{\frac{\Sigma d^2}{4s}}$$

in which d is the discrepancy between the forward and backward leveling over a section and s is the number of sections. The probable error for 1 kilometer, r_1, was derived by assuming that the average length of a section is to 1 kilometer as $(r'')^2$ is to r_1^2.

Line.	San Diego to Barstow, Cal.	Pocatello, Idaho, to Butte, Mont.	Ogden to Salt Lake City, Utah, and Barstow, Cal., to Las Vegas, Nev.	Butte to Huntley, Mont.	Las Vegas, Nev., to Zenda, Utah.	Salt Lake City to Zenda, Utah.
Observer	E. H. P.	E. H. P. and H. M. R.	H. M. R.	H. M. R.	F. K.	H. W. M.
Instrument	7	7	7	7	7	8
Date of first leveling	Mar. 5, 1906	June 26, 1906	Oct. 17, 1906*	May 31, 1907	Mar. 26, 1908	Apr. 13, 1908
Date of last leveling	June 7, 1906	Oct. 2, 1906	May 20, 1907	Sept. 10, 1907	July 18, 1908	July 18, 1908
Length of main line, kilometers	375	427	456	409	404	324
Length of side lines, kilometers	7	12	32	3	1	13
Total length, kilometers	382	439	488	412	405	337
Total length, miles	237	273	303	256	252	209
Number of permanent bench marks	128	133	125	108	113	93
Average distance between permanent bench marks, in kilometers	3.0	3.3	3.9	3.8	3.6	3.6
Progress, kilometers per month	124	136	70	124	108	105
Progress, miles per month	78	85	43	77	67	65
Percentage run more than twice	15	18	26	16	21	28
Discrepancy (B–F), total millimeters	−32.3	−87.6	−15.2	+50.4	−122.7	+32.1
Discrepancy (B–F), millimeters per kilometer	−0.09	−0.21	−0.03	+0.12	− 0.30	+0.10
Probable error for 1 kilometer, in millimeters	± 0.9	± 0.9	± 1.0	± 1.0	± 0.8	± 0.9
Velocipede cars used	Yes.†	Yes.	No.	No.	Yes.	Yes.

* Leveling was interrupted for 5 days while party was moving from Salt Lake City to Barstow. † About one-half the time.

Line.	Crawford, Nebr., to Cadiz, Wyo.	Huntley, Mont., to Cadiz, Wyo.	Goffs, Cal., to Albuquerque, N. Mex.	El Reno, Okla., to Jericho, Tex.	Fort Worth to El Paso, Tex.	Jericho, Tex., to Isleta, N. Mex.
Observer	F. K.	H. W. M.	H. W. M.	F. K.	H. D. K. and C. M. C.	C. M. C.
Instrument	7	8	8	7 and 6	8	10
Date of first leveling	July 29, 1908	Aug. 20, 1908	Apr. 16, 1909	July 1, 1909	Apr. 4, 1910	June 5, 1911
Date of last leveling	Nov. 5, 1908	Nov. 6, 1908	Dec. 3, 1909	Sept. 14, 1909	Jan. 10, 1911	Nov. 6, 1911
Length of main line, kilometers	377	291	982	324	995	670
Length of side lines, kilometers	5	3	2	4	18	7
Total length, kilometers	382	294	984	328	1013	677
Total length, miles	237	183	611	204	629	421
Number of permanent bench marks	105	77	258	84	273	166
Average distance between permanent bench marks, in kilometers	3.6	3.8	3.8	3.9	3.7	4.1
Progress, kilometers per month	119	114	136	133	110	133
Progress, miles per month	74	71	85	83	68	83
Percentage run more than twice	14	19	23	16	21	7
Discrepancy (B–F), total millimeters	−24.8	−15.3	+60.8	−12.4	−72.1	+96.8
Discrepancy (B–F), millimeters per kilometer	−0.07	−0.05	+0.06	−0.04	−0.07	+0.14
Probable error for 1 kilometer, in millimeters	± 0.7	± 0.9	± 0.9	± 0.8	± 0.8	± 0.7
Velocipede cars used	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.

RATE OF PROGRESS ON RECENT PRECISE LEVELING.

On pages 390 and 391 of Appendix 3, Coast and Geodetic Report for 1903, and on pages 15 and 16, "Precise Leveling in the United States, 1903–1907," there are given data regarding the average rates of progress per month for the several leveling parties, the average monthly rate for all the work done with the new level, and there were also instanced a number of cases of unusually rapid leveling.

In the second publication mentioned above the statement is made that the average rate of progress for a leveling party had been 65 miles (104 kilometers) of completed line per month and that the average rate of progress for a whole line varied from 47 to 98 miles per month. Every mile of progress represents a mile leveled at least twice, once in the forward and once in the backward direction. The above average was obtained by using the total number of months of leveling and the total number of miles. If the unit had been the season the mean rate of progress per month for the 16 seasons considered would have been 66.4 miles (106.9 kilometers). The maximum rate of progress for a season is 95 miles (153 kilometers) per month.

There have been added by the Coast and Geodetic Survey to the level net of 1907, 12 seasons of leveling with rates of progress varying from 56 to 84 miles per month. The average rate of progress for all of the 12 seasons (giving each season unit weight) has been 73.6 miles of completed line per month.

The average monthly rate of progress for the 28 seasons' leveling run by the Coast and Geodetic Survey with the new type of instrument is 69.5 miles.

During 6* of the 28 seasons the average monthly rate of progress has been more than 80 miles. These were the following:

In 1902, leveling between Anthony, Kans., and Shreveport, La., 641 miles, rate 85 miles per month. W. H. Burger, chief of party and observer.

In 1905, leveling between Watertown, S. Dak., and Sioux City, Iowa, 237 miles. Rate 95 miles per month. J. B. Miller, chief of party and observer.

In 1905–6, leveling between Smithville and Galveston, Tex., 171 miles. Rate 81 miles per month. E. H. Pagenhart, chief of party and observer.

In 1909, leveling between El Reno, Okla., and Jericho, Tex., 204 miles. Rate 81 miles per month. Ford Kurtz, chief of party and observer.

In 1909, leveling between Goffs, Cal., and Albuquerque, N. Mex., 610 miles. Rate 82 miles per month. H. W. Maynard, chief of party and observer.

In 1911, leveling between Jericho, Tex., and Isleta, N. Mex., 422 miles. Rate 84 miles per month. C. M. Cade, chief of party and observer.

* After the manuscript for this report was sent to press, two precise leveling parties of this Survey at work in 1913 closed their seasons. Assistant J. H. Peters completed 334 miles of leveling to the northward of Butte, Mont., at the rate of 94 miles per month. The other party, first under Assistant C. M. Cade, then under Assistant G. D. Cowie, completed 341 miles of leveling to the westward of Crookston, Minn., at the rate of 89 miles per month. During the one and two-thirds months, while Mr. Cowie was in charge, a progress of 176 miles was made, at the rate of 105 miles per month.

COST OF RECENT PRECISE LEVELING BY THE COAST AND GEODETIC SURVEY.

The cost per completed mile for the 12 seasons' leveling added to the net since the adjustment in 1909 is shown below:

Years.	Location of season's work.	Cost per mile.
1906	San Diego, to Barstow, Cal	$9.40
1906	Pocatello, Idaho, to Butte, Mont	13.30
1906–7	Ogden to Salt Lake City, Utah, and Barstow, Cal., to Las Vegas, Nev	13.40
1907	Butte to Huntley, Mont	15.80
1908	Las Vegas, Nev., to Zenda, Utah	13.10
1908	Salt Lake City to Zenda, Utah	16.50
1908	Crawford, Nebr., to Cadiz, Wyo	12.80
1908	Huntley, Mont., to Cadiz, Wyo	14.00
1909	El Reno, Okla., to Jericho, Tex	12.70
1909	Goffs, Cal., to Albuquerque, N. Mex	11.90
1910–11	Fort Worth to El Paso, Tex	11.70
1911	Jericho, Tex., to Isleta, N. Mex	10.30

The average cost per mile for these seasons' leveling is $12.90. The average cost of the 16 seasons of leveling done with the recent instrument, which were included in the 1907 net adjustment, was $9.70 per mile. The average cost of the 28 seasons considered in the present net is $11.10 per mile of progress.

The average cost for the several seasons varies considerably, due to a number of causes. On some lines the party lived at hotels and boarding houses convenient to the work, while on others the members lived in a camp or an especially fitted car, and were forced to go out long distances to the work. Some of the lines were run up steep mountain grades while others were over flat prairies. In an old settled country there will be many masonry structures in which to set bench marks, while in a new or unsettled section bench marks must be especially constructed of stone or cement. The number of permanent bench marks used has some influence on the cost of the work. Differences in both the observing and party management of different chiefs of party produced variations in cost which were large in exceptional cases.

The above figures represent the actual cost of the leveling, including the establishment of the bench marks, with the exception of the cost of the instruments and stationery. It includes the transportation to and from the field paid by the Government and all wages and salaries, including those of the chief of party and recorder. The salary of each member of the permanent field force is charged to the leveling for the whole period during which he was engaged upon work incidental to the leveling, including the time spent in travel to and from the field, the time spent in preparing for the field and in completing field reports and records and computations at the end of the season. One-eleventh has been added to the salary actually paid each officer during the time he was connected with the leveling, to take account of the fact that the Government pays its permanent employees 12 months' salary for 11 months' work, upon an average.

The cost of computing a line of levels at the office is between 40 and 45 cents per kilometer, on an average. This computation does not include the orthometric correction nor any net adjustment.

New Lines of United States Coast and Geodetic Survey Leveling—Detailed Statement of Results.

SAN DIEGO TO BARSTOW, CAL.

This line was run by E. H. Pagenhart, Aid, between March 5, 1906, and June 7, 1906. The leveling started from seven tidal bench marks at San Diego, Cal., and followed the line of the Atchison, Topeka & Santa Fe Railway to Barstow, Cal.

Precise level No. 7 and rods R_2 and S were used. The lengths of these rods at 0° C., as determined by the Bureau of Standards, were:

Date.	Rod R_2.	Rod S.
	Meters.	*Meters.*
January, 1905	3.0009	3.0014
August, 1908	3.0017	3.0020

These measures show a slight lengthening of the rods. The interval between the office measurements of the rods is much longer than usual, due to the rods having been in use practically all the time. The field measurements of the rods during this period show nothing in regard to the time when the above change took place. It was assumed therefore that the lengthening was uniform and the mean length of the rods on April 20, 1906, 3.0014 meters, or an excess of 0.47 millimeter per meter was used in the computation. The index correction of rod R_2 was -0.6 millimeter; of rod S -0.9 millimeter.

Determination of mean sea level.

The results of the tide observations at San Diego are as follows:

	Feet.
1906	6.5026
1907	6.5574
1908	6.4612
Mean	6.5071±0.0188

The first series of readings is for 365 days beginning January 21, 1906, and each of the other series is a calendar year in length.

The direct results of the leveling are shown in the following tables, in which all the permanent bench marks are given.

If no distance is given in the fourth column, the bench mark is in the main line of levels. If a distance is given in the fourth as well as in the third column, the bench mark is on a spur and the distance in the fourth column shows the point at which the spur branches from the main line.

The elevations are based on an elevation of 3.49 feet = 1.0638 meters for the 10-foot mark on the tide staff at San Diego.

Results of leveling, San Diego to Barstow, Cal., 1906.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†
		km.	*km.*	*mm.*	*m.*			*km.*	*km.*	*mm.*	*m.*
San Diego	Tide Staff	0.0			1.0638	Near Don	165 S. B.	92.3	92.1	+ 2.4	50.5010
Do	Tidal 7	0.1		+ 0.8	0.5972	San Onofre	28 S. B.	100.5		+11.0	8.7382
Do	Tidal 6	0.2		+ 0.8	2.6079	Near San Onofre	V	101.1		+ 8.1	3.0437
Do	Tidal 3	0.2		+ 0.4	1.8797	Near Mateo	W	108.6		+14.2	4.6080
Do	Tidal 2	0.3		− 0.3	3.0744	Near Serra	X	116.0		+24.9	12.5745
Do	Tidal 5	0.3		− 0.3	2.3716	San Juan Capistrano	103 S. B.	119.0		+25.8	31.6775
Do	Tidal 4	0.4		0.0	3.8061	Do	Y	119.3		+25.0	36.8116
Do	Tidal 1	0.5		− 0.1	2.6584	Do	Z	119.8		+22.1	35.2811
Roseville	35 Sea	2.7		+ 0.3	10.7588	Near El Toro	A_1	127.3		+20.5	85.3434
Near Roseville	A	4.8		+ 0.5	10.1565	Do	278 S. B.	127.4	127.3	+20.2	85.0752
Near San Diego	B	9.5	7.5	− 2.4	6.2862	El Toro	444 S. B.	134.2		+15.8	135.6062
San Diego	C	11.2	7.5	0.0	7.1818	Near Irvine	B_1	140.4		+11.7	78.6695
Do	42 S. D.	12.5	7.5	− 2.9	12.9069	Irvine	C_1	142.8		+10.6	59.1100
Do	City	12.8	7.5	− 2.9	14.0584	Near Aliso	D_1	150.9		− 2.5	24.7690
Old Town	D	8.2		− 5.0	7.7510	Santa Ana	E_1	152.6		− 4.9	32.2083
American Park	25 S. D.	14.7		−10.2	7.7525	Do	F_1	154.3		− 3.9	37.4851
Near Atwood	E	15.9		− 6.9	19.1865	Do	City	155.1		− 3.5	39.0248
Near Ladrillo	F	19.0		−11.0	29.5797	Do	G_1	155.9		− 1.9	37.8424
Selwyn	G	24.5		0.0	70.8506	Do	H_1	156.3		− 2.3	40.6459
Linda Vista	376 S. D.	27.0		− 2.1	114.8304	Orange	I_1	161.9		+ 7.2	57.0100
Sorrento	31 S. D.	33.3		− 6.6	9.6358	Do	J_1	162.4		+ 5.6	60.2026
Do	H	33.4		− 7.3	12.3218	Near Orange	K_1	164.8		+ 5.1	57.4496
Near Del Mar	I	39.3		− 9.8	46.3322	Olive	L_1	168.3		+ 1.3	83.5734
Del Mar	J	40.8		− 9.8	27.5968	Near Olive	M_1	169.5		+ 1.3	73.4847
Near Encinitas	K	49.3		− 4.2	22.1713	Richfield	N_1	172.0		+ 1.3	75.0988
Encinitas	L	51.8		+ 0.6	28.0264	Near Yorba	RR	175.9		− 0.3	88.4993
Near Carlsbad	M	65.0		− 2.5	13.4600	Horse Shoe Bend	O_1	180.6		+ 0.5	116.3774
Carlsbad	N	66.2		− 3.0	16.9153	Near Gypsum	P_1	183.7		+ 2.4	122.5163
Oceanside	O	71.2		− 4.4	13.5404	Near Crary	Q_1	192.2		+12.4	143.2570
Do	P	71.7		− 3.7	25.5459	Crary	494 S. B.	194.1		+15.3	150.7553
Do	Q	72.0		− 3.1	20.6144	Near Crary	R_1	195.3		+13.6	154.5842
Do	R	72.1		− 1.6	19.6423	Corona	S_1	200.4		+10.4	184.8038
Near Las Flores	S	83.1		+ 3.8	22.8474	Do	T_1	201.2		+11.6	208.9460
Do	T	83.8		+ 0.4	17.7787	Do	City	201.3		+11.6	205.3812
Las Flores	84 S. B.	84.4		+ 0.4	25.8322	Riverside	U_1	206.8		+ 0.7	204.0361
Don	U	88.4		+ 3.0	41.6809						

* From Tide Staff at San Diego.
† These elevations are superseded by the standard elevations given in this publication, which depend on an adjustment.

Results of leveling, San Diego to Barstow, Cal., 1906—Continued.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†
		km.	*km.*	*mm.*	*m.*			*km.*	*km.*	*mm.*	*m.*
Riverside	687 May	208.3		− 0.3	209.6534	Near Summit	M_2	286.4		− 0.7	1136.9636
Do	V_1	210.3		+ 4.0	219.5815	Do	3462 S. B.	291.9		− 1.7	1055.5172
Do	814 Arlington	214.5		− 5.4	248.5107	Near Hesperia	N_2	298.8		+ 4.9	995.3828
Do	W_1	215.4		− 2.8	257.9051	Hesperia	3190 S. B.	300.8		+ 3.8	972.5461
Do	X_1	216.9		− 4.5	258.3422	Do	O_2	301.0		+ 5.8	969.2796
Do	861 Casa Blanca	218.4		− 7.6	262.6771	Near Hesperia	2856 Hesperia	308.8		− 0.7	870.8394
Do	863 Olivewood	221.9		−12.5	263.1845	Near Victorville	P_2	311.9		+ 4.1	837.2259
Do	Y_1	225.5		−12.2	258.4770	Victorville	2723 S. B.	313.8		+ 5.2	830.1357
Do	851 Riverside	226.0		− 9.9	259.5845	Do	Q_2	314.4		+ 3.9	829.2738
Do	Z_1	226.2		−10.3	261.3609	Do	R_2	314.5		+ 2.5	832.3207
Highgrove	945 Highgrove	232.0		− 3.1	288.2199	Near Victorville	S_2	315.5		+ 3.7	824.2829
Colton	A_2	237.6		− 6.6	298.0906	Oro Grande	T_2	322.7		− 7.7	807.0390
San Bernardino	B_2	241.0		−12.9	327.6286	Do	U_2	323.2		− 5.9	808.5591
Do	1048 S. B.	244.0	242.7	−13.7	319.5973	Near Oro Grande	V_2	327.2		− 4.5	785.0874
Do	C_2	244.3	242.7	−12.2	320.3156	Near Helen	W_2	332.3		− 9.4	768.9131
Do	City	244.6	242.7	−13.2	318.4861	Do	X_2	335.5		− 8.3	757.3096
Do	D_2	244.2		−10.2	335.2435	Helen	Y_2	340.2		−19.1	740.6139
Near Verdemont	1420 S. B.	250.4		− 3.6	433.0905	Near Helen	Z_2	342.8		−19.1	740.1976
Do	E_2	251.8		− 2.1	460.5566	Do	A_3	347.7		−27.9	724.2030
Verdemont	F_2	255.1		− 7.1	529.0367	Near Cottonwood	B_3	351.7		−27.1	710.3327
Devore	G_2	259.1		−12.4	616.3683	Cottonwood	C_3	355.0		−28.9	692.5162
Near Devore	2008 S. B.	259.9	259.1	−11.0	612.4807	Near Cottonwood	D_3	358.0		−34.5	688.4489
Keenbrook	H_2	266.0		− 3.1	755.9543	Do	E_3	360.5		−32.1	684.7466
Near Cajon	I_2	268.4		− 7.0	801.9511	Near Todd	F_3	366.6		−33.3	680.1013
Dell	2768 S. B.	270.4		− 5.7	843.8086	Near Barstow	G_3	372.5		−35.4	651.8559
Cajon	J_2	272.9		−12.5	892.3392	Barstow	H_3	374.0		−32.6	640.6592
Near Gish	K_2	276.8		−10.1	994.5880	Do	RR	374.3		−34.1	641.9385
Near Cajon	3685 S. B.	281.2		− 2.3	1123.2866	Do	I_3	374.4		−33.3	643.5276
Summit	L_2	283.4		+ 1.7	1165.3856	Do	J_3	374.6		−32.3	648.9277

* From Tide Staff at San Diego.
† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

POCATELLO, IDAHO, TO BUTTE, MONT.

This line was run between June 26, 1906, and October 2, 1906. E. H. Pagenhart, Aid, began the work and continued in charge until August 1, when the party was turned over to H. M. Roy, Aid, who completed the work. The leveling started from three bench marks in Pocatello, Idaho, and followed the Oregon Short Line Railroad to Butte, Mont.

Precise Level No. 7 was used for the entire line. Rods R_2 and S were used until July 28 and rods V and W for the remainder of the period of leveling. The lengths of rods R_2 and S and their index corrections are given in connection with the line San Diego to Barstow, Cal. (see p. 31). For the lengths of rods V and W and their index corrections, see line Ogden to Salt Lake City, Utah, page 34.

In the computations a mean length of 3.00146 meters, or an excess of 0.49 millimeter per meter, was used for rods R_2 and S and for rods V and W a mean length of 3.00182 meters, or an excess of 0.61 millimeter per meter.

The leveling between the three bench marks recovered at Pocatello, Idaho, showed that they had not been disturbed since their establishment in 1903.

The elevations in the following table depend on an elevation of 1358.2677 meters for bench mark A_3 at Pocatello, Idaho, which in turn depends on the 1907 adjustment of the precise level net.

Results of leveling, Pocatello, Idaho, to Butte, Mont., 1906.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B−F).	Observed elevation.†
		km.	*km.*	*mm.*	*m.*
Pocatello, Idaho	B_3				1359.8555
Do	A_3	0.0		0.0	1358.2677
Near Pocatello, Idaho	L_6	7.5		− 2.7	1361.1993
Near Ross Fork, Idaho	M_6	15.0		− 7.2	1361.5134
Ross Fork, Idaho	N_6	18.7		− 2.7	1358.3592
Do	O_6	19.0		− 2.7	1353.9012
Gibson, Idaho	P_6	27.4		− 3.6	1360.0463
Near Blackfoot, Idaho	Q_6	34.6		− 1.6	1365.7693
Do	O. S. L. 4	37.1		− 2.4	1367.8729
Blackfoot, Idaho	R_6	38.8		− 6.4	1371.1880
Do	S_6	38.8		− 6.1	1370.6736
Do	T_6	39.1		− 5.7	1370.5608
Do	U_6	39.2		− 5.2	1371.7785
Near Wapello, Idaho	V_6	48.0		− 9.8	1382.5362
Wapello, Idaho	W_6	48.6		− 10.9	1383.9345
Near Wapello, Idaho	X_6	52.0		− 10.7	1389.4880
Firth, Idaho	Y_6	57.5		− 11.4	1390.8146
Do	Z_6	58.1		− 8.4	1392.7443
Monroe, Idaho	A_7	62.3		− 12.1	1403.3645
Near Monroe, Idaho	B_7	64.6		− 7.3	1404.7436
Shelley, Idaho	C_7	67.3		− 6.3	1410.6071
Do	D_7	67.6		− 4.6	1409.8090
Near Idaho Falls, Idaho	E_7	74.9		− 11.0	1421.6931
Idaho Falls, Idaho	O. S. L. 7	81.0		− 15.2	1433.7267
Do	F_7	81.5		− 16.7	1435.1363
Do	G_7	81.9		− 16.0	1433.3349
Do	City	82.0		− 16.0	1433.9621
Do	H_7	82.2		− 15.3	1434.6404
Do	O. S. L. 6	82.5		− 16.4	1432.9877
Near Payne, Idaho	I_7	87.7		− 10.9	1438.8653
Do	J_7	93.8		− 20.6	1446.7699
Near Bassett, Idaho	K_7	101.2		− 27.9	1453.0604
Market Lake, Idaho	L_7	109.9		− 33.0	1455.1411
Do	M_7	110.4		− 30.1	1455.7031
Near Market Lake, Idaho.	N_7	111.5		− 29.9	1456.5684
Do	O_7	116.9		− 38.2	1461.0304
Near Hawgood, Idaho	O. S. L. 8	122.6	122.1		‡1468.860
Do	P_7	124.1		− 47.2	1475.4864
Hawgood, Idaho	Q_7	126.6		− 44.3	1468.8290
Hamer, Idaho	R_7	135.2		− 41.2	1463.2393
Near Camas, Idaho	S_7	140.0		− 47.6	1463.5268
Camas, Idaho	T_7	144.1		− 49.2	1468.1548
Near Camas, Idaho	U_7	147.9		− 53.9	1475.3771
Jones, Idaho	V_7	152.5		− 59.6	1492.2044
Near Jones, Idaho	W_7	155.5		− 58.4	1511.4977
Dubois, Idaho	X_7	163.3		− 66.8	1567.4016
Do	Y_7	163.4		− 67.7	1569.4858
Near High Bridge, Idaho.	Z_7	174.2		− 63.3	1671.5915
Do	A_8	175.6		− 59.5	1682.7814
High Bridge, Idaho	B_8	177.6		− 62.7	1689.7576
Do	O. S. L. 10	177.9	177.6		§1701.170
Near Spencer, Idaho	C_8	182.0		− 61.3	1779.2906
Spencer, Idaho	D_8	185.2		− 67.2	1792.9956
Do	E_8	185.3		− 67.5	1792.2514
Do	O. S. L. 11	185.4		− 67.9	1793.1553
Near Spencer, Idaho	F_8	188.0		− 67.7	1804.1909
Do	G_8	191.4		− 62.8	1834.4244
Near Humphrey, Idaho	H_8	193.2		− 59.3	1852.5528
Humphrey, Idaho	I_8	200.2		− 60.2	1979.0939
Do	J_8	200.8		− 58.4	1985.3890
Near Monida, Mont	K_8	207.7		− 57.6	2046.8101
Monida, Mont	A	211.5		− 55.6	2071.0615
Do	B	211.6		− 54.8	2069.2830
Near Monida, Mont	C	217.4		− 56.8	2030.7028
Near Williams, Mont	D	220.9		− 60.6	2023.6270
Do	E	224.5		− 71.5	2006.5101
Do	F	225.8		− 71.6	1995.1462
Do	G	230.2		− 73.3	1953.7909
Lima, Mont	H	235.9		− 80.2	1907.0584
Do	O. S. L. 14	236.1	235.9		§1907.942
Do	I	236.2		− 78.9	1906.4635
Near Dell, Mont	J	243.5		− 83.7	1852.2675
Near Dell, Mont	K	247.2		− 90.3	1834.5942
Dell, Mont	L	249.2		− 89.1	1833.3383
Do	M	249.6		− 90.3	1830.0255
Near Crab Tree, Mont	N	256.3		− 95.3	1786.2601
Crab Tree, Mont	O	259.0	259.0	− 97.2	1772.7492
Near Crab Tree, Mont	P	266.2		−101.6	1738.7446
Red Rock, Mont	Q	273.0		−102.1	1705.8005
Do	R	273.1		−102.4	1704.9617
Armstead, Mont	S	279.7		−104.7	1673.7743
Near Armstead, Mont	T	283.5		−108.3	1665.0063
Near Grayling, Mont	U	285.6		−103.0	1657.7663
Grayling, Mont	V	289.2		−104.4	1640.9366
Near Barratts, Mont	W	299.2		−106.2	1608.4590
Do	X	306.2		−104.4	1578.9610
Near Dillon, Mont	Y	308.2		−106.5	1571.8978
Dillon, Mont	O. S. L. 16	313.5		−103.1	1553.2764
Do	Z or magnetic station.	314.7		−105.5	1560.1796
Do	A_2	315.7		−103.6	1552.6785
Do	B_2	315.8		−104.6	1550.3374
Do	City	316.0	315.8		§1551.376
Near Bond, Mont	C_2	323.1		−103.0	1550.4308
Bond, Mont	D_2	326.2		−100.9	1572.9318
Near Apex, Mont	E_2	332.0		−104.4	1622.0609
Apex, Mont	F_2	335.7		− 96.7	1653.7608
Near Glen, Mont	G_2	345.5		− 88.7	1513.0183
Glen, Mont	H_2	349.1		− 93.4	1522.6679
Do	I_2	349.3		− 93.4	1524.3478
Near Lavon, Mont	J_2	353.4		− 92.0	1538.7730
Lavon, Mont	K_2	354.3		− 91.3	1540.0988
Browne, Mont	L_2	355.9		− 88.5	1544.3486
Near Melrose, Mont	M_2	361.4		− 80.8	1563.3347
Melrose, Mont	N_2	365.4		− 76.5	1579.9484
Do	O_2	365.5		− 77.8	1579.1668
Near Big Hole, Mont	P_2	372.9		− 81.3	1604.8665
Big Hole, Mont	Q_2	375.4		− 83.3	1612.5645
Maiden Rock, Mont	R_2	377.3		− 80.7	1620.4999
Near Divide, Mont	S_2	380.8		− 87.7	1629.0291
Divide, Mont	T_2	383.8	383.8	− 85.7	1644.3525
Woodin, Mont	U_2	390.4		− 75.1	1693.9665
Near Woodin, Mont	V_2	391.1		− 74.0	1698.3786
Beaudine's Spur, Mont.	W_2	397.9		− 81.4	1733.1968
Feely, Mont	X_2	401.1		− 84.8	1772.2683
Near Buxton, Mont	Y_2	405.7		− 86.0	1697.8905
Do	O. S. L.	405.8			§1696.906
Buxton, Mont	Z_2	407.5		− 85.1	1682.7488
Silver Bow, Mont	A_3	415.9		− 80.5	1626.7837
Do	5327 Butte.	416.0	415.9		1627.0293
Near Butte, Mont	5388 Butte.	420.9		− 86.7	1645.6896
Do	B_3	422.8		− 88.2	1650.6264
Do	C_3	424.6		− 87.7	1657.0764
Do	5441 R. H. C.	425.9		− 91.6	1659.5350
Butte, Mont	D_3	427.3		− 87.6	1674.2159
Do	E_3	427.8		− 89.9	1691.5855
Do	5563 R. H. C.	428.7		− 91.2	1696.7749
Do	5631 R. H. C.	429.5		− 87.6	1717.2764
Do	5712 Butte.	430.0		− 89.4	1741.8989
Do	5767 R. H. C.	430.6		− 88.8	1758.2839
Do	City	430.6	430.6		§1758.143
Do	5811 R. H. C.	431.0		− 88.3	1770.1596
Do	5716 R. H. C.	431.6		− 90.0	1742.7540
Do	5566 R. H. C.	433.1		− 92.2	1697.3407
Do	F_3	434.7		− 90.7	1679.1278
Do	5485 R. H. C.	435.0		− 90.6	1672.8296

* From A_7 at Pocatello.
† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.
‡ Unchecked elevation; spur line was run in one direction only.
§ Unchecked elevation.

OGDEN TO SALT LAKE CITY, UTAH.

This line was run by H. M. Roy, Aid, between October 17 and December 8, 1906. The leveling started from three bench marks at Ogden, Utah, and followed the Oregon Short Line Railroad to Salt Lake City.

Precise Level No. 7 was used. Rods V and W were used the first day of leveling and rods X and Y for the remainder of the period. The lengths of these rods as determined by the Bureau of Standards were as follows:

Date.	Rod V.	Rod W.	Date.	Rod X.	Rod Y.
	Meters.	*Meters.*		*Meters.*	*Meters.*
December, 1905	3.0014	3.0021	September, 1906	3.0020	3.0022
August, 1907	3.0015	3.0023	August, 1907	3.0015	3.0016

In the computation the August, 1907, value of 3.0019 meters was used for rods V and W and the September, 1906, value of 3.0021 meters for rods X and Y. The index corrections were as follows: rod V, −0.8 millimeter, rod W, −0.7 millimeter, rod X, +0.2 millimeter, rod Y, +0.1 millimeter.

The leveling between the two bench marks recovered at Ogden, Utah, showed that they had not been disturbed since their establishment.

The elevations in the following table are based on an elevation of 1308.7087 meters for bench mark A at Ogden which in turn depends on the level net adjustment of 1907.

Results of leveling, Ogden to Salt Lake City, Utah, 1906.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B−F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B−F).	Observed elevation.†
		km.	*km.*	*mm.*	*m.*			*km.*	*km.*	*mm.*	*m.*
Near Ogden	A	0.0	.....	0.0	1308.7087	Near Farmington	K_1	32.2	32.2	−0.6	1294.8609
Ogden	C	0.9	0.0	+1.4	1310.3558	Do	L_1	34.1	.....	−4.9	1294.3394
Near Evona	A_1	3.9	3.9	+4.9	1320.8820	Farmington	M_1	34.7	.....	−1.5	1297.9457
Near Roy	B_1	7.2	.....	+1.0	1342.2006	Near Farmington	N_1	38.0	.....	−3.6	1286.1725
Do	C_1	9.7	9.7	+0.8	1351.5553	Centerville	O_1	42.3	.....	+4.4	1293.3701
Near Syracuse Junction	D_1	15.7	.....	−1.3	1351.0143	Wood Cross	P_1	45.7	.....	−1.7	1307.7353
Near Syracuse Grove	Salt Lake NW. Base	24.0	15.7	−5.3	1288.8003	Simkins	Q_1	48.3	.....	+3.8	1303.9953
						Stock Yards Junction	R_1	50.6	.....	+0.5	1297.7801
Near Syracuse	K. S. 8	24.8	15.7	−3.8	1291.8816	Near Salt Lake City	S_1	55.0	.....	−1.2	1286.9194
Near Kaysville	Salt Lake SE. Base	32.9	15.7	−8.8	1283.2654	Salt Lake City	T_1	59.0	.....	−0.6	1297.7811
						Do	U_1	60.0	.....	−3.6	1319.2868
Near Layton	H_1	19.8	19.8	+1.2	1354.9971	Do	V_1	61.3	.....	−1.7	1297.5990
Layton	I_1	23.7	.....	−0.3	1326.9571	Do	W_1	62.6	.....	−5.1	1289.4123
Kaysville	J_1	27.1	27.0	−1.0	1307.9756						

* From A at Ogden.
† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

BARSTOW, CAL., TO LAS VEGAS, NEV.

This line was run by H. M. Roy, Aid, between December 13, 1906, and May 21, 1907. Three bench marks established earlier in the same year in Barstow were recovered. The leveling follows the Atchison, Topeka & Santa Fe Railway from Barstow to Leastalk, Cal., and the San Pedro, Los Angeles & Salt Lake Railroad from Leastalk, Cal., to Las Vegas, Nev.

Precise level No. 7 and rods X and Y were used. The lengths of these rods at 0° C., as determined by the Bureau of Standards, were:

Date.	Rod X.	Rod Y.
	Meters.	*Meters.*
September, 1906	3.0020	3.0022
August, 1907	3.0015	3.0016

The field measurements of the rods also show a slight shortening but there is no indication of any sudden change. It is assumed to be uniformly distributed between the first and the last leveling, over a period of 8.5 months, or at a rate of 0.065 millimeter per month. In the computation the mean length of the rods on various dates during the period of leveling was used. The index correction of rod X was 0.0 millimeter and of rod Y −0.1 millimeter.

The differences of elevation between the three bench marks recovered at Barstow agreed with the previous determinations within the limits of the accuracy of the leveling.

The elevations in the following table are based on an elevation of 648.9277 meters for bench mark J_3 at Barstow as determined by the line San Diego to Barstow.

Results of leveling, Barstow, Cal., to Las Vegas, Nev., 1906–7.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B—F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B—F).	Observed elevation.†
		km.	*km.*	*mm.*	*m.*			*km.*	*km.*	*mm.*	*m.*
Barstow, Cal	J_3	0.0	.....	0.0	648.9277	Near Fenner, Cal	G_5	201.2	.....	+15.6	582.4472
Near Nebo, Cal	K_3	5.0	.....	+10.6	629.3256	Fenner, Cal	H_5	206.8	.....	+26.0	638.8941
Do	L_3	10.4	.....	+19.1	616.6872	Near Piute, Cal	I_5	210.7	.....	+23.8	676.3303
Daggett, Cal	M_3	15.1	.....	+10.2	611.3408	Piute, Cal	J_5	214.0	.....	+23.6	709.7309
Near Daggett, Cal	N_3	20.2	.....	+ 1.1	602.6300	Near Goffs, Cal	K_5	218.4	.....	+23.7	753.4647
Minneola, Cal	O_3	24.9	.....	+ 6.3	583.6467	Goffs, Cal	L_5	222.3	.....	+24.0	786.6980
Near Minneola, Cal	P_3	28.9	.....	+ 3.4	574.0136	Near Goffs, Cal	M_5	222.9	.....	+26.6	783.9579
Newberry, Cal	Q_3	34.7	.....	+ 4.0	557.7046	Near Vontrigger, Cal	N_5	230.7	.....	+20.9	905.7935
Near Newberry, Cal	R_3	39.7	.....	+10.3	549.5648	Vontrigger, Cal	O_5	237.2	.....	+23.7	1026.7825
Troy, Cal	S_3	44.6	.....	+ 6.8	541.3559	Near Blackburn, Cal	P_5	239.9	.....	+24.8	1068.3848
Near Troy, Cal	T_3	50.2	.....	+ 6.9	546.4942	Blackburn, Cal	Q_5	243.1	.....	+19.1	1130.6389
Hector, Cal	U_3	55.4	.....	+ 4.7	567.6529	Near Ledge, Cal	R_5	250.3	.....	+16.2	1244.7605
Near Pisgah, Cal	V_3	60.3	.....	+ 7.9	614.5351	Ledge, Cal	S_5	257.8	.....	+ 6.8	1326.1257
Pisgah, Cal	W_3	64.4	.....	+ 6.0	655.0063	Near Ledge, Cal	T_5	259.3	.....	+ 9.1	1339.6395
Near Pisgah, Cal	X_3	68.0	.....	+ 4.6	660.8916	Purdy, Cal	U_5	262.4	.....	+ 8.0	1378.9099
Lavic, Cal	Y_3	71.6	.....	+ 6.9	661.8752	Near Barnwell, Cal	V_5	266.2	.....	+14.7	1443.0697
Near Lavic, Cal	Z_3	75.0	.....	+ 5.1	649.0385	Barnwell, Cal	W_5	269.6	.....	+11.8	1465.3769
Arctic, Cal	A_4	78.4	.....	+ 7.9	617.0068	Near Barnwell, Cal	X_5	272.8	.....	+ 6.8	1393.6038
Near Arctic, Cal	B_4	81.3	.....	+10.5	587.0684	Vanderbilt, Cal	Y_5	277.2	.....	− 1.4	1265.9829
Near Ludlow, Cal	C_4	84.6	.....	+ 0.5	555.4308	Near Vanderbilt, Cal	Z_5	280.3	.....	− 7.2	1183.2340
Ludlow, Cal	D_4	86.7	.....	− 1.9	540.3580	Leastalk, Cal	A_6	284.0	.....	− 7.2	1069.4460
Near Ludlow, Cal	E_4	89.1	.....	+ 0.4	534.2760	Near Leastalk, Cal	B_6	287.7	.....	− 7.6	1036.7937
Near Ash Hill, Cal	F_4	93.0	.....	+ 4.1	554.5882	Moore, Cal	C_6	291.3	.....	− 7.2	1000.8985
Ash Hill, Cal	G_4	97.5	.....	+10.4	592.3259	Near Nipton, Cal	D_6	296.2	.....	− 8.4	957.0015
Near Ash Hill, Cal	H_4	100.5	.....	+ 7.9	561.4786	Nipton, Cal	E_6	300.1	.....	−10.1	921.9867
Near Klondike, Cal	I_4	101.6	.....	+ 8.3	447.3884	Near Nipton, Cal	F_6	304.0	.....	−10.4	888.6824
Do	J_4	103.2	.....	+ 9.0	526.5860	Lyons, Cal	G_6	307.9	.....	−16.3	854.5739
Klondike, Cal	K_4	105.0	.....	+13.0	501.8297	Calada, Cal	H_6	315.7	.....	−16.8	836.7288
Near Siberia, Cal	L_4	109.6	.....	+12.8	440.3216	Roach, Nev	A	322.8	.....	− 1.1	796.2964
Siberia, Cal	M_4	113.2	.....	+ 5.2	389.0204	Borax, Nev	B	330.9	.....	+ 2.7	823.9529
Near Siberia, Cal	N_4	116.9	.....	+12.5	337.4333	Jean, Nev	C	338.2	.....	+ 0.8	873.6292
Nome, Cal	O_4	119.2	.....	+11.4	305.6462	Near Jean, Nev	D	341.9	.....	− 0.8	903.1638
Near Nome, Cal	P_4	122.2	.....	+11.1	273.0016	Sutor, Nev	E	345.5	.....	+ 4.4	924.5957
Bagdad, Cal	Q_4	125.1	.....	+ 9.9	241.0216	Near Erie, Nev	F	349.3	.....	+ 9.9	942.2219
Near Bagdad, Cal	R_4	131.4	.....	+11.4	222.5543	Erie, Nev	G	351.3	.....	+15.3	951.6085
Amboy, Cal	S_4	137.6	.....	+20.5	186.2600	Near Sloan, Nev	H	359.5	.....	+ 7.9	871.5414
Near Bengal, Cal	T_4	144.5	.....	+24.4	205.4868	Sloan, Nev	I	360.6	.....	+ 6.2	862.1967
Bengal, Cal	U_4	148.1	.....	+25.8	216.0383	Near Sloan, Nev	J	364.1	.....	+ 5.8	828.2862
Near Cadiz, Cal	V_4	154.4	.....	+28.8	206.3871	Bard, Nev	K	369.1	.....	− 6.1	784.7791
Do	W_4	158.2	.....	+35.7	231.4429	Near Arden, Nev	L	372.7	.....	− 6.2	758.6713
Cadiz, Cal	X_4	160.6	.....	+34.4	249.4960	Do	M	376.3	.....	− 9.0	731.9909
Near Siam, Cal	Y_4	166.0	.....	+29.6	291.1761	Do	2336 B	378.3	.....	−12.8	711.5799
Siam, Cal	Z_4	169.6	.....	+22.9	316.1902	Bracken, Nev	N	383.6	.....	−13.8	660.6493
Near Danby, Cal	A_5	175.2	.....	+17.6	360.6951	Near Bracken, Nev	2136 B	384.7	.....	−10.5	650.5533
Danby, Cal	B_5	181.0	.....	+14.2	412.0116	Las Vegas, Nev	O	390.7	.....	−12.7	618.3479
Near Arimo, Cal	C_5	185.8	.....	+13.1	448.5790	Do	2024 B	391.6	.....	−11.6	616.4339
Arimo, Cal	D_5	188.1	.....	+15.7	467.1310	Do	P	392.0	.....	−10.7	615.3470
Near Arimo, Cal	E_5	191.8	.....	+27.1	498.1629	Do	2033 B	392.4	.....	−10.1	619.1610
Essex, Cal	F_5	195.5	.....	+19.2	526.9931						

* From J_3 at Barstow.
† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

BUTTE TO HUNTLEY, MONT.

This line was run by H. M. Roy, Aid, between May 31, 1907, and September 10, 1907. The leveling started from several bench marks in Butte, and followed the Northern Pacific Railway to Huntley, Mont.

Precise level No. 7 was used. Rods X and Y were used up to July 4, and rods AA and BB for the remainder of the period of leveling. For the length of rods X and Y see line Barstow, Cal., to Las Vegas, Nev., page 35. The lengths of rods AA and BB as determined by the Bureau of Standards were:

Date.	Rod AA.	Rod BB.
	Meters.	*Meters.*
June, 1907	3.0010	3.0016
January, 1908	3.0008	3.0013

In the computation values interpolated for various dates during the period of leveling were used for the mean length of rods. The index correction for each of the rods X and Y was −0.2 millimeter, and for rods AA and BB it was 0.0 and −0.1 millimeter, respectively.

The leveling between the bench marks established the previous season at Butte, Mont., showed that they had remained undisturbed.

The elevations in the following table are based on an elevation of 1673.2159 * meters for bench mark D_3 at Butte, Mont.:

Results of leveling, Butte to Huntley, Mont., 1907.

Place.	Permanent bench mark.	Distance to bench mark.†	Distance to base of spur.†	Total discrepancy (B−F).	Observed elevation.‡
		km.	*km.*	*mm.*	*m.*
Butte	D_3	0.0	.....	.....	1673.2159
Near Butte	G_3	5.3	.....	+13.1	1708.8391
Skones	H_3	9.2	.....	+15.2	1791.8298
Highview	I_3	16.0	.....	+19.2	1926.6121
Homestake	J_3	16.7	.....	+18.5	1928.8301
Lewis Spur	K_3	19.4	.....	+23.2	1873.8567
Near Lewis Spur	L_3	22.5	.....	+26.2	1811.3388
Welch	M_3	26.3	.....	+29.3	1731.7624
Near Welch	N_3	30.0	.....	+36.2	1660.4291
Spire Rock	O_3	33.8	.....	+35.2	1588.3219
Near Pipestone	P_3	37.1	.....	+33.3	1522.6529
Pipestone	Q_3	41.6	.....	+28.8	1431.8870
Near Whitehall	R_3	47.0	.....	+28.9	1347.1116
Whitehall	S_3	52.6	.....	+31.5	1326.3450
Do	T_3	53.1	.....	+29.8	1328.6636
Near Whitehall	U_3	58.7	.....	+26.9	1312.2916
Jefferson Island	V_3	64.8	.....	+33.0	1301.4790
Near Lime Spur	W_3	68.5	.....	+34.3	1300.2174
Lime Spur	X_3	71.7	.....	+42.7	1292.6830
Near Lime Spur	Y_3	75.4	.....	+42.2	1290.4402
Near Sappington	Z_3	79.5	.....	+38.6	1283.7100
Sappington	A_4	84.1	.....	+37.4	1274.9167
Near Sappington	B_4	89.6	.....	+43.8	1267.6068
Willow Creek	C_4	94.9	.....	+42.8	1264.6002
Near Willow Creek	D_4	98.8	.....	+37.0	1250.1584
Near Three Forks	E_4	102.6	.....	+34.7	1243.3446
Three Forks	F_4	106.2	.....	+30.5	1238.0757
Do	I Three Forks.	107.8	.....	+29.5	1236.0693
Old Gallatin City	S. B. Gallatin.	111.8	.....	+31.3	1233.4364
Near Old Gallatin City	G_4	113.2	.....	+35.1	1229.9266
Do	Gauge B. M.	114.4	.....	+31.3	1231.1107
Near Logan	H_4	118.6	.....	+35.2	1239.6288
Logan	I_4	122.3	.....	+32.7	1248.9956
Near Manhattan	J_4	127.7	.....	+46.8	1281.2485
Manhattan	K_4	131.0	.....	+51.5	1291.7845
Near Manhattan	L_4	134.2	.....	+51.2	1298.3406
Central Park	M_4	138.2	.....	+46.6	1318.8602
Near Belgrade	N_4	142.6	.....	+48.9	1340.2565
Belgrade	O_4	146.1	.....	+46.6	1356.3042
Near Belgrade	P_4	150.1	.....	+42.9	1368.2063
Storey	Q_4	154.9	.....	+47.8	1401.2226
Bozeman	R_4	161.1	.....	+47.6	1447.6475
Near Bozeman	S_4	165.1	.....	+45.3	1472.2511
Near Gordon	T_4	171.7	.....	+33.0	1547.8522
Chestnut	U_4	175.1	.....	+34.1	1600.2672
Near West End	V_4	178.3	.....	+34.8	1651.6448
West End	W_4	180.2	.....	+34.5	1686.4814
Muir	X_4	182.5	.....	+31.8	1686.8865
Near Hoppers	Y_4	185.5	.....	+38.2	1626.7854
Hoppers	Z_4	187.6	.....	+43.9	1584.6586
Near Coal Spur	A_5	192.2	.....	+45.4	1487.8951
Do	B_5	197.9	.....	+48.4	1408.2089
Livingston	C_5	202.4	.....	+42.4	1370.6084
Do	D_5	202.7	.....	+42.2	1369.1779
Near Africa	E_5	206.6	.....	+39.8	1354.7035
Africa	F_5	208.5	.....	+41.3	1351.7405
Mission	G_5	215.0	.....	+50.8	1333.8181
Near Elton	H_5	220.2	.....	+48.0	1322.5376
Elton	I_5	224.1	.....	+46.3	1306.6860
Near Springdale	J_5	229.1	.....	+48.7	1296.9776
Springdale	K_5	234.0	.....	+56.4	1286.1374
Near Springdale	L_5	237.6	.....	+58.6	1276.7216
Carney	M_5	241.9	.....	+54.9	1264.3594
Dehart	N_5	249.6	.....	+44.2	1251.3007
Near Dehart	O_5	253.1	.....	+48.4	1254.8483
Bigtimber	P_5	258.2	.....	+42.4	1242.8868
Near Bigtimber	Q_5	262.1	.....	+41.7	1231.5699
Near Reynolds	R_5	268.5	.....	+52.3	1203.0515
Near Greycliff	S_5	271.9	.....	+57.7	1196.4159
Greycliff	T_5	275.4	.....	+66.4	1195.7051
Near Pateum	U_5	280.2	.....	+61.5	1174.5329
Pateum	V_5	283.2	.....	+57.3	1176.6278
Near Quebec	W_5	286.4	.....	+59.3	1160.9636
Reedpoint	X_5	296.9	.....	+57.9	1139.4453
Near Reedpoint	Y_5	298.9	.....	+61.8	1135.2731
Oneida	Z_5	302.3	.....	+68.8	1128.9427
Near Oneida	A_6	305.8	.....	+72.5	1127.5043
Merrill	B_6	310.2	.....	+72.6	1116.0807
Near Merrill	C_6	312.0	.....	+71.6	1114.0496
Wataga	D_6	315.8	.....	+66.4	1105.9019
Near Wataga	E_6	319.8	.....	+59.0	1098.1547
Columbus	F_6	323.6	.....	+59.3	1095.9733
Do	G_6	323.9	.....	+59.7	1091.6523
Near Columbus	H_6	327.7	.....	+58.9	1077.6728
Misko	I_6	333.3	.....	+62.1	1079.0200
Near Rapids	J_6	335.3	.....	+58.8	1067.5114
Rapids	K_6	337.2	.....	+56.6	1062.3970
Near Rapids	L_6	341.1	.....	+55.7	1057.9522
Youngs Point	M_6	345.1	.....	+55.5	1043.5577
Near Park City	N_6	348.9	.....	+55.7	1038.5711
Park City	O_6	352.5	.....	+53.5	1033.8319
Near Park City	P_6	355.9	.....	+55.8	1024.2394
Near Laurel	Q_6	359.9	.....	+54.2	1017.7491
Laurel	R_6	364.5	.....	+56.4	1003.9535
Near Laurel	S_6	368.4	.....	+58.7	992.9880
Foster	T_6	373.9	.....	+58.9	982.2577
Near Yegen	U_6	378.6	.....	+61.0	978.1394
Yegen	V_6	382.4	.....	+67.7	970.4118
Near Billings	W_6	385.9	.....	+74.2	960.0309
Billings	X_6	389.0	.....	+72.2	952.0714
Do	Y_6	389.5	.....	+69.3	952.0485
Do	Z_6	390.0	.....	+68.8	952.1416
Do	A_7	390.5	.....	+69.9	949.9650
Near Billings	B_7	393.1	.....	+67.4	946.6458
Near Lockwood	C_7	397.1	.....	+62.7	947.5728
Do	D_7	404.2	.....	+57.7	927.5531
Near Huntley	U.S.R.S.1.	406.1	.....	+52.7	923.9487
Do	U.S.R.S.2.	407.2	.....	+55.3	922.2959
Do	U.S.R.S.3.	408.8	.....	+50.4	921.5705

* This value for the elevation of bench mark D_3 differs from that given on p. 34 by 1 meter. This is due to the computation not having been corrected for a meter error discovered in the line from Pocatello to Butte.

† From D_3 at Butte.

‡ These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

LAS VEGAS, NEV., TO ZENDA, UTAH.

This line is an extension to the lines San Diego to Barstow and Barstow to Las Vegas. It was run by Ford Kurtz, Aid, between March 26 and July 18, 1908, and followed the line of the San Pedro, Los Angeles & Salt Lake Railroad.

Precise Level No. 7 and rods AA and BB were used. The lengths of these rods, as determined by the Bureau of Standards, were:

Date.	Rod AA.	Rod BB.
	Meters.	*Meters.*
Jan. 11, 1908	3.0008	3.0013
Feb. 5, 1909	3.0004	3.0010

These determinations show very little change in the lengths of the rods. In the computation the mean length of January, 1908, 3.00105 meters, or an excess of 0.35 millimeter per meter, was used up to April 30, 1908. Following this date the mean length of February, 1909, 3.0007 meters, or an excess of 0.23 millimeter per meter, was used.

The index correction of rod AA was −0.1 millimeter; of rod BB −0.2 millimeter.

At Las Vegas three bench marks established the previous season were recovered. The result of the leveling between them showed that they had maintained their position.

The elevations in the following table depend upon an elevation of 618.3470 meters for bench mark P at Las Vegas, as determined by the line Barstow to Las Vegas.

Results of leveling, Las Vegas, Nev., to Zenda, Utah, 1908.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B–F.)	Observed elevation.†
		km.	*km.*	*mm.*	*m.*
Las Vegas, Nev.	P	0.0		0.0	615.3470
Stewart, Nev.	Q	8.0		− 2.6	580.9701
Near Valley, Nev.	R	12.7		+ 0.3	601.6402
Valley, Nev.	S	13.7		− 0.7	612.2765
Near Valley, Nev.	T	17.9		− 10.3	650.7570
Dike, Nev.	U	21.4		− 7.2	685.6567
Near Dike, Nev.	V	26.0		− 13.4	735.5306
Apex, Nev.	W	28.7		− 17.8	754.1468
Near Apex, Nev.	X	33.1		− 8.8	709.2883
Garnet, Nev.	Y	38.0		− 11.5	683.4269
Do.	Z	38.0	38.0	− 11.2	681.9237
Near Dry Lake, Nev.	A_1	42.3		− 18.2	651.6389
Dry Lake, Nev.	B_1	47.1		− 13.6	638.1219
Do.	C_1	47.4		− 13.5	636.4427
Near Dry Lake, Nev.	D_1	50.7		− 11.5	639.7809
Crystal, Nev.	E_1	57.0		− 17.9	619.7839
Ute, Nev.	F_1	64.8		− 23.2	588.9645
Byron, Nev.	G_1	72.0		− 24.2	544.1760
Near Moapa, Nev.	H_1	78.3		− 21.3	484.3776
Moapa, Nev.	I_1	80.6		− 27.4	508.2790
Do.	J_1	80.7		− 26.5	507.9978
Do.	K_1	80.9		− 27.9	510.9042
Do.	L_1	81.5		− 29.2	514.0288
Acton, Nev.	M_1	88.6		− 29.2	532.9135
Guelph, Nev.	N_1	96.7		− 28.0	531.8433
Near Rox, Nev.	O_1	100.0		− 25.6	546.9968
Rox, Nev.	P_1	104.5		− 26.7	580.4770
Do.	Q_1	104.7		− 28.3	589.1962
Hoya, Nev.	R_1	112.8		− 25.3	617.9252
Galt, Nev.	S_1	120.5		− 10.2	684.0933
Near Galt, Nev.	T_1	126.2		− 14.7	724.8954
Vigo, Nev.	U_1	128.8		− 10.0	741.8694
Near Vigo, Nev.	V_1	129.8		− 8.5	747.3248
Near Carp, Nev.	W_1	134.1		− 20.5	769.4213
Carp, Nev.	X_1	137.3		− 27.8	789.4447
Do.	Y_1	137.4		− 27.4	788.9397
Do.	Z_1	137.9		− 29.2	790.8891
St. George, Nev.	A_2	145.7		− 27.8	821.5034
Leith, Nev.	B_2	154.5		− 25.9	894.0925
Near Leith, Nev.	C_2	156.2		− 25.3	913.6426
Do.	D_2	160.3		− 16.6	958.5382
Kyle, Nev.	E_2	162.2		− 17.6	986.1753
Near Kyle, Nev.	F_2	164.4		− 17.5	1001.5092
Elgin, Nev.	G_2	170.2		− 24.5	1051.7359
Do.	H_2	170.9		− 22.2	1056.6281
Do.	I_2	170.9		− 23.4	1056.0667
Boyd, Nev.	J_2	178.1		− 32.6	1150.9186
Near Boyd, Nev.	K_2	183.2		− 27.9	1196.8399
Stine, Nev.	L_2	185.9		− 30.3	1228.9550
Cana, Nev.	M_2	187.1		− 30.5	1237.7816
Near Stine, Nev.	N_2	191.1		− 39.1	1266.8732
Etna, Nev.	O_2	195.0		− 39.9	1299.5302
Caliente, Nev.	P_2	201.3		− 44.6	1338.0675
Do.	Q_2	201.9		− 44.5	1341.8657
Do.	R_2	202.6		− 43.7	1355.2691
Caliente, Nev.	S_2	203.0		− 42.1	1342.6316
Do.	T_2	203.5		− 40.3	1344.9964
Eccles, Nev.	U_2	211.8		− 34.0	1409.7757
Near Minto, Nev.	V_2	216.3		− 34.2	1437.4117
Minto, Nev.	W_2	219.6		− 38.2	1466.3594
Big Springs, Nev.	X_2	224.7		− 38.8	1542.9542
Islen, Nev.	Y_2	227.7		− 40.2	1592.2856
Barclay, Nev.	Z_2	234.3		− 50.3	1625.4944
Acoma, Nev.	A_3	242.8		− 63.3	1681.9177
Do.	B_3	243.0		− 63.4	1682.9007
Do.	C_3	243.1		− 64.5	1684.3883
Near Acoma, Nev.	D_3	245.8		− 67.1	1709.3977
Brown, Nev.	E_3	250.6		− 72.0	1761.9708
Crestline, Nev.	F_3	257.6		− 82.2	1823.7399
Do.	G_3	257.7		− 82.0	1824.0797
Lien, Nev.	H_3	264.3		− 87.1	1769.0888
Uvada, Utah	A_8	269.8		− 82.3	1723.5438
Tomas, Utah	B_8	277.4		− 81.4	1683.3681
Near Modena, Utah	C_8	279.2		− 83.6	1678.9024
Modena, Utah	D_8	283.6		− 84.7	1664.8818
Do.	E_8	283.7		− 83.2	1667.2948
Do.	F_8	283.8		− 84.0	1665.8910
Do.	G_8	284.0		− 85.9	1668.5134
Escalante, Utah	H_8	293.7		− 84.5	1616.7290
Near Morton, Utah	I_8	298.4		− 91.7	1588.9832
Morton, Utah	J_8	302.3		− 97.2	1577.8741
Beryl, Utah	K_8	310.7		−101.1	1570.0352
Do.	L_8	311.2		−101.3	1570.5587
Do.	M_8	311.2		−101.0	1568.9025
Sahara, Utah	N_8	319.1		−116.6	1587.8886
Do.	O_8	319.2		−115.9	1585.6386
Ford, Utah	P_8	327.1		−118.3	1569.4194
Lund, Utah	Q_8	335.1		−120.7	1549.8224
Do.	R_8	335.2		−121.4	1549.4904
Do.	S_8	335.3		−120.9	1548.7986
Do.	5092 R Lund.	335.4		−121.7	1548.9623
Kerr, Utah	T_8	342.3		−115.2	1549.5209
Latimer, Utah	U_8	350.0		−118.1	1546.7284
Near Nada, Utah	V_8	355.5		−115.9	1544.3796
Nada, Utah	W_8	357.0		−120.6	1546.5006
Near Thermo, Utah	X_8	363.5		−120.2	1537.0089
Thermo, Utah	Y_8	367.9		−122.9	1533.5169
Do.	Z_8	368.4		−125.3	1536.1003
Do.	A_9	368.5		−124.6	1534.7677
Laho, Utah	B_9	376.1		−130.1	1526.6050
Upton, Utah	C_9	384.5		−137.1	1518.4577
Near Milford, Utah	D_9	388.3		−133.9	1515.0429
Milford, Utah	E_9	392.2		−135.3	1513.7774
Do.	F_9	392.3		−134.5	1512.9704
Do.	G_9	392.7		−135.0	1511.4136
Do.	5084 F.R.R.	393.1		−135.9	1510.9556
Opal, Utah	H_9	399.7		−122.8	1515.0091
Near Zenda, Utah	I_9	403.8		−122.7	1511.2697

* From P at Las Vegas.
† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

SALT LAKE CITY TO ZENDA, UTAH.

This line was run by H. W. Maynard, Aid, between April 13 and July 18, 1908. The leveling started from three bench marks in Salt Lake City, and followed the San Pedro, Los Angeles & Salt Lake Railroad to Zenda, where it was connected with the line Las Vegas to Zenda.

Precise level No. 8 and rods X and Y were used. The lengths of these rods were determined by the Bureau of Standards and are as follows:

Date.	Rod X.	Rod Y.
	Meters.	*Meters.*
August, 1907	3.0015	3.0016
February, 1909	3.0007	3.0009

These measurements show a shortening of the rods. The field measurements show no indication of a sudden change during the period of leveling. In the computation various values, depending upon the period of time, were used for the mean length of the rods. The index correction of rod X was −0.1 millimeter and of rod Y −0.3 millimeter.

The new determination of the differences of elevations of the three bench marks at Salt Lake City agreed very closely with the previous determinations.

The elevations in the following table are based on an elevation of 1289.4123 meters for bench mark W_1 at Salt Lake City, Utah, as determined by the line Ogden to Salt Lake City.

Results of leveling, Salt Lake City to Zenda, Utah, 1908.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B−F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B−F).	Observed elevation.†
		km.	*km.*	*mm.*	*m.*			*km.*	*km.*	*mm.*	*m.*
Salt Lake City	W_1	0.0		0.0	1289.4123	Eureka	G. S. 6394	143.0	137.3	+49.5	1948.7096
Do	4251 Slak	1.4	0.0	+ 2.7	1295.5778	Near Tintic	N_3	142.5		+36.2	1744.2038
Do	4352 Slak	7.5	1.3	−13.1	1326.5747	McIntire	O_3	148.0		+34.1	1700.4455
Do	X_1	1.8		− 0.3	1287.7906	Near McIntire	P_3	153.2		+32.9	1659.3785
Do	O.S.L.4222.57	1.8	1.8	− 0.2	1287.9338	Jericho	Q_3	158.7		+35.8	1618.0108
Near Buena Vista	Y_1	6.6		− 3.9	1288.3744	Near Jericho	R_3	161.9		+33.3	1592.1592
Do	Z_1	8.5		− 4.8	1287.0858	Do	S_3	166.1		+40.1	1564.7500
Do	A_2	12.6		− 3.5	1288.2765	Dyer	T_3	168.1		+41.0	1548.4550
Near Riter	B_2	15.4		+ 4.3	1285.1168	Near Dyer	U_3	169.9		+40.5	1535.5986
Near Garfield	C_2	18.3		+ 2.5	1286.2352	Champlin	V_3	175.5		+42.4	1508.9040
Do	D_2	21.7		− 1.0	1287.3814	Near Lynn Junction	W_3	184.5		+45.4	1467.1775
Garfield	E_2	24.3		+ 4.9	1291.5923	Do	X_3	186.1		+44.5	1459.9493
Do	F_2	24.9		+ 4.9	1286.8778	Do	Y_3	187.2		+40.4	1457.7682
Near Garfield	G_2	28.3		+ 6.3	1287.8220	Lynn Junction	Z_3	190.3		+39.4	1457.2757
Do	H_2	29.9		+ 3.1	1289.9700	Near Lynn Junction	A_4	192.7		+41.5	1455.8750
Lake Point	I_2	31.4		+ 6.9	1291.7199	Do	B_4	195.9		+35.6	1457.6016
Near Lake Point	J_2	33.0		+ 4.8	1297.4569	Near Cline	C_4	202.4		+26.9	1451.9211
Near Morris	K_2	36.2		− 2.3	1323.6397	Do	D_4	205.4		+28.8	1448.9898
Morris	L_2	37.8		− 4.7	1334.3017	Near Akin	E_4	210.7		+32.7	1418.3634
Erda	M_2	44.5		−11.2	1381.7928	Akin	F_4	216.7		+31.8	1413.2173
Near Erda	N_2	48.0		−12.6	1412.1804	Near Oasis	G_4	221.8		+34.6	1403.3118
Shields	O_2	51.2		−16.8	1438.0246	Oasis	U.S.G.S.4592	225.3		+32.2	1399.2754
Near Tooele	P_2	55.5		−13.8	1471.2924	Do	H_4	225.4		+32.2	1400.1389
Do	Q_2	58.9		−20.6	1499.8490	Near Oasis	I_4	228.4		+30.6	1394.4247
Near Stockton	R_2	62.0		−21.6	1522.0827	Van	J_4	233.3		+35.8	1392.4612
Stockton	S_2	67.1		−21.2	1543.9110	Jerome	K_4	239.7		+41.0	1391.3303
Near Stockton	T_2	68.7		−20.8	1533.2614	Clear Lake	L_4	247.0		+38.8	1394.8003
Do	U_2	72.1		−21.8	1515.2529	Near Neels	M_4	259.1		+44.7	1417.7638
St. John	V_2	77.6		−27.7	1529.3714	Near Borden	N_4	265.6		+33.0	1449.6946
Near Ajax	W_2	86.5		−22.8	1535.5551	Near Goss	O_4	270.2		+34.7	1465.1034
Do	X_2	89.7		−20.7	1542.2151	Goss	P_4	274.0		+35.7	1450.6367
Faust	Y_2	98.3		+ 3.9	1600.1379	Near Goss	Q_4	276.9		+35.7	1462.5958
Near Faust	Z_2	100.2		+ 9.0	1614.0605	Cruz	R_4	281.8		+27.2	1484.3476
Do	A_3	103.4		+ 1.3	1645.6540	Near Cruz	S_4	283.5		+26.2	1475.6967
Vernon	B_3	107.3		+ 4.5	1679.0741	Near Pumice	T_4	288.3		+29.1	1472.2713
Near Vernon	C_3	108.3		+ 5.9	1685.5984	Pumice	U_4	289.7		+28.9	1479.9094
Dunbar	D_3	112.0		+12.2	1715.2525	Near Pumice	V_4	290.3		+29.8	1477.5934
Near Dunbar	E_3	113.5	113.5	+16.0	1727.4491	Black Rock	W_4	298.1		+27.9	1478.2021
Near Lofgreen	F_3	116.9		+19.3	1750.5373	Do	X_4	298.1		+27.0	1478.4199
Lofgreen	G_3	118.9		+18.5	1767.8566	Malone	Z_4	305.8		+32.0	1489.4035
Near Boulter	H_3	126.1		+28.5	1820.5792	Near Read	A_5	309.4		+30.8	1483.9301
Boulter	I_3	127.9		+33.3	1835.0935	Read	B_5	313.9		+21.6	1487.7854
Near Boulter	J_3	130.8		+33.3	1834.1951	Do	C_5	314.3		+22.1	1487.5880
Near Tintic	K_3	133.9		+38.6	1810.5036	Near Read	D_5	317.5		+27.7	1494.3111
Tintic	L_3	137.3		+40.3	1784.9783	Zenda	E_5	321.3		+29.1	1504.9892
Near Tintic	M_3	139.6	137.3	+39.9	1832.7325	Do	I_9	323.9		+32.1	1510.0909

* From W_1 at Salt Lake City.
† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

CRAWFORD, NEBR., TO CADIZ, WYO.

This line was run by Ford Kurtz, Aid, between July 29 and November 5, 1908. Leveling started from two bench marks in Crawford, Nebr., and followed the line of the Chicago, Burlington & Quincy Railroad to Cadiz, Wyo.

Precise Level No. 7 and Rods AA and BB were used. For the lengths of these rods as determined by the Bureau of Standards see line Las Vegas, Nev., to Zenda, Utah, page 37.

In the computation the mean length of the rods on February 5, 1909, 3.0007 meters, or an excess of 0.23 millimeter per meter was used. The index correction to both rods was −0.2 millimeter.

The result of the leveling between the two bench marks recovered at Crawford, Nebr., showed that they had not been disturbed since their establishment in 1902.

The direct results of the leveling are shown in the following table. The elevations are based on an elevation of 1121.5968 meters which is the adjusted elevation published on page 110 of "Precise Leveling in the United States 1903–1907."

Results of leveling, Crawford, Nebr., to Cadiz, Wyo., 1908.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B−F).	Observed elevation.†
		km.	*km.*	*mm.*	*m.*
Crawford, Nebr	G_4	0.0		0.0	1121.5968
Fort Robinson, Nebr.	H_4	5.0	0.0	−10.8	1153.8640
Crawford, Nebr	N_4	0.6		− 0.9	1118.7296
Near Crawford, Nebr.	O_4	4.3		− 0.1	1129.9363
Horn, Nebr	P_4	9.3		− 5.5	1122.7182
Near Horn, Nebr	Q_4	16.7		− 5.5	1135.8888
Near Joder, Nebr	R_4	18.0		− 2.8	1131.6122
Do	S_4	21.2		+ 2.4	1129.6844
Joder, Nebr.	T_4	23.1		+ 4.8	1136.9881
Orella, Nebr	U_4	28.1		+ 6.9	1167.3131
Near Orella, Nebr	V_4	31.1		− 3.5	1127.6763
Mansfield, Nebr	W_4	36.8		− 6.0	1106.0292
Near Ardmore, S. Dak	N.S.D.204 M.	42.7		− 9.4	1090.1061
Ardmore, S. Dak	O_4	45.2		− 7.6	1085.5075
Do	3553 DW	45.5		− 8.0	1084.2306
Near Ardmore, S. Dak	3527 DW	49.0		− 1.9	1076.2813
Near Rumford, S. Dak	3487 DW	53.9		+ 1.7	1064.1303
Rumford, S. Dak	3500 DW	58.8		− 1.5	1068.0920
Near Rumford, S. Dak	3532 DW	62.9		− 6.2	1077.8766
Near Provo, S. Dak	3632 DW	67.7		−10.6	1108.3445
Provo, S. Dak	3708 DW	72.7		− 4.4	1131.5541
Near Provo, S. Dak	P_4	77.0		− 4.2	1103.8493
Near Dennis, S. Dak	Q_4	79.4		− 5.0	1091.8249
Do	3528 DW	82.9		− 5.7	1076.6726
Near Edgemont, S. Dak.	R_4	85.2		− 7.3	1066.1910
Edgemont, S. Dak	S_4	87.6		− 8.9	1053.6915
Do	T_4	87.7		−10.4	1053.9561
Do	3449 DW	88.1		−10.0	1052.6226
Do	U_4	88.7		− 8.6	1049.0729
Near Edgemont, S. Dak.	3463 DW	94.8		−22.8	1056.8789
Marietta, S. Dak	3486 DW	101.2		−27.4	1063.8763
Near Marietta, S. Dak	3544 DW	105.6		−32.0	1081.6067
Argentine, S. Dak	3632 DW	110.4		−31.0	1108.4070
Do	V_4	111.1		−31.8	1104.7350
Near Dewey, S. Dak	W_4	116.4		−34.8	1125.0207
Do	X_4	118.5		−34.5	1126.8594
Dewey, S. Dak	3704 DW	119.8		−36.1	1130.1729
Near Dewey, S. Dak	S.D.WY3824M	123.0		−41.6	1142.5824
Dakoming, Wyo	Q_6	127.8		−52.1	1169.0664
Clifton, Wyo	R_6	133.3		−59.1	1203.4223
Do	S_6	133.4		−57.9	1201.3456
Near Clifton, Wyo	T_6	136.0		−53.9	1215.5858
Do	3971 DW	137.6		−56.9	1211.5684
Near Spencer, Wyo	4120 DW	147.4		−45.3	1257.0449
Spencer, Wyo	4195 DW	151.0		−45.8	1279.8751
Johnson Siding, Wyo	U_6	157.1		−46.0	1323.9957
Near Newcastle, Wyo	4344 DW	156.9	155.8	−47.3	1325.4750
Newcastle, Wyo	V_6	160.2		−46.8	1316.4919
Do	W_6	160.3		−46.8	1318.3586
Do	X_6	160.8		−45.3	1330.6509
Do	4332 DW	161.1		−45.7	1321.8021
Do	U.S.G.S.M.M.	161.3		−45.7	1319.6831
Near Newcastle, Wyo	4171 DW	170.0		−59.6	1272.7252
Pedro, Wyo	Y_6	174.3		−62.8	1282.0314
Near Pedro, Wyo	4218 DW	177.9		−59.7	1287.0366
Near Osage, Wyo	Z_6	181.8		−64.3	1315.8191
Do	4312 DW	185.1		−61.1	1315.7027
Jerome, Wyo	A_7	198.1		−65.4	1284.4002
Do	B_7	198.4		−65.3	1283.9086
Near Jerome, Wyo	C_7	201.7		−62.4	1273.7412
Near Upton, Wyo	D_7	207.1		−62.5	1288.8440
Upton, Wyo	E_7	207.7		−61.0	1291.3630
Do	F_7	208.0		−60.3	1291.3610
Do	G_7	208.3		−59.9	1291.4724
Thornton, Wyo	H_7	220.0		−59.7	1318.5643
Near Kara, Wyo	I_7	226.0		−58.3	1325.3305
Kara, Wyo	J_7	229.6		−58.7	1326.6820
Do	K_7	230.2		−58.2	1325.1220
Near Kara, Wyo	L_7	230.9		−57.0	1328.0826
Near Moorcroft, Wyo.	M_7	233.4		−61.3	1335.0326
Do	N_7	236.9		−63.1	1306.2329
Moorcroft, Wyo	O_7	241.2		−51.7	1283.0458
Do	P_7	241.3		−52.8	1283.0226
Do	Q7	242.4		−53.2	1280.9756
Near Moorcroft, Wyo.	R_7	244.8		−52.6	1268.0746
Do	S_7	245.9		−52.0	1267.8975
Near Wessex, Wyo	T_7	250.9		−55.0	1283.7170
Wessex, Wyo	U_7	254.1		−57.0	1286.4961
Rozet, Wyo	V_7	263.1		−44.5	1306.3352
Near Rozet, Wyo	W_7	270.3		−45.1	1329.3219
Minturn, Wyo	X_7	276.5		−51.0	1340.9794
Near Gillette, Wyo	Y_7	280.9		−48.8	1357.0295
Gillette, Wyo	Z_7	287.6		−48.5	1385.0774
Do	A_8	287.9		−49.3	1386.6869
Do	B_8	288.2		−50.1	1385.8124
Near Gillette, Wyo	C_8	293.2		−53.5	1422.8982
Sparta, Wyo	D_8	296.6		−50.8	1447.7710
Oriva, Wyo	E_8	303.2		−49.3	1418.4083
Do	F_8	303.3		−48.6	1415.3907
Near Oriva, Wyo	G_8	305.6		−48.0	1406.4900
Kier, Wyo	H_8	311.6		−50.3	1353.7590
Near Felix, Wyo	I_8	316.0		−50.0	1311.9960
Felix, Wyo	J_8	318.0		−48.3	1296.0390
Do	K_8	318.6		−46.5	1291.5711
Near Felix, Wyo	L_8	323.2		−45.8	1251.8203
Echeta, Wyo	M_8	327.7		−39.6	1244.8674
Do	N_8	327.8		−38.8	1244.0374
Near Echeta, Wyo	O_8	331.2		−41.5	1218.8000
Croton, Wyo	P_8	337.2		−50.5	1205.9905
Do	Q_8	337.5		−51.3	1208.0370
Near Lariat, Wyo	Rail△	343.6		−49.6	1189.6251
Lariat, Wyo	R_8	347.7		−48.9	1183.6942
Arvada, Wyo	S_8	359.1		−29.9	111[illegible].0408
Do	T_8	359.5		−29.3	1114.2710
Do	U_8	359.6		−30.3	1114.8279
Kendrick, Wyo	V_8	370.9		−26.8	1180.1992
Cadiz, Wyo	W_8	377.4		−24.8	1138.8698

* From G_4 at Crawford.
† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

HUNTLEY, MONT., TO CADIZ, WYO.

This line was run by H. W. Maynard, Aid, between August 20 and November 6, 1908. The leveling started from two bench marks in Huntley, Mont., and followed the line of the Chicago, Burlington & Quincy Railroad to Cadiz, Wyo. Precise Level No. 8 and rods X and Y were used. The lengths of these rods at 0° C., as determined by the Bureau of Standards, are shown on page 39, in connection with the line Salt Lake City to Zenda, Utah.

In the computation the mean length of the rods interpolated for various dates during the period of leveling was used. The index corrections were the same as given on page 39 in connection with the line Salt Lake City to Zenda, Utah.

The result of the leveling between the two bench marks recovered at Huntley, Mont., differed very little from that of the previous year.

The elevations in the following table depend on an elevation of 921.5705 meters for U. S. R. S. 3, as determined by the line Butte to Huntley.

Results of leveling, Huntley, Mont., to Cadiz, Wyo., 1908.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B–F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B–F).	Observed elevation.†
		km.	*km.*	*mm.*	*m.*			*km.*	*km.*	*mm.*	*m.*
Near Huntley, Mont.	U. S. R. S. 3	0.0	.....	0.0	921.5705	Near Lodgegrass, Mont.	Y_7	127.0	.....	−10.7	1018.9115
Huntley, Mont.	U. S. R. S. 4	1.3	.....	+ 1.1	920.3727	Lodgegrass, Mont.	Z_7	129.6	.....	− 4.3	1023.4653
Near Huntley, Mont.	U. S. R. S. 5	3.1	.....	+ 3.7	918.6257	Near Lodgegrass, Mont.	A_8	130.3	.....	− 5.0	1025.7441
Do	U. S. R. S. 6	4.5	.....	+ 6.1	917.3688	Near Little Horn, Mont.	B_8	139.1	.....	−14.4	1065.9695
Do	U. S. R. S. 7	5.4	.....	+ 5.5	916.4649	Near Wyola, Mont.	C_8	145.1	.....	−11.2	1095.3111
Do	U. S. R. S. 8	7.6	.....	+ 4.0	918.4841	Wyola, Mont.	D_8	151.0	.....	−10.9	1130.3179
Near Ballantine, Mont.	U. S. R. S. 9	9.9	.....	+ 5.7	916.5700	Do	E_8	151.2	.....	−11.3	1128.0659
Do	U. S. R. S. 10	11.4	.....	+ 4.4	917.0662	Near Aberdeen, Mont.	F_8	158.9	.....	− 2.0	1185.4298
Do	U. S. R. S. 11	12.7	.....	+ 1.9	914.0400	Aberdeen, Mont.	G_8	164.0	163.0	.....	1203.8771
Do	E_7	14.7	.....	− 2.5	908.1956	Near Parkman, Wyo.	H_8	166.2	.....	+ 1.3	1245.1977
Ballantine, Mont.	U. S. G. S. 2982	16.3	.....	− 4.9	913.1962	Parkman, Wyo.	U. S. G. S. 4292	172.0	.....	− 9.0	1309.8087
Near Ballantine, Mont.	U. S. R. S. 12	16.7	.....	− 4.1	914.8407	Ohlman, Wyo.	U. S. G. S. 4138	176.5	176.3	− 2.7	1262.8644
Do	U. S. R. S. 13	18.8	.....	− 1.6	924.7259	Near Ranchester, Wyo.	U. S. G. S. 4011	179.8	.....	− 9.5	1222.2909
Do	U. S. R. S. 14	20.1	.....	+ 0.4	923.3812	Ranchester, Wyo.	US. G. S. 3788	186.2	.....	−18.3	1154.2462
Do	U. S. R. S. 15	21.8	.....	+ 2.9	922.3258	Do	S. E. Base	186.3	.....	−18.9	1154.2701
Near Anita, Mont.	U. S. R. S. 16	23.4	.....	+ 6.0	923.3400	Do	U. S. G S. 3751	187.3	.....	−21.4	1144.7236
Anita, Mont.	U. S. G. S. 3056	26.6	.....	+ 2.1	929.3441	Near Ranchester, Wyo.	U. S. G. S. 3698	192.0	.....	−17.5	1128.7475
Near Anita, Mont.	F_7	30.3	.....	+ 4.5	921.6781	Near Monarch, Wyo.	U. S. G. S. 3660	196.5	.....	−20.0	1117.0650
Do	G_7	31.7	.....	+ 8.2	919.4669	Do	Z_3	198.3	.....	−20.4	1117.2265
Corinth, Mont.	U. S. G. S. 3144	37.4	.....	+11.9	939.1220	Alger, Wyo.	A_4	200.5	200.5	−18.9	1106.3399
Toluca, Mont.	U. S. G. S. 3303	53.0	.....	+18.7	987.8194	Near Dietz, Wyo.	B_4	204.1	.....	−17.7	1103.3800
Near Toluca, Mont.	H_7	58.4	.....	+11.5	952.0478	Near Sheridan, Wyo.	U. S. G. S. 3682	211.9	.....	−25.4	1123.9141
Do	I_7	61.6	.....	+ 7.9	942.8107	Do	C_4	213.0	.....	−23.8	1131.7033
Near Hardin, Mont.	J_7	71.0	.....	+ 8.5	895.9655	Sheridan, Wyo.	Astro	215.3	.....	−23.8	1136.7793
Do	U. S. G. S. 2989	71.8	.....	+10.4	891.5741	Do	D_4	216.5	215.3	−26.3	1140.0957
Hardin, Mont.	K_7	75.3	.....	+10.4	883.4645	Do	U. S. G. S. 3738	216.7	215.3	−22.6	1140.8569
Near Hardin, Mont.	L_7	78.0	.....	+17.1	881.6765	Do	E_4	217.0	215.3	−23.8	1143.2407
Do	M_7	78.2	.....	+16.5	881.6950	Wakeley, Wyo.	F_4	223.4	.....	−28.5	1141.9954
Do	N_7	78.7	.....	+15.4	881.1980	Arno, Wyo.	G_4	233.4	.....	−34.9	1149.4357
Dunmore, Mont.	O_7	86.9	.....	− 0.4	902.3030	Near Verona, Wyo.	H_4	240.4	.....	−23.0	1172.1658
Near Dunmore, Mont.	P_7	87.8	.....	− 4.4	907.3462	Verona, Wyo.	I_4	245.8	.....	−19.8	1221.3301
Do	Q_7	90.2	.....	− 4.4	916.0541	Ulm, Wyo.	J_4	258.7	.....	−15.5	1352.6875
Crow Agency, Mont.	R_7	96.1	.....	− 9.4	924.3267	Near Ulm, Wyo.	K_4	263.0	.....	−13.6	1299.9859
Near Crow Agency, Mont.	S_7	96.6	.....	−12.0	925.0113	Near Clearmont, Wyo.	L_4	271.7	.....	−16.6	1216.0955
Do	T_7	99.8	.....	−16.6	931.1647	Clearmont, Wyo.	M_4	276.9	.....	− 9.7	1193.4001
Garryowen, Mont.	U_7	104.9	.....	−18.2	950.0550	Do	N_4	277.2	.....	− 7.4	1193.6291
Near Garryowen, Mont.	V_7	109.4	.....	− 7.0	961.0528	Big Corral, Wyo.	O_4	287.6	.....	−11.3	1156.9130
Near Ionia, Mont.	W_7	118.9	.....	− 2.5	988.0816	Cadiz, Wyo.	W_8	290.9	.....	−15.3	1136.6874
Ionia, Mont.	X_7	122.5	.....	− 1.8	997.2459						

* From U. S. R. S. 3 near Huntley.
†These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

GOFFS, CAL., TO ALBUQUERQUE, N. MEX.

This line was run by H. W. Maynard, Aid, between April 16 and December 3, 1909. The leveling started from two bench marks in Goffs and followed the line of the Atchison, Topeka & Santa Fe Railway to Albuquerque, N. Mex. Precise level No. 8 and rods X and Y were used. The lengths of these rods at 0° C., as determined by the Bureau of Standards and the Instrument Division of this Survey, were:

Date.	Rod X.	Rod Y.
	Meters.	*Meters.*
February 5, 1909	3.0007	3.0009
January 22, 1910	3.0003	3.0005

In accordance with paragraph 21 of the general instructions, each rod was measured with a steel tape at least twice a month while in the field. The field measurements of the rods confirm the shortening found by the Instrument Division and show that it was distributed uniformly over the entire period of leveling. The mean length of rods interpolated for various dates during the period of leveling was used in the computation. The index correction of rod X was −0.2 millimeter and rod Y −0.4 millimeter.

The difference of elevation between the bench marks recovered at Goffs determined by this leveling agreed with the former difference within the limits of the accuracy of the leveling.

The elevations in the following table depend upon an elevation of 786.6405 meters for L_5 at Goffs.

Results of leveling, Goffs, Cal., to Albuquerque, N. Mex., 1909.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B−F).	Observed elevation.†
		km.	*km.*	*mm.*	*m.*
Goffs, Cal	L_5	0.0	.....	0.0	786.6405
Rising, Cal	I_6	5.8	.....	− 9.9	735.2199
Near Homer, Cal	J_6	14.9	.....	−16.7	610.2255
Ibis, Cal	K_6	27.1	.....	− 8.6	442.9545
Near Java, Cal	L_6	34.3	.....	−18.0	347.6388
Do	M_6	38.2	.....	−19.0	299.0128
Hartoum, Cal	N_6	44.1	.....	−17.0	225.4581
Needles, Cal	O_6	50.2	.....	−19.6	146.9460
Do	P_6	50.2	.....	−19.9	147.4070
Do	Q_6	50.4	.....	−20.5	148.5500
Do	Needles Astro.	50.9	50.6	−19.0	153.3019
Do	△Bar	51.4	50.6	−18.6	168.1928
Near Needles, Cal	R_6	58.2	.....	−19.3	144.8652
Do	U. S. G. S. 473.	58.5	.....	−19.6	144.3038
Do	S_6	58.5	.....	−20.0	142.7230
Near Beal, Cal	T_6	64.8	.....	−23.7	140.8788
Do	U_6	68.1	.....	−27.1	144.5169
Do	V_6	69.2	.....	−28.5	153.6071
Topock, Ariz	U. S. G. S. 504.	69.6	.....	−27.9	153.6839
Do	△Topog	69.7	.....	−28.3	153.8441
Do	A	69.8	.....	−28.2	153.6597
Near Topock, Ariz	B	73.6	.....	−31.5	161.4411
Do	C	74.6	.....	−34.9	171.7910
Near Powell, Ariz	D	79.3	.....	−40.6	214.3575
Powell, Ariz	U. S. G. S. 762.	81.0	.....	−37.6	232.2382
Franconia, Ariz	U. S. G. S. 1101	91.0	.....	−38.7	335.3551
Near Franconia, Ariz.	E	94.6	.....	−35.7	380.7181
Do	F	95.1	.....	−35.9	386.0038
Do	G	95.4	.....	−37.6	386.0630
Do	H	95.9	.....	−38.4	390.8998
Near Haviland, Ariz	I	97.2	.....	−40.9	405.4046
Do	J	103.2	.....	−41.6	457.9022
Do	K	104.1	.....	−39.5	467.1892
Do	L	105.5	.....	−40.3	486.1307
Near Yucca, Ariz	M	106.8	.....	−40.9	501.7408
Do	N	108.4	.....	−44.1	515.7420
Do	O	109.7	.....	−45.0	531.9762
Yucca, Ariz	P	111.4	.....	−41.2	550.7005
Near Yucca, Ariz	Q	111.8	.....	−39.0	555.6982
Do	R	114.5	.....	−43.6	589.2442
Near Kaster, Ariz	S	123.9	.....	−37.3	694.5633
Near Drake, Ariz	T	130.0	.....	−36.2	766.9118
Drake, Ariz	U	132.2	.....	−37.0	794.9691
Near Drake, Ariz	V	134.0	.....	−37.5	806.4379
Do	W	136.1	.....	−40.7	822.6550
Hancock, Ariz	X	137.2	.....	−43.6	838.6614
Near McConnico, Ariz	Y	141.3	.....	−41.0	883.5326
Near Kingman, Ariz	Z	147.4	.....	−42.9	984.1337
Kingman, Ariz	A_1	149.5	.....	−49.5	1018.1178
Do	B_1	149.6	.....	−48.3	1014.8168
Berry, Ariz	C_1	160.2	.....	−45.9	1028.6421
Near Hualapai, Ariz	D_1	171.1	.....	−40.9	995.3662
Hualapai, Ariz	E_1	173.7	.....	−45.9	1005.4307
Do	F_1	174.6	.....	−46.1	1011.7919
Near Hualapai, Ariz	G_1	176.1	.....	−42.8	1022.1777
Do	H_1	177.9	.....	−38.5	1042.2299
Antares, Ariz	I_1	184.2	.....	−33.5	1098.8394
Near Hackberry, Ariz	J_1	191.1	.....	−35.3	1083.5886
Do	K_1	193.4	.....	−31.8	1080.1363
Hackberry, Ariz	L_1	193.9	.....	−34.7	1083.0815
Near Hackberry, Ariz	M_1	195.4	.....	−31.9	1094.5951
Tinnaka, Ariz	N_1	202.3	202.0	−30.7	1164.3314
Crozier, Ariz	O_1	206.2	.....	−29.5	1209.6236
Near Crozier, Ariz	P_1	209.3	.....	−25.2	1256.7372
Near Truxton, Ariz	Q_1	211.3	.....	−21.7	1277.2164
Near Cherokee, Ariz	R_1	224.4	.....	− 7.2	1385.6208
Near Peach Springs, Ariz.	S_1	226.0	.....	− 6.7	1404.8950
Peach Springs	T_1	231.3	.....	− 3.5	1459.1953
Nelson, Ariz	U_1	242.1	.....	+ 0.7	1559.2607
Near Nelson, Ariz	V_1	243.9	.....	+ 2.0	1590.4027
Near Yampai, Ariz	W_1	250.4	.....	− 3.9	1662.1423
Yampai, Ariz	X_1	253.8	.....	−11.4	1701.7929
Near Yampai, Ariz	Y_1	258.4	.....	−17.6	1644.6904
Near Pica, Ariz	Z_1	265.1	.....	−20.8	1587.8315
Do	A_2	268.1	.....	−18.3	1581.7017
Near Audley, Ariz	B_2	271.4	.....	−17.2	1577.9476
Audley, Ariz	C_2	274.5	.....	−20.3	1570.3515
Near Audley, Ariz	D_2	277.9	.....	−21.8	1568.0521
Near Chino, Ariz	E_2	282.6	.....	−16.3	1612.4952
Do	F_2	285.7	.....	−19.3	1619.4165
Near Seligman, Ariz	G_2	289.0	.....	−20.3	1593.9135
Do	H_2	289.2	.....	−19.6	1592.5761
Seligman, Ariz	I_2	291.0	.....	−19.3	1597.4117
Near Pan, Ariz	J_2	298.5	.....	−16.1	1665.7989
Near Crookton, Ariz	K_2	309.9	.....	−14.7	1710.8224
Gleed, Ariz	L_2	314.3	.....	−12.7	1654.1040
Near Pineveta, Ariz	M_2	318.8	.....	−16.7	1557.0321
Do	N_2	322.0	.....	− 9.3	1534.3079
Near Ash Fork, Ariz	O_2	327.3	.....	− 9.3	1535.9630
Ash Fork, Ariz	U. S. G. S. 5141.	332.7	.....	+ 1.8	1566.3260
Do	P_2	333.2	332.7	+ 3.6	1569.2115
Near Ash Fork, Ariz	U. S. G. S. 5134.	333.5	.....	+ 4.4	1564.2529
Near Holmes, Ariz	U. S. G. S. 5446.	339.3	.....	+10.0	1659.2677
Do	Q_2	340.9	.....	+ 4.6	1688.0800
Near Fairview, Ariz	U. S. G. S. 5713.	344.1	.....	+ 8.0	1740.7660
Fairview, Ariz	U. S. G. S. 5964.	348.7	.....	+12.6	1809.0283
Near Fairview, Ariz	R_2	349.7	.....	+11.2	1823.8945
Do	S_2	350.7	.....	+13.2	1847.1231
Do	T_2	352.3	.....	+13.2	1885.5203
Near McLellan, Ariz	U_2	353.9	.....	+16.2	1922.4393
McLellan, Ariz	V_2	356.3	.....	+24.6	1957.7903
Near McLellan, Ariz	U. S. G. S. 6568.	358.6	.....	+26.2	2001.3890
Near Supai	W_2	363.1	.....	+22.4	2104.3635
Supai, Ariz	U. S. G. S. 6961.	364.1	.....	+22.3	2121.2235
Near Williams, Ariz	X_2	368.6	.....	+24.7	2067.0745
Williams, Ariz	U. S. G. S. 6770.	369.8	.....	+24.9	2062.2532
Do	Y_2	370.1	.....	+25.3	2062.4575
Near Williams, Ariz	Z_2	374.1	.....	+27.9	2105.2097
Do	U. S. G. S. 6952.	375.4	.....	+33.4	2118.3779
Do	U. S. G. S. 6930.	376.5	.....	+35.0	2111.7537
Near Davorn, Ariz	U. S. G. S. 6953.	380.5	.....	+33.7	2118.8457
Chalender, Ariz	U. S. G. S. 6869.	383.6	.....	+35.1	2092.9984
Near Chalender, Ariz.	A_3	387.8	.....	+37.7	2091.4966
Do	U. S. G. S. 6852.	389.8	.....	+38.2	2087.8023
Near Maine, Ariz	B_3	393.8	.....	+32.6	2134.0654
Maine, Ariz	U. S. G. S. 7086.	395.5	.....	+25.9	2159.3314
Near Maine, Ariz	U. S. G. S. 7178.	398.9	.....	+24.1	2187.1617
Near Arey, Ariz	U. S. G. S. 7193.	402.9	.....	+14.4	2191.9341
Near Bellemont, Ariz.	U. S. G. S. 7131.	406.1	.....	+14.5	2172.9411
Do	C_3	407.8	.....	+13.2	2173.3345
Do	U. S. G. S. 7186.	410.9	.....	+15.0	2189.6877
Near Riordan, Ariz	U. S. G. S. 7273.	415.7	.....	+13.1	2216.3541
Near Agassiz, Ariz	U. S. G. S. 7091.	420.5	.....	+13.5	2160.6145
Do	D_3	421.2	.....	+11.7	2150.1857
Flagstaff, Ariz	U. S. G. S. 6907.	425.2	.....	+16.3	2104.6062
Do	E_3	425.5	.....	+16.8	2102.7596
Near Flagstaff, Ariz	U. S. G. S. 6844.	428.9	.....	+24.2	2084.3546
Do	U. S. G. S. 6843.	430.5	.....	+21.7	2084.9646
Near Cosnino, Ariz	F_3	443.5	.....	+17.6	1966.2439
Winona, Ariz	G_3	450.0	.....	+10.4	1899.5165
Near Winona, Ariz	H_3	455.1	.....	+14.3	1849.4026

* From L_5 at Goffs.

† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

Results of leveling, Goffs, Cal., to Albuquerque, N. Mex., 1909—Continued.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†
		km.	*km.*	*mm.*	*m.*
Near Angell, Ariz.	I_3	462.6	.....	+ 7.5	1766.8663
Near Hibbard, Ariz.	J_3	467.8	.....	+ 1.2	1701.4995
Do	K_3	467.8	.....	+ 2.2	1699.6642
Do	L_3	470.6	.....	+ 8.5	1671.8675
Near Canyon Diablo, Ariz.	M_3	473.8	.....	+ 7.9	1659.4903
Do	N_3	476.7	.....	+ 1.2	1654.8918
Do	O_3	476.9	.....	+ 1.5	1654.9128
Near Sunshine, Ariz.	P_3	483.6	.....	+ 5.8	1631.6823
Do	Q_3	484.9	.....	+ 4.1	1630.1693
Do	R_3	488.4	.....	+ 4.9	1612.5105
Do	S_3	491.9	.....	+ 6.8	1572.2215
Near Dennison, Ariz.	T_3	496.5	.....	− 3.4	1537.7523
Do	U_3	501.3	.....	− 6.0	1527.4235
Near Winslow, Ariz.	V_3	511.9	.....	− 7.1	1485.8771
Do	W_3	515.8	.....	−16.2	1498.6223
Winslow, Ariz.	X_3	519.5	.....	−26.0	1479.6269
Near Winslow, Ariz.	Y_3	524.1	.....	−34.9	1481.8018
Do	Z_3	524.3	.....	−34.2	1481.7396
Near Hobson, Ariz.	A_4	533.3	.....	−17.1	1489.8550
Near Hardy, Ariz.	B_4	541.8	.....	− 1.0	1501.3522
Near Manila, Ariz.	C_4	547.5	.....	+ 1.1	1511.4156
Near Joseph City, Ariz.	D_4	554.1	.....	+ 7.7	1521.2998
Do	E_4	557.9	.....	+ 1.9	1527.1911
Near Penzance, Ariz.	F_4	562.6	.....	+ 3.9	1535.9553
Do	G_4	564.4	.....	+ 1.9	1538.4049
Near Holbrook, Ariz.	H_4	568.0	.....	− 2.2	1542.0429
Holbrook, Ariz.	I_4	572.3	.....	− 4.6	1549.1667
Near Holbrook, Ariz.	J_4	577.2	.....	− 1.8	1556.0178
Near Aztec, Ariz.	K_4	582.1	.....	− 1.7	1562.7430
Do	L_4	589.7	.....	+ 2.6	1581.2749
Do	M_4	590.8	.....	+ 3.4	1583.4405
Near Carrizo, Ariz.	N_4	594.3	.....	− 7.0	1590.6983
Near Adamana, Ariz.	O_4	602.5	.....	−16.4	1607.5351
Adamana, Ariz.	P_4	605.4	.....	−16.8	1614.4214
Near Adamana, Ariz.	Q_4	608.5	.....	−19.0	1625.8513
Near Pinta, Ariz.	R_4	622.5	.....	−22.5	1664.7319
Do	S_4	624.2	.....	−19.0	1672.2983
Do	T_4	628.4	.....	−22.0	1685.4802
Do	U_4	631.8	.....	−22.5	1701.6988
Near Navajo, Ariz.	V_4	632.2	.....	−22.6	1702.0110
Do	W_4	634.2	.....	−24.5	1708.2444
Do	X_4	641.9	.....	−19.3	1731.0394
Near Chambers, Ariz.	Y_4	646.5	.....	−25.3	1744.7234
Chambers, Ariz.	Z_4	648.9	.....	−18.9	1752.3863
Near Sanders, Ariz.	A_5	656.4	.....	−22.0	1776.0126
Sanders, Ariz.	B_5	658.1	.....	−22.6	1776.9108
Near Sanders, Ariz.	C_5	660.8	.....	−29.1	1784.7145
Near Houck, Ariz.	D_5	667.9	.....	−21.5	1808.2159
Do	E_5	669.0	.....	−22.4	1811.3601
Houck, Ariz.	F_5	670.2	.....	−22.3	1815.7075
Near Allantown, Ariz.	G_5	682.0	.....	−15.3	1854.0013
Near Lupton, Ariz.	H_5	687.1	.....	−20.7	1870.5761
Do	I_5	688.8	.....	−24.1	1875.2495
Near Manuelito, N. Mex.	A	694.0	.....	−17.8	1891.5417
Do	B	698.9	.....	−21.2	1905.7288
Do	C	701.5	.....	−23.8	1909.1342
Do	D	706.2	.....	−21.4	1919.6355
Near Defiance, N. Mex.	E	711.5	.....	− 8.0	1938.6258
Near West Yard, N. Mex.	F	720.4	.....	− 3.2	1968.0133
Gallup, N. Mex.	G	726.3	.....	−15.8	1982.9991
Near Gallup, N. Mex.	H	729.2	.....	− 6.1	1995.5657
Do	I	731.5	.....	− 7.5	2001.2553
Near Zuni, N. Mex.	J	733.1	.....	− 9.8	2003.2915
Do	K	738.0	.....	− 3.9	2021.3168
Wingate, N. Mex.	L	745.9	.....	−13.7	2054.1140
Near Perea, N. Mex.	M	758.0	.....	−14.3	2115.2834
Guam, N. Mex.	N	761.2	.....	− 9.1	2133.0084
Near Guam, N. Mex.	O	766.3	.....	+ 2.5	2169.0437
Near Gonzales, N. Mex.	P	768.0	.....	+ 7.8	2183.4007
Gonzales, N. Mex.	Q	770.7	.....	+10.2	2210.5337
Near Gonzales, N. Mex.	R	771.9	.....	+12.5	2199.8867
Thoreau, N. Mex.	S	778.6	.....	+15.0	2173.9716
Near Thoreau, N. Mex.	T	781.2	.....	+16.2	2152.7206
Near Chaves, N. Mex.	U	785.7	.....	+18.1	2124.9545
Near Baca, N. Mex.	V	793.8	.....	+23.4	2082.4986
Do	W	797.2	.....	+14.7	2070.0969
Do	X	798.9	.....	+11.9	2057.4535
Near Bluewater, N. Mex.	Y	802.3	.....	+ 9.6	2049.0174
Do	Z	803.9	.....	+ 9.1	2045.4846
Do	A_1	812.5	.....	+ 4.4	2008.2232
Near Toltec, N. Mex.	B_1	819.6	.....	+11.6	1989.6643
Near Grants, N. Mex.	C_1	823.2	.....	+13.8	1986.0189
Grants, N. Mex.	D_1	825.7	.....	+ 9.2	1970.6649
Near Grants, N. Mex.	E_1	826.3	.....	+10.0	1967.2669
Near Horace, N. Mex.	F_1	834.5	.....	+14.6	1943.3106
Do	G_1	839.0	.....	+21.9	1917.2755
Near McCartys, N. Mex.	H_1	844.2	.....	+23.2	1894.5771
Do	I_1	844.7	.....	+24.3	1889.7195
McCartys, N. Mex.	J_1	846.4	.....	+21.2	1878.8127
Near Alaska, N. Mex.	K_1	853.4	.....	+29.7	1845.4118
Do	L_1	860.4	.....	+30.1	1824.8649
Near Cubero, N. Mex.	M_1	863.9	.....	+29.8	1806.9455
Do	N_1	867.9	.....	+26.0	1794.2653
Near Laguna, N. Mex.	O_1	870.4	.....	+27.9	1785.2983
Do	P_1	873.0	.....	+26.0	1777.3445
Laguna, N. Mex.	Q_1	874.4	.....	+28.7	1766.7293
Do	Astro	874.6	874.4	+28.1	1764.9909
Near Laguna, N. Mex.	R_1	877.6	.....	+33.9	1749.1537
Do	S_1	879.5	.....	+30.7	1741.7216
El Rito, N. Mex.	T_1	884.2	.....	+29.3	1726.4527
Near El Rito, N. Mex.	U_1	889.6	.....	+36.5	1715.0077
Near Armijo, N. Mex.	V_1	891.1	.....	+38.0	1711.6335
Do	W_1	897.7	.....	+43.4	1683.3544
Do	X_1	898.9	.....	+46.4	1681.4676
Suwanee, N. Mex.	Y_1	905.2	.....	+54.2	1661.0266
Near Suwanee, N. Mex.	Z_1	910.7	.....	+59.2	1628.0948
Near Garcia, N. Mex.	A_2	913.2	.....	+59.4	1612.8083
Do	B_2	916.6	.....	+60.0	1583.2179
Do	C_2	918.5	.....	+60.2	1571.8125
Near Rio Puerco, N. Mex.	D_2	923.2	.....	+53.9	1553.4265
Do	E_2	926.8	.....	+55.3	1538.4188
Near Pavo, N. Mex.	F_2	929.7	.....	+60.3	1558.3808
Do	G_2	932.7	.....	+61.2	1579.6638
Do	H_2	933.6	.....	+60.7	1584.2060
Near Sandia, N. Mex.	I_2	941.1	.....	+60.2	1621.8798
Do	J_2	947.6	.....	+60.1	1581.4102
Near Manzana, N. Mex.	K_2	950.2	.....	+60.5	1558.1114
Do	L_2	951.7	.....	+60.4	1546.2116
Near Isleta, N. Mex.	M_2	957.3	.....	+62.0	1519.6363
Do	U. S. G. S. 4891.	960.5	.....	+64.2	1490.4858
Isleta, N. Mex.	N_2	961.0	960.5	+66.6	1492.5039
Near Isleta, N. Mex.	O_2	964.0	.....	+67.4	1493.7434
Do	U. S. G. S. 4902.	964.2	.....	+67.8	1493.7440
Do	U. S. G. S. 4904.	966.1	.....	+71.4	1494.4403
Near Albuquerque, N. Mex.	U. S. G. S. 4928.	970.4	.....	+68.8	1501.7722
Do	U. S. G. S. 4932.	976.2	.....	+65.5	1502.8156
Albuquerque, N. Mex.	P_2	981.7	.....	+61.3	1510.6140
Do	U. S. G. S. 4954.	981.9	.....	+60.7	1509.4460
Do	Astro	982.4	.....	+63.1	1520.0071
Do	U. S. G. S. 4951.	982.4	981.9	+60.8	1508.7336

* From L_5 at Goffs.
† These elevations are superseded by the standard elevations given later in this publication which depend on an adjustment.

EL RENO, OKLA., TO JERICHO, TEX.

This line was run by Ford Kurtz, Aid, between July 1 and September 14, 1909. The leveling started from three bench marks at El Reno and followed the line of the Chicago, Rock Island & Gulf Railway to Jericho, Tex.

Precise level No. 7 was used until July 17. Precise level No. 6, one of the intermediate type was used from July 17 to August 3, after which No. 7 was used to the end of the season.

Rods AA and BB were used. The length of these rods at 0° C. as determined by the Bureau of Standards and the Instrument Division of this Survey, were:

Date.	Rod AA.	Rod BB.
	Meters.	*Meters.*
Feb. 15, 1909	3.0004	3.0010
Oct. 30, 1909	3.0007	3.0012

In accordance with paragraph 21 of the General Instructions, each rod was measured with a steel tape at least twice each month while in the field. These measurements showed that the lengthening of the rods found by the Instrument Division was uniformly distributed over the entire period of the leveling. The mean length of rods interpolated for various dates during the period of leveling was used in the computation. The index correction of rod AA was −0.2 millimeter and rod BB −0.3 millimeter.

The difference of elevation between the three bench marks recovered at El Reno agreed with those previously determined within the limit of the accuracy of the leveling.

The elevations in the following table are based on an elevation of 405.1837 meters, for bench mark 1327 RJ at El Reno, which is the adjusted elevation published on page 108 of "Precise Leveling in the United States 1903–1907."

Results of leveling, El Reno, Okla., to Jericho, Tex., 1909.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B−F).	Observed elevation.†
		km.	*km.*	*mm.*	*m.*
Reno Junction, Okla	1327 RJ	0.0		0.0	405.1837
Fort Reno, Okla	A_2	6.2		− 3.9	425.4729
Calumet, Okla	B_2	15.8		− 8.0	419.6824
Near Calumet, Okla	C_2	27.4		−13.6	440.3583
Geary, Okla	D_2	34.4		− 5.6	469.5504
Do	E_2	34.9		− 4.7	472.5328
Do	F_2	35.4		− 4.8	482.7466
Do	G_2	35.5		− 5.7	484.8750
Near Geary, Okla	H_2	41.3		− 4.0	436.0810
Do	I_2	47.1		− 5.0	429.1110
Bridgeport, Okla	J_2	49.2		− 0.8	434.7144
Near Bridgeport, Okla	K_2	53.5		+ 1.3	435.6483
McCool, Okla	L_2	60.1		+ 3.7	440.3779
Near Hydro, Okla	M_2	64.2		+ 4.1	447.9001
Hydro, Okla	N_2	68.1		+10.0	474.8369
Do	O_2	68.7		+11.2	453.9727
Near Hydro, Okla	P_2	72.1		+14.4	456.5948
Near Weatherford, Okla	Q_2	77.1		+13.8	477.6181
Weatherford, Okla	R_2	81.6		+20.0	501.7888
Do	S_2	81.9		+22.5	505.9606
Near Weatherford, Okla	T_2	86.5		+25.7	516.4559
Do	U_2	87.8		+30.3	525.4892
Do	V_2	90.1		+28.9	548.5405
Near Indianapolis, Okla	W_2	95.8		+23.5	511.5747
Indianapolis, Okla	X_2	99.1		+16.5	507.9643
Near Indianapolis, Okla	Y_2	105.3		+14.4	466.4738
Near Clinton, Okla	Z_2	110.4		+18.6	454.3792
Clinton, Okla	A_3	112.7		+17.3	462.5477
Do	B_3	113.3		+17.1	477.2748
Do	C_3	113.5		+16.5	477.5155
Near Clinton, Okla	D_3	115.7		+12.7	456.2210
Do	E_3	119.0		+ 9.3	471.7544
Near Parkersburg, Okla	F_3	120.0		+10.9	470.9889
Parkersburg, Okla	G_3	122.9		+ 8.5	464.8471
Near Parkersburg, Okla	H_3	132.1		+11.3	481.1469
Foss, Okla	I_3	137.5		+21.3	495.6119
Do	J_3	137.7		+21.1	500.2528
Do	K_3	137.9		+20.2	496.4930
Near Foss, Okla	L_3	143.8		+22.3	535.9915
Canute, Okla	M_3	149.9		+26.5	580.2150
Near Canute, Okla	N_3	155.6		+25.9	592.7827
Near Elk City, Okla	O_3	159.6		+24.9	592.2892
Elk City, Okla	P_3	162.1		+23.4	583.5718
Do	Q_3	162.5		+23.5	587.2390
Do	R_3	162.6		+22.4	588.7026
Near Elk City, Okla	S_3	171.2		+14.4	637.8188
Meritt, Okla	T_3	174.1		+10.0	625.3203
Doxey, Okla	U_3	183.0		+13.1	560.3188
Do	V_3	183.1		+13.0	560.1714
Near Sayre, Okla	W_3	189.5		+ 5.2	560.8088
Do	X_3	190.2		+ 3.5	554.2118
Sayre, Okla	Y_3	190.7		+ 3.3	550.9015
Do	Z_3	191.8		+ 3.8	551.9593
Near Sayre, Okla	A_4	198.4		+ 9.0	562.4033
Hext Ranch, Okla	B_4	204.3		+ 6.3	588.5195
Near Erick, Okla	C_4	211.2		+ 9.1	617.1646
Erick, Okla	D_4	214.6		+ 8.9	628.4050
Do	E_4	214.9		+ 9.6	628.4216
Near Erick, Okla	F_4	219.0		+ 5.1	616.4215
Texola, Okla	G_4	226.9		+ 2.1	654.5990
Do	H_4	227.1		+ 1.0	655.8434
Benonine, Tex	H_9	229.7		+ 0.2	654.0872
Fuller, Tex	I_9	235.7		+ 6.9	666.0794
Near Shamrock, Tex	J_9	246.6		− 4.6	700.5207
Shamrock, Tex	K_9	252.8		− 8.4	711.1211
Do	L_9	253.3		− 9.9	713.9511
Near Shamrock, Tex	M_9	258.9		− 9.3	730.1064
Lela (formerly Story), Tex.	N_9	262.9		− 7.5	735.7027
Near Ramsdell, Tex	O_9	267.8		− 3.6	759.7594
Ramsdell, Tex	P_9	273.1		− 4.9	780.1000
Do	Q_9	273.3		− 4.9	781.8814
Near Ramsdell, Tex	R_9	282.7		+ 1.8	833.3390
McLean, Tex	S_9	289.8		+10.2	871.4294
Do	T_9	290.0		+ 8.6	873.3345
Near McLean, Tex	U_9	296.4		− 1.2	902.8315
Near Alanreed, Tex	V_9	301.7		+ 5.1	917.0344
Alanreed, Tex	W_9	304.2		+ 4.4	928.6541
Do	X_9	304.4		+ 5.5	922.8503
Near Alanreed, Tex	Y_9	309.3		0.0	946.1982
Rockledge, Tex	Z_9	314.7		− 5.2	965.5598
Near Jericho, Tex	A_{10}	318.2		− 8.1	967.2732
Jericho, Tex	B_{10}	323.9		−12.4	976.1447

* From 1327 RJ at Reno Junction.
† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

FORT WORTH TO EL PASO, TEX.

This line was run by C. M. Cade, Assistant, between April 4, 1910, and January 10, 1911. Three bench marks were recovered at Fort Worth. The leveling follows the Texas & Pacific Railway from Fort Worth to Sierra Blanca, and the Galveston, Harrisburg & San Antonio Railway from Sierra Blanca to El Paso, Tex.

The leveling determined the elevation of eight primary triangulation stations, Lamb, Patterson, Stanton, Stanton South Base, Scar, Odessa, Hays, and Allamore.

Precise level No. 8 was used. Rods AA and BB were used up to October 6, 1910, and rods R_2 and S for the remainder of the line. Their lengths as determined by the Instrument Division of this Survey were:

Date.	Rod AA.	Rod BB.	Date.	Rod R_2.	Rod S.
	Meters.	*Meters.*		*Meters.*	*Meters.*
Oct. 30, 1909	3.0007	3.0012	Sept. 29, 1910	3.0007	3.0002
Nov. 10, 1910	3.0004	3.0011	Feb. 13, 1911	2.9999	2.9996

In accordance with paragraph 21 of the general instructions each rod was measured with a steel tape at least twice each month while in the field. These measures failed to show when the change found by the Instrument Division occurred. It was assumed, therefore, that the change was gradual and distributed over the entire period of leveling. In the computations the mean length of the rods interpolated for various dates during the period of leveling was used. The index corrections were: Rod AA, −0.3 millimeter; rod BB, −0.4 millimeter; rod R_2, −0.8 millimeter; and rod S, −0.5 millimeter.

The new determination of the differences of elevation of the three bench marks recovered at Fort Worth agreed very closely with the previous determinations.

The elevations in the following table are based on an elevation of 188.6548 meters for M_3 at Fort Worth, which is the elevation published on page 574 of Appendix 3, 1903:

Results of leveling, Fort Worth to El Paso, Tex., 1910.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B−F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B−F).	Observed elevation.†
		km.	*km.*	*mm.*	*m.*			*km.*	*km.*	*mm.*	*m.*
Fort Worth	U	− 1.9		− 1.9	184.7294	Near Wiles	U_{11}	143.4		+25.7	362.0573
Do	M_3	0.0		0.0	188.6548	Near Tiffin	V_{11}	146.5		+32.6	400.7591
Do	C_{10}	1.3		+ 0.4	190.3768	Tiffin	W_{11}	149.5		+25.4	426.5407
Near Fort Worth	D_{10}	3.2		− 4.2	169.9167	Ranger	X_{11}	153.2		+29.9	441.8819
Do	E_{10}	7.1		− 4.9	175.6766	Do	Y_{11}	153.7		+30.2	440.2135
Near Benbrook	F_{10}	12.4		− 6.7	190.0425	Near Ranger	Z_{11}	155.2		+28.4	446.5884
Benbrook	G_{10}	14.1		− 2.2	202.0455	Do	A_{12}	160.6		+25.8	447.0386
Near Benbrook	H_{10}	18.7		− 2.5	240.0300	Olden	B_{12}	164.3		+21.2	476.1788
Iona	I_{10}	23.8		+ 3.9	298.8634	Near Eastland	C_{12}	166.8		+25.0	455.3415
Aledo	J_{10}	29.2		+ 9.6	270.7460	Eastland	D_{12}	169.9		+30.2	436.0418
Do	K_{10}	29.4		+ 9.9	271.9600	Near Eastland	E_{12}	174.3		+22.5	446.4078
Near Aledo	L_{10}	32.1		+ 6.1	245.7054	Lom	F_{12}	177.3		+20.8	458.3283
Do	M_{10}	33.9		+ 7.2	249.4139	Cisco	G_{12}	185.9		+28.2	496.0362
Near Anneta	N_{10}	38.1		+ 7.2	261.2622	Do	H_{12}	186.2		+26.6	493.8204
Near Earls	O_{10}	43.1		+10.1	274.8170	Near Cisco	I_{12}	193.2		+26.9	504.8704
Earls	P_{10}	44.0		+10.3	276.2637	Near Dothan	Lamb △	196.6	193.2	+24.2	534.8021
Near Weatherford	Q_{10}	45.8		+ 6.3	286.0485	Do	Lamb. Ref. Mark	196.6	193.2	+23.6	534.6741
Weatherford	R_{10}	49.0		+ 3.0	301.7396	Dothan	J_{12}	198.0		+25.4	493.4025
Do	S_{10}	49.9		+ 1.2	320.8632	Near Putnam	K_{12}	202.2		+30.2	478.8256
Do	T_{10}	50.5		+ 1.9	308.2018	Putnam	L_{12}	207.5		+20.1	488.7310
Near Weatherford	U_{10}	52.5		− 2.1	319.8510	Do	M_{12}	207.6		+20.2	490.1952
Do	V_{10}	55.7		− 2.3	347.4182	Near Putnam	N_{12}	211.5		+24.6	459.1702
Lambert	W_{10}	61.0		− 6.8	353.1561	Chautauqua	O_{12}	217.9		+19.0	465.1138
Near Millsap	X_{10}	66.3		− 7.2	295.4481	Near Chautauqua	P_{12}	222.7		+20.3	485.3184
Millsap	Y_{10}	73.3		− 3.1	250.6137	Near Baird	Q_{12}	223.8		+20.6	497.5410
Near Millsap	Z_{10}	77.4		+ 0.8	229.8846	Baird	R_{12}	226.7		+28.9	523.9269
Bennetts	A_{11}	78.3		− 0.7	229.7384	Do	S_{12}	227.2		+26.9	525.8412
Near Brazos	B_{11}	86.8		− 2.8	248.1484	Near Baird	T_{12}	232.3		+28.7	580.3318
Do	C_{11}	88.0		+ 0.9	238.9428	Clyde	U_{12}	237.5		+38.9	605.7625
Brazos	D_{11}	89.2		− 0.9	246.4075	Near Clyde	V_{12}	242.4		+31.2	612.4088
Near Santo	E_{11}	95.4		− 2.1	240.0557	Elmdale	W_{12}	251.8		+21.2	543.5159
Do	F_{11}	99.0		+ 0.9	245.4439	Abilene	X_{12}	260.0		+20.0	522.1158
Santo	G_{11}	100.3		+ 3.5	250.7682	Do	Y_{12}	261.4		+18.7	526.0844
Near Santo	H_{11}	106.4		+ 9.2	268.6099	Do	Z_{12}	262.3		+17.2	525.8050
Judd	I_{11}	109.3		+ 7.6	278.6569	Do	A_{13}	262.9		+19.4	524.2231
Near Gordon	J_{11}	114.9		+ 9.1	284.9137	Near Abilene	B_{13}	269.1		+16.3	525.2349
Gordon	K_{11}	117.9		+10.2	294.9047	Tye	C_{13}	273.6		+12.6	548.5709
Near Mingus	L_{11}	121.6		+14.6	291.4735	Do	D_{13}	274.0		+14.4	547.0838
Mingus	M_{11}	123.1		+16.7	292.1171	Near Merkel	E_{13}	280.5		+29.9	541.5673
Near Mingus	N_{11}	125.3		+19.2	290.7038	Merkel	F_{13}	287.1		+31.0	570.2424
Strawn	O_{11}	130.0		+26.5	303.6483	Do	G_{13}	287.4		+31.1	571.7030
Do	P_{11}	130.9		+26.3	304.1189	Do	H_{13}	288.1		+32.1	570.6292
Near Strawn	Q_{11}	134.5		+20.5	317.6110	Near Merkel	I_{13}	291.9		+37.5	567.0647
Do	R_{11}	137.0		+20.7	328.1414	Trent	J_{13}	297.9		+41.0	583.7763
Near Wiles	S_{11}	140.7		+24.9	344.6217	Do	K_{13}	298.5		+39.6	584.6752
Wiles	T_{11}	142.2		+24.4	354.3755	Near Eskota	L_{13}	305.0		+39.4	595.9629

* From M_3 at Fort Worth.
† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

Results of leveling, Fort Worth to El Paso, Tex., 1910—Continued.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B–F).	Observed elevation.†
		km.	*km.*	*mm.*	*m.*
Eskota	M_{13}	311.7		+ 38.4	590.9148
Near Sweetwater	N_{13}	319.5		+ 30.1	607.5459
Do	O_{13}	321.3		+ 28.5	610.0124
Sweetwater	P_{13}	327.8		+ 34.6	663.4317
Do	Q_{13}	328.5		+ 34.5	662.9713
Near Sweetwater	R_{13}	334.0		+ 36.0	720.0554
Roscoe	S_{13}	340.9		+ 29.8	727.4329
Near Roscoe	Patterson△	348.0	340.9	+ 17.0	726.6774
Roscoe	T_{13}	341.2		+ 34.1	727.5463
Near Roscoe	U_{13}	346.1		+ 32.0	726.5200
Near Loraine	V_{13}	356.6		+ 25.6	704.1666
Loraine	W_{13}	358.6		+ 26.6	690.2467
Do	X_{13}	359.2		+ 24.7	688.3101
Near Colorado	Y_{13}	367.4		+ 15.3	675.8280
Colorado	Z_{13}	373.0		+ 16.6	630.3619
Do	A_{14}	373.8		+ 14.7	631.5501
Do	B_{14}	374.7		+ 16.2	631.1023
Near Westbrook	C_{14}	381.8		+ 12.1	636.5760
Westbrook	D_{14}	389.1		+ 7.6	650.6473
Near Westbrook	E_{14}	396.4		+ 2.4	676.8681
Iatan	F_{14}	404.3		− 0.9	674.0999
Near Iatan	G_{14}	408.7		+ 3.6	705.5464
Near Coahoma	H_{14}	413.5		+ 12.2	722.4626
Coahoma	I_{14}	417.8		+ 19.8	733.7960
Near Coahoma	J_{14}	420.7		+ 11.7	739.1964
Near Big Springs	K_{14}	432.2		+ 3.1	732.0331
Big Spring	L_{14}	434.5		+ 4.6	732.2160
Do	M_{14}	434.6		+ 4.6	732.0701
Do	South End Meridian Line.	435.1	434.6	+ 3.8	741.8841
Near Big Spring	N_{14}	440.9		− 8.5	736.3717
Do	O_{14}	445.0		− 12.9	738.7112
Morita	P_{14}	452.3		− 10.8	754.7072
Near Morita	Q_{14}	457.5		− 16.3	753.9091
Near Stanton	R_{14}	462.8		− 26.5	784.5296
Do	Stanton △	468.0		− 26.9	825.5943
Stanton	S_{14}	470.0		− 26.9	815.0317
Do	T_{14}	470.4		− 29.1	811.8878
Near Stanton	U_{14}	476.3		− 38.4	827.2178
Do	Stanton S. B.△	482.5		− 45.2	821.2040
Germania	V_{14}	488.1		− 47.6	838.8364
Near Germania	W_{14}	489.4		− 46.0	844.3102
Near Midland	X_{14}	495.0		− 41.9	849.0584
Do	Y_{14}	497.7		− 47.5	840.2758
Midland	Z_{14}	502.7		− 49.9	847.8576
Do	A_{15}	503.1		− 51.7	845.7129
Near Midland	B_{15}	510.3		− 58.1	866.4553
Near Warfield	Scar △	515.0	514.1	− 61.8	880.7894
Warfield	C_{15}	519.5		− 63.8	874.7523
Near Warfield	D_{15}	521.8		− 61.2	871.9812
Near Odessa	E_{15}	527.1		− 58.2	878.7979
Do	Odessa△	533.9	533.0	− 68.0	898.7045
Odessa	F_{15}	535.5		− 67.2	883.5098
Do	G_{15}	535.9		− 67.1	884.8442
Near Odessa	H_{15}	543.7		− 70.7	897.4087
Douro	I_{15}	552.9		− 74.5	939.7318
Near Douro	J_{15}	556.5		− 84.8	943.7444
Metz	K_{15}	569.1		− 99.4	872.7080
Near Metz	L_{15}	573.4		− 96.0	884.0286
Do	M_{15}	577.8		−105.0	856.4843
Near Sand Hills	N_{15}	582.7		−107.1	837.3713
Sand Hills	O_{15}	585.8		−102.2	825.5163
Near Sand Hills	P_{15}	589.3		−102.6	814.7004
Monahans	Q_{15}	594.2		− 99.9	799.4728
Near Monahans	R_{15}	595.2		− 98.3	796.2017
Do	S_{15}	598.2		−103.4	794.3023
Aroya	T_{15}	603.1		−103.8	812.7058
Near Aroya	U_{15}	607.0		−102.4	808.8523
Pyote	V_{15}	617.5		−111.4	798.6502
Do	W_{15}	618.6		−110.0	800.3837
Near Pyote	X_{15}	624.4		−106.5	795.1856
Quito	Y_{15}	634.1		−122.4	818.9845
Near Quito	Z_{15}	636.3		−125.1	812.1793
Do	A_{16}	636.7		−126.1	810.7089
Do	B_{16}	637.3		−127.2	809.5213
Near Barstow	C_{16}	639.2		−128.7	808.2671
Do	Hays△	641.1	638.2	−124.8	853.1958
Do	D_{16}	643.1		−128.3	781.8416
Barstow	E_{16}	644.6		−130.3	782.5682
Near Barstow	F_{16}	647.1		−128.0	782.2276
Near Pecos	G_{16}	650.5		−129.8	782.6920
Do	H_{16}	652.5		−133.9	784.0168
Pecos	I_{16}	655.4		−134.7	788.6380
Do	J_{16}	655.7		−136.0	787.7794
Near Pecos	K_{16}	662.0		−136.5	806.0970
Near Hermosa	L_{16}	666.1		−146.6	819.5921
Hermosa	M_{16}	670.0		−143.6	832.3709
Near Hermosa	N_{16}	675.8		−152.6	850.1886
Near Toyah	O_{16}	682.0		−150.1	868.4814
Toyah	P_{16}	686.2		−140.3	886.4421
Toyah	Q_{16}	687.1		−141.1	890.7625
Do	R_{16}	687.3		−141.2	891.5483
Near Toyah	S_{16}	692.9		−146.1	920.2331
Do	T_{16}	697.7		−144.3	955.8790
Gomez	U_{16}	703.3		−147.5	998.5415
Near Gomez	V_{16}	707.5		−140.9	1029.7692
Near San Martine	W_{16}	718.2		−135.5	1135.6285
San Martine	X_{16}	719.7		−139.3	1132.6133
Do	Y_{16}	720.0		−139.9	1133.4694
Near San Martine	Z_{16}	723.9		−136.6	1167.3364
Near Kent	A_{17}	728.8		−141.8	1215.6442
Do	B_{17}	733.3		−145.0	1261.0538
Kent	C_{17}	738.8		−145.0	1284.1141
Near Kent	D_{17}	742.7		−145.9	1311.7258
Do	E_{17}	743.4		−148.2	1319.1480
Boracho	F_{17}	755.4		−154.4	1359.0942
Near Boracho	G_{17}	757.7		−155.0	1341.4514
Near Plateau	H_{17}	766.2		−147.4	1245.7942
Do	I_{17}	768.9		−146.6	1225.2362
Plateau	J_{17}	771.8		−148.8	1201.7022
Near Plateau	U. S. G. S. 3889.	774.2		−155.8	1188.0984
Do	K_{17}	776.3		−157.3	1177.9794
Near Wild Horse	U. S. G. S. 3840.	778.9		−161.3	1173.1356
Do	U. S. G. S. 3826.	783.8		−159.1	1168.7228
Wild Horse	L_{17}	785.3		−161.5	1173.6046
Near Wild Horse	U. S. G. S. 3867.	788.8		−170.5	1181.2183
Do	M_{17}	790.6		−174.9	1177.5977
Near Van Horn	N_{17}	793.9		−170.3	1199.3402
Van Horn	O_{17}	798.3		−156.8	1234.0484
Do	U. S. G. S. 4039.	798.4		−156.0	1233.8071
Near Van Horn	U. S. G. S. 4239.	803.4		−155.7	1294.6609
Do	U. S. G. S. 4395.	807.4		−156.1	1342.2898
Near Allamore	U. S. G. S. 4603.	812.8		−150.2	1405.8267
Do	P_{17}	814.4		−152.7	1385.0543
Allamore	Allamore△	816.0		−157.1	1387.3327
Near Allamore	Q_{17}	817.6		−155.1	1378.3029
Do	R_{17}	822.4		−152.8	1359.0618
Near Eagle Flat	S_{17}	825.6		−154.2	1361.2107
Eagle Flat	T_{17}	828.7		−159.4	1359.4357
Near Eagle Flat	U_{17}	832.1		−167.6	1347.2676
Near Sierra Blanca	V_{17}	838.0		−161.6	1328.3659
La Valley	W_{17}	843.1		−170.2	1335.2210
Near Sierra Blanca	X_{17}	846.1		−165.7	1340.1181
Sierra Blanca	Y_{17}	851.7		−150.2	1377.8343
Near Sierra Blanca	Z_{17}	854.4		−156.1	1389.3238
Etholen	A_{18}	858.6		−166.9	1418.0941
Near Etholen	B_{18}	861.5		−166.9	1399.1438
Lasca	C_{18}	865.2		−161.5	1365.4392
Near Torcer	D_{18}	869.5		−158.2	1326.5944
Torcer	E_{18}	872.2		−157.4	1303.9048
Near Torcer	F_{18}	873.1		−157.2	1287.2741
Do	G_{18}	876.5		−158.5	1235.6468
Near Finlay	H_{18}	880.1		−159.3	1214.9353
Finlay	I_{18}	882.9		−154.1	1204.3364
Do	J_{18}	887.3		−161.3	1178.0622
Madden	K_{18}	893.9		−156.0	1119.4501
Nulo	L_{18}	902.0		−160.2	1087.9471
Fort Hancock	M_{18}	909.8		−143.9	1095.7508
Near Fort Hancock	N_{18}	915.9		−146.6	1097.0476
Iser	O_{18}	921.1		−143.2	1118.5481
Near Polvo	P_{18}	925.6		−147.0	1125.3854
Do	Q_{18}	928.7		−143.5	1123.2385
Polvo	R_{18}	931.9		−138.5	1113.3070
Near Polvo	S_{18}	935.2		−131.3	1090.4351
Do	U. S. G. S. 3560	935.5		−131.8	1089.4673
Near Fabens	T_{18}	944.9		−124.0	1096.4985
Fabens	U_{18}	947.7		−123.7	1103.7201
Do	V_{18}	947.8		−122.4	1103.3755
Near Fabens	U.S.R.S.3572.14.	950.9		−117.1	1101.9818
Near Clint	U.S.R.S.3586.94.	956.6		−113.8	1106.4822
Clint	U.S.R.S.3592.95.	959.7		−104.3	1108.3120
Do	W_{18}	960.2		−104.7	1108.3556
Near Clint	X_{18}	962.7		−106.4	1109.3652
Do	U.S.R.S.3600.09.	964.3		−105.3	1110.4900
Belen	Y_{18}	968.1		− 95.7	1115.2887
Do	U.S.G.S.3614.68.	968.7		− 94.3	1114.8947
Do	Z_{18}	969.1		− 96.1	1114.7325
Ysleta	A_{19}	975.2		− 88.7	1118.7956
Near Ysleta	B_{19}	980.4		− 77.3	1122.8153
Alfalfa	C_{19}	984.9		− 70.5	1125.9093
Near Alfalfa	D_{19}	986.1		− 67.1	1127.3646
El Paso	E_{19}	990.4		− 67.8	1129.8560
Do	F_{19}	992.7		− 67.8	1129.3928
Do	G_{19}	993.2		− 70.7	1130.8960
Do	H_{19}	994.3		− 71.6	1130.1558
Do	U. S. G. S. 3698.	994.7		− 73.0	1131.3378
Do	U. S. G. S. 365.	994.8		− 72.9	1131.0234
Do	U. S. G. S. 366.	994.9		− 72.1	1131.2244
Do	City Bench Mark.	994.8	994.8	− 73.3	1131.4913

* From M_3 at Fort Worth.
† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

JERICHO, TEX., TO ISLETA, N. MEX.

This line is a continuation of the line El Reno, Okla., to Jericho, Tex. It was run by C. M. Cade, Assistant, between June 5, 1911, and November 4, 1911. The leveling started from two bench marks in Jericho, Tex., and followed the line of the Chicago, Rock Island & Gulf Railway to Amarillo, Tex., then along the Atchison, Topeka & Santa Fe Railway to Isleta, N. Mex., where it connected with the line Goffs to Albuquerque. The results agreed with the previous determination within allowable limits of error.

Precise Level No. 10 was used. Rods R_2 and S were used up to August 31, 1911, and rods X and Y for the remainder of the season. The lengths of these rods at 0° C. as determined by the Instrument Division of this Survey were:

Date.	Rod R_2.	Rod S.	Date.	Rod X.	Rod Y.
	Meters.	*Meters.*		*Meters.*	*Meters.*
Feb. 13, 1911	2.9999	2.9996	Aug. 22, 1911	3.0012	3.0015
Nov. 23, 1911	3.0000	2.9997	Dec. 2, 1911	3.0009	3.0012

In accordance with paragraph 21 of the general instructions each rod was measured with a steel tape at least twice a month. These measurements showed that rods R_2 and S had held practically a constant length and that the shortening of rods X and Y was a gradual one. The mean of the measures for both sets of rods was used in the computation. The mean length of R_2 and S, was 2.9998 or a defect in length of 0.07 millimeter per meter, and the mean length of X and Y was 3.0012 or an excess in length of 0.40 millimeter per meter. The index corrections of rods R_2 and S were both equal to −0.9 millimeter; the index correction of rod X was −0.2 millimeter and of rod Y −0.4 millimeter.

The new difference of elevation between the two bench marks recovered at Jericho agreed with the difference as formerly determined within the limit of the accuracy of the leveling.

The elevations in the following table depend upon an elevation of 976.1447 meters as determined by the line El Reno to Jericho.

Results of leveling, Jericho, Tex., to Isleta, N. Mex., 1911.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B−F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B−F).	Observed elevation.†
		km.	*km.*	*mm.*	*m.*			*km.*	*km.*	*mm.*	*m.*
Jericho, Tex.	B_{10}	0.0	.....	0.0	976.1447	Joel, Tex.	M_{20}	150.1	.....	+44.9	1148.2544
Near Jericho, Tex.	I_{19}	4.9	.....	− 8.2	972.2814	Near Joel, Tex.	N_{20}	153.3	.....	+48.5	1147.8888
Boydston, Tex.	J_{19}	9.5	.....	− 5.1	985.1002	Hereford, Tex.	O_{20}	160.2	.....	+55.1	1162.0741
Groom, Tex.	K_{19}	18.4	.....	+ 3.7	994.9504	Do	P_{20}	160.7	.....	+53.8	1165.2403
Near Groom, Tex.	L_{19}	21.4	.....	+ 5.2	1003.5240	Do	Q_{20}	161.0	.....	+51.8	1164.2888
Do	M_{19}	24.5	.....	+ 0.9	1007.8900	Near Hereford, Tex.	R_{20}	167.0	.....	+49.0	1177.5422
Lark, Tex.	N_{19}	30.1	.....	+ 9.2	1028.2619	Summerfield, Tex.	S_{20}	174.3	.....	+48.0	1199.4791
Near Conway, Tex.	O_{19}	36.4	.....	+11.4	1044.0206	Near Summerfield, Tex.	T_{20}	177.4	.....	+49.7	1197.5339
Conway, Tex.	P_{19}	43.6	.....	+14.2	1053.6920	Do	U_{20}	178.0	.....	+47.8	1198.8921
Near Conway, Tex.	Q_{19}	50.1	.....	+14.7	1057.7725	Black, Tex.	V_{20}	185.9	.....	+42.7	1217.4390
Yarnall, Tex.	R_{19}	57.1	.....	+18.0	1074.3557	Near Friona, Tex.	W_{20}	190.9	.....	+40.1	1220.4598
Near Yarnall, Tex.	S_{19}	64.6	.....	+17.0	1072.7989	Friona, Tex.	X_{20}	197.1	.....	+45.4	1220.9633
Royal, Tex.	T_{19}	71.6	.....	+18.5	1096.8317	Near Friona, Tex.	Y_{20}	203.5	.....	+51.7	1252.4309
Near Amarillo, Tex.	U_{19}	79.1	.....	+15.4	1100.2816	Parmerton, Tex.	Z_{20}	207.1	.....	+52.7	1272.9924
Do	V_{19}	82.6	.....	+13.8	1113.8542	Near Parmerton, Tex.	A_{21}	210.3	.....	+55.2	1258.2433
Do	W_{19}	83.3	.....	+12.9	1114.3468	Bovina, Tex.	B_{21}	217.0	.....	+62.0	1240.3071
Amarillo, Tex.	X_{19}	84.6	.....	+ 8.8	1117.9126	Near Bovina, Tex.	C_{21}	219.4	.....	+59.1	1234.6797
Do	Y_{19}	85.7	84.6	+ 5.7	1116.7754	Do	D_{21}	223.4	.....	+56.5	1245.1372
Zita, Tex.	Z_{19}	93.5	.....	+11.6	1112.9943	Wilsey, Tex.	E_{21}	228.1	.....	+59.9	1270.5748
Near Zita, Tex.	A_{20}	95.8	.....	+14.6	1113.6553	Near Wilsey, Tex.	F_{21}	231.3	.....	+59.3	1259.5472
Haney, Tex.	B_{20}	102.0	.....	+12.0	1109.9001	Texico, N. Mex.	Q_2	238.3	.....	+61.7	1264.1678
Near Canyon, Tex.	C_{20}	105.1	.....	+13.1	1095.1103	Do	R_2	238.4	.....	+61.3	1264.7714
Canyon, Tex.	D_{20}	112.4	.....	+22.0	1082.4900	Near Texico, N. Mex.	S_2	244.6	.....	+69.2	1279.7278
Do	E_{20}	113.5	.....	+23.5	1090.3404	Near Clovis, N. Mex.	T_2	250.7	.....	+63.5	1287.8586
Do	F_{20}	114.0	.....	+24.2	1090.4540	Clovis, N. Mex.	U_2	253.0	.....	+61.2	1297.5296
Near Canyon, Tex.	G_{20}	116.4	.....	+24.4	1093.1557	Do	V_2	253.4	.....	+58.7	1299.2714
Lester, Tex.	H_{20}	120.9	.....	+25.2	1117.8595	Do	W_2	253.6	.....	+59.0	1301.3668
Umbarger, Tex.	I_{20}	129.8	.....	+32.2	1147.8887	Near Clovis, N. Mex.	X_2	257.5	.....	+61.0	1313.0789
Near Umbarger, Tex.	J_{20}	132.5	.....	+34.6	1144.4177	Near Blacktower, N. Mex.	Y_2	261.9	.....	+64.2	1313.5500
Dawn, Tex.	K_{20}	139.9	.....	+35.9	1156.1620						
Near Dawn, Tex.	L_{20}	143.9	.....	+36.3	1150.7182						

* From B_{10} at Jericho.
† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

Results of leveling, Jericho, Tex., to Isleta, N. Mex., 1911—Continued.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B−F).	Observed elevation.†
		km.	*km.*	*mm.*	*m.*
Blacktower, N.Mex.	Z_2	262.6	.....	+64.1	1316.5884
Do	A_3	262.6	.....	+64.5	1318.4618
Near Blacktower, N. Mex.	B_3	268.9	.....	+60.8	1328.4997
Do	C_3	272.2	.....	+55.5	1331.4444
Near St. Vrain, N. Mex.	D_3	281.7	.....	+61.2	1340.4815
Near Melrose, N. Mex.	E_3	291.5	.....	+75.1	1340.9951
Melrose, N. Mex.	F_3	292.6	.....	+76.9	1340.7896
Near Melrose, N. Mex.	G_3	294.9	.....	+76.4	1332.2174
Cantarn, N. Mex.	H_3	303.2	.....	+65.2	1343.4585
Near Krider, N.Mex.	I_3	308.6	.....	+67.8	1321.8352
Krider, N. Mex.	J_3	311.8	.....	+65.7	1313.3714
Near Krider, N.Mex.	K_3	314.9	.....	+68.0	1305.7999
Tolar, N. Mex.	L_3	321.2	.....	+72.0	1282.1907
Near Tolar, N. Mex.	M_3	323.6	.....	+73.6	1274.7237
Taiban, N. Mex.	N_3	328.6	.....	+75.1	1257.5705
Near Taiban, N. Mex.	O_3	329.0	.....	+73.8	1256.3765
Near La Lande, N. Mex.	P_3	336.0	.....	+66.4	1240.2285
La Lande, N. Mex.	Q_3	340.0	.....	+67.7	1254.2743
Near Fort Sumner, N. Mex.	R_3	345.4	.....	+72.1	1255.3330
Do	S_3	349.7	.....	+68.3	1236.3047
Fort Sumner, N. Mex.	T_3	350.3	.....	+70.4	1237.1399
Do	U_3	350.9	.....	+72.2	1240.4976
Near Fort Sumner, N. Mex.	V_3	351.9	.....	+68.7	1235.3806
Fort Sumner, N. Mex.	U. S. G. S. Fort Sumner.	353.5	353.1	+65.1	1233.5603
Near Fort Sumner, N. Mex.	W_3	353.7	.....	+66.6	1243.4374
Do	X_3	354.2	.....	+68.1	1246.2730
Do	Y_3	357.7	.....	+67.2	1266.1572
Agudo, N. Mex.	Z_3	363.1	.....	+70.4	1297.8492
Ricardo, N. Mex.	A_4	372.7	.....	+61.5	1345.3733
Near Ricardo, N. Mex.	B_4	377.0	.....	+63.8	1362.1739
Evanola, N. Mex.	C_4	383.5	.....	+62.3	1395.8169
Near Yeso, N. Mex.	D_4	390.0	.....	+55.7	1431.4242
Yeso, N. Mex.	E_4	394.7	.....	+51.1	1455.1868
Do	F_4	395.0	.....	+51.3	1456.5909
Largo, N. Mex.	G_4	405.0	.....	+56.3	1513.9908
Near Largo, N. Mex.	H_4	406.8	.....	+59.3	1521.5204
Buchanan, N. Mex.	I_4	414.1	.....	+62.8	1563.1195
Near Buchanan, N. Mex.	J_4	415.4	.....	+62.2	1567.8816
Do	K_4	418.8	.....	+66.8	1587.1211
Cardenas, N. Mex.	L_4	423.4	.....	+68.2	1614.2614
Near Cardenas, N. Mex.	M_4	425.5	.....	+69.5	1623.2167
Duoro, N. Mex.	N_4	435.0	.....	+72.6	1658.0027
Near Duoro, N.Mex.	O_4	438.0	.....	+74.3	1670.4176
Do	P_4	442.6	.....	+77.9	1694.1661
Casaus, N. Mex.	Q_4	446.0	.....	+81.5	1712.7209
Near Casaus, N. Mex.	R_4	448.7	.....	+82.1	1726.1374
Iden, N. Mex.	S_4	456.8	.....	+77.6	1772.0350
Near Vaughn, N. Mex.	T_4	460.8	.....	+77.3	1793.0967
Vaughn, N. Mex.	U_4	465.0	.....	+72.1	1818.0887
Do	V_4	465.3	.....	+72.7	1818.4709
Near Vaughn, N. Mex.	W_4	467.5	.....	+75.0	1823.2421
Do	X_4	469.1	.....	+81.1	1828.9185
Tejon, N. Mex.	Y_4	473.5	.....	+71.6	1856.2093
Near Carnero, N. Mex.	Z_4	478.3	.....	+65.3	1883.9136
Carnero, N. Mex.	A_5	482.2	.....	+70.8	1896.5351
Near Encino, N. Mex.	B_5	485.9	.....	+74.7	1877.4485
Encino, N. Mex.	C_5	491.4	.....	+83.3	1865.9908
Near Encino, N. Mex.	D_5	495.0	.....	+80.2	1878.9654
Near Negra, N. Mex.	E_5	496.4	.....	+78.5	1879.9012
Negra, N. Mex.	F_5	499.6	.....	+71.9	1889.6043
Near Pedernal, N. Mex.	G_5	505.6	.....	+66.6	1919.3415
Pedernal, N. Mex.	H_5	510.2	.....	+64.3	1940.9276
Dunmoor, N. Mex.	I_5	515.7	.....	+58.6	1942.5997
Near Dunmoor, N. Mex.	J_5	520.8	.....	+60.6	1931.0412
Near Lucy, N. Mex.	K_5	526.7	.....	+58.6	1895.4941
Do	L_5	530.3	.....	+61.1	1881.2668
Lucy, N. Mex.	M_5	531.8	.....	+62.3	1882.5357
Near Lucy, N. Mex.	N_5	538.5	.....	+68.7	1858.4393
Near Silio, N. Mex.	O_5	543.4	.....	+69.1	1854.4891
Willard, N. Mex.	P_5	552.2	.....	+72.0	1857.9957
Do	Q_5	552.5	.....	+73.1	1857.4899
Do	R_5	553.2	.....	+71.6	1861.3867
Near Willard, N. Mex.	S_5	559.5	.....	+72.9	1891.6268
Broncho, N. Mex.	T_5	564.9	.....	+73.9	1923.7280
Do	U_5	566.0	.....	+73.5	1926.3008
Near Mountainair, N. Mex.	V_5	569.5	.....	+76.3	1943.8680
Mountainair, N. Mex.	W_5	574.9	.....	+75.1	1977.2685
Do	X_5	575.3	.....	+73.0	1980.9341
Near Mountainair, N. Mex.	Y_5	577.9	.....	+74.4	1966.1440
Do	Z_5	580.9	.....	+78.5	1930.0447
Abo, N. Mex.	A_6	585.5	.....	+67.8	1876.1738
Near Abo, N. Mex.	B_6	586.9	.....	+65.4	1872.1486
Do	C_6	591.6	.....	+62.6	1822.4475
Near Scholle, N. Mex.	D_6	597.2	.....	+68.4	1768.3488
Do	E_6	598.0	.....	+69.6	1757.7479
Do	F_6	600.6	.....	+70.7	1728.3191
Near Sais Siding, N. Mex.	G_6	605.3	.....	+69.7	1673.6702
Sais Siding, N. Mex.	H_6	606.7	.....	+71.0	1659.5770
Becker, N. Mex.	I_6	616.7	.....	+71.3	1578.8532
Do	J_6	617.0	.....	+73.4	1577.5758
Near Bodega, N. Mex.	K_6	625.9	.....	+71.0	1526.5444
Near Madrone, N. Mex.	L_6	630.7	.....	+68.1	1498.7844
Madrone, N. Mex.	M_6	634.3	.....	+75.2	1481.7530
Near Belen, N. Mex.	N_6	636.8	.....	+77.8	1466.6090
Do	O_6	637.0	.....	+78.0	1465.3163
Do	U. S. G. S. 4793.	639.5	.....	+77.4	1461.2243
Belen, N. Mex.	P_6	641.8	.....	+82.2	1456.2749
Do	Q_6	641.9	.....	+82.7	1465.1263
Near Belen, N. Mex.	U. S. G. S. 4808.	644.2	.....	+85.1	1465.8551
Near Los Lunas, N. Mex.	U. S. G. S. 4821.	649.3	.....	+87.5	1469.7855
Do	U. S. G. S. 4833.	653.4	.....	+93.8	1473.4047
Do	R_6	655.5	.....	+96.2	1475.0929
Los Lunas, N. Mex.	S_6	658.2	.....	+96.7	1480.2333
Do	U. S. G. S. 4851.	658.5	.....	+98.4	1479.0221
Near Los Lunas, N. Mex.	T_6	662.9	.....	+97.6	1481.9132
Near Isleta, N. Mex.	U. S. G. S. 4891.	669.6	.....	+97.3	1490.8125
Isleta, N. Mex.	N_2	670.2	.....	+96.8	1492.8329

* From B_{10} at Jericho.
† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

Details of Lines Run by the United States Geological Survey.

ALBUQUERQUE, N. MEX., TO EL PASO, TEX.

This line was run in 1905 by M. S. Bright along the Atchison, Topeka & Santa Fe Railway.

The United States Coast and Geodetic Survey line between Goffs, Cal., and El Reno, Okla., was connected with it at Isleta, Belen, and Albuquerque, N. Mex. The United States Coast and Geodetic Survey line Fort Worth to El Reno was connected with it at El Paso. It thus serves as a link between them and together with the United States Coast and Geodetic Survey lines Galveston to Fort Worth to El Paso and San Diego to Goffs to Albuquerque forms a direct connection between the Gulf of Mexico and the Pacific Ocean.

DUQUOIN, ILL., TO SHAWNEETOWN, ILL.

This line was run in 1906 by T. A. Green. The leveling started from United States Coast and Geodetic Survey bench mark R_3 at Duquoin and followed the Illinois Central Railroad to Shawneetown, Ill.

MITCHELL, IND., TO OAKLAND, ILL.

This line started from the United States Coast and Geodetic Survey bench mark X at Mitchell, Ind., and followed the Chicago, Indianapolis & Louisville Railway to Elliston, Ind. From Elliston to Terre Haute, Ind., the line followed the Chicago & Eastern Illinois Railroad, thence the Vandalia Railroad was followed to Oakland, Ill.

The leveling Robinson to Bloomfield, Ind., was done in 1906 by T. A. Green, the remaining portions of the line Mitchell to Robinson, Ind., and Bloomfield, Ind., to Oakland, Ill., were done in 1906 and 1907, respectively, by C. H. Semper.

At Oakland connection is made with the United States Geological Survey line from Pekin to Olney, Ill.

GEORGETOWN TO LOUISVILLE, KY.

This line was run in 1906 by C. H. Semper. The leveling started from United States Coast and Geodetic Survey bench mark W at Georgetown and followed the Frankfort & Cincinnati Railway and the Louisville & Nashville Railroad to Louisville, Ky.

At Louisville the line connected with two bench marks of the Ohio River Survey.

MITCHELL, IND., TO LOUISVILLE, KY.

This line was run in 1911 by E. L. McNair. The leveling started from United States Coast and Geodetic Survey bench mark X at Mitchell, Ind., and followed the Chicago, Indianapolis & Louisville Railroad to Louisville, Ky., where it connected with the line Georgetown to Louisville and two bench marks of the Ohio River Survey.

Details of Lines Run by the United States Engineers.

LAWRENCEBURG, IND., TO CAIRO, ILL

This line is a continuation of the line of precise levels from Pittsburgh, Pa., to Petersburg, Ky., run along the Ohio River under the direction of the Chief of Engineers. The instruments and methods used on this work are described on page 347, Appendix 3, Report of 1903. The field work was done in 1903, 1906, and 1907.

TERRE HAUTE, IND., TO SHAWNEETOWN, ILL.

This line of levels was run in connection with a Survey of the Wabash River in 1911. The instruments and the methods were the same as those in use by the Mississippi River Commission.

The leveling started from four bench marks of the United States Geological Survey and followed the course of the Wabash River to its junction with the Ohio River thence down the Ohio River to Shawneetown, Ill.

The following bench marks were recovered:

Two bench marks of the United States Coast and Geodetic Survey at Vincennes, Ind.

Two bench marks of the Ohio River Survey between the mouth of the Wabash River and Shawneetown, Ill.

Three bench marks of the United States Geological Survey at Shawneetown, Ill.

The new determination of the differences of elevation between the recovered bench marks agreed with the previous determinations within the limits of the accuracy of the leveling.

Orthometric and Dynamic Corrections.*

As stated on page 5, it was found to be necessary to apply a correction to the observed elevations, in addition to that necessary to close the circuits, on account of the nonparallelism of level surfaces.

* Lallemand discusses at length the orthometric and dynamic corrections on pages 358 to 387 of his "Nivellement de Haute Précision" in the Encyclopédie des Travaux Publics, Paris et Liège, 1912.

A level surface is one which is everywhere perpendicular to the direction of gravity, as defined by the plumb line. The surface of still water at a uniform temperature is level. A level surface is also called an equipotential surface, meaning thereby that every point on it has the same gravity potential. The difference in potential between two equipotential surfaces is equal to the work done by or against gravity * in moving a unit mass from a point on one surface to a point on the other surface. The work or difference of potential is independent of the particular points that may be chosen or of the path between them. The work in passing from one point to another on the same level surface is zero. Potential and equipotential surfaces and their properties are discussed in many books, such as: Helmert's "Die Mathematischen und Physikalischen Theorieen der Höheren Geodäsie: II Theil." In ordinary spirit leveling it is assumed that, if the field work could be made sufficiently exact, the same difference of elevation between two points would be obtained, irrespective of the route followed. It is implied that level surfaces are parallel to each other.

As stated above, this is not true, but the error introduced by this assumption in the results of leveling which is not of a high grade is small compared with the errors of leveling, and may be neglected.

In precise leveling a correction must be applied to the observed differences in elevation on account of the nonparallelism of level surfaces, and this is most important on north-and-south lines especially when the average elevation of the line is great. This correction would be small and probably negligible on a line run along a coastal plain.

The surface of the sea and other level surfaces above or below it are approximately spheroidal in shape, but each of the surfaces above sea level has a greater proportional flattening than the sea surface, and consequently such a surface will be at a shorter distance from sea level at the poles than at the equator. A level surface 1000 meters above the sea at the equator would be only 995 meters above the sea at the poles. The polar convergence of other level surfaces toward sea level is approximately in the same proportion to their elevation; for instance, a level surface 500 meters above the sea at the equator would be 497½ meters above it at the poles, etc.

If a line were drawn whose tangent everywhere coincided with the direction of gravity—i. e., with the perpendicular at every point to the level surface through that point—this line would not be straight but slightly curved and concave toward the earth's axis. Strictly speaking, there is therefore some ambiguity in the expression "elevation" of a point above sea level. The distance between a point and the sea level might be measured: (1) Along a curved line of the kind just mentioned passing through the point; (2) along a straight line perpendicular to the level surface at the point in question and extending down to sea level; (3) along a straight line perpendicular to the sea-level surface and passing through the point in question. This third kind of line is the one commonly used in geodesy for reducing to sea level, to obtain a point on the sea-level surface corresponding to a point above it. But as long as only the lengths of these lines are considered, it is entirely indifferent which length is selected to measure, since if one of these lengths be 10000 meters—higher than the highest mountain on the earth—the others will differ from it by less than a thousandth of a millimeter. This source of ambiguity may, therefore, be neglected, but the ambiguity arising from the route followed remains to be considered.

The manner in which discordant differences of level between two points are obtained by following different routes between them may be illustrated by a simple ideal case. Suppose a still lake, lying north and south, is situated on the edge of a level plateau near the sea in the Northern Hemisphere. Let B be a point at the lake's surface near the middle, and A a point at sea level in the same latitude as B. Let one line of levels be carried by water leveling north from A to C, a point at sea level and in the same latitude as the north end of the lake, then directly upward to D, at the north end of the lake's surface, then by water leveling along the lake southward to B. The difference of level between A and B, or between A and any point of the lake's surface, will come out equal to the elevation of D above C. Let another line of levels be run southward from A by water levels to E, at sea level and in the same latitude as F at the south

* Gravity is considered to be the resultant of gravitation (the attraction of the earth's mass) and the centrifugal force due to the earth's rotation.

end of the lake's surface, then directly up from E to F and northward by water levels on the lake to B. The difference of level between A and B, or between A and any point on the lake's surface, will now come out equal to the elevation of F above E, and will be greater than the apparent elevation by the first route, since the two level surfaces approach each other as they near the north pole; and neither result will agree with the result of measuring directly upward from A to B.

There are two methods of correcting this ambiguity, so that except for errors of observation one may always arrive at the same result for the same point. One method is to correct the difference of level in such a manner that one may obtain the actual distance between B and the sea level, or in the general case, between a point and the geoid. This elevation is called the orthometric elevation of B, and the correction to the measured difference of elevation to obtain the orthometric elevation from the observed results of leveling is called the *orthometric correction*. It is to be noted (1) that one may speak, not of the orthometric correction to an elevation, but of the orthometric correction to a difference of elevation for a given route; (2) that points on the same level surface have different orthometric elevations if they lie in different latitudes, and that, therefore, conversely points in different latitudes, having the same orthometric elevation, lie on different level surfaces. This inconvenience has led to the second method, which discards the simple conception of measured length altogether, and gives to each surface a number of its own. Instead of giving the elevation of a point above sea level, a serial number is given to the level surface on which it lies. The points F, B, and D on the lake-level surface would bear the same number. For convenience, the system of numbering these surfaces is such that the number of a level surface is not very different from the height (in the unit chosen) of any point in the surface. The serial number of a level surface is called its *dynamic number*,* and is defined as follows: In the metric system the dynamic number of a point is the *work* required to raise a mass of 1 kilogram against the force of gravity from sea level to the level surface passing through the point, the work being measured in standard kilogram-meters at sea level in latitude 45°. If the English system be used, the kilogram in the preceding statement is replaced by the pound, and the kilogram-meter by the corresponding standard foot-pound. More generally, to get the dynamic number in any system of units, the work which is necessary to raise a unit mass from sea level to the level surface in question is expressed in absolute units and the result divided by g_{45}, where g_{45} is the normal acceleration of gravity at sea level in latitude 45°.

The quantity which must be added to the orthometric elevation of a point to obtain the dynamic number is called the *dynamic correction.*

The exact determination of orthometric and dynamic corrections would require a knowledge of the force of gravity at every point of the line of levels. To get a sufficient approximation to this knowledge by direct observation at numerous points on the line is, at present, impracticable. If it is assumed that the force of gravity is given by one of the usual mathematical expressions, a fair approximation to the truth will, in general, be obtained. The following expression† is taken for the force of gravity g at any point in latitude ϕ and at an orthometric elevation h:

$$g = g_{45}(1 - \alpha\cos 2\phi + \beta\cos^2 2\phi - kh); \tag{1}$$

g_{45} has the meaning previously given; α, β, and k are constants, α and β being independent of the unit used and equal, respectively, to 0.002644 and 0.000007; $g_{45} = 980.624$ dynes and $k = 0.0000003147$, if h is in meters; or, more strictly,

$$k = \frac{3147}{10^{10}}\left(1 + \frac{71}{10^5}\cos 2\phi - \frac{23}{10^8}h\right),$$

or for brevity, $k = k'(1 + \gamma\cos 2\phi - ch)$‡

* The phrase *dynamic number* is an attempt to render into English the French expression *cote dynamique*, or its equivalent, *dynamische Kote*, as used by German writers.

† Equivalent to the expression given by Helmert.

‡ Sitzungsberichte der Königliche Preussischen Akademie der Wissenschaften, 1903, erste Halbband, seite 651.

Let W be the work of raising a unit mass from sea level to a point at orthometric elevation h and H the dynamic number of the level surface on which the point lies. The curved vertical of length h is chosen as the most convenient path for passing from sea level to the given point.

Then
$$W=\int_o^h g dh = g_{45}\int_o^h (1-\alpha\cos 2\phi+\beta\cos^2 2\phi-kh)dh$$
$$W=g_{45}(1-\alpha\cos 2\phi+\beta\cos^2 2\phi)h-k'\frac{h^2}{2}(1+\gamma\cos 2\phi-\frac{2}{3}ch)$$

By definition $H=\frac{W}{g_{45}}$, or
$$H=h-(\alpha\cos 2\phi-\beta\cos^2 2\phi)h-k'\frac{h^2}{2}\left(1+\gamma\cos 2\phi-\frac{2}{3}ch\right) \tag{2}$$

This gives the connection between the orthometric elevation and dynamic number. Since H is by definition constant for a level surface, equation (2) may be regarded as the equation of the level surface in coordinates ϕ and h. Let there be a neighboring point on the surface with coordinates $\phi+d\phi$ and $h+dh$. The relation that $d\phi$ and dh must satisfy will be found by differentiating (2), noting that H is constant. It is
$$dh=\frac{-2h(\alpha\sin 2\phi-\beta\sin 4\phi+k'h\frac{\gamma}{2}\sin 2\phi)d\phi}{1-\alpha\cos 2\phi+\beta\cos^2 2\phi-k'h(1+\gamma\cos 2\phi-ch)} \tag{3}$$

or
$$dh=-2h\alpha\sin 2\phi\left[1+\left(\alpha-\frac{2\beta}{\alpha}\right)\cos 2\phi+k'h\left(1+\frac{\gamma}{2\alpha}\right)+\text{-----}\right]d\phi \tag{4}$$

The term in $k'h$ may be neglected as insignificant in comparison with uncertainties due to errors of observation. On the line of levels from San Diego to Seattle, with an average elevation of about 1000 meters, and stretching through a difference of latitude of about 15°, the orthometric correction amounted to about one and one-quarter meters, while the term in question had an effect of less than half a millimeter. The neglected terms in (4), involving higher powers in α, β, and $k'h$ have even less effect on the result, so for all practical purposes the equation may be written:
$$dh=-2h\alpha\sin 2\phi\left[1+\left(\alpha-\frac{2\beta}{\alpha}\right)\cos 2\phi\right]d\phi \tag{5}$$

By this equation one may compute the orthometric correction to an observed difference in elevation. After corrections have been applied for curvature and refraction, the two points sighted on the level rods are on the same level surface. The rods measure the distances from this level surface to the points on which they rest, but since the point on the more northerly rod (speaking for the northern hemisphere) is nearer sea level than the corresponding point of the level surface on the other rod by an amount which may be calculated from (5), the observed difference in rod readings must be corrected by (5) to obtain the required difference in elevation above sea level. Equation (5) may be extended to far greater distances than those of a single sight by using for h the average height of the instrument between the points whose difference in elevation is to be found.

Tables on pages 54 to 56 contain quantities useful in computing from (2) and (5) the orthometric and dynamic corrections.

In table 1 the argument is the latitude; the quantities tabulated in the second and third columns are for computing by (5) and consist, respectively, of the factor $2\alpha\sin 2\phi\left[1+\left(\alpha-\frac{2\beta}{\alpha}\right)\cos 2\phi\right]\sin 1'$, called C, and its logarithm; $\sin 1'$ is included so that $d\phi$ may be taken in minutes of arc. The orthometric correction to the difference of elevation between two points (elevation of second point minus elevation of starting point) is then $-Chd\phi$, where h is the average elevation of the instrument between the points, $d\phi$ is the difference of latitude in minutes, positive when the second point is north of the first. Any unit of length may be used for h; the orthometric correction computed as above is then expressed in the same unit.

The fourth and fifth columns contain, respectively, the quantities $\alpha\cos 2\phi - \beta\cos^2 2\phi$ (called D_1) and its logarithm.

The expression $-(\alpha\cos 2\phi - \beta\cos^2 2\phi)h = -D_1 h$ constitutes the dynamic correction for latitude and is expressed in the same unit as h. The remaining term of (2), $-k'\frac{h^2}{2}\left(1+\gamma\cos 2\phi - \frac{2}{3}ch\right)$, constitutes the dynamic correction for elevation. In table 2, $\frac{k'}{2}\left(1+\gamma\cos 2\phi - \frac{2}{3}ch\right)$, abbreviated as D_2, is tabulated under the two arguments ϕ and h (expressed in meters), and in Table 2a log D_2 is given for the same arguments. The total dynamic correction is then $-D_1 h - D_2 h^2$.

Example 1: If the elevation above sea level of Lake Michigan be 177 meters at Chicago, latitude 41° 53′, what is it at Milwaukee, in latitude 43° 03′? In making the computation the mean elevation of the lake, h, may be assumed to be 177 meters. $d\phi = +70'$. The tables give C for the middle latitude, 42° 28′, as .000001532; whence the elevation at Milwaukee $= 177 - Chd\phi = 177 - 0.0190 = 176.9810$ meters.

Example 2: Suppose levels are to be carried from A, in south latitude 30° 35′, to a point B, in south latitude 30° 17′, and that the average elevation of the instrument between these points is 600 meters. For the middle latitude 30° 26′ the table gives $C = -.000001342$, the negative sign following from the rule at the head of the table, and $d\phi = -30° 17' - (-30° 35') = +18'$. The correction to the quantity (Observed elevation at B − Observed elevation at A) is then $-600 \times (-.000001342) \times 18 = +.0145$ meters.

For examples of computation of dynamic numbers from the orthometric elevations the table on pages 83–84 may be consulted.

An idea of how closely actual gravity at a point conforms to the value derived from the formulas used above, which give the values in "free-air," may be obtained by consulting page 12 of Special Publication No. 12 of the United States Coast and Geodetic Survey.

It may be noted that, granted numerous observations of the relative intensity of gravity along the line of leveling, the dynamic numbers may be obtained free from any hypothesis as to the change in the intensity of gravity much more readily than the orthometric elevations. Suppose it is assumed that the dynamic number of a certain point is known and that it is desired to carry it forward by leveling to a second point, not far distant. For this purpose, besides the observed difference of level, there is needed the average intensity of gravity along the line, which may be taken as the value of gravity at a point whose projection on the geoid is the middle point of the line joining the projections of the two points and whose elevation is the mean of the elevations, which need not be known with the greatest exactness. This value could be obtained by direct observation or by interpolation from adjacent gravity stations. Let this value be called g and the observed difference of elevation $\Delta h'$. Then the difference in dynamic numbers is $\frac{\Delta h' g}{g_{45}}$.

A similar process, using theoretical instead of observed gravity, could be used to carry the dynamic number from one point to another without the intervention of orthometric elevations. For this purpose, if g now represents theoretical gravity the formula can be written $\frac{g}{g_{45}}\Delta h' = \Delta h' - (D_1 + kh)\Delta h'$. The last term serves as a correction to the observed $\Delta h'$ to obtain the difference in the dynamic numbers. The value (approximate) of k is $\frac{3147}{10^{10}}$. (See p. 51.)

But should the law of variation of gravity with elevation and latitude not be known, and the orthometric elevation of a point be desired with only observed values of gravity available, its dynamic number must first be found, then both the distance and gravity must be measured along the vertical into the earth to the surface of the geoid, the dynamic number being derived at each step. The dynamic number *zero* marks the surface of the geoid, and the distance between the given point and the point on the surface whose dynamic number is zero is the orthometric elevation of the former

TABLE 1.—*Orthometric and dynamic corrections.*

[For explanation of the use of the tables, see p. 52.]

[C is expressed in units of the ninth decimal place. D_1 is expressed in units of the sixth decimal place. -10 is to be understood with log C and log D_1. In south latitudes, if ϕ is taken negative, C is negative. The sign of D_1 is independent of the sign of the latitude.]

Latitude ϕ.	C.	Log C.	D_1.	Log D_1	Latitude ϕ.	C.	Log C.	D_1.	Log D_1.
° ′					° ′				
0 00	0	−∞	+2637	7.4211	15 00	+ 767	3.8850	+2285	7.3588
10	+ 9	1.9506	+2637	7.4211	10	+ 775	3.8893	+2277	7.3573
20	+ 18	2.2516	+2637	7.4211	20	+ 783	3.8936	+2269	7.3558
30	+ 27	2.4277	+2637	7.4210	30	+ 790	3.8979	+2261	7.3543
40	+ 36	2.5526	+2636	7.4210	40	+ 798	3.9020	+2253	7.3528
50	+ 45	2.6495	+2636	7.4209	50	+ 806	3.9062	+2245	7.3513
1 00	+ 54	2.7287	+2635	7.4208	16 00	+ 813	3.9102	+2237	7.3497
10	+ 62	2.7956	+2635	7.4208	10	+ 821	3.9143	+2229	7.3481
20	+ 71	2.8536	+2634	7.4206	20	+ 828	3.9182	+2221	7.3465
30	+ 80	2.9047	+2633	7.4205	30	+ 836	3.9222	+2213	7.3449
40	+ 89	2.9504	+2633	7.4204	40	+ 843	3.9260	+2204	7.3432
50	+ 98	2.9917	+2632	7.4202	50	+ 851	3.9299	+2196	7.3416
2 00	+ 107	3.0295	+2631	7.4201	17 00	+ 858	3.9336	+2187	7.3399
10	+ 116	3.0642	+2629	7.4199	10	+ 866	3.9374	+2179	7.3382
20	+ 125	3.0963	+2628	7.4197	20	+ 873	3.9410	+2170	7.3364
30	+ 134	3.1262	+2627	7.4195	30	+ 880	3.9447	+2161	7.3347
40	+ 143	3.1541	+2626	7.4192	40	+ 888	3.9483	+2152	7.3329
50	+ 151	3.1804	+2624	7.4190	50	+ 895	3.9518	+2143	7.3311
3 00	+ 160	3.2051	+2623	7.4187	18 00	+ 902	3.9553	+2134	7.3293
10	+ 169	3.2285	+2621	7.4185	10	+ 909	3.9588	+2125	7.3274
20	+ 178	3.2507	+2619	7.4182	20	+ 917	3.9622	+2116	7.3256
30	+ 187	3.2718	+2617	7.4179	30	+ 924	3.9656	+2107	7.3237
40	+ 196	3.2919	+2615	7.4176	40	+ 931	3.9689	+2098	7.3218
50	+ 205	3.3111	+2614	7.4172	50	+ 938	3.9722	+2089	7.3198
4 00	+ 214	3.3294	+2611	7.4169	19 00	+ 945	3.9755	+2079	7.3179
10	+ 222	3.3470	+2609	7.4165	10	+ 952	3.9787	+2070	7.3159
20	+ 231	3.3640	+2607	7.4161	20	+ 959	3.9819	+2060	7.3139
30	+ 240	3.3802	+2605	7.4157	30	+ 966	3.9850	+2051	7.3119
40	+ 249	3.3959	+2602	7.4153	40	+ 973	3.9881	+2041	7.3098
50	+ 258	3.4110	+2600	7.4149	50	+ 980	3.9912	+2031	7.3077
5 00	+ 266	3.4256	+2597	7.4145	20 00	+ 987	3.9942	+2021	7.3056
10	+ 275	3.4396	+2594	7.4140	10	+ 994	3.9972	+2011	7.3035
20	+ 284	3.4533	+2592	7.4136	20	+1000	4.0002	+2001	7.3014
30	+ 293	3.4665	+2589	7.4131	30	+1007	4.0031	+1991	7.2992
40	+ 302	3.4793	+2586	7.4126	40	+1014	4.0060	+1981	7.2970
50	+ 310	3.4917	+2583	7.4121	50	+1021	4.0088	+1971	7.2947
6 00	+ 319	3.5038	+2580	7.4115	21 00	+1027	4.0117	+1961	7.2925
10	+ 328	3.5155	+2576	7.4110	10	+1034	4.0145	+1951	7.2902
20	+ 336	3.5269	+2573	7.4104	20	+1040	4.0172	+1940	7.2879
30	+ 345	3.5380	+2570	7.4099	30	+1047	4.0200	+1930	7.2855
40	+ 354	3.5488	+2566	7.4093	40	+1054	4.0227	+1919	7.2832
50	+ 362	3.5593	+2563	7.4087	50	+1060	4.0253	+1909	7.2808
7 00	+ 371	3.5696	+2559	7.4080	22 00	+1066	4.0280	+1898	7.2784
10	+ 380	3.5796	+2555	7.4074	10	+1073	4.0306	+1888	7.2759
20	+ 388	3.5894	+2551	7.4068	20	+1079	4.0331	+1877	7.2734
30	+ 397	3.5989	+2547	7.4061	30	+1086	4.0357	+1866	7.2709
40	+ 406	3.6082	+2543	7.4054	40	+1092	4.0382	+1855	7.2684
50	+ 414	3.6173	+2539	7.4047	50	+1098	4.0407	+1844	7.2658
8 00	+ 423	3.6262	+2535	7.4040	23 00	+1104	4.0432	+1833	7.2632
10	+ 431	3.6350	+2531	7.4033	10	+1111	4.0456	+1822	7.2606
20	+ 440	3.6435	+2526	7.4025	20	+1117	4.0480	+1811	7.2579
30	+ 449	3.6519	+2522	7.4018	30	+1123	4.0504	+1800	7.2553
40	+ 457	3.6600	+2518	7.4010	40	+1129	4.0527	+1789	7.2525
50	+ 466	3.6680	+2513	7.4002	50	+1135	4.0550	+1777	7.2498
9 00	+ 474	3.6759	+2508	7.3994	24 00	+1141	4.0573	+1766	7.2470
10	+ 483	3.6836	+2503	7.3985	10	+1147	4.0596	+1755	7.2442
20	+ 491	3.6912	+2499	7.3977	20	+1153	4.0618	+1743	7.2413
30	+ 500	3.6986	+2494	7.3968	30	+1159	4.0640	+1732	7.2384
40	+ 508	3.7058	+2489	7.3960	40	+1165	4.0662	+1720	7.2355
50	+ 516	3.7130	+2484	7.3951	50	+1171	4.0684	+1708	7.2326
10 00	+ 525	3.7200	+2478	7.3942	25 00	+1176	4.0705	+1697	7.2296
10	+ 533	3.7269	+2473	7.3932	10	+1182	4.0726	+1685	7.2266
20	+ 542	3.7336	+2468	7.3923	20	+1188	4.0747	+1673	7.2235
30	+ 550	3.7403	+2462	7.3913	30	+1193	4.0768	+1661	7.2204
40	+ 558	3.7468	+2457	7.3904	40	+1199	4.0788	+1649	7.2173
50	+ 567	3.7532	+2451	7.3894	50	+1205	4.0808	+1637	7.2141
11 00	+ 575	3.7595	+2445	7.3884	26 00	+1210	4.0828	+1625	7.2109
10	+ 583	3.7657	+2440	7.3873	10	+1216	4.0848	+1613	7.2076
20	+ 591	3.7718	+2434	7.3863	20	+1221	4.0868	+1601	7.2044
30	+ 600	3.7778	+2428	7.3852	30	+1227	4.0887	+1589	7.2010
40	+ 608	3.7837	+2422	7.3841	40	+1232	4.0906	+1576	7.1977
50	+ 616	3.7896	+2416	7.3831	50	+1237	4.0924	+1564	7.1943
12 00	+ 624	3.7953	+2410	7.3819	27 00	+1243	4.0943	+1552	7.1908
10	+ 632	3.8009	+2403	7.3808	10	+1248	4.0961	+1539	7.1873
20	+ 640	3.8065	+2397	7.3797	20	+1253	4.0979	+1527	7.1838
30	+ 649	3.8119	+2391	7.3785	30	+1258	4.0997	+1514	7.1802
40	+ 657	3.8173	+2384	7.3773	40	+1263	4.1015	+1502	7.1766
50	+ 665	3.8226	+2377	7.3761	50	+1268	4.1032	+1489	7.1729
13 00	+ 673	3.8278	+2371	7.3749	28 00	+1273	4.1049	+1476	7.1692
10	+ 681	3.8330	+2364	7.3736	10	+1278	4.1066	+1464	7.1654
20	+ 689	3.8380	+2357	7.3724	20	+1283	4.1083	+1451	7.1616
30	+ 697	3.8430	+2350	7.3711	30	+1288	4.1100	+1438	7.1577
40	+ 705	3.8480	+2343	7.3698	40	+1293	4.1116	+1425	7.1538
50	+ 713	3.8528	+2336	7.3685	50	+1298	4.1132	+1412	7.1499
14 00	+ 720	3.8576	+2329	7.3672	29 00	+1303	4.1148	+1399	7.1459
10	+ 728	3.8623	+2322	7.3658	10	+1307	4.1164	+1386	7.1418
20	+ 736	3.8670	+2315	7.3645	20	+1312	4.1180	+1373	7.1377
30	+ 744	3.8716	+2307	7.3631	30	+1317	4.1195	+1360	7.1335
40	+ 752	3.8761	+2300	7.3617	40	+1321	4.1210	+1347	7.1293
50	+ 760	3.8806	+2292	7.3602	50	+1326	4.1225	+1334	7.1250

TABLE 1.—*Orthometric and dynamic corrections*—Continued.

[C is expressed in units of the ninth decimal place. D_1 is expressed in units of the sixth decimal place. −10 is to be understood with log C and log D_1. In south latitudes, if ϕ is taken negative, C is negative. The sign of D_1 is independent of the sign of the latitude.]

Latitude ϕ.	C.	Log C.	D_1.	Log D_1.	Latitude	C.	Log C.	D_1.	Log D_1.
° ′					° ′				
30 00	+1330	4.1240	+1320	7.1207	45 00	+1538	4.1870	00	−∞
10	+1335	4.1254	+1307	7.1163	10	+1538	4.1870	− 15	5.1870$_n$
20	+1339	4.1269	+1294	7.1118	20	+1538	4.1870	− 31	5.4880$_n$
30	+1344	4.1283	+1280	7.1073	30	+1538	4.1870	− 46	5.6641$_n$
40	+1348	4.1297	+1267	7.1027	40	+1538	4.1869	− 62	5.7891$_n$
50	+1352	4.1311	+1253	7.0980	50	+1538	4.1869	− 77	5.8860$_n$
31 00	+1356	4.1324	+1240	7.0933	46 00	+1537	4.1868	− 92	5.9651$_n$
10	+1361	4.1338	+1226	7.0886	10	+1537	4.1867	− 108	6.0320$_n$
20	+1365	4.1351	+1213	7.0837	20	+1537	4.1866	− 123	6.0900$_n$
30	+1369	4.1364	+1199	7.0788	30	+1536	4.1865	− 138	6.1411$_n$
40	+1373	4.1377	+1185	7.0738	40	+1536	4.1864	− 154	6.1868$_n$
50	+1377	4.1389	+1171	7.0687	50	+1535	4.1862	− 169	6.2282$_n$
32 00	+1381	4.1402	+1158	7.0636	47 00	+1535	4.1860	− 184	6.2659$_n$
10	+1385	4.1414	+1144	7.0584	10	+1534	4.1859	− 200	6.3006$_n$
20	+1389	4.1426	+1130	7.0531	20	+1533	4.1857	− 215	6.3328$_n$
30	+1393	4.1438	+1116	7.0477	30	+1533	4.1855	− 230	6.3627$_n$
40	+1396	4.1450	+1102	7.0423	40	+1532	4.1852	− 246	6.3906$_n$
50	+1400	4.1461	+1088	7.0367	50	+1531	4.1850	− 261	6.4169$_n$
33 00	+1404	4.1473	+1074	7.0311	48 00	+1530	4.1848	− 276	6.4416$_n$
10	+1407	4.1484	+1060	7.0254	10	+1529	4.1845	− 292	6.4650$_n$
20	+1411	4.1495	+1046	7.0196	20	+1528	4.1842	− 307	6.4872$_n$
30	+1414	4.1506	+1032	7.0137	30	+1527	4.1839	− 322	6.5083$_n$
40	+1418	4.1517	+1018	7.0077	40	+1526	4.1836	− 338	6.5284$_n$
50	+1421	4.1527	+1004	7.0016	50	+1525	4.1833	− 353	6.5476$_n$
34 00	+1425	4.1538	+ 989	6.9954	49 00	+1524	4.1829	− 368	6.5660$_n$
10	+1428	4.1548	+ 975	6.9891	10	+1523	4.1826	− 383	6.5836$_n$
20	+1431	4.1558	+ 961	6.9827	20	+1521	4.1822	− 399	6.6005$_n$
30	+1435	4.1568	+ 947	6.9762	30	+1520	4.1818	− 414	6.6168$_n$
40	+1438	4.1577	+ 932	6.9695	40	+1519	4.1814	− 429	6.6324$_n$
50	+1441	4.1587	+ 918	6.9628	50	+1517	4.1810	− 444	6.6475$_n$
35 00	+1444	4.1596	+ 903	6.9559	50 00	+1516	4.1806	− 459	6.6621$_n$
10	+1447	4.1605	+ 889	6.9489	10	+1514	4.1801	− 474	6.6762$_n$
20	+1450	4.1614	+ 875	6.9418	20	+1512	4.1797	− 490	6.6899$_n$
30	+1453	4.1623	+ 860	6.9345	30	+1511	4.1792	− 505	6.7031$_n$
40	+1456	4.1632	+ 846	6.9271	40	+1509	4.1787	− 520	6.7159$_n$
50	+1459	4.1640	+ 831	6.9196	50	+1507	4.1782	− 535	6.7283$_n$
36 00	+1462	4.1649	+ 816	6.9119	51 00	+1505	4.1777	− 550	6.7404$_n$
10	+1464	4.1657	+ 802	6.9040	10	+1504	4.1771	− 565	6.7521$_n$
20	+1467	4.1665	+ 787	6.8960	20	+1502	4.1766	− 580	6.7635$_n$
30	+1470	4.1673	+ 772	6.8879	30	+1500	4.1760	− 595	6.7746$_n$
40	+1472	4.1680	+ 758	6.8795	40	+1498	4.1754	− 610	6.7854$_n$
50	+1475	4.1688	+ 743	6.8710	50	+1496	4.1748	− 625	6.7959$_n$
37 00	+1478	4.1695	+ 728	6.8623	52 00	+1493	4.1742	− 640	6.8062$_n$
10	+1480	4.1703	+ 713	6.8534	10	+1491	4.1736	− 655	6.8162$_n$
20	+1482	4.1710	+ 699	6.8443	20	+1489	4.1729	− 670	6.8260$_n$
30	+1485	4.1717	+ 684	6.8350	30	+1487	4.1723	− 685	6.8356$_n$
40	+1487	4.1723	+ 669	6.8254	40	+1485	4.1716	− 700	6.8449$_n$
50	+1489	4.1730	+ 654	6.8157	50	+1482	4.1709	− 715	6.8540$_n$
38 00	+1492	4.1736	+ 639	6.8057	53 00	+1480	4.1702	− 729	6.8629$_n$
10	+1494	4.1743	+ 624	6.7954	10	+1477	4.1695	− 744	6.8716$_n$
20	+1496	4.1749	+ 609	6.7849	20	+1475	4.1687	− 759	6.8802$_n$
30	+1498	4.1755	+ 594	6.7741	30	+1472	4.1680	− 774	6.8885$_n$
40	+1500	4.1761	+ 579	6.7630	40	+1470	4.1672	− 788	6.8967$_n$
50	+1502	4.1766	+ 564	6.7516	50	+1467	4.1664	− 803	6.9047$_n$
39 00	+1504	4.1772	+ 549	6.7399	54 00	+1464	4.1656	− 818	6.9126$_n$
10	+1506	4.1777	+ 534	6.7278	10	+1461	4.1648	− 832	6.9203$_n$
20	+1507	4.1782	+ 519	6.7154	20	+1459	4.1639	− 847	6.9279$_n$
30	+1509	4.1787	+ 504	6.7026	30	+1456	4.1631	− 862	6.9353$_n$
40	+1511	4.1792	+ 489	6.6894	40	+1453	4.1622	− 876	6.9426$_n$
50	+1513	4.1797	+ 474	6.6758	50	+1450	4.1613	− 891	6.9497$_n$
40 00	+1514	4.1802	+ 459	6.6617	55 00	+1447	4.1604	− 905	6.9567$_n$
10	+1516	4.1806	+ 444	6.6472	10	+1444	4.1595	− 920	6.9636$_n$
20	+1517	4.1810	+ 429	6.6321	20	+1441	4.1585	− 934	6.9704$_n$
30	+1519	4.1815	+ 413	6.6164	30	+1437	4.1576	− 948	6.9770$_n$
40	+1520	4.1819	+ 398	6.6002	40	+1434	4.1566	− 963	6.9835$_n$
50	+1521	4.1822	+ 383	6.5833	50	+1431	4.1556	− 977	6.9900$_n$
41 00	+1523	4.1826	+ 368	6.5657	56 00	+1428	4.1546	− 991	6.9963$_n$
10	+1524	4.1830	+ 353	6.5473	10	+1424	4.1536	−1006	7.0025$_n$
20	+1525	4.1833	+ 337	6.5281	20	+1421	4.1526	−1020	7.0086$_n$
30	+1526	4.1836	+ 322	6.5080	30	+1417	4.1515	−1034	7.0146$_n$
40	+1527	4.1839	+ 307	6.4869	40	+1414	4.1504	−1048	7.0205$_n$
50	+1528	4.1842	+ 292	6.4648	50	+1410	4.1493	−1062	7.0263$_n$
42 00	+1529	4.1845	+ 276	6.4414	57 00	+1407	4.1482	−1077	7.0320$_n$
10	+1530	4.1848	+ 261	6.4166	10	+1403	4.1471	−1091	7.0377$_n$
20	+1531	4.1850	+ 246	6.3904	20	+1399	4.1459	−1105	7.0432$_n$
30	+1532	4.1853	+ 230	6.3625	30	+1396	4.1448	−1119	7.0487$_n$
40	+1533	4.1855	+ 215	6.3326	40	+1392	4.1436	−1133	7.0541$_n$
50	+1534	4.1857	+ 200	6.3005	50	+1388	4.1424	−1147	7.0594$_n$
43 00	+1534	4.1859	+ 184	6.2658	58 00	+1384	4.1412	−1160	7.0646$_n$
10	+1535	4.1861	+ 169	6.2280	10	+1380	4.1399	−1174	7.0698$_n$
20	+1535	4.1862	+ 154	6.1867	20	+1376	4.1387	−1188	7.0748$_n$
30	+1536	4.1864	+ 138	6.1410	30	+1372	4.1374	−1202	7.0798$_n$
40	+1536	4.1865	+ 123	6.0899	40	+1368	4.1361	−1216	7.0848$_n$
50	+1537	4.1866	+ 108	6.0319	50	+1364	4.1348	−1229	7.0896$_n$
44 00	+1537	4.1867	+ 92	5.9650	59 00	+1360	4.1335	−1243	7.0944$_n$
10	+1537	4.1868	+ 77	5.8859	10	+1356	4.1321	−1256	7.0991$_n$
20	+1538	4.1869	+ 62	5.7890	20	+1351	4.1308	−1270	7.1038$_n$
30	+1538	4.1869	+ 46	5.6641	30	+1347	4.1294	−1283	7.1084$_n$
40	+1538	4.1870	+ 31	5.4880	40	+1343	4.1280	−1297	7.1129$_n$
50	+1538	4.1870	+ 15	5.1870	50	+1338	4.1266	−1310	7.1174$_n$

TABLE 1.—*Orthometric and dynamic corrections*—Continued.

[C is expressed in units of the ninth decimal place. D_1 is expressed in units of the sixth decimal place. −10 is to be understood with log C and log D_1. In south latitudes, if ϕ is taken negative, C is negative. The sign of D_1 is independent of the sign of the latitude.]

Latitude ϕ.	C.	Log C.	D_1.	Log D_1.	Latitude	C.	Log C.	D_1.	Log D_1.
° ′					° ′				
60 00	+1334	4.1251	−1324	7.1218_n	66 10	+1139	4.0566	−1784	7.2513_n
10	+1329	4.1237	−1337	7.1262_n	20	+1133	4.0543	−1795	7.2541_n
20	+1325	4.1222	−1350	7.1305_n	30	+1127	4.0519	−1806	7.2568_n
30	+1320	4.1207	−1364	7.1347_n	40	+1121	4.0496	−1818	7.2595_n
40	+1316	4.1192	−1377	7.1389_n	50	+1115	4.0472	−1829	7.2622_n
50	+1311	4.1176	−1390	7.1430_n	67 00	+1109	4.0448	−1840	7.2648_n
61 00	+1306	4.1160	−1403	7.1471_n	10	+1102	4.0423	−1851	7.2674_n
10	+1302	4.1145	−1416	7.1511_n	20	+1096	4.0398	−1862	7.2700_n
20	+1297	4.1129	−1429	7.1551_n	30	+1090	4.0373	−1873	7.2726_n
30	+1292	4.1112	−1442	7.1590_n	40	+1083	4.0348	−1884	7.2751_n
40	+1287	4.1096	−1455	7.1629_n	50	+1077	4.0322	−1895	7.2776_n
50	+1282	4.1079	−1468	7.1667_n	68 00	+1071	4.0296	−1906	7.2800_n
62 00	+1277	4.1062	−1481	7.1705_n	10	+1064	4.0270	−1916	7.2825_n
10	+1272	4.1045	−1493	7.1742_n	20	+1058	4.0243	−1927	7.2849_n
20	+1267	4.1028	−1506	7.1779_n	30	+1051	4.0216	−1937	7.2872_n
30	+1262	4.1010	−1519	7.1815_n	40	+1045	4.0189	−1948	7.2896_n
40	+1257	4.0993	−1531	7.1851_n	50	+1038	4.0162	−1958	7.2919_n
50	+1252	4.0975	−1544	7.1887_n	69 00	+1031	4.0134	−1969	7.2942_n
63 00	+1246	4.0957	−1557	7.1922_n	10	+1025	4.0106	−1979	7.2965_n
10	+1241	4.0938	−1569	7.1956_n	20	+1018	4.0077	−1989	7.2987_n
20	+1236	4.0919	−1581	7.1990_n	30	+1011	4.0048	−1999	7.3009_n
30	+1230	4.0901	−1594	7.2024_n	40	+1004	4.0019	−2010	7.3031_n
40	+1225	4.0881	−1606	7.2058_n	50	+0998	3.9990	−2020	7.3053_n
50	+1220	4.0862	−1618	7.2091_n	70 00	+0991	3.9960	−2030	7.3074_n
64 00	+1214	4.0843	−1630	7.2123_n	10	+0984	3.9929	−2039	7.3095_n
10	+1209	4.0823	−1643	7.2155_n	20	+0977	3.9899	−2049	7.3116_n
20	+1203	4.0803	−1655	7.2187_n	30	+0970	3.9868	−2059	7.3137_n
30	+1197	4.0782	−1667	7.2219_n	40	+0963	3.9836	−2069	7.3157_n
40	+1192	4.0762	−1679	7.2250_n	50	+0956	3.9805	−2078	7.3177_n
50	+1186	4.0741	−1691	7.2280_n	71 00	+0949	3.9773	−2088	7.3197_n
65 00	+1180	4.0720	−1702	7.2311_n	10	+0942	3.9740	−2097	7.3217_n
10	+1175	4.0699	−1714	7.2341_n	20	+0935	3.9707	−2107	7.3236_n
20	+1169	4.0677	−1726	7.2370_n	30	+0928	3.9674	−2116	7.3255_n
30	+1163	4.0656	−1738	7.2400_n	40	+0921	3.9640	−2125	7.3274_n
40	+1157	4.0633	−1749	7.2429_n	50	+0913	3.9606	−2134	7.3293_n
50	+1151	4.0611	−1761	7.2457_n	72 00	+0906	3.9572	−2144	7.3311_n
66 00	+1145	4.0589	−1772	7.2485_n					

TABLE 2.—*Giving D_2 in units of the tenth decimal place.*

[See p. 53. D_2 is always positive.]

ϕ \ h	0 meter.	1000 meters.	2000 meters.	3000 meters.	4000 meters.	5000 meters.
°						
0	1575	1574	1574	1574	1574	1573
10	1575	1574	1574	1574	1574	1573
20	1574	1574	1574	1574	1573	1573
30	1574	1574	1574	1573	1573	1573
40	1574	1573	1573	1573	1573	1572
50	1573	1573	1573	1573	1572	1572
60	1573	1573	1572	1572	1572	1572
70	1573	1572	1572	1572	1572	1572
80	1572	1572	1572	1572	1572	1571
90	1572	1572	1572	1572	1571	1571

TABLE 2a.—*Giving log D_2. −10 is to be supplied as part of the characteristic*

[See p. 53. D_2 is always positive.]

ϕ \ h	0 meter.	1000 meters.	2000 meters.	3000 meters.	4000 meters.	5000 meters.
°						
0	3.1972	3.1971	3.1970	3.1970	3.1969	3.1968
10	.1971	.1971	.1970	.1970	.1969	.1968
20	.1971	.1970	.1970	.1969	.1968	.1968
30	.1970	.1970	.1969	.1968	.1968	.1967
40	.1969	.1969	.1968	.1967	.1966	.1966
50	.1968	.1968	.1967	.1966	.1965	.1965
60	.1967	.1966	.1966	.1965	.1965	.1964
70	.1966	.1966	.1965	.1964	.1964	.1963
80	.1966	.1965	.1965	.1964	.1963	.1962
90	3.1966	3.1965	3.1964	3.1964	3.1963	3.1962

METHODS OF OBTAINING THEORETICALLY BEST ORTHOMETRIC ELEVATIONS.

In the table on pages 81–82 there is given the theoretically best orthometric elevation of each junction point of the precise level net. In the table on pages 83–84 there are given the theoretically best elevation and the dynamic number for each junction point in the precise level net and for a few other bench marks at the highest and the lowest points of some lines and at points where the grade changes suddenly.

There are shown below the methods which may be used to obtain the theoretically best orthometric elevation of any other bench mark in the precise level net for which the standard elevation is given, it being assumed that in each case there are known the distances of the bench mark in question from the two junction points between which it lies and also the theoretically best orthometric elevations of those junction points.

Two cases are to be considered, according to whether or not the orthometric correction has been applied to the standard elevations. The simpler case, in which the orthometric correction has been applied to the standard elevations, is considered first.

Let $\mathbf{h}_1$ and $\mathbf{h}_2$ be the known standard elevations of the two junction points, P_1 and P_2, between which lies the point P whose theoretically best orthometric elevation is desired. If the bench mark in question is on a spur line, the point P should be taken at the base of the spur, since, in this first case, all points on the spur will receive the same correction.

Let h, h_1, and h_2 be the theoretically best orthometric elevations of P, P_1, and P_2, respectively.

Let $c=h-\mathbf{h}$, $c_1=h_1-\mathbf{h}_1$, and $c_2=h_2-\mathbf{h}_2$ be the corrections to the standard elevations necessary to make them the theoretically best orthometric elevations. By assumption c_1 and c_2 are known and c is desired.

Let d_1 and d_2 represent the distances of P from P_1 and P_2 along the line of levels, both taken as positive, regardless of direction. (If the bench mark is on a spur line, d_1 and d_2 should be measured to the base of the spur only.) Where a line of levels follows a railroad, the distances from the bench mark and the junction points may be obtained from a railroad time-table. Where the line of levels does not follow a railroad, the distances my be scaled from any reliable topographic map. For bench marks of the Coast and Geodetic Survey it is best to use the distances as published in the direct results of leveling. (For references to sources, see pp. 59–71.)

The formula for c, the desired correction, is—

$$\left.\begin{aligned} c&=c_1+\frac{c_2-c_1}{d_1+d_2}d_1 \\ \text{or}\qquad c&=c_2+\frac{c_1-c_2}{d_1+d_2}d_2 \\ \text{or}\qquad c&=\frac{c_1d_2+c_2d_1}{d_1+d_2} \end{aligned}\right\} \qquad (1)$$

Either the first or the second form of (1) will be more convenient than the third when there are many elevations to be computed between any two junction points.

If the orthometric correction has not been applied to the standard elevations, the formula is more complicated. In this case it is necessary to compute the orthometric correction to the observed difference of elevation between P and P_1 and between P and P_2.

Let k_1 represent the orthometric correction to the quantity $\mathbf{h}-\mathbf{h}_1$, that is, the correction to the observed difference of elevation necessary to carry orthometric elevations from P_1 to P; let k_2 represent the orthometric correction to the quantity $\mathbf{h}-\mathbf{h}_2$, that is, the correction needed to carry orthometric elevations from P_2 to P; then $k=k_1-k_2$, the orthometric correction to the quantity $\mathbf{h}_2-\mathbf{h}_1$.

These orthometric corrections may be computed from the approximate elevations of points along the line of levels by the formulas and tables on pages 51–56. No details of the orthometric correction for Coast and Geodetic Survey lines of levels have yet been published

The formula for c, the desired correction, is—

$$\left.\begin{aligned} & c=c_1+\frac{c_2-c_1-k}{d_1+d_2}d_1+k_1 \\ \text{or}\quad & c=c_2+\frac{c_1-c_2+k}{d_1+d_2}d_2+k_2 \\ \text{or}\quad & c=\frac{(c_1+k_1)d_2+(c_2+k_2)d_1}{d_1+d_2} \end{aligned}\right\} \qquad (2)$$

Either the first or the second form of (2) will be more convenient than the third when there are many elevations between the two junction points to be computed, since the fraction which multiplies d_1 or d_2 is constant between any two junction points. If P is on a spur, k_1 and k_2 (also d_1 and d_2 as mentioned before) are to be taken to the base of the spur only; for a long spur the additional correction needed to carry orthometric elevations from the base of the spur to the point in question should be applied.

The following examples will illustrate the above formulas. For each of the two bench marks used in the examples, the theoretically best elevations are shown in the table on pages 83–84. It should be borne in mind that the standard elevations contain the orthometric correction only for bench marks west of the imaginary line connecting those junction points in the Mississippi Valley named on page 74.

(1) To find the theoretically best orthometric elevation of U.S.G.S. 7273, assumed to be P, near Riordan, Ariz. Riordan is on the line between the junction points Goffs L_5, which may be taken as P_1, and Belen U.S.G.S. 4793, assumed to be P_2. The respective distances d_1 and d_2 are 416 and 574 kilometers. (See pp. 42, 43, and 48.) From the table on page 82 it is found for Goffs that $c_1=786.7842-786.7998=-0.0156$ meter and for Belen $c_2=1461.2611-1461.2516=+0.0095$ meter. Then since the orthometric correction has already been applied to the standard elevation at Riordan, equation (1) is to be used, giving—

$$c=\frac{-0.0156\times 574+0.0195\times 416}{990}=-0.0051 \text{ meter.}$$

This, added to the standard elevation, 2216.5503 meters,* gives 2216.5452 meters, as shown in the table on page 84.

(2) To find the elevation of Q at Swearengin, Ala., on the basis of the general adjustment. This bench mark is on a spur which branches off from the main line at bench mark J_2 at Woodville, Ala., between Chattanooga, Tenn., and Decatur, Ala. (See Appendix 3, Report for 1903, p. 246.) Taking Woodville J_2 as P, Chattanooga 698 N as P_1, and Decatur P.B.M. 50 as P_2, it is found that $d_1=116$ kilometers and $d_2=80$ kilometers. From this publication, p. 81, it is found that—

$$c_1=211.2396-211.1690=+0.0706 \text{ meter.}$$
$$c_2=169.6716-169.5959=+0.0757 \text{ meter.}$$

From computations not published in detail, $k_1=+0.0071$ meter, $k_2=-0.0005$ meter, giving $k=+0.0076$ meter, as published on page 84.

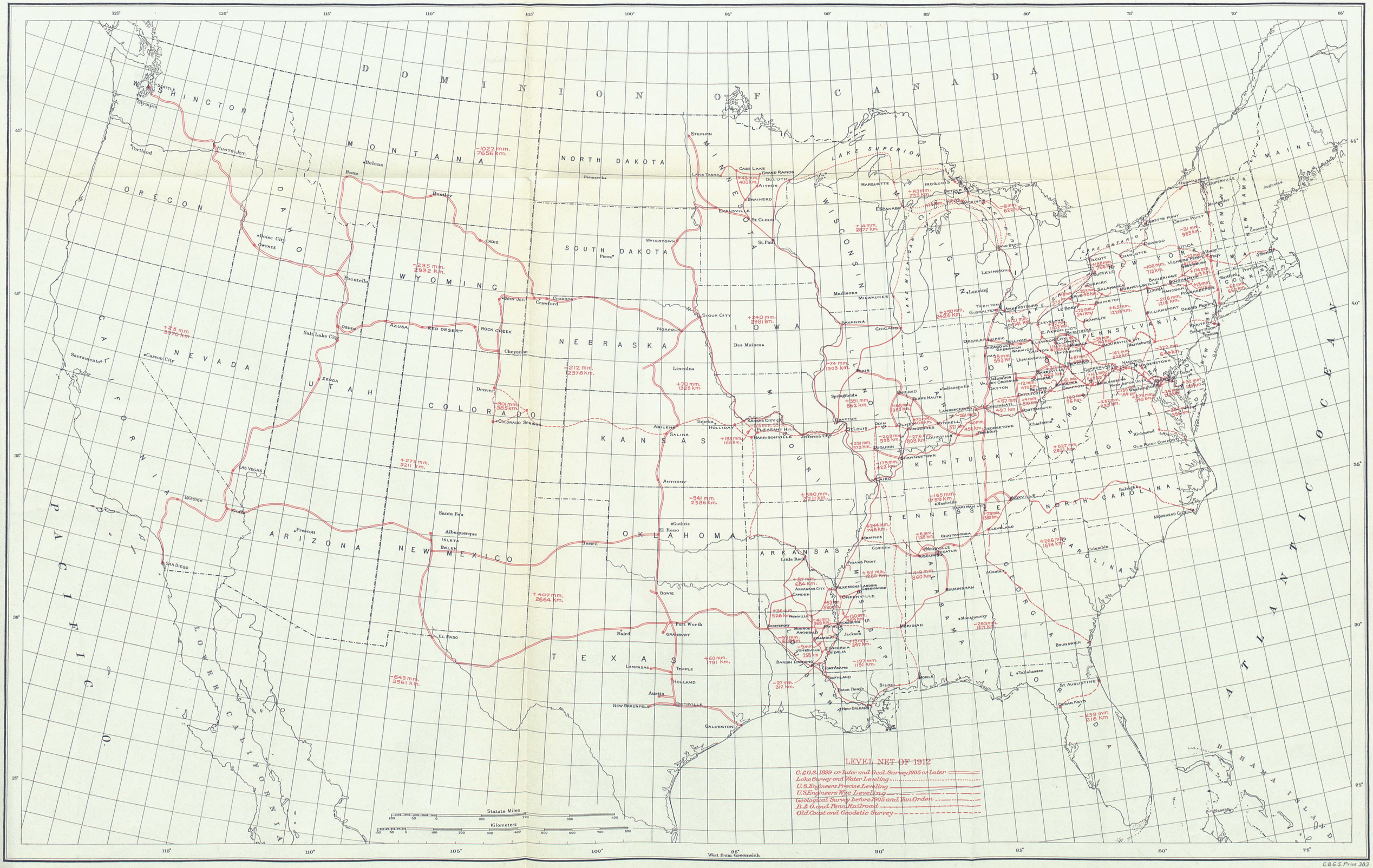
Then—

$$c=\frac{(0.0706+0.0071)\times 80+(0.0757-0.0005)\times 116}{196}=+0.0762 \text{ meter.}$$

There is an additional orthometric correction of $+0.0010$ meter to the leveling from J_2 to Q. The standard elevation of Q is 413.8715 meters.* After applying the two corrections given above to this elevation, there is obtained the elevation of Q on the 1912 general adjustment which equals 413.9487 meters, as is shown in the table on page 84.

The dynamic number for a bench mark may be computed by the methods described on pages 52 to 56.

* This is from the original computation. In publishing the standard elevation, the number of decimal places was reduced to three.


DOMINION OF CANADA
WASHINGTON
OREGON
IDAHO
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
WYOMING
NEBRASKA
NEVADA
UTAH
COLORADO
KANSAS
OKLAHOMA
ARIZONA
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NEW YORK
VERMONT
NEW HAMPSHIRE
MAINE
CONNECTICUT
PACIFIC OCEAN
ATLANTIC OCEAN
LOWER CALIFORNIA
BAHAMA ISLANDS
LAKE SUPERIOR
LAKE MICHIGAN
LAKE ONTARIO
LEVEL NET OF 1912
C.&G.S. 1899 or later and Geol. Survey 1905 or later
Lake Survey and Water Leveling
U.S. Engineers Precise Leveling
U.S. Engineers Wire Leveling
Geological Survey before 1905 and Van Orden
B.&O. and Penn. Railroad
Old Coast and Geodetic Survey
Statute Miles
Kilometers
West from Greenwich
C.&G.S. Print 383

THE ADJUSTMENTS OF 1912.

CONDENSED STATEMENT OF DIRECT RESULTS OF OBSERVATION.

On the following pages are shown in condensed form for convenient reference the direct results of all the leveling which is included in the level net in this publication. All lines introduced into the net for the first time in this adjustment are indicated by italics.

The numbering of the lines repeated from Appendix 8, Report for 1899, Appendix 3, Report for 1903, and "Precise Leveling in the United States, 1903–1907," has been retained unchanged as far as possible.

For each long line of leveling there are stated in tabular form the location and designation of the terminal bench marks, the distance between them measured along the level line, the observed difference of elevation, and a reference to the authority from which these facts are obtained. A plus sign on the difference of elevation indicates that the first-named bench mark is higher than the second.

As the desirable information in regard to tide observations and the observations fixing the relations between certain bench marks which are common to two or more level lines at their junction points can not conveniently be put in this tabular form, it is placed immediately after it in paragraphs, which are numbered to correspond with the relation which they bear to the tabular matter. The numbers assigned in the tabulation and the following paragraphs serve also to indicate approximately the order in which the corrected elevations and descriptions of bench marks are given.

Another distinction may also be made between the paragraphic matter and the tabular matter. All elevations or relative elevations which are stated in the paragraphic matter are assumed to be determined by the observations with so high a degree of accuracy, as compared with the relative elevations stated in the tabular matter, that they are treated as fixed quantities in the adjustment, or, in other words, are assigned infinite weight.

The lines of leveling are also shown on Illustration No. 5. The lines have been drawn nearly in their true location, but the drawing has necessarily been somewhat generalized and in a few cases it has been necessary to exaggerate distances between points in order to make them show as separate points. The various symbols used in drawing the lines serve to show by what organizations they were run. "U. S. Engineer Precise Leveling" includes the precise leveling done under the direction of the Corps of Engineers, United States Army; the Mississippi River Commission, and the Missouri River Commission. "U. S. Engineer Wye Leveling" includes wye leveling done under the direction of the Corps of Engineers, United States Army, and the Board of Engineers on Deep Waterways.

No.	Places.	Distance.	Bench marks.	Difference of elevation.	Reference.
		km.		*m.*	
2	Perth Amboy, N. J. Harrisburg, Pa.	267	F No. XXIX	−106.3911	C. and G. S. Rep. 1882, pp. 525–528.
3	Harrisburg, Pa. Hagerstown, Md.	119	No. XXIX A	− 59.5851	Ibid., 1882, pp. 528–529.
4B	Cumberland, Md. Hancock, Md.	94	I F	+ 61.8102	Ibid., 1882, pp. 533–535.
4C	Hancock, Md. Hagerstown, Md.	50	F A	− 40.0451	Ibid., 1882, p. 533.
4D	Grafton, W. Va. Amblersburg, W. Va.	48	M L	−191.1505	Ibid., 1882, p. 537.
4E	Amblersburg, W. Va. Cumberland, Md.	116	L I	+304.9094	Ibid., 1882, pp. 535–537.
7B	Olney, Ill. Odin, Ill.	85	B_3 No. V	− 12.8461	Ibid., 1882, p. 552.
7C	Lawrenceburg, Ind. Mitchell, Ind.	170	U X	− 61.4077	Ibid., 1882, pp. 547–550.
7D	Mitchell, Ind. Vincennes, Ind.	107	X No. I	+ 78.2550	Ibid., 1882, pp. 550–556.
7E	Vincennes, Ind. Olney, Ill.	52	No. I B_3	− 17.0756	Ibid., 1882, pp. 551–556.
8	Odin, Ill. St. Louis, Mo.	104	No. V K_3	+ 34.4398	Ibid., 1882, pp. 552–554.
9	St. Louis, Mo.* Jefferson City, Mo.	205	K_3 Old B. M. 90 (85)	− 43.6058	Ibid., 1893, Pt. 2, pp. 23–32; 1896, p. 268.

* This includes a local adjustment of two runnings between M_3 and No. XIV near New Haven and Etlah, Mo. (See C. and G. S. Rep. 1893, pp. 25, 28.)

No.	Places.	Distance	Bench marks.	Difference of elevation.	Reference.
		km.		*m.*	
11	Jefferson City, Mo. Pleasant Hill, Mo.	198	No. XXVIII. No. LI	− 69.6683	C. and G. S. Rep. 1896, pp. 268–273.
13	Kansas City, Mo. Pleasant Hill, Mo.	45	No. LVIII. No. LII	− 32.0065	Ibid., 1896, pp. 273–275.
15A	Kansas City, Mo. Holliday, Kans.	23	Old M. R. C. B. M. 244. No. LXII	− 2.9290	Ibid., 1896, p. 275.
16	Holliday, Kans. Abilene, Kans.	239	No. LXIII. B_1	−120.1134	Ibid., 1897, pp. 273–278.
20	Salina, Kans. Ellis, Kans.	188	H_1. A_2	−272.6940	Ibid., 1897–98, p. 190.
22	Ellis, Kans. Hugo, Colo.	372	B_2. K	−891.8633	Ibid., 1897–98, pp. 201–209.
23	Hugo, Colo. Limon, Colo.	25	K. N	− 93.8534	Ibid., 1897–98, p. 221.
25	Limon, Colo. Roswell, Colo.	123	P. Z	−214.1380	Ibid., 1897–98, pp. 221–224.
26	Roswell, Colo. Denver, Colo.	121	Z. Z_1	+267.8229	Ibid., 1899, pp. 385–388.
28	Limon, Colo. Denver, Colo.	141	N. Z_1	+ 46.4068	Ibid., 1899, pp. 389–392.
30	Mobile, Ala. Ocean Springs, Miss.	93	A. E_1	− 1.0250	Ibid., 1887, pp. 188–190.
31	Meridian, Miss. Mobile, Ala.	219	C. A	+101.1643	Ibid., 1888, pp. 411–417.
32	Corinth, Miss. Meridian, Miss.	314	V. C	+ 32.3287	Ibid., 1888, pp. 418–422; 1892, Pt. 2, pp. 165–169.
34	Cairo, Ill. Corinth, Miss.	265	P. B. M. 1. W	− 41.1591	Ibid., 1892, Pt. 2, pp. 169–181.
36A	Odin, Ill. Duquoin, Ill.	71	No. V. R_3	+ 19.7118	Ibid., 1892, Pt. 2, pp. 187–189.
36B	Duquoin, Ill. Cairo, Ill.	123	R_3. P. B. M. 2	+ 43.3714	Ibid., 1892, Pt. 2, pp. 181–187.
44	Greenville, Miss. Vicksburg, Miss.	185	Greenville No. 1. No. 211	+ 12.1193	Ibid., 1888, pp. 443–450.
46	Little Rock, Ark. Arkansas City, Ark.	181	3 (or No. I). F	+ 38.0703	Ibid., 1888, pp. 457–461.
48	Van Buren, Ark. Little Rock, Ark.	261	No. XXXVIII. 3 (or No. I)	+ 46.1848	Ibid., 1888, pp. 461–462; 1899, pp. 362–368.
50	Van Buren, Ark. Fort Smith, Ark.	9	No. XXXIX. No. XLI	− 10.1563	Ibid., 1899, p. 368.
51	Chester, Ark. Van Buren, Ark.	40	No. XLVIII. No. XXXIX	+131.2299	Ibid., 1899, p. 369.
53	Boston, Mo. Chester, Ark.	252	No. XCVII. No. XLIX	+ 27.5842	Ibid., 1899, pp., 377–382.
55	Harrisonville, Mo. Boston, Mo.	145	No. 43. No. XCVI	+ 25.8493	Ibid., 1899, pp. 373–376.
56	Pleasant Hill, Mo. Harrisonville, Mo.	13	No. LI No. 43	− 48.3294	Ibid., 1899, p. 372.
57A	Holliday, Kans. Harrisonville, Mo.	75	No. LXII. No. 43	− 76.4558	Ibid., 1899, pp. 370–372.
59A	Hagerstown, Md. Georgetown, D. C.	129	A. No. XI	+158.4543	Ibid., 1896, pp. 257, 262–263.
59B	Georgetown, D. C. Washington, D. C.	8	No. XI. Capitol B. M.	− 18.0040	Ibid., 1896, p. 251.
61A	Georgetown, D. C. Richmond, Va.	185	No. XI. O	− 49.1571 in 1884 − 48.7652 in 1895	Ibid., 1896, pp. 248–255.
63	Richmond, Va. Old Point Comfort, Va.	140	O. U	+ 55.4865 in 1884 + 55.5318 in 1891–92	Ibid., 1896, pp. 239–244.
64	St. Augustine, Fla. Cedar Keys, Fla.	216	Sea level. Sea level	− 0.2585	Ibid., 1899, p. 397.
65	Meridian, Miss. Vicksburg, Miss.	224	C. B. M. Cistern	+ 45.5885	Ibid., 1899, pp. 354–360.
66	Corinth, Miss. Memphis, Tenn.	151	W. P. B. M. Memphis	+ 57.2388	Ibid., 1892, Pt. 2, pp. 207–219.
68	Annapolis, Md. Washington, D. C.	63	a. Capitol B. M.	− 26.3500	Ibid., 1889, p. 463.
70A	Norfolk, Nebr. Abilene, Kans.	466	N_1. Y_2	+113.4466	Ibid., 1899, pp. 306–319.
72C	Gibraltar, Mich. Deshler, Ohio.	124	I (1898). I_1	− 38.2539	Ibid., 1899, p. 340.
72D	Deshler, Ohio. Cincinnati, Ohio.	272	I_1. T	+ 50.8004	Ibid., 1899, pp. 340–342.
74A	Monroe, La. Bodcau, La.	140	P. B. M. 27. P. B. M. 44	− 38.3101	Ch. of Eng. Rep. 1893, Pt. 3, pp. 1952–1953; 1902, Pt. 2, p. 1457.
74D	Shreveport, La. Barbin Landing, La.	315	P. B. M. 46. T. B. M. 53	+ 35.4849	Ibid., 1902, Pt. 2, pp. 1457–1459.
74E	Barbin Landing, La. Smithland, La.	67	T. B. M. 53. P. B. M. XLV	+ 9.3550	Ibid., 1902, Pt. 2, pp. 1459–1460.
76	Monroe, La. Rayville, La.	34	P. B. M. 24. P. B. M. 17	− 4.9980	Ibid., 1893, Pt. 3, pp. 1945–1946; 1902, Pt. 2, pp. 1456, 1457.
78	Rayville, La. Vicksburg, Miss.	79	P. B. M. 16. S. W. Base	− 2.1750	Ch. of Eng. Rep. 1893, Pt. 3, p. 1945; 1902, Pt. 2, p. 1456.
79	Concordia, La. Vidalia, La.	11	T. B. M. 9. LXIV	− 0.1609	Ibid., 1902, Pt. 2, p. 1466.
80A	Monroe, La. Columbia, La.	61	P. B. M. 27. T. B. M. 137	+ 5.5998	Ibid., 1902, Pt. 2, p. 1450.
80B	Columbia, La. Jonesville, La.	78	T. B. M. 137. P. B. M. 4	+ 1.7178	Do.
80C	Jonesville, La. Concordia, La.	29	P. B. M. 4. T. B. M. 9	− 3.1422	Ibid., 1902, Pt. 2, p. 1466.
81A	Rayville, La. Archibald, La.	15	P. B. M. 17. P. B. M. Archibald	+ 3.3802	Ibid., 1902, Pt. 2, p. 1463.

No.	Places.	Distance.	Bench marks.	Difference of elevation.	Reference.
		km.		*m.*	
81B	Archibald, La. Concordia, La.	95	P. B. M. Archibald T. B. M. 9	+ 3.8656	Ibid., 1902, Pt. 2, p. 1463.
83A	Jonesville, La. Acme, La.	54	P. B. M. 4 P. B. M. 12a	+ 1.5342	Ibid., 1902, Pt. 2, pp. 1450–1451.
84	Shreveport, La. Jeters Landing, La.	44	P. B M. 46 P. B. M. 4	− 0.4581	Ibid., 1902, Pt. 2, p. 1465.
86	Parkeville, La. Monroe, La.	34	P. R. P. Parkeville P. B. M. 24	+ 1.7471	Ibid., 1902, Pt. 2, p. 1448.
87	Glendora, La. Steins Bluff, La.	42	P. R. P. Glendora P. B. M. Stein	− 4.7268	Ibid., 1902, Pt. 2, pp. 1455, 1456.
88A	Little Rock, Ark. Camden, Ark.	186	3 (or No. I) P. B. M. Camden IV	+ 45.2904	Ibid., 1902, Pt. 2, p. 1449.
88B	Camden, Ark. Parkeville, La.	152	P. B. M. Camden IV P. R. P. Parkeville	+ 11.5171	Ibid., 1902, Pt. 2, pp. 1448–1449.
89	Wilkersons Landing, Miss. Parkeville, La.	163	P. B. M. 84 T. B. M. 74	+ 17.4850	Ibid., 1902, Pt. 2, pp. 1454, 1455.
90	Greenville, Miss. Wilkersons Landing, Miss.	32	Greenville No. 1 P. B. M. 84	− 2.3115	Ibid., 1883, Pt. 3, pp. 2183, 2184.
91	Greenville, Miss. Wilkersons Landing, Miss.	33	Greenville No. 1 P. B. M. 84	− 2.3033	Ibid., 1902, Pt. 2, p. 1455.
92	Vicksburg, Miss. Greenville, Miss.	269	P. B. M. 2 Greenville No. 1	− 10.5820	Ibid., 1894, Pt. 3, pp. 1497–1499; 1902, Pt. 2, pp. 1460–1462.
93	Wilkersons Landing, Miss. Friar Point, Miss.	153	P. B. M. 84 P. B. M. Friar Point II	− 12.8985	Ibid., 1883, Pt. 3, pp. 2177–2183.
94	Friar Point, Miss. Clarksdale, Miss.	32	P. B. M. Friar Point II. P. B. M. Clarksdale III	+ 2.5630	Ibid., 1902, Pt. 2, p. 1467.
96	Friar Point, Miss. Memphis, Tenn.	134	P. B. M. Friar Point II. P. B. M. Memphis	− 25.3792	Ibid., 1879, Pt. 3, p. 1944; 1878, Pt. 3, p. 1392
99	Riverton Junction, Ala. Pittsburgh Landing, Tenn.	63	T. B. M. 44 P. B. M. 61	− 1.1236	Ibid., 1896, Pt. 3, pp. 1999–2011.
100	Meridian, Miss. York, Ala.	42	C P. B. M. 26	+ 57.4130	Ibid., 1899, Pt. 2, pp. 1779–1781.
101	York, Ala. Birmingham, Ala.	207	P. B. M. 26 P. B. M. 1	−138.5920	Ibid., 1899, Pt. 2, pp. 1770–1779.
102	York, Ala. Demopolis, Ala.	46	P. B. M. 26 P. B. M. 6	+ 8.7319	Ibid., 1899, Pt. 2, pp. 1781–1783.
103	Memphis, Tenn. Cairo, Ill.	330	P. B. M. Memphis P. B. M. 2	− 16.7198	Miss. Riv. Com. Rep. 1881, pp. 52–63; Ch. of Eng. Rep. 1883, Pt. 3, pp. 2187–2188.
104	Cairo, Ill. St. Louis, Mo.	275	P. B. M. 1 K_3	− 29.2737	Ch. of Eng. Rep. 1884, Pt. 4, pp. 2480–2499.
105	St. Louis, Mo. 12 miles above St. Louis, Mo.	21	K_3 P. B. M. 12	− 13.3804	Ibid., 1884, Pt. 4, pp. 2479–2480; 1888, Pt. 4, p. 2328. (Mean of these two measures used.)
106A	12 miles above St. Louis, Mo. Grafton, Ill.	47	P. B. M. 12 P. B. M. 3	+ 6.3495	Ibid., 1884, Pt. 4, pp. 2476–2479.
106B	Grafton, Ill. Albany, Ill.	504	P. B. M. 3 P. B. M. 53	− 49.2893	Ibid., 1884, Pt. 4, pp. 2499–2534.
108	Albany, Ill. Fulton, Ill.	6	P. B. M. 53 P. B. M. 56	+ 4.9232	Ibid., 1884, Pt. 4, p. 2534; 1885, Pt. 4, p. 2652 (Mean of these two measures used.)
110	Fulton, Ill. Savanna, Ill.	31	P. B. M. 56 P. B. M. 62	− 2.9032	Ibid., 1885, Pt. 4, pp. 2652–2654.
112	Savanna, Ill. Chicago, Ill.	224	P. B. M. 62 P. B. M. 99	+ 0.2105	Ibid., 1885, Pt. 4, pp. 2654–2669.
113	Savanna, Ill. St. Paul, Minn.	478	P. B. M. 62 P. B. M. 68	− 33.8437	Ibid., 1892, Pt. 4, pp. 2958–3037.
116	St. Paul, Minn. Duluth, Minn.	250	P. B. M. 68 B. M. 1 of U. S. Eng.	+ 23.1902	Ibid., 1892, Pt. 4, pp. 3074–3098.
118	Marquette, Mich. Escanaba, Mich.	105	1 (1871) 1 (1874)	+ 5.1567	Prof. Papers No. 24 (U. S. Lake Survey Rep.), pp. 603–604.
120	12 miles above St. Louis, Mo. Jefferson City, Mo.	224	P. B. M. 12 XXVIII (Capitol)	− 52.1251	Ch. of Eng. Rep. 1888, Pt. 4, p. 2328; 1893, Pt. 6, pp. 4046–4082.
121	Jefferson City, Mo. Kansas City, Mo.	306	Old B. M. 90 (85) LVIII	− 58.2482	Ibid., 1893, Pt. 6, pp. 3988–4045.
122	Kansas City, Mo. St. Joseph, Mo.	113	Old M. R. C. B. M. 244. P. B. M. 287	− 19.0180	Ibid., 1893, Pt. 6, pp. 3964–3988.
124	St. Joseph, Mo. Sioux City, Iowa.	366	P. B. M. 290 P. B. M. 399	− 85.1170	Ibid., 1893, Pt. 6, pp. 4138–4208.
133A	Greenbush, N. Y. Troy, N. Y.	11	Gristmill D. W. Troy 2	− 3.0162	C. and G. S. Rep. 1903, pp. 297, 298.
133C	Troy, N. Y. Whitehall, N. Y.	106 (66 mi.)	N. Y. 12 U. S. C. S. 36	− 25.1211* (− 82.418 ft.)	Rep. on Deep Waterways 1900, Pt. II, pp. 1017, 1023, 1025. N. Y. State Eng. Rep. 1901, pp. 653, 671, 675.
133D	Whitehall, N. Y. Crown Point, N. Y.	60 (37.2 mi.)	U. S. C. S. 36 L. H.	− 8.0071 (− 26.27 ft.)	Rep. on Deep Waterways 1900, Pt. II, pp. 1025–1026.
133E	Crown Point, N. Y. Coopersville, N. Y.	103 (63.9 mi.)	L. H. D. W. Coopersville	+ 8.4674 (+ 27.78 ft.)	Ibid., Pt. I, pp. 393–398; Pt. II, p. 1026.
133F	Coopersville, N. Y. Hogansburg, N. Y.	126 (78.5 mi.)	D. W. Coopersville P. B. M. P. Hogansburg	− 23.2380 (− 76.24 ft.)	Ibid., Pt. II, pp. 1026–1029.
133G	Hogansburg, N. Y. Tibbetts Pt., N. Y.	193	P. B. M. P. Hogansburg. P. B. M. 35	− 26.0919	MS. furnished by Ch. of Eng., Mar., 1900.
133H	Oswego, N. Y. Tibbetts Point, N. Y.	73	A P. B. M. 35	− 3.6430	Ibid., Mar., 1903.
135	Greenbush, N. Y. Boston, Mass.	320	Gristmill Sea level	+ 4.2898 (+ 14.074 ft.)	Rep. Top. Surv. Mass., 1893.
138A	Dunkirk, N. Y. Salamanca, N. Y.	76	598 D 1391 D	−241.4932	MS. furnished by U. S. Geol. Surv., Feb., 1903.
138B	Salamanca, N. Y. Hornellsville, N. Y.	131	1391 D 1141 D	+ 75.9076	Do.
138C	Hornellsville, N. Y. Elmira, N. Y.	94	1141 D 857 A	+ 86.5039	Do.

* This result is a weighted mean. In combining, the Deep Waterways leveling was given twice as much weight as the New York State leveling. The weight assigned to the portion of the line Oswego-Greenbush is $\frac{750}{L}$, as it consists of three runnings instead of two. See page 628 of the State Engineer's Report.

No.	Places.	Distance.	Bench marks.	Difference of elevation.	Reference.
		km.		*m.*	
138D	Elmira, N. Y. Binghamton, N. Y.	94	857 A 867 A	− 2.2659	MS. furnished by U. S. Geol. Surv., Feb., 1903.
138E	Binghamton, N. Y. Bainbridge, N. Y.	60	867 A 989 A	− 37.7005	Do.
138F	Bainbridge, N. Y. Vischers Ferry, N. Y.	168 (104.6 mi.)	989 A L. S. 18	+243.4220	Do.
140B	Leboeuf, Pa. Erie, Pa.	36	1193 Pittsburgh, 1899 L. H.	+188.0081	Do.
140C	Franklin, Pa. Leboeuf, Pa.	86	987 Pittsburgh, 1899 1193 Pittsburgh, 1899	− 62.8310	Do.
140D	West Penn Junction, Pa. Franklin, Pa.	150	P. R. R. No. 26 987 Pittsburgh, 1899	− 60.6127	Do.
142B	Braddock, Pa. Bentons Ferry, W. Va.	201	P. R. R. No. 88 885 Pittsburgh	− 17.1478 (− 56.259 ft.)	Do.
143A	Braddock, Pa. Blairsville Intersec., Pa.	70 (43 mi.)	P. R. R. No. 88 P. R. R. No. 47	− 88.7061	Pa. R. R. B. M. Book, pp. 71–74.
143B	West Penn Junction, Pa. Blairsville Intersec., Pa.	68 (42 mi.)	P. R. R. No. 26 P. R. R. No. 47	−100.9072	Ibid., pp. 77–80.
143C	Blairsville Intersec., Pa. Harrisburg, Pa.	314 (195 mi.)	P. R. R. No. 47 P. R. R. No. 2	+238.6040	Ibid., pp. 46–71.
144	New Orleans, La. Ocean Springs, Miss.	135	Halfway House E_1	− 3.1523	Ch. of Eng. Rep. 1900, Pt. 7, pp. 4631–4645.
145	Baton Rouge, La. New Orleans, La.	144	P. B. M. XXXII Halfway House	+ 6.9856	Ibid., 1900, Pt. 7, pp. 4682–4708.
146	Smithland, La. Baton Rouge, La.	104	P. B. M. XLV P. B. M. XXXII	+ 6.1987	Ibid., 1900, Pt. 7, pp. 4709–4721.
147	Fort Adams, Miss. Smithland, La.	24	P. B. M. XLIX P. B. M. XLV	+ 6.0760	Ibid., 1900, Pt. 7, pp. 4721–4725.
150	Decatur, Ala. Birmingham, Ala.	139	P. B. M. 50 P. B. M. 2	− 11.9243	C. and G. S. Rep. 1903, pp. 249–251.
151	Tuscumbia, Ala. Corinth, Miss.	86	P. B. M. 9 V	+ 5.5652	Ibid., 1903, pp. 286–289; Ch. of Eng. Rep. 1896, Pt. 3, pp. 1982–1998.
152	Decatur, Ala. Tuscumbia, Ala.	86	P. B. M. 50 P. B. M. 9	+ 26.4098	Ch. of Eng. Rep. 1896, Pt. 3, pp. 1982–1998.
153	Decatur, Ala. Tuscumbia, Ala.	72	P. B. M. 50 P. B. M. 9	+ 26.4163	C. and G. S. Rep. 1903, pp. 284–286.
155	South Sioux City, Nebr. Norfolk, Nebr.	116	B_2 T. B. M. 2	−127.0836	Ibid., 1903, pp. 252–256.
157A	Decatur, Ala. Chattanooga, Tenn.	196	P. B. M. 50 698 N	− 41.5760	Ibid., 1903, pp. 244–249.
157B	Chattanooga, Tenn. Harriman, Tenn.	128	698 N C_2	− 30.3215	Ibid., 1903, pp. 242–244.
159A	Ludlow, Ky. Georgetown, Ky.	109	C W	−105.1874	Ibid., 1903, pp. 230–232.
159B	Georgetown, Ky. Harriman, Tenn.	303	W A_2	+ 32.9943	Ibid., 1903, pp. 232–239.
160	Knoxville, Tenn. Harriman, Tenn.	81	933 M C C_2	+ 42.5945	Ibid., 1903, pp. 239–240.
162	Morehead City, N. C. Caswell, Tenn.	863	7 M C 867 M C	−262.0148 (−859.627 ft.)	U. S. Geol. Surv., 20th Ann. Rep., Pt. 1, pp. 376–378.
164A	Wright, Tenn. Cleveland, Tenn.	120	940 M C 875 M C	+ 20.0138 (+ 65.662 ft.)	Ibid., p. 378.
164B	Cleveland, Tenn. Brunswick, Ga.	671	875 M C 10 M C	+263.4319	Ibid., pp. 378–380.
166A	Belpre, Ohio. Chillicothe, Ohio.	158	No. XL Q	− 5.1780	C. and G. S. Rep. 1882, pp. 542–545.
166B	Chillicothe, Ohio. Cincinnati, Ohio.	158	Q T	+ 27.9232	C. and G. S. Rep. 1882, pp. 545–546.
167A	Belpre, Ohio. Portsmouth, Ohio.	272 (169 mi.)	No. XL U. S. E.	+ 26.1723 (+ 85.867 ft.)	Leveling of U. S. E., submitted by U. S. Geol. Surv.
167B	Portsmouth, Ohio. Lawrenceburg, Ind.	222 (138 mi.)	U. S. E. U	+ 14.9800 (+ 49.147 ft.)	Do.
168	Grafton, W. Va. Belpre, Ohio.	170	M No. XL	+114.4023	C. and G. S. Rep. 1882, pp. 540–542.
169A	Monaca, Pa. Pittsburgh, Pa.	40 (25 mi.)	25 C P. R. R. 100	− 17.5190 (− 57.477 ft.)	MS. furnished by Ch. of Eng. and by U. S. Geol. Surv.
169C	Benwood, W. Va. Monaca, Pa.	111	U. S. E. 94 A 25 C	− 11.6321 (− 38.163 ft.)	Leveling by U. S. E.; results submitted by U. S. Geol. Surv.
169D	Marietta, Ohio. Benwood, W. Va.	124	U. S. E. 171 B U. S. E. 94 A	− 17.2703 (− 56.661 ft.)	Do.
170A	Dobbs Ferry, N. Y. Poughkeepsie, N. Y.	87	V 173 A	− 49.7925	C. and G. S. Rep. 1903, pp. 291–294.
170B	Poughkeepsie, N. Y. Greenbush, N. Y.	116	173 A Gristmill	+ 48.5028	Ibid., 1903, pp. 294–297.
171	Page, Nebr. Norfolk, Nebr.	103	K_2 O_1	+131.2314	Ibid., 1903, pp. 257–259.
172	Chadron, Nebr. Page, Nebr.	427	C_4 K_2	+421.1151	Ibid., 1903, pp. 268–276.
173A	Orin Junction, Wyo. Crawford, Nebr.	160	T_1 G_4	+308.7615	Ibid., 1903, pp. 300–302.
173B	Crawford, Nebr. Chadron, Nebr.	41	G_4 C_4	+103.9571	Ibid., 1903, pp. 298–300.
174	Cheyenne, Wyo. Orin Junction, Wyo.	247	B T_1	+417.1586	Ibid., 1903, pp. 278–283.
175	Denver, Colo. Cheyenne, Wyo.	169	A_2 B	−262.6197	Ibid., 1899, pp. 289–293.
176	Cheyenne, Wyo. Rock Creek, Wyo.	172	B U	−196.7608*	Ibid., 1899, pp. 293–297.
178	Anthony, Kans. Salina, Kans.	215	Anthony SH Base H_1	+ 45.7929	Ibid., 1903, pp. 261–266.
180A	Bowie, Tex. El Reno, Okla.	233	1124 Gainv 1327 Reno Junction.	− 62.5517	Ibid., 1903, pp. 303–311.
180B	El Reno, Okla. Anthony, Kans.	198	1327 Reno Junction F_5	− 4.7097	Ibid., 1903, pp. 311–315.
181A	St. Paul, Minn. St. Cloud, Minn.	128	P. B. M. 68 P. B. M. St. Cloud	−100.5379	Ch. of Eng. Rep. 1899, Pt. 5, pp. 3420–3440

* This differs 1 meter from the value found in the report. An error of 1 meter was found in this line.

No.	Places.	Distance.	Bench marks.	Difference of elevation.	Reference.
		km.		*m.*	
181B	St. Cloud, Minn.	119	P. B. M. St. Cloud	− 52.1694	Ibid., 1899, Pt. 5, pp. 3440–3457.
	Brainerd, Minn.		P. B. M. North Base		
182	Brainerd, Minn.	68	P. B. M. North Base	− 3.6394	Ibid., 1899, Pt. 5, pp. 3457–3468; 1905, Supp., pp. 80, 86.
	Aitken, Minn.		P. B. M. Courthouse		
183A	Cass Lake, Minn.	129	T. B. M. 92	+ 40.0211	Ibid., 1901, Supp., pp. 71–85; 1905, Supp., pp. 80, 83.
	Brainerd, Minn.		P. B. M. North Base		
184A	Lake Itasca, Minn.	76	P. B. M. Park House	+ 46.9142	Ibid., 1901, Supp., pp. 85–96; 1905, Supp., pp. 80, 83, 84.
	Cass Lake, Minn.		T. B. M. 92		
185A	Blackberry, Minn.	98	T. B. M. 230	− 9.9462	Ibid., 1901, Supp., pp. 97–111; 1905, Supp., pp. 80, 84, 85.
	Cass Lake, Minn.		T. B. M. 92		
186	Shreveport, La.	410	P. B. M. 46	−124.9945	C. and G. S. Rep. 1903, pp. 319–328.
	Fort Worth, Tex.		U		
187	Fort Worth, Tex.	109	U	−157.9008	Ibid., 1903, pp. 317–319.
	Bowie, Tex.		1124 Gainv		
188	Fort Worth, Tex.	75	U	+ 89.9821	Ibid., 1903, pp. 329–330.
	Granbury, Tex.		Comanche △		
189	Cleveland, Tenn.	50	875 M C	+ 55.1436	MS. furnished by U. S. Geol. Surv., Feb., 1903.
	Chattanooga, Tenn.		698 N		
190A	Alliance, Ohio	94	Br. 66	+124.9438	Leveling of the Pitts., Ft. W. and Ch. R. R., submitted by U. S. Geol. Surv.
	Monaca, Pa.		25 C	(+409.920 ft.)	
192A	Canton, Ohio	36	Br. 77	+ 19.9553	MS. furnished by U. S. Geol. Surv., Feb., 1903.
	E. Akron Jct., Ohio.		Wall	(+ 65.470 ft.)	
192B	E. Akron Jct., Ohio	60	Wall	+117.6680	Do.
	Cleveland, Ohio.		U. S. E. 2	(+386.049 ft.)	
194	Duluth, Minn.	470	B. M. 1 of U. S. Eng.	+ 5.0841	MS. furnished Mar. 2, 1903, by Ch. of Eng. from U. S. Lake Survey.
	Marquette, Mich.		1 (1871)		
195	Escanaba, Mich.	500	1 (1874)	+ 3.1775*	Do.
	Sand Beach, Mich.		U. S. B. M. E		
196	Milwaukee, Wis.	720	B. M. 1	+ 3.0279	Do.
	Sand Beach, Mich.		U. S. B. M. E		
197	Chicago, Ill.	130	P. B. M. 99	− 0.4404	Do.
	Milwaukee, Wis.		B. M. 1		
198	Marquette, Mich.	240	1 (1871)	+ 0.6770	Do.
	Iroquois Point, Mich.		Iroquois		
199	Iroquois Point, Mich.	126	Iroquois	+ 1.7274	Do.
	Detour, Mich.		P. B. M. Goetz		
200	Mackinaw, Mich.	210	B. M. 1	− 0.8284*	Do.
	Escanaba, Mich.		1 (1874)		
201	Detour, Mich.	72	Goetz	+ 3.4869*	Do.
	Mackinaw, Mich.		B. M. 1		
202	Detour, Mich.	260	Goetz	+ 5.8360*	Do.
	Sand Beach, Mich.		U. S. B. M. E		
203	Sand Beach Mich.	48	U. S. B. M. E	− 9.0267	MS. furnished Mar. 2, 1903, by Ch. of Eng. from U. S. Lake Survey.
	Lexington, Mich.		Lexington 4.		
204	Lexington, Mich.	185	Lexingtan 4	+ 2.8581	Do.
	Trenton, Mich.		(1877)		
205	Gibraltar, Mich.	7	(1877)	− 6.3912	Do.
	Trenton, Mich.		(1877)		
206	Trenton, Mich.	12	(1877)	+ 7.4113	Do.
	Amherstburg, Can.		Gauge		
207	Amherstburg, Can.	418	Gauge	− 3.3370	Do.
	Buffalo, N. Y.		L. H.		
208	Cleveland, Ohio	288	U. S. E. 1	− 2.6478†	Do.
	Buffalo, N. Y.		L. H.		
209	Buffalo, N. Y.	80	L. H.	+190.8456	Do.
	Olcott, N. Y.		P. B. M. 4		
210	Olcott, N. Y.	180	P. B. M. 4	+ 2.2409	Do.
	Oswego, N. Y.		A		
211	Oswego, N. Y.	131	A	− 54.4108	Do.
	Utica, N. Y.		L. S. 92		
212	Utica, N. Y.	148	L. S. 92	+ 73.0104	Do.
	Vischers Ferry, N. Y.		L. S. 18		
213	Vischers Ferry, N. Y.	34	L. S. 18	+ 53.9514	Do.
	Greenbush, N. Y.		Gristmill		
214	Erie, Pa.	130	1 (1873)	− 4.4781‡	Do.
	Buffalo, N. Y.		L. H.		
215	Buffalo, N. Y.	66	L. H.	− 2.6277	MS. furnished by U. S. Geol. Surv. Feb., 1903.
	Dunkirk, N. Y.		598 D		
216	Hornellsville, N. Y.	142	1141 D	+261.9448	Do.
	Charlotte, N. Y.		1 (1874)		
217	Charlotte, N. Y.	91	1 (1874)	+ 9.5418	MS. furnished by Ch. of Eng. Mar. 14, 1903.
	Oswego, N. Y.		A		
218	Sidney, N. Y.	99	Tel. Pole 991	+170.8679	MS. furnished Feb., 1903, by U. S. Geol. Surv.
	Utica, N. Y.	(61.4 mi.)	L. S. 92		
220	Irvineton, Pa.	62	1167 D	− 7.9602	Do.
	Leboeuf, Pa.	(39 mi.)	1193 P		
221	Franklin, Pa.	93	987 P	− 54.9415	Do.
	Irvineton, Pa.		1167 D		
222	Salamanca, N. Y.	78	1391 D	+ 68.1732§	Do.
	Irvineton, Pa.		1167 D		
223	Elmira, N. Y.	121	857 A	+101.6296	Do.
	Williamsport, Pa.		P. R. R. 46		
224	Harrisburg, Pa.	150	P. R. R. 2	− 57.2873	Pa. R. R. B. M. Book, pp. 46, 110–113, 96–99.
	Williamsport, Pa.	(93 mi.)	P. R. R. 46		
225A	Hancock, Md.	89	F	+ 57.2077	MS. furnished by the B. & O. R. R.
	Washington Jct., Md.		B. & O. 44 A		
225B	Washington Jct., Md.	69	B. & O. 44 A	+ 43.4779	Do.
	Washington, D. C.		Capitol B. M.		

* These values are the result of the Lake Survey adjustment of the figure Escanaba-Mackinaw-Detour-Sand Beach. The unadjusted values are:

195	+3.1790
200	−0.8230
201	+3.4860
202	+5.8372

† This value is the result of the Lake Survey adjustment of the circuit Cleveland-Buffalo-Erie-Cleveland. The unadjusted value is −2.6441.
‡ This value is the result of the Lake Survey adjustment of the circuit Cleveland-Buffalo-Erie-Cleveland. The unadjusted value is −4.4818.
§ This line was run twice.

No.	Places.	Distance.	Bench marks.	Difference of elevation.	Reference.
		km.		*m.*	
226	Cumberland, Md.	90	I.	+ 61.9468	MS. furnished by the B. & O. R. R.
	Hancock, Md.	(56 mi.)	F		
227	Cumberland, Md.	35	I.	−275.0180	Do.
	Foley, Pa.	(22 mi.)	B. & O. 176		
228	Sidney, N. Y.	71	Tel. Pole 991	+ 20.2617	MS. furnished Feb., 1903, by U. S. Geol. Surv.
	Hancock, N. Y.		924 A		
229	Hancock, N. Y.	222	924 A	+229.2567	Do.
	Poughkeepsie, N. Y.		173 A		
230	Binghamton, N. Y.	78	857 A	− 17.8684	Do.
	Hancock, N. Y.		924 A		
231	Fort Worth, Tex.	200	U	− 20.5443	C. and G. S. Rep. 1903, pp. 332-335.
	Temple, Tex.		L_4		
232	Temple, Tex.	89	L_4	−110.1793	Ibid., 1903, pp. 336-337.
	Lampasas, Tex.		Lampasas NE. Base		
233A	Temple, Tex.	27	L_4	+ 50.5745	Ibid., 1903, p. 338.
	Holland, Tex.		W_4		
234	Rock Creek, Wyo.	212	U	− 4.2761	Ibid., 1903, pp. 340-345.
	Red Desert, Wyo.		B_3		
235	Mackinaw, Mich.	290	B. M. 1	+ 2.3491*	MS. furnished Mar. 2, 1903, by Ch. of Eng. from U. S. Lake Survey.
	Sand Beach, Mich.		U. S. B. M. E.		
236	Cleveland, Ohio	155	U. S. E. 1	+ 1.8303†	Do.
	Erie, Pa.		1 (1873)		
237A	Red Desert, Wyo.	420	B_3	+737.8221	C. and G. S. Rep., 1904, App. 6, pp. 408-409.
	Ogden, Utah.		B		
237B	Ogden, Utah	217	B	− 50.1589	Ibid., 1904, App. 6, p. 410.
	Pocatello, Idaho.		B_6		
238	Pocatello, Idaho	358	B_3	+456.3112	Ibid., 1904, App. 6, p. 412.
	Owyhee, Idaho.		W_4		
239	Owyhee, Idaho	937	W_4	+903.5122	Ibid., 1905, App. 4, pp. 206-212.
	Seattle, Wash.		Sea level		
240	St. Cloud, Minn.	141	P. B. M. St. Cloud	− 99.6535	Pp. 20, 21, Precise Leveling in U.S., 1903-7.
	Evansville, Minn.		T_1		
241	Evansville, Minn.	314	T_1	+161.0497	Pp. 33-35, Precise Leveling in U. S., 1903-7.
	Stephen, Minn.		Stephen W. Base		
242	Evansville, Minn.	266	T_1	−114.7609	Pp. 21, 22, Precise Leveling in U. S., 1903-7.
	Watertown, S. Dak.		U		
243	Watertown, S. Dak.	358	U	+194.2572	Pp. 25-27, Precise Leveling in U. S., 1903-7.
	Sioux City, Iowa.		P. B. M. 399		
244	Holland, Tex.	116	W_4	+ 54.0813	C. and G. S. Rep. 1904, App. 7, pp. 437, 438.
	Smithville, Tex.		W_5		
245	Smithville, Tex.	114	W_5	− 92.5571	Ibid., 1904, App. 7, pp. 438, 439.
	New Braunfels, Tex.		S_6		
246	Smithville, Tex.	273	W_5	+100.6431	Pp. 37, 38, Precise Leveling in U. S., 1903-7.
	Galveston, Tex.		Sea level		
247‡	Vidalia, La.	92	LXIV	− 1.0034	MS. furnished by Miss. River Com., Dec., 1906.
	Fort Adams, Miss.		P. B. M. XLIX		
248§	Vicksburg, Miss.	147	SW. Base	+ 6.9112	Do.
	Vidalia, La.		LXIV		
249	Acme, La.	35	P. B. M. 12 a	− 9.1469	Ch. of Eng. Rep., 1902, Pt. 2, pp. 1466-1467.
	Barbin Landing, La.		T. B. M. 53		
250	Archibald, La.	56	P. B. M. Archibald	+ 5.2811	Ibid., 1902, Pt. 2, pp. 1463, 1464.
	Columbia, La.		T. B. M. 137		
251	Camden, Ark.	183	P. B. M. Camden IV	− 24.5491	Ibid., 1902, Pt. 2, pp. 1451-1453.
	Shreveport, La.		P. B. M. 46		
252	Delhi, La.	35	P. B. M. 13	+ 5.8046	Ibid., 1902, Pt. 2, p. 1462.
	Crowville, La.		P. B. M. Gray		
253	Gilbert, La.	29	P. B. M. Gilbert	+ 1.8374	Ibid., 1902, Pt. 2, p. 1465.
	New Light, La.		P. B. M. New Light		
254	Blackberry, Minn.	105	T. B. M. 230	+ 26.3900	Ibid., 1903, Supp., pp. 80-96; 1905, Supp. pp. 80, 85.
	Aitkin, Minn.		P. B. M. Courthouse		
255	Washington, D. C.	48	Capitol B. M	+ 5.7282	MS. furnished by B. & O. R. R.
	Relay, Md.		B. & O. 31	(+ 18.793 ft.)	
256	Relay, Md.	96	B. & O. 31	− 49.2281	Do.
	Washington Jct., Md.		B. & O. 44 A	(−161.509 ft.)	
257	Relay, Md.	12	B. & O. 31	+ 14.1938	Do.
	Baltimore, Md.		B. & O. 40	(+ 46.567 ft.)	
258	Baltimore, Md.	6	B. & O. 40	+ 7.6634	Pp. 28, 29, Precise Leveling in U. S. 1903-7.
	Baltimore, Md.		Sea level		
259	Cumberland, Md.	117	I	−304.6561	MS. furnished by B. & O. R. R.
	Amblersburg, W. Va.		L	(−999.526 ft.)	
260	Amblersburg, W. Va.	48	L	+191.3401	Do.
	Grafton, W. Va.		M	(+627.755 ft.)	
262	Bentons Ferry, W. Va.	127	885 Pittsburgh	+ 72.0615	Do.
	Benwood, W. Va.		U. S. E. 94 A	(+236.422 ft.)	
263	Benwood, W. Va.	103	U. S. E. 94 A	− 65.0215	MS. furnished by B. & O. R. R., Feb., 1904.
	Uhrichsville, Ohio.		B. & O. 48	(−213.3246 ft.)	
264	Uhrichsville, Ohio	74	B. & O. 48	− 29.3801	Do.
	Warwick, Ohio.		B. & O. 449	(− 96.391 ft.)	
265	Warwick, Ohio	51	B. & O. 449	− 48.9522	Do.
	Sullivan, Ohio.		B. & O. 481	(−160.604 ft.)	
266	Sullivan, Ohio	28	B. & O. 481	+ 24.4871	P. 40, Precise Leveling in U. S., 1903-7.
	Greenwich, Ohio.		B. & O. 495		
267	Greenwich, Ohio	12	B. & O. 495	+ 26.0051	MS. furnished by B. & O. R. R., Feb., 1904.
	Boughtonville, Ohio.		B. & O. 503	(+ 85.318 ft.)	
268	Boughtonville, Ohio	116‖	B. & O. 503	+ 73.3311	Pp. 32, 33, Precise Leveling in U. S., 1903-7.
	Deshler, Ohio.		I_1		
269	Uhrichsville, Ohio	113	B. & O. 48	+ 49.7325	MS. furnished by U. S. Geol. Surv.
	Zanesville, Ohio.		U. S. E. 1	(+163.164 ft.)	
270	Zanesville, Ohio	104	U. S. E. 1	− 16.0990	Do.
	Valley Crossing, Ohio.		R	(− 52.818 ft.)	
271	Valley Crossing, Ohio	15	R	− 7.8234	Do.
	Columbus, Ohio.		T		

* This is the result of the Lake Survey adjustment. See note on p. 63. The unadjusted value is +2.3424.
† This is the result of the Lake Survey adjustment. The unadjusted value is +1.8294.
‡ This line supersedes line 148.
§ This line supersedes line 42.
‖ This line was assigned a weight of 1½ times a regular line of the same length on account of the rerunning which amounted to more than an additional single running.

No.	Places.	Distance.	Bench marks.	Difference of elevation.	Reference.
		km.		*m.*	
272	Valley Crossing, Ohio	65	R	+ 34.7235	Ms. furnished by U. S. Geol. Susv.
	Chillicothe, Ohio.		Q		
273	Chillicothe, Ohio	80	Q	+ 31.3551	Do.
	Portsmouth, Ohio.		U. S. E.	(+102.871 ft.)	
274	Marietta, Ohio	122	U. S. E. 171 B	− 32.8743	Leveling of U. S. Eng. submitted by U. S. Geol. Surv.
	Zanesville, Ohio.		U. S. E. 1.	(−107.855 ft.)	
275	Foley, Pa	208	B. & O. 176	+215.8208	MS. furnished by B. & O. R. R.
	Benvenue, Pa.		818 Pittsburgh	(+708.072 ft.)	
276	Benvenue, Pa	71	818 Pittsburgh	− 22.0540	Do.
	Ellwood City, Pa.		B. & O. 349	(− 72.356 ft.)	
277	Ellwood City, Pa	39	B. & O. 349	+ 13.9604	Do.
	Struthers, Ohio.		B. & O. 376	(+ 45.8020 ft.)	
278	Ellwood City, Pa	26	B. & O. 349	+ 41.6606	P. 41, Precise Leveling in U. S., 1903–7.
	Monaca, Pa.		25 A		
280	Struthers, Ohio	69	B. & O. 376	− 76.5850	P. 42, Precise Leveling in U. S., 1903–7.
	Alliance, Ohio.		Br. 66		
281	Warwick, Ohio	25	B. & O. 449	− 1.6721	MS. furnished by B. & O. R. R.
	East Akron Jct., Ohio.		Wall	(− 5.4860 ft.)	
282	Pekin, Ill	251	P. B. M. 49	+ 8.5321	House Doc. 263, 59th Cong., 1st sess., pp. 94–126.
	Grafton, Ill.		P. B. M. 2		
283	Chicago, Ill	287	P. B. M. 99	+ 41.5467	Ibid., pp. 126–169.
	Pekin, Ill.		P. B. M. 49		
284	Pekin, Ill	138	P. B. M. 49	− 80.9811	MS. furnished by U. S. Geol. Surv.
	Champaign, Ill.		F_1		
285A	Champaign, Ill	92	F_1	+ 20.7500	Do.
	Oakland, Ill.		C_4		
285B	Oakland, Ill	124	C_4	+ 50.8714	Do.
	Olney, Ill.		B_3		
286	*San Diego, Cal*	375	Sea level	−648.9277	This publication, pp. 32, 33.
	Barstow, Cal.		J_3		
287	*Pocatello, Idaho*	427	B_3	−314.3604	Ibid., p. 34.
	Butte, Mont.		D_3		
288	*Ogden, Utah*	63	B	+ 20.2896	Ibid., p. 35.
	Salt Lake City, Utah.		W_1		
289	*Barstow, Cal*	222	J_3	−137.7703	Ibid., p. 36.
	Goffs, Cal.		L_5		
290	*Goffs, Cal*	170	L_5	+171.3510	Ibid., p. 36.
	Las Vegas, Nev.		P		
291	*Butte, Mont*	409	D_3	+751.6454	Ibid., p. 37.
	Huntley, Mont.		U. S. R. S. 3		
292	*Las Vegas, Nev*	404	P	−895.9227	Ibid., p. 38.
	Zenda, Utah.		I_9		
293	*Salt Lake City, Utah*	324	W_1	−220.6786	Ibid., p. 39.
	Zenda, Utah.		I_9		
294	*Huntley, Mont*	291	U. S. R. S. 3	−215.1169	Ibid., p. 41.
	Cadiz, Wyo.		W_8		
295	*Crawford, Nebr*	377	G_4	− 17.2730	Ibid., p. 40.
	Cadiz, Wyo.		W_8		
296	*El Reno, Okla*	324	1327 Reno Junction	−570.9610	Ibid., p. 44.
	Jericho, Tex.		B_{10}		
297	*Goffs, Cal*	960	L_5	−703.8453	Ibid., pp. 42, 43.
	Isleta, N. Mex.		U. S. G. S. 4891		
298	*Isleta, N. Mex*	22	U. S. G. S. 4891	− 18.2478	Ibid., p. 43.
	Albuquerque, N. Mex.		U. S. G. S. 4951		
299	*Fort Worth, Tex*	997	U	−946.6084	Ibid., pp. 45, 46.
	El Paso, Tex.		U. S. G. S. 3698		
300	*Jericho, Tex*	640	B_{10}	−485.0796	Ibid., pp. 47, 48.
	Belen, N. Mex.		U. S. G. S. 4793		
301	*Belen, N. Mex*	30	U. S. G. S. 4793	− 29.5882	Ibid., p. 48.
	Isleta, N. Mex.		U. S. G. S. 4891		
302	*Belen, N. Mex*	361	U. S. G. S. 4793	+330.5759	MS. furnished by U. S. Geol. Survey, 1912.
	El Paso, Tex.		U. S. G. S. 3698		
303	*Albuquerque, N. Mex*	21	U. S. G. S. 4951	+ 18.2327	MS furnished by U. S. Geol. Survey, 1912
	Isleta, N. Mex.		U. S. G. S. 4891		
304	*Isleta, N. Mex*	30	U. S. G. S. 4891	+ 29.5826	MS. furnished by U. S. Geol. Survey, 1912.
	Belen, N. Mex.		U. S. G. S. 4793		
305	*Lawrenceburg, Ind*	175	U	+ 16.9636	MS. furnished by Chief of Eng., 1912.
	Louisville, Ky.		U. S. E. B. M. 604 M		
306	*Louisville, Ky*	70	U. S. E. B. M. 604 M	+ 27.7884	Do.
	Wabash Island, Ky.		P. B. M. 839		
307	*Shawneetown, Ill*	185	P. B. M. Station	+ 9.1425	Do.
	Cairo, Ill.		P. B. M. 2		
309	*Georgetown, Ky*	127	W	+140.2510	MS. furnished by U. S Geol. Survey.
	Louisville, Ky.		602 B		
311	*Duquoin, Ill*	114	R_3	+ 34.4056	Do.
	Shawneetown, Ill.		P. B. M. Station		
312	*Mitchell, Ind*	152	X	+ 53.0216	Do.
	Terre Haute, Ind.		U. S. G. S. 513		
313	*Terre Haute, Ind*	62	U. S. G. S. 513	− 42.8120	Do.
	Oakland, Ill.		C_4		
314	*Mitchell, Ind*	102	X	+ 78.0957	Do.
	Louisville, Ky.		U. S. E. B. M. 604 M		
315	*Terre Haute, Ind*	145	U. S. G. S. 513	+ 25.3012	MS. furnished by Chief of Eng., 1912.
	Vincennes, Ind.		No. 1		
316	*Vincennes, Ind*	203	No. 1	+ 27,3510	Do.
	Wabash Island, Ky.		P. B. M. 839		

The statements of the local relative elevations which were held fixed in the adjustments of 1899, 1903, and 1907 are here repeated in abbreviated form for convenience of reference, together with new matter of the same kind. The complete statements may be found on the pages of Appendix 8, Report for 1899, Appendix 3, Report for 1903, and Precise Leveling in United States, 1903–1907, referred to in the separate paragraphs.

No. 1.—VICINITY OF NEW YORK CITY.

The differences of elevation which are fixed, see pages 402–404 of Appendix 8, Report for 1899, are—

Perth Amboy, N. J., F – Sea level at Sandy Hook = $+2^m.3640$; distance 55 kilometers.
Dobbs Ferry, V – Sea level at Sandy Hook = $+2^m.9357$; distance 144 kilometers.

6A.—CINCINNATI, OHIO, TO LAWRENCEBURG, IND., AND LUDLOW, KY.

The differences of elevation fixed as indicated on page 360 of Appendix 3, Report for 1903, are—

Cincinnati, T – Lawrenceburg, U = $+18^m.4695$; distance 37 kilometers.
Cincinnati, T – Cincinnati, O_4 = $+16^m.7277$.
Cincinnati, T – Ludlow, A_5 = $+4^m.0849$.
Cincinnati, T – Ludlow, C = $+4^m.4507$; distance 8 kilometers.

No. 10.—JEFFERSON CITY, MO.

The differences of elevation fixed as indicated on page 405 of Appendix 8, Report for 1899, are—

Old B. M. 90 (85) – No. XXVII = $-14^m.8684$; distance 0.5 kilometer.
No. XXVII – No. XXVIII = $-6^m.8101$; distance 0.2 kilometer.

No. 12.—PLEASANT HILL, MO.

The difference of elevation fixed as indicated on page 405 of Appendix 8, Report for 1899, is No. LI – No. LII = $+1^m.2130$; distance 1.2 kilometers.

No. 14.—KANSAS CITY, MO.

The difference of elevation fixed as indicated on page 405 of Appendix 8, Report for 1899, is LVIII – Old M. R. C. B. M. 244 = $-1^m.9810$; distance 8.3 kilometers.

No. 15B.—HOLLIDAY, KANS.

The difference of elevation fixed as indicated on page 361 of Appendix 3, Report for 1903, is No. LXIII – No. LXII = $+0^m.0206$.

No. 17A.—ABILENE, SOLOMON, AND SALINA, KANS.

The differences of elevation fixed as indicated in Appendix 8, Report for 1899, on pages 405–406, and on page 361 of Appendix 3, Report for 1903, are—

Abilene, B_1 – Solomon, C_1 = $-5^m.6278$; distance 14 kilometers.
Abilene, B_1 – Abilene, Y_2 = $+2^m.2729$; distance 2 kilometers.
Solomon, C_1 – Salina, H_1 = $-15^m.3095$; distance 23 kilometers.

No. 21.—ELLIS, KANS.

The difference of elevation fixed as indicated on page 406 of Appendix 8, Report for 1899, is $A_2 - B_2 = +0^m.1163$.

No. 24.—LIMON, COLO.

The difference of elevation fixed as indicated on page 406 of Appendix 8, Report for 1899, is $N - P = -6^m.9860$.

No. 27.—DENVER, COLO.

The differences of elevation fixed as indicated on page 406 of Appendix 8, Report for 1899, are $Z_1 - B_2 = +0^m.6844$ and $B_2 - A_2 = +0^m.0360$.

No. 29A.—NEAR BILOXI, MISS.

The difference of elevation fixed as indicated on page 361 of Appendix 3, Report for 1903, is Ocean Springs E_1 – Sea level at Biloxi = $+4^m.7915$.

No. 33.—CORINTH, MISS.

The difference of elevation fixed as indicated on pages 407–408 of Appendix 8, Report for 1899, is $W - V = +0^m.0569$.

No. 35.—CAIRO, ILL.

The difference of elevation fixed as indicated on page 408 of Appendix 8, Report for 1899, is P. B. M. 2 − P. B. M. 1 = $+0^m.4031$.

No. 41.—VIDALIA, LA.

The difference of elevation fixed as indicated on page 408 of Appendix 8, Report for 1899, is LXIV − LXI = $+0^m.9880$; distance 5.8 kilometers.

No. 43.—NEAR VICKSBURG, MISS.

SW. Base and NE. Base at Delta, La., P. B. M. "B." near Vicksburg, and M. R. C. $\frac{107}{1}$ at Kleinston, Miss., were connected by the Mississippi River Commission in 1905. The discrepancies between the elevations as determined from the earlier leveling and as determined in 1905 are too large to be due to errors of leveling. Therefore the values involving these bench marks, given in the statement of local relation, on page 409 of Appendix 8, Report for 1899, are no longer adopted. The elevations as given by the 1905 line are adopted.

The following differences of elevations, fixed as indicated on pages 408–409 of Appendix 8, Report for 1899, remain unchanged:

Delta No. 211 − Delta No. 215 = $-0^m.1143$; distance 3.6 kilometers.
Delta No. 211 − Vicksburg, B. M. Cistern = $-31^m.1994$; distance 12 kilometers.
Delta No. 211 − Delta, SW. Base = $+1^m.1314$; distance 2.6 kilometers.
Delta No. 211 − Vicksburg, P. B. M. 2 = $-1^m.6679$; distance 15 kilometers.

No. 45.—WILKERSONS LANDING, MISS.—ARKANSAS CITY, ARK.

The difference of elevation fixed as indicated on page 410 of Appendix 8, Report for 1899, is Arkansas City, F − Wilkersons Landing, P. B. M. 84 = $-0^m.0564$; distance 2 kilometers.

No. 49.—VAN BUREN, ARK.

The difference of elevation fixed as indicated on page 410 of Appendix 8, Report for 1899, is No. XXXIX − No. XXXVIII = $-0^m.0072$.

No. 52.—CHESTER, ARK.

The difference of elevation fixed as indicated on page 410 of Appendix 8, Report for 1899, is No. XLIX − No. XLVIII = $-1^m.1358$.

No. 54.—BOSTON, MO.

The difference of elevation fixed as indicated on page 410 of Appendix 8, Report for 1899, is No. XCVI − No. XCVII = $-0^m.0008$.

No. 58.—WASHINGTON, D. C.

Elevations of bench marks at Washington above mean sea level, which was based on tidal observations at the Navy Yard on the Potomac River and an assumed fall of the river from Washington to the sea, were not used in the 1912 adjustment. (See p. 60, Precise Leveling in the United States, 1903–1907; p. 362, Appendix 3, Report for 1903; p. 410, Appendix 8, Report for 1899; and p. 256, Appendix 3, Report for 1896.)

No. 60.—RICHMOND, VA.

The elevation of O fixed as indicated on page 411 of Appendix 8, Report for 1899, is O − Sea level = $+58^m.1957$.

No. 62.—OLD POINT COMFORT, VA.

The elevation of U fixed as indicated on page 411 of Appendix 8, Report for 1899, is U − Sea level = $+2^m.6875$.

No. 67.—ANNAPOLIS, MD.

The elevation of the Perkins Tidal B. M. fixed as indicated on page 411 of Appendix 8, Report for 1899, is ("a" or Perkins Tidal B. M.) − Sea level = $+1^m.268$.

No. 71.—GIBRALTAR, MICH.

The difference of elevation fixed as indicated on page 411 of Appendix 8, Report for 1899, is 1 (1898) − (1877) = $+1^{m}.5488$.

No. 74B.—SHREVEPORT, LA.-BODCAU, LA.

The difference of elevation fixed as indicated on page 363 of Appendix 3, Report for 1903, is Bodcau, P. B. M. 44 − Shreveport, P. B. M. 46 = +2.4335; distance, 15 kilometers.

No. 75.—MONROE, LA.

The difference of elevation fixed as indicated on page 411 of Appendix 8, Report for 1899, is P. B. M. 24 − P. B. M. 27 = $-1^{m}.9772$; distance, 2 kilometers.

No. 77.—RAYVILLE, LA.

The difference of elevation fixed as indicated on page 412 of Appendix 8, Report for 1899, is P. B. M. 17 − P. B. M. 16 = $+2^{m}.3294$.

No. 82.—JONESVILLE, LA.

In the publication of the lines from Vidalia to Jonesville and from Jonesville to Concordia (see Report of the Chief of Engineers, U. S. Army, for 1902, Pt. II, pp. 1451 and 1466) the determination of P. B. M. 5 in 1894 differs from that given in manuscript in the Vicksburg tabulation (see p. 414 of Appendix 8, Report for 1899). As now published, there are no discrepancies between the various determinations. In the report referred to, junction is made on P. B. M. 4, and therefore that bench mark is made the junction point in this adjustment.

No. 85.—PARKEVILLE, LA.

The difference of elevation fixed as indicated on page 412 of Appendix 8, Report for 1899, is T. B. M. 74 − P. R. C. Parkeville = $+1^{m}.2220$.

No. 95.—AUSTIN, MISS.

The fixed relation between the bench marks is shown on page 412 of Appendix 8, Report for 1899.

No. 107.—GRAFTON, ILL.

P. B. M. 3, which was considered the most stable of the bench marks at Grafton (see p. 412 of Appendix 8, Report for 1899), was moved and reset in 1901. P. B. M. 2 was adopted as the junction point, and a mean value of the difference between P. B. M. 2 and P. B. M. 3, in its old position, was determined as follows: P. B. M. 3 − P. B. M. 2, from the line Grafton to Cairo = +2.9471 meters; from the line Keokuk to Grafton = +2.9496 meters. The mean is +2.9484 meters and is adopted. (See the Report of the Chief of Engineers, U. S. Army, for 1884, pt. 4, pp. 2476, 2512.)

No. 123.—ST. JOSEPH, MO.

The difference of elevation fixed as indicated on page 413 of Appendix 8, Report for 1899, is P. B. M. 287 − P. B. M. 290 = $-0^{m}.9892$.

No. 133B.—TROY, N. Y.

The difference of elevation of two bench marks in Troy, as determined by the Board of Engineers on Deep Waterways, is adopted as fixed, namely, D. W. Troy 2 − D. W. Troy 1 (or N. Y. 12) = $+0^{m}.7925$ = +2.60 feet.

No. 140A.—ERIE, PA.

According to information furnished by the engineer in charge at Erie, B. M. 1 (1873) is 2.200 feet lower than the United States Engineers' bench mark on the lighthouse; hence, L. H. − 1 (1873) = $+0^{m}.6706$.

No. 141A.—PITTSBURGH, PA.

The following differences of elevation, as determined by the United States Geological Survey lines from Erie to Pittsburgh and Grafton to Pittsburgh, are adopted as fixed:

Braddock, P. R. R. 88 – Pittsburgh, Penn avenue curb = $+28^m.0770$; distance, 7.6 kilometers.

West Penn Junction, P. R. R. 26 – Pittsburgh, Penn avenue curb = $+15^m.8292$; distance, 27.3 kilometers.

Pittsburgh, P. R. R. 99 – Pittsburgh, Penn avenue curb = $+2^m.1766$; distance, 1.4 kilometers.

And from the P. R. R. bench mark book is adopted as fixed: P. R. R. 99 – P. R. R. 100 = $-0^m.0518$.

The following difference of elevation, as determined by the United States Geological Survey, on the line Grafton to Pittsburgh, is considered fixed: Benvenue, 818 Pittsburgh, 1899 – Pittsburgh, Penn avenue curb = +81.563 feet = 24.8605 meters; distance, 1.5 kilometers.

This with the other fixed differences of elevation above, gives: Benvenue, 818 Pittsburgh, 1899 – P. R. R. 99 = +22.6839 meters.

No. 143D.—HARRISBURG, PA.

The differences of elevation fixed as indicated on page 364 of Appendix 3, Report for 1903, are:

P. R. R. 1 – No. XXIX = −11.2227 meters.

P. R. R. 2 – P. R. R. 1 = +5.2160 meters.

No. 149.—BIRMINGHAM, ALA.

The following difference of elevation, as determined by the Corps of Engineers, United States Army, on line from York to Birmingham, is considered fixed: P. B. M. 1 – P. B. M. 2 = $+4^m.5173$.

No. 154.—SIOUX CITY, IOWA.

The difference of elevation fixed as indicated on page 365 of Appendix 3, Report for 1903, is P. B. M. 399 – B_2 = −1.0821 meters; distance, 16 kilometers. Using the leveling of 1904, Watertown to Sioux City, gives a value differing only 8.6 mm. from the above value, which is therefore not changed. (See p. 24, Precise Leveling in the United States, 1903–1907.)

No. 156.—NORFOLK, NEBR.

The differences of elevation fixed as indicated on page 365 of Appendix 3, Report for 1903, are—

T. B. M. 2 – N_1 = −0.8132 meter.

O_1 – N_1 = +1.1565 meters.

No. 158.—HARRIMAN, TENN.

The difference of elevation fixed as indicated on page 365 of Appendix 3, Report for 1903, is A_2 – C_2 = −7.1484 meters.

No. 161.—MOREHEAD CITY, N. C.

The difference of elevation fixed as indicated on page 365 of Appendix 3, Report for 1903, is 7 M C – Sea level = +2.1186 meters. Six months' record in 1898 with self-registering tide gauge gave an elevation for 7 M C of 6.929 feet. As this differed but 0.02 foot from the value used in 1903, the above difference of elevation is not changed.

No. 163.—NEAR KNOXVILLE, TENN.

The differences of elevation fixed as indicated on page 366 of Appendix 3, Report for 1903, are—

Caswell, 867 M C – Knoxville, 933 M C = −20.0834 meters; distance, about 10 kilometers.

Knoxville, 933 M C – Wright, 940 M C = −2.1626 meters; distance, about 10 kilometers.

No. 165.—BRUNSWICK, GA.

The difference of elevation fixed as indicated on page 366 of Appendix 3, Report for 1903, is 10 M C − Sea level = +3.2577 meters.

No. 169E.—BELPRE TO MARIETTA, OHIO.

The following difference of elevation, determined by the Corps of Engineers, United States Army, and transmitted to this office by the United States Geological Survey, is considered fixed; Belpre, No. XL − Marietta, U. S. E. 171 B = +29.722 feet = +9.0593 meters; distance, 13 miles, or 21 kilometers.

No. 179.—ANTHONY, KANS.

The difference of elevation fixed as indicated on page 366 of Appendix 3, Report for 1903, is Anthony SE. base − F_5 = +9.8326 meters; distance, approximately, 3 kilometers.

No. 193.—CLEVELAND, OHIO.

The difference of elevation fixed as indicated on page 366 of Appendix 3, Report for 1903, is U. S. E. 2 − U. S. E. 1 = −1.1186 meters.

No. 219.—BAINBRIDGE AND SIDNEY, N. Y.

The difference of elevation fixed as indicated on page 366 of Appendix 3, Report for 1903, is Bainbridge, 989 A − Sidney, Tel. Pole 991 = −0.4401 meter; distance, 2 kilometers.

No. 231.—GRAFTON, VALLEY FALLS, AND BENTON FERRY, W. VA.

Bench marks at Grafton and Valley Falls were connected by the United States Geological Survey on the line Grafton to Pittsburgh, and by the Baltimore & Ohio Railroad on the line Cumberland to Benwood, with the following results:

Grafton, M − Valley Falls, 986 Pittsburgh, 1899 = +11.251 feet by U. S. G. S.
Grafton, M − Valley Falls, 986 Pittsburgh, 1899 = +11.2596 feet by B. & O. R. R.
Mean adopted, +11.2553 feet = 3.4306 meters; distance, 4.8 miles = 8 kilometers.

The difference between bench marks at Grafton and Benton Ferry was also determined as follows:

Grafton, M − Benton Ferry, 885 Pittsburgh, 1899 = +111.748 feet by U. S. G. S.
Grafton, M − Benton Ferry, 885 Pittsburgh, 1899 = +111.7658 feet by B. & O. R. R.
Mean adopted, +111.7569 feet = +34.0636 meters; distance, 17.4 miles = 28 kilometers.

No. 279.—MONACA, PA.

The following difference of elevation, determined by the Corps of Engineers, United States Army, and transmitted to this office by the United States Geological Survey, is considered fixed: Monaca, 25 A − Monaca, 25 C = +67.291 feet = +20.5103 meters.

No. 286.—CHICAGO, ILL.

Five bench marks in Chicago, determined on the line Savanna to Chicago in 1883, were redetermined in 1904 on the line Grafton to Chicago. The following are the observed elevations from each line, all referred to P. B. M. 99 as 180.3077 meters:

Bench mark.	1883	1904	1904-1883
	Meters.	*Meters.*	*mm.*
P. B. M. 99	180.3077	180.3077	0.0
B. M. VII	181.5620	181.5405	−21.5
P. B. M. 96	182.3783	182.3750	− 3.3
B. M. VI	181.4351	181.4441	+ 9.0
P. B. M. 98	182.4300	182.4168	−13.2
Mean			− 5.8

This indicates that P. B. M. 99 and P. B. M. 96 are stable and that the other bench marks have changed in elevation in the interval. It was reported in 1904 that B. M. VII had been damaged. P. B. M. 99 was retained as the junction point between these lines and the water leveling on Lake Michigan. New elevations from the 1904 line are given for the other bench marks.

NO. 308.—NEAR SHAWNEETOWN, ILL.

The difference of elevation P. B. M. Station − P. B. M. 839 as observed by the Ohio River Survey in 1906 was +2.9499, and as observed by the Wabash River Survey in 1911 was +2.9598. The mean adopted is P. B. M. Station − P. B. M. 839 = +2.9548 meters.

The following differences of elevation, representing the mean of the two Surveys were also held fixed.

P. B. M. 839 − P. B. M. 842 = +0.5014 meters.
P. B. M. Station − P. B. M. Hotel = −4.9533 meters.

NO. 310.—LOUISVILLE, KY.

Differences of elevation between bench marks in Louisville were determined by the Corps of Engineers, United States Army, during the Ohio River Survey in 1903 and by the United States Geological Survey in 1906 and 1911. A local adjustment gives the following differences which are adopted as fixed; connections in the adjustment were made on 604 M.

U. S. E. B. M. No. 10(=602B) − U. S. E. B. M. 603 = +0.3687 meters.
U. S. E. B. M. 604M − U. S. E. B. M. 603 = +4.3984 meters.
U. S. E. B. M. 604M − B. M. 13 = −7.2128 meters.
B. M. 13 − B. M. 86 or No. 16 = −0.0931 meters.

THE CIRCUIT CLOSURES.

The leveling shown in the preceding table and paragraphs forms a large number of circuits, which are clearly shown on the sketch opposite page 58. The closing error in millimeters and circumference in kilometers are printed inside each circuit. These circuits are also given below in a table for convenient reference, arranged in the order of the magnitude of the closures expressed in millimeters per kilometer, the best closure being placed first. Only simple circuits are used, i. e., there is no circuit given in the table, or the closure shown on the sketches, which is divided by cross lines into smaller circuits.

For all circuits of which the Atlantic, the Pacific, or the Gulf of Mexico forms one side, it is assumed that the mean sea surface is everywhere the same level on the Atlantic, the Pacific, and the Gulf of Mexico, and the circumferences of such circuits do not include tidewater distances.

A plus sign on the closing error indicates that the elevation as carried around the circuit in a clockwise direction is too great.

The last column shows the character of the lines forming the circuits, the different grades of lines being mentioned in decreasing order of the number of kilometers entering into the circuit. The symbols 1899− and 1899+ in the last column refer, respectively, to leveling by the Coast and Geodetic Survey previous to 1899, and leveling by the Coast and Geodetic Survey in 1899 and later. The leveling referred to by "Eng." was done under the direction of the Corps of Engineers, United States Army, the Mississippi River Commission, or the Missouri River Commission, with Kern instruments. "Eng. Wye." refers to leveling done with a wye level under the direction of the Corps of Engineers, United States Army, or of the Board of Engineers on Deep Waterways. The abbreviation "G. S. 1905+" refers to leveling done by the United States Geological Survey in 1905 and later years with instruments and methods similar to those used by the Coast and Geodetic Survey in 1899 and later; "Geol." refers to leveling done by the United States Geological Survey previous to 1905; "Lake" refers to leveling done by the United States Lake Survey, and "Water" to water leveling on the lakes. "Van O." refers to Van Orden leveling. The orthometric correction was applied to the observed elevations before computing the circuit closures. The orthometric correction is discussed on pages 49–53.

Closing errors of circuits.

[The circumferences given for the circuits of which tide water forms one side do not include the tide-water distance.]

No.	Circuit.	Circuit closure.	Orthometric correction.	Corrected closure.	Circumference of circuit.	Closure per kilometer.	Character of lines.
		mm.	*mm.*	*mm.*	*km.*	*mm.*	
1	Savanna-Chicago-Sand Beach-Escanaba-Marquette-St. Paul-Savanna.	+ 31.7	− 17.8	+ 13.9	2877	+0.005	Water, Eng., Lake.
2	San Diego-Goffs-Ogden-Pocatello-Seattle	−1216.2	+1241.4	+ 25.2	3070	+0.008	1899+.
3	Belpre-Chillicothe-Portsmouth-Belpre	+ 4.8	− 0.5	+ 4.3	510	+0.008	Eng. Wye, 1899−, G. S. 1905+.
4	Cincinnati-Chillicothe-Uhrichsville-Warwick-Destler-Cincinnati.	+ 8.2	+ 0.8	+ 9.0	993	+0.009	1899+, G. S. 1905+,1899−, B. & O.
5	Sand Beach-Mackinaw-Escanaba-Sand Beach.	+ 13.6	0.0	+ 13.6	1000	+0.014	Water.
6	Sand Beach-Detour-Mackinaw-Sand Beach	− 8.8	0 0	− 8.8	622	−0.014	Water.
7	Cleveland-Erie-Buffalo-Cleveland	− 8.3	0.0	− 8.3	573	−0.014	Water.
8	Zanesville-Chillicothe-Belpre-Marietta-Zanesville.	− 9.5	− 2.7	− 12.2	470	−0.026	G. S. 1905+, 1899−, Eng. Wye.
9	Oswego-Utica-Greenbush-Coopersville-Oswego	− 20.4	− 10.6	− 31.0	985	−0.031	Lake, Eng. Wye, Water.
10	Concordia-Archibald-Columbia-Jones ville-Concordia.	− 8.9	+ 0.2	− 8.7	258	−0.034	Eng.
11	Biloxi-Smithland-Barbin Ldg.-Shreveport-Fort Worth-Galveston.	+ 96.7	− 36.4	+ 60.3	1791	+0.034	1899+, Eng.
12	Decatur-Tuscumbia-Decatur	− 6.5	+ 0.1	− 6.4	158	−0.040	Eng., 1899+.
13	Kansas City-Sioux City-Norfolk-Abilene-Holliday-Kansas City.	+ 133.6	− 63.9	+ 69.7	1325	+0.053	1899+, Eng., 1899−.
14	El Reno-Abilene-Limon-Colorado Springs-Denver-Cheyenne-Ogden-Goffs-Belen-El Reno.	+ 504.4	− 229.6	+ 274.8	5211	+0.053	1899+, 1899−.
15	Utica-Bainbridge-Vischers Ferry-Utica	− 16.2	− 5.8	− 22.0	417	−0.053	Geol., Lake.
16	Harrisburg-Elmira-Hornellsville-Salamanca-Irvineton-Franklin-Pittsburg-Harrisburg.	+ 72.4	− 7.1	+ 65.3	1228	+0.053	Geol., P. R. R.
17	Vicksburg-Rayville-Concordia-Vidalia-Vicksburg.	+ 19.3	− 0.4	+ 18.9	347	+0.054	Eng.
18	Chicago-Savanna-Grafton-Pekin-Chicago	− 71.6	− 2.9	− 74.5	1303	−0.057	Eng.
19	Hancock-Bainbridge-Binghamton-Hancock	+ 10.5	+ 2.4	+ 12.9	211	+0.061	Geol.
20	Monroe-Camden-Shreveport-Monroe	+ 40.5	− 4.4	+ 36.1	526	+0.069	Eng.
21	Cleveland-Warwick-Uhrichsville-Benwood-Monaca-Alliance-Ellwood City-Pittsburg-Franklin-Leboeuf-Erie-Cleveland.	+ 63.9	+ 17.9	+ 81.8	1102	+0.074	Geol., B. & O., Water, Eng. Wye., P. R. R., 1899+.
22	Crawford-Pocatello-Ogden-Cheyenne-Crawford.	− 145.3	− 90.0	− 235.3	2932	−0.080	1899+.
23	Savanna-St. Paul-Sioux City-Kansas City-Jefferson City-Twelve miles above St. Louis-Grafton-Savanna.	+ 341.4	− 101.7	+ 239.7	2981	+0.080	Eng., 1899+.
24	Smithland-Vidalia-Concordia-Jonesville-Barbin Landing-Smithland.	− 27.2	+ 0.1	− 27.1	312	−0.087	Eng.
25	Cincinnati-Louisville-Georgetown-Cincinnati	− 51.5	+ 11.2	− 40.3	456	−0.088	Eng., G. S. 1905+, 1899+.
26	Abilene-Norfolk-Crawford-Cheyenne-Denver-Limon-Abilene.	+ 170.3	−382.0	− 211.7	2378	−0.089	1899+, 1899−.
27	Boston-Greenbush-Poughkeepsie-Sandy Hook.	− 64.4	+ 4.8	− 59.6	667	−0.089	Van O., 1899+, 1899−.
28	Georgetown-Louisville - Shawneetown - Cairo-Corinth-Tuscumbia-Decatur - Chattanooga-Harriman-Georgetown.	− 220.1	+ 55.0	− 165.1	1759	−0.094	Eng., 1899+, G. S. 1905+.
29	Vicksburg-Wilkersons Landing-Monroe-Rayville-Vicksburg.	+ 52.4	+ 0.7	+ 53.1	530	+0.10	Eng., 1899−.
30	Cincinnati-Deshler-Trenton-Sand Beach-Chicago-Pekin-Oakland-Terre Haute-Mitchell-Cincinnati.	+ 236.4	+ 13.8	+ 250.2	2424	+0.10	Water, 1899+, G. S. 1905+, 1899−, Eng., Lake.
31	Warwick-Buffalo-Trenton-Deshler-Warwick	− 123.7	+ 2.5	− 121.2	1141	−0.11	Water, 1899+, Lake, B. & O., Eng., Wye., Geol.
32	Brainerd-Aitkin-Grand Rapids-Cass Lake-Brainerd.	+ 45.5	− 2.0	+ 43.5	400	+0.11	Eng.
33	Escanaba-Detour-Marquette-Escanaba	+ 89.3	− 6.0	+ 83.3	753	+0.11	Water, Lake.
34	Washington - Relay - Washington Junction - Washington.	− 22.0	− 2.1	− 24.1	213	−0.11	B. & O.
35	Cincinnati-Portsmouth-Chillicothe-Cincinnati.	+ 57.6	− 0.6	+ 57.0	497	+0.11	Eng., Wye, 1899−, G. S. 1905+.
36	Wilkersons Landing-Little Rock-Camden-Parkville-Wilkersons Landing.	+ 86.6	+ 0.0	+ 86.6	684	+0.13	Eng., 1899−.
37	Grafton-Benwood-Belpre-Grafton	− 66.2	+ 5.3	− 60.9	470	−0.13	1899−, B. & O., Eng., Wye.
38	Boston-Greenbush-Oswego-Buffalo-Trenton - Sand Beach-Detour-Marquette-St. Paul-Sioux City-Norfolk-Crawford-Pocatello-Seattle.	− 1117.9	+ 95.9	− 1022.0	7656	−0.13	1899+, Water.
39	Monroe-Shreveport-Barbin Landing-Jonesville-Columbia-Monroe.	− 96.6	− 2.1	− 98.7	698	−0.14	Eng.
40	Utica-Oswego-Charlotte-Hornellsville-Elmira-Bainbridge-Utica.	− 110.5	+ 4.4	− 106.1	713	−0.15	Geol., Lake, Water.
41	Fort Worth-El Reno-Belen-Fort Worth	+ 691.2	−284.1	+ 407.1	2664	+0.15	1899+.
42	Morehead City-Knoxville-Cleveland-Brunswick.	+ 324.0	− 58.0	+ 266.0	1674	+0.16	Geol., 1899+.
43	Biloxi - Meridian - Vicksburg - Vidalia-Smithland-Biloxi.	− 204.2	+ 7.6	− 196.6	1191	−0.17	Eng., 1899−.
44	Sandy Hook - Poughkeepsie - Hancock - Binghamton-Elmira-Harrisburg-Sandy Hook.	− 185.3	− 20.6	− 205.9	1218	−0.17	Geol., 1899−, P. R. R. 1899+.
45	Mitchell-Terre Haute-Vincennes-Mitchell	+ 67.8	+ 2.7	+ 70.5	404	+0.17	Eng., G. S. 1905+, 1899−.
46	St. Louis-Jefferson City-Harrisonville-Little Rock-Wilkersons Landing-Memphis-Cairo-St. Louis.	+ 457.6	− 67.8	+ 389.8	2211	+0.18	1899−, Eng.
47	Pittsburgh-Monaca-Benwood-Benton Ferry-Pittsburgh.	+ 86.0	+ 0.6	+ 86.6	488	+0.18	Geol., Eng., Wye, B. & O.
48	Harrisburg-Pittsburgh-Cumberland-Hancock-Hagerstown-Harrisburg.	− 150.6	− 11.5	− 162.1	908	−0.18	P. R. R., B. & O., 1899−.
49	Galveston-Fort Worth-El Paso-Belen-Goffs-San Diego.	− 981.0	+337.8	− 643.2	3561	−0.18	1899+.
50	Brunswick-Cleveland-Chattanooga - Decatur-Meridian-Biloxi.	− 301.8	+ 8.9	− 292.9	1617	−0.18	Geol., 1899+, 1899−, Eng.

Closing errors of circuits—Continued.

No.	Circuit.	Circuit closure.	Orthometric correction.	Corrected closure.	Circumference of circuit.	Closure per kilometer.	Character of lines.
		mm.	*mm.*	*mm.*	*km.*	*mm.*	
51	Old Point Comfort-Washington-Washington Junction - Hancock - Cumberland - Amblersburg - Grafton - Belpre - Portsmouth - Cincinnati-Georgetown - Harriman - Knoxville-Morehead City.	+ 628.7	−101.7	+ 527.0	2821	+0.19	Geol., 1899+, 1899−, B. & O., Eng., Wye.
52	Knoxville-Harriman-Chattanooga-Cleveland-Knoxville.	− 78.8	+ 1.0	− 77.8	389	−0.20	1899+, G. S. 1905+.
53	Cumberland - Pittsburgh - Grafton - Amblersburg-Cumberland.	+ 133.8	+ 7.7	+ 141.5	648	+0.22	B. & O., Geol., 1899−.
54	Kansas City-Pleasant Hill-Jefferson City-Kansas City.	− 120.9	− 3.8	− 124.7	551	−0.23	Eng., 1899−.
55	Pittsburgh-Ellwood City-Monaca-Pittsburgh..	− 34.2	+ 1.4	− 32.8	140	−0.23	B. & O., Eng., Wye, 1899+, Geol.
56	Monroe-Columbia-Archibald - Rayville - Monroe.	− 40.7	0.0	− 40.7	168	−0.24	Eng.
57	Oswego-Olcott-Buffalo-Salamanca - Hornellsville-Charlotte-Oswego.	+ 186.8	+ 1.3	+ 188.1	766	+0.25	Geol., Water, Lake.
58	Baltimore-Relay-Washington-Annapolis.....	+ 32.6	− 0.7	+ 31.9	129	+0.25	1899−, B. & O., 1899+.
59	Vicksburg-Greenwood-Greenville-Vicksburg...	− 130.6	+ 0.6	− 130.0	469	−0.28	Eng., 1899−, Geol., 1899+ Lake.
60	Greenbush-Bainbridge-Hancock - Poughkeepsie-Greenbush.	+ 207.7	− 33.4	+ 174.3	613	+0.28	Geol., 1899+, Lake.
61	Irvineton-Leboeuf-Franklin-Irvineton.....	− 70.7	+ 0.6	− 70.1	241	−0.29	Geol.
62	Corinth-Cairo-Memphis-Corinth.....	+ 237.0	+ 6.6	+ 243.6	746	+0.33	1899−, Eng.
63	Louisville-Mitchell-Vincennes-Shawneetown-Louisville.	− 278.1	+ 2.6	− 275.5	808	−0.34	Eng., 1899−, G. S., 1905+.
64	Shreveport-Camden - Little Rock - Harrisonville - Holliday - Abilene - El Reno - Fort Worth-Shreveport.	− 864.8	− 75.9	− 940.7	2586	−0.36	1899+, 1899−, Eng.
65	Vincennes-Olney - Odin - Duquoin - Shawneetown-Vincennes.	− 200.5	− 2.1	− 202.6	538	−0.38	Eng., 1899−, G. S., 1905+.
66	Cairo-Duquoin-Odin-St. Louis-Cairo.....	+ 227.2	+ 3.4	+ 230.6	573	+0.40	Eng., 1899−.
67	Shawneetown-Duquoin-Cairo-Shawneetown...	− 176.7	− 1.9	− 178.6	422	−0.42	Eng., 1899−, G. S., 1905+.
68	Terre Haute - Oakland - Olney - Vincennes - Terre Haute.	− 166.2	− 2.2	− 168.4	383	−0.44	Eng., G. S., 1905+, 1899−.
69	St. Louis - Odin - Olney-Oakland-Pekin-Grafton-St. Louis.	+ 380.6	+ 10.0	+ 390.6	862	+0.45	Eng., 1899+, 1899−.
70	Decatur - Tuscumbia - Corinth-Meridian-Decatur.	− 427.2	+ 8.5	− 418.7	860	−0.49	1899+, 1899−, Eng.
71	Sandy Hook - Harrisburg - Hagerstown-Washton-Relay-Baltimore.	− 304.5	− 17.5	− 322.0	644	−0.50	1899−, B. & O., 1899+.
72	Cincinnati-Mitchell-Louisville-Cincinnati.....	− 275.6	− 5.3	− 280.9	521	−0.54	Eng., 1899−, G. S., 1905.
73	Irvineton-Salamanca-Buffalo-Leboeuf-Irvineton.	− 292.7	+ 9.6	− 283.1	448	−0.63	Geol., Water.
74	Monaca-Ellwood City-Alliance-Monaca.....	+ 148.3	− 2.1	+ 146.2	228	+0.64	P. R. R., 1899+, B. & O.
75	Uhrichsville - Zanesville - Marietta - Benwood-Uhrichsville.	+ 315.0	− 1.7	+ 313.3	462	+0.68	Eng., Wye, G. S., 1905+, B. & O.
76	Meridian-Corinth-Memphis-Wilkersons Landing-Vicksburg-Meridian.	+ 900.3	+ 11.0	+ 911.3	1280	+0.71	1899−, Eng.
77	Cumberland-Hancock-Cumberland.....	− 136.6	+ 0.3	− 136.3	184	−0.74	1899−, B. & O.
78	Limon-Denver-Limon.....	− 292.1	− 8.6	− 300.7	385	−0.78	1899.
79	Washington - Hagerstown-Hancock-Washington Junction-Washington.	+ 280.4	− 1.9	+ 278.5	345	+0.81	1899−, B. & O.
80	Annapolis-Washington-Old Point Comfort.....	− 378.5	− 5.1	− 383.6	396	−0.97	1899−.
81	Cumberland-Amblersburg-Cumberland.....	− 253.3	+ 1.1	− 252.2	233	−1.08	B. & O., 1899−.
82	Pleasant Hill-Kansas City-Holliday-Harrisonville-Pleasant Hill.	+ 183.1	0.0	+ 183.1	165	+1.11	1899−.
83	St. Augustine-Cedar Keys.....	− 258.5	− 0.7	− 259.2	216	−1.20	1899−, Van O.
84	Grafton-Amblersburg-Grafton.....	− 189.6	− 0.5	− 190.1	96	−1.98	1889−, B. & O.

METHODS EMPLOYED IN THE 1912 ADJUSTMENTS.

When extensive additions are made to the precise level net of the country a readjustment of the net must be made in order to obtain the best practicable elevations of bench marks and to eliminate the differences in the elevation of a bench mark which is on several lines of levels. Theoretically the best method of procedure is to readjust the entire net and not to hold fixed any elevations resulting from the previous adjustment. This method, however, is impracticable, for the surveyors, engineers, and others whose operations are based on the elevations furnished by the precise leveling, wish to have the elevations used in any particular case held as fixed for an indefinite period or for all time.

The following plan was adopted in the present (1912) adjustment: First, the orthometric correction was applied to the leveling to the westward of the Mississippi River; second, an adjustment of the entire net was made, using the weights for the different classes of leveling as determined by the 1907 adjustment. (See p. 72, Precise Leveling in the United States, 1903–1907.) Then a comparison was made of the elevations resulting from the adjustments in 1907 and in 1912, which showed that the 1907 elevations of bench marks eastward from the imagi-

nary line joining the following places might be held: Shreveport, La.; Little Rock, Ark.; St. Louis, Mo.; Savanna, Ill.; and Marquette, Mich.

Sixty-nine junction points in the net were held, and of these only fourteen had a difference of more than one decimeter (0.33 foot) between the 1907 values and those of this preliminary 1912 adjustment. The junction points at which the difference is as great as one decimeter are located in Illinois, Indiana, Michigan, northwestern Ohio, and southwestern Wisconsin.

THE 1912 SPECIAL ADJUSTMENT.

A special adjustment was then made which included that portion of the net to the westward of the imaginary line mentioned above. The elevations of the following bench marks were held fixed: Mean sea level, with elevation of zero, at Seattle and San Diego, on the Pacific coast, and at Galveston on the Gulf coast; and the elevations of P. B. M. 46 at Shreveport, La.; No. 1 or 3 at Little Rock, Ark.; K_3 at St. Louis, Mo.; P. B. M. 62 at Savanna, Ill.; 1 (1871) at Marquette, Mich., as adopted in Precise Leveling in the United States 1903–1907.

The observation equations were formed from 35 observed differences of elevations with the orthometric correction applied between the junction points and the fixed points and between each two adjacent junction points. These observation equations are shown in the table on page 75.

This is a different procedure from that followed in 1907. In that adjustment all of the net was adjusted as a whole and then certain of the previously adjusted elevations (adjustment of 1903) were held, a correction of so much per kilometer being applied to a line of levels joining a bench mark whose elevation was held and the one nearest to it whose elevation resulted from the 1907 adjustment.

The elevations in the western part of the country, resulting from the special adjustment (for sake of clearness called the *1912 special adjustment*) and those held from the 1907 adjustment in the eastern part of the country to the eastward of the imaginary line mentioned above, are assumed to be *standard* elevations and are expected to be held without change. It is believed that the precise leveling net is sufficiently extended and of such strength that this may be done and that any new leveling in the future can be fitted to the standard elevations. It is possible that changes may have to be made in restricted portions of the net where elevations have been changed by earthquakes or other agencies, or if a mistake is found in an already adjusted line. Such changes will probably be very few in number and will not make it inadvisable to classify the 1912 elevation, as *fixed* or *standard*. The elevations from future leveling which will be fitted to the standard elevations will also be given that designation.

From time to time adjustments of the whole net will be made in order to obtain the theoretically best values for the junction points. The results of such adjustments will probably have a scientific value and interest only and should not be confused with the standard values. The results from such a general adjustment made in 1912 are shown on pages 81 to 82.

The general adjustment of 1912, which gives the theoretically best values for the junction points of the entire net, showed that in the 1912 special adjustment the weights for the classes of levels 1 and 2 are too large. (See pp. 76 and 79.)

After the best weights from the 1912 general adjustment were found, they were used in a second special adjustment of that portion of the net west of the Mississippi River, and the resulting elevations of the junction points together with the standard elevations of the same points are shown in the following table. This comparison shows only six differences each greater than one decimeter, and these are nearly all at the junction points which are between the old leveling which had been given small weight and the new leveling of great weight. The relative differences in elevation between any two contiguous bench marks would be practically the same by using either system of weights. A great amount of work had been done toward getting the results of the 1912 special adjustment ready for publication before the theoretically best weights were obtained from the 1912 general adjustment. It was decided that it was

inadvisable to supersede that work. The difference between the corrections per kilometer for the two adjustments is only 0.3 millimeter in the worst case, namely, the line between Jefferson City and Pleasant Hill, and in only 8 of the 35 relative differences was it greater than 0.15 millimeter per kilometer. The average difference in the corrections by the two adjustments was only 0.09 millimeter per kilometer.

A comparison between the standard and the theoretically best elevations of junction points is shown in the table on pages 81 and 82.

The 1912 special adjustments were made by the same methods as the adjustment of 1907. The 35 links, or equations of observed differences between two points known as junction points, or else between either sea level or one of the fixed points (on the eastern boundary of the territory covered) and one junction point, are shown as observation equations in the table below. Each observation equation bears the same number in the adjustment as in the general adjustment and is formed from the same data, except those equations involving a fixed point on the eastern boundary. (See pp. 74 and 76–79.)

Observation equations in the 1912 special adjustment.

No. of equation or link.	Observed difference.		Weight.
20	Harrisonville No. 43—Little Rock No. 1 or 3	+ 230.0737	0.0033
21	Pleasant Hill No. LI—Harrisonville No. 43	− 48.3144	9.6
22A	Kansas City Old M. R. C. B. M. 244—Holliday No. LXIII	− 2.9355	3.0
22B	Holliday No. LXIII—Harrisonville No. 43	− 76.4081	0.28
22E	Abilene Y_2—Norfolk N_1	− 113.3063	6.4
22F	Abilene Y_2—Holiday No. LXIII	+ 117.7747	0.028
22H	Limon N—Abilene Y_2	+ 1281.3715	0.0047
22I	Denver A_2—Limon N	− 47.1601	0.083
22J	Denver A_2—Limon N	− 47.4608	0.027
23	Kansas City Old M. R. C. B. M. 244—Pleasant Hill No. LI	− 31.2112	0.77
24	Jefferson City Old B. M. 90 (85)—Pleasant Hill No. LI	− 91.3154	0.042
25	Kansas City Old M. R. C. B. M. 244—Jefferson City Old B. M. 90 (85)	+ 60.2200	1.6
26	St. Louis K_3—Jefferson City Old B. M. 90 (85)	− 43.5512	0.038
27	St. Louis K_3—Jefferson City Old B. M. 90 (85)	− 43.8279	2.1
56	Denver A_2—Cheyenne B	− 262.4208	18.0
57A	Cheyenne B—Crawford G_4	+ 726.1522	7.4
57B	Norfolk N_1—Crawford G_4	− 657.4283	5.3
58A	Cheyenne B—Ogden B	+ 536.8017	3.7
58B	Ogden B—Pocatello B_3	− 49.9520	14.0
58C	Pocatello B_3—Seattle sea level	+ 1360.0994	2.3
59	Norfolk N_1—Sioux City P. B. M. 399	+ 128.9961	26.0
60	Sioux City P. B. M. 399—Kansas City Old M. R. C. B. M. 244	+ 105.0363	1.0
61	St. Paul P. B. M. 68—Sioux City P. B. M. 399	− 120.8009	2.0
62	Marquette 1 (1871)—St. Paul P. B. M. 68	− 28.3198	1.5
63	St. Paul P. B. M. 68—Savanna P. B. M. 62	+ 33.7924	1.0
64A	Abilene Y_2—El Reno 1327 Reno Junction	− 54.5787	6.6
64B	El Reno 1327 Reno Junct.—Fort Worth U	+ 220.3769	8.8
65	Fort Worth U—Shreveport P. B. M. 46	+ 124.9933	7.3
66	Fort Worth U—Galveston sea level	+ 184.7126	4.9
94	Pocatello B_3—Crawford G_4	+ 239.5398	2.0
95	Ogden B—Goffs L_5	+ 523.4866	3.1
96	Goffs L_5—San Diego, sea level	+ 786.6356	5.0
97	Belen U. S. G. S. 4793—Goffs L_5	+ 674.3299	3.0
98	Belen U. S. G. S. 4793—El Reno 1327 Reno Junction	+ 1056.1121	3.1
99	Belen U. S. G. S. 4793—Fort Worth U	+ 1276.8961	2.2

WEIGHTS USED IN THE 1912 SPECIAL ADJUSTMENT.

In the 1912 special adjustment above, the weights assigned to the different classes of leveling were the same as those used in the 1907 adjustment and are:

Class.	Lines.	Weight p.
1	Coast and Geodetic Survey leveling of 1899 and later; United States Geological Survey leveling of 1905 and later; United States Lake Survey leveling, and water leveling on lakes, except short series of observations	$\frac{3000}{L}$
2	Engineer lines with Kern instrument, and wye levels run under the direction of the Corps of Engineers, United States Army, and Board of Engineers on Deep Waterways	$\frac{500}{L}$
6	Coast and Geodetic Survey leveling previous to 1899	$\frac{1600}{L^2}$

ELEVATIONS RESULTING FROM THE 1912 SPECIAL ADJUSTMENT.

The following table gives the elevations of the 19 junction points resulting from the use of the two scales of weights:

Junction point.	Elevations.		Difference.	Junction point.	Elevations.		Difference.
	1907 weights used.	1912 weights used.			1907 weights used.	1912 weights used.	
	Meters.	*Meters.*	*mm.*		*Meters.*	*Meters.*	*mm.*
Pocatello B_3	1360.3278	1360.3623	+ 34.5	Abilene Y_2	350.4667	350.6011	+134.4
Ogden B	1310.3635	1310.4054	+ 41.9	El Reno 1327 Reno Junction	405.0611	405.1381	+ 77.0
Goffs L_5	786.7998	786.8070	+ 7.2	Fort Worth U	184.6681	184.7078	+ 39.7
Crawford G_4	1121.0399	1121.1720	+132.1	St. Paul P. B. M. 68	214.1977	214.3144	+116.7
Cheyenne B	1847.1831	1847.2834	+100.3	Holliday No. LXIII	232.9184	233.0157	+ 97.3
Denver A_2	1584.7622	1584.8620	+ 99.8	Kansas City Old M. R. C. B. M. 244	229.9730	230.0701	+ 97.1
Limon N	1631.9971	1632.0921	+ 95.0	Pleasant Hill No. LI	261.1451	261.2399	+ 94.8
Belen U. S. G. S. 4793	1461.2516	1461.3022	+ 50.6	Harrisonville No. 43	309.4561	309.5510	+ 94.9
Sioux City P. B. M. 399	334.7831	334.9858	+202.7	Jefferson City Old B. M. 90 (85)	169.8939	169.9292	+ 35.3
Norfolk N_1	463.7560	463.9363	+180.3				

LINES FITTED TO THE LEVEL NET.

The following lines were fitted to the level net in Illinois, Indiana, and Kentucky:

From Cincinnati, Ohio, to Cairo, Ill., United States Engineers.
From Terre Haute, Ind., to mouth of Wabash River, United States Engineers.
From Georgetown, Ky., to Louisville, Ky., United States Geological Survey.
From Louisville, Ky., to Mitchell, Ind., United States Geological Survey.
From Mitchell, Ind., to Oakland, Ill., United States Geological Survey.
From Shawneetown, Ill., to Duquoin, Ill., United States Geological Survey.

THE GENERAL ADJUSTMENT OF 1912.

This adjustment was made to obtain the theoretically best values for the various junction points of the entire net of precise leveling in the United States. The mean sea level was considered to have zero elevation at each of the following tidal stations: Sandy Hook, N. J., Biloxi, Miss., Galveston, Tex., San Diego, Cal., Seattle, Wash., Baltimore, Md., Morehead City, N. C., and Brunswick, Ga. The first five tidal stations are strongly connected with the net. The connection with the station at Baltimore is of only moderate strength, while the connection between the net and the tidal stations at Morehead City and Brunswick is comparatively weak.

The various lines composing the net are shown on the sketch opposite page 58.

The general adjustment of 1912 involves 173 links and 84 circuits. The adjustment of 1907 involved 148 links and 71 circuits; that of 1903, 106 links and 48 circuits; and that of 1899, 54 links and 25 circuits. This indicates that the net of 1912 is much stronger than that of any one of the preceding adjustments.

COMPOSITION OF OBSERVATION EQUATIONS.

The adjustment was made by the same methods as that of 1907. The 173 links, or equations, of observed differences of elevation between two points, known as junction points, or between mean sea level and one such point, are shown as observation equations in the table on pages 77–79. For equations which are unchanged from the adjustment of 1907 the previous numbering has been retained. The lines shown on pages 59–71, which are used in making up each equation, are indicated in the following table:

Link or equation.	Lines forming equations. [See pp. 59–71.]	Link or equation.	Lines forming equations. [See pp. 59–71.]	Link or equation.	Lines forming equations. [See pp. 59–71.]	Link or equation.	Lines forming equations. [See pp. 59–71.]
1A	29A, 144, 145, 146.	6D	83A, 249.	12A	90, 91, 44, 43.	16D	153.
4B	147, 247.	7A	77, 81A.	13A	90, 91, 92, 43.	17	46, 45.
5B	74A, 74B.	7B	81B, 79.	14A	65, 43.	18A	88A.
5C	74D.	7C	250.	15	29A, 30, 31.	18B	88B, 86, 75.
5D	74E.	8A	248.	16	32.	18C	251.
6A	80A.	9	89, 85, 86, 75.	16A	100, 101, 149, 150.	19	96, 93.
6B	80B.	10	77, 76, 75.	16B	151.	20	55, 54, 53, 52, 51, 49, 48.
6C	80C, 79.	11A	78.	16C	152.	21	56.

Link or equation.	Lines forming equations. [See pp. 59–71.]	Link or equation.	Lines forming equations. [See pp. 59–71.]	Link or equation.	Lines forming equations. [See pp. 59–71.]	Link or equation.	Lines forming equations. [See pp. 59–71.]
22A	15A, 15B.	37C	168.	47J	257, 258.	75	169C.
22B	57A, 15B.	37E	169A, 141A.	48	3.	76	169D, 169E.
22E	70A.	38B	118.	49B	59A, 59B.	77	167A.
22F	16, 17A.	39A	195.	50	1, 2.	78	167B, 6A.
22H	23, 22, 21, 20, 17A.	39C	196, 197.	51A	211.	79	166A.
22I	27, 28.	39D	112.	51B	213, 212.	80	166B.
22J	27, 26, 25, 24.	40A	198, 199.	52A	133A, 133B, 133C, 133D, 133E, 133F, 133G, 133H.	81	273.
23	14, 13, 12.	40B	200, 201.			82	270, 272.
24	10, 11.	40C	202.			83	269.
25	14, 121.	40D	203, 204.	53	135.	84	169E, 274.
26	9.	41A	206, 207.	54B	170B.	85	227, 275, 141A.
27	105, 120, 10.	42A	209, 210.	54C	170A, 1.	86	141A, 276.
28	103.	43A	138A, 215.	55	219, 228, 229.	87	278, 279.
29	33, 66.	43B	138B.	56	175.	88	281, 192B, 193, 208.
30	35, 34, 33.	43C	217, 216.	57A	173A, 174.	89	190A.
31	104, 35.	43D	138C.	57B	156, 171, 172, 173B.	90	277, 280.
32A	36A.	43E	138D, 138E.	58A	176, 234, 237A.	91	282.
32B	36B.	43F	218, 219.	58B	237B.	92	283.
33A	110, 108, 106B, 107.	43G	138F, 213.	58C	238, 239.	93A	284, 285A.
33B	107, 106A, 105.	44A	140B, 140A, 214.	59	156, 155, 154.	93B	285B.
34	8.	44B	140C.	60	122, 123, 124.	94	287, 291, 294, 295.
35C	205, 71, 72C.	44C	220.	61	181A, 240, 242, 243.	95	288, 290, 292, 293.
35D	72D.	44D	221.	62	194, 116.	96	286, 289.
35F	7B.	44E	222.	63	113.	97	297, 301, 304.†
35G	6A, 7C.	44F	140D, 141A.	64A	17A, 178, 179, 180B.	98	296, 300.
35H	7D.	45A	141A, 143A, 143B, 143C, 143D.*	64B	180A, 187.	99	299, 302.
35I	7E.			65	186.	100	314.
36C	160.	45B	143D, 223, 224.	66	231, 233A, 244, 246.	101	6A, 305.
36D	161, 162, 163.	46B	141A, 142B, 261.	67	4E.	102	308, 316.
36F	163, 164A.	47B	4B.	68	259.	103	306, 308.
36G	164B, 165.	47C	4C.	69	4D.	104	307.
36H	157B.	47D	226.	70	260.	105	313.
36I	157A.	47F	225B.	71	261, 262.	106	315.
36J	189.	47G	225A.	72	263.	107	312.
36K	6A, 159A.	47H	255.	73	264.	108	309, 310.
36L	158, 159B.	47I	256.	74	265, 266, 267, 268.	109	311.

* The mean was taken at Blairsville intersection of 141A and 143A, and 141A and 143B.
† Mean of No. 301 and No. 304 was used in the adjustment.

All the leveling by the Coast and Geodetic Survey previous to 1899 was corrected for a systematic error before using it to form observation equations. The formula for systematic error derived in 1899 (see pp. 442–444, 446, Appendix 8, Report for 1899) was again used, as the evidence indicated that a new computation of the constants of this formula would give values agreeing closely with the values there given. These corrections for systematic error are shown in the table on pages 84–85.

Each observed difference in the following table is the directly observed difference corrected for systematic error and orthometric correction.

Observation equations, general adjustment of 1912.

No. of equation or link.	Observed difference.		Adjusted difference.	Correction v.	Weight p.	pv^2.
		Meters.	*Meters.*	*mm.*		
1A	Smithland P. B. M. XLV—Biloxi sea level	+ 14.8235	+ 14.7729	− 50.6	0.39	999
4B	Vidalia LXIV—Smithland P. B. M. XLV	+ 5.0717	+ 5.0427	− 29.0	1.3	1093
5B	Monroe P. B. M 27—Shreveport P. B. M. 46	− 35.8766	− 35.8434	+ 33.2	1.1	1212
5C	Shreveport P. B. M. 46—Barbin Landing T. B. M. 53	+ 35.4809	+ 35.5465	+ 65.6	0.48	2066
5D	Barbin Landing T. B. M. 53—Smithland P. B. M. XLV	+ 9.3546	+ 9.3627	+ 8.1	2.2	144
6A	Monroe P. B. M. 27—Columbia T. B. M. 137	+ 5.5991	+ 5.6100	+ 10.9	2.5	297
6B	Columbia T. B. M. 137—Jonesville P. B. M. 4	+ 1.7171	+ 1.7142	− 2.9	1.9	16
6C	Jonesville P. B. M. 4—Vidalia LXIV	− 3.3032	− 3.3011	+ 2.1	3.8	17
6D	Jonesville P. B. M. 4—Barbin Landing T. B. M. 53	− 7.6132	− 7.6211	− 7.9	1.7	106
7A	Rayville P. B. M. 16—Archibald P. B. M. Archibald	+ 1.0505	+ 1.0442	− 6.3	10.0	397
7B	Archibald P. B. M. Archibald—Vidalia LXIV	+ 3.7034	+ 3.6818	− 21.6	1.4	653
7C	Archibald P. B. M. Archibald—Columbia T. B. M. 137	+ 5.2807	+ 5.2687	− 12.0	2.7	389
8A	Vicksburg SW. Base—Vidalia LXIV	+ 6.9100	+ 6.8945	− 15.5	1.0	240
9	Wilkersons Landing P. B. M. 84—Monroe P. B. M. 27	+ 18.4746	+ 18.4911	+ 16.5	0.76	207
10	Rayville P. B. M. 16—Monroe P. B. M. 27	+ 0.6914	+ 0.7029	+ 11.5	4.4	582
11A	Vicksburg SW. Base—Rayville P. B. M. 16	+ 2.1750	+ 2.1685	− 6.5	1.9	80
12A	Wilkersons Landing P. B. M. 84—Vicksburg SW. Base	+ 15.6932	+ 15.6197	− 73.5	0.046	249
13A	Wilkersons Landing P. B. M. 84—Vicksburg SW. Base	+ 15.6851	+ 15.6197	− 65.4	0.50	2139
14A	Meridian C—Vicksburg SW. Base	+ 77.9776	+ 78.2393	+ 261.7	0.032	2192
15	Meridian C—Biloxi sea level	+ 105.1911	+ 104.9494	− 241.7	0.016	935
16	Corinth V—Meridian C	+ 32.6611	+ 32.7424	+ 81.3	0.01	106
16A	Decatur P. B. M. 50—Meridian C	+ 64.7134	+ 64.7222	+ 8.8	0.396	30
16B	Tuscumbia P. B. M. 9—Corinth V	+ 5.5678	+ 5.5658	− 2.0	1.7	7
16C	Decatur P. B. M. 50—Tuscumbia P. B. M. 9	+ 26.4114	+ 26.4140	+ 2.6	1.7	11
16D	Decatur P. B. M. 50—Tuscumbia P. B. M. 9	+ 26.4178	+ 26.4140	− 3.8	2.1	30
17	Little Rock No. I or 3—Wilkersons Landing P. B. M. 84	+ 38.1357	+ 38.0777	− 58.0	0.048	161
18A	Little Rock No. I or 3—Camden P. B. M. Camden IV	+ 45.2834	+ 45.2825	− 0.9	0.81	1
18B	Camden P. B. M. Camden IV—Monroe P. B. M. 27	+ 11.2852	+ 11.2863	+ 1.1	0.81	1
18C	Camden P. B. M. Camden IV—Shreveport P. B. M. 46	− 24.5553	− 24.5571	− 1.8	0.82	3
19	Memphis P. B. M. Memphis—Wilkersons Landing P. B. M. 84	+ 38.2705	+ 38.2304	− 40.1	0.52	836

Observation equations, general adjustment of 1912—Continued.

No. of equation or link.	Observed difference.		Adjusted difference.	Correction v.	Weight p.	pv^2.
		Meters.	*Meters.*	*mm.*		
20	Harrisonville No. 43—Little Rock No. I or 3	+ 230.0737	+ 229.0234	− 1050.3	0.0033	3640
21	Pleasant Hill No. LI—Harrisonville No. 43	− 48.3144	− 48.3111	+ 3.3	9.6	105
22A	Kansas City Old M. R. C. B. M. 244—Holliday No. LXIII	− 2.9355	− 2.9459	− 10.4	3.0	324
22B	Holliday No. LXIII—Harrisonville No. 43	− 76.4081	− 76.5347	− 126.6	0.28	4488
22E	Abilene Y_2—Norfolk N_1	− 113.3063	− 113.3124	− 6.1	0.32	12
22F	Abilene Y_2—Holliday No. LXIII	+ 117.7747	+ 117.6258	− 148.9	0.028	621
22H	Limon N—Abilene Y_2	+ 1281.3715	+ 1281.5068	+ 135.3	0.0047	86
22I	Denver A_2—Limon N	− 47.1601	− 47.2285	− 68.4	0.083	388
22J	Denver A_2—Limon N	− 47.4608	− 47.2285	+ 232.3	0.027	1457
23	Kansas City Old M. R. C. B. M. 244—Pleasant Hill No. LI	− 31.2112	− 31.1695	+ 41.7	0.77	1339
24	Jefferson City Old B. M. 90 (85)—Pleasant Hill No. LI	− 91.3154	− 91.3160	− 0.6	0.042	0
25	Kansas City Old M. R. C. B. M. 244—Jefferson City Old B. M. 90 (85)	+ 60.2200	+ 60.1465	− 73.5	0.49	2647
26	St. Louis K_3—Jefferson City Old B. M. 90 (85)	− 43.5512	− 43.7557	− 204.5	0.038	1589
27	St. Louis K_3—Jefferson City Old B. M. 90 (85)	− 43.8279	− 43.7557	+ 72.2	0.61	3180
28	Cairo P. B. M. 2—Memphis P. B. M. Memphis	+ 16.7064	+ 16.6719	− 34.5	0.45	536
29	Corinth V—Memphis P. B. M. Memphis	+ 57.1981	+ 57.1316	− 66.5	0.070	310
30	Cairo P. B. M. 2—Corinth V	− 40.4649	− 40.4597	+ 5.2	0.022	1
31	St. Louis K_3—Cairo P. B. M. 2	+ 28.8537	+ 28.8160	− 37.7	0.55	782
32A	Odin No. V—Duquoin R_3	+ 19.7888	+ 19.8357	+ 46.9	0.32	704
32B	Duquoin R_3—Cairo P. B. M. 2	+ 43.4963	+ 43.5452	+ 48.9	0.11	263
33A	Savanna P. B. M. 62—Grafton (Ill.) P. B. M. 2	+ 50.1727	+ 50.2103	+ 37.6	0.28	396
33B	Grafton (Ill.) P. B. M. 2—St. Louis K_3	+ 4.0785	+ 4.0787	+ 0.2	2.2	0
34	Odin No. V—St. Louis K_3	+ 34.4653	+ 34.5649	+ 99.6	0.15	1488
35C	Trenton (1877)—Deshler I_1	− 33.4281	− 33.4308	− 2.7	1.1	8
35D	Deshler I_1—Cincinnati T	+ 50.7550	+ 50.7291	− 25.9	0.55	369
35F	Olney B_3—Odin No. V	− 12.8095	− 12.6728	+ 136.7	0.22	4111
35G	Mitchell X—Cincinnati T	+ 42.8601	+ 42.6242	− 235.9	0.055	3061
35H	Mitchell X—Vincennes No. 1	+ 78.2843	+ 78.3496	+ 65.3	0.14	597
35I	Olney B_3—Vincennes No. 1	+ 17.0688	+ 17.1393	+ 70.5	0.59	2932
36C	Knoxville 933 MC—Harriman C_2	+ 42.5944	+ 42.6015	+ 7.1	1.9	96
36D	Morehead City sea level—Knoxville 933 MC	− 284.2055	− 284.1467	+ 58.8	0.027	93
36F	Knoxville 933 MC—Cleveland 875 MC	+ 17.8344	+ 17.7716	− 62.8	0.19	749
36G	Cleveland 875 MC—Brunswick sea level	+ 266.6371	+ 266.3751	− 262.0	0.035	2403
36H	Harriman C_2—Chattanooga 698 N	+ 30.3036	+ 30.3056	+ 2.0	1.2	5
36I	Chattanooga 698 N—Decatur P. B. M. 50	+ 41.5684	+ 41.5680	− 0.4	0.77	0
36J	Chattanooga 698 N—Cleveland 875 MC	− 55.1414	− 55.1355	+ 5.9	0.48	17
36K	Cincinnati T—Georgetown W	− 100.7581	− 100.7752	− 17.1	1.4	409
36L	Harriman C_2—Georgetown W	− 25.7788	− 25.7563	+ 22.5	0.50	253
37C	Grafton (W. Va.) M—Belpre No. XL	+ 114.4413	+ 114.4243	− 17.0	0.056	16
37E	Pittsburg P. R. R. 99—Monaca 25 C	+ 17.4722	+ 17.4751	+ 2.9	2.5	21
38B	Escanaba 1 (1874)—Marquette 1 (1871)	− 5.1364	− 5.1193	+ 17.1	1.4	409
39A	Escanaba 1 (1874)—Sand Beach U. S. B. M. E	+ 3.1498	+ 3.1223	− 27.5	0.30	227
39C	Sand Beach U. S. B. M. E—Chicago P. B. M. 99	− 2.6226	− 2.5552	+ 67.4	0.18	818
39D	Chicago P. B. M. 99—Savanna P. B. M. 62	− 0.2064	− 0.1874	+ 19.0	0.67	242
40A	Marquette 1 (1871)—Detour, Goetz	+ 2.3942	+ 2.4354	+ 41.2	0.41	696
40B	Escanaba 1 (1874)—Detour, Goetz	− 2.6544	− 2.6839	− 29.5	0.53	461
40C	Detour Goetz—Sand Beach U. S. B. M. E	+ 5.8042	+ 5.8062	+ 2.0	0.58	2
40D	Sand Beach U. S. B. M. E—Trenton (1877)	− 6.2001	− 6.2301	− 30.0	0.64	576
41A	Trenton (1877)—Buffalo L. H	+ 4.0858	+ 4.0395	− 46.3	0.35	750
42A	Buffalo L. H.—Oswego A	+ 103.0937	+ 103.0628	− 30.9	0.58	554
43A	Salamanca 1391 D—Buffalo L. H	+ 244.1403	+ 244.2829	+ 142.6	0.18	3660
43B	Hornellsville 1141 D—Salamanca 1391 D	− 75.9152	− 75.8885	+ 26.7	0.18	128
43C	Oswego A—Hornellsville 1141 D	− 271.5069	− 271.4572	+ 49.7	0.17	420
43D	Elmira 857 A—Hornellsville 1141 D	− 86.4967	− 86.5109	− 14.2	0.26	52
43E	Bainbridge 989 A—Elmira 857 A	+ 39.9607	+ 39.9618	+ 1.1	0.16	0
43F	Utica L. S. 92—Bainbridge 989 A	− 170.4504	− 170.4779	− 27.5	0.24	182
43G	Greenbush Gristmill—Bainbridge 989 A	− 297.3877	− 297.4242	− 36.5	0.14	187
44A	Leboeuf 1193 Pittsburg (1899)—Buffalo L. H	+ 184.2194	+ 184.1556	− 63.8	0.65	2646
44B	Franklin 987 Pittsburg (1899)—Leboeuf 1193 Pittsburg (1899)	− 62.8152	− 62.9091	− 93.9	0.27	2381
44C	Irvineton 1167 D—Leboeuf 1193 Pittsburg (1899)	− 7.9570	− 7.9993	− 42.3	0.38	680
44D	Irvineton 1167 D—Franklin 987 Pittsburg (1899)	+ 54.9283	+ 54.9098	− 18.5	0.26	89
44E	Salamanca 1391 D—Irvineton 1167 D	+ 68.1610	+ 68.1266	− 34.4	0.61	722
44F	Pittsburg P. R. R. 99—Franklin 987 Pittsburg (1899)	− 74.2480	− 74.3771	− 129.1	0.16	2667
45A	Harrisburg No. XXIX—Pittsburg P. R. R. 99	− 118.0154	− 117.9089	+ 106.5	0.057	647
45B	Elmira 857 A—Harrisburg No. XXIX	+ 152.8755	+ 152.9230	+ 47.5	0.080	180
46B	Pittsburg P. R. R. 99—Grafton (W. Va.) M	− 77.1337	− 77.0499	+ 83.8	0.12	843
47B	Hancock F—Cumberland I	− 61.7906	− 61.8967	− 106.1	0.18	2026
47C	Hagerstown A—Hancock F	+ 40.0505	+ 40.0268	− 23.7	0.64	359
47D	Hancock F—Cumberland I	− 61.9467	− 61.8967	+ 50.0	0.20	500
47F	Washington Capitol B. M.—Washington Jct. B. & O. 44 A	− 43.4746	− 43.4625	+ 12.1	0.26	38
47G	Washington Jct. B. & O. 44 A—Hancock F	− 57.2026	− 57.1721	+ 30.5	0.20	186
47H	Relay B. & O. 31—Washington Capitol B. M	− 5.7291	− 5.7500	− 20.9	0.38	166
47I	Relay B. & O. 31—Washington Jct. B. & O. 44 A	− 49.2278	− 49.2125	+ 15.3	0.19	44
47J	Relay B. & O. 31—Baltimore sea level	+ 21.8572	+ 21.8605	+ 3.3	1.5	16
48	Harrisburg No. XXIX—Hagerstown A	− 59.4914	− 59.5263	− 34.9	0.12	146
49B	Hagerstown A—Washington Capitol B. M	+ 140.5322	+ 140.6614	+ 129.2	0.085	1419
50	Sandy Hook sea level—Harrisburg No. XXIX	− 108.6672	− 108.7456	− 78.4	0.022	135
51A	Utica L. S. 92—Oswego A	+ 54.4144	+ 54.4302	+ 15.8	1.1	275
51B	Greenbush Gristmill—Utica L. S. 92	− 126.9593	− 126.9463	+ 13.0	0.83	140
52A	Oswego A—Greenbush Gristmill	+ 72.5759	+ 72.5161	− 59.8	0.15	536
53	Boston sea level—Greenbush Gristmill	− 4.2848	− 4.2062	+ 78.6	0.072	445
54B	Greenbush Gristmill—Poughkeepsie 173 A	− 48.5030	− 48.5098	− 6.8	1.3	60
54C	Poughkeepsie 173 A—Sandy Hook sea level	+ 52.7282	+ 52.7160	− 12.2	1.7	253
55	Bainbridge 989 A—Poughkeepsie 173 A	+ 249.0590	+ 248.9144	− 144.6	0.082	1715
56	Denver A_2—Cheyenne B	− 262.4208	− 262.4214	− 0.6	0.89	0
57A	Cheyenne B—Crawford G_4	+ 726.1522	+ 726.1226	− 29.6	0.37	324
57B	Norfolk N_1—Crawford G_4	− 657.4283	− 657.2647	+ 163.6	0.26	6959
58A	Cheyenne B—Ogden B	+ 536.8017	+ 536.8568	+ 55.1	0.19	577
58B	Ogden B—Pocatello B_3	− 49.9520	− 49.9588	− 6.8	0.69	32
58C	Pocatello B_3—Seattle sea level	+ 1360.0994	+ 1360.3237	+ 224.3	0.12	6037
59	Norfolk N_1—Sioux City P. B. M. 399	+ 128.9961	+ 128.9620	− 34.1	1.3	1512
60	Sioux City P. B. M. 399—Kansas City Old M. R. C. B. M. 244	+ 105.0363	+ 104.9221	− 114.2	0.31	4043
61	St. Paul P. B. M. 68—Sioux City P. B. M. 399	− 120.8009	− 120.7499	+ 51.0	0.17	442
62	Marquette 1 (1871)—St. Paul P. B. M. 68	− 28.3198	− 28.2864	+ 33.4	0.21	234
63	St. Paul P. B. M. 68—Savanna P. B. M. 62	+ 33.7924	+ 33.7854	− 7.0	0.31	15
64A	Abilene Y_2—El Reno 1327 Reno Junction	− 54.5787	− 54.5596	+ 19.1	0.36	131
64B	El Reno 1327 Reno Junction—Fort Worth U	+ 220.3769	+ 220.4168	+ 39.9	0.44	700

Observation equations, general adjustment of 1912—Continued.

No. of equation or link.	Observed difference.		Adjusted difference.	Correction v.	Weight p.	pv^2.
		Meters.	*Meters.*	*mm.*		
65	Fort Worth U—Shreveport P. B. M. 46	+ 124.9933	+ 124.9827	− 10.6	0.37	41
66	Fort Worth U—Galveston sea level	+ 184.7126	+ 184.6648	− 47.8	0.24	548
67	Cumberland I—Amblersburg L	− 304.8581	− 304.7803	+ 77.8	0.12	726
68	Cumberland I—Amblersburg L	− 304.6654	− 304.7803	− 114.9	0.15	1980
69	Amblersburg L—Grafton (W. Va.) M	+ 191.1625	+ 191.2177	+ 55.2	0.69	2102
70	Amblersburg L—Grafton (W. Va.) M	+ 191.3386	+ 191.2177	− 120.9	0.38	5554
71	Grafton (W. Va.) M—Benwood U. S. E. 94 A	+ 106.1391	+ 106.1618	+ 22.7	0.14	72
72	Benwood U. S. E. 94 A—Uhrichsville B. & O. 48	− 65.0135	− 65.1964	− 182.9	0.17	5687
73	Uhrichsville B. & O. 48—Warwick B. & O. 449	− 29.3675	− 29.3541	+ 13.4	0.24	43
74	Warwick B. & O. 449—Deshler I_1	+ 74.8779	+ 74.8377	− 40.2	0.28	452
75	Monaca 25 C—Benwood U. S. E. 94 A	+ 11.6198	+ 11.6368	+ 17.0	0.90	260
76	Benwood U. S. E. 94 A—Belpre No. XL	+ 8.2007	+ 8.2625	+ 61.8	0.80	3055
77	Belpre No. XL—Portsmouth U. S. E	+ 26.1638	+ 26.2016	+ 37.8	0.37	529
78	Portsmouth U. S. E.—Cincinnati T	− 3.4840	− 3.4478	+ 36.2	0.54	708
79	Belpre No. XL—Chillicothe Q	− 5.1464	− 5.1470	− 0.6	0.064	0
80	Chillicothe Q—Cincinnati T	+ 27.9843	+ 27.9008	− 83.5	0.064	446
81	Portsmouth U. S. E.—Chillicothe Q	− 31.3456	− 31.3486	− 3.0	1.9	17
82	Chillicothe Q—Zanesville U. S. E. 1	− 18.6156	− 18.6161	− 0.5	0.89	0
83	Zanesville U. S. E. 1—Uhrichsville B. & O. 48	− 49.7222	− 49.6958	+ 26.4	1.3	906
84	Belpre No. XL—Zanesville U. S. E. 1	− 23.8053	− 23.7631	+ 42.2	0.82	1460
85	Cumberland I—Pittsburg P. R. R. 99	− 36.4939	− 36.5127	− 18.8	0.074	26
86	Pittsburg P. R. R. 99—Ellwood City B. & O. 349	− 44.7276	− 44.6967	+ 30.9	0.25	239
87	Ellwood City B. & O. 349—Monaca 25 C	+ 62.1670	+ 62.1718	+ 4.8	5.8	134
88	Warwick B. & O. 449—Buffalo L. H	+ 112.2669	+ 112.3080	+ 41.1	0.25	422
89	Monaca 25 C—Alliance Br. 66	− 124.9380	− 124.8411	+ 96.9	0.21	1972
90	Ellwood City B. & O. 349—Alliance Br. 66	− 62.6248	− 62.6693	− 44.5	0.46	911
91	Pekin P. B. M. 49—Grafton (Ill.) P. B. M. 2	+ 8.5124	+ 8.4957	− 16.7	0.60	167
92	Chicago P. B. M. 99—Pekin P. B. M. 49	+ 41.5284	+ 41.5272	− 1.2	0.52	1
93A	Pekin P. B. M. 49—Oakland C_4	− 60.2490	− 60.2343	− 14.7	0.65	140
93B	Oakland C_4—Olney B_3	+ 50.8569	+ 50.9166	+ 59.7	1.2	4277
94	Pocatello B_8—Crawford G_4	+ 239.5398	+ 239.2246	− 315.2	0.10	9935
95	Ogden B—Goffs L_5	+ 523.4866	+ 523.5807	+ 94.1	0.16	1417
96	Goffs L_5—San Diego sea level	+ 786.6356	+ 786.7842	+ 148.6	0.25	5520
97	Belen U. S. G. S. 4793—Goffs L_5	+ 674.3299	+ 674.4769	+ 147.0	0.15	3241
98	Belen U. S. G. S. 4793—El Reno 1327 Reno Junction	+ 1056.1121	+ 1056.1795	+ 67.4	0.16	727
99	Belen U. S. G. S. 4793—Fort Worth U	+ 1276.8961	+ 1276.5963	− 299.8	0.11	9887
100	Mitchell X—Louisville U. S. E. B. M. 604 M	+ 78.0875	+ 78.0609	− 26.6	1.5	1061
101	Louisville U. S. E. B. M. 604 M—Cincinnati T	− 35.4239	− 35.4367	− 12.8	0.86	141
102	Vincennes No. 1—Shawneetown P. B. M. Station	+ 24.3858	+ 24.4327	+ 46.9	0.69	1518
103	Louisville U. S. E. B. M. 604 M—Shawneetown Station	+ 24.8277	+ 24.7214	− 106.3	0.39	4407
104	Shawneetown P. B. M. Station—Cairo P. B. M. 2	+ 9.1361	+ 9.1361	0.0	0.81	0
105	Oakland C_4—Terre Haute U. S. G. S. 513	+ 42.8087	+ 42.7829	− 25.8	2.4	1598
106	Terre Haute U. S. G. S. 513—Vincennes No. 1	+ 25.2914	+ 25.2730	− 18.4	1.0	339
107	Terre Haute U. S. G. S. 513—Mitchell X	− 53.0330	− 53.0766	− 43.6	1.0	1901
108	Louisville U. S. E. B. M. 604 M—Georgetown W	− 136.2223	− 136.2119	+ 10.4	1.2	130
109	Shawneetown P. B. M. Station—Duquoin R_3	− 34.4018	− 34.4091	− 7.3	1.3	69

DISCUSSION OF WEIGHTS.

Before beginning the adjustment the question of what relative weights should be assigned to the different classes of leveling was again carefully considered. The same criterion for determining these relative weights that had been used in 1899, 1903, and 1907 was again used—that is, that after the adjustment is made the average value of pv^2 for each of the groups into which the leveling is divided with respect to assigned weights should be as nearly as possible the same.

The weights used in the final solution of the 1907 adjustment were assigned for the first trial solution. In the following tables, L is the length of the link in kilometers.

Weights used in first trial solution.

Class.	Lines.	Number of equations.	Weight p.	Average pv^2.
1	Coast and Geodetic Survey leveling of 1899 and later; United States Geological Survey leveling of 1905 and later; United States Lake Survey leveling, and water leveling on lakes, except short series of observations	52	$\frac{3000}{L}$	15566
2	Engineer lines with Kern instrument; and wye levels run under the direction of the Corps of Engineers, United States Army, and Board of Engineers on Deep Waterways	47	$\frac{500}{L}$	4263
3	United States Geological Survey leveling previous to 1905, and Van Orden leveling	20	$\frac{24}{L}$	1467
4	Leveling by the Pennsylvania R. R. Co	3	$\frac{20}{L}$	1522
5	Leveling by the Baltimore & Ohio R. R. Co	16	$\frac{18}{L}$	1475
6	Coast and Geodetic Survey leveling previous to 1899	35	$\frac{1600}{L^2}$	1815
	Average value of pv^2 from all lines			6548

It is evident from this that the weights assigned to classes 1 and 2 are very much too large, while the weights assigned to the last four classes are relatively correct. A second trial solution was then made in which the weights of all leveling in class 1 and the Engineer lines with Kern instruments in class 2 were reduced to $\frac{300}{L}$. The remainder of the leveling in class 2 was reduced to $\frac{100}{L}$, while classes 3, 4, 5, and 6 were held at their former values.

This solution gave the following result:

Weights used in second trial solution.

Class.	Lines.	Number of equations.	Weight p.	Average pv^2.
1	Coast and Geodetic Survey leveling of 1899 and later; Engineer lines with Kern instrument; United States Geological Survey leveling of 1905 and later; United States Lake Survey leveling, and water leveling on lakes, except short series of observations	92	$\frac{300}{L}$	1905
2	Wye levels run under the direction of the Corps of Engineers, United States Army, and Board of Engineers on Deep Waterways	7	$\frac{100}{L}$	1013
3	United States Geological Survey leveling previous to 1905, and Van Orden leveling	20	$\frac{24}{L}$	933
4	Leveling by the Pennsylvania R. R. Co	3	$\frac{20}{L}$	975
5	Leveling by the Baltimore & Ohio R. R. Co	16	$\frac{18}{L}$	1083
6	Coast and Geodetic Survey leveling previous to 1899	35	$\frac{1600}{L^2}$	1247
	Average value of pv^2 from all lines			1531

This indicates that a still further reduction of the weight of class 1 is necessary and that the weights of the other classes are relatively correct. Another solution was made in which the weight of class 1 was reduced to $\frac{150}{L}$, the weights of the other classes not being changed. These are the adopted weights which were used in the final adjustment of the level net of 1912.

Weights used in the general adjustment of 1912.

Class.	Lines.	Number of equations.	Weight p.	Average pv^2.
1	Coast and Geodetic Survey leveling of 1899 and later; Engineer lines with Kern instrument; United States Geological Survey leveling of 1905 and later; United States Lake Survey leveling, and water leveling on lakes, except short series of observations	92	$\frac{150}{L}$	1031
2	Wye levels run under direction of the Corps of Engineers, United States Army, and Board of Engineers on Deep Waterways	7	$\frac{100}{L}$	938
3	United States Geological Survey leveling previous to 1905, and Van Orden leveling	20	$\frac{24}{L}$	1004
4	Leveling by the Pennsylvania R. R. Co	3	$\frac{20}{L}$	933
5	Leveling by the Baltimore & Ohio R. R. Co	16	$\frac{18}{L}$	1046
6	Coast and Geodetic Survey leveling previous to 1899	35	$\frac{1600}{L^2}$	1101
	Average value of pv^2 from all lines			1038

These average values of pv^2 are so nearly equal that any change in the assigned weights is not warranted.

The formation of normal equations by the method of least squares and their solution gave the adjusted elevations shown in the table on pages 81–82. For the purpose of showing clearly the effects of the orthometric correction and the new lines the elevations as adjusted in 1907 are also placed in the table and the differences (1912 minus 1907) are shown.

The resulting probable error of an observation of unit weight is ± 32.6 millimeters—that is, this is the probable error of the observed difference of elevation on the two ends of a line

of such a length as to be assigned unit weight; for instance, 150 kilometers of leveling of the class 1 to which was assigned leveling of the Coast and Geodetic Survey of 1899 and later; of the United States Engineer's lines with Kern instruments; of the United States Geological Survey in 1905 and later; and of the United States Lake Survey. This probable error of ±32.6 millimeters for an observation of unit weight corresponds to a probable error of ±2.66 millimeters for 1 kilometer of leveling of class 1. This probable error is larger than the one obtained by using the formula adopted by the Seventeenth General Conference of the International Geodetic Association. (See p. 88.) This difference clearly indicates the presence of systematic errors in the leveling. Another indication of the presence of systematic errors is the fact that the average pv^2 for lines more than 400 kilometers in length is 3000, while the average pv^2 for shorter lines is only 250.

ELEVATION OF JUNCTION POINTS.

In the following table are given the adjusted and adopted values of the elevation of the junction points from the adjustments of 1907 and 1912.

In the fourth column is given the difference between the two adjusted values, showing the effect of the introduction of the new leveling and the orthometric correction into the level net. These differences in the eastern part of the country are due almost entirely to the introduction of the orthometric correction, while those in the central and western parts of the country are due to a combination of the new leveling, the orthometric correction, and a meter error in the 1907 net near Cheyenne, Wyo.

The elevations given in the sixth column result from the 1912 special adjustment. (See p. 76.) The absence of an elevation in this column signifies that the junction point did not enter into the 1912 special adjustment and that the standard elevation is the same as the 1907 adopted elevation.

All junction points introduced into the net for the first time in this adjustment are indicated by italics.

Table of elevations of junction points.

Junction point.	Adjusted elevation (general adjustment).			Adopted elevation.		
	1907	1912	Difference.	1907	1912 standard.	Difference.
	m.	*m.*	*mm.*	*m.*	*m.*	*mm.*
Smithland, P. B. M. XLV	14.8127	14.7729	− 39.8	14.8127	.....	.....
Vidalia, LXIV	19.8617	19.8156	− 46.1	19.8617	.....	.....
Barbin Landing, T. B. M. 53	24.1793	24.1356	− 43.7	24.1793	.....	.....
Jonesville, P. B. M. 4	16.5610	16.5145	− 46.5	16.5610	.....	.....
Columbia, T. B. M. 137	18.2787	18.2287	− 50.0	18.2787	.....	.....
Monroe, P. B. M. 27	23.8916	23.8387	− 52.9	23.8916	.....	.....
Shreveport, P. B. M. 46	59.7386	59.6821	− 56.5	59.7386	.....	.....
Fort Worth, U	184.7369	184.6648	− 72.1	184.7280	184.6681	− 59.9
Archibald, P. B. M. Archibald	23.5477	23.4974	− 50.3	23.5477	.....	.....
Rayville, P. B. M. 16	24.5923	24.5416	− 51.0	24.5923	.....	.....
Vicksburg, SW. base	26.7594	26.7101	− 49.3	26.7594	.....	.....
Meridian, C	104.8489	104.9494	+100.5	104.8587	.....	.....
Decatur, P. B. M. 50	169.5845	169.6716	+ 87.1	169.5959	.....	.....
Tuscumbia, P. B. M. 9	143.1694	143.2576	+ 88.2	143.1832	.....	.....
Harriman, C_2	241.4796	241.5452	+ 65.6	241.4888	.....	.....
Chattanooga, 698N	211.1590	211.2396	+ 80.6	211.1690	.....	.....
Knoxville, 933 M. C	284.0746	284.1467	+ 72.1	284.0848	.....	.....
Cleveland, 875 M. C	266.3004	266.3751	+ 74.7	266.3100	.....	.....
Wilkersons Landing P. B. M. 84	42.3907	42.3298	− 60.9	42.3907	.....	.....
Camden, P. B. M. Camden IV	35.1840	35.1250	− 59.0	35.1840	.....	.....
Little Rock, No. I or 3	80.4742	80.4075	− 66.7	80.4742	.....	.....
Harrisonville, No. 43	309.6134	309.4309	−182.5	309.6134	309.4561	−157.3
Pleasant Hill, No. LI	261.3053	261.1198	−185.5	261.3053	261.1451	−160.2
Holliday, No. LXIII	233.0889	232.8962	−192.7	233.0889	232.9184	−170.5
Kansas City, old M. R. C. B. M. 244	230.1447	229.9503	−194.4	230.1447	229.9730	−171.7
Cheyenne, B	1847.5070	1847.2217	−285.3	1847.5070	1847.1831	−323.9
Denver, A_2	1584.8873	1584.8003	− 87.0	1584.8873	1584.7622	−125.1
Limon, N	1632.0507	1632.0288	− 21.9	1632.0507	1631.9971	− 53.6
Abilene, Y_2	350.7139	350.5220	−191.9	350.7139	350.4667	−247.2
Norfolk, N_1	464.1507	463.8344	−316.3	464.1507	463.7560	−394.7
Sioux City, P. B. M. 399	335.1723	334.8724	−299.9	335.1723	334.7831	−389.2
St. Paul, P. B. M. 68	214.4346	214.1225	−312.1	214.4346	214.1977	−236.9
Jefferson City, old B. M. 90 (85)	169.9766	169.8028	−172.8	169.9869	169.8939	− 93.0
Memphis, P. B. M. Memphis	80.6435	80.5602	− 83.3	80.6435	.....	.....
Corinth, V	137.6047	137.6918	+ 87.1	137.6187	.....	.....
Cairo, P. B. M. 2	97.3460	97.2321	−113.9	97.3258	.....	.....
St. Louis, K_3	126.2001	126.0481	−152.0	126.1776	.....	.....

Table of elevations of junction points—Continued.

Junction point.	Adjusted elevation (general adjustment).			Adopted elevation.		
	1907	1912	Difference.	1907	1912 standard.	Difference.
	m.	*m.*	*mm.*	*m.*	*m.*	*mm.*
Grafton, P. B. M. 2	130.2875	130.1268	−160.7	130.2623		
Savanna, P. B. M. 62	180.5661	180.3371	−229.0	180.5371		
Chicago, P. B. M. 99	180.3701	180.1497	−220.4	180.3077		
Pekin, P. B. M. 49	138.8128	138.6225	−190.3	138.8128		
Olney, B_3	148.1688	147.9402	−228.6	148.1688		
Odin, No. V	160.8293	160.6130	−216.3	160.8293		
Cincinnati, T or City B. M. No. 1	166.5833	166.5263	− 57.0	166.5849		
Marquette, 1 (1871)	186.1200	185.8361	−283.9	186.0774		
Escanaba, 1 (1874)	180.9716	180.7168	−254.8	180.9320		
Detour, Goetz	183.6392	183.4007	−238.5	183.6017		
Sand Beach, U. S. B. M. E	177.7968	177.5945	−202.3	177.7620		
Trenton (1877)	183.9643	183.8246	−139.7	183.9457		
Deshler, I_1	217.3779	217.2554	−122.5	217.3654		
Warwick, B. & O. 449	292.1888	292.0931	− 95.7	292.1003		
Uhrichsville, B. & O. 48	262.8218	262.7390	− 82.8	262.8218		
Zanesville, U. S. E. 1	213.0912	213.0432	− 48.0	213.0912		
Chillicothe, Q	194.4632	194.4271	− 36.1	194.4632		
Portsmouth, U. S. E	163.1077	163.0785	− 29.2	163.1077		
Belpre, No. XL	189.2904	189.2801	− 10.3	189.2904		
Benwood, U. S. E. 94A	197.5211	197.5426	+ 21.5	197.5211		
Monaca, 25C	209.1593	209.1794	+ 20.1	209.2284		
Alliance, Br. 66	334.0015	334.0205	+ 19.0	334.0706		
Ellwood City, B. & O. 349	271.3305	271.3512	+ 20.7	271.3996		
Leboeuf, 1193 Pittsburgh (1899)	364.0038	363.9407	− 63.1	363.9960		
Franklin, 987 Pittsburgh (1899)	301.0623	301.0316	− 30.7	301.0750		
Irvineton, 1167D	355.9928	355.9414	− 51.4	355.9911		
Pittsburgh, P. R. R. 99	226.6279	226.6545	+ 26.6	226.6992		
Grafton, W. Va., M	303.6738	303.7044	+ 30.6	303.6738		
Amblersburg, L	494.8938	494.9221	+ 28.3	494.8938		
Hancock, F	128.2339	128.2451	+ 11.2	128.2339		
Cumberland, I	190.1244	190.1418	+ 17.4	190.1244		
Washington Junction, B. & O. 44A	71.0660	71.0730	+ 7.0	71.0660		
Washington, Capitol B. M	27.6033	27.6105	+ 7.2	27.6409		
Relay, B. & O. 31	21.8587	21.8605	+ 1.8	21.8587		
Hagerstown, A	168.2605	168.2719	+ 11.4	168.2605		
Harrisburg, No. XXIX	108.7402	108.7456	+ 5.4	108.7402		
Elmira, 857A	261.7017	261.6686	− 33.1	261.7098		
Hornellsville, 1141D	348.2297	348.1795	− 50.2	348.2288		
Salamanca, 1391D	424.1298	424.0680	− 61.8	424.1256		
Buffalo, L. H	179.8788	179.7851	− 93.7	179.8630		
Bainbridge, 989A	301.6547	301.6304	− 24.3	301.6531		
Poughkeepsie, 173A	52.7297	52.7160	− 13.7	52.7276		
Utica, L. S. 92	131.1957	131.1525	− 43.2	131.1893		
Oswego, A	76.7879	76.7223	− 65.6	76.7788		
Greenbush, gristmill	4.2294	4.2062	− 23.2	4.2255		
**El Reno, 1327 Reno Junction*		*405.0816*			*405.0611*	
Crawford, G_4		*1121.0991*			*1121.0399*	
Pocatello, B_3		*1360.3237*			*1360.3278*	
Ogden, B		*1310.3649*			*1310.3635*	
Goffs, L_5		*786.7842*			*786.7998*	
Belen, U. S. C. S. 4793		*1461.2611*			*1461.2516*	
Georgetown, W		*267.3015*			*267.3251*	
Louisville, U. S. E. B. M. 604 M		*131.0896*			*131.1752*	
Mitchell, X		*209.1505*			*209.3096*	
Terre Haute, U. S. G. S. 513		*156.0739*			*156.2590*	
Vincennes, No. 1		*130.8009*			*131.0424*	
Oakland, C_4		*198.8568*			*199.0415*	
Shawneetown, P. B. M. Station		*106.3682*			*106.5382*	
Duquoin, R_3		*140.7773*			*140.9633*	

* The following bench marks are on the lines used in the 1907 adjustment, but did not appear as junction points; their elevations, as obtained from that adjustment by the usual method (see p. 57), are as follows:

El Reno, 1327 Reno Junction	405.1786	Ogden, B	1309.7019	Vincennes, No. 1	131.1209
Crawford, G_4	1121.5968	Georgetown, W	267.3214	Oakland, C_4	199.0415
Pocatello, B_3	1359.8535	Mitchell, X	209.4321	Duquoin, R_3	146.9633

DYNAMIC NUMBERS.

On pages 49 to 53 are discussed the orthometric and dynamic corrections which must be applied to the observed differences in elevation in a net to make the results accordant. The elevations of junction points resulting from the 1912 general adjustment which are given in the above table are what are termed orthometric elevations.

In the table below are given the orthometric elevation for each of the junction points, the dynamic corrections for elevation and latitude, and the resulting dynamic number.

In addition there are shown in the table the dynamic numbers for a number of bench marks at the highest and lowest points of some level lines, and also at a few points of decided change in grade. For the method of obtaining the orthometric elevations which are needed in computing the dynamic numbers of the additional points, see page 57.

Comparison of orthometric elevations and dynamic numbers.

Place and bench mark.	Latitude. ϕ		Orthometric elevation. h.	Dynamic correction for latitude. $-D_1h$.	Dynamic correction for elevation. $-D_2h^2$.	Total dynamic correction.	Dynamic number. H.
Junction points.	°	′	*Meters.*				*Metric units.*
Smithland, La., P. B. M. XLV	30	55	14.7729	−0.0184	−0.0000	−0.0184	14.7545
Vidalia, La., LXIV	31	35	19.8156	− .0236	− .0001	− .0237	19.7919
Barbin Landing, La., T. B. M. 53	31	09	24.1356	− .0296	− .0001	− .0297	24.1059
Jonesville, La., P. B. M. 4	31	37	16.5145	− .0196	− .0000	− .0196	16.4949
Columbia, La., T. B.M. 137	32	05	18.2287	− .0210	− .0001	− .0211	18.2076
Monroe, La., P. B. M. 27	32	29	23.8387	− .0266	− .0001	− .0267	23.8120
Shreveport, La., P. B. M. 46	32	30	59.6821	− .0666	− .0006	− .0672	59.6149
Fort Worth, Tex., U	32	45	184.6648	− .2022	− .0053	− .2075	184.4573
Archibald, La., P. B. M. Archibald	32	20	23.4974	− .0266	− .0001	− .0267	23.4707
Rayville, La., P. B. M. 16	32	28	24.5416	− .0275	− .0001	− .0276	24.5140
Vicksburg, Miss., S. W. Base	32	20	26.7101	− .0302	− .0001	− .0303	26.6798
Meridian, Miss., C	32	22	104.9494	− .1185	− .0017	− .1202	104.8292
Decatur, Ala., P. B. M. 50	34	36	169.6716	− .1588	− .0045	− .1633	169.5083
Tuscumbia, Ala., P. B. M. 9	34	43	143.2576	− .1329	− .0032	− .1361	143.1215
Harriman, Tenn., C_2	35	56	241.5452	− .1986	− .0091	− .2077	241.3375
Chattanooga, Tenn., 698 N	35	03	211.2396	− .1899	− .0070	− .1969	211.0427
Knoxville, Tenn., 933 MC	35	58	284.1467	− .2328	− .0127	− .2455	283.9012
Cleveland, Tenn., 875 MC	35	09	266.3751	− .2372	− .0111	− .2483	266.1268
Wilkersons Landing, Miss., P. B. M. 84	33	35	42.3298	− .0434	− .0003	− .0437	42.2861
Camden, Ark., P. B. M. IV	33	35	35.1250	− .0360	− .0002	− .0362	35.0888
Little Rock, Ark., 3 or No. I	34	44	80.4075	− .0745	− .0010	− .0755	80.3320
Harrisonville, Mo., No. 43	38	40	309.4309	− .1793	− .0150	− .1943	309.2366
Pleasant Hill, Mo., No. LI	38	47	261.1198	− .1485	− .0107	− .1592	260.9606
Holliday, Kans., No. LXIII	39	02	232.8962	− .1273	− .0085	− .1358	232.7604
Kansas City, Mo., Old M. R. C. B. M. 244	39	07	229.9503	− .1239	− .0083	− .1322	229.8181
Cheyenne, Wyo., B	41	08	1847.2217	− .6569	− .5370	−1.1939	1846.0278
Denver, Colo., A_2	39	45	1584.8003	− .7631	− .3949	−1.1580	1583.6423
Limon, Colo., N	39	16	1632.0288	− .8571	− .4192	−1.2763	1630.7525
Abilene, Kans., Y_2	38	55	350.5220	− .1952	− .0193	− .2145	350.3075
Norfolk, Nebr., N_1	42	01	463.8344	− .1274	− .0339	− .1613	463.6731
Sioux City, Iowa, P. B. M. 399	42	32	334.8724	− .0761	− .0177	− .0938	334.7786
St. Paul, Minn., P. B. M. 68	44	57	214.1225	− .0010	− .0072	− .0082	214.1143
Jefferson City, Mo., Old B. M. 90 (85)	38	35	169.8038	− .0997	− .0045	− .1042	169.6996
Memphis, Tenn., P. B. M. Memphis	35	09	80.5602	− .0717	− .0010	− .0727	80.4875
Corinth, Miss., V	34	56	137.6918	− .1252	− .0030	− .1282	137.5636
Cairo, Ill., P. B. M. 2	37	00	97.2321	− .0708	− .0015	− .0723	97.1598
St. Louis, Mo., K_3	38	37	126.0481	− .0737	− .0025	− .0762	125.9719
Grafton, Ill., P. B. M. 2	38	58	130.1268	− .0719	− .0027	− .0746	130.0522
Savanna, Ill., P. B. M. 62	42	06	180.3371	− .0482	− .0051	− .0533	180.2838
Chicago, Ill., P. B. M. 99	41	53	180.1497	− .0517	− .0051	− .0568	180.0929
Pekin, Ill., P. B. M. 49	40	34	138.6225	− .0565	− .0030	− .0595	138.5630
Olney, Ill., B_3	38	44	147.9402	− .0848	− .0035	− .0883	147.8519
Odin, Ill., V	38	37	160.6130	− .0938	− .0041	− .0979	160.5151
Cincinnati, Ohio, T	39	06	166.5263	− .0900	− .0043	− .0943	166.4320
Marquette, Mich., 1 (1871)	46	33	185.8361	+ .0265	− .0054	+ .0211	185.8572
Escanaba, Mich., 1 (1874)	45	44	180.7168	+ .0122	− .0051	+ .0071	180.7239
Detour, Mich., Goetz	45	59	183.4007	+ .0166	− .0053	+ .0113	183.4120
Sand Beach, Mich., U. S. B. M. E	44	02	177.5945	− .0158	− .0050	− .0208	177.5737
Trenton, Mich. (1877)	42	09	183.8246	− .0483	− .0053	− .0536	183.7710
Deshler, Ohio, I_1	41	12	217.2554	− .0759	− .0074	− .0833	217.1721
Warwick, Ohio, B. & O. 449	40	55	292.0931	− .1097	− .0134	− .1231	291.9700
Uhrichsville, Ohio, B. & O. 48	40	24	262.7390	− .1110	− .0109	− .1219	262.6171
Zanesville, Ohio, U. S. E. 1	39	56	213.0432	− .0991	− .0071	− .1062	212.9370
Chillicothe, Ohio, Q	39	20	194.4271	− .1010	− .0059	− .1069	194.3202
Portsmouth, Ohio, U. S. E	38	44	163.0785	− .0935	− .0042	− .0977	162.9808
Belpre, Ohio, No. XL	39	17	189.2801	− .0992	− .0056	− .1048	189.1753
Benwood, W. Va., U. S. E. 94 A	40	01	197.5426	− .0904	− .0061	− .0965	197.4461
Monaca, Pa., 25 C	40	41	209.1794	− .0830	− .0069	− .0899	209.0895
Alliance, Ohio, Br. 66	40	55	334.0205	− .1254	− .0176	− .1430	333.8775
Ellwood City, Pa., B. & O. 349	40	51	271.3512	− .1035	− .0116	− .1151	271.2361
Leboeuf, Pa., 1193 Pittsburgh (1899)	41	55	363.9407	− .1033	− .0208	− .1241	363.8166
Franklin, Pa., 987 Pittsburgh (1899)	41	24	301.0316	− .0997	− .0143	− .1140	300.9176
Irvineton, Pa., 1167 D	41	50	355.9414	− .1038	− .0199	− .1237	355.8177
Pittsburgh, Pa., P. R. R. 99	40	26	226.6545	− .0951	− .0081	− .1032	226.5513
Grafton, W. Va., M	39	20	303.7044	− .1577	− .0145	− .1722	303.5322
Amblersburg, W. Va., L	39	23	494.9221	− .2548	− .0386	− .2934	494.6287
Hancock, W. Va., F	39	42	128.2451	− .0623	− .0026	− .0649	128.1802
Cumberland, Md., I	39	39	190.1418	− .0933	− .0057	− .0990	190.0428
Washington Junction, Md., B. & O. 44 A	39	17	71.0730	− .0372	− .0008	− .0380	71.0350
Washington, D. C., Capitol B. M	38	53	27.6105	− .0155	− .0001	− .0156	27.5949
Relay, Md., B. & O. 31	39	13	21.8605	− .0116	− .0001	− .0117	21.8488
Hagerstown, Md., A	39	38	168.2719	− .0828	− .0045	− .0873	168.1846
Harrisburg, Pa., No. XXIX	40	16	108.7456	− .0473	− .0019	− .0492	108.6964
Elmira, N. Y., 857 A	42	05	261.6686	− .0702	− .0108	− .0810	261.5876
Hornellsville, N. Y., 1141 D	42	20	348.1795	− .0856	− .0191	− .1047	348.0748
Salamanca, N. Y., 1391 D	42	10	424.0680	− .1107	− .0283	− .1390	423.9290
Buffalo, N. Y., L. H	42	52	179.7851	− .0354	− .0051	− .0405	179.7446
Bainbridge, N. Y., 989 A	42	18	301.6304	− .0750	− .0143	− .0893	301.5411
Poughkeepsie, N. Y., 173 A	41	42	52.7160	− .0160	− .0004	− .0164	52.6996
Utica, N. Y., L. S. 92	43	06	131.1525	− .0230	− .0027	− .0257	131.1268
Oswego, N. Y., A	43	27	76.7223	− .0110	− .0009	− .0119	76.7104
Greenbush, N. Y., Gristmill	42	40	4.2062	− .0009	− .0000	− .0009	4.2053
El Reno, Okla., 1327 Reno Junction	35	33	405.0816	− .3466	− .0258	− .3724	404.7092
Crawford, Nebr., G_4	42	42	1121.0991	− .2376	− .1978	− .4354	1120.6637
Pocatello, Idaho, B_3	42	51	1360.3237	− .2694	− .2909	− .5603	1359.7634
Ogden, Utah, B	41	13	1310.3649	− .4560	− .2699	− .7259	1309.6390
Goffs, Cal., L_5	34	55	786.7842	− .7165	− .0974	− .8139	785.9703
Belen, N. Mex., U. S. G. S. 4703	34	38	1461.2611	−1.3665	− .3358	−1.7023	1459.5588
Georgetown, Ky., W	38	13	267.3015	− .1657	− .0112	− .1769	267.1246
Louisville, Ky., U. S. E. B. M. 604 M	38	15	131.0896	− .0809	− .0027	− .0836	131.0060
Mitchell, Ind., X	38	44	209.1505	− .1199	− .0069	− .1268	209.0237
Terre Haute, Ind., U. S. G. S. 513	39	28	156.0739	− .0792	− .0038	− .0830	155.9909

Comparison of orthometric elevations and dynamic numbers—Continued.

Place and bench mark.	Latitude. ϕ		Orthometric elevation. h.	Dynamic correction for latitude. $-D_1h$.	Dynamic correction for elevation. $-D_2h^2$.	Total dynamic correction.	Dynamic number. H.
Junction points—Continued.	°	′	*Meters.*				*Metric units.*
Vincennes, Ind., No. 1	38	40	130.8009	−0.0758	−0.0027	−0.0785	130.7224
Oakland, Ill., C_4	39	39	198.8568	− .0975	− .0062	− .1037	198.7531
Shawneetown, Ill., P. B. M. Station	37	42	106.3682	− .0708	− .0018	− .0726	106.2956
Duquoin, Ill., R_3	38	02	140.7773	− .0896	− .0031	− .0927	140.6846
*Additional points.**							
Gallitzin, Pa., P. R. R. No. 6	40	29	659.7338	− .2738	− .0685	− .3423	659.3915
Sand Patch, Pa., B. & O. 186	39	49	693.1056	− .3295	− .0756	− .4051	692.7005
Frederick Junction, Md., B. & O. 153 A	39	22	76.5848	− .0395	− .0009	− .0404	76.5444
Cranberry Summit, W. Va., No. XXVI	39	25	756.1854	− .3869	− .0900	− .4769	755.7085
Parkersburg, W. Va., No. XXXIX	39	15	185.0830	− .0975	− .0054	− .1029	184.9801
Swearengin, Ala., Q	34	35	413.9487	− .3888	− .0270	− .4158	413.5329
Swearengin, Ala., P	34	34	219.5381	− .2065	− .0076	− .2141	219.3240
Northfield, N. Y., 1766 A	42	15	538.5312	− .1364	− .0456	− .1820	538.3492
Hancock, N. Y., Bridge 18	41	58	278.1921	− .0777	− .0122	− .0899	278.1022
Owyhee, Idaho, W_4	43	25	903.8994	− .1320	− .1286	− .2606	903.6388
Hunts Junction, Wash., P_3	46	04	127.4300	+ .0125	− .0026	+ .0099	127.4399
Altamont, Wyo., C_6	41	11	2200.6045	− .7725	− .7619	−1.5344	2199.0701
Etholen, Tex., A_{18}	31	12	1417.9282	−1.7347	− .3164	−2.0511	1415.8771
San Onofre, Cal., V	33	22	3.0679	− .0032	.0000	− .0032	3.0647
Summit, Cal., L_2	34	20	1165.4345	−1.1200	− .2137	−1.3337	1164.1008
Wendover, Wyo., N_1	42	19	1354.8387	− .3350	− .2888	− .6238	1354.2149
Volente, Wyo., Z	41	15	2057.3917	− .7097	− .6659	−1.3756	2056.0161
Needles, Cal., O_6	34	50	147.0990	− .1350	− .0034	− .1384	146.9606
Powell, Ariz., D	34	44	214.5162	− .1987	− .0072	− .2059	214.3103
Riordan, Ariz., U. S. G. S. 7273	35	13	2216.5452	−1.9610	− .7730	−2.7340	2213.8112

* See page 82.

CORRECTIONS APPLIED IN THE 1912 GENERAL ADJUSTMENT.

The three tables which follow have been prepared in order to exhibit fully the facts as to the corrections applied to the lines used in the 1912 net.

Table 1 gives the observed and corrected difference of elevation of the end bench marks of each link corresponding to the equations given on pages 77–79.

TABLE 1.—*Differences of elevation.*

Equation.	Observed difference.	Orthometric correction.	Systematic correction.	Corrected difference.	Equation.	Observed difference.	Orthometric correction.	Systematic correction.	Corrected difference.
	Meters.	*Meters.*	*Meters.*	*Meters.*		*Meters.*	*Meters.*	*Meters.*	*Meters.*
1A	+ 14.8235			+ 14.8235	22J	− 47.4193	−0.0807	+0.0392	− 47.4608
4B	+ 5.0723	−0.0009		+ 5.0717	23	− 31.2385	−0.0086	+0.0359	− 31.2112
5B	− 35.8766			− 35.8766	24	− 91.3438	+0.0044	+0.0270	− 91.3154
5C	+ 35.4849	−0.0040		+ 35.4809	25	+ 60.2292	−0.0092		+ 60.2200
5D	+ 9.3550	−0.0004		+ 9.3546	26	− 43.6058		+0.0546	− 43.5512
6A	+ 5.5998	−0.0007		+ 5.5991	27	− 43.8270	−0.0009		− 43.8279
6B	+ 1.7178	−0.0007		+ 1.7171	28	+ 16.7198	−0.0134		+ 16.7064
6C	− 3.3031	−0.0001		− 3.3032	29	+ 57.1819	+0.0021	+0.0141	+ 57.1981
6D	− 7.6127	−0.0005		− 7.6132	30	− 40.6991	−0.0221	+0.2563	− 40.4649
7A	+ 1.0508	−0.0003		+ 1.0505	31	+ 28.8706	−0.0169		+ 28.8537
7B	+ 3.7047	−0.0013		+ 3.7034	32A	+ 19.7118	−0.0080	+0.0850	+ 19.7888
7C	+ 5.2811	−0.0004		+ 5.2807	32B	+ 43.3714	−0.0121	+0.1370	+ 43.4963
8A	+ 6.9112	−0.0012		+ 6.9100	33A	+ 50.2177	−0.0450		+ 50.1727
9	+ 18.4769	−0.0023		+ 18.4746	33B	+ 4.0825	−0.0040		+ 4.0785
10	+ 0.6914			+ 0.6914	34	+ 34.4398	+0.0002	+0.0253	+ 34.4653
11A	+ 2.1750			+ 2.1750	35C	− 33.4115	−0.0166		− 33.4281
12A	+ 15.5581	−0.0030	+0.1381	+ 15.6932	35D	+ 50.8004	−0.0454		+ 50.7550
13A	+ 15.6887	−0.0036		+ 15.6851	35F	− 12.8461	−0.0015	+0.0381	− 12.8095
14A	+ 77.9193	−0.0001	+0.0584	+ 77.9776	35G	+ 42.9382	+0.0063	−0.0844	+ 42.8601
15	+ 104.9308	−0.0098	+0.2701	+ 105.1911	35H	+ 78.2550	−0.0011	+0.0304	+ 78.2843
16	+ 32.3287	−0.0196	+0.3520	+ 32.6611	35I	+ 17.0756	−0.0008	−0.0060	+ 17.0688
16A	+ 64.7374	−0.0240		+ 64.7134	36C	+ 42.5945	−0.0001		+ 42.5944
16B	+ 5.5652	+0.0026		+ 5.5678	36D	− 284.2168	+0.0113		− 284.2055
16C	+ 26.4098	+0.0016		+ 26.4114	36F	+ 17.8512	−0.0168		+ 17.8344
16D	+ 26.4163	+0.0015		+ 26.4178	36G	+ 266.6896	−0.0525		+ 266.6371
17	+ 38.0139	−0.0066	+0.1284	+ 38.1357	36H	+ 30.3215	−0.0179		+ 30.3036
18A	+ 45.2904	−0.0070		+ 45.2834	36I	+ 41.5760	−0.0076		+ 41.5684
18B	+ 11.2870	−0.0018		+ 11.2852	36J	− 55.1436	+0.0022		− 55.1414
18C	− 24.5491	−0.0062		− 24.5553	36K	− 100.7367	−0.0214		− 100.7581
19	+ 38.2777	−0.0072		+ 38.2705	36L	− 25.8459	+0.0671		− 25.7788
20	+ 229.7044	−0.0997	+0.4690	+ 230.0737	37C	+ 114.4023	−0.0016	+0.0406	+ 114.4413
21	− 48.3294	−0.0030	+0.0180	− 48.3144	37E	+ 17.4672	+0.0050		+ 17.4722
22A	− 2.9496	−0.0017	+0.0158	− 2.9355	38B	− 5.1567	+0.0203		− 5.1364
22B	− 76.4352	−0.0099	+0.0370	− 76.4081	39A	+ 3.1775	−0.0277		+ 3.1498
22E	− 113.4466	+0.1403		− 113.3063	39C	− 2.5875	−0.0351		− 2.6226
22F	+ 117.8405	+0.0040	−0.0698	+ 117.7747	39D	− 0.2105	+0.0041		− 0.2064
22H	+1281.5046	−0.0510	−0.0821	+1281.3715	40A	+ 2.4044	−0.0102		+ 2.3942
22I	− 47.1272	−0.0721	+0.0392	− 47.1601	40B	− 2.6585	+0.0041		− 2.6544

TABLE 1.—*Differences of elevation*—Continued.

Equation.	Observed difference.	Orthometric correction.	Systematic correction.	Corrected difference.	Equation.	Observed difference.	Orthometric correction.	Systematic correction.	Corrected difference.
	Meters.	*Meters.*	*Meters.*	*Meters.*		*Meters.*	*Meters.*	*Meters.*	*Meters.*
40C	+ 5.8360	−0.0318		+ 5.8042	64A	− 54.4608	−0.1179		− 54.5787
40D	− 6.1686	−0.0315		− 6.2001	64B	+ 220.4525	−0.0756		+ 220.3769
41A	+ 4.0743	+0.0115		+ 4.0858	65	+ 124.9945	−0.0012		+ 124.9933
42A	+ 103.0865	+0.0072		+ 103.0937	66	+ 184.7546	−0.0420		+ 184.7126
43A	+ 244.1209	+0.0194		+ 244.1403	67	− 304.9094	−0.0082	+0.0595	− 304.8581
43B	− 75.9076	−0.0076		− 75.9152	68	− 304.6561	−0.0093		− 304.6654
43C	− 271.4866	−0.0203		− 271.5069	69	+ 191.1505	−0.0020	+0.0140	+ 191.1625
43D	− 86.5039	+0.0072		− 86.4967	70	+ 191.3401	−0.0015		+ 191.3386
43E	+ 39.9664	−0.0057		+ 39.9607	71	+ 106.1251	+0.0140		+ 106.1391
43F	− 170.4278	−0.0226		− 170.4504	72	− 65.0215	+0.0080		− 65.0135
43G	− 297.3734	−0.0143		− 297.3877	73	− 29.3801	+0.0126		− 29.3675
44A	+ 184.2006	+0.0188		+ 184.2194	74	+ 74.8711	+0.0068		+ 74.8779
44B	− 62.8310	+0.0158		− 62.8152	75	+ 11.6321	−0.0123		+ 11.6198
44C	− 7.9602	+0.0032		− 7.9570	76	+ 8.2110	−0.0103		+ 8.2007
44D	+ 54.9415	−0.0132		+ 54.9283	77	+ 26.1723	−0.0085		+ 26.1638
44E	+ 68.1732	−0.0122		+ 68.1610	78	− 3.4895	+0.0055		− 3.4840
44F	− 74.2653	+0.0173		− 74.2480	79	− 5.1780	+0.0005	+0.0311	− 5.1464
45A	− 118.0141	−0.0013		− 118.0154	80	+ 27.9232	−0.0046	+0.0657	+ 27.9843
45B	+ 152.9102	−0.0347		+ 152.8755	81	− 31.3551	+0.0095		− 31.3456
46B	− 77.1118	−0.0219		− 77.1337	82	− 18.6275	+0.0119		− 18.6156
47B	− 61.8102	−0.0002	+0.0198	− 61.7906	83	− 49.7325	+0.0103		− 49.7222
47C	+ 40.0451	+0.0008	+0.0046	+ 40.0505	84	− 23.8150	+0.0097		− 23.8053
47D	− 61.9468	+0.0001		− 61.9467	85	− 36.5133	+0.0194		− 36.4939
47F	− 43.4779	+0.0033		− 43.4746	86	− 44.7379	+0.0103		− 44.7276
47G	− 57.2077	+0.0051		− 57.2026	87	+ 62.1709	−0.0039		+ 62.1670
47H	− 5.7282	−0.0009		− 5.7291	88	+ 112.2295	+0.0374		+ 112.2669
47I	− 49.2281	+0.0003		− 49.2278	89	− 124.9438	+0.0058		− 124.9380
47J	+ 21.8572			+ 21.8572	90	− 62.6246	−0.0002		− 62.6248
48	− 59.5851	−0.0098	+0.1035	− 59.4914	91	+ 8.5321	−0.0197		+ 8.5124
49B	+ 140.4503	−0.0057	+0.0876	+ 140.5322	92	+ 41.5467	−0.0183		+ 41.5284
50	− 108.7551	−0.0029	+0.0908	− 108.6672	93A	− 60.2311	−0.0179		− 60.2490
51A	+ 54.4108	+0.0036		+ 54.4144	93B	+ 50.8714	−0.0145		+ 50.8569
51B	− 126.9618	+0.0025		− 126.9593	94	+ 239.4411	+0.0987		+ 239.5398
52A	+ 72.5714	+0.0045		+ 72.5759	95	+ 524.1827	−0.6961		+ 523.4866
53	− 4.2898	+0.0050		− 4.2848	96	+ 786.6980	−0.0624		+ 786.6356
54B	− 48.5028	−0.0002		− 48.5030	97	+ 674.2599	+0.0700		+ 674.3299
54C	+ 52.7282			+ 52.7282	98	+1056.0406	+0.0715		+1056.1121
55	+ 249.0783	−0.0193		+ 249.0590	99	+1277.1843	−0.2882		+1276.8961
56	− 262.6197	+0.1989		− 262.4208	100	+ 78.0957	−0.0082		+ 78.0875
57A	+ 725.9201	+0.2321		+ 726.1522	101	− 35.4331	+0.0092		− 35.4239
57B	− 657.4601	+0.0318		− 657.4283	102	+ 24.3962	−0.0104		+ 24.3858
58A	+ 536.7852	+0.0165		+ 536.8017	103	+ 24.8336	−0.0059		+ 24.8277
58B	− 50.1589	+0.2069		− 49.9520	104	+ 9.1425	−0.0064		+ 9.1361
58C	+1359.8234	+0.2760		+1360.0994	105	+ 42.8120	−0.0033		+ 42.8087
59	+ 128.9789	+0.0172		+ 128.9961	106	+ 25.3012	−0.0098		+ 25.2914
60	+ 105.1242	−0.0879		+ 105.0363	107	− 53.0216	−0.0114		− 53.0330
61	− 120.6951	−0.1058		− 120.8009	108	− 136.2213	−0.0010		− 136.2223
62	− 28.2743	−0.0455		− 28.3198	109	− 34.4056	+0.0038		− 34.4018
63	+ 33.8437	−0.0513		+ 33.7924					

Table 2 gives for each link the weight, the various corrections applied, and in the third column the probable error of the observed differences except in cases when a correction for systematic error was applied. In those cases the probable error of the corrected difference is given, and the systematic correction is shown in the fourth column.

TABLE 2.—*Corrections to differences of elevation.*

Equation	Weight p	Probable error	Systematic correction	Additional correction adjustment of 1912	Total correction adjustment of 1912	Equation	Weight p	Probable error	Systematic correction	Additional correction adjustment of 1912	Total correction adjustment of 1912
		mm.	*mm.*	*mm.*	*mm.*			*mm.*	*mm.*	*mm.*	*mm.*
1A	0.39	52.2			− 50.6	16C	1.7	24.9			+ 2.6
4B	1.3	28.6			− 20.0	16D	2.1	22.5			− 3.8
5B	1.1	31.1			+ 33.2	17	0.048	148.6	+128.4	− 186.4	− 58.0
5C	0.48	47.0			+ 65.6	18A	0.81	36.2			− 0.9
5D	2.2	22.0			+ 8.1	18B	0.81	36.2			+ 1.1
6A	2.5	20.6			+ 10.9	18C	0.82	36.0			− 1.8
6B	1.9	23.6			− 2.9	19	0.52	45.2			− 40.1
6C	3.8	17.5			+ 2.1	20	0.0033	567.0	+469.0	− 1519.3	− 1050.3
6D	1.7	25.0			− 7.9	21	9.6	10.5	+ 18.0	− 14.7	+ 3.3
7A	10.0	10.3			− 6.3	22A	3.0	18.8	+ 15.5	− 26.2	− 10.4
7B	1.4	27.5			− 21.6	22B	0.28	61.6	+ 37.0	− 163.6	− 126.6
7C	2.7	19.8			− 12.0	22E	0.32	57.6			− 6.1
8A	1.0	32.6			− 15.5	22F	0.028	194.6	− 69.8	− 79.1	− 148.9
9	0.76	37.3			+ 16.5	22H	0.0047	475.1	− 82.1	+ 217.4	+ 135.3
10	4.4	15.5			+ 11.5	22I	0.083	113.0	+ 39.2	− 107.6	− 68.4
11A	1.9	23.6			− 6.5	22J	0.027	198.2	+ 39.2	+ 193.1	+ 232.3
12A	0.046	144.2	+138.1	− 211.6	− 73.5	23	0.77	37.1	+ 35.9	+ 5.8	+ 41.7
13A	0.50	46.1			− 65.4	24	0.042	158.9	+ 27.0	− 27.6	− 0.6
14A	0.032	182.0	+ 58.4	+ 203.3	+ 261.7	25	0.49	46.5			− 73.5
15	0.016	257.4	+270.1	− 511.8	− 241.7	26	0.038	167.1	+ 54.6	− 259.1	− 204.5
16	0.016	257.4	+352.0	− 270.7	+ 81.3	27	0.61	41.7			+ 72.2
16A	0.39	52.2			+ 8.8	28	0.45	48.6			− 34.5
16B	1.7	24.9			− 2.0	29	0.070	123.1	+ 14.1	− 80.6	− 66.5

TABLE 2.—*Corrections to differences of elevation*—Continued.

Equation	Weight p	Probable error	Systematic correction	Additional correction, adjustment of 1912	Total correction, adjustment of 1912	Equation	Weight p	Probable error	Systematic correction	Additional correction, adjustment of 1912	Total correction, adjustment of 1912
		mm.	*mm.*	*mm.*	*mm.*			*mm.*	*mm.*	*mm.*	*mm.*
30	0.022	219.2	+256.3	− 251.1	+ 5.2	54B	1.3	28.6			− 6.8
31	0.55	43.9			− 37.7	54C	1.7	25.0			− 12.2
32A	0.32	57.6	+ 85.0	− 38.1	+ 46.9	55	0.082	113.7			− 144.6
32B	0.11	98.2	+137.0	− 88.1	+ 48.9	56	0.89	34.5			− 0.6
33A	0.28	61.6			+ 37.6	58A	0.19	74.8			+ 55.1
33B	2.2	21.9			+ 0.2	58B	0.69	39.2			− 6.8
34	0.15	84.1	+ 25.3	+ 74.3	+ 99.6	58C	0.12	94.0			+ 224.3
35C	1.1	29.6			− 2.7	59	1.3	28.6			− 34.1
35D	0.55	43.9			− 25.9	60	0.31	58.5			− 114.2
35G	0.055	138.9	− 84.4	− 151.5	− 235.9	61	0.17	79.0			+ 51.0
35F	0.22	69.5	+ 38.1	+ 98.6	+ 136.7	62	0.21	71.1			+ 33.4
35H	0.14	87.1	+ 30.4	+ 34.9	+ 65.3	63	0.31	58.5			− 7.0
35I	0.59	42.4	− 6.0	+ 76.5	+ 70.5	64A	0.36	54.3			+ 19.1
36K	1.4	27.5			− 17.1	64B	0.44	49.1			+ 39.9
36C	1.9	171.4			+ 7.1	65	0.37	53.6			− 10.6
36D	0.027	198.2			+ 58.8	66	0.24	66.5			− 47.8
36F	0.19	74.8			− 62.8	67	0.12	94.0	+ 59.5	+ 18.3	+ 77.8
36G	0.035	174.1			− 262.0	68	0.15	84.1			− 114.9
36H	1.2	29.7			+ 2.0	69	0.69	39.2	+ 14.0	+ 41.2	+ 55.2
36I	0.77	37.1			− 0.4	70	0.38	52.8			− 120.9
36J	0.48	47.0			+ 5.9	71	0.14	87.1			+ 22.7
37C	0.056	137.6	+ 40.6	− 57.6	− 17.0	72	0.17	79.0			− 182.9
37E	2.5	20.6			+ 2.9	73	0.24	66.5			+ 13.4
38B	1.4	27.5			+ 17.1	74	0.28	61.6			− 40.2
39A	0.30	59.5			− 27.5	75	0.90	34.6			+ 17.0
39C	0.18	76.8			+ 67.4	76	0.80	36.4			+ 61.8
39D	0.67	39.8			+ 19.0	77	0.37	53.6			+ 37.8
40A	0.41	50.8			+ 41.2	78	0.54	44.3			+ 36.2
40B	0.53	44.7			− 29.5	79	0.064	128.7	+ 31.1	− 31.7	− 0.6
40C	0.58	42.8			+ 2.0	80	0.064	128.7	+ 65.7	− 149.2	− 83.5
40D	0.64	40.7			− 30.0	81	1.9	23.6			− 3.0
41A	0.35	55.1			− 46.3	82	0.89	34.5			− 0.5
42A	0.58	42.8			− 30.9	83	1.3	28.6			+ 23.4
43A	0.18	73.8			+ 142.6	84	0.82	35.9			+ 42.2
43B	0.18	76.8			+ 25.7	85	0.074	119.6			− 18.8
43C	0.17	79.0			+ 49.7	86	0.25	65.2			+ 30.9
43D	0.23	63.9			− 14.2	87	5.8	13.5			+ 4.8
43E	0.16	81.4			+ 1.1	88	0.25	65.2			+ 41.1
43F	0.24	66.5			− 27.5	89	0.21	71.1			+ 96.9
43G	0.14	87.1			− 36.5	90	0.46	48.0			− 44.5
44A	0.65	40.4			− 63.8	91	0.60	42.0			− 16.7
44B	0.27	62.7			− 93.9	92	0.52	45.2			− 1.2
44C	0.38	52.8			− 42.3	93A	0.65	40.4			− 14.7
44D	0.26	63.9			− 18.5	93B	1.2	29.7			+ 59.7
44E	0.61	41.7			− 34.4	94	0.10	103.0			− 315.2
44F	0.16	81.4			− 129.1	57A	0.37	53.6			− 29.6
45A	0.057	136.4			+ 106.5	95	0.16	81.4			+ 94.1
45B	0.080	115.0			+ 47.5	96	0.25	65.2			+ 148.6
46B	0.12	94.0			+ 83.8	97	0.15	84.1			+ 147.0
47B	0.18	76.8	+ 19.8	− 125.9	− 106.1	98	0.16	81.4			+ 67.4
47C	0.64	40.7	+ 4.6	− 28.3	− 23.7	99	0.11	98.2			− 299.8
47D	0.20	72.8			+ 56.0	57B	0.26	63.9			+ 163.6
47F	0.26	63.9			+ 12.1	100	1.5	84.1			− 23.6
47G	0.20	72.8			+ 30.5	101	0.86	35.2			− 12.8
47H	0.38	52.8			− 20.9	102	0.69	39.2			+ 46.9
47I	0.19	74.7			+ 15.3	36L	0.50	46.0			+ 22.5
47J	1.5	26.6			+ 3.3	103	0.39	52.2			− 106.3
48	0.12	94.0	+103.5	− 138.4	− 34.9	104	0.81	36.2			0.0
49B	0.085	111.6	+ 87.6	+ 41.6	+ 129.2	105	2.4	66.5			− 25.8
50	0.022	219.6	+ 90.8	− 169.2	− 78.4	106	1.0	32.6			− 18.4
51A	1.1	31.1			+ 15.8	107	1.0	32.6			− 43.6
51B	0.83	35.7			+ 13.0	108	1.2	29.7			+ 10.4
52A	0.15	84.1			− 59.8	109	1.3	28.6			− 7.3
53	0.072	38.4			+ 78.6						

Table 3 shows the same corrections as Table 2, expressed in millimeters per kilometer. The different links have been rearranged and placed in Table 3 in the order of magnitude of the total correction in the general adjustment of 1912, in millimeters per kilometer, and serial numbers on this basis have been assigned. The table serves to place the links in order of accuracy as shown by this standard, the most accurate line being placed first. In the column headed "Character of line" a single entry indicates that practically the whole link was of that character. If there are two or more entries, the link is a composite one, in which the character of the longer portion is mentioned first. The symbols 1899+ and 1899− refer to leveling by the Coast and Geodetic Survey in 1899 and later and before 1899, respectively; the abbreviation "G. S. 1905+" refers to leveling done by the United States Geological Survey in 1905 and later with instruments and methods similar to those used by the Coast and Geodetic Survey in 1899 and later; "Geol." refers to leveling by the United States Geological Survey previous to 1905; "Lake" refers to leveling by the United States Lake Survey, and "Water" to water leveling on the lakes; Van O. refers to Van Orden leveling.

TABLE 3.—*Corrections to differences of elevation.*

[Corrections in millimeters per kilometer.]

Equation.	Length.	Systematic correction.	Additional correction, adjustment 1912.	Total correction, adjustment 1912.	Character of line.
	km.	*mm.*	*mm.*	*mm.*	
104	185			0.000	Eng.
36I	196			− .002	1899+
33B	68			+ .003	Eng.
24	198	+ .14	− .14	− .003	1899−
82	169			− .003	G. S. 1905+
92	287			− .004	Eng.
79	158	+ .20	− .20	− .004	1899−
56	169			− .004	1899+
18A	186			− .005	Eng.
18B	186			+ .006	Eng.
43E	154			+ .007	Geol.
40C	260			+ .008	Water.
18C	183			− .010	Eng.
22E	466			− .013	1899+
63	478			− .015	Eng.
36H	128			+ .016	1899+
30	265	+ .97	− .95	+ .020	1899−
35C	131			− .021	1899+, Lake.
16A	388			+ .023	Eng., 1899+
16B	86			− .023	Eng., 1899+
65	410			− .026	1899+
16C	86			+ .030	Eng.
58B	217			− .031	1899+
6B	78			− .037	Eng.
81	80			− .038	G. S. 1905+
64A	413			+ .046	1899+
62	720			+ .046	Water, Eng.
6C	40			+ .052	Eng.
16D	72			− .053	1899+
39A	500			− .055	Water.
61	893			+ .057	1899+, Eng.
54B	116			− .059	1899+
109	114			− .064	G. S. 1905+
93A	230			− .064	G. S. 1906+
91	251			− .067	Eng.
36D	863			+ .068	Geol.
58A	804			+ .069	1899+
33A	541			+ .070	Eng.
98	964			+ .070	1899+
51B	182			+ .071	Lake.
37E	40			+ .072	Eng. Wye.
57A	407			− .073	1899+
101	175			− .073	Eng.
36L	303			+ .074	1899+
85	243			− .077	B. & O.
66	616			− .078	1899+
39C	850			+ .079	Water.
11A	79			− .082	Eng.
108	127			+ .082	G. S. 1905+
9	197			+ .084	Eng.
39D	224			+ .085	Eng.
36C	81			+ .088	1899+
6D	89			− .089	Eng.
52A	672			− .089	Lake, Eng. Wye, Water.
35D	272			− .095	1899+
95	961			+ .098	1899+
40B	282			− .10	Water.
37C	170	+ .24	− .34	− .10	1899−
28	330			− .10	Eng.
41A	430			− .11	Water, Eng. Wye.
40A	366			+ .11	Lake, Water.
8A	147			− .11	Eng.
36J	50			+ .12	Geol.
5D	67			+ .12	Eng.
42A	260			− .12	Water, Lake.
64B	342			+ .12	1899+
51A	131			+ .12	Lake.
106	145			− .13	Eng.
1A	383			− .13	Eng.
40D	233			− .13	Water, Lake.
19	287			− .14	Eng.
31	275			− .14	Eng.
77	272			+ .14	Eng. Wye.
54C	87			− .14	1899+
97	990			+ .15	1899+
75	111			+ .15	Eng. Wye.
88	373			+ .15	Water, Geol. B. & O.
43D	94			− .15	Geol.
38B	105			+ .16	Lake.
36K	109			− .16	1899+
78	222			+ .16	Eng. Wye.
47I	96			+ .16	B. & O.
58C	1296			+ .17	1899+
87	26			+ .18	1899+
71	127			+ .18	B. & O.
47J	18			+ .18	B. & O., 1899+
47F	69			+ .18	B. & O.
45B	271			+ .18	P. R. R., Geol.
73	74			+ .18	B. & O.
6A	61			+ .18	Eng.
43G	202			− .18	Geol., Lake.
74	207			− .19	1899+, B. & O.
44D	93			− .20	Geol.
43B	131			+ .20	Geol.
7B	106			− .20	Eng.
94	1504			− .21	1899+
7C	56			− .21	Eng.
5C	315			+ .21	Eng.
43C	233			+ .21	Geol., Water.
13A	301			− .22	Eng.
99	1358			− .22	1899+, G. S. 1905+
102	216			+ .22	Eng.
83	113			+ .23	G. S. 1905+
22H	585	− .14	+ .37	+ .23	1899−
60	479			− .24	Eng.
25	306			− .24	Eng.
5B	140			+ .24	Eng.
21	13	+1.38	−1.13	+ .25	1899−
4B	116			− .25	Eng.
53	320			+ .25	Van. O.
96	597			+ .25	1899+
16	314	+1.12	− .86	+ .26	1899−
100	102			− .26	G. S. 1905+
103	383			− .28	Eng.
45A	382			+ .28	P. R. R.
43F	99			− .28	Geol.
27	245			+ .29	Eng.
57B	571			+ .29	1899+
50	267	+ .34	− .63	− .29	1899−
48	119	+ .87	−1.16	− .29	1899−
59	116			− .29	1899+
107	152			− .29	G. S. 1905+
17	181	+ .71	−1.03	− .32	1899−
12A	217	+ .64	− .98	− .34	1899−, Eng.
10	34			+ .34	Eng.
47G	89			+ .34	B. & O.
84	122			+ .35	Eng. Wye.
44A	166			− .38	Water., Geol.
36G	671			− .39	Geol.
32B	123	+1.11	− .71	+ .40	1899−
90	108			− .41	1899+, B. & O.
46B	201			+ .42	Geol.
105	62			− .42	G. S. 1905+
7A	15			− .42	Eng.
29	151	− .09	+ .53	− .44	1899−
44E	78			− .44	Geol.
47H	48			− .44	B. & O.
86	71		+ .44	+ .44	B. & O.
22A	23	+ .69	−1.14	− .45	1899−
47C	50	+ .09	− .56	− .47	1899−
93B	124			+ .48	G. S. 1905+
22I	141	+ .28	− .77	− .49	1899−
55	293			− .49	Geol.
76	124			+ .50	Eng. Wye.
36F	120			− .52	Geol.
80	158	+ .42	− .95	− .53	1899−
47D	90			+ .56	B. & O.
35H	107	+ .28	+ .32	+ .61	1899−
22F	239	+ .29	+ .33	− .62	1899−
32A	71	+1.20	− .53	+ .66	1899−
67	116	+ .51	+ .16	+ .67	1899−
44C	62			− .68	Geol.
15	312	+ .87	−1.64	− .77	1899−
44F	150			− .86	Geol.
23	45	+ .80	+ .13	+ .93	1899−
49B	137	+ .64	+ .30	+ .94	1899−
22J	244	+ .16	+ .79	+ .95	1899−
34	104	+ .24	+ .71	+ .96	1899−
68	117			− .98	B. & O.
26	205	+ .27	−1.26	−1.00	1899−
43A	142			+1.00	Geol., Water.
98	94			+1.00	P. R. R.
44B	86			−1.1	Geol.
47B	94	+ .2	−1.3	−1.1	1899−
69	48	+ .3	+ .9	+1.2	1899−
14A	224	+ .3	+ .9	+1.2	1899−
35I	52	− .1	+1.5	+1.4	1899−
35G	170	+ .5	−1.9	−1.4	1899−
20	698	+ .7	−2.2	−1.5	1899−
35F	85	+ .4	+1.2	+1.6	1899−
22B	75	+ .5	−2.2	−1.7	1899−
72	103			−1.8	B. & O.
70	48			−2.5	B. & O.

RESOLUTION OF THE SEVENTEENTH INTERNATIONAL GEODETIC ASSOCIATION.

The following is a translation of the resolution adopted by the International Geodetic Association, at its Seventeenth General Conference, held at Hamburg, Germany, September, 1912:

Because of the important advances made in the art of leveling since the year 1867, when limits were first fixed for errors permissible in precise leveling, and because of the benefit accruing to the greater needs of Geodesy in creating a new class of more precise leveling, that is, one with narrower limits of error, and with its errors, both accidental and systematic, computed according to uniform rules:

Therefore, the Seventeenth General Conference of the International Geodetic Association, still preserving unchanged the limits of error of 1867 for precise leveling, decides to place hereafter in a new class of leveling, to be termed *leveling of high precision*, every line, set of lines or net which is run twice in opposite directions on different dates as far as possible, and whose errors, accidental and systematic, computed by the formulas hereinafter given, do not exceed:

± 1 mm. per km. for the probable accidental error,

or ± 1.5 mm. per km. for the mean accidental error;

± 0.2 mm. per km. for the probable systematic error,

or ± 0.3 mm. per km. for the mean systematic error.

If L denote the length of an unconnected line, or the length of the side of a polygonal circuit in the case of a net;

ΣL, the aggregate length of the set of lines, or of the net under consideration;

Δ, the discrepancy between the results of the two runnings between consecutive bench marks;

r, the distance between these two bench marks;

s, the entire systematic discrepancy between the results of the two runnings, either for a whole line or for the side of a circuit;

f, the error of closure of a circuit of the net after the orthometric correction has been applied;

Σf^2, the sum of the squares of the errors of closure of the circuits, including the closing error, Σf, of the outside circuit;

Then, the probable or mean errors are to be computed by the following formulas:

1. For the probable accidental error, η_r, in the case of a set of lines, whether or not they form circuits:

$$\text{I. } \eta_r^2=\frac{1}{9}\left[\frac{\Sigma\Delta^2}{\Sigma L}-\frac{\Sigma r^2}{(\Sigma L)^2}\Sigma\frac{s^2}{L}\right].$$

2. For the probable systematic error, σ_r or σ_R:

(*a*) In the case of a set of lines not forming a net:

$$\text{II. } \sigma_r^2=\frac{1}{9\Sigma L}\Sigma\frac{s^2}{L}.$$

(*b*) In the case of a net allowing at least 10 circuits:

$$\text{III. } \sigma_R^2=\frac{1}{\Sigma L^2}\left[\frac{2}{9}\Sigma f^2-\eta_r^2\Sigma L\right].$$

3. For the mean accidental error, or for the mean systematic error, the same formulæ as above, after multiplying the second member by $\frac{9}{4}$.

COMPUTATIONS ACCORDING TO THE INTERNATIONAL GEODETIC ASSOCIATION RESOLUTION.

The accidental and systematic errors in the leveling done by the Coast and Geodetic Survey since 1899 have been computed in accordance with these resolutions. There were not enough circuits to justify the computation of errors from the circuit closures. Some details of the computation for the various lines are shown in the following table. In some cases extra decimals used in the computation have been cut off in stating the result. To obtain the s the process given by Lallemand in his "Nivellement de haute Précision," page 713, was used. The accumulated discrepancy was plotted as ordinate s against the distance in kilometers from an initial bench mark as abscissa. The line connecting these points gave a somewhat irregular line which, nevertheless, showed, as a rule, a tendency to a fairly well-defined slope. A straight line was drawn by eye to represent as nearly as possible the tendency of the irregular line, and was tested to see whether the area between the irregular line and the straight line, lying above

the latter, was equal to the area between the two lines and below the straight line. After a straight line was finally adopted the difference between the two ordinates corresponding to the two ends of the line of levels gave the value of s.

Data for accidental and systematic errors.

Line. From—	Line. To—	Length of line. L.	Systematic discrepancy. s.	Number of sections. N.	$\Sigma\Delta^2$.	$\Sigma\tau^2$.	$\frac{s}{3L}$.	$\frac{s^2}{L}$.
		km.	*mm.*					
San Diego, Cal., Tidestaff	Barstow, Cal., J_3	375	− 22	280	1812	587	0.02	1.3
Barstow, Cal., J_3	Las Vegas, Nev., 2033 B	392	− 19	240	2206	678	.02	0.9
Las Vegas, Nev., P	Zenda, Utah, I_9	404	−148	329	1874	550	.12	54.2
Salt Lake City, Utah, W_1	Zenda, Utah, I_9	324	+ 75	215	1565	516	.08	17.4
Ogden, Utah, A	Salt Lake City, Utah, W_1	63	− 4	44	273	102	.02	0.2
Ogden, Utah, B	Pocatello, Idaho, B_3	217	− 33	149	1031	341	.05	5.0
Pocatello, Idaho, B_3	Owyhee, Idaho, W_4	358	− 51	252	1537	538	.05	7.3
Owyhee, Idaho, W4	Hunts Junction, Wash., P_3	502	+100	352	2725	764	.07	19.9
Seattle, Wash., Tidal 4	Hunts Junction, Wash., P_3	435	+ 22	337	2167	640	.02	1.1
Pocatello, Idaho, A_3	Butte, Mont., D_3	435	−100	306	2029	739	.08	23.0
Butte, Mont., D_3	Huntley, Mont., U. S. R. S. 3	409	+ 44	248	2149	718	.04	4.7
Huntley, Mont., U. S. R. S. 3	Cadiz, Mont., W_8	291	− 41	193	1467	468	.05	5.8
Crawford, Nebr., G_4	Cadiz, Mont., W_8	377	− 26	345	1506	436	.02	1.8
Goffs, Cal., M_5	Albuquerque, N. Mex., Astro	982	+ 46	677	4827	1517	.02	2.2
Jericho, Tex., B_{10}	Isleta, N. Mex., N_2	670	+ 75	613	2533	780	.04	8.4
El Reno, Okla., 1327 Reno Junction	Jericho, Tex., B_{10}	324	+ 2	237	1381	484	.00	0.0
Temple, Tex., L_4	Holland, Tex., Y_4	23	− 11	18	172	43	.15	4.6
Smithville, Tex., W_5	Galveston, Tex., Tide Gauge, C. & G. S.	273	− 47	198	1082	440	.06	8.1
Holland, Tex., W_4	New Braunfels, Tex., S_6	230	−121	158	1350	357	.17	63.7
Fort Worth, Tex., M_3	El Paso, Tex., E_{19}	990	−188	831	4587	1281	.06	35.7
Bowie, Tex., 1124 Gainv	Anthony, Kans , SE. Base	433	− 87	292	1803	678	.07	17.5
Bowie, Tex., 1124 Gainv	Bodcau, La., P. B. M. 44	533	− 79	346	2281	849	.05	11.7
Norfolk, Nebr., T. B. M. 2	Sioux City, Iowa, P. B. M. 397	129	+ 27	82	541	209	.07	5.6
Fort Worth, Tex., U	Lampasas, Tex., NE. Base	287	− 46	189	1317	459	.05	7.4
Solomon, Kans., W_2	Anthony, Kans., F_5	241	−109	159	1017	383	.15	49.3
Watertown, S. Dak., U	Sioux City, Iowa, P. B. M. 397	362	− 47	239	1248	672	.04	6.1
St. Cloud, Minn., P. B. M. St. Cloud	Watertown, S. Dak., U	407	+ 5	304	2178	629	.00	0.1
Evansville, Minn., T_1	Stephen, Minn., West Base	314	+ 40	222	1084	497	.04	5.1
Abilene, Kans., B_1	Norfolk, Nebr., P_1	470	+283	460	2667	496	.20	170.4
Norfolk, Nebr., P_1	Page, Nebr., S. W. Base	107	+ 59	69	568	177	.19	32.5
Page, Nebr., T. B. M. 2	Chadron, Nebr., C_4	426	+ 72	275	2018	678	.06	12.2
Chadron, Nebr., C_4	Orin Junction, Wyo., R_1	203	− 10	139	703	313	.02	0.5
Cheyenne, Wyo., T. B. M. 1	Orin Junction, Wyo., T_1	245	− 32	160	1179	387	.04	4.2
Denver, Colo., A_2	Rock Creek, Wyo., V	342	− 48	349	2100	345	.05	7.0
Rock Creek, Wyo., U	Red Desert, Wyo., B_3	212	+ 26	155	841	319	.04	3.2
Red Desert, Wyo., B_3	Azusa, Wyo., T. B. M. 105	177	+ 69	123	1072	267	.13	26.9
Ogden, Utah, B	Azusa, Wyo., T. B. M. 105	243	+ 10	173	1371	374	.01	0.4
Ludlow, Ky.*	Somerset, Ky., B_5	255	+ 43	168	948	455	.06	7.2
Somerset, Ky., B_5	Knoxville, Tenn., 867 M. C	250	+ 86	179	1154	386	.15	29.6
Harriman, Tenn., A_2	Woodville, Ala., K_2	247	+ 4	177	826	373	.01	0.1
Woodville, Ala., J_2	Birmingham, Ala., P. B. M. 3	219	+184	149	1136	348	.28	154.6
Decatur, Ala., P. B. M. 50	Tuscumbia, Ala., P. B. M. 8	72	+ 9	60	261	108	.04	1.1
Dobbs Ferry, N. Y., V	Troy, N. Y., City 2	215	+ 76	207	850	290	.12	26.9
Fort Worth, Tex., U	Granbury, Tex., Comanche Ref. Mark.	75	− 28	53	334	115	.13	10.4
Chicago Junction, Ohio, B. & O. 507	Deshler, Ohio, H_1	109	− 22	80	621	167	.07	4.4
Greenwich, Ohio, B. & O. 495	Sullivan, Ohio, B. & O. 481	28	+ 5	23	108	40	.06	0.9
Ellwood City, Pa., B. & O. 349	Monaca, Pa., 25 A	26	+ 5	20	136	37	.06	1.0
Alliance, Ohio, Br. 66	Struthers, Ohio, B. & O. 376	69	+ 16	60	259	100	.08	3.7
Gibraltar, Mich. (1877)	Leipsic, Ohio, T. B. M. 92	137	− 14	98	649	203	.03	1.4
Lima, Ohio, U_1	Dayton, Ohio, Dayton City B. M.	118	− 11	72	477	212	.03	1.0
Total		15028	.....	11104	70020	22542	.....	867.7

* Line is named Cincinnati to Somerset in Appendix 3. Report for 1913.

From the figures in the above table and the formulas previously given, there is found:

$$\eta_\tau^2 = \frac{1}{9}\left[\frac{70020}{15028} - \frac{22542}{(15028)^2} \times 867.7\right]$$

$$= \frac{1}{9}\left[4.659 - 0.087\right]$$

$$\eta_\tau = \pm 0.713 \text{ mm.}$$

$$\sigma_\tau^2 = \frac{867.7}{9 \times 15028} = 0.006416.$$

$$\sigma_\tau = \pm 0.080 \text{ mm.}$$

In the computation of η_r^2 the number 0.087 represents the average effect of the systematic discrepancy in increasing the apparent size of the accidental discrepancy for a kilometer. This effect is here very small. If it were omitted in the computation, there would result $\eta_r = \pm 0.720$. A little consideration will show that the process employed on page 29 for calculating the probable accidental error for a kilometer is equivalent to the one given in the formula above, with the omission of the effect of the systematic discrepancy, which appears practically negligible for the lines here considered. (In the formulas of the Geodetic Conference 2/3 is used as an approximation to 0.6745, the constant from the theory of errors.)

In the next to the last column of the table is given $\frac{s}{3L}$, which is the probable systematic error of the individual line, according to Lallemand's formulas. It will be seen that for only one line (Woodville-Birmingham) does the probable systematic error of an individual line go beyond the limit 0.2 mm. fixed in the resolution for leveling of high precision, while the lines as a class show a probable systematic error of less than half of the limiting value.*

This small systematic error, however, can not apparently include all sources of error.† The probable accidental error for a kilometer, obtained from the general adjustment (2.66 millimeters per kilometer,‡ see p. 81) is so much larger than the 0.7 millimeter found above that some effects of systematic error are indicated. See pages 18 to 21 for a discussion of systematic errors.

STANDARD ELEVATIONS.

The following list gives the adopted (or standard) elevations of each bench mark in the precise level net. The elevations of all bench marks not changed by the 1912 special adjustment have been carried forward from Appendix 3, Report for 1903, and Precise Leveling in the United States, 1903–7, so that reference to those publications is unnecessary, as far as elevations are concerned. The elevations are given in meters and feet above *mean sea level.* Mean sea level is assumed to be everywhere at the same level on the open coasts of the Atlantic Ocean, the Gulf of Mexico, and the Pacific Ocean. Variations from this condition, if any, are so small that they come within the limits of the accuracy of the leveling.

It is intended to hold these elevations as standard elevations for an indefinite period. In the future, when new leveling is added, the lines will be fitted to the level net without in any way disturbing the present standard elevations, except in rare cases where earthquakes or other agencies have changed the elevations or where a mistake has been discovered in the standard elevations. An occasional mark will have its elevation changed by the settling of a building or other structure or from the effect of drainage of the land on which it is located, but this will be only a local matter.

If elevations of any of these bench marks are desired on any other basis than the standard basis, the correction necessary to transform them may be computed in a manner similar to the examples on pages 57–58.

* Since the formula for the probable systematic error of an individual line is not given in the resolution of the Geodetic Conference, but is taken for comparison from Lallemand's book cited above, it is probably the intent of the resolution that work of apparently similar quality should be judged by its average value, rather than by the values for individual lines.

† The expression "systematic error" is used in the resolution in the rather special sense of an error whose effect is directly proportional to the length of the line. There may well be other errors, not of the accidental class, whose effects follow a quite different law.

‡ Class I, for which this value applies, is not coextensive with the Coast and Geodetic Survey levels discussed here, but is assumed to include work of the same order of accuracy.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Sandy Hook, N. J.	T. II	3.488	11.444
Do	A	3.475	11.401
Do	B	2.863	9.393
Do	C	5.953	19.531
Near Highlands, N. J.	No. II	2.321	7.615
Near Branchport, N. J.	No. V	1.060	3.476
Red Bank, N. J.	E	11.728	38.478
Sandy Hook, N. J.	T of 1886	3.280	10.761
Do	U of 1886	1.877	6.158
Port Monmouth, N. J.*	S	3.556	11.667
Do.*	Port Monmouth tidal.	3.576	11.732
Keyport, N. J.	R	6.983	22.910
Conaskonk Point, N. J.*	Conaskonk Point tidal.	3.960	12.992
Matawan, N. J.*	No. VI	† 16.860	55.315
South Amboy, N. J.*	Tidal, South Amboy	2.188	7.178
Near South Amboy, N. J.*	No. VIII	4.437	14.557
Near Perth Amboy, N. J.*	F	2.364	7.756
Perth Amboy, N. J.	State Geological Survey.	18.576	60.945
Near Giffords, N. Y.	N	21.661	71.066
Great Kills, N. Y.*	O	1.720	5.643
Do.*	Great Kills tidal	2.001	6.565
Fort Wadsworth, N. Y.*	M	12.158	39.888
Quarantine Dock, N. Y.*	Quarantine Dock	2.550	8.366
Constables Hook, N. J.*	Constables Hook	2.732	8.963
Do.*	P	2.953	9.688
Bergen, N. J.*	Q	4.070	13.353
Elm Park, N. Y.*	Elm Park tidal	3.375	11.073
Elizabeth, N. J.	Elizabeth tidal	‡ 3.779	12.398
Fort Hamilton, N. Y.*	L	11.084	36.365
Bath Beach, N. Y.*	Locust Grove tidal	2.804	9.199
Do	K	8.329	27.326
Bay Ridge, N. Y.*	No. 25	26.599	87.267
Do.*	Bay Ridge tidal	1.946	6.384
Do	J	13.300	43.635
Brooklyn, N. Y.*	A	20.048	65.774
Do.*	G	2.896	9.501
Governors Island, N. Y.*	Hydrographic marks. B.M.1	3.695	12.123
	Hydrographic marks. B.M.2	8.471	27.792
Do	H	‡ 2.438	7.999
Do	I	‡ 2.603	8.540
Brooklyn, N. Y.	C	‡ 17.060	55.971
Do.*	D	4.114	13.497
Do	F	‡ 3.106	10.190
Corlears Hook, N. Y.	E	‡ 3.544	11.627
Do	Tidal, Corlears Hook	2.339	7.674
Hunters Point, N. Y.*	Tidal, Hunters Point (No. 8).	1.817	5.961
Do	B	‡ 2.402	7.881
Ravenswood, N. Y.*	No. 7	3.035	9.957
Astoria, N. Y.*	No. 6	3.630	11.909
Near Astoria Dock, N. Y.*	No. 4	1.799	5.902
Pot Cove, N. Y.*	No. 1	2.921	9.583
Do.*	No. 2	4.187	13.737
Polhemus Dock, N. Y.	No. 4a	‡ 2.061	6.762
New York, N. Y.*	No. 5	2.299	7.543
Do	Tidal, foot of Forty-second Street.	§ 3.079	10.102
	Tidal, foot of Forty-second Street.	‡ 4.462	14.639
Dobbs Ferry, N. Y.*	Tidal, Dobbs Ferry	** 3.005	9.859
Do	V	‡ 2.878	9.442
Long Island City, N. Y.*	No. 9	3.951	12.963
Flushing, N. Y.*	No. 10	2.581	8.468
College Point, N. Y.*	No. 11	12.561	41.211
Do	Tidal, Station No. 68.	2.922	9.587
Do.*	No. 12	10.480	34.383
Willets Point, N. Y.*	No. 105	3.068	10.066
Do.*	Tidal, U. S. Engineers.	4.308	14.134
Sandy Hook, N. J.	No. I	4.720	15.486
Navesink Highlands, N. J.	No. III	61.714	202.473
Do	D	63.274	207.591
Seabright, N. J.	No. IV	2.822	9.259
Morgan, N. J.	No. VII	1.705	5.594
St. Louis, Mo.	K_3	126.178	413.969
St. Paul, Mo.	No. X	132.071	433.303
Allenton, Mo.	No. XI	146.363	480.192
Near South Point, Mo.	No. XII	149.524	490.564
Washington, Mo.	L_3	166.427	546.020
New Haven, Mo.	M_3	155.388	509.802
Near New Haven, Mo.	No. XIII	154.500	506.889
Near Etlah, Mo.	No. XIV	155.322	509.585
Berger, Mo.	No. XV	156.068	512.033
Hermann, Mo.	N_3	158.445	519.832
Near Gasconade, Mo.	No. XVI	159.474	523.208
Gasconade, Mo.	No. XVII	159.712	523.988
Do	No. XVIII	160.651	527.069
Morrison, Mo.	No. XIX	160.785	527.509
Chamois, Mo.	O_3	163.484	536.364
St. Aubert, Mo.	No. XX	164.254	538.890
Near St. Aubert, Mo.	No. XXI	164.087	538.342
Isbell, Mo.	No. XXII	164.588	539.986
Bonnots Mill, Mo.	P_3	168.348	552.322
Osage City, Mo.	No. XXIII	167.079	548.159
Do	No. XXIV	166.684	546.863
Near Osage City, Mo.	No. XXV	169.867	557.305
Jefferson City, Mo.	Old B. M. 90 (85)	169.894	557.394
Do	No. XXVII	184.762	606.173
Do	No. XXVIII	191.572	628.516
Biloxi, Miss.	I_1 or P. B. M. 18	6.718	22.041
Near Biloxi, Miss.	H_1 or P. B. M. 19	1.785	5.856
Do	G_1 or P. B. M. 20	2.115	6.939
Do	F_1 or P. B. M. 21	0.327	1.073
Near Ocean Springs, Miss.	E_1	4.792	15.722
Ocean Springs, Miss.	D_1	7.537	24.728
Scranton, Miss.	C_1	5.168	16.955
Grand Bay, Ala.	B_1	32.540	106.758
St. Elmo, Ala.	A_1	40.466	132.762
Mobile, Ala.	A	3.745	12.287
Do	Astronomic station	4.666	15.308
Citronelle, Ala.	B	100.820	330.774
Near Citronelle, Ala.	E_2	71.750	235.400
Deer Park, Ala.	F_2	46.932	153.976
Escatawpa, Ala.	G_2	53.608	175.879
Near Escatawpa, Ala.	H_2	65.654	215.400
Near Bucatunna, Miss.	I_2	80.748	264.921
Bucatunna, Miss.	J_2	46.125	151.328
Winchester, Miss.	K_2	51.227	168.067
Waynesboro, Miss.	L_2	58.803	192.923
Near Waynesboro, Miss.	M_2	54.136	177.611
Shubuta, Miss.	N_2	61.304	201.128
De Soto, Miss.	O_2	63.371	207.910
Quitman, Miss.	D_2	70.059	229.752
Do	C_2	70.858	232.473
Enterprise, Miss.	B_2	74.754	245.255
Meridian, Miss.	C	104.859	344.025
Do	D	105.144	344.960
Scooba, Miss.	E	58.989	193.533
Near Macon, Miss.	F	53.621	175.922
Macon, Miss.	No. 96	54.985	180.397
Artesia, Miss.	G	71.451	234.419
West Point, Miss.	H	72.572	238.097
Do	I	74.117	243.166
Okolona, Miss.	L	93.296	306.089
Do	K	94.854	311.200
Near Shannon, Miss.	M	76.262	250.203
Shannon, Miss.	N	77.350	253.772
Verona, Miss.	O	96.379	316.203
Tupelo, Miss.	P	85.186	279.481
Saltillo, Miss.	Q	95.765	314.189
Guntown, Miss.	R	121.747	399.432
Baldwyn, Miss.	S	114.525	375.737
Booneville, Miss.	T	162.758	533.982
Rienzi, Miss.	U	138.928	455.800
Corinth, Miss.	V	137.619	451.505
Do	W	137.676	451.692
Ramer, Tenn.	X	126.440	414.829
Falcon, Tenn.	Y	131.739	432.214
Bethel Springs, Tenn.	Z	142.731	468.277
McNairy, Tenn.	No. XXVII	139.541	457.811
Henderson, Tenn.	No. XXVI	131.454	431.279
Pinson, Tenn.	No. XXV	117.996	387.125
Near Jackson, Tenn.	No. XXIV	107.673	353.257
Jackson, Tenn.	No. XXIII	120.769	396.223
Do	No. XXII	119.793	393.021
Oakfield, Tenn.	No. XXI	134.974	442.827
Medina, Tenn.	No. XX	153.920	504.986
Milan, Tenn.	No. XIX	131.235	430.560
Do	No. XVIII	129.437	424.661
Bradford, Tenn.	No. XVII	112.144	367.926
Greenfield, Tenn.	No. XV	133.406	437.683
Sharon, Tenn.	No. XIV	127.360	417.847
Martin, Tenn.	No. XIII	127.309	417.680
McConnell, Tenn.	No. XII	108.864	357.165
Fulton, Ky.	No. XI	109.864	360.445
Alexander, Ky.	No. X	112.931	370.508
Clinton, Ky.	No. IX	119.275	391.321
Arlington, Ky.	No. VIII	111.427	365.573
Bardwell, Ky.	No. VII	119.732	392.821
Near Bardwell, Ky.	No. VI	97.417	319.609
Fort Jefferson, Ky.	No. V	98.668	323.713
Wickliffe, Ky.	No. IV	101.983	334.589
East Cairo, Ky.	No. III	99.053	324.976
Cairo, Ill.	P. B. M. 3	99.736	327.217
Do	P. B. M. 2	97.326	319.310
Do	P. B. M. 1	96.923	317.988

* Reported as probably destroyed by the Chief Engineer of the Board of Estimate and Apportionment of the city of New York.

† This elevation for VI at Matawan is derived from the 1886–7 line alone. The elevation given by the 1881 line is 16.7885.

§ 1885.

‡ These elevations of bench marks, established by the Coast and Geodetic Survey, were furnished by Mr. Frederick W. Koop, Assistant Engineer in Charge, Board of Estimate and Apportionment, New York City. Mr. Koop had supplemented the leveling in the vicinity of that city by many miles of precise leveling. The elevations under consideration result from an adjustment made by him.

** Reported in 1902 to have been destroyed.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Washington, D. C.	Navy Yard B. M. C. or 12.	2.877	9.439
Do	Capitol B. M.	27.641	90.686
Do	Monument B. M.	12.324	40.433
Do	National Museum B. M.	9.059	29.721
Richmond, Va.	O	58.196	190.931
Laurel, Va.	N_1	66.865	219.373
Ashland, Va.	N	67.413	221.171
Near Doswell, Va.	M	44.673	146.565
Rutherglen, Va.	K_3	62.523	205.128
Penola, Va.	K_2	29.713	97.483
Milford, Va.	K_1	31.188	102.323
Near Guinea, Va.	I_2	38.675	126.886
Near Summit, Va.	I_1	60.822	199.547
Fredericksburg, Va.	I	21.051	69.065
Do	H	13.129	43.074
Near Potomac Run, Va.	G_8	25.906	84.993
Brooke, Va.	G_7	17.959	58.920
Near Widewater, Va.	G_6	2.247	7.372
Quantico, Va.	G_5	10.736	35.223
Near Woodbridge, Va.	G_4	20.954	68.747
Pohick Creek, Va.	G_3	19.455	63.829
Near Accotink, Va.	G_2	25.032	82.126
Cameron Run, Va.	G_1	15.686	51.463
Alexandria, Va.	G	14.247	46.742
Old Point Comfort, Va.	Old Tidal B. M.	2.935	9.629
Do	U	2.688	8.819
Fort Monroe, Va.	Fort B. M.	3.368	11.050
Newport News, Va.	S	6.814	22.356
Morrison, Va.	R_3	9.873	32.392
Lee Hall, Va.	R_2	19.483	63.920
Williamsburg, Va.	R	27.092	88.884
Toano, Va.	Q_4	30.828	101.142
Diascond, Va.	Q_3	13.543	44.432
Near Lanexa, Va.	Q_2	2.340	7.677
Providence Forge, Va.	Q	9.798	32.146
Roxbury, Va.	P_5	13.054	42.828
Near Richmond, Va.	P_4	34.261	112.405
Richmond, Va.	P_3	5.982	19.626
Do	P_2	6.726	22.067
Do	New City Hall B. M.	50.043	164.183
Do	P	62.753	205.882
Do	City B. M.	7.768	25.486
St. Augustine, Fla.	B. M. Fairfield	2.212	7.257
Do	B. M. Hitchcock	0.398	1.306
Do	Tidal Bench Mark	0.266	0.873
Do	A	2.148	7.047
Do	B	2.039	6.690
Do	C	2.407	7.897
Do	D	2.404	7.887
Tocoi Junction, Fla.	E	10.846	35.584
Middleton, Fla.	F	10.543	34.590
Hastings, Fla.	G	2.294	7.526
Buena Vista, Fla.	H	4.487	14.721
East Palatka, Fla.	I	5.135	16.847
Palatka, Fla.	J	3.873	12.707
Francis, Fla.	B. M. Francis	21.152	69.396
Hollister, Fla.	K	24.466	80.269
Interlachen, Fla.	L	32.136	105.433
McMeekin, Fla.	M	36.646	120.229
Hawthorn, Fla.	N	44.242	145.151
Do	O	44.757	146.840
Grove Park, Fla.	P	30.645	100.541
Rochelle, Fla.	Q	25.349	83.166
Gainesville, Fla.	R	53.947	176.991
Do	S	54.014	177.211
Do	T	54.476	178.727
Arredonda, Fla.	U	27.072	88.819
Palmer, Fla.	V	23.271	76.348
Archer, Fla.	B. M. Archer	25.929	85.069
Albion, Fla.	B. M. Albion	26.999	88.579
Bronson, Fla.	W	21.972	72.086
Otter Creek, Fla.	B. M. Otter Creek	9.871	32.385
Ellzey, Fla.	X	7.767	25.482
Rosewood, Fla.	B. M. Rosewood	4.441	14.570
Cedar Keys, Fla.	Tidal Bench Mark	0.930	3.051
Do	B. M. Perkins	3.571	11.716
Do	Y	4.002	13.130
Do	Z	4.054	13.300
Do	B. M. Transit	3.886	12.749
Annapolis, Md.	a	†1.268	4.160
Do	Wood's	†1.110	3.642
Do	b	1.151	3.776
Do	5 S. R.	2.868	9.409
Do	1 S. R.	5.271	17.293
Do	Obs.	7.014	23.012
Do	Hern	8.899	29.196

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Annapolis, Md.	Taylor	28.966	95.033
Do	No. XIII	12.612	41.378
Do	No. XII	13.062	42.854
Bowie, Md.	No. VII	45.292	148.595
Wilson, Md.	No. IV	17.921	58.796
Near Washington, D. C.	Hill	84.071	275.823
Washington, D. C.	No. II	2.332	7.651
Do	No. I or 5	11.921	39.111
Do	New C. S. Office	23.746	77.907
Do	No. 8 or E	1.630	5.348
Do	No. 14 or Ordnance	4.998	16.398
Do	No. 16 or 24	14.483	47.516
Do	No. 22	9.595	31.480
Do	No. 25	3.603	11.821
Do	No. 30	7.476	24.528
Do	No. 36	6.170	20.243
Do	No. 41	5.447	17.871
Do	No. 47 or Brewery	4.148	13.609
Do	No. 79	9.842	32.290
Do	No. 80	9.991	32.779
Do	No. 82	9.057	29.715
Do	No. 84 or Smithsonian	9.596	31.483
Do	No. 88	8.972	29.436
Do	No. 92	11.250	36.909
Do	No. 93	12.364	40.564
Do	No. 95	12.062	39.573
Do	No. 96	12.004	39.383
Do	No. 97	12.040	39.501
Do	No. 98	12.050	39.534
Do	No. 101	6.751	22.149
Do	No. 102	10.104	33.150
Do	No. 103	1.386	4.547
Birmingham, Ala.	P. B. M. 1	186.038	610.360
Do	T. B. M. 1	184.800	606.298
Do	P. B. M. 2	181.520	595.537
Do	P. B. M. 3	180.419	591.925
Do	T. B. M. 2	176.123	577.830
Elyton, Ala.	T. B. M. 3	174.056	571.049
Near West End, Ala.	T. B. M. 7	166.002	544.625
Near Powderly, Ala.	P. B. M. 4	160.352	526.088
Powderly, Ala.	T. B. M. 8	157.270	515.977
Near Powderly, Ala.	T. B. M. 9	159.849	524.438
Near Hillman, Ala.	T. B. M. 10	159.009	521.682
Do	T. B. M. 11	156.225	512.548
Turpin, Ala.	T. B. M. 13	157.873	517.955
Bessemer, Ala.	T. B. M. 14	159.012	521.692
Do	T. B. M. 15	157.046	515.242
Bessemer, Ala.	P. B. M. 5	156.402	513.129
Jonesboro, Ala.	T. B. M. 18	154.896	508.188
Near McCalla, Ala.	T. B. M. 24	150.498	493.759
Near Baylor, Ala.	T. B. M. 27	151.937	498.480
Kimbrel, Ala.	P. B. M. 6	149.672	491.049
Near Standiford, Ala.	T. B. M. 32	147.347	483.421
Near Woodstock, Ala.	T. B. M. 39	151.515	497.095
Near Bibbville, Ala.	T. B. M. 42	151.062	495.609
Near Vance, Ala.	P. B. M. 7	147.533	484.031
Do	T. B. M. 47	143.814	471.830
Near Coaling Station, Ala.	P. B. M. 8	113.259	371.584
Near Johnson, Ala.	T. B. M. 60	98,993	324.780
Near Olmstead, Ala.	T. B. M. 63	90.820	297.965
Near Cottondale, Ala.	P. B. M. 9	74.819	245.469
Do	T. B. M. 69	106.700	350.094
Do	T. B. M. 70	110.159	361.413
Near Tuscaloosa, Ala.	T. B. M. 75	65.233	214.019
Tuscaloosa, Ala.	P. B. M. 11	67.871	222.673
Near Tuscaloosa, Ala.	Old B. M. 3	44.721	146.722
Tuscaloosa, Ala.	P. B. M. 12	34.278	112.460
Near Tuscaloosa, Ala.	Old B. M. 4	34.272	112.441
Do	Old B. M. 5	28.042	92.001
Do	P. B. M. 13	38.574	126.555
Tuscaloosa, Ala.	P. B. M. 10	50.845	166.814
Near Tuscaloosa, Ala.	T. B. M. 78	51.696	169.606
Do	T. B. M. 80	41.999	137.792
Englewood, Ala.	T. B. M. 88	42.190	138.418
Hull, Ala.	T. B. M. 94	39.166	128.497
Do	P. B. M. 14	39.438	129.390
Moundville, Ala.	T. B. M. 100	49.893	163.691
Do	P. B. M. 15	49.904	163.727
Powers, Ala.	P. B. M. 16	41.712	136.850
Akron, Ala.	P. B. M. 17	39.683	130.193
Warrior River, Ala.	P. B. M. 18	36.204	118.779
Do	T. B. M. 122	38.602	126.647
Near Eutaw, Ala.	T. B. M. 123	35.735	117.241
Do	T. B. M. 124	36.058	118.300
Eutaw, Ala.	P. B. M. 19	53.066	174.101
Do	P. B. M. 20	65.857	216.066
Near Hairston, Ala.	T. B. M. 132	49.726	163.143
Do	T. B. M. 138	40.328	132.309
Near Boligee, Ala.	T. B. M. 139	37.385	122.654
Do	P. B. M. 21	37.386	122.657
Near Miller, Ala.	T. B. M. 150	33.911	111.256
Near Epes, Ala.	P. B. M. 22	29.708	97.467
Epes, Ala.	P. B. M. 23	34.813	114.216

* Destroyed. Reported 1903.

† Settled. Reported by U. S. Geological Survey, 1903.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Epes, Ala	T. B. M. 152	42.772	140.328
Near Epes, Ala	T. B. M. 153	49.181	161.355
Near Parker, Ala	T. B. M. 156	72.917	239.229
Parker, Ala	T. B. M. 157	81.436	267.178
Near Livingston, Ala	T. B. M. 160	71.829	235.659
Do	T. B. M. 162	55.567	182.306
Livingston, Ala	P. B. M. 24	48.932	160.538
Near Livingston, Ala	P. B. M. 25	37.205	122.063
Near York, Ala	T. B. M. 172	42.722	140.164
Do	T. B. M. 175	48.944	160.577
York, Ala	P. B. M. 26	47.446	155.662
Near York, Ala	T. B. M. 179	48.642	159.586
Do	T. B. M. 182	50.884	166.942
Cuba, Ala	P. B. M. 27	65.428	214.658
Near Cuba, Ala	T. B. M. 188	72.861	239.045
Toomsuba, Miss	P. B. M. 28	88.615	290.731
Near Russell, Miss	T. B. M. 207	125.920	413.123
Meridian, Miss	T. B. M. 217	101.868	334.212
Do	P. B. M. 29	103.883	340.823
Coatopa, Ala	P. B. M. 1	38.471	126.217
McDowell, Ala	P. B. M. 2	29.046	95.295
Near McDowell, Ala	P. B. M. 3	28.137	92.313
Do	P. B. M. 4	28.130	92.290
Demopolis, Ala	Old B. M.	36.632	120.183
Do	P. B. M. 5	38.406	126.004
Do	P. B. M. 6	38.714	127.014
Near Grafton, Ill	P. B. M. 1	128.406	421.279
Do	P. B. M. 2	130.262	427.368
Grafton, Ill	P. B. M. 3	*133.210	437.040
Do	P. B. M. 3	†133.175	436.925
Do	P. B. M. 4	‡135.952	446.036
Jersey Landing, Ill	P. B. M. 5	135.329	443.992
Near Jersey Landing, Ill	P. B. M. 6	128.932	423.004
Near Piasa Creek, Ill	P. B. M. 7	137.616	451.495
Alton, Ill	P. B. M. 8	130.844	429.277
Do	P. B. M. 9	148.359	486.741
Near Alton, Ill	P. B. M. 10	129.943	426.321
Do	P. B. M. 11	126.128	413.805
Near Wilsons Island No. 5, Ill.	P. B. M. 12	139.558	457.867
Near St. Louis, Mo	P. B. M. 13	131.537	431.551
St. Louis, Mo	P. B. M. 14	130.017	426.564
Do	P. B. M. 15	126.995	416.649
Do	P. B. M. 16	153.250	502.788
Carondelet, Mo	P. B. M. 17	132.586	434.993
Jefferson Barracks, Mo	P. B. M. 18	150.804	494.763
Cliff Cave, Mo	P. B. M. 19	120.100	394.028
Near Cliff Cave, Mo	P. B. M. 20	125.002	410.111
Near Jefferson Station, Mo.	P. B. M. 21	123.952	406.666
Kimmswick, Mo	P. B. M. 22	124.596	408.779
Sulphur Springs, Mo	P. B. M. 23	123.216	404.251
Illinois, Mo	P. B. M. 24	125.659	412.266
Platin Rock Creek, Mo	P. B. M. 25	117.546	385.649
Near Rush Tower, Mo	P. B. M. 26	118.565	388.992
Rush Tower, Mo	P. B. M. 27	120.586	395.623
Near Cliff, Mo	P. B. M. 28	115.457	378.795
Do	P. B. M. 29	124.946	409.927
Near White Sand Depot Landing, Mo.	P. B. M. 30	118.596	389.094
Near Ste. Genevieve, Mo	P. B. M. 31	122.814	402.932
Ste. Genevieve, Mo	P. B. M. 32	119.064	390.629
Do	P. B. M. 33	122.225	401.000
Quarrytown, Mo	P. B. M. 34	117.164	384.396
Ste. Marys, Mo	P. B. M. 35	118.572	389.015
Do	P. B. M. 36	120.689	395.960
Near Ste. Marys, Mo	P. B. M. 37	112.023	367.529
Chester, Ill	P. B. M. 38	116.002	380.583
Near Chester, Ill	P. B. M. 39	116.179	381.164
Do	P. B. M. 40	111.964	367.335
Bois Brulé, Mo	P. B. M. 41	110.488	362.493
Near Grand Eddy, Mo	P. B. M. 42	113.339	371.846
Do	P. B. M. 43	112.685	369.701
Near Wittenberg, Mo	P. B. M. 44	112.465	368.979
Wittenberg, Mo	P. B. M. 45	110.511	362.568
Near Wittenberg, Mo	P. B. M. 46	110.386	362.158
Near Tower Rock, Mo	P. B. M. 47	104.918	344.218
Birmingham Point, Mo	P. B. M. 48	103.947	341.033
In Cape Girardeau County, Mo.	P. B. M. 49	104.116	341.587
Do	P. B. M. 50	104.142	341.673
Near Bainbridge Creek, Mo.	P. B. M. 51	103.050	338.090
Near Cape Rock, Mo	P. B. M. 52	104.491	342.818
Do	P. B. M. 53	102.681	336.879
Cape Girardeau, Mo	P. B. M. 54	105.667	346.676
Do	P. B. M. 55	108.690	356.594
Do	P. B. M. 56	101.042	331.502
Grays Point, Mo	P. B. M. 57	104.824	343.910
Near Commerce, Mo	P. B. M. 58	104.596	343.162
Commerce, Mo	P. B. M. 59	112.673	369.661
Do	P. B. M. 60	104.422	342.591
Do	P. B. M. 61	110.550	362.696
Near Cairo, Ill	P. B. M. 62	98.527	323.251
Do	P. B. M. 63	102.716	336.994
Do	P. B. M. 64	101.461	332.877
Do	P. B. M. 65	97.381	319.491
Do	P. B. M. 66	95.398	312.985
Near Columbia Bottom, Mo.	P. B. M. 2=$\frac{1}{1}$	129.976	426.430
	Top of cap over same	131.215	430.495
Columbia Bottom, Mo	P. B. M. 3	131.174	430.360
Do	T. B. M. 2	130.964	429.671
Near Fort Bellefontaine, Mo.	P. B. M. 4=$\frac{2}{1}$	131.177	430.370
	Top of cap over same	132.415	434.432
Near Mouth of Cold Water Creek, Mo.	P. B. M. 5	131.356	430.957
Jamestown Landing, Mo	P. B. M. 6	128.469	421.485
Near Jamestown Landing, Mo.	P. B. M. 7	132.146	433.549
	Top of cap over same	133.380	437.598
Do	P. B. M. 8	127.460	418.175
Do	P. B. M. 9=$\frac{3}{1}$	134.563	441.479
	Top of cap over same	135.802	445.544
Near Musics Ferry, Mo	P. B. M. 10	138.943	455.849
Do	P. B. M. 11	132.194	433.706
	Top of cap over same	133.434	437.775
Do	P. B. M. 12; old P. B. M. 11, 1887.	133.818	439.035
Musics Ferry, Mo	P. B. M. 13	137.050	449.638
Do	P. B. M. 14=$\frac{4}{1}$	134.346	440.767
	Top of cap over same	135.584	444.829
Near Musics Ferry, Mo	P. B. M. 15	135.736	445.327
	Top of cap over same	136.973	449.386
Charbonnier Point, Mo	P. B. M. 16=$\frac{5}{1}$	132.608	435.065
	Top of cap over same	133.845	439.123
Near St. Charles, Mo	P. B. M. 17	133.377	437.588
	Top of cap over same	134.613	441.643
Do	P. B. M. 18	132.723	435.442
	Top of cap over same	133.954	439.481
St. Charles, Mo	P. B. M. 19	139.106	456.384
Do	P. B. M. 20; old B. M. 17.	135.371	444.130
Do	T. B. M. 23	137.132	449.907
Do	T. B. M. 24=gauge B. M.	136.406	447.525
Do	P. B. M. 21=$\frac{6}{2}$	135.757	445.396
	Top of cap over same	136.994	449.454
Do	T. B. M. 25. City B. M.	139.054	456.213
Near St. Charles, Mo	T. B. M. 32	138.834	455.491
Do	P. B. M. 22=$\frac{6}{1}$	146.377	480.239
	Top of cap over same	147.615	484.300
Do	P. B. M. 23	136.301	447.181
	Top of cap over same	137.543	451.256
Near Creve Coeur Lake, Mo.	P. B. M. 24=$\frac{7}{2}$	137.107	449.825
	Top of cap over same	138.347	453.893
Do	P. B. M. 25	136.214	446.895
	Top of cap over same	137.453	450.960
Do	P. B. M. 26	139.058	456.226
Near Mona, Mo	T. B. M. 45	138.164	453.293
Mona, Mo	P. B. M. 27=$\frac{8}{1}$	137.452	450.957
	Top of cap over same	138.691	455.022
Drew, Mo	P. B. M. 28	141.119	462.988
	Top of cap over same	142.355	467.043
Do	T. B. M. 51	140.518	461.019
Gumbo, Mo	P. B. M. 29=$\frac{9}{1}$	141.431	464.012
	Top of cap over same	142.666	468.063
Stevens, Mo	P. B. M. 30	140.315	460.350
	Top of cap over same	141.554	464.415
Bon Homme, Mo	P. B. M. 31=$\frac{10}{1}$	140.317	460.357
	Top of cap over same	141.554	464.415
Do	P. B. M. 32	144.362	473.628
Do	T. B. M. 56	140.855	462.122
Centaur, Mo	P. B. M. 33	140.279	460.232
	Top of cap over same	141.514	464.284
Near Centaur, Mo	P. B. M. 34	143.312	470.183
Near Port Royal, Mo	T. B. M. 61	143.980	472.374
Port Royal, Mo	P. B. M. 35=$\frac{11}{1}$	144.650	474.573
	Top of cap over same	145.892	478.647
Do	T. B. M. 62	144.203	473.106
Near Port Royal, Mo	T. B. M. 63	145.679	477.949
Do	P. B. M. 36	146.046	479.153
	Top of cap over same	147.284	483.214

* As originally located.
† In new position. See Precise Leveling in the United States, 1903–1907, page 177.
‡ This elevation is from levels run in 1902. The bench mark had apparently settled 0.019 meter since its elevation was determined in 1880.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Port Royal, Mo	P. B. M. 37	154.067	505.468
St. Albans, Mo	P. B. M. 38=12/1	146.068	479.225
	Top of cap over same	147.304	483.280
Near Becker, Mo	T. B. M. 69	149.849	491.630
Do	P. B. M. 39	146.984	482.230
	Top of cap over same	148.223	486.295
Do	P. B. M. 40	145.785	478.296
Do	P. B. M. 41	142.026	465.964
	Top of cap over same	143.263	470.022
Near Labaddie, Mo	P. B. M. 42	149.505	490.501
Near Boles, Mo	P. B. M. 43=13/1	142.804	468.516
	Top of cap over same	144.040	472.571
Do	T. B. M. 78	148.994	488.824
Do	P. B. M. 44	148.041	485.698
Do	T. B. M. 80	147.547	484.077
Boles, Mo	T. B. M. 81	148.092	485.865
Near Boles, Mo	P. B. M. 45	144.509	474.110
	Top of cap over same	145.740	478.149
Do	T. B. M. 83	148.814	488.234
Near South Point, Mo	T. B. M. 84	148.621	487.601
Do	T. B. M. 85	147.009	482.312
Do	P. B. M. 46=14/1	147.706	484.599
	Top of cap over same	148.941	488.651
Do	T. B. M. 86	148.089	485.855
Do	P. B. M. 47	150.227	492.870
Do	T. B. M. 87	148.308	486.574
Do	T. B. M. 88	147.222	483.011
South Point, Mo	P. B. M. 48	147.596	484.238
	Top of cap over same	148.835	488.303
Do	T. B. M. 89	148.972	488.752
Near Washington, Mo	T. B. M. 90	149.112	489.212
Washington, Mo	P. B. M. 50	150.490	493.733
Do	T. B. M. 92	149.685	491.092
Do	T. B. M. 94=Old B. M. 75, 1879.	151.722	497.775
Do	T. B. M. 95	151.929	498.454
Do	P. B. M. 51=15/1	151.140	495.865
	Top of cap over same	152.376	499.920
Do	T. B. M. 96=Old B. M. 42a.	149.510	490.517
Near Washington, Mo	T. B. M. 97	149.995	492.109
Do	P. B. M. 52	152.829	501.406
Do	T. B. M. 98	151.502	497.053
Do	P. B. M. 53	148.771	488.093
	Top of cap over same	150.006	492.145
Do	T. B. M. 99=Old B. M. 43a.	150.055	492.305
Do	T. B. M. 100	152.020	498.752
Near Dundee, Mo	P. B. M. 54=16/1	151.335	496.505
	Top of cap over same	152.572	500.567
Do	T. B. M. 105	151.519	497.109
Do	P. B. M. 55	152.010	498.719
	Top of cap over same	153.243	502.765
Do	T. B. M. 106	152.949	501.800
Do	P. B. M. 56	154.104	505.590
Dundee, Mo	P. B. M. 57=17/1	147.302	483.273
	Top of cap over same	148.542	487.342
Do	T. B. M. 108=Old B. M. 46 (b).	151.039	495.534
Do	T. B. M. 107=Old R. R. B. M.	152.893	501.616
Do	T. B. M. 109=Old B. M. 46a.	152.912	501.679
Kent, Mo	T. B. M. 110	152.816	501.364
Near Kent, Mo	T. B. M. 111=Old B. M. 47.	152.748	501.141
Do	T. B. M. 112	153.582	503.877
Near New Haven, Mo	P. B. M. 58	154.046	505.399
	Top of cap over same	155.284	509.461
Do	T. B. M. 113	153.631	504.038
Do	P. B. M. 59	155.248	509.343
Do	T. B. M. 114	154.630	507.315
New Haven, Mo	P. B. M. 60=18/1	153.718	504.323
	Top of cap over same	154.959	508.395
Do	T. B. M. 115	155.326	509.599
Do	T. B. M. 116	154.182	505.845
Near New Haven, Mo	P. B. M. 61	156.408	513.149
Near Etlah, Mo	T. B. M. 118	154.903	508.211
Do	P. B. M. 62	154.310	506.265
	Top of cap over same	155.550	510.334
Do	T. B. M. 119	155.099	508.854
Do	T. B. M. 120	155.056	508.713
Etlah, Mo	P. B. M. 63=19/1	155.907	511.505
	Top of cap over same	157.150	515.583
Near Etlah, Mo	T. B. M. 122	155.645	510.645
Do	T. B. M. 123=Old R. R. B. M.	154.505	506.905
Near Berger, Mo	T. B. M. 125	155.913	511.525
Do	P. B. M. 64	156.772	514.343
	Top of cap over same	158.004	518.385
Do	T. B. M. 126	155.210	509.218
Do	P. B. M. 65	156.982	515.032
Berger, Mo	P. B. M. 66=20/1	154.849	508.034
	Top of cap over same	156.086	512.092
Near Berger, Mo	T. B. M. 128	155.806	511.174
Near Hermann, Mo	P. B. M. 67	154.724	507.624
	Top of cap over same	155.964	511.692
Do	T. B. M. 129	155.959	511.675
Do	T. B. M. 130	157.017	515.147
Do	P. B. M. 68	155.814	511.200
	Top of cap over same	157.050	515.259
Do	T. B. M. 132	156.075	512.056
Do	P. B. M. 69	158.165	518.913
Do	T. B. M. 133	156.905	514.779
Hermann, Mo	P. B. M. 70=21/1	155.767	511.046
	Top of cap over same	157.001	515.094
Do	P. B. M. 71	155.713	510.868
Do	T. B. M. 135	158.182	518.969
Do	P. B. M. 72=Old B. M. 59.	157.696	517.374
Near Hermann, Mo	P. B. M. 73	159.476	523.214
	Top of cap over same	160.716	527.282
Do	T. B. M. 136	157.654	517.236
Do	T. B. M. 137	159.160	522.177
Do	P. B. M. 74	157.553	516.905
Near Gasconade, Mo	T. B. M. 139	160.198	525.583
Do	P. B. M. 75=22/1	159.656	523.805
	Top of cap over same	160.894	527.866
Do	T. B. M. 140	157.549	516.892
Do	T. B. M. 141	159.639	523.749
Do	P. B. M. 76	158.783	520.941
	Top of cap over same	160.019	524.996
Do	T. B. M. 142=Old R. R. B. M.	158.059	518.565
Do	T. B. M. 143	160.423	526.321
Gasconade, Mo	T. B. M. 144, Gasconade Survey, B. M. 1879.	159.669	523.847
Do	P. B. M. 77	159.666	523.838
Near Gasconade, Mo	T. B. M. 145	160.428	526.338
Do	T. B. M. 146	157.793	517.693
Do	P. B. M. 78=23/1	160.644	527.046
	Top of cap over same	161.882	531.108
Do	P. B. M. 79	159.635	523.736
Near Morrison, Mo	T. B. M. 148	159.524	523.372
Do	T. B. M. 149=Old R. R. B. M.	160.094	525.242
Morrison, Mo	P. B. M. 80	160.792	527.532
	Top of cap over same	162.030	531.593
Do	P. B. M. 81	162.190	532.118
Do	T. B. M. 150	161.087	528.500
Near Morrison, Mo	T. B. M. 151	160.181	525.527
Do	P. B. M. 82	162.667	533.683
Do	P. B. M. 83=24/1	162.406	532.827
	Top of cap over same	163.643	536.885
Do	T. B. M. 153	162.513	533.178
Near Chamois, Mo	T. B. M. 154	161.292	529.172
Do	T. B. M. 155	161.610	530.215
Do	P. B. M. 84	160.906	527.906
	Top of cap over same	162.144	531.967
Do	T. B. M. 157	164.494	539.677
Do	T. B. M. 158	162.258	532.341
Chamois, Mo	P. B. M. 85	163.970	537.958
Do	P. B. M. 86=25/1	161.658	530.373
	Top of cap over same	162.901	534.451
Near Chamois, Mo	T. B. M. 160=Old R. R. B. M.	163.125	535.186
Near Deer Creek, Mo	P. B. M. 87	163.613	536.787
	Top of cap over same	164.857	540.868
Do	T. B. M. 161	165.076	541.587
Do	P. B. M. 88	162.326	532.565
Near St. Aubert, Mo	P. B. M. 89=Old B. M. 74.	161.502	529.861
Do	T. B. M. 163	162.530	533.234
Do	T. B. M. 164	164.690	540.320
St. Aubert, Mo	P. B. M. 90=26/1	164.722	540.425
	Top of cap over same	165.964	544.500
Shipley Landing, Mo	P. B. M. 91	164.069	538.283
	Top of cap over same	165.307	542.345
Do	T. B. M. 167	165.594	543.286

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Loose Creek, Mo	T. B. M. 168	166.679	546.846
Isbell, Mo	P. B. M. 92=$\frac{27}{1}$	161.884	531.114
	Top of cap over same	163.118	535.163
Do	P. B. M. 93	167.227	548.644
Do	T. B. M. 169	166.428	546.023
Near Isbell, Mo	T. B. M. 170	167.908	550.878
Near Bonnots Mill, Mo	T. B. M. 171=Old R. R. B. M.	165.184	541.941
Do	P. B. M. 94	163.187	535.389
	Top of cap over same	164.423	539.444
Do	T. B. M. 172	164.299	539.038
Do	T. B. M. 173	166.235	545.389
Bonnots Mill, Mo	T. B. M. 174	166.475	546.177
Do	T. B. M. 175=Old R. R. B. M.	165.897	544.280
Do	P. B. M. 95=$\frac{28}{1}$	162.261	532.351
	Top of cap over same	163.500	535.416
Near Osage, Mo	T. B. M. 178=Old B. M. 81.	165.939	544.418
Do	T. B. M. 177=Old B. M. 80.	165.963	544.497
Near Bonnots Mill, Mo	P. B. M. 96	167.209	548.585
Near Osage, Mo	T. B. M. 179	165.318	542.381
Near Osage City, Mo	P. B. M. 97	164.338	539.166
	Top of cap over same	165.580	543.240
Do	T. B. M. 180=Old R. R. B. M.	165.774	543.877
Osage City, Mo	P. B. M. 98	166.618	546.646
Do	T. B. M. 182=Old R. R. B. M.	166.623	546.662
Do	P. B. M. 99	167.026	547.984
	Top of cap over same	168.265	552.049
Do	T. B. M. 183	168.526	552.906
Near Osage City, Mo	T. B. M. 184=Old R. R. B. M.	170.250	558.562
Ewings Landing, Mo	P. B. M. 100=$\frac{29}{1}$	165.206	542.013
	Top of cap over same	166.450	546.095
Near Jefferson City, Mo	P. B. M. 101	177.115	581.085
Do	P. B. M. 102	174.045	571.013
	Top of cap over same	175.282	575.071
Do	T. B. M. 190	174.124	571.272
Do	T. B. M. 191	169.609	556.459
Do	T. B. M. 192	169.612	556.469
Do	P. B. M. 103	166.976	547.820
	Top of cap over same	168.214	551.882
Jefferson City, Mo	T. B. M. 193=Old B. M. 88.	169.669	556.656
Near Jefferson City, Mo	P. B. M. 104	170.371	558.959
Do	T. B. M. 194	169.480	556.036
Jefferson City, Mo	T. B. M. 195	169.227	555.206
Do	T. B. M. 196. Gauge B. M. 1st.	169.365	555.658
Newport, Ky	A	156.192	512.440
Do	U. S. E	152.534	500.439
Covington, Ky	B	156.548	513.608
Ludlow, Ky	C	162.134	531.935
Crescent Springs, Ky	D	237.475	779.116
Erlanger, Ky	E	279.016	915.405
Dixon, Ky	F	282.004	925.208
Richwood, Ky	G	286.150	938.810
Walton, Ky	H	278.533	913.820
Near Crittenden, Ky	I	273.038	895.792
Crittenden, Ky	J	281.565	923.768
Sherman, Ky	K	284.890	934.677
Dry Ridge, Ky	L	292.011	958.039
Williamstown, Ky	M	297.064	974.617
Mason, Ky	N	278.908	915.051
Blanchett, Ky	O	286.971	941.504
Corinth, Ky	P	292.271	958.892
Hinton, Ky	Q	290.606	953.430
Sadieville, Ky	R	261.700	858.594
Near Sadieville, Ky	S	263.843	865.625
Rogers Gap, Ky	T	275.398	903.535
Near Kinkaid, Ky	U	255.070	836.842
Near Georgetown, Ky	V	260.848	855.799
Georgetown, Ky	W	267.325	877.049
Near Donerail, Ky	X	265.403	870.743
Greendale, Ky	Y	285.248	935.851
Hillenmeyer, Ky	Z	286.354	939.480
Lexington, Ky	A_1	298.568	979.552
Near Lexington, Ky	B_1	308.166	1011.041
Brannon, Ky	C_1	313.527	1028.630
Near Brannon, Ky	D_1	297.197	975.054
Nicholasville, Ky	E_1	289.917	951,169
Do	F_1	288.655	947.029
Jessamine, Ky	G_1	269.934	885.608
Wilmore, Ky	H_1	267.670	878.181
Near High Bridge, Ky	I_1	273.423	897.055
High Bridge, Ky	J_1	232.834	763.890
Near High Bridge, Ky	K_1	234.686	769.936
Between High Bridge and Burgin, Ky.	L_1	264.987	869.378
Burgin, Ky	M_1	274.677	901.169
Do	N_1	273.508	897.334
Faulconer, Ky	O_1	271.216	889.814
Near Danville, Ky	P_1	280.872	921.494
Danville, Ky	Q_1	301.285	988.466
Near Junction City, Ky	R_1	313.322	1027.957
Do	S_1	289.539	949.929
Near Moreland, Ky	T_1	303.053	994.266
Moreland, Ky	U_1	333.488	1094.119
Near Moreland, Ky	V_1	292.084	958.279
McKinney, Ky	W_1	308.271	1011.386
Near McKinney, Ky	X_1	278.428	913.476
Near Kings Mountain, Ky.*	Y_1	305.038	1000.779
Kings Mountain, Ky	Z_1	353.306	1159.138
Waynesburg, Ky	A_2	369.514	1212.314
Eubank, Ky	B_2	356.137	1168.426
Floyd, Ky	C_2	340.398	1116.789
Near Pulaski, Ky	D_2	340.566	1117.340
Science Hill, Ky	E_2	342.904	1125.011
Norwood, Ky	F_2	326.951	1072.672
Near Somerset, Ky	G_2	292.241	958.794
Somerset, Ky	A_5	262.024	859.657
Do	B_5	268.005	879.280
Do	C_5	272.108	892.741
Do	D_5	268.363	880.454
Near Burnside, Ky	E_5	249.177	817.508
Burnside, Ky	F_5	235.332	772.085
Near Sloans Valley, Ky	G_5	280.439	920.074
Alpine, Ky	H_5	290.058	951.632
Greenwood, Ky	I_5	363.515	1192.632
Flat Rock, Ky	J_5	393.551	1291.175
Whitley, Ky	K_5	401.546	1317.406
Pine Knot, Ky	L_5	430.209	1411.444
Between Strunk, Ky., and Isham, Tenn.	M_5	415.308	1362.556
Near Winfield, Tenn	A	396.250	1300.030
Oneida, Tenn	B	438.584	1438.921
Helenwood, Tenn	C	422.928	1387.556
New River, Tenn	D	367.076	1204.315
Robbins, Tenn	E	419.437	1376.103
Glen Mary, Tenn	F	389.141	1276.707
Sunbright, Tenn	G	407.657	1337.455
Annadel, Tenn	H	375.500	1231.953
Lancing, Tenn	I	359.921	1180.841
Near Nemo, Tenn	J	255.000	836.612
Oakdale, Tenn	K	241.353	791.839
Do	L	242.012	794.001
Elverton, Tenn	M	248.942	816.737
Wheat, Tenn	N	272.707	894.706
Near Williams Ferry, Tenn.	Melton△	413.109	1355.342
Oliver Springs, Tenn	O	238.952	783.962
Dossett, Tenn	P	275.790	904.821
Clinton, Tenn	Q	253.505	831.708
Heiskell, Tenn	R	274.822	901.645
Powell, Tenn	S	302.978	994.020
Black Oak, Tenn	T	336.082	1102.629
Near Harriman, Tenn.†	A_2	234.340	768.830
Harriman, Tenn	B_2	242.094	794.270
Do	C_2	241.489	792.285
Do	City	239.572	785.996
Near Emory Gap, Tenn	D_2	254.791	835.927
Cardiff, Tenn	E_2	241.908	793.660
Rockwood, Tenn	F_2	267.727	878.368
Do	G_2	268.237	880.041
Glen Alice, Tenn	H_2	242.640	796.061
Roddy, Tenn	I_2	235.270	771.882
Lorraine, Tenn	J_2	244.741	802.954
Near Spring City, Tenn	K_2	233.412	765.786
Near Sheffield, Tenn	L_2	247.974	813.561
Near Evensville, Tenn	M_2	231.314	758.903
Do	N_2	226.445	742.928
Dayton, Tenn	O_2	215.431	706.793
Do	P_2	214.692	702.400
Near Graysville, Tenn	Q_2	232.702	763.456
Do	R_2	215.913	708.375
Sale Creek, Tenn	S_2	223.545	733.414
Near Retro, Tenn	T_2	222.048	728.502
Rathburn, Tenn	U_2	235.280	771.914
Daisy, Tenn	V_2	219.688	720.760
Near Cave Springs, Tenn	W_2	206.621	677.889
Do	X_2	207.088	679.421
Hixson, Tenn	Y_2	207.327	680.238
Near Boyce, Tenn	Z_2	209.989	688.939
Do	A_3	209.952	688.850
Near Chattanooga, Tenn	B_3	203.887	668.919

* Mr. G. B. Nicholson, chief engineer of the Chicago, New Orleans & Texas Pacific Railroad, on June 20, 1904, stated that bench mark Y_1, near Kings Mountain, Ky., would probably be destroyed soon by improvements.

† Described as near Harriman Junction, Tenn. See p. 630 of Appendix 3, Report for 1903.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Chattanooga, Tenn	C_3	206.257	676.695
Do	Gauge	205.485	674.162
Near Chattanooga, Tenn	D_3	201.407	660.783
Wauhatchie, Tenn	674N	203.784	668.581
Hooker, Ga	E_3	261.167	856.845
Near Whiteside, Tenn	974N	295.851	970.638
Whiteside, Tenn	F_3	262.552	861.389
Near Shellmound, Tenn	639N	193.951	636.321
Shellmound, Tenn	U S	189.917	623.086
Do	G_3	189.178	620.661
Near Carpenter, Ala	665N	201.740	661.875
Near Bridgeport, Ala	C	189.429	621.485
Do	U. S. E	189.432	621.495
Bridgeport, Ala	679N	205.867	675.415
Bolivar, Ala	D	187.915	616.518
Near Bolivar, Ala	625N	189.416	621.442
Stevenson, Ala	627N	190.225	624.097
Near Stevenson, Ala	E	184.571	605.547
Near Cedar Grove, Ala	F	185.276	607.860
Near Fackler, Ala	G	183.343	601.518
Do	H	184.337	604.779
Hollywood, Ala	I	195.160	640.287
Near Hollywood, Ala	J	192.073	630.160
Scottsboro, Ala	K	198.685	651.852
Near Larkinsville, Ala	L	198.343	650.730
Do	M	187.436	614.946
Lim Rock, Ala	N	187.352	614.671
Near Lim Rock, Ala	O	203.119	666.400
Near Swearengin, Ala	P	219.461	720.015
Swearengin, Ala	Q	413.871	1357.842
Near Swearengin, Ala	Gunter △	412.272	1352.596
Do	Gunter N	412.432	1353.121
Do	Gunter S	412.368	1352.911
Do	Gunter E	412.375	1352.934
Do	Gunter W	412.370	1352.917
Woodville, Ala	J_2	187.340	614.631
Do	K_2	188.708	619.119
Near Woodville, Ala	L_2	187.730	615.911
Do	T. B. M. 1	184.001	603.677
Paint Rock, Ala	M_2	182.062	597.315
Gurley, Ala	N_2	196.126	643.457
Near Gurley, Ala	T. B. M. 8	187.814	616.186
Brownsboro, Ala	O_2	192.825	632.627
Near Brownsboro, Ala	T. B. M. 12	197.192	646.954
Near Fearns, Ala	P_2	244.570	802.393
Huntsville, Ala	Q_2	194.738	638.903
Do	City	193.801	635.829
Near Madison, Ala	R_2	188.894	619.730
Madison, Ala	S_2	205.394	673.863
Near Greenbrier, Ala	T_2	178.500	585.629
Near Belle Mina, Ala	T. B. M. 38	178.379	585.232
Belle Mina, Ala	U_2	183.058	600,583
Near Belle Mina, Ala	T. B. M. 39	174.649	572.994
Decatur, Ala	P. B. M. 52	173.194	568.221
Do	P. B. M. 51	172.414	565.662
Do	P. B. M. 50	169.596	556.416
Near Flint, Ala	V_2	173.105	567.929
Near Hartsells, Ala	W_2	201.182	660.045
Near Leesdale, Ala	T. B. M. 60	181.063	594.038
Near Falkville, Ala	X_2	183.227	601.137
Near Wilhite, Ala	Y_2	205.780	675.130
Near Cullman, Ala	Z_2	261.371	857.515
Cullman, Ala	A_3	244.655	802.672
Johnson, Ala	B_3	198.258	650.451
Near Hanceville, Ala	C_3	161.700	530.511
Near Garden City, Ala	D_3	130.113	426.879
Near Blount Springs, Ala	E_3	138.764	455.262
Do	F_3	124.247	407.634
Reids, Ala	G_3	179.288	588.214
Warrior, Ala	H_3	166.942	547.709
Near Warrior, Ala	I_3	125.781	412.666
Morris, Ala	J_3	126.072	413.621
Near Cunningham, Ala	T. B. M. 107	120.682	395.938
Newcastle, Ala	K_3	157.603	517.069
Boyles, Ala	L_3	178.104	584.329
Burnsville, Miss	P. B. M. 1	143.264	470.025
Do	P. B. M. 2	141.801	465.225
Iuka, Miss	P. B. M. 3	172.163	564.838
Near Pegram, Ala	T. B. M. 41	132.073	433.310
Near Riverton Junction, Ala.	T. B. M. 43	126.122	413.785
Margerum, Ala	T. B. M. 45	133.156	436.863
Near Margerum, Ala	T. B. M. 47	134.769	442.155
Near Cherokee, Ala	T. B. M. 49	148.810	488.221
Near Barton, Ala	T. B. M. 58	151.030	495.504
Barton, Ala	T. B. M. 59	147.081	482.548
Near Prides, Ala	T. B. M. 63	131.266	430.662
Prides, Ala	T. B. M. 72	130.865	429.346
Do	P. B. M. 7	128.787	422.529
Do	T. B. M. 73	127.746	419.113
Near Prides, Ala	T. B. M. 68	148.768	488.083
Do	T. B. M. 71	138.016	452.807
Tuscumbia, Ala	T. B. M. 79	137.238	450.255
Do	T. B. M. 80	142.768	468.398
Do	P. B. M. 8	146.353	480.160
Do	P. B. M. 9	143.183	469.760
Near Florence, Ala	T. B. M. 86	141.332	463.687
Do	P. B. M. 10	134.548	441.430
Florence, Ala	T. B. M. 87	137.313	450.501
Do	Old Gauge B. M	131.383	431.046
Do	P. B. M. 11	131.594	431.738
Do	P. B. M. 12	131.694	432.066
Do	T. B. M. 90	139.849	458.821
Do	P. B. M. 13	139.249	456.853
East Florence, Ala	P. B. M. 14	144.043	472.581
Near East Florence, Ala	T. B. M. 93	133.409	437.693
Do	P. B. M. 15	135.023	442.988
Do	P. B. M. 16	133.426	437.748
Near Bainbridge, Ala	P. B. M. 17	130.713	428.848
Do	T. B. M. 99	131.314	430.819
Bainbridge, Ala	P. B. M. 18	133.954	439.481
Lock 9, Muscle Shoals Canal, Ala.	T. B. M. 102	132.980	436.285
Do	P. B. M. 19	132.986	436.305
Lock 8, Muscle Shoals Canal, Ala.	T. B. M. 103	136.053	446.367
Do	P. B. M. 20	136.058	446.384
Lock 7, Muscle Shoals Canal, Ala.	T. B. M. 104	138.636	454.842
Do	P. B. M. 21	139.703	458.342
Near Lock 7, Muscle Shoals Canal, Ala.	P. B. M. 22	139.552	457.847
Do	T. B. M. 105	139.941	459.123
Lock 6, Muscle Shoals Canal, Ala.	T. B. M. 107	142.442	467.328
Do	P. B. M. 23	143.659	471.321
Near Lock 6, Muscle Shoals Canal, Ala.	T. B. M. 108	143.416	470.524
Do	P. B. M. 24	143.721	471.525
Do	T. B. M. 109	143.601	471.131
Near Lock 5, Muscle Shoals Canal, Ala.	P. B. M. 25	143.760	471.653
Lock 5, Muscle Shoals Canal, Ala.	T. B. M. 113	147.300	483.267
Do	P. B. M. 26	147.294	483.247
Near Lock 5, Muscle Shoals Canal, Ala.	P. B. M. 27	147.321	483.336
Do	T. B. M. 114	147.169	482.837
Near Lock 4, Muscle Shoals Canal, Ala.	P. B. M. 28	148.392	486.849
Lock 4, Muscle Shoals Canal, Ala.	T. B. M. 116	150.840	494.881
Do	P. B. M. 29	150.380	493.372
Near Lock 3, Muscle Shoals Canal, Ala.	P. B. M. 30	152.219	499.405
Lock 3, Muscle Shoals Canal, Ala.	T. B. M. 118	154.050	505.412
Do	P. B. M. 31	154.042	505.386
Near Lock 3, Muscle Shoals Canal, Ala.	T. B. M. 119	154.137	505.698
Near Lock 2, Muscle Shoals Canal, Ala.	T. B. M. 120	154.690	507.512
Lock 2, Muscle Shoals Canal, Ala.	T. B. M. 121	155.896	511.469
Do	P. B. M. 32	155.898	511.475
Near Lock 2, Muscle Shoals Canal, Ala.	P. B. M. 33	156.494	513.431
Near Lock 1, Muscle Shoals Canal, Ala.	T. B. M. 125	158.910	521.357
Lock 1, Muscle Shoals Canal, Ala.	P. B. M. 34	158.916	521.377
Near Lock 1, Muscle Shoals Canal, Ala.	T. B. M. 126	158.830	521.095
Near Lambs Ferry, Ala	T. B. M. 128	156.924	514.841
Sycamore Landing, Ala	P. B. M. 35	160.221	525.658
Do	P. B. M. 36	161.234	528.982
Near Lock B, Elk River Canal, Ala.	P. B. M. 37	163.384	536.036
Do	P. B. M. 38	166.565	546.472
Lock B, Elk River Canal, Ala.	T. B. M. 140	161.472	529.763
Do	P. B. M. 39	161.476	529.776
Lock A, Elk River Canal, Ala.	P. B. M. 40	164.112	538.424
Do	T. B. M. 141	164.578	539.953
Near Lock A, Elk River Canal, Ala.	P. B. M. 41	163.634	536.856
Do	P. B. M. 42	164.112	538.424
Do	T. B. M. 142	163.341	535.895
Near Miltons Bluff, Ala	P. B. M. 43	163.798	537.394
Miltons Bluff, Ala	T. B. M. 143	163.360	535.957
Near Milton's Bluff, Ala	T. B. M. 146	164.335	539.156
Near Browns Ferry, Ala	P. B. M. 44	164.742	540.491
Do	P. B. M. 45	166.256	545.458
Do	P. B. M. 46	166.472	546.167
Near Finleys Landing, Ala.	P. B. M. 47	167.294	548.864
Decatur, Ala	T. B. M. 176	164.261	538.913
Do	P. B. M. 48	165.031	541.439
Do	P. B. M. 49	167.122	548.299

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Decatur, Ala	U. S	*173.028	567.676
Do	Old Railroad B. M.	†173.258	568.431
Do	Old Railroad B. M.	‡172.882	567.197
Riverton, Ala	P. B. M. 4	122.061	400.462
Near Riverton, Ala	Lift lock center line stone 3.	118.587	389.064
Do	P. B. M. 5	126.250	414.205
Do	P. B. M. 6	128.626	422.000
Do	P. B. M. 53	123.381	404.792
Near Paynes Landing, Ala.	P. B. M. 54	121.546	398.772
Near Indian Creek, Miss	P. B. M. 55	126.434	414.809
Buggs Landing, Miss	P. B. M. 56	113.242	371.528
Near Buggs Landing, Miss.	P. B. M. 57	118.079	387.398
Near Yellow Creek, Tenn	P. B. M. 58	124.153	407.325
Do	P. B. M. 59	112.609	369.451
Near Boyds Landing, Tenn.	P. B. M. 60	122.507	401.925
Near Hamburg Landing, Tenn.	Old P. B. M. 1	107.194	351.686
Pittsburg Landing, Tenn.	Old P. B. M. 2	118.173	387.706
Do	P. B. M. 61	128.384	421.206
Decatur, Ala	M_3	176.194	578.063
Do	N_3	182.277	598.020
Do	O_3	180.088	590.839
Trinity, Ala	P_3	193.219	633.919
Hillsboro, Ala	O_3	182.355	598.276
Do	R_3	183.193	601.026
Courtland, Ala	S_3	172.986	567.538
Do	T_3	172.661	566.472
Near Courtland, Ala	U_3	167.594	549.848
Near Town Creek, Ala	V_3	165.102	541.672
Leighton, Ala	W_3	174.482	572.446
Near Tuscumbia, Ala	X_3	155.734	510.937
Near Prides, Ala	Y_3	134.618	441.659
Near Cherokee, Ala	Z_3	164.090	538.352
Near Margerum, Ala	A_4	134.137	440.081
Near Riverton Junction, Ala.	B_4	126.432	414.802
Do	C_4	132.074	433.313
Near Burnsville, Miss	A_3	164.179	538.644
Near Corinth, Miss	B_3	146.645	481.118
Corinth, Miss	T. B. M. 1	§137.004	449.487
Do	C_3	136.675	448.408
South Rockwood, Mich	A	179.020	587.335
Newport, Mich	B	176.906	580.399
Monroe, Mich	C‖	177.109	581.065
Do	P. B. M. M. C. Bridge.¶	178.072	584.225
Do	D	180.067	590.770
Near La Salle, Mich	E	177.492	582.322
Vienna, Mich	F	179.475	588.828
Alexis, Ohio	U	178.455	585.481
Toledo, Ohio	Toledo City, No. 165.	181.789	596.419
Do	Park A	183.221	601.118
Do	V	179.563	589.116
Do	Power House	177.608	582.702
Do	W	184.065	603.887
Do	Post Office	183.661	602.561
Do	Toledo City, No. 44	181.774	596.370
Do	Toledo City, No. 296.	179.940	590.353
Near Perrysburg, Ohio	X	183.834	603.129
Perrysburg, Ohio	Y	187.665	615.698
Roachton, Ohio	Z	197.387	647.594
Hull Prairie, Ohio	A_1	201.325	660.514
Haskins, Ohio	B_1	203.516	667.702
Tontogany, Ohio	C_1	204.067	669.510
Weston, Ohio	D_1	208.365	683.611
Do	E_1	208.089	682.705
Do	Weston Village	207.883	682.029
Milton Center, Ohio	F_1	210.259	689.825
Custar, Ohio	G_1	212.335	696.636
Deshler, Ohio	H_1	217.541	713.716
Do	I_1	217.365	713.138
Belmore, Ohio	J_1	224.547	736.701
Leipsic, Ohio	K_1	233.466	765.963
Do	L_1	232.777	763.703
Near Ottawa, Ohio	M_1	226.679	743.696
Ottawa, Ohio	N_1	222.303	729.339
Near Columbus Grove, Ohio.	O_1	227.516	746.442
Columbus Grove, Ohio	P_1	234.999	770.993
Do	Q_1	236.500	775.917
Near Monroe, Ohio	R_1	240.925	790.435
West Cairo, Ohio	S_1	248.296	814.618
Near Lima, Ohio	T_1	254.934	836.396
Lima, Ohio	U_1	267.941	879.076
Do	V_1	267.447	877.449
Do	Lima City	266.001	872.705
Near Cridersville, Ohio	W_1	264.854	868.942
Cridersville, Ohio	X_1	272.001	892.390
Near Wapakoneta, Ohio	Y_1	270.087	886.110
Wapakoneta, Ohio	Z_1	273.869	898.519
Near Wapakoneta, Ohio	A_2	279.170	915.910
Botkins, Ohio	B_2	306.320	1004.985
Anna, Ohio	C_2	314.063	1030.[illegible]8
Swanders, Ohio	D_2	308.838	1013.246
Near Swanders, Ohio	E_2	306.640	1006.035
Sidney, Ohio	F_2	305.033	1000.762
Do	Sidney City	291.713	957.062
Do	G_2	293.424	962.675
Near Sidney, Ohio	H_2	293.168	961.835
Kirkwood, Ohio	I_2	300.562	986.094
Near Piqua, Ohio	J_2	284.762	934.257
Piqua, Ohio	K_2	274.000	898.948
Do	Penn. R. R	263.783	865.428
Do	L_2	267.269	876.865
Farrington, Ohio	M_2	260.669	855.212
Near Troy, Ohio	N_2	257.410	844.519
Troy, Ohio	O_2	254.642	835.438
Do	P_2	256.352	841.048
Do	Troy City	255.327	837.685
Do	Q_2	253.334	831.147
Near Troy, Ohio	R_2	252.155	827.279
Do	S_2	247.753	812.836
Tippecanoe City, Ohio	T_2	245.953	806.931
Do	U_2	244.209	801.209
Near Tippecanoe City, Ohio.	V_2	242.995	797.226
Tadmor, Ohio	W_2	241.105	791.025
Near Tadmor, Ohio	X_2	235.737	773.414
Near Dayton, Ohio	Y_2	230.024	754.670
Dayton, Ohio	Z_2	226.900	744.421
Do	Dayton City	226.690	743.732
Do	A_3	226.599	743.434
Do	B_3	226.792	744.067
Near Dayton, Ohio	E_4	224.538	736.672
Do	C_3	222.009	728.374
Near Alexandria, Ohio	D^4	220.114	722.157
Near Whitfield, Ohio	D_3	217.722	714.310
Carrollton, Ohio	C_4	216.843	711.426
Miamisburg, Ohio	B_4	215.730	707.774
Near Miamisburg, Ohio	E_3	213.278	699.730
Miamisburg, Ohio	F_3	212.441	696.983
Do	A_4	214.922	705.123
Near Miamisburg, Ohio	G_3	211.457	693.755
Near Franklin, Ohio	Z_3	214.614	704.113
Near Carlisle, Ohio	H_3	210.946	692.079
Franklin, Ohio	I_3	209.997	688.965
Near Carlisle, Ohio	J_3	206.550	677.656
Near Franklin, Ohio	Y_3	208.621	684.451
Near Poasttown, Ohio	K_3	200.647	658.289
Near Middletown, Ohio	X_3	205.648	674.697
Heno, Ohio	L_3	195.998	643.037
Middletown, Ohio	M_3	203.150	666.501
Excello Mills, Ohio	W_3	194.534	638.234
Near Trenton, Ohio	N_3	192.941	633.007
Le Sourdsville, Ohio	V_3	190.481	624.936
Near Overpeck, Ohio	O_3	193.656	635.353
Near Rockdale, Ohio	U_3	192.130	630.346
Near Hamilton, Ohio	P_3	182.164	597.650
Near Woodsdale, Ohio	T_3	188.047	616.951
Hamilton, Ohio	Q_3	180.167	591.098
Do	Hamilton City	183.377	601.629
Do	R_3	184.501	605.317
Do	S_3	181.662	596.003
Near Hamilton, Ohio	Telegraph Pole 745	186.007	610.258
Do	F_4	183.593	602.338
Near Flockton, Ohio	P. R. R. No. 24	186.893	613.165
Do	P. R. R. No. 23	184.602	605.648
Near Jones, Ohio	G_4	194.765	638.991
Port Union, Ohio	P. R. R. No. 21	181.689	596.091
Near Crescentville, Ohio	P. R. R. No. 20	179.652	589.408
Near Crestvue, Ohio	H_4	197.169	646.879
Near Crescentville, Ohio	P. R. R. No. 19	176.529	579.162
Near Port Union, Ohio	P. R. R. No. 17	174.865	573.703
Near Glendale, Ohio	I_4	185.075	607.200
Do	J_4	174.744	573.306
Lockland, Ohio	T_4	174.982	574.087
Rensselaer, Ohio	K_4	164.284	538.988
Carthage, Ohio	L_4	168.068	551.403
Do	S_4	168.026	551.265
St. Bernard, Ohio	R_4	167.138	548.352

* This elevation is the result of leveling up to and including 1900. In October, 1901, this bench mark was reported as disturbed.
† 1895.
‡ 1901. According to observer's note in 1901 the bench mark may have been disturbed or may not have been correctly identified.
§ Bench mark apparently settled. Elevation from leveling of 1901 only.
‖ Destroyed.
¶ No description available.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Ivorydale, Ohio	M_4	152.243	499.484
Winston Springs, Ohio	U. S. G. S. No. 498*	151.783	497.975
Cincinnati, Ohio	Q_4	164.984	541,285
Do	N_4	152.696	500.971
Do	O_4	149.857	491.656
Do	Cincinnati City	153.716	504.317
Do	P_4	166.208	545.301
Do	Reference mark to Cincinnati City No. 1.	168.223	551.912
Do	Y_4	168.578	553.076
Do	Z_4	149.602	490.819
Do	Gauge B. M	149.850	491.633
Do	U_4	150.567	493.985
Ludlow, Ky	A_5	162.500	533.135
Cincinnati, Ohio	V_4	153.720	504.330
Do	U. S. H	152.275	499.589
Sedamsville, Ohio	U. S. G. S	149.863	491.676
Cincinnati, Ohio	W_4	150.718	494.481
St. Joseph, Ohio	X_4	148.107	485.914
Delhi, Ohio	Canal Stone	148.657	487.719
Near Delhi, Ohio	B_5	150.620	494.159
North Bend, Ohio	C_5	149.890	491.764
Near Lawrenceburg, Ind	D_5	147.107	482.634
Lawrenceburg, Ind	E_5	147.506	483.943
Gibraltar, Mich	(1877)	177.555	582.528
Do	2 (1875)	178.322	585.045
Do	1 (1898)	179.104	587.610
Trenton, Mich	2 (1898)	183.400	601.705
Do	(1877)	183.946	603.496
Amherstburg, Ontario	Gauge B. M	176.532	579.172
Near Sibleys, Mich	P. B. M. 3	180.887	593.400
Wyandotte, Mich	P. B. M. 4	178.533	585.737
Do	(1877)	178.730	586.383
Ecorse, Mich	P. B. M. 5	178.241	584.779
Do	P. B. M. 6	176.380	578.673
Delray, Mich	P. B. M. 7	180.844	593.319
Detroit, Mich	P. B. M. 8	183.340	601.508
Do	P. B. M. 9	177.702	583.011
Do	(1871)	178.252	584.815
Do	P. B. M. 10	180.688	592.807
Do	P. B. M. 11	179.089	587.561
Windmill Point, Mich	P. B. M. 12	178.070	584.218
Grossepoint, Mich	P. B. M. 13	180.466	592.079
Grossepoint Farms, Mich	P. B. M. 35	184.385	604.936
Do	P. B. M. 36	184.741	606.104
Near Roseville, Mich	P. B. M. 37	178.211	584.081
Do	P. B. M. 38	177.117	581.091
Do	P. B. M. 39	177.098	581.029
Near Mt. Clemens, Mich	P. B. M. 40	176.854	580.228
Do	P. B. M. 41	180.192	591.180
New Baltimore, Mich	P. B. M. 34	179.910	590.255
Do	P. B. M. 33	179.409	588.611
Do	P. B. M. 32	182.904	600.078
Near Fair Haven, Mich	P. B. M. 31	177.944	583.805
Fair Haven, Mich	P. B. M. 30	177.850	583.496
Algonac, Mich	P. B. M. 29	178.278	584.900
Do	P. B. M. 28	178.354	585.150
Near Roberts Landing, Mich.	P. B. M. 27	178.370	585.202
Marine City, Mich	P. B. M. 26	178.752	586.456
Do	P. B. M. 25	179.271	588.158
Do	P. B. M. 24	179.786	589.848
East China, Mich	P. B. M. 23	180.089	590.842
St. Clair, Mich	P. B. M. 22	182.782	599.677
Do	P. B. M. 21	179.469	588.808
Do	P. B. M. 20	191.201	627.299
Marysville, Mich	P. B. M. 19	179.836	590.012
Do	P. B. M. 18	178.968	587.164
Near Black River, Mich	P. B. M. 17	181.882	596.725
Port Huron, Mich	P. B. M. 16	181.437	595.265
Do	P. B. M. 15	182.704	599.421
Do	P. B. M. 14	182 924	600.143
Fort Gratiot, Mich	L. H. (1877)	179.937	590.343
Lakeport, Mich	P. B. M. Lakeport	181.493	595.448
Lexington, Mich	P. B. M. Lexington 1	190.042	623.496
Do	P. B. M. Lexington 2	188.864	619.631
Do	P. B. M. Lexington 3	189.788	622.663
Do	P. B. M. Lexington 4	186.795	612.843
Sand Beach, Mich	U. S. B. M	179.166	587.814
Do	U. S. B. M. A	177.869	583.559
Do	U. S. B. M. B	177.752	583.175
Do	U. S. B. M. E	177.762	583.207
Do	U. S. B. M. Jenks	186.099	610.569
Do	U. S. B. M. Bowlder in Harbor.	177.600	582.676
Mackinaw, Mich	B. M. 1	180.112	590.917
Do	B. M. 2	180.794	593.155
Do	B. M. 3	178.901	586.944
Do	B. M. R	179.814	589.940
Do	B. M. 4	178.046	584.139
Milwaukee, Wis	B. M. 1	†180.754	593.024
Do	B. M. 2	193.870	636.055
Do	B. M. 3	193.233	633.965
Do	B. M. 4	181.145	594.307
Do	B. M. 5 (1876)	179.999	590.547
Detour, Mich	P. B. M. Goetz	183.602	602.368
Do	P. B. M. Detour 2	178.775	586.531
Do	P. B. M. Terrett	182.788	599.697
Do	P. B. M. Detour 1	186.500	611.875
Do	P. B. M. Detour 3	180.216	591.259
Do	P. B. M. Detour 4	181.349	594.976
Do	P. B. M. Detour 5	179.973	590.461
Do	P. B. M. Boathouse.	177.448	582.177
Near Detour, Mich	P. B. M. Caribou	194.902	639.441
Near Schlesser, Mich	P. B. M. Schlesser	214.251	702.922
Raber, Mich	P. B. M. Raber	177.529	582.443
Near Gatesville, Mich	P. B. M. Gatesville.	218.693	717.495
Near Raber, Mich	P. B. M. Hudson	207.335	680.232
Near Stalwart, Mich	P. B. M. Tripp	207.510	680.806
Near Sterlingville, Mich	P. M. B. Fairview	209.473	687.246
Do	P. B. M. Campbell	191.357	627.810
Kelden, Mich	P. B. M. Munuscong	183.339	601.505
Barbeau, Mich	P. B. M. Barbeau	201.437	660.881
Near McCarron, Mich	P. B. M. Charlotte	183.548	602.190
Near Rosedale, Mich	P. B. M. Hinds	180.501	592.194
Do	P. B. M. Newcomb.	178.244	584.789
Near Sault Sainte Marie, Mich.	P. B. M. Riverside	179.869	590.120
Do	P. M. B. Little	178.694	586.265
Sault Sainte Marie, Mich	P. B. M. Soo	188.907	619.772
Do	P. B. M. A	184.730	606.068
Do	P. B. M. B	179.414	588.627
Do	P. B. M. Meridian	185.268	607.833
Do	P. B. M. Neesville	195.595	641.715
Near Sault Sainte Marie, Mich.	P. B. M. 1.	195.710	642.092
Do	P. B. M. Solomon	185.422	608.339
Do	P. B. M. Brush	184.014	603.719
Do	P. B. M. 2	195.486	641.357
Near Brimley, Mich	P. B. M. 3	204.324	670.353
Brimley, Mich	P. B. M. 4	197.522	648.037
Bay Mills, Mich	P. B. M. Bay Mills	185.800	609.579
Near Bay Mills, Mich	P. B. M. Mission	194.062	636.685
Iroquois Point, Mich	P. B. M A	188.496	618.424
Do	P. B. M. Iroquois L. H.	189.596	622.033
Do	P. B. M. Old B. M	189.801	622.705
Do	P. B. M. Iroquois 1	187.481	615.094
Do	P. B. M. Iroquois	185.336	608.057
Escanaba, Mich	B. M. 1 Escanaba (1874)	180.932	593.608
Do	B. M. 3 (1876)	178.954	587.118
Near Maple Ridge, Mich	B. M. 4 (1876)	292.371	959.221
Near Sands, Mich	B. M. 5 (1876)	366.583	1202.698
Marquette, Mich	B. M. 6 (1876)	191.541	628.414
Do	B. M. 1 Marquette (1871).	186.077	610.488
Do	B. M. 2 (1874)	185.925	609.989
Do	B. M. 3 (1874)	185.901	609.910
Do	B. M. 11 (1896)	189.183	620.678
Olcott, N. Y	P. B. M. 4	79.018	259.245
Do	P. B. M. 5	87.266	286.305
Do	P. B. M. 6	76.155	249.852
Do	P. B. M. 3	83.512	273.989
Do	P. B. M. 2	84.038	275.715
Do	P. B. M. 1	87.571	287.306
Near Newfane, N. Y	T. B. M. 60	95.829	314.399
Near Coomer, N. Y	T. B. M. 59	96.315	315.993
Near Wilson, N. Y	T. B. M. 53	93.220	305.839
Wilson, N. Y	P. B. M. Wilson	88.335	289.812
Near Ransomville, N. Y	T. B. M. 47	95.271	312.568
Do	T. B. M. 43	97.760	320.734
Ransomville, N. Y	P. B. M. Ransomville	99.696	327.086
Do	T. B. M. 41	98.450	322.998
Near Model City, N. Y	T. B. M. 37	100.249	328.900
Model City, N. Y	P. B. M. Model City.	110.834	363.628
Near Model City, N. Y	T. B. M. 35	126.195	414.025
Lewiston, N. Y	P. B. M. Lewiston	122.326	401.331
Lewiston Heights, N. Y	P. B. M. Lewiston Heights 2.	154.352	506.403
Do	T. B. M. 31	161.824	530.918
Near Lewiston Heights, N. Y.	P. B. M. Lewiston Heights 1.	183.146	600.872
Near Niagara Falls, N. Y	University	179.635	589.352
Niagara Falls, N. Y	P. B. M. Suspension Bridge.	178.118	584.375
Do	T. B. M. 24	183.941	603.480
Do	P. B. M. Echota	174.627	572.922
Do	P. B. M. Niagara 1	172.684	566.547
Do	P. B. M. Niagara 2	174.293	571.826
Near La Salle, N. Y	P. B. M. Schoolhouse	175.341	575.265

* Original disk missing, 1899.

† Destroyed.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
La Salle, N. Y.	P. B. M. La Salle 2	176.873	580.291
Do	P. B. M. La Salle 1	174.227	571.610
Near La Salle, N. Y.	T. B. M. 16	174.721	573.230
Do	P. B. M. Wheatfield	175.730	576.541
Near North Tonawanda, N. Y.	P. B. M. Crossing	174.491	572.476
North Tonawanda, N. Y.	P. B. M. North Tonawanda 2.	176.425	578.821
Do	P. B. M. North Tonawanda 1.	176.720	579.789
Tonawanda, N. Y.	P. B. M. Tonawanda 1	175.630	576.213
Do	P. B. M. Tonawanda 2	175.305	575.146
Do	P. B. M. State Ditch.	175.307	575.153
Do	T. B. M. 11	178.590	585.924
Pullman, N. Y.	T. B. M. 9	184.129	604.097
Near Buffalo, N. Y.	T. B. M. 8	184.045	603.821
Buffalo, N. Y.	T. B. M. 7	183.979	603.604
Do	P. B. M. St. John	180.450	592.026
Do	P. B. M. Guard Lock	175.763	576.649
Do	P. B. M. Black Rock.	176.850	580.215
Do	P. B. M. International Bridge 2.	177.473	582.259
Do	P. B. M. International Bridge 1.	176.740	579.854
Do	P. B. M. Water Works	177.639	582.804
Do	P. B. M. Fire Station	177.344	581.836
Do	L. H.	179.863	590.101
Between Buffalo and Tonawanda, N. Y.	D. W. Cherry*	175.670	576.344
Pendleton Center, N. Y.	D. W. Sawyers Creek	177.239	581.492
Do	D. W. Pendleton 1	180.183	591.150
Do	D. W. Pendleton 2	189.276	620.983
Near Lockport, N. Y.	D. W. Lockport 1, N. Y. 554.	179.935	590.337
Do	D. W. Lockport 2	122.071	400.495
Lockport, N. Y.	D. W. Lockport 3	113.402	372.053
Wrights Corners, N. Y.	D. W. Wrights	123.242	404.336
Near Newfane, N. Y.	U. S. G. S.	108.782	356.896
Newfane, N. Y.	D. W. Newfane 1	93.020	305.183
Near Newfane, N. Y.	D. W. Newfane 2	100.662	330.255
Near La Salle, N. Y.	D. W. Monument	184.796	606.285
Lewistown, N. Y.	D. W. Lewiston 3	110.748	363.346
Near Lewiston, N. Y.	D. W. Lewiston 4	99.150	325.295
Do	D. W. Lewiston 5	86.772	284.684
Near Niagara Falls, N. Y.	D. W. Niagara 2	172.827	567.017
On International Bridge, Ontario.	D. W. International Bridge 3.	176.625	579.477
Fort Erie, Ontario	D. W. Fort Erie	173.918	570.596
On Lake Erie, Ontario	D. W. Lake Erie	177.442	582.158
Detroit Junction, Mich.	U. S. B. M. Detroit Jct. (1877).	180.690	592.814
New Haven, Mich.	U. S. B. M. New Haven (1877).	192.330	631.003
Pine River, Mich.	U. S. B. M. Pine River (1877).	191.729	629.031
Port Colborne, Ontario	B. M. Custom-house.	178.150	584.480
Do	B. M. Baptist Church	176.870	580.281
Do	B. M. Church of England.	176.428	578.831
Port Dalhousie, Ontario	B. M. A.	80.433	263.887
Do	B. M. B.	78.610	257.906
Do	B. M. C.	78.665	258.087
Rensselaer, N. Y.	L. S. 1	4.242	13.917
Do	L. S. 2	7.974	26.161
Do	L. S. 3	6.502	21.332
East Albany, N. Y.	1 (1875) = L. S. 4	8.008	26.273
Albany, N. Y.	2 (1875) = L. S. 5	5.128	16.824
Do	L. S. 6	7.987	26.204
Near Albany, N. Y.	L. S. 7	9.157	30.043
Watervliet, N. Y.	L. S. 8	7.841	25.725
Near Watervliet, N. Y.	6 (1875) = L. S. 9	14.936	49.003
Cohoes, N. Y.	7a (1875) = L. S. 10	21.252	69.724
Do	8a (1875) = L. S. 11	48.710	159.809
Do	L. S. 12	57.936	190.078
Near Cohoes, N. Y.	L. S. 13	58.610	192.290
Crescent, N. Y.	L. S. 14	59.320	194.619
Near Crescent, N. Y.	L. S. 15	58.837	193.034
Near Vischers Ferry, N. Y.	L. S. 16	58.613	192.299
Do	L. S. 17	58.141	190.751
Do	12 (1875) = L. S. 18	58.177	190.869
Vischers Ferry, N. Y.	L. S. 19	61.958	203.274
Fondas Basin, N. Y.	L. S. 20	64.698	212.263
Rexford Flats, N. Y.	L. S. 21	67.520	221.522
Do	L. S. 22	70.540	231.430
Near Rexford Flats, N. Y.	L. S. 23	70.508	231.325
Near Schenectady, N. Y.	L. S. 24	71.598	234.901
Schenectady, N. Y.	L. S. 25	71.667	235.127
Do	L. S. 26	70.999	232.936
Do	L. S. 27	70.999	232.936
Near Schenectady, N. Y.	L. S. 28	71.641	235.042
Do	L. S. 29	73.029	239.596
Do	L. S. 30	73.959	242.647
Do	L. S. 31	77.306	253.628
Near Pattersonville, N. Y.	19(1875) = L. S. 32	76.489	250.948
Do	L. S. 33	78.722	258.274
Pattersonville, N. Y.	L. S. 34	78.981	259.123
Near Pattersonville, N. Y.	L. S. 35	79.023	259.261
Near Amsterdam, N. Y.	L. S. 36	78.788	258.490
Do	21(1875) = L. S. 37	80.364	263.661
Do	L. S. 38	80.387	263.736
Do	L. S. 39	82.808	271.679
Amsterdam, N. Y.	L. S. 40	85.169	279.425
Do	L. S. 41	84.290	276.541
Do	L. S. 42	80.360	263.648
Near Amsterdam, N. Y.	24a(1875) = L. S. 43	85.322	279.927
Near Fort Hunter, N. Y.	L. S. 44	86.092	282.454
Fort Hunter, N. Y.	L. S. 45	90.800	297.900
Near Fultonville, N. Y.	L. S. 46	91.531	300.298
Do	L. S. 47	90.975	298.474
Fultonville, N. Y.	L. S. 48	92.064	302.047
Near Fultonville, N. Y.	L. S. 49	91.420	299.934
Do	L. S. 50	91.253	299.386
Do	L. S. 51	90.546	297.066
Between Downing and Sprakers, N. Y.	L. S. 52	90.599	297.240
Near Sprakers, N. Y.	L. S. 53	91.105	298.900
Sprakers, N. Y.	L. S. 54	92.606	303.825
Do	29(1875) = L. S. 55	93.063	305.324
Canajoharie, N. Y.	L. S. 56	93.923	308.146
Do	31(1875) = L. S. 57	93.410	306.463
Near Fort Plain, N. Y.	L. S. 58	93.696	307.401
Do	L. S. 59	95.144	312.152
Fort Plain, N. Y.	L. S. 60	95.779	314.235
Near Fort Plain, N. Y.	L. S. 61	95.625	313.730
Near St. Johnsville, N. Y.	L. S. 62	95.409	313.021
Do	34(1875) = L. S. 63	97.349	319.386
St. Johnsville, N. Y.	L. S. 64	97.706	320.557
Near Mindenville, N. Y.	L. S. 65	99.259	325.652
Do	35a(1875) = L. S. 66	100.024	328.162
Indian Castle, N. Y.	L. S. 67	102.085	334.924
Near Indian Castle, N. Y.	L. S. 68	102.663	336.820
Little Falls, N. Y.	37(1875) = L. S. 69	104.695	343.487
Do	L. S. 70	107.755	353.526
Do	L. S. 71	110.691	363.159
Do	L. S. 72	113.754	373.208
Near Little Falls, N. Y.	38a(1875) = L. S. 73	115.296	378.267
Do	L. S. 74	116.154	381.082
Do	L. S. 75	118.619	389.169
Near Herkimer, N. Y.	39a(1875) = L. S. 76	119.886	393.326
Herkimer, N. Y.	L. S. 77	120.241	394.491
Mohawk, N. Y.	L. S. 78	119.826	393.129
Near Mohawk, N. Y.	L. S. 79	121.436	398.411
Do	L. S. 80	124.358	407.998
Ilion, N. Y.	L. S. 81	124.751	409.287
Do	L. S. 82	124.525	408.546
Near Ilion, N. Y.	L. S. 83	127.240	417.453
Frankfort, N. Y.	L. S. 84	130.249	427.325
Do	41(1875) = L. S. 85	127.624	418.713
Near Frankfort, N. Y.	L. S. 86	131.777	432.338
Near Utica, N. Y.	L. S. 87	130.356	427.676
Do	L. S. 88	131.470	431.331
Utica, N. Y.	L. S. 89	131.533	431.538
Do	L. S. 90	130.367	427.712
Do	L. S. 91	131.563	431.636
Do	L. S. 92	131.189	430.409
Near Utica, N. Y.	L. S. 93	132.805	435.711
Whitesboro, N. Y.	L. S. 94	132.188	433.687
Do	L. S. 95	132.578	434.966
Near Oriskany, N. Y.	L. S. 96	133.062	436.554
Oriskany, N. Y.	L. S. 97	132.271	433.959
Near Oriskany, N. Y.	L. S. 98	132.830	435.793
Do	L. S. 99	132.011	433.106
Stanwix, N. Y.	L. S. 100	133.389	437.627
Rome, N. Y.	L. S. 101	132.132	433.503
Do	L. S. 102	132.920	436.088
Near Rome, N. Y.	L. S. 103	132.669	435.265
Do	L. S. 104	132.016	433.122
Do	L. S. 105	132.707	435.390
New London, N. Y.	L. S. 106	132.691	435,337
Stacys Basin, N. Y.	L. S. 107	132.785	435.645
Do	49(1875) = L. S. 108	132.243	433.867
Near Higginsville, N. Y.	51(1875) = L. S. 109	131.384	431.049
Higginsville, N. Y.	L. S. 110	132.062	433.273
Near Higginsville, N. Y.	L. S. 111	114.385	375.278
Sylvan Junction, N. Y.	L. S. 112	114.915	377.017
North Bay, N. Y.	L. S. 113	118.023	387.214
Near North Bay, N. Y.	L. S. 114	128.662	422.119
Cleveland, N. Y.	L. S. 115	120.324	394.763
Do	L. S. 116	128.933	423.008
Bernhardts Bay, N. Y.	L. S. 117	117.843	386.623

* This bench mark may be identical with N. Y. 543. (See page 102.) If found to be the same the mean of the two elevations should be used.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Constantia, N. Y.	L. S. 118	119.992	393.674
Near Constantia, N. Y.	L. S. 119	125.186	410.714
West Monroe, N. Y.	L. S. 120	120.427	395.101
Central Square, N. Y.	L. S. 121	138.372	453.975
Near Caughdenoy, N. Y.	L. S. 122	116.047	380.731
Pennellville, N. Y.	L. S. 123	125.721	412.470
Near Fulton, N. Y.	L. S. 124	121.872	399.842
Fulton, N. Y.	L. S. 125	106.054	347.945
Do.	L. S. 126	100.287	329.025
Do.	L. S. 127	98.501	323.165
Do.	L. S. 128	98.290	322.473
Near Fulton, N. Y.	L. S. 129	97.592	320.183
Do.	L. S. 130	95.100	312.007
Minetto, N. Y.	L. S. 131	91.815	301.230
Near Minetto, N. Y.	L. S. 132	88.889	291.630
Near Oswego, N. Y.	L. S. 133	87.378	286.673
Do.	L. S. 134	82.775	271.571
Do.	L. S. 135	83.734	274.717
Oswego, N. Y.	L. S. 136	78.903	258.868
Do.	L. S. 137	77.716	254.973
Do.	L. S. 138	80.031	262.568
Do.	L. S. 139	76.728	251.732
Do.	A	76.779	251.899
Do.	B	76.935	252.411
Do.	C	79.851	261.978
Near Bath, N. Y.	D. W. Bath	6.226	20.426
West Troy, N. Y.	N. Y. 12	6.449	21.158
Near Troy, N. Y.	D. W. Troy 3	5.560	18.241
Cohoes, N. Y.	D. W. Cohoes 2	33.854	111.069
Do.	D. W. Cohoes 3	47.476	155.761
Near Cohoes, N. Y.	N. Y. 33	48.977	160.685
Do.	9a(1875)	58.907	193.264
Near Crescent, N. Y.	D. W. Crescent	58.622	192.329
Dunsbach Ferry, N. Y.	D. W. Dunsbach	56.738	186.148
Niskayuna, N. Y.	D. W. Niskayuna	59.808	196.220
Near Vischers Ferry, N. Y.	D. W. Vischers	60.831	199.576
Near Aqueduct Station, N. Y.	D. W. Aqueduct 1	82.884	271.929
Aqueduct Station, N. Y.	N. Y. 57	82.450	270.505
Near Aqueduct Station, N. Y.	D. W. Aqueduct 3	80.511	264.143
Schenectady, N. Y.	N. Y. 65	73.257	240.344
Do.	N. Y. 67	71.004	232.952
Near Rotterdam Junction, N. Y.	N. Y. 76a	76.425	250.738
Rotterdam Junction, N. Y.	D. W. Rotterdam 1	76.776	251.889
Near Rotterdam Junction, N. Y.	D. W. Rotterdam 2	75.341	247.181
Pattersonville, N. Y.	D. W. Pattersonville	82.781	271.591
Near Amsterdam, N. Y.	D. W. Amsterdam 1	85.527	280.600
Amsterdam, N. Y.	D. W. Amsterdam 2	85.049	279.032
Fort Hunter, N. Y.	N. Y. 101	91.122	298.956
Near Auriesville, N. Y.	N. Y. 106	92.289	302.785
Fultonville, N. Y.	N. Y. 115	91.426	299.953
Near Downing, N. Y.	N. Y. 121	91.373	299.780
Do.	N. Y. 124	90.608	297.270
Near Sprakers, N. Y.	N. Y. 131	92.521	303.546
Fort Plain, N. Y.	N. Y. 142a	95.713	314.018
Mindenville, N. Y.	N. Y. 154	98.107	321.873
Near Indian Castle, N. Y.	N. Y. 160	100.207	328.762
Little Falls, N. Y.	N. Y. 173	115.064	377.506
Near Little Falls, N. Y.	N. Y. 175	115.156	377.808
Near Herkimer, N. Y.	N. Y. 182	117.270	384.743
Herkimer, N. Y.	N. Y. 187	118.438	388.575
Ilion, N. Y.	D. W. Ilion	117.830	386.581
Frankfort, N. Y.	D. W. Frankfort 1	122.465	401.787
Near Frankfort, N. Y.	D. W. Frankfort 3	124.498	408.457
Near Utica, N. Y.	D. W. Utica 1	120.987	396.938
Near Oriskany, N. Y.	D. W. Oriskany 2	128.500	421.587
Near Rome, N. Y.	D. W. Rome 1	130.466	428.037
Rome, N. Y.	D. W. Rome 2	131.610	431.790
Do.	D. W. Rome 3	131.901	432.745
Near Rome, N. Y.	D. W. Rome 4	128.290	420.898
New London, N. Y.	D. W. New London	124.432	408.241
Near Sylvan Beach, N. Y.	D. W. Sylvan Beach 1	116.286	381.515
Do.	D. W. Sylvan Beach 2	113.952	373.858
Near North Bay, N. Y.	D. W. North Bay	128.617	421.971
Brewerton, N. Y.	D. W. Brewerton	113.698	373.024
Near Caughdenoy, N. Y.	D. W. High Banks	112.014	367.499
On Sand Ridge, N. Y.	D. W. Sand Ridge	117.128	384.277
Near Ingalls Crossing, N. Y.	D. W. Ingalls 1	114.724	376.390
Do.	D. W. Ingalls 2	114.571	375.888
Phoenix, N. Y.	D. W. Phoenix	109.135	358.054
Hinmanville, N. Y.	D. W. Hinmanville 1	109.936	360.682
Near Hinmanville, N. Y.	D. W. Hinmanville 2	107.753	353.520
Near Fulton, N. Y.	D. W. Fulton 2	95.104	312.020
Albany, N. Y.	N. Y. 1	3.913	12.838
Do.	N. Y. 2	5.623	18.448
Do.	N. Y. 4	3.086	10.125
Near Albany, N. Y.	N. Y. 5a	7.625	25.016
Watervliet, N. Y.	N. Y. 8	9.800	32.152
Do.	N. Y. 9	7.976	26.168
Do.	N. Y. 10	8.852	29.042
Do.	N. Y. 11	8.649	28.376

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Troy, N. Y.	N. Y. 13	8.176	26.824
Near Green Island, N. Y.	N. Y. 14	11.484	37.677
Do.	N. Y. 15	14.887	48.842
Near Cohoes, N. Y.	N. Y. 16	18.174	59.626
Do.	N. Y. 17	21.224	69.632
Do.	N. Y. 18	24.166	79.285
Do.	N. Y. 19	27.291	89.537
Do.	N. Y. 20	30.382	99.678
Do.	N. Y. 21	33.414	109.626
Do.	N. Y. 22	36.466	119.639
Do.	N. Y. 23	39.542	129.731
Do.	N. Y. 24	42.560	139.632
Cohoes, N. Y.	N. Y. 25	45.591	149.576
Do.	N. Y. 27	48.680	159.711
Do.	N. Y. 28	51.710	169.652
Do.	N. Y. 29	54.801	179.793
Near Cohoes, N. Y.	N. Y. 31	58.014	190.334
Do.	N. Y. 32	58.550	192.093
Crescent, N. Y.	N. Y. 37	59.292	194.527
Near Crescent, N. Y.	N. Y. 38	58.359	191.466
Do.	N. Y. 41	58.282	191.214
Near Vischers Ferry, N. Y.	N. Y. 43	58.586	192.211
Do.	N. Y. 44	58.594	192.237
Do.	N. Y. 47	58.832	193.018
Vischers Ferry, N. Y.	N. Y. 48	60.504	198.504
Near Vischers Ferry, N. Y.	N. Y. 50	63.524	208.412
Fondas Basin, N. Y.	N. Y. 51	64.828	212.690
Rexford Flats, N. Y.	N. Y. 54	70.816	232.335
Do.	N. Y. 55	71.938	236.017
Near Rexford Flats, N. Y.	N. Y. 56	71.881	235.830
Near Schenectady, N. Y.	N. Y. 60	71.077	233.192
Schenectady, N. Y.	N. Y. 62	71.027	233.028
Do.	N. Y. 63	71.487	234.537
Do.	N. Y. 66a	72.073	236.460
Do.	N. Y. 66b	71.650	235.072
Do.	N. Y. 68	71.407	234.274
Do.	N. Y. 69	68.043	223.238
Near Schenectady, N. Y.	N. Y. 70	70.702	231.961
Do.	N. Y. 73	73.230	240.255
Do.	N. Y. 74	75.599	248.028
Do.	N. Y. 75	76.383	250.600
Near Rotterdam Junction, N. Y.	N. Y. 76	75.947	249.169
Do.	N. Y. 77	76.812	252.007
Do.	N. Y. 78	76.375	250.574
Do.	N. Y. 79	76.021	249.412
Do.	N. Y. 80	75.633	248.139
Near Pattersonville, N. Y.	N. Y. 82	77.991	255.875
Do.	N. Y. 84	78.990	259.153
Do.	N. Y. 85a	78.474	257.460
Do.	N. Y. 85	78.791	258.500
Do.	N. Y. 86	79.063	259.393
Do.	N. Y. 87	77.682	254.862
Near Amsterdam, N. Y.	N. Y. 92	82.912	272.020
Near Fort Hunter, N. Y.	N. Y. 96	86.090	282.447
Do.	N. Y. 98	87.555	287.253
Do.	N. Y. 99	88.532	290.459
Fort Hunter, N. Y.	N. Y. 100	90.801	297.903
Near Fort Hunter, N. Y.	N. Y. 102	92.135	302.280
Near Auriesville, N. Y.	N. Y. 104	92.090	302.132
Auriesville, N. Y.	N. Y. 105	91.607	300.547
Near Auriesville, N. Y.	N. Y. 107	91.470	300.098
Near Fultonville, N. Y.	N. Y. 110	91.716	300.905
Do.	N. Y. 111	92.012	301.876
Do.	N. Y. 113	91.624	300.603
Fultonville, N. Y.	N. Y. 116	91.900	301.509
Near Fultonville, N. Y.	N. Y. 119	91.718	300.911
Near Downing, N. Y.	N. Y. 122	91.317	299.596
Do.	N. Y. 123	90.594	297.224
Near West Downing, N. Y.	N. Y. 126	91.318	299.599
Near Sprakers, N. Y.	N. Y. 130	93.320	306.167
Do.	N. Y. 132	92.872	304.698
Do.	N. Y. 133	92.574	303.720
Near Canajoharie, N. Y.	N. Y. 134	92.853	304.635
Do.	N. Y. 137	93.693	307.391
Do.	N. Y. 138	93.329	306.197
Near Fort Plain, N. Y.	N. Y. 139	93.143	305.587
Do.	N. Y. 143	95.237	312.457
Do.	N. Y. 145	93.752	307.585
Do.	N. Y. 146	94.650	310.531
Near St. Johnsville, N. Y.	N. Y. 147	94.395	309.694
Do.	N. Y. 149	95.494	313.300
Do.	N. Y. 150	96.813	317.627
Do.	N. Y. 152	97.343	319.366
St. Johnsville, N. Y.	N. Y. 153	97.754	320.715
Near Mindenville, N. Y.	N. Y. 156	99.287	325.744
Do.	N. Y. 157	99.851	327.594
Do.	N. Y. 159	99.917	327.811
Near Indian Castle, N. Y.	N. Y. 161	99.617	326.827
Do.	N. Y. 162	99.546	326.594
Do.	N. Y. 163	101.745	333.808
Do.	N. Y. 165	102.418	336.016
Do.	N. Y. 166	102.440	336.089
Do.	N. Y. 167	103.192	338.556
Near Little Falls, N. Y.	N. Y. 174	114.973	377.207
Do.	N. Y. 176	115.329	378.375
Do.	N. Y. 178	116.121	380.974
Near Herkimer, N. Y.	N. Y. 180	117.435	385.285

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Herkimer, N. Y	N. Y. 181	117.349	385.003
Do	N. Y. 184	119.884	393.319
Near Mohawk, N. Y	N. Y. 188	119.577	392.312
Mohawk, N. Y	N. Y. 190	119.752	392.886
Do	N. Y. 192	123.875	406.413
Do	N. Y. 194	125.055	410.285
Ilion, N. Y	N. Y. 196	124.544	408.608
Do	N. Y. 198	125.065	410.317
Near Ilion, N. Y	N. Y. 199	124.730	409.218
Do	N. Y. 201	128.119	420.337
Near Frankfort, N. Y	N. Y. 202	128.774	422.486
Do	N. Y. 205	131.205	430.462
Do	N. Y. 206	131.313	430.816
Frankfort, N. Y	N. Y. 207	130.895	429.445
Near Frankfort, N. Y	N. Y. 208	131.419	431.164
Do	N. Y. 209	131.361	430.974
Near Utica, N. Y	N. Y. 210	131.086	430.071
Do	N. Y. 211	130.932	429.566
Do	N. Y. 212	130.618	428.536
Do	N. Y. 213	131.382	431.042
Do	N. Y. 214	130.995	429.773
Do	N. Y. 216	131.109	430.147
Utica, N. Y	N. Y. 218	129.877	426.105
Do	N. Y. 224	132.322	434.126
Near Utica, N. Y	N. Y. 226	132.771	435.600
Near Whitesboro, N. Y	N. Y. 227	132.137	433.519
Near Oriskany, N. Y	N. Y. 231	132.936	436.141
Do	N. Y. 234	132.602	435.045
Do	N. Y. 235	132.569	434.937
Do	N. Y. 236	132.916	436.075
Rome, N. Y	N. Y. 238	131.829	432.509
Near Rome, N. Y	N. Y. 240	132.562	434.914
Near New London, N. Y	N. Y. 242	131.885	432.693
Do	N. Y. 244	130.909	429.491
Near Stacys Basin, N. Y	N. Y. 246	132.717	435.422
Higginsville, N. Y	N. Y. 248	132.289	434.018
Do	N. Y. 249	130.476	428.070
Near Higginsville, N. Y	N. Y. 250	131.641	431.892
Do	N. Y. 251	130.583	428.421
Do	N. Y. 252	130.606	428.497
Do	N. Y. 253	131.829	432.509
Do	N. Y. 254	131.850	432.578
Do	N. Y. 255	130.482	428.089
Near Durhamville, N. Y	N. Y. 256	130.609	428.506
Durhamville, N. Y	N. Y. 257	129.149	423.716
Do	N. Y. 258	131.855	432.594
Do	N. Y. 259	131.490	431.397
Do	N. Y. 260	132.001	433.073
Near Durhamville, N. Y	N. Y. 261	132.324	434.133
Do	N. Y. 262	131.116	430.170
Near Canastota, N. Y	N. Y. 263	131.674	432.000
Do	N. Y. 264	130.466	428.037
Canastota, N. Y	N. Y. 265	131.755	432.266
Do	N. Y. 266	131.172	430.353
Do	N. Y. 267	131.979	433.001
Do	N. Y. 268	130.826	429.218
Near Canastota, N. Y	N. Y. 269	131.970	432.972
Do	N. Y. 270	132.047	433.224
Do	N. Y. 271	130.697	428.795
Do	N. Y. 272	132.076	433.319
Near Canaseraga, N. Y	N. Y. 273	130.447	427.975
Do	N. Y. 274	132.108	433.424
Near Chittenango, N. Y	N. Y. 275	131.800	432.414
Chittenango, N. Y	N. Y. 276	131.894	432.722
Near Chittenango, N. Y	N. Y. 277	130.504	428.162
Do	N. Y. 278	132.284	434.002
Do	N. Y. 279	132.673	435.278
Near Kirkville, N. Y	N. Y. 280	132.586	434.993
Do	N. Y. 281	132.734	435.478
Near Manlius, N. Y	N. Y. 282	129.876	426.102
Do	N. Y. 283	128.190	420.570
Manlius, N. Y	N. Y. 284	132.036	433.188
Near Dewitt, N. Y	N. Y. 285	132.508	434.737
Do	N. Y. 286	132.347	434.208
Do	N. Y. 287	132.720	435.432
Do	N. Y. 288	130.590	428.444
Do	N. Y. 289	132.268	433.949
Near Syracuse, N. Y	N. Y. 290	132.144	433.542
Do	N. Y. 291	131.585	431.708
Do	N. Y. 292	131.091	430.088
Syracuse, N. Y	N. Y. 293	131.252	430.616
Do	N. Y. 294	128.021	420.016
Do	N. Y. 295	125.793	412.706
Do	N. Y. 296	125.471	411.649
Do	N. Y. 297	124.882	409.717
Do	N. Y. 298	124.501	408.467
Do	N. Y. 299	123.474	405.098
Do	N. Y. 300	122.804	402.899
Do	N. Y. 301	123.237	404.320
Do	N. Y. 302	123.934	406.607
Do	N. Y. 303	123.520	405.249
Do	N. Y. 304	123.614	405.557
Do	N. Y. 305=U. S. G. S.	123.819	406.230
Do	N. Y. 306	123.042	403.680
Do	N. Y. 307	123.960	406.692
Near Syracuse, N. Y	N. Y. 308	123.154	404.048
Do	N. Y. 309	124.309	407.837
Near Syracuse, N. Y	N. Y. 310	124.168	407.375
Do	N. Y. 311	121.262	397.840
Do	N. Y. 312	125.155	410.613
Near Belle Isle, N. Y	N. Y. 313	126.784	415.957
Belle Isle, N. Y	N. Y. 314	126.774	415.924
Near Amboy, N. Y	N. Y. 315	124.035	406.938
Do	N. Y. 316	126.695	415.665
Do	N. Y. 317	125.171	410.665
Near Camillus, N. Y	N. Y. 318	123.216	404.251
Do	N. Y. 319	126.969	416.564
Near Warners, N. Y	N. Y. 320	126.972	416.574
Warners, N. Y	N. Y. 321=U. S. G. S.	125.756	412.584
Near Memphis, N. Y	N. Y. 322	126.953	416.512
Do	N. Y. 323	123.797	406.157
Do	N. Y. 324	126.079	413.644
Do	N. Y. 325	126.369	414.596
Near Jordan, N. Y	N. Y. 326	125.431	411.518
Do	N. Y. 327	125.509	411.774
Jordan, N. Y	N. Y. 328	126.193	414.018
Do	N. Y. 329	126.276	414.290
Do	N. Y. 330	125.924	413.136
Do	N. Y. 331	125.927	413.145
Near Jordan, N. Y	N. Y. 332	125.159	410.626
Do	N. Y. 333	123.964	406.705
Near Weedsport, N. Y	N. Y. 334	124.648	408.949
Do	N. Y. 335	123.801	406.170
Do	N. Y. 336	124.397	408.126
Do	N. Y. 337	124.320	407.873
Do	N. Y. 338	124.058	407.014
Do	N. Y. 339	124.335	407.922
Do	N. Y. 340	123.244	404.343
Weedsport, N. Y	N. Y. 341	124.096	407.138
Do	N. Y. 342	124.397	408.126
Near Weedsport, N. Y	N. Y. 343	124.361	408.008
Do	N. Y. 344	123.388	404.815
Near Port Byron, N. Y	N. Y. 345	124.819	409.510
Port Byron, N. Y	N. Y. 346	122.754	402.735
Do	N. Y. 347	124.568	408.687
Do	N. Y. 348	124.206	407.499
Do	N. Y. 349	123.212	404.238
Do	N. Y. 350=U. S. G. S.	124.218	407.539
Do	N. Y. 351=U. S. G. S.	123.938	406.620
Do	N. Y. 352=U. S. G. S.	122.920	403.280
Near Port Byron, N. Y	N. Y. 353	120.639	395.796
Near Montezuma, N. Y	N. Y. 354	120.808	396.351
Do	N. Y. 355	121.121	397.378
Do	N. Y. 356	120.813	396.367
Montezuma, N. Y	N. Y. 357	121.134	397.420
Do	N. Y. 358	121.056	397.165
Do	N. Y. 359	120.979	396.912
Do	N. Y. 360	121.068	397.204
Do	N. Y. 361	121.017	397.037
Near Montezuma, N. Y	N. Y. 362	120.976	396.902
Do	N. Y. 363=U. S. G. S.	120.897	396.643
Do	N. Y. 364	119.423	391.807
Do	N. Y. 365	120.035	393.815
Do	N. Y. 366	120.730	396.095
Near Meadville, N. Y	N. Y. 367	118.725	389.517
Do	N. Y. 368	118.590	389.074
Do	N. Y. 369	121.041	397.115
Do	N. Y. 370	118.246	387.945
Do	N. Y. 371	118.583	389.051
Near Clyde, N. Y	N. Y. 372	118.860	389.960
Do	N. Y. 373	121.104	397.322
Do	N. Y. 374	120.589	395.632
Do	N. Y. 375	118.728	389.527
Clyde, N. Y	N. Y. 376	121.586	398.903
Do	N. Y. 377	121.696	399.264
Near Clyde, N. Y	N. Y. 378	122.322	401.318
Do	N. Y. 379	122.418	401.633
Near Lock Berlin, N. Y	N. Y. 380	122.616	402.283
Do	N. Y. 381	120.103	394.038
Lock Berlin, N. Y	N. Y. 382	122.261	401.118
Do	N. Y. 383	123.920	406.561
Near Lock Berlin, N. Y	N. Y. 384	124.654	408.969
Do	N. Y. 385	124.917	409.832
Do	N. Y. 386	124.690	409.087
Near Lyons, N. Y	N. Y. 387	124.650	408.956
Do	N. Y. 388	124.629	408.887
Do	N. Y. 389	124.875	409.694
Lyons, N. Y	N. Y. 390	124.773	409.359
Do	N. Y. 391	124.276	407.729
Do	N. Y. 392	125.714	412.447
Do	N. Y. 393	125.828	412.821
Near Lyons, N. Y	N. Y. 394	126.772	415.918
Do	N. Y. 395	127.046	416.817
Do	N. Y. 396	128.857	422.758
Do	N. Y. 397	129.591	425.166
Do	N. Y. 398	127.113	417.037
Near Newark, N. Y	N. Y. 399	129.513	424.911
Do	N. Y. 400	127.370	417.880
Newark, N. Y	N. Y. 401	131.140	430.248
Do	N. Y. 402	133.671	438.552
Do	N. Y. 403	136.078	446.449
Do	N. Y. 404	136.482	447.775
Do	U. S. G. S.	139.468	457.571
Do	N. Y. 405	135.861	445.737

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Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Newark, N. Y.	N. Y. 406	136.995	449.458
Do	N. Y. 407	136.786	448.772
Near Port Gibson, N. Y.	N. Y. 408	136.786	448.772
Do	N. Y. 409	136.903	449.156
Port Gibson, N. Y.	N. Y. 410	136.870	449.048
Near Palmyra, N. Y.	N. Y. 411	137.029	449.569
Palmyra, N. Y.	N. Y. 412	136.837	448.939
Do	N. Y. 413	137.526	451.200
Do	N. Y. 414	136.383	447.450
Do	N. Y. 415	136.722	448.562
Near Palmyra, N. Y.	N. Y. 416	136.126	446.607
Do	U. S. G. S.	136.132	446.626
Do	N. Y. 417	137.159	449.996
Near Macedon, N. Y.	N. Y. 418	137.188	450.091
Macedon, N. Y.	N. Y. 419	139.082	456.305
Do	N. Y. 420	141.257	463.441
Near Macedon, N. Y.	N. Y. 421	141.964	465.760
Wayneport, N. Y.	N. Y. 422	142.146	466.357
Near Fairport, N. Y.	N. Y. 423	142.482	467.460
Do	N. Y. 424	140.677	461.538
Do	N. Y. 425	142.492	467.492
Fairport, N. Y.	N. Y. 426	142.112	466.246
Near Fairport, N. Y.	N. Y. 427	142.024	465.957
Do	N. Y. 428	138.990	456.003
Do	N. Y. 429	141.611	464.602
Do	N. Y. 430	142.020	465.944
Near Bushnell Basin, N. Y.	N. Y. 431	141.617	464.622
Do	N. Y. 432=U. S. G. S.	141.964	465.760
Do	N. Y. 433	141.563	464.445
Near Pittsford, N. Y.	N. Y. 434	141.992	465.852
Pittsford, N. Y.	N. Y. 435	142.168	466.430
Do	N. Y. 436	142.167	466.426
Near Pittsford, N. Y.	N. Y. 437	142.121	466.275
Do	N. Y. 438	138.527	454.484
Do	N. Y. 439	137.485	451.065
Do	N. Y. 440	142.064	466.088
Do	N. Y. 441	143.966	472.328
Near Brighton, N. Y.	N. Y. 442	144.602	474.415
Do	N. Y. 443	145.076	475.970
Do	N. Y. 444	145.052	475.891
Do	N. Y. 445	145.031	475.823
Brighton, N. Y.	N. Y. 446	146.691	481.269
Do	N. Y. 447	149.737	491.262
Near Rochester, N. Y.	N. Y. 448	152.825	501.393
Rochester, N. Y.	N. Y. 449	153.867	504.812
Do	N. Y. 450	155.665	510.711
Do	N. Y. 451	156.551	513.618
Do	N. Y. 452	156.506	513.470
Do	N. Y. 453	155.525	510.252
Do	N. Y. 454	156.364	513.004
Do	N. Y. 455	156.130	512.236
Do	N. Y. 456	156.792	514.408
Near Rochester, N. Y.	N. Y. 458	156.514	513.496
Do	N. Y. 459	156.739	514.235
Near South Greece, N. Y.	N. Y. 460	156.655	513.959
Do	N. Y. 461	156.236	512.584
South Greece, N. Y.	N. Y. 462	156.402	513.129
Near South Greece, N. Y.	N. Y. 463	156.823	514.510
Near Spencerport, N. Y.	N. Y. 464	156.449	513.283
Do	N. Y. 465	156.501	513.454
Spencerport, N. Y.	N. Y. 466	156.576	513.700
Do	N. Y. 467=U. S. G. S.	156.896	514.750
Near Spencerport, N. Y.	N. Y. 468	156.480	513.385
Do	N. Y. 469	156.761	514.307
Do	N. Y. 470	156.635	513.893
Near Brockport, N. Y.	N. Y. 471	157.104	515.432
Do	N. Y. 472	155.229	509.280
Do	N. Y. 473	156.338	512.919
Do	N. Y. 474	156.830	514.533
Brockport, N. Y.	N. Y. 475=U. S. G. S.	155.964	511.692
Do	N. Y. 476	156.516	513.503
Do	N. Y. 477	156.046	511.961
Near Brockport, N. Y.	N. Y. 478	157.223	515.822
Near Holley, N. Y.	N. Y. 479	155.959	511.675
Do	N. Y. 480	157.434	516.515
Holley, N. Y.	N. Y. 481	157.173	515.658
Near Holley, N. Y.	N. Y. 482	157.344	516.219
Hulberton, N. Y.	N. Y. 483	157.275	515.993
Near Hulberton, N. Y.	N. Y. 484	157.067	515.311
Do	N. Y. 485	157.484	516.679
Near Albion, N. Y.	N. Y. 486	157.568	516.954
Do	N. Y. 487	157.112	515.458
Albion, N. Y.	N. Y. 488	156.530	513.549
Near Albion, N. Y.	N. Y. 489	157.427	516.492
Do	N. Y. 490	156.882	514.704
Eagle Harbor, N. Y.	N. Y. 491	157.188	515.708
Do	N. Y. 492=U. S. G. S.	157.190	515.714
Near Eagle Harbor, N. Y.	N. Y. 493	157.541	516.866
Near Knowlesville, N. Y.	N. Y. 494	157.183	515.691
Do	N. Y. 495	155.638	510.622
Do	N. Y. 496	157.468	516.626
Do	N. Y. 497	156.549	513.611
Near Medina, N. Y.	N. Y. 498	157.022	515.163
Do	N. Y. 499	157.418	516.462
Medina, N. Y.	N. Y. 500	157.235	515.862
Do	N. Y. 501	156.584	513.726
Do	N. Y. 502	157.094	515.399
Do	N. Y. 503=U. S. G. S.	157.640	517.191
Near Medina, N. Y.	N. Y. 504	156.766	514.323
Do	N. Y. 505	155.923	511.557
Do	N. Y. 506	157.356	516.258
Do	N. Y. 507	157.839	517.843
Near Middleport, N. Y.	N. Y. 508	157.823	517.791
Do	N. Y. 509	155.927	511.570
Middleport, N. Y.	N. Y. 510	157.165	515.632
Near Middleport, N. Y.	N. Y. 511	155.084	508.805
Do	N. Y. 512	157.464	516.613
Do	N. Y. 513	157.513	516.774
Near Gasport, N. Y.	N. Y. 514	157.372	516.311
Gasport, N. Y.	N. Y. 515	155.580	510.432
Do	N. Y. 516	155.275	509.431
Near Gasport, N. Y.	N. Y. 517	157.310	516.108
Do	N. Y. 518	155.035	508.644
Do	N. Y. 519	154.500	506.889
Do	N. Y. 520	158.712	520.708
Near Lockport, N. Y.	N. Y. 521	158.658	520.530
Do	N. Y. 522	158.859	521.190
Lockport, N. Y.	N. Y. 523	156.345	512.942
Do	N. Y. 524	157.135	515.534
Do	N. Y. 525	157.404	516.416
Do	N. Y. 526	158.138	518.824
Do	N. Y. 527	173.904	570.550
Near Lockport, N. Y.	N. Y. 528	175.252	574.973
Do	N. Y. 529	176.008	577.453
Do	N. Y. 530	175.200	574.802
Near Pendleton, N. Y.	N. Y. 531	177.194	581.344
Pendleton, N. Y.	N. Y. 532	175.340	575.261
Near Pendleton, N. Y.	N. Y. 533	175.556	575.970
Do	N. Y. 534	175.704	576.456
Do	N. Y. 535	175.997	577.417
Do	N. Y. 536	175.347	575.284
Near Tonawanda, N. Y.	N. Y. 537	175.457	575.645
Tonawanda, N. Y.	N. Y. 538	176.484	579.015
Do	N. Y. 540	176.368	578.634
Near Tonawanda, N. Y.	N. Y. 541	176.318	578.470
Do	N. Y. 542	176.330	578.509
Do	N. Y. 543*	175.618	576.173
Do	N. Y. 544	175.940	577.230
Near Buffalo, N. Y.	N. Y. 545	176.203	578.093
Do	N. Y. 546	176.624	579.474
Buffalo, N. Y.	N. Y. 548	176.739	579.851
Do	N. Y. 549	177.292	581.665
Do	N. Y. 550	175.646	576.265
Do	N. Y. 551	177.334	581.803
Do	N. Y. 552	176.636	579.513
Phoenix, N. Y.	N. Y. 54	111.070	364.402
Three River Point, N. Y.	N. Y. 55	111.590	366.108
Belgium, N. Y.	N. Y. 56	112.588	369.382
Near Belgium, N. Y.	N. Y. 57	111.148	364.658
Do	N. Y. 58	112.631	369.524
Near Baldwinsville, N. Y.	N. Y. 59	112.548	369.251
Do	N. Y. 60	111.580	366.075
Do	N. Y. 61	111.838	366.922
Do	N. Y. 62	111.953	367.299
Do	N. Y. 63	112.332	368.543
Do	N. Y. 64	114.003	374.025
Do	N. Y. 65	114.703	376.321
Do	N. Y. 66	115.364	378.490
Do	N. Y. 67	119.801	393.047
Do	N. Y. 68	114.695	376.295
Do	N. Y. 69	114.946	377.119
Near Plainville, N. Y.	N. Y. 70	116.010	380.609
Do	N. Y. 71	115.321	378.349
Do	N. Y. 72	119.728	392.808
Do	N. Y. 73	118.920	390.157
Do	N. Y. 74	115.828	380.012
Do	N. Y. 75	116.350	381.725
Near Weedsport, N. Y.	N. Y. 76	114.572	375.892
Do	N. Y. 77	117.008	383.884
Do	N. Y. 78	116.540	382.348
Do	N. Y. 80	116.479	382.148
Near Port Byron, N. Y.	N. Y. 81	115.354	378.457
Do	N. Y. 82	117.378	385.098
Do	N. Y. 83	117.445	385.317
Do	N. Y. 84	115.682	379.533
Fox Ridge, N. Y.	N. Y. 85	117.880	386.745
Near Fox Ridge, N. Y.	N. Y. 86	118.544	388.923
Near Savannah, N. Y.	N. Y. 87	123.530	405.281
Do	N. Y. 88	119.765	392.929
Do	N. Y. 89	118.442	388.588
Near Clyde, N. Y.	N. Y. 90	120.990	396.948
Syracuse, N. Y.	N. Y. 1	123.997	406.813
Do	N. Y. 2	123.453	405.029
Do	N. Y. 3	123.179	404.130

*This bench mark may be identical with D. W. Cherry (see page 99). If found to be the same the mean of the two elevations should be used.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Syracuse, N. Y.	N. Y. 4	122.835	403.001
Do	N. Y. 5	119.475	391.978
Do	N. Y. 6	116.067	380.796
Do	N. Y. 7	113.782	373.300
Do	N. Y. 8	113.916	373.739
Do	N. Y. 9	113.336	371.837
Near Liverpool, N. Y.	N. Y. 10	111.386	365.439
Do	N. Y. 11	113.474	372.289
Near Belgium, N. Y.	N. Y. 12	111.288	365.117
Do	N. Y. 13	113.759	373.224
Do	N. Y. 14	113.093	371.039
Waterford, N. Y.	D. W. Waterford 1	9.048	29.685
Do	N. Y. 6	10.861	35.633
Near Waterford, N. Y.	N. Y. 13	15.902	52.172
Mechanicsville, N. Y.	D. W. Mechanicsville 1.	18.636	61.142
Do	D. W. Mechanicsville 2.	17.036	55.892
Do	N. Y. 20	26.937	88.376
Do	N. Y. 21	26.993	88.560
Do	D. W. Mechanicsville 5.	28.083	92.136
Near Mechanicsville N. Y.	N. Y. 25	26.225	86.040
Stillwater, N. Y.	N. Y. 30	27.142	89.048
Between Stillwater and Schaghticoke, N. Y.	D. W. Stillwater 2	30.436	99.855
Bemis Heights, N. Y.	N. Y. 35	31.468	103.241
Near Bemis Heights, N. Y.	N. Y. 38	32.023	105.062
Wilburs Basin, N. Y.	D. W. Wilburs Basin.	31.108	102.060
Between Wilburs Basin and Coveville, N. Y.	U. S. G. S.	31.454	103.195
Coveville, N. Y.	N. Y. 50	32.247	105.797
Schuylerville, N. Y.	N. Y. 55	32.280	105.905
Do	N. Y. 57	31.807	104.353
Northumberland, N. Y.	N. Y. 60	33.254	109.101
Fort Miller, N. Y.	N. Y. 67	37.559	123.225
Moses Kill, N. Y.	N. Y. 76	43.250	141.896
Near Fort Edward, N. Y.	N. Y. 82	43.272	141.968
Fort Edward, N. Y.	U. S. G. S.	44.065	144.570
Dunhams Basin, N. Y.	N. Y. 95	44.406	145.689
Smiths Basin, N. Y.	N. Y. 101	43.147	141.558
Fort Ann, N. Y.	N. Y. 112	42.480	139.370
Near Comstock, N. Y.	N. Y. 115	39.954	131.082
Between Comstock and Whitehall, N. Y.	N. Y. 120	40.743	133.671
Whitehall, N. Y.	D. W. Whitehall 1	37.400	122.703
Do	U. S. C. S. 36	31.566	103.563
Near Whitehall, N. Y.	U. S. B. M.	32.657	107.142
Near Snody Dock, N. Y.	D. W. Snody	32.212	105.682
Chubbs Dock, N. Y.	D. W. Chubb	32.395	106.283
Near Dresden, N. Y.	D. W. Dresden	32.611	106.991
Putnam, N. Y.	U. S. C. S. 39	32.501	106.630
Do	D. W. Putnam 2	32.083	105.259
Wrights, N. Y.	D. W. Wrights	32.805	107.628
Fort Ticonderoga, N. Y.	D. W. Ticonderoga	33.092	108.569
Ticonderoga, N. Y.	U. S. G. S.	33.335	109.367
Between Addison Junction and Crown Point, N. Y.	D. W. Five Mile Point.	32.576	106.876
Near Crown Point, N. Y.	D. W. Crown Point	34.566	113.405
Fort Frederick, N. Y.	Crown Point North Base.	49.117	161.145
Crown Point Lighthouse, N. Y.	L. H.	39.570	129.823
Near Coopersville, N. Y.	D. W. Coopersville	31.102	102.040
Do	D. W. Leggets Crossing.	40.459	132.739
Rouses Point, N. Y.	Rouse Point 1882	32.903	107.949
Fort Montgomery, N. Y.	U. S. E.	28.651	93.999
Near Champlain, N. Y.	D. W. Champlain 1	40.185	131.840
Champlain, N. Y.	D. W. Champlain 2	33.072	108.504
Near Champlain, N. Y.	D. W. Champlain 3	49.981	163.979
Do	D. W. Champlain 4	51.858	170.137
Do	D. W. Champlain 5	60.231	197.608
Near Barrington, Quebec	D. W. Barrington 1	63.349	207.837
Barrington, Quebec	D. W. Barrington 2	57.402	188.326
Near Barrington, Quebec	D. W. Barrington 3.	53.832	176.614
Near Ste. Clothilde, Quebec.	D. W. Ste. Clothilde 1	59.971	196.755
Do	D. W. Ste. Clothilde 2.	52.387	171.873
Aubrey, Quebec	D. W. Aubrey 1	41.186	135.124
Near Aubrey, Quebec	D. W. Aubrey 2	40.323	132.293
Ormstown, Quebec	D. W. Ormstown 1	41.968	137.690
Near Ormstown and St. Stanislas, Quebec.	D. W. Ormstown 2	47.363	155.390
Near St. Stanislas, Quebec.	D. W. Lake St. Francis.	47.679	156.427
Valleyfield, Quebec	D. W. Valleyfield	47.143	154.668
St. Stanislas, Quebec	D. W. St. Stanislas	50.185	164.649
Huntingdon, Quebec	D. W. Huntingdon	48.444	158.937
Carrs Crossing, Quebec	D. W. Carr	55.698	182.736
Whites Station, Quebec	D. W. White	54.503	178.815
Ste. Agnes, Quebec	D. W. Ste. Agnes	60.230	197.605
Fort Covington, N. Y.	D. W. Fort Covington.	50.735	166.452
St. Regis, Quebec	P. B. M. A St. Regis.	51.770	169.849
Do	P. B. M. B St. Regis.	50.866	166.883
Hogansburg, N. Y.	P. B. M. C Hogansburg.	54.849	179.950
Do	P. B. M. P Hogansburg.	54.334	178.261
Near Racket River, N. Y.	P. B. M. 1	52.390	171.883
Near Grass River, N. Y.	P. B. M. 2	63.393	207.982
On River Road, N. Y.	P. B. M. 3	62.294	204.376
Do	P. B. M. 4	67.476	221.377
Do	P. B. M. 5	75.395	247.358
Richards Landing, N. Y.	P. B. M. 6	70.830	232.381
Louisville Landing, N. Y.	P. B. M. Louisville Landing.	70.107	230.009
Near Louisville Landing, N. Y.	P. B. M. 7	68.340	224.212
Bradfords Hill, N. Y.	P. B. M. 8	79.070	259.415
Near Egg Island, N. Y.	P. B. M. 9	72.794	238.825
Near Murphys Island, N. Y	P. B. M. 10	72.013	236.263
Waddington, N. Y.	P. B. M. 11	84.857	278.402
Do	P. B. M. A Waddington.	83.175	272.883
Do	P. B. M. B Waddington.	84.145	276.066
Near Waddells Point, N. Y	P. B. M. 12	77.205	253.297
Tilden, N. Y.	P. B. M. 13A	83.340	273.425
Do	P. B. M. 13	82.282	269.954
Near Lisbon, N. Y.	P. B. M. 14	83.371	273.526
Lisbon, N. Y.	P. B. M. 15	84.955	278.723
Near Ogdensburg, N. Y.	P. B. M. 16	86.024	282.230
Ogdensburg, N. Y.	P. B. M. A Ogdensburg.	84.703	277.896
Do	P. B. M. B Ogdensburg.	85.571	280.744
Do	P. B. M. C Ogdensburg.	88.355	289.678
Do	P. B. M. D Ogdensburg.	76.512	251.023
Near Ogdensburg, N. Y.	P. B. M. 17	79.064	259.396
Do	P. B. M. 18	75.910	249.048
Near Morristown, N. Y.	P. B. M. 19	76.001	249.347
Morristown, N. Y.	P. B. M. A Morristown.	83.116	272.690
Do	P. B. M. B Morristown.	82.689	271.289
Do	P. B. M. C Morristown.	78.638	257.998
Near Morristown, N. Y.	P. B. M. 20	74.837	245.528
Do	P. B. M. 21	104.557	343.034
Near Oak Point Village, N. Y.	P. B. M. 22	103.398	339.232
Do	P. B. M. Oak Point.	103.153	338.428
Do	P. B. M. 23	79.258	260.032
Near Chippewa Village, N. Y.	P. B. M. 23A	79.063	259.393
Chippewa Village, N. Y.	P. B. M. Chippewa Village.	88.605	290.698
Near Chippewa Village, N. Y.	P. B. M. 24	88.494	290.334
Do	P. B. M. 25	111.905	367.142
Near Alexandria Bay, N. Y.	P. B. M. 26	101.724	333.739
Do	P. B. M. 27	83.373	273.533
Alexandria Bay, N. Y.	P. B. M. A Alexandria Bay.	78.993	259.163
Do	P. B. M. B Alexandria Bay.	86.637	284.242
Near Alexandria Bay, N. Y.	P. B. M. 28	88.063	288.920
Do	P. B. M. 29	83.622	274.350
Near Clayton, N. Y.	P. B. M. 30	80.533	264.215
Clayton, N. Y.	P. B. M. A Clayton.	84.983	278.815
Do	P. B. M. B Clayton.	80.582	264.376
Do	P. B. M. C Clayton.	79.440	260.629
Near Clayton, N. Y.	P. B. M. 31	111.153	364.674
Do	P. B. M. 32	83.171	272.870
Near Dodges Bay, N. Y.	P. B. M. 33	79.187	259.799
Near Cape Vincent, N. Y.	P. B. M. 34	79.337	260.291
Cape Vincent, N. Y.	P. B. M. A Cape Vincent.	77.464	254.146
Do	P. B. M. B Cape Vincent.	79.087	259.471
Do	P. B. M. C Cape Vincent.	82.956	272.165
Tibbetts Point, N. Y.	P. B. M. 35	80.423	263.854
Near Waterford, N. Y.	N. Y. 1	11.646	38.209
Do	N. Y. 2	15.105	49.557
Do	N. Y. 3	15.684	51.457
Do	N. Y. 4	16.910	55.479
Waterford, N. Y.	N. Y. 5	14.992	49.186

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Waterford, N. Y.	N. Y. 7	16.608	54.488
Do	N. Y. 8	18.963	62.214
Do	N. Y. 9	22.990	75.426
Do	N. Y. 10	24.702	81.043
Do	N. Y. 11	24.471	80.285
Do	N. Y. 12	24.473	80.292
Do	N. Y. 14	24.195	79.380
Do	N. Y. 15	25.306	83.025
Near Mechanicsville, N. Y.	N. Y. 16	26.838	88.051
Do	N. Y. 17	28.687	94.117
Do	N. Y. 18	29.041	95.279
Do	N. Y. 19	29.248	95.958
Mechanicsville, N. Y.	N. Y. 22	28.984	95.092
Near Mechanicsville, N. Y.	N. Y. 23	29.026	95.229
Do	N. Y. 24	28.752	94.331
Near Stillwater, N. Y.	N. Y. 26	31.449	103.179
Do	N. Y. 27	31.542	103.484
Do	N. Y. 28	32.169	105.541
Stillwater, N. Y.	N. Y. 29	31.584	103.622
Near Stillwater, N. Y.	N. Y. 31	31.872	104.567
Near Bemis Heights, N. Y.	N. Y. 32	31.932	104.764
Do	N. Y. 33	32.314	106.017
Do	N. Y. 34	32.048	105.145
Bemis Heights, N. Y.	N. Y. 36	31.544	103.491
Near Bemis Heights, N. Y.	N. Y. 37	31.727	104.091
Do	N. Y. 39	32.143	105.456
Do	N. Y. 40	31.200	102.362
Do	N. Y. 41	31.949	104.819
Do	N. Y. 42	32.089	105.279
Near Coveville, N. Y.	N. Y. 43	31.872	104.567
Do	N. Y. 44	32.078	105.243
Do	N. Y. 45	31.927	104.748
Do	N. Y. 46	32.068	105.210
Do	N. Y. 47	31.992	104.960
Do	N. Y. 48	31.646	103.825
Coveville, N. Y.	N. Y. 49	31.294	102.670
Near Coveville, N. Y.	N. Y. 51	32.311	106.007
Near Schuylerville, N. Y.	N. Y. 52	32.586	106.909
Do	N. Y. 53	32.433	106.407
Schuylerville, N. Y.	N. Y. 54	32.393	106.276
Do	N. Y. 56	32.103	105.325
Near Schuylerville, N. Y.	N. Y. 58	32.728	107.375
Near Northumberland, N. Y.	N. Y. 59	33.237	109.045
Do	N. Y. 61	34.245	112.352
Near Fort Miller, N. Y.	N. Y. 62	34.800	114.173
Do	N. Y. 63	33.986	111.502
Do	N. Y. 64	36.942	121.201
Do	N. Y. 65	36.661	120.279
Fort Miller, N. Y.	N. Y. 66	37.173	121.958
Near Fort Miller, N. Y.	N. Y. 68	37.514	123.077
Do	N. Y. 69	40.167	131.781
Do	N. Y. 70	40.392	132.519
Do	N. Y. 71	40.218	131.949
Do	N. Y. 72	40.391	132.516
Do	N. Y. 73	40.487	132.831
Do	N. Y. 74	40.273	132.129
Do	N. Y. 75	42.801	140.423
Near Fort Edward, N. Y.	N. Y. 77	42.660	139.960
Do	N. Y. 78	42.756	140.275
Do	N. Y. 79	42.194	138.431
Do	N. Y. 80	43.230	141.830
Do	N. Y. 81	43.113	141.447
Do	N. Y. 83	42.958	140.938
Do	N. Y. 84	42.731	140.193
Do	N. Y. 85	43.038	141.200
Do	N. Y. 86	43.222	141.804
Do	N. Y. 87	43.138	141.529
Fort Edward, N. Y.	N. Y. 88	42.652	139.934
Near Fort Edward, N. Y.	N. Y. 90	45.270	148.523
Do	N. Y. 91	45.646	149.757
Do	N. Y. 92	45.204	148.307
Glens Falls, N. Y.	N. Y. 93	46.590	152.854
Near Glens Falls, N. Y.	N. Y. 94	45.849	150.423
Near Dunhams Basin, N. Y.	N. Y. 96	45.381	148.887
Do	N. Y. 97	45.042	147.775
Do	N. Y. 98	45.944	150.735
Near Smiths Basin, N. Y.	N. Y. 99	45.902	150.597
Do	N. Y. 100	46.167	151.466
Smiths Basin, N. Y.	N. Y. 102	45.691	149.905
Near Smiths Basin, N. Y.	N. Y. 103	45.662	149.809
Do	N. Y. 104	45.694	149.914
Do	N. Y. 105	45.662	149.809
Near Fort Ann, N. Y.	N. Y. 106	46.124	151.325
Do	N. Y. 107	45.448	149.107
Do	N. Y. 108	46.299	151.899
Do	N. Y. 109	46.072	151.155
Do	N. Y. 110	45.216	148.346
Do	N. Y. 111	40.281	132.155
Near Comstock, N. Y.	N. Y. 113	39.109	128.310
Do	N. Y. 114	38.602	126.647
Do	N. Y. 116	38.141	125.134
Do	N. Y. 117	38.013	124.714
Near Comstock, N. Y.	N. Y. 118	38.418	126.043
Do	N. Y. 119	38.652	126.811
Do	N. Y. 121	37.564	123.241
Near Whitehall, N. Y.	N. Y. 122	37.808	124.042
Do	N. Y. 123	40.826	133.943
Do	N. Y. 124	37.527	123.120
Do	N. Y. 125	37.760	123.884
Do	N. Y. 126	38.275	125.574
Do	N. Y. 127	37.397	122.693
Do	N. Y. 128	38.068	124.895
Whitehall, N. Y.	N. Y. 129	37.035	121.506
Dobbs Ferry, N. Y.	T	4.229	13.875
Do	U	*4.480	14.698
Do	W	*2.760	9.056
Between Ardsley and Irvington, N. Y.	R. R. 36	1.903	6.243
Near Tarrytown, N. Y.	X	3.498	11.476
Do	Y	2.610	8.563
Tarrytown, N. Y.	Tidal 1 Tarrytown	3.272	10.735
Do	Z	6.249	20.502
Near Tarrytown, N. Y.	A_1	2.619	8.592
Do	Iq′	3.228	10.591
Scarboro, N. Y.	B_1	2.040	6.693
Ossining, N. Y.	Tidal 2 Ossining	2.641	8.665
Near Ossining, N. Y.	R. R. 60	2.388	7.835
Near Croton, N. Y.	C_1	2.743	8.999
Near Oscawana, N. Y.	R. R. 67	3.122	10.243
Montrose, N. Y.	R. R. 71	11.411	37.438
Verplanck, N. Y.	V. O. 12	9.093	29.833
Peekskill, N. Y.	Im′	4.311	14.144
Do	V. O. Peekskill	3.213	10.541
Near Peekskill, N. Y.	V. O. 11	2.070	6.791
Do	R. R. 81	2.935	9.629
Near Highland, N. Y.	R. R. 84	2.399	7.871
Do	D_1	2.401	7.877
Near Garrison, N. Y.	R. R. 97	3.250	10.663
Garrison, N. Y.	R. R. 99	6.290	20.636
Cold Spring, N. Y.	V. O. 9	4.278	14.035
Do	E_1	3.974	13.038
Near Fishkill, N. Y.	Ik′	3.396	11.142
Fishkill, N. Y.	R. R. 118	2.515	8.251
Near Chelsea, N. Y.	F_1	1.619	5.312
New Hamburg, N. Y.	Il′	4.435	14.550
Camelot, N. Y.	G_1	1.764	5.787
Poughkeepsie, N. Y.	H_1	9.657	31.683
Do	Ih′	11.780	38.648
Do	Ig′	13.192	43.281
Do	Vose	12.176	39.947
Do	I_1	12.196	40.013
Near Poughkeepsie, N. Y.	If′	6.188	20.302
Near Hyde Park, N. Y.	R. R. 77½	2.992	9.816
Do	Ie′	2.064	6.772
Do	R. R. 159	2.563	8.409
Hyde Park, N. Y.	R. R. 161	2.275	7.464
Near Hyde Park, N. Y.	R. R. 162	2.565	8.415
Do	R. R. 163	1.973	6.473
Near Staatsburg, N. Y.	R. R. Dewitt	7.339	24.078
Near Rhinecliff, N. Y.	Iz	1.164	3.819
Rhinecliff, N. Y.	Iyyy	3.966	13.012
Do	Iyy	4.724	15.499
Near Barrytown, N. Y.	Iy	3.132	10.276
Do	Iv	0.698	2.290
Near Tivoli, N. Y.	It	2.234	7.329
Do	Is	2.361	7.746
Near Germantown, N. Y.	Ir	2.748	9.016
Do	Iq	2.680	8.793
Do	Io	3.004	9.856
Near Livingston Creek, N. Y.	In	2.426	7.959
Near Linlithgo, N. Y.	R. R. 213	2.786	9.140
Catskill Station, N. Y.	Im	4.500	14.764
Near Hudson, N. Y.	Ik	2.362	7.749
Hudson, N. Y.	151 A	46.190	151.542
Do	City 14	46.268	151.798
Do	City 29	29.186	95.754
Do	J_1	30.848	101.207
Do	V. O. 4	3.257	10.686
Between Hudson and Stockport Station, N. Y.	R. R. 223	2.708	8.884
Stockport Station, N. Y.	D. W. Stockport 1	2.052	6.732
Near Coxsackie Station, N. Y.	R. R. 237	2.066	6.778
Stuyvesant, N. Y.	Ih	4.064	13.333
Near Stuyvesant, N. Y.	D. W. Stuyvesant 3	2.768	9.081
Near Schodack Landing, N. Y.	If	1.803	5.915
Do	K_1	3.272	10.735
Near Castleton, N. Y.	D. W. Castleton 1	4.444	14.580
Castleton, N. Y.	L_1	5.666	18.589
Do	Ib	5.155	16.913
Rensselaer, N. Y.	M_1	8.192	26.877
Do	V. O. 1	6.704	21.995

* These elevations of bench marks, established by the Coast and Geodetic Survey, were furnished by Mr. Frederick W. Koop, Assistant Engineer in Charge, Board of Estimate and Apportionment, New York City. Mr. Koop had supplemented the leveling in the vicinity of that city by many miles of precise leveling. The elevations under consideration result from an adjustment made by him.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Rensselaer, N. Y.	N_1	5.368	17.612
Greenbush (now Rensselaer), N. Y.	Gristmill	4.226	13.865
Rensselaer, N. Y.	(1875)	4.272	14.016
Troy, N. Y.	O_1	8.170	26.804
Do	D. W. Troy 2	7.242	23.760
Do	City 1	7.027	23.054
Do	P_1	8.285	27.182
Do	City 2	8.224	26.982
Hudson, N. Y.	D. W. Hudson 1	2.209	7.247
Near Hudson, N. Y.	D. W. Hudson 3	2.452	8.045
Stockport Station, N. Y.	D. W. Stockport 2	3.166	10.387
Near Stockport Station, N. Y.	D. W. Stockport 3	2.581	8.468
Near Coxsackie Station, N. Y.	D. W. Coxsackie	2.063	6.768
Between Stuyvesant and Castleton, N. Y.	D. W. Stuyvesant 2	2.047	6.716
Do	D. W. Stuyvesant 4	2.644	8.675
Do	D. W. Stuyvesant 5	3.368	11.050
Near Castleton, N. Y.	D. W. Castleton 2	3.090	10.138
Do	D. W. Castleton 3	3.710	12.172
Do	D. W. Castleton 5	3.894	12.776
Dunkirk, N. Y.	598 D	182.556	598.936
Do	Nelson Block	179.487	588.867
Forestville, N. Y.	871 D	265.752	871.888
Near Smith Mills, N. Y.	1097 D	334.862	1098.626
Dayton, N. Y.	1322 D	403.229	1322.927
Cattaraugus, N. Y.	1401 D	422.341	1385.630
Little Valley, N. Y.	1593 D	485.927	1594.245
Near Salamanca, N. Y.	1413 D	430.918	1413.770
Salamanca, N. Y.	1391 D	424.126	1391.487
Carrollton, N. Y.	1393 D	425.087	1394.640
Allegany, N. Y.	1408 D	429.445	1408.937
Olean, N. Y.	1450 D	442.506	1451.788
Near Hinsdale, N. Y.	1508 D	460.032	1509.288
Near Cuba, N. Y.	1515 D	462.318	1516.788
Friendship, N. Y.	1520 D	463.603	1521.004
Near Belvidere, N. Y.	1351 D	412.165	1352.245
Belmont, N. Y.	1416 D	432.136	1417.766
Wellsville, N. Y.	1519 D	463.453	1520.512
Near Andover, N. Y.	1573 D	479.819	1574.206
Do	1675 D	510.878	1676.105
Alfred, N. Y.	1610 D	491.153	1611.391
Almond, N. Y.	1383 D	421.513	1382.914
Hornellsville, N. Y.	1141 D	348.229	1142.481
Near Canisteo, N. Y.	1113 D	339.576	1114.092
Near Adrian, N. Y.	1080 D	329.545	1081.182
Cameron, N. Y.	1048 D	319.710	1048.915
Rathbone, N. Y.	1006 D	306.947	1007.042
Addison, N. Y.	1021 D	311.675	1022.554
Painted Post, N. Y.	935 D	285.353	936.196
Corning, N. Y.	City Hall	285.525	936.760
Near Big Flats, N. Y.	899 D	274.568	900.812
Horseheads, N. Y.	901 D	274.964	902.111
Elmira, N. Y.	857 A	261.710	858.627
Do	Erie Station	260.480	854.591
Wellsburg, N. Y.	824 A	250.913	823.204
Near Chemung, N. Y.	804 A	244.778	803.076
Waverly, N. Y.	840 A	255.830	839.336
Near Barton, N. Y.	798 A	243.084	797.518
Owego, N. Y.	815 A	248.421	815.028
Near Owego, N. Y.	812 A	247.400	811.678
Near Union, N. Y.	825 A	252.482	828.351
Binghamton, N. Y.	867 A	263.974	866.055
Near Port Crane, N. Y.	959 A	292.157	958.518
Near Sanitaria Springs, N. Y.	1126 A	343.089	1125.618
Near Tunnel, N. Y.	1384 A	421.845	1384.003
Near Harpersville, N. Y.	1051 A	319.748	1049.040
Afton, N. Y.	973 A	296.504	972.780
Near Bainbridge, N. Y.	978 A	297.996	977.675
Do	989 A	301.653	989.673
Unadilla, N. Y.	1024 A	311.910	1023.325
Wells Bridge, N. Y.	1047 A	319.022	1046.658
Near Otego, N. Y.	1051 A	320.085	1050.146
Oneonta, N. Y.	1232 A	375.487	1231.910
Do	Oneonta	331.156	1086.468
Colliers, N. Y.	1119 A	340.917	1118.492
Near Maryland, N. Y.	1170 A	356.571	1169.850
Schenevus, N. Y.	1272 A	387.520	1271.389
Worcester, N. Y.	1311 A	399.338	1310.161
Near East Worcester, N. Y.	1406 A	428.308	1405.207
Near Richmondville, N. Y.	1224 A	372.790	1223.062
Cobleskill, N. Y.	930 A	283.344	929.604
Barnerville Crossing, N. Y.	Barnerville	275.489	903.833
Near Howes Cave, N. Y.	731 A	222.726	730.727
Near Esperance, N. Y.	753 A	229.344	752.439
Near Duanesburg, N. Y.	681 A	207.515	680.822
Near Kelleys, N. Y.	410 A	124.666	409.008
Schenectady, N. Y.	242 A	73.516	241.194
Near Schenectady, N. Y.	B. M. 15 (1875)	66.216	217.244
Near Rexford Flats, N. Y.	B. M. 14 (1875)	63.492	208.307
Do	14a (1875)	63.519	208.395

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Cohoes, N. Y.	Mill Race	48.586	159.403
Do	B. M. 8 (1875)	48.734	159.888
Erie, Pa.	B. M. 1 (1873)	175.380	575.392
Do	L. H.	176.050	577.591
Do	635 Pittsburg, 1899	193.908	636.180
Do	685	209.068	685.917
Near Belle Valley, Pa.	1103 Pittsburg, 1899	336.326	1103.429
Near Samson, Pa.	1214 Pittsburg, 1899	370.420	1215.286
Do	P. R. R. No. 85	369.429	1212.035
Do	P. R. R. No. 82	363.024	1191.021
Near Leboeuf, Pa.	1193 Pittsburg, 1899	363.996	1194.210
Near Millers, Pa.	1148 Pittsburg, 1899	349.983	1148.236
Near Venango, Pa.	1128 Pittsburg, 1899	344.034	1128.718
Near Saegerstown, Pa.	1109 Pittsburg, 1899	338.096	1109.237
Near Meadville, Pa.	1071 Pittsburg, 1899	326.781	1072.114
Near Cochranton, Pa.	1062 Pittsburg, 1899	323.820	1062.399
Utica, Pa.	1038 Pittsburg, 1899	316.482	1038.325
Near Sugar Creek, Pa.	1013 Pittsburg, 1899	308.955	1013.630
Franklin, Pa.	989 Pittsburg, 1899	301.554	989.348
Do	987 Pittsburg, 1899	301.075	987.777
East Sandy, Pa.	970 Pittsburg, 1899	295.932	970.904
Near Brandon, Pa.	957 Pittsburg, 1899	291.913	957.718
Near Kennerdell, Pa.	941 Pittsburg, 1899	287.236	942.373
Near St. George, Pa.	925 Pittsburg, 1899	282.301	926.182
Near Rockland, Pa.	919 Pittsburg, 1899	280.658	920.792
Near Dotter, Pa.	905 Pittsburg, 1899	276.187	906.123
Near Emlenton, Pa.	898 Pittsburg, 1899	274.042	899.086
Parker, Pa.	883 Pittsburg, 1899	269.448	884.014
Monterey, Pa.	869 Pittsburg, 1899	265.190	870.044
Near Lower Hillville, Pa.	855 Pittsburg, 1899	261.027	856.386
East Brady, Pa.	852 Pittsburg, 1899	259.887	852.646
Red Bank, Pa.	844 Pittsburg, 1899	257.479	844.746
Near Rimerton, Pa.	820 Pittsburg, 1899	250.183	820.809
Mosgrove, Pa.	806 Pittsburg, 1899	246.043	807.226
Kittanning, Pa.	803 Pittsburg, 1899	244.907	803.499
Near Rosston, Pa.	786 Pittsburg, 1899	239.860	786.941
West Penn Junction, Pa.	788 Pittsburg, 1899	240.358	788.574
Do	P. R. R. No. 26	240.352	788.555
Edgecliff, Pa.	764 Pittsburg, 1899	232.709	763.479
Blacks Run, Pa.	770 Pittsburg, 1899	235.060	771.193
Wildwood, Pa.	P. R. R.	228.244	748.831
Near Brilliant, Pa.	745 Pittsburg, 1899	227.184	745.353
Pittsburgh, Pa.	Penn Ave. Curb	224.523	736.623
Do	P. R. R. No. 99	226.699	743.762
Do	738 Pittsburg, 1899	225.060	738.384
Do	P. R. R. No. 100	226.751	743.932
Near Elmira, N. Y.	1067 H	325.630	1068.338
Snedekerville, Pa.	1265 H	385.642	1265.227
Near Columbia Crossroads, Pa.	1099 H	335.236	1099.853
Near Troy, Pa.	1139 H	347.399	1139.758
Near Cowley, Pa.	1358 H	414.177	1358.846
Near Canton, Pa.	1246 H	379.883	1246.333
Roaring Branch, Pa.	966 H	294.509	966.235
Near Ralston, Pa.	851 H	259.725	852.114
Near Fields, Pa.	732 H	223.270	732.512
Near Powys, Pa.	620 H	189.145	620.553
Williamsport, Pa.	528 H	161.016	528.267
Near Red House, N. Y.	1340 D	408.708	1340.903
Near Quaker Bridge, N. Y.	1316 D	401.513	1317.297
Near Wolf Run, N. Y.	Bridge 121	404.476	1327.018
Near Corydon, Pa.	1281 D	390.713	1281.864
Do	Bridge 758	387.478	1271.251
Near Sugar Run, Pa.	1253 D	382.343	1254.404
Sugar Run, Pa.	Bridge 113	379.537	1245.198
Kinzua, Pa.	1229 D	374.968	1230.207
Tuttletown, Pa.	Bridge	375.533	1232.061
Near Great Bend, Pa.	Bridge 644	372.238	1221.251
Near Hemlock, Pa.	1205 D	367.519	1205.768
Warren, Pa.	1193 D	363.775	1193.485
Do	P. R. R. 33	364.180	1194.814
Jacksons Crossing, Pa.	P. R. R. 37	359.902	1180.778
Near Irvineton, Pa.	P. R. R. 38	355.450	1166.172
Do	P. R. R. 39	356.297	1168.951
Do	1167 D	355.991	1167.947
Thompson, Pa.	1135 D	346.290	1136.120
Tidioute, Pa.	1116 D	340.444	1116.940
Trunkeyville, Pa.	1098 D	334.868	1098.646
Near Hickory, Pa.	1086 D	331.190	1086.579
Tionesta, Pa.	1063 D	324.396	1064.289
Near President, Pa.	1042 D	317.814	1042.695
Near Oleopolis, Pa.	1030 D	314.352	1031.336
Near South Oil City, Pa.	1009 P	307.747	1009.667
Near Langdon, N. Y.	860 A	262.271	860.467
Near Kirkwood, N. Y.	Signal tower	265.945	872.521
Great Bend, Pa.	880 A	268.462	880.779
Hickory Grove, Pa.	893 A	272.376	893.620
Near Susquehanna, Pa.	955 A	291.432	956.140

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Deposit, N. Y.	1026 A	312.891	1026.543
Do	978 A	298.391	978.971
Near Hancock, N. Y.	924 A	281.856	924.722
Near Stockport, N. Y.	882 A	269.110	882.905
Lordville, N. Y.	865 A	263.931	865.914
Long Eddy, N. Y.	834 A	254.568	835.195
Hankins, N. Y.	801 A	244.455	802.016
Callicoon, N. Y.	780 A	237.953	780.684
Cochecton, N. Y.	746 A	227.618	746.777
Narrowsburg, N. Y.	718 A	219.065	718.716
Westcoolang Park, Pa.	665 A	202.881	665.619
Shohola, Pa.	648 A	197.813	648.991
Near Pondeddy, Pa.	573 A	175.027	574.234
Near Mill Rift, Pa.	491 A	149.923	491.872
Port Jervis, N. Y.	456 A	139.317	457.076
Guymard, N. Y.	780 A	238.023	780.914
Otisville, N. Y.	861 A	262.805	862.219
Middletown, N. Y.	558 A	170.359	558.919
Campbell Hall, N. Y.	408 A	124.687	409.077
Walden, N. Y.	National Bank	114.342	375.137
Loyd, N. Y.	Centerville Hotel	109.172	358.175
Highland, N. Y.	Bridge	86.117	282.535
Poughkeepsie, N. Y.	Bridge	68.662	225.269
Do	173 A	52.728	172.992
Maywood, N. Y.	1344 A	409.775	1344.403
Near Northfield, N. Y.	1766 A	538.552	1766.899
Do	Bridge	400.106	1312.681
Walton, N. Y.	1215 A	370.653	1216.051
Near Rock Rift, N. Y.	1214 A	370.259	1214.758
Near Cadosia, N. Y.	990 A	301.927	990.572
Near Hancock, N. Y.	Bridge 18	278.205	912.744
Utica, N. Y.	D. W. Utica 2	123.470	405.084
Do	P. O	127.165	417.207
Do	Seneca Street Bridge	131.107	430.140
Do	Whitsboro Street Bridge.	131.538	431.554
Near Washington Mills, N. Y.	633 A	193.056	633.384
Richfield Junction, N. Y.	Station	358.946	1177.642
Near Richfield Junction, N. Y.	1221 A	372.318	1221.513
Leonardsville, N. Y.	1152 A	351.298	1152.550
West Edmeston, N. Y.	U. S. B. M.	345.709	1134.214
Near West Edmeston, N. Y.	Bridge	343.565	1127.170
Near South Edmeston, N. Y.	1110 A	338.324	1109.985
New Berlin, N. Y.	1089 A	332.016	1089.289
Near New Berlin, N. Y.	Bridge	332.636	1091.323
Near South New Berlin, N. Y.	do	321.514	1087.834
South New Berlin, N. Y.	1059 A	322.987	1059.666
Near South New Berlin, N. Y.	Bridge	327.430	1074.243
Near Holmesville, N. Y.	do	321.423	1054.535
Mount Upton, N. Y.	1035 A	315.685	1035.710
Near Mount Upton, N. Y.	Bridge	310.003	1017.068
Sidney, N. Y.	Tel. pole 991	302.093	991.117
Charlotte, N. Y.	1 (1874)	86.310	283.169
Do	2 (1874)	77.230	253.379
Rochester, N. Y.	Bridge 87	156.126	512.223
Do	N. Y. 457	156.254	512.643
Do	Rowe Street Bridge.	160.662	527.105
Do	Bridge	167.277	548.808
Do	Culvert	164.080	538.319
Genesee Junction, N. Y.	Bridge	159.946	524.756
Near Genesee Junction, N. Y.	Bridge	160.294	525.898
Near Whites, N. Y.	Lock	161.829	530.934
Severance, N. Y.	Bridge	161.964	531.377
Near Severance, N. Y.	Bridge	162.925	534.530
Scottsville, N. Y.	537 R	163.204	535.445
Near Scottsville, N. Y.	Culvert	164.685	540.304
Do	Bridge	166.749	547.076
Honeoye Junction, N. Y.	Bridge 34	168.733	553.585
Genesee Valley Junction, N. Y.	Bridge	164.230	538.811
Near Genesee Valley Junction, N. Y.	Stone	172.568	566.167
Near Avon, N. Y.	Cattle pass	172.740	566.731
Avon, N. Y.	Tel. pole	177.640	582.807
Near Avon, N. Y.	Bridge	168.036	551.298
Near Fowlerville, N. Y.	Lock	168.245	551.984
Fowlerville, N. Y.	Tel. pole	170.743	560.179
Near York, N. Y.	Culvert	169.397	555.763
Piffard, N. Y.	Wall	172.199	564.956
Near Piffard, N. Y.	Culvert	172.693	566.577
Near Cuylerville, N. Y.	Bridge 5	173.520	569.290
Near Mount Morris, N. Y.	575 R	174.981	574.083
Do	Bridge	184.013	603.716
Near Sonyea, N. Y.	Bridge	186.404	611.560
Do	Bridge 13	215.670	707.577
Near Tuscarora, N. Y.	Bridge 15	228.242	748.824
Do	773 R	235.703	773.302
Nunda Junction, N. Y.	Tree	264.436	867.570
Nunda, N. Y.	944 R	287.837	944.345
Near Nunda, N. Y.	Culvert	382.209	1253.964
Near Ross Crossing, N. Y.	Culvert	401.712	1317.950
Near Swains, N. Y.	Bridge	397.882	1305.385
Swains, N. Y.	1316 R	401.318	1316.657
Near Swains, N. Y.	Bridge 9	395.358	1297.104
Do	Bridge 8	388.830	1275.686
Near Canaseraga, N. Y.	Bridge 6	384.149	1260.329
Canaseraga, N. Y.	1253 R	382.211	1253.971
Burns, N. Y.	Tel. pole	365.016	1197.557
Near Burns, N. Y.	Culvert	362.745	1190.106
Arkport, N. Y.	1188 R	362.190	1188.285
Near Arkport, N. Y.	Bridge 4	356.311	1168.997
Near Hornellsville, N. Y.	Bridge 1	356.324	1169.040
Buffalo, N. Y.	L. V. R. R.	178.683	586.229
Do	Switch tower	179.708	589.592
Do	Bridge	178.509	585.658
Do	R. R. B. M.	180.278	591.462
Near West Seneca, N. Y.	Bridge	179.576	589.159
Do	N. Y. C. R. R.	180.220	591.272
Near Blasdell, N. Y	Culvert	183.748	602.847
Near Athol Springs, N. Y.	Mile post 11	195.236	640.537
Do	631 R	192.363	631.111
Near Lake View, N. Y.	Culvert	202.859	665.546
Near Derby, N. Y.	724 R	220.617	723.808
Do	Trestle 235	207.595	681.085
Near Angola, N. Y.	Trestle	206.400	677.164
Do	Bridge 228	207.284	680.064
Farnham, N. Y.	633 R	192.925	632.955
Near Farnham, N. Y.	Culvert 218	185.975	610.153
Near Irving, N. Y.	Bridge 216	180.111	590.914
Near Silver Creek, N. Y.	Bridge	187.131	613.946
Silver Creek, N. Y.	Bridge 207	189.618	622.105
Near Silver Creek, N. Y.	Bridge 204	191.420	628.017
Near Waites Crossing, N. Y.	Bridge	190.003	623.368
Do	Bridge 195	190.228	624.106
Near Dunkirk, N. Y.	Culvert 187	187.335	614.615
Near Leboeuf, Pa.	Bridge	366.159	1201.307
Near Union City, Pa.	Mile post 74	383.927	1259.600
Do	Mile post 73	391.478	1284.374
Do	Mile post 72	397.130	1302.917
Do	Bridge 27	392.927	1289.128
Do	Bridge 29	396.868	1302.058
Do	P. R. R. 72	398.646	1307.891
Near Elgin, Pa.	P. R. R. 71	417.446	1369.571
Do	P. R. R. 70	420.471	1379.495
Elgin, Pa.	1382 P	421.172	1381.795
Near Lovell, Pa.	P. R. R. 69	416.504	1366.677
Do	P. R. R. 68	418.372	1372.609
Near Corry, Pa.	P. R. R. 67	421.295	1382.199
Do	P. R. R. 66	430.613	1412.769
Do	1432 P	436.578	1432.340
Near Colza, Pa.	P. R. R. 64	425.967	1397.527
Near Roach, Pa.	P. R. R. 62	421.896	1384.170
Spring Creek, Pa.	1406 P	428.426	1405.594
Near Spring Creek, Pa.	P. R. R. 58	423.686	1390.043
Do	P. R. R. 57	425.164	1394.892
Do	P. R. R. 56	419.359	1375.847
Near Horn, Pa.	P. R. R. 55	416.538	1366.592
Do	P. R. R. 54	403.048	1322.333
Near Garland, Pa.	P. R. R. 51	391.690	1285.070
Near Pittsfield, Pa.	P. R. R. 50	385.484	1264.709
Do	1244 P	348.768	1144.250
Do	P. R. R. 47	377.247	1237.684
Do	P. R. R. 46	375.270	1231.198
Near Youngsville, Pa.	P. R. R. 45	372.345	1221.602
Do	P. R. R. 48	367.902	1207.025
Do	P. R. R. 43	369.206	1211.303
Near Irvineton, Pa.	P. R. R. 42	357.541	1173.032
Morehead City, N. C.	7 M. C.	2.119	6.952
Do	17 M. C.*	5.167	16.952
Near Atlantic, N. C.	18 M. C.	5.652	18.543
Near Newport, N. C.	28 M. C.	8.574	28.130
Near Havelock, N. C.	26 M. C.	8.098	26.568
Riverdale, N. C.	25 M. C.	7.617	24.990
Near Newbern, N. C.	7 M. C.	2.157	7.077
Newbern, N. C.	16 M. C.	4.530	14.862
Near Clark, N. C.	27 M. C.	8.084	26.522
Near Tuscarora, N. C.	51 M. C.	15.198	49.862
Cove Creek, N. C.	48 M. C.	14.267	46.808
Dover, N. C.	64 M. C.	19.154	62.841
Kinston, N. C.	48 M. C.	13.356	43.819

* Reported destroyed in 1907.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Falling Creek, N. C.	55 M. C.	16.587	54.419
Lagrange, N. C.	109 M. C.	33.039	108.395
Near Bests, N. C.	120 M. C.	36.204	118.779
Goldsboro, N. C.	111 M. C.*	33.582	110.177
Do	111 A.†	35.007	114.852
Rose, N. C.	136 M. C.	41.162	135.046
Princeton, N. C.	152 M. C.	46.070	151.148
Selma, N. C.	178 M. C.	54.047	177.319
Wilsons Mills, N. C.	229 M. C.	69.616	228.398
Clayton, N. C.	346 M. C.	105.099	344.812
Garner, N. C.	384 M. C.	116.643	382.686
Raleigh, N. C.	363 M. C.	110.470	362.434
Cary, N. C.	497 M. C.	151.101	495.737
Near Morrisville, N. C.	321 M. C.	97.663	320.416
Near Nelson, N. C.	360 M. C.	109.458	359.113
Durham, N. C.	406 M. C.	123.498	405.176
University Station, N. C.	471 M. C.	143.422	470.544
Near Blackwood, N. C.‡	549 M. C.	167.153	548.401
Chapel Hill, N. C.	503 M. C.	152.945	501.787
Hillsboro, N. C.	543 M. C.	165.255	542.174
Efland, N. C.	667 M. C.	202.960	665.878
Mebane, N. C.	678 M. C.	206.305	676.852
Graham, N. C.	642 M. C.	195.399	641.071
Gibsonville, N. C.	721 M. C.	219.434	719.926
McLeansville, N. C.	744 M. C.	226.571	743.342
Greensboro, N. C.	839 M. C.	255.585	838.532
Near Pomona, N. C.	813 M. C.	247.570	812.236
Jamestown, N. C.	793 M. C.	241.497	792.311
High Point, N. C.	940 M. C.	286.162	938.850
Thomasville, N. C.	852 M. C.	259.318	850.779
Near Conrad, N. C.	665 M. C.	202.455	664.221
Lexington, N. C.	811 M. C.	246.737	809.503
Near Linwood, N. C.	630 M. C.	191.787	629.231
Salisbury, N. C.	765 M. C.	232.907	764.129
Near Majolica, N. C.	671 M. C.	204.084	669.566
Cleveland, N. C.	790 M. C.	240.379	788.643
Elmwood, N. C.	838 M. C.	254.982	836.553
Statesville, N. C.	926 M. C.	281.890	924.834
Plott, N. C.	776 M. C.	236.246	775.084
Catawba, N. C.	873 M. C.	265.756	871.901
Claremont, N. C.	970 M. C.	295.223	968.577
Newton, N. C.	996 M. C.	303.218	994.808
Hickory, N. C.	1164 M. C.	354.509	1163.085
Near Hildebran, N. C.	1087 M. C.	330.907	1085.651
Connelly Springs, N. C.	1193 M. C.	363.250	1191.763
Drexel, N. C.	1193 M. C.	363.209	1191.628
Morganton, N. C.	1182 M. C.	359.901	1180.775
Glen Alpine, N. C.	1215 M. C.	370.011	1213.944
Near Bridgewater, N. C.	1091 M. C.	332.095	1089.548
Nebo, N. C.	1298 M. C.	395.207	1296.608
Marion, N. C.	1438 M. C.	437.955	1436.857
Greenlees, N. C.	1286 M. C.	391.496	1284.433
Old Fort, N. C.	1437 M. C.	437.722	1436.093
Round Knob, N. C.	1829 M. C.	557.229	1828.175
Mud Cut, N. C.	2153 M. C.	655.801	2151.574
Near Swannanoa, N. C.	2522 M. C.	768.302	2520.671
Swannanoa, N. C.	2222 M. C.	676.777	2220.392
Azalea, N. C.	2057 M. C.	626.660	2055.967
Biltmore, N. C.	1996 M. C.	607.906	1994.438
Asheville, N. C.	1986 M. C.	604.884	1984.523
Near Olivette, N. C.	1924 M. C.	586.114	1922.942
Alexander, N. C.	1796 M. C.	546.976	1794.537
Bailey, N. C.	1729 M. C.	526.756	1728.199
Marshall, N. C.	1646 M. C.	501.456	1645.193
Barnard, N. C.	1529 M. C.	465.858	1528.402
Hot Springs, N. C.	1326 M. C.	403.869	1325.027
Paint Rock, N. C.	1259 M. C.	383.272	1257.452
Near Wolf Creek, Tenn.	1184 M. C.	360.575	1182.986
Near Delrio, Tenn.	1141 M. C.	347.384	1139.709
Bridgeport, Tenn.	1094 M. C.	333.247	1093.328
Newport, Tenn.	1058 M. C.	322.180	1057.019
Rankin, Tenn.	1010 M. C.	307.493	1008.833
White Pine, Tenn.	1142 M. C.	347.809	1141.103
Morristown, Tenn.	1351 M. C.	411.412	1349.774
Talbot, Tenn.	1193 M. C.	363.276	1191.848
Mossy Creek, Tenn.	1118 M. C.	340.344	1116.612
Near Hodges, Tenn.	905 M. C.	275.525	903.952
Near Mascot, Tenn.	865 M. C.	263.238	863.640
Near Caswell, Tenn.	867 M. C.	264.001	866.143
Knoxville, Tenn.	933 M. C.	284.085	932.035
Near Wright, Tenn.	940 M. C.	286.247	939.129
Concord, Tenn.	820 M. C.	249.536	818.686
Lenoir City, Tenn.	799 M. C.	243.249	798.059
Loudon, Tenn.	784 M. C.	238.548	782.636
Philadelphia, Tenn.	860 M. C.	261.708	858.620
Sweetwater, Tenn.	918 M. C.	279.582	917.262
Mouse Creek, Tenn.	979 M. C.	297.974	977.603
Athens, Tenn.	869 M. C.	264.485	837.731
Riceville, Tenn.	807 M. C.	245.740	806.232
Near Charleston, Tenn.	706 M. C.	214.992	705.353
Near Tasso, Tenn.	798 M. C.	243.055	797.423
Cleveland, Tenn.	875 M. C.	266.310	873.719
Blue Springs, Tenn.	895 M. C.	272.584	894.303
Cohutta, Ga.	866 M. C.	263.874	865.727
Waring, Ga.	795 M. C.	242.016	794.014
Dalton, Ga.	774 M. C.	235.738	773.417
Phelps, Ga.	712 M. C.	216.800	711.285
Miller, Ga.	719 M. C.	218.772	717.754
Near Oostanaula, Ga.	620 M. C.	188.666	618.982
Pinson, Ga.	653 M. C.	198.644	651.718
Rome, Ga.	614 M. C.	186.723	612.607
Chambers, Ga.	697 M. C.	212.126	695.950
Near Seney, Ga.	799 M. C.	243.221	797.968
Rockmart, Ga.	774 M. C.	232.488	762.754
Near Braswell, Ga.	1088 M. C.	331.341	1087.074
McPherson, Ga.	1015 M. C.	309.034	1013.889
Dallas, Ga.	1050 M. C.	319.900	1049.539
Near Powder Springs, Ga.	957 M. C.	291.441	956.169
Austell, Ga.	930 M. C.	283.216	929.184
Near Lenox, Ga.	804 M. C.	244.982	803.745
Peyton, Ga.	855 M. C.	260.422	854.401
Atlanta, Ga.	1050 M. C.	319.902	1049.545
Constitution, Ga.	847 M. C.	258.168	847.006
Ellenwood, Ga.	848 M. C.	258.390	847.734
Stockbridge, Ga.	810 M. C.	246.750	809.546
McDonough, Ga.	866 M. C.	263.787	865.441
Locust Grove, Ga.	837 M. C.	254.885	836.235
Jenkinsburg, Ga.	766 M. C.	233.218	765.149
Jackson, Ga.	727 M. C.	221.373	726.288
Cork, Ga.	546 M. C.	166.298	545.596
Juliette, Ga.	375 M. C.	114.312	375.039
Dames Ferry, Ga.	347 M. C.	105.663	346.663
Holton, Ga.	339 M. C.	103.246	338.733
Macon, Ga.	334 M. C.	101.788	333.949
Reid, Ga.	272 M. C.	82.820	271.719
Bullard, Ga.	259 M. C.	78.781	258.467
Adams Park, Ga.	259 M. C.	78.834	258.641
Westlake, Ga.	234 M. C.	71.363	234.130
McGriff, Ga.	259 M. C.	78.796	258.517
Cochran, Ga.	342 M. C.	104.081	341.472
Empire, Ga.	381 M. C.	116.181	381.170
Gresston, Ga.	400 M. C.	122.008	400.288
Eastman, Ga.	357 M. C.	108.722	356.699
Godwinsville, Ga.	312 M. C.	94.933	311.459
Chauncey, Ga.	300 M. C.	91.225	299.294
Achord, Ga.	275 M. C.	83.677	274.530
McRae, Ga.	229 M. C.	69.899	229.327
Scotland, Ga.	142 M. C.	43.211	141.768
Towns, Ga.	128 M. C.	38.864	127.506
Lumber City, Ga.	146 M. C.	44.342	145.479
Hazelhurst, Ga.	256 M. C.	77.919	255.639
Graham, Ga.	244 M. C.	74.339	243.894
Pine Grove, Ga.	229 M. C.	69.835	229.117
Baxley, Ga.	206 M. C.	62.754	205.885
Wheaton, Ga.	200 M. C.	61.106	200.479
Surrency, Ga.	187 M. C.	56.824	186.430
Brentwood, Ga.	167 M. C.	50.809	166.696
Odum, Ga.	155 M. C.	47.186	154.809
Jesup, Ga.	99 M. C.	30.326	99.495
Gardi, Ga.	61 M. C.	18.697	61.342
Pendarvis, Ga.	85 M. C.	25.948	85.131
Mount Pleasant, Ga.	55 M. C.	16.899	55.443
Everett, Ga.	16 M. C.	4.970	16.306
Sapps Still, Ga.	18 M. C.	5.559	18.238
Near Dock Junction, Ga.	24 M. C.	7.512	24.646
Brunswick, Ga.	10 M. C.	3.258	10.689
Do	U. S. E. 1	2.334	7.657
Do	U. S. E. 2	2.629	8.625
Do	U. S. E. 3	2.094	6.870
Near Black Fox, Tenn.	789 N.	239.658	786.278
Near Hinches Switch, Tenn.	854 N.	258.870	849.309
Ooltewah Junction, Tenn.	Ledge of Rock	237.397	778.860
Tyners, Tenn.	716 N.	216.670	710.858
Near McCarty, Tenn.	Bridge	206.239	676.636
McCarty, Tenn.	Bridge	204.939	672.371
Boyce, Tenn.	688 N.	208.183	683.014
Chattanooga, Tenn.	698 N.	211.169	692.810
Cleveland, Ohio	U. S. E. 2	176.094	577.735
Do	U. S. E. 1	177.213	581.406
Do	U. S. E. 3	181.273	594.726
Do	Gauge	174.552	572.676
Do	Bridge	180.421	591.931
Near Cleveland, Ohio	Bridge 15	250.765	822.718
Near Bedford, Ohio	R. R. B. M.	276.303	906.504
Bedford, Ohio	Town Hall	289.452	949.644
Near Macedonia, Ohio	Bridge	316.614	1038.758
Macedonia, Ohio	1004 Cleve.	305.836	1003.397
Little York, Ohio	Wall	295.651	969.982
Highland Springs, Ohio	Rock	325.845	1069.043
Near Seasons, Ohio	1002 Cleve.	305.540	1002.426
Silver Lake Junction, Ohio	1012 Cleve.	308.518	1012.196
East Akron Junction, Ohio.	Wall	293.744	963.725
East Akron, Ohio	983 Cleve.	299.751	983.433
Myersville, Ohio	1076 Cleve.	327.790	1075.424
New Berlin, Ohio	1069 Canton	325.490	1067.878
Near New Berlin, Ohio	Bridge 43	322.458	1057.931
Do	Bridge 44	320.177	1050.447

* Reported destroyed in 1913.
‡ Formerly called Robson.
† Established by Mr. W. E. Gehres, city engineer, Goldsboro, N. C.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Fruitland, Tex	H	321.199	1053.800
Sunset, Tex	I	304.720	999.736
Alvord, Tex	J	269.984	885.772
Cowen, Tex	K	266.043	872.842
Decatur, Tex	L	334.222	1096.526
Herman, Tex	M	282.661	927.363
Rhome, Tex	N	285.930	938.089
Avondale, Tex	O	256.415	841.255
Near Saginaw, Tex	P	229.000	751.311
Fort Worth, Tex	Q	191.466	628.168
Do	R	163.873	537.640
Do	S	161.660	530.380
Do	T	173.574	569.467
Do	U	184.668	605.865
Do	V	188.749	619.254
Fort Worth, Tex	M_3	188.595	618.749
Near Belt Junction, Tex	N_3	199.609	654.884
Primrose, Tex	O_3	234.932	770.773
Virgile, Tex	P_3	287.910	944.585
Near Cresson, Tex	Q_3	318.550	1045.109
Waples, Tex	R_3	256.456	841.389
Granbury, Tex	S_3	220.989	725.028
Near Granbury, Tex	Comanche △	374.658	1229.190
Do	Comanche Ref. Mk.	373.964	1226.914
Near Bethel, Tex	T_3	207.974	682.328
Burleson, Tex	U_3	217.952	715.064
Egan, Tex	V_3	252.164	827.308
Do	R. R.	255.212	837.308
Alvarado, Tex	W_3	206.728	678.240
Conley, Tex	X_3	227.260	745.602
Grand View, Tex	Y_3	213.109	699.175
Itasca, Tex	Z_3	215.966	708.548
Schofield, Tex	A_4	200.082	656.435
Hillsboro, Tex	B_4	193.171	633.762
Near Abbott, Tex	C_4	211.635	694.339
West, Tex	D_4	199.807	655.534
Elm Mott, Tex	E_4	156.910	514.796
Waco, Tex	F_4	125.909	413.087
Do	Hydrant 1	122.805	402.902
Do	Hydrant 2	130.029	426.603
Do	G_4	126.304	414.382
Hewitt, Tex	H_4	199.685	655.134
Lorena, Tex	I_4	179.600	589.237
Eddy, Tex	J_4	204.513	670.973
Troy, Tex	K_4	206.686	678.102
Temple, Tex	L_4	205.254	673.404
Temple, Tex	M_4	214.198	702.748
Do	N_4	209.543	687.476
Near Belton, Tex	O_4	155.003	508.539
Nolanville, Tex	P_4	203.096	666.324
Near Killeen, Tex	Q_4	239.975	787.318
Near Copperas Cove, Tex	R_4	286.491	939.929
Do	S_4	326.857	1072.363
Do	Gilmore △	392.130	1286.513
Do	Gilmore Ref. Mk.	390.654	1281.671
Near Kempner, Tex	T_4	272.514	894.073
Near Lampasas, Tex	U_4	298.904	980.654
Do	Lampasas NE. Base △	315.434	1034.886
Do	Lampasas SW. Base △	381.574	1251.881
Little River, Tex	V_4	150.154	492.630
Holland, Tex	X_4	160.942	528.024
Do	Y_4	*161.108	528.568
Hunters Point, N. Y	B. M. 39	3.496	11.470
Near Metuchen, N. J	No. IX	25.491	83.632
South Plainfield, N. J	No. X	19.460	63.845
Near Bound Brook, N. J	No. XI	9.897	32.470
Near New Market N. J	No. XII	14.986	49.167
Bound Brook, N. J	No. XIII	10.891	35.732
Somerville, N. J	No. XIV	24.933	81.801
Do	G	27.823	91.283
North Branch, N. J	No. XV	25.872	84.882
Near Annandale, N. J	No. XVI	108.243	355.127
Near Bloomsbury, N. J	No. XVII	99.443	326.256
Near Phillipsburg, N. J	No. XVIII	80.171	263.028
Easton, Pa	No XIX	65.359	214.432
Do	No. XX	108.887	357.240
Do	H	110.809	363.546
Allentown, Pa	I	97.905	321.210
Near Allentown, Pa	No. XXI	90.190	295.898
Near Macungie, Pa	No. XXII	116.960	383.726
Near Shamrock, Pa	No. XXIII	129.334	424.323
Reading, Pa	J	80.458	263.970
Near Robesonia, Pa	No. XXIV	131.883	432.686
Near Womelsdorf, Pa	No. XXV	147.323	483.342
Lebanon, Pa	No. XXVI	144.651	474.576
Do	K	141.962	465.754
Near Annville, Pa	No. XXVII	123.509	405.212
Near Beaver, Pa	No. XXVIII	112.063	367.660
Harrisburg, Pa	No. XXIX	108.740	356.758
Do	L	112.034	367.565
Carlisle, Pa	M	144.203	473.106
Shippensburg, Pa	No. XXX	199.270	653.772
Chambersburg, Pa	N	189.106	620.425
Greencastle, Pa	No. XXXI	179.346	588.404
Hagerstown, Md	A	168.260	552.033
Near Hagerstown, Md	No. I	171.779	563.578
Do	No. II	176.942	580.517
Near Williamsport, Md	No. IV	150.727	494.510
Do	No. V	136.317	447.233
Williamsport, Md	B	109.043	357.752
Near Williamsport, Md	C	113.273	371.630
Do	No. VI	113.190	371.358
Do	D	123.213	404.241
Near Cherry Run, Md	No. VII	123.589	405.475
Near Hancock, Md	E	123.329	404.622
Do	No. VIII	127.475	418.224
Hancock, Md	F	128.234	420.714
Near Hancock, Md	No. IX	130.172	427.073
Do	G	135.274	443.811
Do	No. X	137.653	451.617
Near Little Orleans, Md	No. XI	139.640	458.136
Little Orleans, Md	No. XII	140.112	459.684
Near Little Orleans, Md	No. XIII	142.525	467.601
Do	H	150.056	492.309
Do	No. XIV	162.263	532.358
Near Oldtown, Md	No. XV	164.712	540.393
Near Cumberland, Md	No. XVI	179.124	587.676
Cumberland, Md	I	190.124	623.765
Near Cumberland, Md	No. XVII	197.326	647.394
Do	No. XVIII	211.529	693.991
Near Keyser, W. Va	J	244.701	802.823
Bloomington, Md	No. XX	307.391	1008.499
Near Bloomington, Md	No. XXV	693.305	2274.618
Near Deer Park, Md	No. XXIII	748.578	2455.960
Near Oakland, Md	No. XXII	732.840	2404.326
Do	No. XXI	724.927	2378.365
Do	K	724.059	2375.517
Near Hutton, Md	No. XXIV	741.989	2434.342
Near Cranberry Summit, W. Va.	No. XXVI	756.159	2480.832
Do	No. XXVII	747.554	2452.600
Amblersburg, W. Va	L	494.894	1623.665
Rowlesburg, W. Va	No. XXVIII	426.822	1400.332
Near Rowlesburg, W. Va	No. XXIX	523.329	1716.955
Near Grafton, W. Va	No. XXX	311.956	1023.476
Grafton, W. Va	M	303.674	996.304
Near Grafton, W. Va	No. XXXI	329.821	1082.088
Near Bridgeport, W. Va	No. XXXII	298.441	979.135
Near West Union, W. Va	No. XXXIII	243.778	799.795
West Union, W. Va	N	245.206	804.480
Near West Union, W. Va	No. XXXIV	244.593	802.469
Cornwall, W. Va	No. XXXV	211.398	693.562
Near Cairo, W. Va	No. XXXVI	208.988	685.655
Petroleum, W. Va	No. XXXVII	212.343	696.662
Near Petroleum, W. Va	No. XXXVIII	211.198	692.905
Near Parkersburg, W. Va	No. XXXIX	185.092	607.256
Parkersburg, W. Va	O	187.639	615.612
Belpre, Ohio	No. XL	189.290	621.029
Little Hocking, Ohio	No. XLI	190.012	623.398
Near Coolville, Ohio	No. XLII	193.022	633.273
Do	No. XLIII	184.756	606.154
Near Stewart, Ohio	No. XLVIII	187.558	615.347
Do	No. XLVII	187.885	616.419
Near Guysville, Ohio	No. XLIV	188.167	617.345
Do	No. XLV	189.552	621.889
Near Canaanville, Ohio	No. XLVI	190.125	623.768
Do	No. XLIX	192.124	630.327
Athens, Ohio	No. L	197.867	649.169
Do	P	199.981	656.104
Moonville, Ohio	No. LI	217.067	712.161
Near Zaleski, Ohio	No. LII	217.720	714.303
Near Hamden, Ohio	No. LIII	215.249	706.196
Near Londonderry, Ohio	No. LIV	183.075	600.639
Near Schooley, Ohio	No. LV	200.428	657.571
Chillicothe, Ohio	Q	194.463	638.001
Near Musselmans Junction, Ohio.	No. LVI	213.252	699.644
Do	No. LVII	217.075	712.187
Near Lyndon, Ohio	No. LVIII	277.878	911.671
Martinsville, Ohio	No. LIX	322.055	1056.609
Near Clinton Valley, Ohio	No. LX	301.767	990.047
Near Loveland, Ohio	No. LXI	211.204	692.925
Loveland, Ohio	R	177.358	581.882
Near Remington, Ohio	No. LXII	180.095	590.862
Near Cumminsville, Ohio	No. LXIII	154.359	506.426
Cincinnati, Ohio	No. LXIV	150.821	494.819
Do	S	150.718	494.481
Do	T or City B. M. No. 1	166.585	546.538
Near Lawrenceburg, Ind	No. LXVI	147.044	482.427
Lawrenceburg, Ind	U	148.115	485.941

* Destroyed, 1903.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Cochran, Ind	No. LXVII	150.432	493.542
Near Delaware, Ind	No. LXVIII	282.829	927.915
Near North Vernon, Ind	No. LXIX	208.716	684.762
Near Medora, Ind	V	162.711	533.828
Near Fort Ritner, Ind	No. LXX	158.956	521.508
Near Scottville, Ind	W	157.002	515.097
Mitchell, Ind	X	209.310	686.711
West Shoals, Ind	Y	159.096	521.967
Washington, Ind	Z	155.203	509.195
Vincennes, Ind	A_3	132.237	433.848
Do	No. I	131.042	429.927
Olney, Ill	B_3	148.169	486.118
Do	No. II	146.429	480.409
Near Clay City, Ill	No. III	130.656	428.661
Flora, Ill	C_3	149.300	489.828
Near Iuka, Ill	No. IV	143.641	471.262
Salem, Ill	D_3	165.911	544.326
Odin, Ill	No. V	160.829	527.653
Near Sandoval, Ill	No. VI	148.940	488.647
Near Huey, Ill	No. VII	136.185	446.800
Near Carlylo, Ill	E_3	133.798	438.969
Carlyle, Ill	F_3	142.818	468.562
Near Aviston, Ill	No. VIII	137.971	452.660
Lebanon, Ill	G_3	139.444	457.493
Near Caseyville, Ill	No. IX	137.098	449.796
Near East St. Louis, Ill	H_3	158.999	521.649
East St. Louis, Ill	I_3	126.179	413.972
St. Louis, Mo	J_3	126.181	413.979
Near Cole, Mo	No. XXIX	169.713	556.800
Scott, Mo	No. XXX	177.033	580.816
Elston, Mo	No. XXXI	213.096	699.132
Centertown, Mo	No. XXXII	261.117	856.681
Do	M. P. R. R. No. 114.	258.919	849.470
California, Mo	No. XXXIII	267.057	876.169
Do	M. P. R. R. No. 122	271.067	889.326
Clarskburg, Mo	No. XXXIV	275.691	904.496
Tipton, Mo	No. XXXV	282.007	925.218
Fortuna, Mo	No. 14	295.663	970.021
Near Versailles, Mo	Versailles North Base.	322.290	1057.380
Do	Hunter△	319.464	1048.108
Near Syracuse, Mo	No. XXXVI	281.657	924.070
Near Otterville, Mo	No. XXXVII	223.456	733.122
Do	M. P. R. R. No. 143.	219.211	719.195
Near Smithton, Mo	No. XXXVIII	269.197	883.190
Near Sedalia, Mo	M. P. R. R. No. 152.	276.518	907.209
Sedalia, Mo	No. XXXIX	277.353	909.949
Near Sedalia, Mo	No. XL	226.237	742.246
Lamonte, Mo	No. XLI	264.354	867.301
Knobnoster, Mo	No. XLII	246.852	809.880
Near Knobnoster, Mo	M. P. R. R. No. 169.	226.782	744.034
Montserrat, Mo	No. XLIII	243.354	798.404
Warrensburg, Mo	No. XLIV or Normal △.	267.741	878.414
Do	No. XLV	269.528	884.276
Center View, Mo	No. XLVI	265.948	872.531
Holden, Mo	No. XLVII	260.289	853.965
Near Holden, Mo	No. XLVIII or M. P. R. R. No. 188.	244.336	801.626
Kingsville, Mo	No. XLIX	279.758	917.839
Near Strasburg, Mo	No. L	255.390	837.892
Pleasant Hill, Mo	No. LI	261.145	856.773
Near Pleasant Hill, Mo	M. P. R. R. No. 201.	260.566	854.874
Do	No. LII	259.932	852.794
Near Greenwood, Mo	M. P. R. R. No. 206.	280.167	919.181
Do	No. LIII	280.159	919.155
Lees Summit, Mo	No. LIV	315.659	1035.625
Near Little Blue, Mo	No. LV	240.058	787.590
Near Independence, Mo	No. LVI	310.008	1017.085
Independence, Mo	No. LVII	320.459	1051.373
Do	City Directrix	319.943	1049.680
Near Kansas City, Mo	No. LVIII	227.992	748.004
Kansas City, Mo	Old M. R. C. B. M. 241.	228.082	748.299
Do	Old M. R. C. B. M. 243.	230.132	755.025
Do	Old M. R. C. B. M. 244.	229.973	754.503
Do	M. C. R. R., Top of Cap.	*228.624	750.077
Do	Old M. R. C. B. M. 245.	227.352	745.904
Kansas City, Kans	No. LIX	228.203	748.696
Argentine, Kans	No. LX	229.107	751.662
Near Holliday, Kans	No. LXI	231.714	760.215
Do	No. LXII	232.898	764.100
Do	No. LXIII	232.918	764.165
Near Cedar Junction, Kans.	A	238.332	781.927
Near De Soto, Kans	B	240.818	790.084
De Soto, Kans	C	243.259	798.093
Near Weaver, Kans	D	243.732	799.644
Near Eudora, Kans	E	247.164	810.904
Lawrence, Kans	F	251.830	826.212
Do	G	249.112	817.295
Near Club House, Kans	H	252.746	829.217
Near Lecompton, Kans	I	256.998	843.168
Do	J	257.927	846.216
Near Grover, Kans	K	261.354	857.459
Near Tecumseh, Kans	L	263.896	865.798
Topeka, Kans	M	270.718	888.181
Do	B. M. Jennings	283.018	928.535
Do	O	284.360	932.937
Do	N	269.115	882.922
Silver Lake, Kans	P	278.820	914.762
Near Rossville, Kans	Q	283.312	929.500
St. Marys, Kans	R	294.297	965.539
Near Belvue, Kans	S	293.010	961.317
Wamego, Kans	T	302.066	991.029
St. George, Kans	U	305.837	1003.400
Manhattan, Kans	V	306.772	1006.468
Ogden, Kans	W	322.604	1058.410
Fort Riley, Kans	X	326.123	1069.955
Junction City, Kans	Y	329.267	1080.270
Near Chapman, Kans	Z	337.404	1106.967
Chapman, Kans	A_1	340.918	1118.495
Bavaria, Kans	I_1	388.525	1274.685
Brookville, Kans	J_1	414.297	1359.239
Near Terra Cotta, Kans	K_1	440.902	1446.526
Kanopolis, Kans	L_1	483.234	1585.410
Ellsworth, Kans	M_1	469.497	1540.341
Do	N_1	469.396	1540.010
Do	Water gauge B. M.	464.546	1524.098
Wilson, Kans	O_1	515.085	1689.908
Do	P_1	515.447	1691.096
Dorrance, Kans	Q_1	527.837	1731.745
Bunker Hill, Kans	R_1	568.813	1866.180
Do	S_1 or Bunker Hill △	570.030	1870.174
Near Homer, Kans	T_1 or Russell SE. Base.	573.091	1880.216
Near Russell, Kans	Russell NW. Base	560.752	1839.734
Russell, Kans	U_1	558.729	1833.096
Gorham, Kans	V_1	584.236	1916.879
Walker, Kans	W_1	593.492	1947.148
Victoria, Kans	X_1	587.547	1927.644
Hays, Kans	Y_1	609.061	1998.227
Ellis, Kans	Z_1	647.282	2123.624
Do	A_2	646.389	2120.695
Do	B_2	646.274	2120.317
Ogallah, Kans	C_2	724.535	2377.078
Wakeeney, Kans	D_2	751.218	2464.621
Collyer, Kans	E_2	787.100	2582.344
Quinter, Kans	F_2	816.736	2679.574
Buffalo Park, Kans	G_2	838.421	2750.719
Grainfield, Kans	H_2	857.775	2814.217
Grinnell, Kans	I_2	887.312	2911.123
Oakley, Kans	J_2	930.316	3052.212
Monument, Kans	K_2	967.065	3172.779
Near Page City, Kans	L_2	983.593	3227.014
Winona, Kans	M_2	1013.459	3324.990
McAllaster, Kans	N_2	961.834	3155.617
Turkey Creek, Kans	O_2	984.997	3231.611
Wallace, Kans	P_2	1010.198	3314.291
Near Wallace, Kans	Q_2	1017.978	3339.816
Sharon Springs, Kans	R_2	1052.927	3454.478
Monotony, Kans	S_2	1152.144	3779.992
Weskan, Kans	T_2	1167.234	3829.500
Near Weskan, Kans	U_2	1181.412	3876.016
Arapahoe, Colo	A	1223.320	4013.509
Cheyenne Wells, Colo	B	1305.078	4281.744
First View, Colo	C	1395.817	4579.443
Kit Carson, Colo	D	1306.898	4287.714
Near Wild Horse, Colo	E	1351.804	4435.044
Aroya, Colo	F	1390.845	4563.131
Boyero, Colo	G	1444.872	4740.384
Mirage, Colo	H	1484.348	4869.898
Hugo, Colo	I	1537.793	5045.252
Do	J	1538.162	5046.453
Do	K	1538.160	5046.446
Near Lake, Colo	L	1596.418	5237.581
Lake, Colo	M	1615.925	5301.580
Limon, Colo	N	1631.997	5354.310
Do	O	1638.995	5377.269
Do	P	1638.983	5377.230
Resolis, Colo	Q	1699.933	5577.197
Mattison, Colo	R	1764.796	5790.002
Ramah, Cold	S	1856.730	6091.622
Calhan, Colo	T	1984.169	6509.728
Peyton, Colo	U	2073.906	6804.140
Falcon, Colo	V	2084.074	6837.499
Do	W	2076.482	6812.591
Elsmere, Colo	X	1957.205	6421.264
Near Roswell, Colo	Y	1864.130	6115.900
Roswell, Colo	Z	1853.322	6080.441
Colorado Springs, Colo	A_1	1825.151	5988.016
Do	B_1	1823.075	5981.205
Do	City B. M.	1822.738	5980.100
Do	North Mast B. M.	1823.390	5982.239
Do	South Mast B. M.	1823.077	5981.212
Do	Nail B. M.	1822.518	5979.378
Do	Reference B. M.	1823.615	5982.977
Do	V. C. Post B. M.	1822.122	5978.079

* This elevation has been destroyed. For present elevation see p. 124.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Pike View, Colo	C_1	1894.918	6216.910
Edgerton, Colo	D_1	1947.208	6388.465
Near Husted, Colo	E_1	1986.472	6517.283
Husted, Colo	F_1	2007.206	6585.308
Monument, Colo	G_1	2121.249	6959.465
Palmer Lake, Colo	H_1	2202.309	7225.409
Near Palmer Lake, Colo	I_1	2154.125	7067.325
Greenland, Colo	J_1	2100.963	6892.909
Larkspur, Colo	K_1	2035.638	6678.589
Near Douglas, Colo	L_1	1923.193	6309.676
Castle Rock, Colo	M_1	1890.511	6202.452
Plateau, Colo	N_1	1832.754	6012.960
Sedalia, Colo	O_1	1779.963	5839.762
Toluca, Colo	P_1	1710.901	5613.181
Near Acequia, Colo	Q_1	1677.569	5503.824
Wolhurst, Colo	R_1	1647.646	5405.652
Littleton, Colo	S_1	1634.447	5362.348
Petersburg, Colo	T_1	1609.734	5281.269
Denver, Colo	U_1	1608.849	5278.365
Do	V_1	1608.602	5277.555
Do	W_1	1608.898	5278.527
Do	X_1	1580.959	5186.863
Do	Y_1	1580.341	5184.835
River Bend, Colo	N_2	1675.061	5495.596
Godfrey, Colo	M_2	1705.132	5594.254
Agate, Colo	L_2	1664.263	5460.170
Lowland, Colo	K_2	1621.113	5318.602
Deer Trail, Colo	J_2	1579.807	5183.084
Byers, Colo	I_2	1585.246	5200.928
Bennett, Colo	H_2	1671.377	5483.510
Watkins, Colo	G_2	1681.210	5515.769
Near Magnolia, Colo	F_2	1672.435	5486.980
Do	E_2	1646.790	5402.843
Magnolia, Colo	D_2	1626.398	5335.941
Near Denver, Colo	C_2	1608.734	5277.988
Denver, Colo	Z_1	1585.483	5201.705
Do.*	A_2	1584.762	5199.340
Do	B_2	1584.798	5199.458
Cairo, Ill	P. B. M. 3	99.736	327.217
Do	P. B. M. 2	97.326	319.310
Do	P. B. M. 1	96.923	317.988
Near Mound City Jct., Ill	No. II	99.729	327.194
Mound City Junction, Ill	No. I	98.172	322.086
Villa Ridge, Ill	Z_3	117.624	385.905
Do	Y_3	115.944	380.393
Near Villa Ridge, Ill	No. XII	104.594	343.155
Near Ullin, Ill	No. 139	102.395	335.941
Do	X_3	102.884	337.545
Anna, Ill	W_3	191.848	629.421
Near Makanda, Ill	V_3	131.489	431.393
Carbondale, Ill	T_3	126.692	415.655
Near De Soto, Ill	U_3	117.553	385.672
Duquoin, Ill	R_3	140.963	462.476
Near Radom, Ill	S_3	152.343	499.812
Near Ashley, Ill	Q_3	170.312	558.765
Near Richview, Ill	P_3	165.871	544.195
Centralia, Ill	N_3	150.754	494.599
Near Centralia, Ill	O_3	143.648	471.285
Odin, Ill	M_3	161.190	528.838
Arkansas City, Ark	F	42.334	138.891
Tillar, Ark	H	46.672	153.123
Walnut Lake, Ark	I	49.944	163.858
Varner, Ark	J	54.685	179.412
Noble Lake, Ark	K	61.803	202.765
Pine Bluff, Ark	N	68.463	224.616
Do	L	71.488	234.540
Near Pine Bluff, Ark	E	103.769	340.449
Redfield, Ark	D	93.856	307.926
Wrightsville, Ark	C	78.704	258.215
Near Wrightsville, Ark	No. II	81.260	266.601
Little Rock, Ark	No. I or 3	80.474	264.021
Do	A	91.208	299.238
Do	B	90.805	297.916
Do	O	87.919	288.448
Argenta, Ark	West Base	78.165	256.446
Near Little Rock, Ark	No. I	96.275	315.863
Marche, Ark	No. II	81.963	268.907
Palarm, Ark	No. III	82.326	270.098
Mayflower, Ark	No. IV	87.592	287.375
Preston, Ark	No. V	84.093	275.895
Conway, Ark	No. VI	97.705	320.553
Near Conway, Ark	No. VII	100.783	330.652
Near Menifee, Ark	No. VIII	86.498	283.786
Menifee, Ark	No. IX	87.266	286.306
Plumerville, Ark	No. X	89.200	292.650
Morrillton, Ark	No. XI	118.367	388.342
Germantown, Ark	No. XII	93.564	306.968
Blackville, Ark	No. XIII	99.346	325.938
Atkins, Ark	No. XIV	108.634	356.410
Galla Creek, Ark	No. XV	113.311	371.755
Russellville, Ark	No. XVI	106.904	350.735
Onita, Ark	No. XVII	108.600	356.298
Near Onita, Ark	No. XVIII	99.987	328.040
Near Mill Creek, Ark	No. XIX	99.402	326.121
London, Ark	No. XX	115.916	380.301
Near Berlin, Ark	No. XXI	103.182	338.523
Knoxville, Ark	No. XXII	120.649	395.830
Lamar, Ark	No. XXIII	125.320	411.154
Near Clarksville, Ark	No. XXIV	114.669	376.210
Clarksville, Ark	No. XXV	112.733	369.858
Do	No. XXVI	112.352	368.608
Spadra, Ark	No. XXVII	115.273	378.191
Hartman, Ark	No. XXVIII	123.963	406.702
Coal Hill, Ark	No. XXIX	144.668	474.632
Altus, Ark	No. XXX	165.520	543.044
Ozark, Ark	No. XXXI	122.021	400.330
Poepping, Ark	No. XXXII	116.888	383.490
White Oak, Ark	No. XXXIII	120.941	396.788
Near Mulberry, Ark	No. XXXIV	117.366	385.058
Dyer, Ark	No. XXXV	130.945	429.609
Alma, Ark	No. XXXVI	132.735	435.482
Van Buren, Ark	No. XXXVII	125.364	411.298
Do	No. XXXVIII	126.421	414.766
Do	No. XXXIX	126.413	414.740
Do	No. XL	126.370	414.599
Fort Smith, Ark	No. XLI	136.571	448.067
Do	No. XLII	130.779	429.064
Near Lillie, Ark	No. XLIII	141.138	463.050
Near Rudy, Ark	No. XLIV	163.619	536.807
Near Lancaster, Ark	No. XLV	185.474	608.509
Near Mountainburg, Ark	No. XLVI	211.660	694.422
Near Chester, Ark	No. XLVII	249.835	819.667
Chester, Ark	No. XLVIII	257.603	845.153
Do	No. XLIX	256.468	841.428
Porter, Ark	No. CXXVIII	331.023	1086.031
Near Winslow, Ark	No. CXXVII	572.021	1876.706
Do	No. CXXVI	531.285	1743.058
Brentwood, Ark	No. CXXV	454.371	1490.716
Near Woolseys, Ark	No. CXXIV	419.644	1376.782
West Fork, Ark	No. CXXIII	411.899	1351.372
Greenland, Ark	No. CXXII	380.726	1249.099
Fayetteville, Ark	No. CXXI	443.186	1454.019
Johnson, Ark	No. CXX	364.066	1194.440
Springdale, Ark	No. CXIX	405.209	1329.423
Lowell, Ark	No. CXVIII	409.481	1343.439
Rogers, Ark	No. CXVII	421.558	1383.062
Avoca, Ark	No. CXVI	415.074	1361.789
Brightwater, Ark	No. CXV	385.981	1266.339
Garfield, Ark	No. CXIV	463.602	1521.001
Seligman, Mo	No. CXIII	470.177	1542.572
Washburn, Mo	No. CXII	449.482	1474.675
Exeter, Mo	No. CXI	475.705	1560.709
Purdy, Mo	No. CX	453.041	1486.352
Monett, Mo	No. CIX	396.901	1302.166
Pierce City, Mo	No. CVII	366.453	1202.271
Wentworth, Mo	No. CVI	373.567	1225.611
Sarcoxie, Mo	No. CV	332.005	1089.253
Reeds, Mo	No. CIV	343.691	1127.593
Carthage, Mo	No. CIII	287.014	941.645
Near Carthage, Mo	No. CII	288.533	946.629
Do	No. CI	294.273	965.461
Do	No. C	280.727	921.018
Jasper, Mo	No. XCIX	289.121	948.558
Boston, Mo	No. XCVIII	287.716	943.948
Near Boston, Mo	No. XCVII	283.765	930.986
Do	No. XCVI	283.764	930.982
Lamar, Mo	No. XCV	298.647	979.811
Near Lamar, Mo	No. XCIV	288.234	945.648
Irwin, Mo	No. XCIII	296.829	973.846
Sheldon, Mo	No. XCII	281.802	924.545
Milo, Mo	No. XCI	267.977	879.188
Nevada, Mo	No. XC	262.768	862.098
Near Horton, Mo	No. LXXXIX	228.038	748.155
Horton, Mo	No. LXXXVIII	236.592	776.219
Near Arthur, Mo	No. LXXXVII	228.720	750.392
Rich Hill, Mo	No. LXXXVI	245.536	805.563
Do	No. LXXXV	245.530	805.543
Near Rich Hill, Mo	No. LXXXIV	231.664	760.051
Near Butler, Mo	No. LXXXIII	231.495	759.496
Butler, Mo	No. LXXXII	263.869	865.710
Passaic, Mo	No. LXXXI	263.738	865.281
Adrian, Mo	No. LXXX	264.510	867.814
Near Archie, Mo	No. LXXIX	242.900	796.914
Archie, Mo	No. LXXVIII	255.181	837.207
Near Archie, Mo	No. LXXVII	243.648	799.368
Lone Tree, Mo	No. LXXVI	267.990	879.231
Harrisonville, Mo	No. LXXV	275.421	903.611
Do	No. LXXIV	280.038	918.758
Near Harrisonville, Mo	No. 43†	309.456	1015.274
Near Pleasant Hill, Mo	Big Creek	260.156	853.528
Kimpton, Mo	No. LXXIII	308.971	1013.682
Coleman, Mo	No. LXXII	310.245	1017.862
Raymore, Mo	No. LXXI	336.819	1105.047
Belton, Mo	No. LXX	337.269	1106.523

* Described as in Jersey, Colo. See p. 590 of Appendix 8, Report for 1899.
† No description is furnished for No. 43, as it was only a temporary bench mark, but its elevation is necessary as a junction point.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Newington, Kans	No. LXIX	265.239	870.205
Morse, Kans	No. LXVIII	333.491	1094.128
Olathe, Kans	No. LXVII	315.584	1035.378
Do	No. LXVI	315.708	1035.785
Do	No. LXV	* 314.085	1030.461
Near Holliday, Kans	No. LXIV	237.736	779.972
Delta, La	No. 215	* 28.005	91.880
Near Delta, La	No. 211	27.891	91.506
On Elcho Plantation, La	No. 207	29.904	98.110
On Duck Port Plantation, La.	No. 197	29.762	97.644
On Cabin Teele Plantation, La.	No. 188	30.200	99.081
On River View Plantation, La.	No. 184	28.905	94.832
Near Millikens Bend, La	No. 179	29.856	97.953
Near Omega, La	No. 171	29.561	96.985
Near Hendersons Ldg., La	No. 162	31.167	102.254
Do	No. 161	30.359	99.603
Near Ingomar, Miss	No. 153	31.958	104.849
Do	No. 150	32.292	105.945
On Shiloh Plantation, Miss	No. 140	33.946	111.371
Near Hays, Miss	No. 137	32.422	106.371
Near Tallulah Ldg., Miss	No. 128	32.537	106.748
Do	No. 124	31.942	104.796
On Ben Lomond Plantation, Miss.	No. 112	33.404	109.593
On Reserve Plantation, Miss.	No. 105	33.194	108.904
Near Mayersville, Miss	No. 95	34.259	112.398
Do	No. 90	33.976	111.470
On Riverdale Plantation, Miss.	No. 83	34.640	113.648
On Palmetto Plantation, Miss.	No. 70	34.898	114.495
Near Leota, Miss	No. 65	36.880	120.997
Do	No. 62	36.724	120.485
Near Lake Washington Landing, Miss.	No. 56	36.070	118.340
On Longwood Plantation, Miss.	No. 46	36.676	120.328
On Glenora Plantation, Miss.	No. 42	36.780	120.669
On Auburn Plantation, Miss.	No. 39	36.300	119.094
Near Lake See, Miss	No. 33	37.166	121.935
Refuge, Miss	No. 22	39.735	130.364
On Refuge Plantation, Miss.	No. 19	39.992	131.207
Warfield Point, Miss	No. 11	39.557	129.780
Near Warfield Point, Miss.	No. 8	40.015	131.283
Near Greenville, Miss	No. 5	39.301	128.940
Do	No. 2	40.577	133.126
Greenville, Miss	Greenville No. 1	40.083	131.506
Georgetown, D. C	No. XI	9.646	31.647
Great Falls, Md	F	50.778	166.594
Seneca, Md	E	60.470	198.392
Whites Ferry, Md	No. V	63.169	207.247
Point of Rocks, Md	D	† 68.310	224.114
Weverton, Md	C	† 76.816	252.020
Near Keedysville, Md	B	119.349	391.564
Kleinston, Miss	A	28.715	94.209
Vicksburg, Miss	B. M. Cistern	59.090	193.864
Do	C	61.239	200.194
Do	D	60.344	197.979
Near Vicksburg, Miss	E	76.036	249.461
Do	F	80.199	263.120
Newmans, Miss	G	100.951	331.203
Bovina, Miss	H	75.398	247.368
Near Bovina, Miss	I	46.545	152.706
Do	J	32.209	105.672
Smiths, Miss	K	41.105	134.859
Edwards, Miss	L	68.950	226.213
Near Edwards, Miss	M	52.781	173.166
Near Bolton, Miss	N	62.257	204.255
Near Clinton, Miss	O	101.300	332.348
Jackson, Miss	P	90.746	297.722
Do	Q	84.032	275.695
Near Pearson, Miss	R	85.570	280.741
Greenfield, Miss	S	94.871	311.256
Brandon, Miss	T	121.029	397.076
Rankin, Miss	U	128.864	422.781
Pelahatchie, Miss	W	109.416	358.976
Near Clarksburg, Miss	X	113.323	371.794
Morton, Miss	Y	138.583	454.668
Forest, Miss	Z	146.704	481.311
Lake, Miss	A_1	137.706	451.790
Newton, Miss	B_1	129.384	424.487
Hickory, Miss	C_1	99.389	326.079
Chunky, Miss	D_1	95.065	311.892
Near Chunky, Miss	E_1	90.842	298.037
Graham, Miss	F_1	94.356	309.566
Near Meridian, Miss	G_1	118.690	389.402
Chewalla, Tenn	L	125.955	413.237
Cypress Creek, Tenn	M	117.203	384.524
Pocahontas, Tenn	N	122.101	400.593
Middleton, Tenn	O	125.273	411.000
Saulsbury, Tenn	P	165.535	543.093
Grand Junction, Tenn	R	177.441	582.154
La Grange, Tenn	I	162.644	533.608
Do	K	162.676	533.713
Moscow, Tenn	H	107.925	354.087
Wolf River, Tenn	G	103.070	338.155
Rossville, Tenn	F	94.534	310.150
Collierville, Tenn	E	117.950	386.974
Bailey, Tenn	D	109.020	357.676
Germantown, Tenn	C	115.653	379.438
White, Tenn	B	95.931	314.734
Buntyn, Tenn	A	91.721	300.921
Memphis, Tenn	P. B. M. Memphis (old).	80.644	264.580
Do	P. B. M. Memphis (new).	83.552	274.119
Washington, D. C	H	11.362	37.277
Do	I	6.286	20.623
Mound, La	P. B. M. 2	25.445	83.481
California, La	P.B. M. 3	26.994	88.563
Barnes, La	P. B. M. 4	24.804	81.378
Tallulah, La	P. B. M. 5	28.088	92.152
Do	P. B. M. 6	27.692	90.853
Near Lake One, La	P. B. M. 7	23.668	77.651
Quebec, La	P. B. M. 8	22.990	75.426
Near Quebec, La	P. B. M. 9	23.922	78.484
Dallas, La	P. B. M. 10	23.336	76.562
Waverly, La	P. B. M. 11	24.045	78.888
Near Bayou Maçon, La	P. B. M. 12	22.729	74.570
Delhi, La	P. B. M. 13	28.854	94.665
Carpenter, La	P. B. M. 14	26.442	86.752
Holly Ridge, La	P. B. M. 15	26.018	85.361
Rayville, La	P. B. M. 16	24.593	80.686
Do	P. B. M. 17	26.922	88.327
Near Rayville, La	P. B. M. 18	24.501	80.384
Girard, La	P. B. M. 19	24.250	79.560
Do	P. B. M. 20	26.392	86.588
Crew Lake, La	P. B. M. 21	20.369	66.827
Gordon, La	P. B. M. 23	19.710	64.665
Monroe, La	P. B. M. 24	21.914	71.896
Do	P. B. M. 25	24.727	81.125
Do	P. B. M. 26	24.775	81.283
Do	P. B. M. 27	23.892	78.386
West Monroe, La	P. B. M. 28	23.145	75.935
Chenlere, La	P. B. M. 29	27.419	89.957
Calhoun, La	P. B. M. 30	50.549	165.843
Choudrant, La	P. B. M. 32	46.516	152.611
Ruston, La	P. B. M. 33	95.947	314.786
Near Ruston, La	T. B. M. 72a=V. S. & P. R. R.	74.424	244.173
Do	V. S. & P. R. R	73.611	241.505
Allen Green, La	P. B. M. 34	100.733	330.488
Simsboro, La	P. B. M. 35	97.727	320.626
Arcadia, La	P. B. M. 36	112.561	369.294
Gibsland, La	P. B. M. 37	73.834	242.237
Taylor, La	P. B. M. 38	66.618	218.563
Near Dubberly, La	T. B. M. 91a=V. S. & P. R. R.	81.934	268.812
Dubberly, La	P. B. M. 39	78.099	256.230
Sibley, La	P. B. M. 40	57.687	189.261
Bayou Dorcheat, La	P. B. M. 41	43.035	141.191
Doyle, La	P. B. M. 42	68.123	223.500
Haughton, La	P. B. M. 43	72.246	237.027
Bodcau, La	P. B. M. 44	62.172	203.976
Shreveport, La	P. B. M. 46	59.739	195.994
Near Shreveport, La	P. B. M. 47	50.029	164.137
Shreveport, La	T. B. M. 116a	56.845	186.499
Do	Mark for barometer	60.739	199.275
Do	Bayou Pierre B. M. 2	55.488	182.047
Near Curtis, La	T. B. M. 121=△148	51.188	167.939
Lotus Landing, La	P. B. M. 48	48.119	157.870
On Cash Plantation, La	P. B. M. 49	46.485	152.510
Caspiana Landing, La	P. B. M. 50	45.220	148.359
On Campo Bello Plantation, La.	P. B. M. 51	44.700	146.653
On Bonner's Plantation, La.	P. B. M. 52	43.960	144.225
Near Howard, La	P. B. M. 53	43.155	141.584
Near Loggy Bayou, La	P. B. M. 54	43.886	143.983
East Point, La	P. B. M. 55	‡ 43.270	141.962
On Crichton's Plantation La.	P. B. M. 56	42.042	137.933
Coushatta, La	P. B. M. 57	40.363	132.424
Do	P. B. M. 58	40.787	133.815
On Upper Brownsville Plantation, La.	P. B. M. 59	38.588	126.601

* Destroyed. † Destroyed. Reported 1903. ‡ Reported destroyed.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Old River, La.	P. B. M. 60	36.979	121.322
Near Campti, La.	P. B. M. 61	* 36.250	118.930
Near Willow, La.	P. B. M. 62	36.323	119.170
Near Tiger Island, La.	P. B. M. 63	34.422	112.933
St. Maurice, La.	P. B. M. 64	32.864	107.821
Near Dunns Landing, La.	P. B. M. 65	31.966	104.875
Near Montgomery, La.	P. B. M. 66	30.266	99.298
Buxtons Landing, La.	P. B. M. 67	28.149	92.352
Near Colfax, La.	P. B. M. 68	26.425	86.696
Colfax, La.	P. B. M. 69	29.347	96.283
Near Fairmount, La.	P. B. M. 70	28.847	94.642
Boyce, La.	P. B. M. 71	26.191	85.928
Near Rapides, La.	P. B. M. 72	23.931	78.514
Alexandria, La.	P. B. M. 73	22.479	73.750
Do	P. B. M. 74	21.632	70.971
Do	B. M. 3 (Merrill, 1871)	24.312	79.764
Do	B. M. 4 (Merrill, 1871)	24.050	78.904
Near Alexandria, La.	P. B. M. 75	22.109	72.536
Near Grand Bend, La.	P. B. M. 76	21.680	71.128
Near Jones Quarter Landing, La.	P. B. M. 77	20.219	66.335
Near Poland, La.	P. B. M. 78	18.555	60.876
Near Egg Bend Ldg., La.	T. B. M. 23=△362	19.373	63.560
Egg Bend Landing, La.	P. B. M. 79	† 18.750	61.516
David Ferry, La.	P. B. M. 80	20.229	66.368
Normands Landing, La.	P. B. M. 81	18.757	61.539
Do	P. B. M. 82	18.839	61.808
Near Barbin Landing, La.	T. B. M. 53	24.179	79.327
Marksville, La.	P. B. M. 83	26.675	87.516
Mansura, La.	P. B. M. 84	23.293	76.420
Do	P. B. M. 85	24.287	79.682
Moreauville, La.	P. B. M. 86	18.668	61.247
Hamburg, La.	P. B. M. 87	16.972	55.682
Near Simmesport, La.	P. B. M. 88	15.391	50.495
Simmesport, La.	P. B. M. 89	12.784	41.942
Near Water Valley Landing, La.	P. B. M. 90	13.011	42.687
Near Merrick, La.	P. B. M. 91	13.576	44.541
Near Barbre Landing, La.	P. B. M. 92	13.657	44.806
Do	P. B. M. 93	15.161	49.741
Do	P. B. M. 94	15.362	50.400
Near Smithland, La.	M. R. C. 1/4°	14.181	46.525
Delhi, La.	T. B. M. 1	29.489	96.748
Near Pullaway Landing, La	P. B. M. Griffin	26.640	87.401
Sunrise Landing, La.	P. R. P. Newcomer	28.114	92.237
Near Crowville, La.	P. B. M. Gray	23.050	75.623
Albany Point, La.	P. B. M. 1	68.006	223.116
Hendersons Mill, La.	P. B. M. 2	74.554	244.599
Mooringsport, La.	P. B. M. 3	55.895	183.382
Jeters Landing, La.	P. B. M. 4	60.197	197.496
Monroe, La.	B. M. C. (Burrowes, 1883).	24.767	81.256
Do	B. M. D. (Burrowes, 1883).	24.614	80.754
Logtown, La.	P. B. M. 9	21.772	71.430
Blankston, La.	P. B. M. 10	19.688	64.593
Near Riverton, La.	T. B. M. 125	21.708	71.220
Do	P. B. M. 11	19.345	63.468
Do	Gauge B. M. B	23.509	77.129
Riverton, La.	Gauge B. M. A	17.248	56.588
Columbia, La.	P. M. M. 12	18.794	61.660
Near Columbia, La.	T. B. M. 137	18.279	59.970
Gibsons Landing, La.	P. R. P. Gibson	18.766	61.568
Coles Landing, La.	P. B. M. 13	18.557	60.882
Cottingham Landing, La.	P. B. M. 14	17.732	58.176
Danville, La.	B. M. B	18.451	60.535
Near Danville, La.	B. M. A	18.362	60.243
Stafford, La.	P. B. M. 8	17.277	56.683
Catahoula Shoals, La.	P. B. M. 7	17.529	57.510
Harrisonburg, La.	T. B. M. H	18.476	60.617
Do	B. M. V	20.633	67.693
Do	P. B. M. 6	24.199	79.393
Trinity, La.	P. B. M. 5	16.441	53.940
Jonesville, La.	P. B. M. 4	16.561	54.334
Jones Bayou, La.	P. B. M. 5a	18.057	59.242
McClures Landing, La.	P. B. M. 6a	17.094	56.083
Eva, La.	P. B. M. 7a	16.432	53.911
Hardscramble Landing, La.	P. B. M. 8a	16.631	54.564
Lums, La.	P. B. M. 9a	16.035	52.608
New Era, La.	P. B. M. 10a	15.947	52.319
Acme, La.	P. B. M. 11a	15.408	50.551
Near Acme, La.	Discharge Jar	15.569	51.079
Do	P. B. M. 12a	15.030	49.311
Near Murrays Landing, La.	P. B. M. White	16.603	54.472
Barbin Landing, La.	P. B. M. Barbin	17.673	57.982
Black River, La.	P. B. M. 3	15.706	51.529
Frogmore, La.	P. B. M. 2	17.298	56.752
Concordia, La.	T. B. M. 9	19.700	64.632
Vidalia, La.	M. R. C. Stone 1/4°	17.781	58.336
Do	B. M. 1858	19.676	64.554
Do	B. M. C. H. Pedestal.	20.334	66.712
Natchez, Miss.	B. M. Polk 1	23.478	77.027
Do	B. M. Polk 2	25.133	82.457
Do	B. M. Polk 3	12.390	40.650
Do	B. M. cor. State and Broadway sts.	59.435	194.996
Do	B. M. No. 7 (Melvin, 1879).	65.860	216.076
Burke, La.	P. B. M. Burke	23.170	76.017
Archibald, La.	P. B. M. Archibald	23.548	77.257
Mangham, La.	P. B. M. Mangham	22.866	75.020
Big Creek, La.	P. B. M. Big Creek	22.794	74.783
Baskin, La.	P. B. M. Baskin	22.600	74.147
Steeles Switch, La.	P. B. M. Steele	22.139	72.634
Winnsboro, La.	P. B. M. Winnsboro	22.111	72.543
Eden, La.	P. B. M. Eden	21.967	72.070
Gilbert, La.	P. B. M. Gilbert	23.822	78.156
Wisner, La.	P. B. M. Wisner	22.908	75.157
Elam, La.	P. B. M. Elam	22.136	72.625
Peck, La.	P. B. M. Peck	22.924	75.210
Near Peck, La.	P. B. M. Newman	21.892	71.824
Near Florence, La.	P. B. M. Chisum	21.994	72.159
Florence, La.	P. B. M. Florence	22.188	72.795
Copeland, La.	P. B. M. Copeland	19.655	64.485
Kirks Ferry, La.	P. B. M. Kirk	19.929	65.384
Greenville, La.	P. B. M. Tensas	19.786	64.915
Lee Bayou, La.	P. B. M. Lee Bayou	19.454	63.825
Clayton, La.	P. B. M. Clayton	18.828	61.772
Cypress City, La.	P. B. M. Cypress	17.886	58.681
Helena, La.	P. B. M. Helena	18.544	60.840
Concordia, La.	P. B. M. Concordia	18.523	60.771
Do	B. M. 384	20.912	68.609
Osbornes Ferry, La.	P. R. P. Osborne	23.954	78.589
New Light, La.	P. B. M. New Light	21.985	72.129
Alto, La.	P. R. P. Alto	22.670	74.376
Near Charlieville, La.	P. B. M. Harland	22.639	74.275
Do	P. A. P. Stokes	22.153	72.680
Do	P. R. P. Stokes	22.202	72.841
Holly Grove Landing, La.	P. R. P. Hatch	21.503	70.548
Near Holly Grove, La.	P. R. P. Noble 2	20.727	68.002
Near Landerneau, La.	P. R. P. Elmore	20.368	66.824
Do	P. R. P. Doucier	20.976	68.819
Near Boeuf River, La.	P. R. P. Harris	19.943	65.430
Do	P. R. P. Wheeler	19.973	65.528
Do	P. R. P. Herbert	19.178	62.920
Do	P. R. P. La Fourche.	19.008	62.362
Near Columbia, La.	P. R. P. Columbia	20.955	68.750
Do	P. R. P. Wade	21.268	69.777
Do	P. R. P. Three Rivers.	16.715	54.839
Near Bayou Siord, La.	P. R. P. Pargoud	31.603	103.684
Bank Smith Place, La.	P. R. P. Zeph	24.183	79.340
Rock Row Shoals, La.	P. R. P. Rock Row	23.455	76.952
Near Glendora, La.	P. R. P. Glendora	24.832	81.470
Parkeville, La.	P. R. P. Parkeville	23.664	77.638
Near Mill Bayou, La.	P. R. P. Cashill	21.875	71.768
Near Fishtrap Shoals, La.	P. R. P. Fishtrap	21.302	69.888
Alabama Landing, La.	P. R. P. Alabama	21.292	69.856
Frank Pierre Creek, La.	P. R. P. Frank Pierre	17.131	56.204
Near Shiloh Shoals, La.	P. R. P. Shiloh	17.381	57.024
Near Lake Landing, Ark.	P. R. P. Lake	18.096	59.370
Near Bayou Lapile, Ark.	P. R. P. Lapile	18.818	61.739
Near Ouachita Belle Landing, Ark.	P. R. P. Belle Point.	19.698	64.626
Near Belle Point Landing, Ark.	T. B. M. 39	20.794	68.222
Near Eutaw Shoals, Ark.	P. R. P. Eutaw	22.167	72.726
Near Jacks Island, Ark.	P. R. P. Jacks Island	23.869	78.310
Careyville Landing, Ark.	P. R. P. Careyville	25.106	82.369
Pigeon Hill Landing, Ark.	P. R. P. Pigeon Hill	27.905	91.552
Near Fletchers Landing, Ark.	P. R. P. Fletcher	25.809	84.675
Near Franklin Bayou, Ark.	P. R. P. Franklin	22.736	74.593
Near Champagnolle, Ark.	P. R. P. Bell Field	24.757	81.224
Champagnolle Landing, Ark.	P. R. P. Champagnolle.	29.802	97.775
El Dorado Landing, Ark.	P. R. P. El Dorado	26.915	88.304
Near Smackover Cr'k, Ark.	P. R. P. Smackover	26.476	86.863
Leppards Camp, Ark.	P. R. P. Leppard	27.676	90.800
Near Little Bay, Ark.	P. R. P. Little Bay	27.677	90.804
Near Beech Hill, Ark.	P. R. P. Beech Hill	28.449	93.336
Near Walnut Hill, Ark.	P. R. P. Walnut Hill.	27.632	90.656
Do	T. B. M. 5	31.749	104.163

* Reported destroyed, 1892.

† Destroyed.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Frenchport, Ark	P. R. P. Frenchport II.	37.605	123.376
Do	P. R. P. Frenchport I.	34.865	114.386
Elliott, Ark	P. R. P. Elliott	77.550	254.429
Camden, Ark	Gauge B. M. A. (Ewens, 1890).	40.810	133.891
Near Camden, Ark	P. B. M. Camden IV.	35.184	115.433
Camden, Ark	P. B. M. Camden III.	32.933	108.058
Do	P. B. M. Camden II	60.870	199.704
Do	P. B. M. Camden I	42.338	138.904
Lester, Ark	P. B. M. Lester	34.793	114.150
Chidester, Ark	P. B. M. Chidester	70.333	230.751
Little Missouri River, Ark.	P. B. M. Little Missouri.	50.651	166.177
Whelen, Ark	P. B. M. Whelen	77.038	252.749
Gurdon, Ark	P. B. M. Gurdon II	63.621	208.730
Do	P. B. M. Gurdon I	63.773	209.228
Near Smithton, Ark	P. B. M. Smithton	62.981	206.630
Curtis, Ark	P. B. M. Curtis	56.540	185.498
Gum Springs, Ark	P. B. M. Gum Springs	65.319	214.301
Arkadelphia, Ark	P. B. M. Arkadelphia II.	66.018	216.594
Do	P. B. M. Arkadelphia I.	57.525	188.730
Near Arkadelphia, Ark	Gauge B. M. B. (Ewens, 189-).	56.872	186.588
Do	P. B. M. Ouachita River.	59.527	195.298
Daleville, Ark	P. B. M. Daleville	57.123	187.411
Donaldson, Ark	P. B. M. Donaldson	69.748	228.832
Malvern, Ark	P. B. M. Malvern	82.640	271.128
Traskwood, Ark	P. B. M. Traskwood	89.106	292.342
Saline River, Ark	P. B. M. Saline River.	86.186	282.762
Benton, Ark	P. B. M. Benton	91.075	298.802
Alexander, Ark	P. B. M. Alexander	99.572	326.679
Mabelvale, Ark	P. B. M. Mabelvale	94.635	310.482
Ensign, Ark	P. B. M. Ensign	89.528	293.726
Little Rock, Ark	T. B. M. 2	80.250	263.287
Do	B. M. Whittemore	80.462	263.982
Do	B. M. Abert	75.260	246.916
Do	B. M. Merrill	78.096	256.220
Do	S. S. Gauge B. M.	75.959	249.209
Do	B. M. State House Steps.	87.922	288.457
Do	Gauge B. M. A. (Ewens).	73.870	242.355
Do	B. M. 1 (Ewens, 1887)	72.104	236.561
Do	No. 6 (Gauge B. M)	80.198	263.116
Glendora, La	T. B. M. 79	26.158	85.820
Port Union Landing, La	P. B. M. Port Union.	25.897	84.964
Near Port Union Landing, La.	P. B. M. Hay	41.321	135.567
Near Farmerville, La	P. B. M. White	54.694	179.442
Do	P. B. M. Rogers	53.574	175.767
Farmerville, La	P. B. M. Farmerville	54.820	179.855
Scotts Bluff, La	P. B. M. Scott	23.239	76.243
Steins Bluff, La	P. B. M. Stein	29.559	96.978
Near Bayou D'Arbonne, La.	P. B. M. Cox Ferry	21.634	70.978
Buena Vista, Ark	H. S. 287	87.783	288.001
Do	P. B. M. Buena Vista	86.135	282.595
Near Ogamaw, Ark	R. R. B. M	57.688	189.265
Stephens, Ark	P. B. M. Stephens	71.949	236.053
Near Stephens, Ark	R. R. B. M	56.252	184.553
McNeil, Ark	P. B. M. McNeil	98.357	322.693
Waldo, Ark	P. B. M. Waldo	107.419	352.424
Near Buckner, Ark	R. R. B. M	75.571	247.936
Stamps, Ark	P. B. M. Stamp	81.563	267.595
New Lewisville, Ark	P. B. M. Lewisville	79.323	260.246
Lewisville, Ark	T. B. M. 239	83.880	275.196
Garland, Ark	P. B. M. Garland	70.652	231.797
Do	Red River Survey, B. M. 4.	70.439	231.099
Jordan Ferry, Ark	P. B. M. Jordan	65.815	215.928
Jordan Landing, Ark	Red River Survey, P. R. P. 14.	65.908	216.233
Canfield, Ark	P. B. M. Canfield	78.953	259.032
Bradley, Ark	P. B. M. Bradley	77.075	252.870
Millers Bluff, La	P. B. M. Lusk	69.964	229.540
Near Millers Bluff, La	Red River Survey, P. R. P. 25.	60.550	198.654
Plain Dealing, La	P. B. M. Plain Dealing.	79.497	260.816
Alden Bridge, La	P. B. M. Alden Bridge	65.814	215.925
Hurricane Bluff, La	P. B. M. Hurricane Bluff.	58.493	191.906
Near Hurricane Bluff, La	Red River Survey, P. R. P. 30C.	69.863	229.209
Benton, La	P. B. M. Benton	64.152	210.472
Near Vanceville, La	T. B. M. 274	54.318	178.208
Near Vanceville, La	Red River Survey, P. R. P. 32	55.518	182.145
Near Shreveport, La	P. B. M. 45	52.272	171.496
Shreveport, La	B. M. "B. P."	56.918	186.738
Parkeville, La	T. B. M. 74	24.886	81.647
On Bayou Bartholomew, La.	P. B. M. Sandidge	27.277	89.491
Do	P. B. M. Myers	27.762	91.082
Do	P. B. M. Williams	26.525	87.024
Do	P. B. M. Anderson	27.618	90.610
Do	P. B. M. Bonner	28.092	92.165
Do	P. B. M. Davis No. 2.	29.288	96.089
On Bayou Bartholomew, Ark.	P. B. M. Noble	34.800	114.173
Wards Ferry, La	P. B. M. Ward	29.713	97.483
Near Bayou Bartholomew, La.	P. B. M. Wells	30.573	100.305
Mound Landing, La	P. B. M. Mound	31.299	102.687
Lindgrove Landing, La	P. B. M. Lindgrove	32.318	106.030
Bonita, La	P. B. M. Bonita	32.524	106.706
Jones, La	P. B. M. Jones	32.647	107.109
Near Jones, La	P. B. M. Louisiana-Arkansas.	32.759	107.477
Wilmot, Ark	P. B. M. Wilmot	34.982	114.770
Parkdale, Ark	P. B. M. Parkdale	35.609	116.827
Sunshine, Ark	P. B. M. Sunshine	36.082	118.379
Portland, Ark	P. B. M. Portland	38.972	127.861
Kidds Spur, Ark	P. B. M. Kidd	37.994	124.652
Morrell, Ark	P. B. M. Morrell	39.783	130.521
Hudspeth, Ark	P. B. M. Hudspeth	40.648	133.359
Dermott, Ark	P. B. M. Dermott	42.799	140.416
Baxter, Ark	P. B. M. Baxter	43.332	142.165
McGehee, Ark	G	45.720	150.000
Do	P. B. M. McGehee	45.398	148.943
Trippe Junction, Ark	P. B. M. Trippe	44.182	144.954
Do	T. B. M. 117=Levee B. M.	44.197	145.003
Near Arkansas City, Ark	M. R. C. Stone $\frac{3}{4}$	41.592	136.456
Near Wilkersons Landing, Miss.	M. R. C. Stone $\frac{3}{4}$	44.276	145.262
Near Port Anderson, Miss	T. B. M. 121=Levee Board B. M.	44.210	145.046
Millers Bend, Miss	P. B. M. Millers Bend	38.802	127.303
Greenville, Miss	B. M. O	38.227	125.416
Vicksburg, Miss	P. B. M. 1	31.488	103.307
Near Vicksburg, Miss	P. B. M. 2	29.559	96.978
Do	T. B. M. 11	29.261	96.000
On Belle Isle Plantation, Miss.	P. B. M. 6	28.516	93.556
On Blakely Plantation, Miss.	P. B. M. 3	34.547	113.343
Yazoo River, Miss	P. B. M. 4	28.828	94.580
Do	P. M. B. 5	32.252	105.813
Calmar, Miss	P. B. M. 7	31.164	102.244
Near L'Argent, Miss	P. B. M. 8	28.921	94.885
L'Argent, Miss	P. B. M. 9	26.980	88.517
Satartia, Miss	P. B. M. 10	29.752	97.611
Enola, Miss	P. B. M. 11	30.405	99.754
Yazoo City, Miss	P. B. M. 12	35.872	117.690
Do	P. B. M. 13	31.330	102.789
Bee Lake, Miss	P. B. M. 29	32.930	108.038
Tchula, Miss	P. B. M. 28	36.074	118.353
Do	P. B. M. 27	34.912	114.540
Sidon, Miss	P. B. M. 26	37.347	122.529
Greenwood, Miss	P. B. M. 25	38.218	125.387
Do	P. B. M. 24	39.414	129.311
Fort Loring, Miss	P. B. M. 23	41.026	134.599
Do	P. B. M. 22	39.168	128.504
Itta Bena, Miss	P. B. M. 21	38.156	125.183
Near Baird, Miss	P. B. M. 20	35.770	117.355
Do	P. B. M. 19	35.042	114.967
Do	P. B. M. 18	38.587	126.598
Indianola, Miss	P. B. M. 17	35.854	117.631
Heathman, Miss	P. B. M. 16	37.062	121.594
The Bogue, Miss	P. B. M. 15	35.053	115.003
Stoneville, Miss	P. B. M. 14	37.341	122.510
Greenville, Miss	Greenville North Base.	38.473	126.223
Near Argyle, Miss	P. B. M. 88	38.223	125.403
Millers Bend, Miss	P. B. M. 87	39.515	129.642
Near Offutts Landing, Miss	P. B. M. 86	41.267	135.390
Port Anderson, Miss	P. B. M. 85	41.748	136.968
Wilkersons Landing, Miss.	P. B. M. 84	*42.391	139.078
Near Wilkersons Landing, Miss.	P. B. M. 83	42.434	139.219
Mound Place, Miss	P. B. M. 82	42.365	138.993
Childers, Miss	P. B. M. 81	42.811	140.456

*Reported destroyed, 1897.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Content, Miss	P. B. M. 80	43.677	143.297
Buck Ridge, Miss	P. B. M. 79	43.240	141.863
Bolivar, Miss	P. B. M. 78	42.992	141.050
Stormville, Miss	P. B. M. 77	43.360	142.257
Nebletts Landing, Miss	P. B. M. 76	44.340	145.472
Near Prentiss, Miss	P. B. M. 75	45.384	148.897
Do	P. B. M. 74	45.269	148.520
Do	P. B. M. 73	44.777	146.906
Near Clarks Landing, Miss.	P. B. M. 72	45.268	148.517
Near Beulah, Miss	P. B. M. 71	44.605	146.342
Riverton, Miss	P. B. M. 70	45.881	150.528
Rosedale, Miss	P. B. M. 69	46.237	151.696
Do	P. B. M. 68	44.832	147.086
Near Terrene, Miss	P. B. M. 67	47.312	155.223
Near Concordia, Miss	P. B. M. 66	47.268	155.078
Concordia, Miss	P. B. M. 65	48.278	158.392
Carsons, Miss	P. B. M. 64	49.210	161.450
Near Australia, Miss	P. B. M. 63	49.446	162.224
Lake Charles Landing, Miss.	P. B. M. 62	50.545	165.830
Robinsonville, Miss	P. B. M. 61	49.403	162.083
Near Sunflower Landing, Miss.	P. B. M. 60	51.395	168.618
Near Hughes Landing, Miss.	P. B. M. 59	53.078	174.140
Do	P. B. M. 58	52.384	171.863
Near Friar Point, Miss	P. B. M. 57	52.289	171.551
Friar Point, Miss	P. B. M. Friar Point II.	55.276	181.351
Do	P.B.M. Friar Point I	55.905	183.415
Near Friar Point, Miss	P. B. M. Delta	54.777	179.714
Glendale, Miss	P. B. M. Glendale	56.336	184.829
Helena, Ark	P. B. M. Helena I	58.615	192.306
Do	P. B. M. Helena II	58.622	192.329
Near Austin, Miss	P. B. M. Trotters Landing.	56.447	185.193
Austin, Miss	P. B. M. Austin I	60.004	196.863
Do	P. B. M. Austin II	59.331	194.655
Mhoons Landing, Miss	P. B. M. Mhoons Landing.	59.333	194.662
Commerce, Miss	P. B. M. Commerce	60.051	197.017
Star Landing, Miss	P. B. M. Star Landing.	63.121	207.089
Horn Lake Creek, Miss	P. B. M. Horn Lake Creek.	67.239	220.600
Friar Point, Miss	P. B. M. Friar Point III.	53.821	176.578
Coahoma, Miss	P. B. M. Coahoma	54.247	177.975
Near Clover Hill, Miss	P. B. M. Clover Hill.	52.861	173.428
Lyon, Miss	P. B. M. Lyon	53.024	173.963
Clarksdale, Miss	P. B. M. Clarksdale I	52.976	173.805
Do	P. B. M. Clarksdale II.	52.598	172.565
Near Clarksdale, Miss	P. B. M. Clarksdale III.	52.713	172.943
Near Ocean Springs, Miss	P. B. M. Keenor	5.516	18.097
	Top of cap over same	6.730	22.080
Near Biloxi, Miss	Biloxi Gauge B	1.698	5.571
Do	P. B. M. 19A	1.736	5.696
Biloxi, Miss	T. B. M. 184	5.362	17.592
Do	P. B. M. City Hall	7.023	23.041
Do	T. B. M. 183	7.186	23.576
Do	T. B. M. 186	7.256	23.806
Do	P. B. M. Hygeia	6.508	21.352
	Top of cap over same	7.721	25.331
Beauvoir, Miss	P. B. M. 17	7.864	25.800
Mississippi City, Miss	P. B. M. 16	6.360	20.866
White Harbor, Miss	P. B. M. 14	9.406	30.860
Pass Christian, Miss	P. B. M. 13	3.368	11.050
Bay St. Louis, Miss	P. B. M. 11	6.520	21.391
Do	P. B. M. 10	7.172	23.530
Waveland, Miss	P. B. M. 9	4.722	15.492
Chinchuba, Miss	P. B. M. 8	2.958	9.705
Claiborne, Miss	P. B. M. 7	1.267	4.157
Near Claiborne, Miss	P. B. M. 6	3.133	10.279
Fort Macomb, Chef Menteur, La.	P. B. M. 4	2.221	7.287
New Orleans, La	T. B. M. 95	1.159	3.802
Do	P. B. M. 41	0.169	0.554
Do	P. B. M. 3	1.307	4.288
Do	T. B. M. 175	0.642	2.106
Do	P. B. M. 2	2.795	9.170
Do	Halfway House	1.635	5.364
Do	City Stone XXMR	1.468	4.816
Do	City Park	1.472	4.829
Do	P. B. M. $\frac{24}{1}$	0.129	0.423
Do	P. B. M. $\frac{24}{1}$A	1.329	4.360
Do	T. B. M. 170	2.845	9.334
Carrollton, La	City Stone XXMB	1.404	4.606
Do	T. B. M. 160	1.908	6.260
Do	P. B. M. Carrollton	2.730	8.957
Carrollton, La	B. M. A (Ewens 1892)	1.863	6.112
	Top of cap over same	3.108	10.197
Do	B. M. $\frac{24}{1}$	0.150	0.492
	Top of cap over same	1.354	4.442
Near Kenner, La	B. M. $\frac{20}{1}$	0.022	0.072
	Top of cap over same	1.214	3.983
On Patterson Plantation, La.	B. M. $\frac{20}{1}$	0.967	3.173
	Top of cap over same	2.176	7.139
On Pecan Grove Plantation, La.	B. M. $\frac{20}{1}$	1.978	6.489
	Top of cap over same	3.176	10.420
Near St. Rose, La	P. B. M. V	4.615	15.141
Near Hahnville, La	P. B. M. VI	4.173	13.691
Near Sarpy, La	B. M. $\frac{20}{1}$	0.472	1.549
	Top of cap over same	1.678	5.505
Near Sellers, La	P. B. M. VII	4.816	15.800
Near La Place, La	B. M. $\frac{20}{1}$	4.178	13.707
	Top of cap over same	5.386	17.671
Near St. Peters, La	B. M. $\frac{20}{1}$	3.023	9.918
	Top of cap over same	4.225	13.862
Near Garyville, La	B. M. $\frac{19}{1}$	3.358	11.017
	Top of cap over same	4.568	14.987
Mount Airy, La	△ Chenet	3.234	10.610
Do	P. B. M. X	5.554	18.222
Near Lutcher, La	B. M. $\frac{19}{1}$	2.221	7.287
	Top of cap over same	3.435	11.270
Do	T. B. M. 83	4.023	13.199
Do	B. M. $\frac{19}{1}$	3.217	10.554
	Top of cap over same	4.429	14.531
Near Hester, La	B. M. $\frac{19}{2}$	3.468	11.378
	Top of cap over same	4.688	15.381
Do	T. B. M. 71	4.762	15.623
Do	P. B. M. XII	5.843	19.170
Do	△ Homestead	4.924	16.155
Do	P. B. M. XIII	7.866	25.807
Near College Landing, La	B. M. $\frac{19}{2}$	5.066	16.621
	Top of cap over same	6.275	20.587
Near Convent, La	P. B. M. XIV	7.280	23.884
On Celestine Plantation	B. M. $\frac{19}{2}$	3.245	10.646
	Top of cap over same	4.454	14.613
Colomb, La	P. B. M. XV	7.128	23.386
Near Whitehall, La	B. M. $\frac{17}{1}$	5.000	16.404
	Top of cap over same	6.206	20.361
Near Miles, La	B. M. $\frac{17}{1}$	3.254	10.676
	Top of cap over same	4.462	14.639
Near Burnside, La	P. B. M. XVI	7.549	24.767
Near Belle Helene, La	B. M. $\frac{18}{1}$	6.141	20.148
	Top of pipe over same	7.661	25.134
New River, La	P. B. M. New River.	6.222	20.413
	Top of cap over same	7.433	20.386
Near Geismar, La	P. B. M. XX	7.179	23.553
St. Gabriel, La	P. B. M. St. Gabriel.	5.457	17.904
	Top of cap over same	6.665	21.867
Near Sunshine, La	T. B. M. 22	7.761	25.463
Do	P. B. M. XXIV	7.922	25.991
Do	B. M. $\frac{12}{1}$	7.826	25.676
Near Burtville, La	B. M. $\frac{12}{1}$	5.930	19.455
Near Baton Rouge, La	P. B. M. XXIX	8.405	27.575
	Top of cap over same	9.623	31.571
Do	P. B. M. XXVIII	9.282	30.453
Do	P. B. M. XXX	8.943	29.340
Baton Rouge, La	P. B. M. City Limits.	9.307	30.535
Do	U. S. E. 2	10.462	34.324
Do	T. B. M. 1	18.407	60.390
Do	P. B. M. XXXI	18.943	62.149
Do	P. B. M. Barracks	17.825	58.481
Do	T. B. M. 2	17.143	56.243
Do	P. B. M. Post Office.	18.000	59.055
Do	P. B. M. North Boulevard.	15.857	52.024
	Top of cap over same	17.061	55.974
West Baton Rouge, La	P. B. M. XXXII	8.617	28.271
Near West Baton Rouge, La.	T. B. M. 90	8.763	28.750
Do	T. B. M. 89	9.381	30.777
Do	T. B. M. 88	9.433	30.948
Do	B. M. $\frac{13}{1}$	9.920	32.546
Do	P. B. M. Poplar Grove.	8.593	28.192
	Top of cap over same	9.810	32.185
Do	T. B. M. 87	9.480	31.102
Near Lobdell, La	T. B. M. 85	9.216	30.236
Do	T. B. M. 84	9.253	30.358
Do	B. M. $\frac{14}{1}$	7.463	24.485
	Top of cap over same	9.009	29.557
Do	P. B. M. XXXIII	9.325	30.594
Do	T. B. M. 83	9.677	31.749
Lobdell, La	T. B. M. 82	8.926	29.285
Near Lobdell, La	T. B. M. 80	8.311	27.267
Do	P. B. M. Allendale	7.774	25.505
	Top of cap over same	8.983	29.472
Near Devall, La	P. B. M. XXXIV	9.554	31.345
Do	T. B. M. 75	10.135	33.251
Do	T. B. M. 74	9.952	32.651
Do	P. B. M. Solitude	8.985	29.478
	Top of cap over same	10.188	33.425
Do	T. B. M. 73	9.887	32.438

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Devall, La	T. B. M. 72	9.278	30.440
Near Walls, La	T. B. M. 70	9.396	30.827
Do	B. M. $\frac{18}{4}$	9.229	30.279
Arbroth, La	P. B. M. XXXV	10.500	34.449
Near Arbroth, La	T. B. M. 65	11.079	36.348
Near Hermitage, La	B. M. $\frac{18}{4}$	11.150	36.581
Do	T. B. M. 64	10.286	33.747
Hermitage, La	P. B. M. XXXVI	11.517	37.785
Near Hermitage, La	T. B. M. 63	10.687	35.062
Near Anchor, La	T. B. M. 61	11.565	37.943
Do	B. M. $\frac{19}{2}$	11.522	37.802
Do	P. B. M. XXXVII	13.722	45.020
Do	T. B. M. 59	11.629	38.153
Near Bayou Sara, La	T. B. M. 58	11.829	38.809
Do	T. B. M. 57	12.179	39.957
Do	T. B. M. 56	11.895	39.026
Do	P. B. M. XXXVIII	12.035	39.485
Do	T. B. M. 55	12.214	40.072
Do	P. B. M. XXXIX	11.940	39.173
Do	B. M. $\frac{19}{2}$	11.599	38.054
Do	T. B. M. 53	9.799	32.149
Near Pointe Coupee, La	B. M. $\frac{18}{3}$	9.450	31.004
	Top of cap over same	10.973	36.001
Do	P. B. M. XL	11.365	37.287
Do	T. B. M. 50	12.112	39.737
Near Brooks, La	T. B. M. 49	12.350	40.518
Do	P. B. M. XLI	12.291	40.325
Do	T. B. M. 47	12.378	40.610
Do	T. B. M. 46	10.602	34.783
Near Morganza, La	B. M. $\frac{18}{3}$	10.707	35.128
	Top of cap over same	12.258	40.216
Do	T. B. M. 43	16.020	52.559
Do	T. B. M. 40	15.633	51.289
Do	T. B. M. 39	10.599	34.774
Do	B. M. $\frac{18}{3}$	9.854	32.329
Near Raccourci, La	T. B. M. 38	11.475	37.648
Raccourci, La	T. B. M. 37	12.039	39.498
Do	P. B. M. XLIII	11.818	38.773
Near Raccourci, La	T. B. M. 35	15.970	52.395
Near Lacour, La	T. B. M. 33	14.315	46.965
Near Ennis, La	P. B. M. XLIV	13.718	45.006
Williamsport, La	T. B. M. 22	14.889	48.848
Near Smithland, La	T. B. M. 20	15.111	49.577
	P. B. M. Smithland	13.434	44.075
Do	Top of cap over same	14.648	48.058
Smithland, La	P. B. M. XLV	14.813	48.599
Near Smithland, La	T. B. M. 17	14.385	47.195
Red River Landing, La	Gauge B. M. W	12.500	41.010
	Top of cap over same	13.740	45.079
Do	Gauge B. M. B	13.867	45.495
Do	Gauge B. M. D	14.943	49.025
Near Red River Ldg., La	B. M. $\frac{14}{2}$	15.932	52.270
Do	T. B. M. 13	13.358	43.825
Do	P. B. M. Carrs Point	15.946	52.316
Do	T. B. M. 9	14.125	46.342
In Louisiana, opposite Tarbert, Miss.	T. B. M. 6	15.392	50.499
Near Point Breeze, La	P. B. M. L	16.194	53.130
Do	T. B. M. 5	16.384	53.753
Do	P. B. M. LI	16.237	53.271
On Point Breeze, La	T. B. M. 4=H. W. Gauge B. M. 49.	15.878	52.093
Do	B. M. $\frac{14}{2}$	16.612	54.501
Near Fort Adams, Miss	T. B. M. 1	13.700	44.947
Fort Adams, Miss	P. B. M. XLIX	20.884	68.517
Fort Adams, Miss	P. B. M. Fort Adams	15.742	51.647
	Top of cap over same	16.951	55.613
Near Fort Adams, Miss	XLVIII	23.995	78.724
On Point Breeze, La	P. B. M. Pt. Breeze	15.286	50.151
	Top of cap over same	16.496	54.121
Near Nocks, La	P. B. M. Knox	14.886	48.838
	Top of cap over same	16.102	52.828
Near Black Hawk, La	P. B. M. Ballymagan	15.433	50.633
	Top of cap over same	16.648	54.619
Do	T. B. M. 13	16.934	55.558
Do	T. B. M. 14	16.668	54.685
Do	LIII	16.019	52.556
Do	T. B. M. 15	16.833	55.226
Do	T. B. M. 17	17.401	57.090
Do	P. B. M. Union Point	16.180	53.084
	Top of cap over same	17.396	57.073
Near Bougere, La	B. M. $\frac{14}{2}$	16.971	55.679
Do	LIV	17.403	57.096
Near Fairview, La	T. B. M. 31	17.626	57.828
Do	New B. M. $\frac{14}{3}$	16.424	53.884
	Top of cap over same	17.638	57.867
Do	T. B. M. 32	17.715	58.120
Near Arnot, Miss	T. B. M. 35	15.858	52.027
Do	P. B. M. Kindling	14.882	48.825
	Top of cap over same	16.099	52.818
Near Fairview, La	T. B. M. 36	17.594	57.723
Do	B. M. $\frac{14}{3}$	17.624	57.821
Do	T. B. M. 38	16.093	52.798
Near Fairview, La	P. B. M. Jones	14.204	46.601
	Top of cap over same	15.418	50.584
Near Fish Pond, La	T. B. M. 42	16.043	52.634
Do	P. B. M. Fish Pond	16.348	53.635
	Top of cap over same	17.568	57.638
Do	T. B. M. 50	16.942	55.584
Do	P. B. M. Hedge	16.022	52.566
	Top of cap over same	17.239	56.558
Near Morville, La	B. M. $\frac{13}{2}$	19.016	62.388
Do	P. B. M. Yeager	17.636	57.861
	Top of cap over same	18.857	61.867
Do	B. M. $\frac{14}{4}$	15.929	52.260
	Top of cap over same	17.150	56.266
Near Vidalia, La	T. B. M. 61	18.846	61.831
Do	P. B. M. Lucerna	17.880	58.661
	Top of cap over same	19.091	62.634
Do	T. B. M. 62	18.849	61.840
Do	T. B. M. 63	17.928	58.819
Do	New B. M. $\frac{13}{3}$	18.181	59.649
	Top of cap over same	19.391	63.619
Do	T. B. M. 66	18.892	61.982
Do	Levee B. M. No. 448	20.245	66.420
Do	LXI	18.874	61.922
Vidalia, La	T. B. M. 69	19.071	62.569
Do	LXII	19.420	63.714
Do	LXIII	18.723	61.427
Do	B. M. $\frac{13}{3}$	18.217	59.767
	Top of cap over same	19.771	64.865
Near Vidalia, La	T. B. M. 71	20.099	65.941
Natchez, Miss	P. B. M. Waterworks	20.508	67.283
	Top of cap over same	21.716	71.247
Do	B. M. N. (Ewens 1886).	21.693	71.171
Do	T. B. M. 77	21.855	71.703
Do	B. M. 3 (Babbitt 1874).	24.587	80.666
Do	B. M. A. (Ewens 18 2.)	27.706	90.899
Do	P. B. M. 1	59.601	195.541
	Top of cap over same	60.842	199.612
Near Vidalia, La	LXIV	19.862	65.164
Do	B. M. $\frac{13}{4}$	19.946	65.440
Do	B. M. $\frac{13}{4}$	17.457	57.274
	Top of cap over same	18.666	61.240
Do	T. B. M. 84	19.286	63.274
Do	P. B. M. Minorca	18.277	59.964
	Top of cap over same	19.492	63.950
Near Bullitt Bayou, La	P. B. M. Sycamore	18.922	62.080
	Top of cap over same	20.134	66.056
Do	T. B. M. 92	19.999	65.613
Do	P. B. M. Vidal	19.132	62.769
	Top of cap over same	20.350	66.765
Do	T. B. M. 93	21.063	69.104
Do	T. B. M. 95	18.869	61.906
Do	B. M. $\frac{13}{2}$	17.801	58.402
	Top of cap over same	19.020	62.401
Do	T. B. M. 96	19.122	62.736
Near Mabel, La	T. B. M. 98	20.240	66.404
Do	P. B. M. Vaucluse	19.534	64.088
	Top of cap over same	20.739	68.041
Do	B. M. $\frac{13}{4}$	18.603	61.033
	Top of cap over same	20.140	66.076
Near L'Argent, La	T. B. M. 103	20.096	65.932
Do	B. M. $\frac{13}{2}$	20.078	65.873
Do	T. B. M. 104	18.193	59.688
Fairchilds Island, La	P. B. M. Fairchilds Is.	20.642	67.723
	Top of cap over same	21.860	71.719
Near Waterproof, La	B. M. $\frac{13}{3}$	20.433	67.037
Waterproof, La	LXXI	20.678	67.841
Near Goldman, La	P. B. M. Melwood	21.005	68.914
	Top of cap over same	22.222	72.907
Do	T. B. M. 114	25.036	82.139
Do	P. B. M. Kempe Bend.	19.290	63.287
Do	T. B. M. 120	18.969	62.234
Do	P. B. M. Stackhouse	18.473	60.607
	Top of cap over same	19.696	64.619
In Louisiana, near Rodney, Miss.	No. 297 or LXXIII	21.826	71.607
Near St. Joseph, La	B. M. $\frac{13}{2}$	21.597	70.856
Do	B. M. $\frac{13}{4}$	20.397	66.919
	Top of cap over same	21.937	71.972
Do	No. 291	23.383	76.716
St. Joseph, La	B. M. A. (1892)	22.520	73.884
Do	P. B. M. Worrell	22.152	72.677
	Top of cap over same	23.370	76.673
Near Rodney, Miss	P. B. M. Woodland	23.180	76.050
	Top of cap over same	24.399	80.049
St. Joseph, La	T. B. M. 136	22.524	73.897
Do	P. B. M. St. Joseph	21.540	70.669
	Top of cap over same	22.755	74.655
Near St. Joseph, La	No. 286	25.237	82.798
Do	P. B. M. Bruin	22.552	73.989
	Top of cap over same	24.399	77.082

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near St. Joseph, La	T. B. M. 141	24.418	80.111
Do	P. B. M. Botany Bay	22.234	72.946
	Top of cap over same	23.448	76.929
Near Hard Times Landing, La.	P. B. M. Winter Quarters.	21.830	71.621
	Top of cap over same	23.045	75.607
Do	P. B. M. Hard Times	23.895	78.396
	Top of cap over same	25.102	82.355
Do	T. B. M. 157	24.420	80.118
Do	No. 272	23.583	77.372
	Top of cap over same	24.803	81.375
Do	T. B. M. 161	23.392	76.745
Do	Levee B. M. 133	24.907	81.716
Near Point Pleasant, La	P. B. M. Bland	22.833	74.911
	Top of cap over same	24.050	78.904
Do	T. B. M. 170	24.492	80.354
Do	P. B. M. McMillan	25.062	82.224
	Top of cap over same	26.279	86.217
Near Ashwood, La	T. B. M. 175	26.210	85.991
Do	P. B. M. Somerset	25.356	83.189
	Top of cap over same	26.574	87.185
Near Ashwood, La	T. B. M. 176	25.959	85.167
Near King, La	T. B. M. 180	24.417	80.108
Do	P. B. M. Leona	23.528	77.191
	Top of cap over same	24.741	81.171
Do	T. B. M. 183	26.327	86.374
Do	P. B. M. Chelula	22.864	75.013
	Top of cap over same	24.078	78.996
Do	P. B. M. 232	26.780	87.861
Near Griffin, La	T. B. M. 193	27.294	89.547
Do	P. B. M. Griffin	26.326	86.371
	Top of cap over same	27.546	90.374
Do	T. B. M. 194	27.288	89.527
Do	T. B. M. 197	24.806	81.384
Near Delta, La	P. B. M. Martin	25.236	82.795
	Top of cap over same	26.454	86.791
Delta, La	Range stone for SW. Base.	26.460	86.811
Do	SW. Base	26.759	87.792
Do	P. B. M. Delta	26.376	86.535
	Top of cap over same	27.597	90.541
Near Delta, La	NE. Base	27.968	91.758
Near Vicksburg, Miss	P. B. M. B	30.005	98.441
Kleinston, Miss	M. R. C. 102	26.923	88.330
Do	P. B. M. Pelican	31.205	102.378
Cairo, Ill	P. B. M. 4	95.158	312.198
Do	P. B. M. 5	95.793	314.281
Fort Jefferson, Ky	P. B. M. 6	97.941	321.328
Columbus, Ky	P. B. M. 7	96.055	315.140
Do	P. B. M. 8	93.846	307.893
Do	P. B. M. 9	94.384	309.658
Do	P. B. M. 10	137.861	452.299
Near Worshams Landing, Ky.	P. B. M. 11	93.486	306.712
Do	P. B. M. 12	92.330	302.919
Near Hickman, Ky	P. B. M. 13	91.895	301.492
Hickman, Ky	P. B. M. 14	109.797	360.226
Do	P. B. M. 15	94.502	310.045
Near Hickman, Ky	P. B. M. 16	91.740	300.984
Do	P. B. M. 17	90.662	297.447
Do	P. B. M. 18	89.946	295.098
Do	P. B. M. 19	90.280	296.194
Near Lesters Ldg., Tenn	P. B. M. 20	89.761	294.491
Do	P. B. M. 21	89.426	293.392
Tiptonville, Tenn	P. B. M. 22	88.435	290.140
Do	P. B. M. 23	90.140	295.734
Near Tiptonville, Tenn	P. B. M. 24	85.376	280.104
Do	P. B. M. 25	85.614	280.885
Near Reelfoot Ldg., Tenn	P. B. M. 26	84.806	278.234
Mott Landing, Tenn	P. B. M. 27	82.462	270.544
Near Booths Point Landing, Tenn.	P. B. M. 28	82.353	270.186
Near Booths Point, Tenn	P. B. M. 29	80.330	263.549
Do	P. B. M. 30	80.230	263.221
Do	P. B. M. 31	80.453	263.953
Near Hales Point, Tenn	P. B. M. 32	79.416	260.551
Do	P. B. M. 33	79.158	259.704
Do	P. B. M. 34	77.722	254.993
Near Forked Deer Island, Tenn.	P. B. M. 35	77.940	255.708
Near Ashport, Tenn	P. B. M. 36	77.635	254.707
Do	P. B. M. 37	77.560	254.461
Do	P. B. M. 38	76.576	251.233
Near Plum Point, Tenn	P. B. M. 39	76.064	249.553
Do	P. B. M. 40	75.411	247.411
Near Fort Pillow Landing, Tenn.	P. B. M. 41	77.443	254.078
Near Fulton, Tenn	P. B. M. 42	91.006	298.576
Do	P. B. M. 43	75.284	246.994
Near Randolph, Tenn	P. B. M. 44	74.269	243.664
Do	P. B. M. 45	74.027	242.870
Randolph, Tenn	P. B. M. 46	104.298	342.184
Near Randolph, Tenn	P. B. M. 47	119.696	392.703
Near Richardsons Landing, Tenn.	P. B. M. 48	73.424	240.892
Do	P. B. M. 49	72.292	237.178
Near Paynes Ldg., Tenn	P. B. M. 50	72.076	236.469
Near Thomas Ldg., Tenn	P. B. M. 51	72.106	236.568
Do	P. B. M. 52	70.757	232.142
Near Brinkleys Ldg., Tenn.	P. B. M. 53	69.101	226.709
Near Island No. 40, Tenn	P. B. M. 54	68.344	224.225
Do	P. B. M. 55	67.523	221.532
Near Memphis, Tenn	P. B. M. 56	67.470	221.358
Keokuk, Iowa	P. B. M. 1 (1881)	150.462	493.641
Do	P. B. M. 2	150.677	494.346
Do	P. B. M. 3	155.314	509.559
Near Keokuk, Iowa	P. B. M. 4	152.348	499.828
Alexandria, Mo	P. B. M. 5	151.932	498.464
Gregory Landing, Mo	P. B. M. 6	148.692	487.834
Near Gregory Ldg., Mo	P. B. M. 7	151.156	495.918
Canton, Mo	P. B. M. 8	150.706	494.441
Do	P. B. M. 9	150.506	493.785
Near La Grange, Mo	P. B. M. 10	147.532	484.028
La Grange, Mo	P. B. M. 11	147.499	483.920
West Quincy, Mo	P. B. M. 12	145.637	477.811
Fabius River, Mo	P. B. M. 13	145.832	478.450
Near Hilton, Mo	P. B. M. 14	144.724	474.815
Do	P. B. M. 15	143.667	471.347
Hannibal, Mo	P. B. M. 16	149.180	489.435
Near Hannibal, Mo	P. B. M. 17	141.716	464.947
Saverton, Mo	P. B. M. 18	141.294	463.562
Near Ashburn, Mo	P. B. M. 19	145.663	477.896
Do	P. B. M. 20	144.488	474.041
Do	P. B. M. 21	139.117	456.420
Near Louisiana, Mo	P. B. M. 22	142.891	468.802
Louisiana, Mo	P. B. M. 23	142.882	468.772
Do	P. B. M. 24	142.601	467.850
Near Louisiana, Mo	P. B. M. 25	141.192	463.227
Near Clarksville, Mo	P. B. M. 26	140.557	461.141
Clarksville, Mo	P. B. M. 27	141.927	465.639
Do	P. B. M. 28	140.470	460.859
In Illinois, opposite Clarksville, Mo.	P. B. M. 29	136.793	448.795
Do	P. B. M. 30	136.776	448.739
Do	P. B. M. 31	135.918	445.924
Near Hamburg, Ill	P. B. M. 32	142.507	467.542
Do	P. B. M. 33	156.944	514.907
Do	P. B. M. 34	135.597	444.871
Do	P. B. M. 35	133.820	439.041
Near Reds Landing, Ill	P. B. M. 36	133.566	438.208
Near Sterling Island, Ill	P. B. M. 37	133.473	437.903
Near Hogville Landing, Ill.	P. B. M. 38	132.611	435.075
Turners Landing, Ill	P. B. M. 39	133.478	437.919
Near Turners Landing, Ill.	P. B. M. 40	132.538	434.835
West Point, Ill	P. B. M. 41	135.868	445.760
Near Hastings Landing, Ill.	P. B. M. 42	134.989	442.876
Near Martins Landing, Ill.	P. B. M. 43	132.802	435.701
Near Millers Landing, Ill	P. B. M. 44	132.677	435.291
Thomas Landing, Ill	P. B. M. 45	130.916	429.514
Near Dixons Landing, Ill	P. B. M. 46	138.572	454.632
Near Point Landing, Ill	P. B. M. 47	131.736	432.204
Near Keokuk, Iowa	P. B. M. 1 (1882)	152.879	501.571
Nashville, Iowa	P. B. M. 2	154.815	507.922
Montrose, Iowa	P. B. M. 3	161.676	530.432
Near Viele Station, Iowa	P. B. M. 4	165.596	543.293
Do	P. B. M. 5	163.788	537.361
Do	P. B. M. 6	165.299	542.318
Fort Madison, Iowa	P. B. M. 7	162.920	534.513
Do	P. B. M. 8	164.492	539.671
Near Fort Madison, Iowa	P. B. M. 9	166.420	545.996
Do	P. B. M. 10	167.054	548.076
Near Burlington, Iowa	P. B. M. 11	164.640	540.156
Burlington, Iowa	P. B. M. 12	162.097	531.813
Do	P. B. M. 13	165.329	542.417
Do	P. B. M. 14	165.367	542.542
Do	P. B. M. 15	161.609	530.212
Do	P. B. M. 16	162.096	531.810
Oquawka, Ill	P. B. M. 17	163.460	536.285
Do	P. B. M. 18	167.071	548.132
Keithsburg, Ill	P. B. M. 19	164.562	539.900
Do	P. B. M. 20	167.585	549.818
Near New Boston, Ill	P. B. M. 21	169.200	555.117
New Boston, Ill	P. B. M. 22	166.202	545.281
Do	P. B. M. 23	173.950	570.701
Port Louisa, Iowa	P. B. M. 24	166.247	545.429
Near Muscatine, Iowa	P. B. M. 25	165.942	544.428
Do	P. B. M. 26	167.195	548.539
Muscatine, Iowa	P. B. M. 27	167.779	550.455
Do	P. B. M. 28	168.239	551.964
Do	P. B. M. 29	168.377	552.417
Near Muscatine, Iowa	P. B. M. 30	168.736	553.595
Do	P. B. M. 31	168.498	552.814
Do	P. B. M. 32	171.131	561.452
Fairport, Iowa	P. B. M. 33	169.332	555.550

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Montpelier, Iowa	P. B. M. 34	169.044	554.605
Do	P. B. M. 35	172.155	564.812
Do	P. B. M. 35a	169.868	557.309
Buffalo, Iowa	P. B. M. 36	172.346	565.438
Near Buffalo, Iowa	P. B. M. 37	173.412	568.936
West Davenport, Iowa	P. B. M. 38	172.976	567.505
Near West Davenport, Iowa.	P. B. M. 39	174.822	573.562
On Arsenal Island, Ill	P. B. M. 40	176.061	577.627
Rock Island, Ill	P. B. M. 41	177.252	581.534
Near Moline, Ill	P. B. M. 42	173.518	569.284
Watertown, Ill	P. B. M. 43	175.377	575.383
Hampton, Ill	P. B. M. 44	176.948	580.537
Do	P. B. M. 45	173.892	570.511
Rapids City, Ill	P. B. M. 46	175.791	576.741
Near Port Byron, Ill	P. B. M. 47	176.901	580.383
Port Byron, Ill	P. B. M. 48	177.351	581.859
Do	P. B. M. 49	179.153	587.771
Cordova, Ill	P. B. M. 50	175.005	574.162
Do	P. B. M. 51	181.465	595.356
Albany, Ill	P. B. M. 52	181.651	595.967
Near Albany, Ill	P. B. M. 53	182.554	598.929
Do	P. B. M. 54	176.252	578.253
Near Fulton, Ill	P. B. M. 55	177.246	581.515
Do	P. B. M. 56	177.631	582.778
Fulton, Ill	P. B. M. 57	182.144	597.584
Near Fulton, Ill	P. B. M. 58	177.707	583.027
Fulton, Ill	B. M. 35	178.735	586.400
Near Fulton, Ill	P. B. M. 59	179.784	589.841
Thomson, Ill	P. B. M. 60	184.817	606.354
Near Savanna, Ill	P. B. M. 61	178.963	587.148
Savanna, Ill	P. B. M. 62	180.537	592.312
Do	McKenzie B. M. 34	180.538	592.315
Do	P. B. M. 63	182.813	599.779
Do	P. B. M. 64	181.044	593.975
Near Hickory Grove, Ill	P. B. M. 65	205.461	674.083
Mount Carroll, Ill	P. B. M. 66	249.070	817.157
Near Lanark, Ill	P. B. M. 67	240.469	788.939
Lanark, Ill	P. B. M. 68	269.241	883.335
Near Lanark, Ill	P. B. M. 69	256.141	840.356
Near Lanark Junction, Ill	P. B. M. 70	288.795	947.488
Forreston Junction, Ill	P. B. M. 71	267.353	877.141
Adeline, Ill	P. B. M. 72	228.885	750.934
Leaf River, Ill	P. B. M. 73	216.148	709.146
Byron, Ill	P. B. M. 74	222.347	729.483
Near Byron, Ill	P. B. M. 75	211.367	693.460
Stillman Valley, Ill	P. B. M. 76	215.461	706.892
Near Davis Junction, Ill	P. B. M. 77	246.467	808.617
Monroe, Ill	P. B. M. 78	256.942	842.984
Fielding, Ill	P. B. M. 79	239.567	785.979
Kirkland, Ill	P. B. M. 80	236.166	774.821
Kingston, Ill	P. B. M. 81	245.359	804.982
Genoa, Ill	P. B. M. 82	255.635	838.696
Hampshire, Ill	P. B. M. 83	274.427	900.349
Pingree Grove, Ill	P. B. M. 84	279.756	917.833
Near Dumser, Ill	P. B. M. 85	259.302	850.727
West Elgin, Ill	P. B. M. 86	218.692	717.492
Do	P. B. M. 87	218.071	715.455
East Elgin, Ill	B. M. Newcomb	227.347	745.888
Near Elgin, Ill	P. B. M. 88	220.024	721.862
Bartlett, Ill	P. B. M. 89	245.077	804.057
Roselle, Ill	P. B. M. 90	235.353	772.154
Itasca, Ill	P. B. M. 91	213.087	699.103
Bensenville, Ill	P. B. M. 92	207.617	681.157
Manheim, Ill	P. B. M. 93	198.449	651.078
Cragin, Ill	P. B. M. 94	188.388	618.070
Chicago, Ill	P. B. M. 95	180.384	591.810
Do	P. B. M. 97	181.606	595.819
Do	P. B. M. 99	180.308	591.560
In Lake Michigan, Ill	P. B. M. 100	179.212	587.965
Chicago, Ill	B. M. I	181.543	595.612
Do	B. M. II	181.055	594.011
Do	B. M. III	179.793	589.871
Do	B. M. IV	180.976	593.752
Do	B. M. VIII	180.796	593.162
Do	B. M. IX	180.897	593.493
Do	B. M. XIII	179.575	589.156
St. Paul, Minn	P. B. M. 66	218.841	717.981
Do	T. B. M. 1	218.301	716.209
Do	P. B. M. 65	217.621	713.978
Do	P. B. M. 67	215.841	708.138
Do	P. B. M. 68	214.198	702.748
Do	Old U. S. B. M. A	215.414	706.737
Do	Old U. S. B. M. 2½	211.756	694.736
Do	P. B. M. 70	214.649	704.227
Do	P. B. M. 71	215.869	708.230
Do	P. B. M. 72	237.677	779.779
Do	P. B. M. 73	213.263	699.680
Do	P. B. M. 74	214.483	703.683
Daytons Bluff, Minn	P. B. M. 75	212.716	697.886
Do	P. B. M. 76	213.933	701.878
Near Highwood, Minn	T. B. M. 8	215.657	707.535
Do	T. B. M. 9	212.652	697.676
Do	P. B. M. 77	215.155	705.888
Do	T. B. M. 10	216.754	711.133
Near Highwood, Minn	P. B. M. 78	216.373	709.884
Near Red Rock, Minn	T. B. M. 11	221.249	725.881
Newport, Minn	T. B. M. 12	226.647	743.591
Do	P. B. M. 79	225.476	739.749
Do	P. B. M. 80	226.695	743.749
Newport Landing, Minn	Old U. S. B. M. 12	211.169	692.811
St. Paul Park, Minn	P. B. M. 81	227.167	745.297
Near St. Paul Park, Minn	T. B. M. 14	229.328	752.387
Do	P. B. M. 83	228.704	750.340
Do	P. B. M. 84	229.921	754.332
Near Pullman, Minn	T. B. M. 17	227.220	745.471
Near head of Nininger Slough, Minn.	P. B. M. 85	211.440	693.700
Do	P. B. M. 86	212.664	697.715
Near Island 18, Minn	T. B. M. 22	211.215	692.961
Foot of Nininger Slough, Minn.	P. B. M. 87	210.694	691.252
Near mouth of Nininger Slough, Minn.	Old U. S. B. M. 23	211.582	694.166
Near Hastings, Minn	T. B. M. 23	211.448	693.726
Do	P. B. M. 88	210.750	691.435
Do	P. B. M. 89	211.972	695.445
Do	P. B. M. 96	210.580	690.878
Hastings, Minn	P. B. M. 97	211.699	694.549
Point Douglas, Minn	T. B. M. 26	215.956	708.515
Do	P. B. M. 90	217.031	712.043
Prescott, Wis	T. B. M. 27	212.714	697.880
Do	T. B. M. 28	213.672	701.022
Do	P. B. M. 91	211.791	694.851
Near Prescott, Wis	T. B. M. 30	208.910	685.399
Do	P. B. M. 92	209.408	687.032
Do	P. B. M. 93	210.625	691.026
Do	P. B. M. 94	207.146	679.612
Do	P. B. M. 95	208.364	683.608
Near Smiths Bar, Wis	T. B. M. 35	208.322	683.469
Smiths Landing, Wis	P. B. M. 98	207.431	680.547
Do	P. B. M. 99	208.649	684.543
Do	T. B. M. 37	207.060	679.329
Near Smiths Landing, Wis.	T. B. M. 38	208.250	683.233
Near Morgans Coulee, Wis.	T. B. M. 39	209.576	687.584
Near Diamond Bluff, Wis.	T. B. M. 40	211.918	695.268
Do	T. B. M. 47	207.058	679.322
Do	P. B. M. 100	208.432	683.831
Do	P. B. M. 101	209.649	687.823
Diamond Bluff, Wis	T. B. M. 45	220.354	722.945
Do	P. B. M. 102	220.144	722.256
Do	P. B. M. 103	221.360	726.245
Near Diamond Bluff, Wis.	T. B. M. 46	220.988	725.025
Do	P. B. M. 104	219.486	720.097
Do	P. B. M. 105	220.709	724.110
Do	T. B. M. 48	220.203	722.450
Trenton, Wis	T. B. M. 50	233.093	764.739
Trenton Landing, Wis	T. B. M. 51	205.897	675.514
Do	P. B. M. 106	205.573	674.451
Do	P. B. M. 107	206.797	678.467
Near Island 24, Wis	T. B. M. 52	206.342	676.974
Near Pucketville, Wis	T. B. M. 53	206.239	676.636
Do	P. B. M. 108	205.418	673.942
Do	P. B. M. 109	206.634	677.932
Pucketville, Wis	P. B. M. 110	205.255	673.407
Do	P. B. M. 111	206.465	677.378
Red Wing, Minn	P. B. M. 112	209.644	687.807
Do	P. B. M. 113	206.458	677.355
Near Red Wing, Minn	T. B. M. 57	209.640	687.794
Do	T. B. M. 58	215.687	707.633
Do	P. B. M. 114	212.460	697.046
Do	T. B. M. 59	204.874	672.157
Do	P. B. M. 115	213.675	701.032
Do	T. B. M. 60	204.902	672.250
Do	T. B. M. 61	204.603	671.268
Near Wacouta, Minn	P. B. M. 116	206.122	676.252
Do	P. B. M. 117	207.338	680.242
Wacouta, Minn	P. B. M. 118	206.085	676.131
Do	P. B. M. 119	207.304	680.130
Near Lake Side, Minn	P. B. M. 120	205.552	674.382
Do	P. B. M. 121	206.772	678.384
Do	T. B. M. 66	204.880	672.177
Do	T. B. M. 67	204.649	671.419
Do	T. B. M. 69	204.271	670.179
Do	T. B. M. 70	203.894	668.942
Lake Side, Minn	P. B. M. 122	205.685	674.819
Do	P. B. M. 123	206.901	678.807
Florence, Minn	T. B. M. 76	208.891	685.337
Do	P. B. M. 124	207.126	679.546
Do	P. B. M. 125	208.345	683.545
Near Florence, Minn	T. B. M. 77	204.968	672.466
Central Point, Minn	P. B. M. 126	205.907	675.547
Do	P. B. M. 127	207.122	679.533
Lake City, Minn	P. B. M. 128	210.195	689.615
Do	P. B. M. 129	210.223	689.707
Do	Old U. S. B. M.	205.770	675.097
Near Lake City, Minn	P. B. M. 130	210.933	692.036
Do	P. B. M. 131	212.154	696.042
Do	T. B. M. 84	208.580	684.316
Near Kings Coulee, Minn	T. B. M. 86	207.227	679.878
Keplers Coulee, Minn	P. B. M. 132	207.497	680.763
Kings Coulee, Minn	T. B. M. 87	207.408	680.471

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Kings Coulee, Minn.	P. B. M. 133	208.120	682.807
Do	P. B. M. 134	209.343	686.819
Dutchmans Coulee, Minn.	T. B. M. 88	207.003	679.143
Near Kings Coulee, Minn.	T. B. M. 89	208.434	683.837
Near Reeds Landing, Minn.	T. B. M. 90	207.670	681.331
Do	P. B. M. 135	208.828	685.130
Do	P. B. M. 136	210.047	689.129
Near Roscoes Coulee, Minn.	T. B. M. 91	208.483	683.998
Reeds Landing, Minn	P. B. M. 137	209.103	686.032
Do	T. B. M. 93	208.307	683.421
Do	Old U. S. B. M. A	210.331	690.061
Do	P. B. M. 138	208.843	685.179
Do	P. B. M. 139	210.058	689.165
Wabasha, Minn	P. B. M. 140	210.480	690.550
Do	Old U. S. B. M. 62¼	206.470	677.394
Do	Old U. S. B. M. E	210.443	690.428
Do	P. B. M. 141	206.768	678.372
Do	P. B. M. 142	207.978	682.341
Teepeeota Point, Minn	P. B. M. 143	205.135	673.014
Do	P. B. M. 144	206.349	676.997
Near Alma, Wis	P. B. M. 145	202.334	663.824
Do	P. B. M. 146	203.551	667.817
Alma, Wis	T. B. M. 104	205.428	673.975
Do	P. B. M. 147	205.430	673.982
Do	Old U. S. B. M. 1	207.385	680.396
Do	Old U. S. B. M. 3	207.982	682.354
Do	P. B. M. 148	209.504	687.348
Do	Old U. S. B. M. 4	207.254	679.966
Near Alma, Wis	T. B. M. 105	206.719	678.211
Do	P. B. M. 149	205.944	675.668
Do	P. B. M. 150	207.156	679.645
Do	T. B. M. 107	205.396	673.870
Do	P. B. M. 151	203.678	668.234
Do	P. B. M. 152	204.895	672.226
Near Cochrane, Wis	P. B. M. 153	204.188	669.907
Do	P. B. M. 154	205.410	673.916
Near Fountain City, Wis	T. B. M. 117	203.628	668.070
Do	P. B. M. 155	200.384	657.426
Do	P. B. M. 156	201.602	661.423
Do	T. B. M. 121	201.313	660.474
Do	P. B. M. 157	199.624	654.933
Do	P. B. M. 158	200.844	658.936
Fountain City, Wis	T. B. M. 122	203.024	666.088
Do	Old U. S. B. M. 1 H. W. G.	200.872	659.028
Do	Old U. S. B. M. A	204.896	672.230
Do	P. B. M. 159	205.844	675.340
Near Fountain City, Wis	T. B. M. 123	202.474	664.283
Do	P. B. M. 160	203.946	669.113
Do	P. B. M. 161	205.165	673.113
Near Island 65, Wis	T. B. M. 124	203.437	667.443
Island 69, Wis	T. B. M. 125	201.918	662.460
Do	P. B. M. 162	201.234	660.215
Do	P. B. M. 163	201.952	662.571
Near Island 69, Wis	T. B. M. 126	202.744	665.170
Opposite Winona, Minn., in Wis.	T. B. M. 127	203.779	668.565
Do	P. B. M. 164	197.352	647.479
Do	P. B. M. 165	198.565	651.458
Winona, Minn	Old U. S. B. M. XVII	200.809	658.821
Do	P. B. M. 166	200.565	658.020
Do	P. B. M. 167	201.717	661.800
Do	New Gauge at Winona.	195.110	640.123
Do	Old U. S. B. M. b	200.932	659.224
Do	Winona City B. M.	200.607	658.158
Do	Old U. S. B. M	200.837	658.912
Do	P. B. M. 168	203.102	666.344
Do	Old U. S. B. M. B	200.472	657.715
Do	Old U. S. B. M. on Liberty and Second Streets.	201.502	661.095
Do	Old U. S. B. M. on Keys' barn.	203.525	667.732
Do	P. B. M. 169	202.353	663.886
Minneopa, Minn	P. B. M. 170	198.212	650.301
Do	P. B. M. 171	199.428	654.290
Near Winona, Minn	T. B. M. 130	199.945	655.986
Near Homer, Minn	T. B. M. 131	201.309	660.461
Do	P. B. M. 172	200.565	658.020
Do	P. B. M. 173	201.782	662.013
Do	T. B. M. 132	200.600	658.136
Do	T. B. M. 133	201.317	660.487
Do	P. B. M. 174	203.888	668.923
Do	P. B. M. 175	205.108	672.925
Near Lamoille, Minn	T. B. M. 135	200.067	656.387
Lamoille, Minn	P. B. M. 176	199.406	654.218
Do	P. B. M. 177	200.621	658.204
Near Richmond, Minn	T. B. M. 142	204.230	670.045
Richmond, Minn	P. B. M. 178	199.815	655.560
Do	P. B. M. 179	201.034	659.559
Do	T. B. M. 144	199.888	655.799
Near Dakota, Minn	T. B. M. 146	204.591	671.229
Near Richmond, Minn	P. B. M. 180	202.069	662.955
Do	P. B. M. 181	203.291	666.964
Dakota, Minn	P. B. M. 182	202.023	662.803
Do	P. B. M. 183	203.242	666.803
Do	Old U. S. B. M. 131	198.963	652.764
Dresbach, Minn	Old U. S. B. M. 130¼	197.586	648.246
Do	P. B. M. 184	210.203	689.641
Near Dresbach, Minn	T. B. M. 151	201.130	659.874
Do	P. B. M. 185	200.043	656.307
Do	P. B. M. 186	201.265	660.317
Do	T. B. M. 153	202.182	663.326
Near River Junction, Minn.	T. B. M. 154	201.264	660.313
Near La Crescent, Minn	P. B. M. 187	198.968	652.780
Do	P. B. M. 188	200.193	656.800
Do	T. B. M. 155	196.281	643.965
Near La Crosse, Wis	Old U. S. B. M. 139	198.583	651.517
Do	P. B. M. 189	199.090	653.181
Do	P. B. M. 190	199.114	653.260
North La Crosse, Wis	T. B. M. 157	197.924	649.355
Do	P. B. M. 191	197.210	647.013
Do	T. B. M. 158	196.873	645.907
La Crosse, Wis	City B. M. (Front Street).	198.576	651.495
Do	P. B. M. 192	207.158	679.651
Do	T. B. M. 160	200.435	657.594
Do	City B. M. (near bridge).	195.390	641.042
Do	P. B. M. 193	196.296	644.015
Do	T. B. M. 161	201.312	660.471
Do	T. B. M. 162	205.517	674.267
Do	P. B. M. 194	198.028	649.697
Do	P. B. M. 195	199.246	653.693
Near Stoddard, Wis	P. B. M. 196	196.098	643.364
Do	P. B. M. 197	197.312	647.348
Do	T. B. M. 170	195.985	642.994
Do	T. B. M. 172	195.408	641.101
Stoddard, Wis	P. B. M. 198	196.786	645.622
Warners Landing, Wis	P. B. M. 199	194.118	636.868
Do	P. B. M. 200	195.336	640.865
Britts Landing, Wis	T. B. M. 175	196.228	643.791
Near Genoa, Wis	P. B. M. 201	194.592	638.424
Do	P. B. M. 202	195.815	642.437
Do	T. B. M. 177	195.158	640.281
Do	T. B. M. 178	195.735	642.174
Do	P. B. M. 203	200.208	656.849
Genoa, Wis	Old U. S. B. M. i	195.095	640.075
Near Genoa, Wis	T. B. M. 180	195.647	641.885
Do	P. B. M. 204	193.395	634.496
Do	P. B. M. 205	194.614	638.496
Tippets Landing, Wis	T. B. M. 186	195.406	641.094
Do	P. B. M. 206	195.912	642.755
Do	P. B. M. 207	197.134	646.764
Victory, Wis	P. B. M. 208	195.211	640.455
Near Victory, Wis	T. B. M. 188	194.612	638.490
Near De Soto, Wis	P. B. M. 209	193.045	633.348
Do	P. B. M. 210	194.266	637.354
Do	T. B. M. 192	194.487	638.079
De Soto, Wis	T. B. M. 193	195.743	642.200
Do	P. B. M. 211	190.983	626.584
Do	P. B. M. 212	194.024	636.561
Near De Soto, Wis	T. B. M. 195	194.036	636.599
Do	P. B. M. 213	192.551	631.728
Do	P. B. M. 214	193.760	635.694
Do	T. B. M. 196	193.770	635.727
Near Rush Creek, Wis	T. B. M. 197	193.995	636.465
Near Ferryville, Wis	T. B. M. 198	193.114	633.575
Do	P. B. M. 215	192.724	632.296
Do	P. B. M. 216	193.945	636.301
Do	T. B. M. 200	192.911	632.909
Ferryville, Wis	P. B. M. 217	191.692	628.909
Do	P. B. M. 218	192.914	632.919
Near Ferryville, Wis	T. B. M. 202	193.674	635.412
Do	T. B. M. 204	191.981	629.858
Do	P. B. M. 219	190.360	624.539
Do	P. B. M. 220	191.579	628.538
Near Lynxville, Wis	P. B. M. 221	191.938	629.716
Do	P. B. M. 222	193.158	633.719
Do	T. B. M. 206	192.862	632.748
Lynxville, Wis	T. B. M. 207	193.586	635.124
Do	Old U. S. B. M	194.437	637.915
Do	P. B. M. 223	194.620	638.515
Near Lynxville, Wis	T. B. M. 209	192.845	632.692
Viola, Wis	T. B. M. 211	192.796	632.531
Do	P. B. M. 224	192.028	630.012
Do	P. B. M. 225	193.246	634.008
Near Viola, Wis	T. B. M. 212	193.507	634.864
Do	T. B. M. 213	193.663	635.376
Near Charme, Wis	T. B. M. 215	191.769	629.162
Do	P. B. M. 226	192.259	630.769
Do	P. B. M. 227	193.478	634.769
Do	P. B. M. 228	193.683	635.442
Charme, Wis	T. B. M. 216	193.172	633.765
Near Charme, Wis	T. B. M. 218	192.615	631.938
Do	P. B. M. 229	192.165	630.461
Do	P. B. M. 230	193.383	634.457
Prairie du Chien, Wis	T. B. M. 225	194.833	639.215
Do	P. B. M. 231	196.128	643.464
Do	P. B. M. 232	192.350	631.068
Do	Old U. S. B. M. a	192.350	631.068
Do	T. B. M. 226	190.810	626.016
North McGregor, Iowa	T. B. M. 227	189.198	620.727
Do	P. B. M. 233	192.418	631.292
South McGregor, Iowa	T. B. M. 228	191.670	628.838

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
South McGregor, Iowa	P. B. M. 234	192.529	631.655
Do	P. B. M. 235	192.879	632.804
Near South McGregor, Iowa.	T. B. M. 230	192.685	632.167
Do	P. B. M. 236	191.345	627.771
Do	P. B. M. 237	192.565	631.774
Do	P. B. M. 238	193.814	635.872
Do	T. B. M. 231	191.281	627.561
Near Island 176, Iowa	T. B. M. 232	190.446	624.822
Near Sny McGill, Iowa	P. B. M. 239	190.360	624.539
Do	P. B. M. 240	191.477	628.204
Clayton, Iowa	Old U. S. B. M. b	189.751	622.541
Do	Old U. S. B. M	190.847	626.137
Do	P. B. M. 241	198.213	650.304
Near Clayton, Iowa	T. B. M. 239	192.650	632.053
Do	P. B. M. 242	192.230	630.674
Do	T. B. M. 241	191.508	628.306
Near Eckard, Iowa	P. B. M. 243	188.979	620.008
Do	P. B. M. 244	190.200	624.015
Do	T. B. M. 245	189.895	623.014
Near Guttenberg, Iowa	P. B. M. 245	188.225	617.535
Do	P. B. M. 246	189.442	621.528
Guttenberg, Iowa	P. B. M. 247	192.510	631.593
Do	P. B. M. 248	194.524	638.200
Do	T. B. M. 250	187.849	616.301
Near Guttenberg, Iowa	T. B. M. 252	189.887	622.988
Do	P. B. M. 249	188.014	616.842
Do	P. B. M. 250	189.232	620.839
Do	T. B. M. 253	189.653	622.220
Do	T. B. M. 254	192.236	630.694
Near Turkey River Junction, Iowa.	T. B. M. 256	190.403	624.681
Turkey River Junction, Iowa.	P. B. M. 251	190.928	626.403
Do	T. B. M. 257	187.905	616.485
Do	P. B. M. 252	187.909	616.498
Near Turkey River Junction, Iowa.	T. B. M. 258	189.927	623.119
Near Buenavista, Iowa	P. B. M. 253	188.097	617.115
Do	P. B. M. 254	189.316	621.114
Do	T. B. M. 262	190.709	625.684
Buena Vista, Iowa	T. B. M. 264	191.170	627.197
Do	P. B. M. 255	191.268	627.519
Near Buena Vista, Iowa	T. B. M. 265	191.464	628.161
Do	T. B. M. 267	191.322	627.696
Near Waupeton, Iowa	P. B. M. 256	190.129	623.781
Do	P. B. M. 257	191.348	627.781
Do	T. B. M. 269	191.853	629.438
Do	T. B. M. 270	190.897	626.302
Do	P. B. M. 258	187.709	615.842
Do	P. B. M. 259	188.925	619.831
Do	T. B. M. 273	190.942	626.449
Finley Landing, Iowa	P. B. M. 260	188.632	618.870
Do	P. B. M. 261	189.852	622.873
Near Island 207, Iowa	P. B. M. 262	187.642	615.622
Frenchtown Landing, Iowa.	T. B. M. 277	187.148	614.002
Do	P. B. M. 263	186.196	610.878
Do	P. B. M. 264	187.415	614.877
Spechts Ferry, Iowa	Old P. B. M. No. 30.	187.590	615.452
Do	Old U. S. B. M. a	187.735	615.927
Do	P. B. M. 265	186.358	611.409
Do	P. B. M. 266	187.577	615.409
Do	T. B. M. 279	188.336	617.899
Near Spechts Ferry, Iowa.	T. B. M. 280	188.539	618.565
Do	P. B. M. 267	185.798	609.572
Do	P. B. M. 268	187.021	613.585
2¼ miles above Little Maquoketa River, Iowa.	P. B. M. 269	188.395	618.092
Do	P. B. M. 270	189.622	622.119
1½ miles above Little Maquoketa River, Iowa.	T. B. M. 283	187.937	616.590
¾ mile above Edmore, Iowa.	P. B. M. 271	186.632	612.309
Do	P. B. M. 272	187.851	616.308
2.3 miles above Eagle Point, Iowa.	T. B. M. 287	186.357	611.406
Do	P. B. M. 273	185.405	608.283
Do	P. B. M. 274	186.623	612.279
Near Eagle Point, Iowa	T. B. M. 289	188.473	618.348
Eagle Point, Iowa	T. B. M. 291	185.582	608.864
Dubuque, Iowa	P. B. M. 275	184.671	605.875
Do	P. B. M. 276	185.324	608.017
Do	T. B. M. 277	186.541	612.010
Eagle Point, Iowa	Old U. S. B. M. 23	181.212	594.527
Dubuque, Iowa	T. B. M. 293	186.259	611.085
Do	T. B. M. 294	185.776	609.500
Do	P. B. M. 278	185.814	609.624
Do	T. B. M. 295	185.181	607.548
Do	P. B. M. 279	196.547	644.838
Do	P. B. M. 280	188.399	618.106
East Dubuque, Ill	Old U. S. B. M. a	187.525	615.239
Do	Old U. S. B. M. b	187.302	614.506
Dubuque, Iowa	T. B. M. 296	185.438	608.391
Do	City B. M. Julien House.	186.729	612.626
Dubuque, Iowa	City B. M. Jess Store	185.616	608.976
Do	T. B. M. 297	185.413	608.309
Do	Old U. S. B. M. a	185.151	607.450
Do	Old U. S. B. M. b	184.804	606.311
Do	P. B. M. 281	186.679	612.463
Near Dubuque, Iowa	T. B. M. 299	186.166	610.779
Do	P. B. M. 282	185.940	610.038
Do	P. B. M. 283	187.159	614.037
Near Cattese, Iowa	T. B. M. 301	188.003	616.807
Do	P. B. M. 284	186.852	613.031
Do	P. B. M. 285	188.071	617.030
Cattese, Iowa	T. B. M. 302	188.131	617.226
Near Cattese, Iowa	T. B. M. 303	187.469	615.054
Do	T. B. M. 304	185.110	607.315
Do	Old U. S. B. M. 24	180.150	591.042
Shawondasee Club Grounds, Iowa.	P. B. M. 286	183.725	602.771
Do	P. B. M. 287	184.944	606.771
Near Massey, Iowa	T. B. M. 307	185.834	609.690
Do	T. B. M. 308	185.039	607.082
Near Nine Mile Island, Iowa.	P. B. M. 288	184.030	603.772
Do	P. B. M. 289	185.249	607.771
Do	T. B. M. 311	186.401	611.551
Near Snyders, Iowa	T. B. M. 312	186.382	611.489
Near Gordons Ferry, Iowa	P. B. M. 290	184.226	604.415
Do	P. B. M. 291	185.446	608.417
Do	T. B. M. 314	182.632	599.185
Do	P. B. M. 292	183.096	600.707
Do	P. B. M. 293	184.316	604.710
Do	T. B. M. 315	186.563	612.082
Gordons Ferry, Iowa	P. B. M. 294	187.245	614.320
Do	P. B. M. 295	188.459	618.303
Near Gordons Ferry, Iowa.	T. B. M. 318	186.288	611.180
Do	P. B. M. 296	185.076	607.203
Do	P. B. M. 297	186.299	611.216
Near Smiths Station, Iowa.	T. B. M. 321	185.199	607.607
Do	P. B. M. 298	183.535	602.147
Do	P. B. M. 299	184.749	606.130
Do	T. B. M. 323	185.562	608.798
Do	P. B. M. 300	184.771	606.203
Do	P. B. M. 301	185.982	610.176
Near North Bellevue, Iowa	P. B. M. 302	190.964	626.521
Do	P. B. M. 303	180.369	591.761
Do	P. B. M. 304	181.580	595.734
Bellevue, Iowa	P. B. M. 305	188.641	618.900
Do	P. B. M. 306	189.860	622.899
Do	P. B. M. 307	188.762	619.297
Do	Old U. S. B. M	181.976	597.033
Do	T. B. M. 326	185.427	608.355
Do	P. B. M. 308	186.190	610.858
Near Bellevue, Iowa	P. B. M. 309	184.455	605.166
Do	P. B. M. 310	185.668	609.146
Do	T. B. M. 329	184.624	605.721
Do	T. B. M. 331	183.006	600.412
Do	P. B. M. 311	181.550	595.636
Do	P. B. M. 312	182.767	599.628
Do	P. B. M. 313	179.528	589.002
Do	P. B. M. 314	180.738	592.972
Do	P. B. M. 315	179.138	587.722
Do	P. B. M. 316	180.346	591.685
Harris Landing, Ill	P. B. M. 317	186.252	611.061
Do	P. B. M. 318	187.461	615.028
Do	P. B. M. 319	186.596	612.191
Do	P. B. M. 320	187.815	616.189
Near Harris Landing, Ill	P. B. M. 321	188.974	619.992
Do	P. B. M. 322	190.193	623.992
Opposite foot of Island 256.	P. B. M. 323	190.249	624.175
Do	P. B. M. 324	191.467	628.171
Near Arnold Landing, Ill	P. B. M. 325	178.718	586.344
Do	P. B. M. 326	179.935	590.337
Arnold Landing, Ill	P. B. M. 327	186.394	611.527
Near Arnold Landing, Ill	P. B. M. 328	181.075	594.077
Do	P. B. M. 329	182.284	598.044
Near Marcus, Ill	P. B. M. 330	178.084	584.264
Do	P. B. M. 331	179.305	588.270
Near Savanna, Ill	P. B. M. 332	179.782	589.834
Do	P. B. M. 333	181.005	593.847
Do	P. B. M. 334	180.460	592.059
Do	P. B. M. 335	181.677	596.052
Do	Old U. S. B. M. 18	176.856	580.235
Savanna, Ill	P. B. M. 336	182.568	598.975
Do	P. B. M. 337	178.616	586.009
Do	P. B. M. 338	179.832	589.999
St. Paul, Minn	T. B. M. 23	248.469	815.185
Do	T. B. M. 22	252.328	827.846
Do	P. B. M. Macalester.	284.250	932.577
	Top of cap over same	285.459	936.544
Do	T. B. M. 18	276.930	908.561
Do	T. B. M. 16	264.893	869.070
Minneapolis, Minn	T. B. M. 13	256.072	840.130
Do	P. B. M. University Campus.	256.774	842.432

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Minneapolis, Minn.	P. B. M. Pillsbury Hall.	258.428	847.859
Do	T. B. M. 12	252.406	828.102
Do	P. B. M. 2 5/8	242.012	794.001
	Top of cap over same	243.225	797.981
Do	P. B. M. Great Northern.	258.367	847.659
Do	P. B. M. Brewery	248.748	816.100
Do	T. B. M. 11	252.214	827.472
Do	P. B. M. Gluck	253.326	831.120
Do	P. B. M. 2 5/8	252.973	829.962
	Top of cap over same	254.186	833.942
Do	T. B. M. 3	253.889	832.908
Near Minneapolis, Minn.	P. B. M. 2 7/8	253.415	831.412
	Top of cap over same	254.621	835.369
Near Fridley, Minn.	P. B. M. 2 5/8	258.171	847.016
	Top of cap over same	259.383	850.993
Near Anoka, Minn.	T. B. M. 27	270.483	887.410
Do	P. B. M. △ Dunn	267.290	876.934
	Top of cap over same	268.504	880.917
Do	T. B. M. 29	260.670	855.214
Do	P. B. M. 2 7/8	254.519	835.034
	Top of cap over same	255.724	838.988
Do	P. B. M. △ Powell	264.310	867.157
	Top of cap over same	265.525	871.144
Do	P. B. M. 2 1/2	260.936	856.088
	Top of cap over same	262.144	860.051
Anoka, Minn.	P. B. M. Anoka	258.824	849.158
Do	P. B. M. 2 1/2	256.642	841.999
	Top of cap over same	257.855	845.980
Near Anoka, Minn.	P. B. M. 2 1/2	261.220	857.020
	Top of cap over same	262.428	860.983
Near Itasca, Minn.	P. B. M. 2 1/2	268.187	879.877
	Top of cap over same	269.397	883.847
Near Elk River, Minn.	P. B. M. 2 1/2	269.943	885.638
	Top of cap over same	271.149	889.595
Elk River, Minn.	P. B. M. 2 1/2	271.654	891.252
	Top of cap over same	272.859	895.205
Do	P. B. M. Elk River	266.164	873.240
Near Otsego, Minn.	P. B. M. 2 1/2	273.563	897.514
	Top of cap over same	274.768	901.468
Near Monticello, Minn.	P. B. M. 2 1/2	271.628	891.166
	Top of cap over same	272.832	895.116
Do	P. B. M. 2 1/2	282.199	925.848
	Top of cap over same	283.390	929.755
Do	P. B. M. △ East Base	283.799	931.097
	Top of cap over same	285.013	935.080
Do	P. B. M. △ West Base	283.683	930.717
	Top of cap over same	284.890	934.677
Monticello, Minn.	P. B. M. 2 1/2	284.439	933.197
	Top of cap over same	285.644	937.151
Do	T. B. M. 70	278.220	912.793
Near Monticello, Minn.	P. B. M. 2 1/2	289.386	949.428
	Top of cap over same	290.594	953.391
Do	P. B. M. 2 1/2	288.916	947.885
	Top of cap over same	290.128	951.862
Near Bear Island, Minn.	P. B. M. 2 1/2	294.193	965.199
	Top of cap over same	295.398	969.152
Do	P. B. M. 2 1/2	295.644	969.959
	Top of cap over same	296.852	973.922
Near Clearwater, Minn.	P. B. M. 2 1/2	298.627	979.746
	Top of cap over same	299.838	983.719
Do	P. B. M. 2 1/2	290.951	954.561
	Top of cap over same	292.159	958.525
Do	P. B. M. 2 1/2	304.777	999.923
	Top of cap over same	305.983	1003.879
Near St. Augusta, Minn.	P. B. M. 2 1/2	307.621	1009.253
	Top of cap over same	308.826	1013.207
East St. Cloud, Minn.	P. B. M. 2 1/2	308.304	1011.494
	Top of cap over same	309.513	1015.462
St. Cloud, Minn.	P. B. M. St. Cloud	314.612	1032.189
Near St. Cloud, Minn.	T. B. M. 110	306.006	1003.955
Near Sauk Rapids, Minn.	P. B. M. 2 1/2	305.166	1001.198
	Top of cap over same	306.374	1005.162
Do	T. B. M. 112	306.726	1006.317
Do	P. B. M. 2 1/2	312.534	1025.372
	Top of cap over same	313.745	1029.345
Near Little Rock, Minn.	P. B. M. 2 1/2	311.922	1023.364
	Top of cap over same	313.130	1027.328
Near Rice, Minn.	P. B. M. 2 1/2	314.077	1030.435
	Top of cap over same	315.288	1034.407
Do	P. B. M. △ Back Base	321.693	1055.421
	Top of cap over same	322.906	1059.400
Do	P. B. M. △ River Base	320.597	1051.826
	Top of cap over same	321.810	1055.805
Do	P. B. M. 2 1/2	321.206	1053.823
	Top of cap over same	322.418	1057.799
Do	P. B. M. 2 1/2	320.784	1052.439
	Top of cap over same	321.994	1056.408
Near North Prairie, Minn.	P. B. M. 2 1/2	318.349	1044.450
	Top of cap over same	319.557	1048.413
Do	P. B. M. 2 1/2	324.605	1064.975
	Top of cap over same	325.818	1068.955
Near Royalton, Minn.	P. B. M. 2 1/2	331.302	1086.946
	Top of cap over same	332.514	1090.923
Do	P. B. M. 2 1/2	332.731	1091.635
	Top of cap over same	333.931	1095.572
Near Little Falls, Minn.	P. B. M. 3 0/2	336.046	1102.511
	Top of cap over same	337.248	1106.455
Do	P. B. M. 3 0/2	338.902	1111.881
	Top of cap over same	340.112	1115.851
Little Falls, Minn.	T. B. M. 152	339.337	1113.308
Near Little Falls, Minn.	P. B. M. 3 0/2	340.746	1117.931
	Top of cap over same	341.942	1121.855
Belle Prairie, Minn.	P. B. M. 3 0/2	343.721	1127 692
	Top of cap over same	344.933	1131.668
Near Belle Prairie, Minn.	P. B. M. 3 0/2	346.039	1135.297
	Top of cap over same	347.249	1139.266
Near Fort Ripley, Minn.	P. B. M. 3 0/2	348.088	1142.019
	Top of cap over same	349.302	1146.001
Do	P. B. M. 3 0/2	350.618	1150.319
	Top of cap over same	351.835	1154.312
Do	P. B. M. 3 0/2	353.604	1160.116
	Top of cap over same	354.819	1164.102
Near Old Fort Ripley, Minn.	P. B. M. 3 0/2	353.417	1159.502
	Top of cap over same	354.627	1163.472
Near Island No. 22, Minn.	P. B. M. 3 0/2	360.617	1183.124
	Top of cap over same	361.828	1187.097
Near Old Crow Wing Ferry, Minn.	P. B. M. 3 1/2	361.634	1186.461
	Top of cap over same	362.845	1190.434
Do	P. B. M. 3 1/2	358.624	1176.585
	Top of cap over same	359.834	1180.555
Near Brainerd, Minn.	P. B. M. 3 1/2	363.145	1191.419
	Top of cap over same	364.353	1195.382
Do	T. B. M. 195	377.192	1237.504
Do	T. B. M. 196	372.266	1221.343
Brainerd, Minn.	P. B. M. 3 1/2	370.425	1215.303
	Top of cap over same	371.635	1219.272
Do	P. B. M. Sanitarium.	368.183	1207.947
	Top of cap over same	369.426	1212.025
Do	P. B. M. △ South Base	369.457	1212.127
	Top of cap over same	370.669	1216.103
Do	P. B. M. △ North Base	366.757	1203.269
	Top of cap over same	367.971	1207.251
Do	P. B. M. 3 1/2	367.260	1204.919
	Top of cap over same	368.468	1208.882
Near Brainerd, Minn.	P. B. M. 3 1/2	370.355	1215.073
	Top of cap over same	371.568	1219.052
Near mouth of Rabbit River, Minn.	P. B. M. 3 1/2	368.274	1208.246
	Top of cap over same	369.480	1212.202
Do	P. B. M. 3 1/2	377.687	1239.128
	Top of cap over same	378.894	1243.088
Near Old Indian Mission, Minn.	P. B. M. 3 1/2	359.161	1178.348
	Top of cap over same	360.370	1182.314
Near mouth of Pine River, Minn.	P. B. M. 3 2/2	364.266	1195.096
	Top of cap over same	365.476	1199.066
Near Island Lake, Minn.	P. B. M. 3 3/1	362.169	1188.216
	Top of cap over same	363.372	1192.163
Near Towhead Rapids, Minn.	P. B. M. 3 3/2	363.955	1194.076
	Top of cap over same	365.166	1198.048
Near Island No. 1, Minn.	P. B. M. 3 3/3	367.453	1205.552
	Top of cap over same	368.664	1209.525
Near Dean Brook, Minn.	P. B. M. 3 3/4	369.086	1210.910
	Top of cap over same	370.296	1214.879
Near mouth of Hay Creek, Minn.	P. B. M. 3 3/5	367.250	1204.886
	Top of cap over same	368.460	1208.856
Near mouth of Cedar Brook, Minn.	P. B. M. 3 3/6	364.845	1196.995
	Top of cap over same	366.056	1200.969
Near Aitkin, Minn.	P. B. M. 3 3/7	364.983	1197.449
	Top of cap over same	366.190	1201.409
Aitkin, Minn.	P. B. M. Courthouse.	370.397	1215.211
Brainerd, Minn.	T. B. M. 201	367.459	1205.572
Near Leaks, Minn.	T. B. M. 3	371.586	1219.111
Do	T. B. M. 5	372.298	1221.448
Near Merrifield, Minn.	T. B. M. 6	372.267	1221.346
Merrifield, Minn.	P. B. M. Merrifield	370.521	1215.617
	Top of cap over same	371.734	1219.597
Near Merrifield, Minn.	T. B. M. 10	371.437	1218.623
Near Hubert, Minn.	T. B. M. 13	371.810	1219.847
Do	T. B. M. 14	372.001	1220.473
Hubert, Minn.	T. B. M. 16	367.134	1204.506
Near Hubert, Minn.	T. B. M. 18	373.528	1225.483
Near Pequot, Minn.	T. B. M. 20	366.832	1203.514
Do	T. B. M. 21	372.194	1221.106
Do	T. B. M. 22	378.443	1241.609
Do	T. B. M. 23	388.874	1275.830
Pequot, Minn.	T. B. M. 24	390.804	1282.162
Do	P. B. M. Pequot	389.391	1277.527
	Top of cap over same	390.601	1281.497
Near Pequot, Minn.	T. B. M. 26	387.985	1272.914
Jenkins, Minn.	T. B. M. 28	386.266	1267.275
Near Pine River, Minn.	T. B. M. 30	388.638	1275.057
Do	T. B. M. 31	388.072	1273.200
Do	T. B. M. 32	390.213	1280.224

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Pine River, Minn	T. B. M. 33	392.654	1288.232
Pine River, Minn	T. B. M. 35	395.515	1297.619
Do	P. B. M. Pine River.	394.592	1294.591
	Top of cap over same	395.797	1298.544
Near Pine River, Minn	T. B. M. 37	399.440	1310.496
Near Mildred, Minn	T. B. M. 39	408.997	1341.851
Do	T. B. M. 41	406.431	1333.432
Near Backus, Minn	T. B. M. 43	411.066	1348.639
Backus, Minn	P. B. M. Backus	407.059	1335.492
	Top of cap over same	408.269	1339.462
Near Island Lake, Minn	T. B. M. 46	409.870	1344.715
Do	T. B. M. 48	404.642	1327.563
Do	T. B. M. 49	407.124	1335.706
Near Hackensack, Minn	T. B. M. 50	411.737	1350.840
Do	T. B. M. 52	422.541	1386.287
Hackensack, Minn	T. B. M. 53	422.864	1387.346
	P. B. M. Hackensack	422.511	1386.188
Do	Top of cap over same	423.726	1390.174
Near Hackensack, Minn	T. B. M. 54	430.989	1414.003
Do	T. B. M. 55	433.504	1422.254
Do	T. B. M. 56	426.416	1399.000
Lothrop, Minn	T. B. M. 57	425.327	1395.427
Near Hunters, Minn	P. B. M. Portage Lake.	423.413	1389.147
	Top of cap over same	424.627	1393.130
Hunters, Minn	T. B. M. 60	422.890	1387.432
Near Hunters, Minn	T. B. M. 62	408.774	1341.119
Near Walker, Minn	T. B. M. 63	400.310	1313.351
Do	T. B. M. 64	397.496	1304.118
Do	T. B. M. 65	398.934	1308.836
Walker, Minn	P. B. M. Walker	402.531	1320.637
	Top of cap over same	403.737	1324.594
Do	P. B. M. Cole	401.982	1318.836
Do	P. B. M. Water Tank	413.719	1357.343
Near Walker, Minn	T. B. M. 69	404.002	1325.463
Do	T. B. M. 71	398.958	1308.915
Do	T. B. M. 72	397.688	1304.748
Do	R. R. B. M.	396.745	1301.655
Near Leech Lake, Minn	T. B. M. 73	405.220	1329.459
Leech Lake, Minn	P. B. M. Leech Lake.	405.956	1331.874
	Top of cap over same	407.161	1335.827
Near Leech Lake, Minn	T. B. M. 77	400.500	1313.973
Near Wilkinson, Minn	T. B. M. 78	399.153	1309.554
Do	T. B. M. 79	396.935	1302.278
Do	T. B. M. 80	397.488	1304.092
Do	T. B. M. 81	400.931	1315.388
Do	T. B. M. 82	396.402	1300.529
Do	T. B. M. 83	397.808	1305.142
Do	P. B. M. Steamboat Lake.	397.780	1305.050
	Top of cap over same	398.987	1309.010
Do	T. B. M. 85	400.081	1312.599
Do	T. B. M. 86	407.102	1335.633
Near Cass Lake, Minn	T. B. M. 87	407.715	1337.645
Do	T. B. M. 89	408.745	1341.024
Do	T. B. M. 90	405.728	1331.126
Cass Lake, Minn	P. B. M. Wye	405.629	1330.801
	Top of cap over same	406.844	1334.787
Near Cass Lake, Minn	T. B. M. 93	402.134	1319.334
Near Farris, Minn	T. B. M. 94	409.615	1343.878
Do	T. B. M. 97	412.837	1354.450
Do	P. B. M. Midge Lake.	404.525	1327.179
	Top of cap over same	405.734	1331.146
Do	T. B. M. 101	404.537	1327.219
Near Rosby, Minn	T. B. M. 102	405.859	1331.556
Do	T. B. M. 103	407.951	1338.420
Near South Bemidji, Minn	T. B. M. 105	411.090	1348.718
Do	T. B. M. 107	414.146	1358.744
Do	T. B. M. 108	414.594	1360.214
Near Bemidji, Minn	△ Bemidji	415.236	1362.320
	Top of cap over same	416.449	1366.299
Bemidji, Minn	T. B. M. 111	411.145	1348.898
Do	P. B. M. Willets	413.841	1357.743
	Top of cap over same	415.052	1361.717
Do	P. B. M. Bemidji Tank.	414.886	1361.172
Near Bemidji, Minn	T. B. M. 114	416.290	1365.778
Do	P. B. M. Dorman	419.016	1374.722
	Top of cap over same	420.227	1378.695
Do	P. B. M. Collette	415.110	1361.906
	Top of cap over same	416.324	1365.889
Near Maltby, Minn	△ County line	447.345	1467.665
	Top of cap over same	448.561	1471.654
Near mouth of Hennepin River, Minn.	P. B. M. Hennepin	421.376	1382.465
	Top of cap over same	422.588	1386.441
Near "The Rapids," Minn.	P. B. M. Rapids	425.638	1396.448
	Top of cap over same	426.849	1400.420
Near mouth of La Salle River, Minn.	P. B. M. La Salle	430.911	1413.747
	Top of cap over same	432.123	1417.724
On Prospect Hill, Minn	△ Prospect Hill	512.016	1679.839
	Top of cap over same	513.234	1683.835
Near Lake Itasca, Minn	P. B. M. Sherratt	453.267	1487.093
	Top of cap over same	454.486	1491.093
Near Lake Itasca, Minn	P. B. M. Park Line	451.293	1480.617
	Top of cap over same	452.505	1484.593
Do	△ Itasca	466.624	1530.915
	Top of cap over same	467.840	1534.905
Lake Itasca, Minn	P. B. M. Park House	453.647	1488.340
	Top of cap over same	454.859	1492.317
Cass Lake, Minn	P. B. M. Roundhouse	403.736	1324.590
Do	U. S. E. B. M. 347	404.878	1328.337
	Top of cap over same	406.078	1332.274
Near Cass Lake, Minn	U. S. E. B. M. 342	400.687	1314.587
	Top of cap over same	401.884	1318.514
Near Lomond, Minn	T. B. M. 169	403.025	1322.258
Lomond, Minn	P. B. M. Lomond Spur.	398.985	1309.003
	Top of cap over same	400.196	1312.977
Near Lomond, Minn	U. S. E. B. M. 337	.....	.....
	Top of cap over same	397.942	1305.582
Cuba, Minn	T. B. M. 170	410.045	1345.290
Near Cuba, Minn	T. B. M. 172	408.357	1339.751
Near Schley, Minn	T. B. M. 174	399.592	1310.994
Do	T. B. M. 175	402.322	1319.951
Do	T. B. M. 176	405.201	1329.397
Do	T. B. M. 177	403.626	1324.229
Do	T. B. M. 179	401.699	1317.907
Near Bena, Minn	T. B. M. 181	401.166	1316.159
Do	T. B. M. 183	400.132	1312.766
Do	△ Bigosh	401.621	1317.652
	Top of cap over same	402.836	1321.637
Bena, Minn	△ Bena	401.220	1316.336
	Top of cap over same	402.432	1320.312
Do	R. R. B. M.	399.003	1309.063
Near Bena, Minn	△ Norway Grove	402.601	1320.867
	Top of cap over same	403.809	1324.830
Do	T. B. M. 188	402.127	1319.312
Do	R. R. B. M.	401.920	1318.632
Near Nushka, Minn	T. B. M. 189	399.103	1309.390
Nushka, Minn	T. B. M. 191	399.205	1309.725
Near Nushka, Minn	T. B. M. 192	402.658	1321.054
Do	△ Divide	402.199	1319.548
	Top of cap over same	403.404	1323.501
Do	B. M. Mississipp*	397.590	1304.427
	Top of cap over same	398.798	1308.389
Near Ball Club, Minn	U. S. E. B. M. 304	393.994	1292.629
	Top of cap over same	395.190	1296.553
Do	B. M. Tomahawk	396.803	1301.845
	Top of cap over same	398.007	1305.794
Do	B. M. Wigwam	392.571	1287.960
	Top of cap over same	393.785	1291.943
Do	T. B. M. 15C	391.318	1283.849
Near Starke, Minn	△ Starke	391.539	1284.575
	Top of cap over same	392.752	1288.553
Starke, Minn	T. B. M. 200	393.426	1290.765
Near Starke, Minn	T. B. M. 202	396.694	1301.487
Near Deer River, Minn	T. B. M. 203	396.819	1301.897
Do	△ Old Road	393.858	1292.183
	Top of cap over same	395.067	1296.149
Deer River, Minn	T. B. M. 206	393.834	1292.104
Do	△ Deer River	395.264	1296.795
	Top of cap over same	396.484	1300.798
Do	B. M. Roundhouse	392.993	1289.345
	Top of cap over same	394.192	1293.279
Near Deer River, Minn	U. S. E. B. M. 192	391.196	1283.449
	Top of cap over same	392.394	1287.380
Do	U. S. Engineer gauge.	390.299	1280.506
Do	T. B. M. 208	390.662	1281.697
Near Hull, Minn	T. B. M. 210	391.900	1285.758
Do	T. B. M. 212	400.421	1313.715
Do	T. B. M. 213	390.662	1281,697
Near Cohasset, Minn	B. M. Cohasset	390.019	1279.587
	Top of cap over same	391.228	1283.554
Cohasset, Minn	T. B. M. 215	390.608	1281.520
Do	U. S. E. B. M. 166	389.438	1277.681
	Top of cap over same	390.633	1281.602
Near Cohasset, Minn	B. M. Dam	392.629	1288.150
	Top of cap over same	393.840	1292.123
Near Pokegama Lake, Minn.	Old U. S. B. M.	390.011	1279.561
Pokegama Lake, Minn	P. B. M. Pokegama Falls.	392.067	1286.307
Near Pokegama Lake, Minn	U. S. E. B. M. 167	389.691	1278.511
	Top of cap over same	390.890	1282.445
Pokegama Lake, Minn	U. S. Engineer gauge.	389.806	1278.889
Do	U. S. Engineer gauge.	387.975	1272.881
Do	U. S. Engineer gauge.	387.982	1272.904
Near Grand Rapids, Minn.	△ Grand Rapids	389.010	1276.277
	Top of cap over same	390.221	1280.250
Do	T. B. M. 220	392.549	1287.888
Grand Rapids, Minn	P. B. M. Balustrade	392.962	1289.243
Near Grand Rapids, Minn.	△ Race track	389.012	1276.284
	Top of cap over same	390.222	1280.254
Do	B. M. Grand Rapids	390.424	1280.916
	Top of cap over same	391.635	1284.889

*Moved by the railroad company in 1904; present elevation not determined.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near La Prairie, Minn.	P. B. M. Prairie River.	391.068	1283.029
Do.	△ La Prairie.		
	Top of cap over same	391.089	1283.097
Do.	T. B. M. 226.	394.911	1295.637
Blackberry, Minn.	T. B. M. 229.	396.989	1302.455
Do.	T. B. M. 230.	396.776	1301.756
Do.	B. M. Blackberry.	395.949	1299.042
	Top of cap over same	397.160	1303.015
Aitkin, Minn.	P. B. M. $\frac{228}{2}$.	364.925	1197.258
	Top of cap over same	366.136	1201.232
Near Aitkin, Minn.	Lower Base	364.989	1197.468
	Top of cap over same	366.203	1201.450
Do.	B. M. $\frac{228}{2}$.	364.969	1197.402
	Top of cap over same	366.183	1201.385
Do.	U. S. E. B. M. 202.		
	Top of cap over same	366.924	1203.817
Do.	P. B. M. Cut-off.	365.871	1200.361
	Top of cap over same	367.088	1204.356
Do.	P. B. M. Biggar.	366.144	1201.257
	Top of cap over same	367.358	1205.241
Near Waldeck, Minn.	P. B. M. Sutton.	366.989	1204.031
	Top of cap over same	368.209	1208.031
Do.	U. S. E. B. M. 209.	367.567	1205.925
	Top of cap over same	368.772	1209.880
Waldeck, Minn.	P. B. M. Waldeck.	367.875	1206.937
	Top of cap over same	369.087	1210.912
Near Waldeck, Minn.	P. B. M. Fowlds.	368.212	1208.042
	Top of cap over same	369.428	1212.032
Do.	P. B. M. Strand.	368.808	1209.998
	Top of cap over same	370.016	1213.962
Near Portage, Minn.	P. B. M. Carlson.	373.339	1224.864
	Top of cap over same	374.551	1228.840
Do.	P. B. M. School.	372.495	1222.093
	Top of cap over same	373.706	1226.068
Do.	P. B. M. Pat.	370.855	1216.713
	Top of cap over same	372.068	1220.693
Near Libby, Minn.	P. B. M. Sandy.	371.461	1218.703
	Top of cap over same	372.670	1222.667
Do.	U. S. E. B. M.	370.991	1217.160
Do.	P. B. M. Big Lagoon.	373.017	1223.808
	Top of cap over same	374.236	1227.807
Do.	P. B. M. Midway.	377.905	1239.842
	Top of cap over same	379.125	1243.847
Do.	P. B. M. Wells.	376.141	1234.057
	Top of cap over same	377.352	1238.029
Near Mississippi, Minn.	P. B. M. Stone.	376.803	1236.227
	Top of cap over same	378.016	1240.208
Do.	P. B. M. Le Moon.	378.885	1243.060
	Top of cap over same	380.098	1247.039
Do.	P. B. M. Tiessen.	380.620	1248.750
	Top of cap over same	381.835	1252.737
Do.	P. B. M. Vicinity.	382.482	1254.861
	Top of cap over same	383.694	1258.835
Do.	P. B. M. Shep.	382.436	1254.709
	Top of cap over same	383.648	1258.684
Near Verna, Minn.	P. B. M. Split Hand.	385.118	1263.507
	Top of cap over same	386.335	1267.502
Near Blackberry, Minn.	P. B. M. Hamilton.	386.023	1266.478
	Top of cap over same	387.239	1270.466
Do.	P. B. M. Five Pines.	390.317	1280.564
	Top of cap over same	391.530	1284.545
Do.	P. B. M. Strawberry.	395.189	1296.550
	Top of cap over same	396.404	1300.535
Duluth, Minn.	B. M. 1 of U. S. Eng.	191.161	627.168
Do.	B. M. 19 of U. S. Eng.	185.235	607.725
Do.	B. M. 23 of U. S. Eng.	185.812	609.618
West Duluth, Minn.	B. M. Iron Bay Iron Works.	191.707	628.958
Near Duluth, Minn.	P. B. M. 1.	193.603	635.179
Do.	P. B. M. 1A.	194.815	639.155
Smithville, Minn.	P. B. M. 2.	214.300	703.082
Do.	P. B. M. 2A.	215.513	707.062
Short Line Park, Minn.	P. B. M. 3.	291.396	956.021
Do.	P. B. M. 3A.	292.613	960.014
Thomson, Minn.	P. B. M. 4.	326.346	1070.687
Do.	P. B. M. 4A.	327.558	1074.664
Carlton, Minn.	P. B. M. 5.	332.190	1089.860
Near Carlton, Minn.	P. B. M. 6.	339.414	1113.560
Do.	P. B. M. 6A.	340.628	1117.544
Near Barnum, Minn.	P. B. M. 7.	332.582	1091.146
Do.	P. B. M. 7A.	333.801	1095.145
Do.	P. B. M. 8.	355.317	1165.736
Do.	P. B. M. 8A.	356.527	1169.705
Do.	P. B. M. 9.	360.217	1181.812
Do.	P. B. M. 9A.	361.440	1185.824
Moose Lake, Minn.	P. B. M. 10.	323.076	1059.958
Do.	P. B. M. 10A.	324.292	1063.948
Sturgeon Lake, Minn.	P. B. M. 11.	325.483	1067.855
Do.	P. B. M. 11A.	326.706	1071.868
Willow River, Minn.	P. B. M. 12.	313.155	1027.409
Do.	P. B. M. 12A.	314.370	1031.396
Kettle River, Minn.	P. B. M. 13.	314.114	1030.556
Do.	P. B. M. 13A.	315.329	1034.542
Miller, Minn.	P. B. M. 14.	344.346	1129.742
Do.	P. B. M. 14A.	345.558	1133.718
Sandstone Junction, Minn.	P. B. M. 15.	341.132	1119.197
Do.	P. B. M. 15A.	342.351	1123.196
Hinckley, Minn.	P. B. M. 16.	313.770	1029.427
Do.	P. B. M. 17.	314.058	1030.372
Do.	P. B. M. 17A.	315.278	1034.374
Mission Creek, Minn.	P. B. M. 18.	300.670	986.448
Do.	P. B. M. 18A.	301.891	990.455
Browns Hill, Minn.	P. B. M. 19.	296.720	973.489
Do.	P. B. M. 19A.	297.939	977.489
Pine City, Minn.	P. B. M. 20.	289.176	948.738
Do.	P. B. M. 21.	288.392	946.166
Do.	P. B. M. 21A.	289.613	950.172
Brock Creek, Minn.	P. B. M. 22.	284.769	934.280
Do.	P. B. M. 22A.	285.989	938.282
Rush City, Minn.	P. B. M. 23.	279.128	915.772
Do.	P. B. M. 23A.	280.344	919.762
Do.	P. B. M. 24.	280.202	919.296
Harris, Minn.	P. B. M. 25.	273.632	897.741
Do.	P. B. M. 25A.	274.844	901.718
North Branch, Minn.	P. B. M. 26.	272.586	894.309
Do.	P. B. M. 27.	272.105	892.731
Do.	P. B. M. 27A.	273.323	896.727
Stacy, Minn.	P. B. M. 28.	271.609	891.104
Do.	P. B. M. 28A.	272.824	895.090
Wyoming, Minn.	P. B. M. 29.	270.511	887.501
Do.	P. B. M. 29A.	271.728	891.495
Forest Lake, Minn.	P. B. M. 30.	278.920	915.090
Do.	P. B. M. 31.	277.341	909.910
Do.	P. B. M. 31A.	278.565	913.925
Do.	P. B. M. 32.	277.291	909.746
Do.	P. B. M. 32A.	278.507	913.735
Centerville, Minn.	P. B. M. 33.	284.010	931.790
Do.	P. B. M. 33A.	285.228	935.786
Bald Eagle Junction, Minn.	P. B. M. 34.	282.915	928.197
Do.	P. B. M. 34A.	284.128	932.177
White Bear, Minn.	P. B. M. 35.	286.076	938.568
Do.	P. B. M. 36.	285.094	935.346
Do.	P. B. M. 36A.	286.312	939.342
Do.	P. B. M. 37.	285.036	935.156
Do.	P. B. M. 37A.	286.252	939.145
Near White Bear, Minn.	P. B. M. 38.	282.143	925.664
Do.	P. B. M. 38A.	283.362	929.663
Do.	T. B. M. 185.	275.296	903.200
Gladstone, Minn.	P. B. M. 39.	273.143	896.136
Do.	P. B. M. 39A.	274.360	900.130
Do.	P. B. M. 40.	272.718	894.742
Do.	P. B. M. 40A.	273.928	898.712
St. Paul, Minn.	T. B. M. 193.	216.791	711.255
Jefferson City, Mo.	City B. M.	194.253	637.312
Do.	T. B. M. 197.	191.382	627.892
Do.	P. B. M. 105.	170.657	559.897
Do.	T. B. M. 199.	169.151	554.956
Do.	T. B. M. 198=Old B. M. 90_a (C).	165.174	541.908
Do.	T. B. M. 200.	169.971	557.647
Do.	T. B. M. 201=Old B. M. 90 (*b*).	166.213	545.317
Do.	P. B. M. 107=$\frac{3}{2}$.	168.686	553.431
	Top of cap over same	169.924	557.492
Near Jefferson City, Mo.	T. B. M. 202.	170.796	560.353
Do.	P. B. M. 108.	168.513	552.863
	Top of cap over same	169.752	556.928
Do.	T. B. M. 203=Old B. M.	169.034	554.572
Do.	T. B. M. 204.	169.549	556.262
Near Grays Creek, Mo.	P. B. M. 109.	171.736	563.437
Do.	T. B. M. 205.	170.812	560.406
Do.	T. B. M. 206.	170.919	560.757
Grays Creek, Mo.	T. B. M. 207=Old R. R. B. M.	169.762	556.961
Do.	P. B. M. 110=$\frac{3}{1}$.	171.849	563.808
	Top of cap over same	173.092	567.886
Near Grays Creek, Mo.	T. B. M. 209.	164.954	541.187
Near Claysville, Mo.	T. B. M. 213.	168.551	552.988
Do.	P. B. M. 111.	169.271	555.350
Do.	P. B. M. 112.	167.675	550.114
	Top of cap over same	168.912	554.172
Do.	P. B. M. 113=$\frac{3}{2}$.	171.625	563.073
	Top of cap over same	172.864	567.138
Near Stanleys Landing, Mo.	T. B. M. 218.	169.030	554.559
Sugar Loaf Rock, Mo.	P. B. M. 114.	173.585	569.503
Near Marion, Mo.	P. B. M. 115.	169.136	554.907
	Top of cap over same	170.374	558.969
Do.	T. B. M. 220.	170.778	560.294
Near Bull Rock, Mo.	T. B. M. 223.	167.219	548.618
Bull Rock, Mo.	P. B. M. 116.	168.985	554.412
Do.	P. B. M. 117.	174.332	571.954
	Top of cap over same	175.569	576.013
Near Marion, Mo.	T. B. M. 224.	168.171	551.741
Do.	T. B. M. 225.	167.216	548.608
Do.	T. B. M. 226.	169.780	557.020
Marion, Mo.	P. B. M. 118=$\frac{3}{2}$.	174.949	573.979
	Top of cap over same	176.190	578.050

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Marion, Mo	P. B. M. 119	170.894	560.675
Do	T. B. M. 230	166.468	546.154
Near Marion, Mo	T. B. M. 232	168.901	554.136
Moniteau Creek, Mo	P. B. M. 120	172.453	565.790
	Top of cap over same	173.694	569.861
Near Sandy Hook Landing, Mo.	T. B. M. 236	171.941	564.110
Do	P. B. M. 121	170.941	560.829
Sandy Hook Landing, Mo	P. B. M. 122=$\frac{3}{4}$	177.132	581.141
	Top of cap over same	178.373	585.212
Near Sandy Hook Landing, Mo.	P. B. M. 123	172.734	566.711
Do	T. B. M. 240	171.419	562.397
Near Geigers Landing, Mo.	T. B. M. 241	169.873	557.325
Geigers Landing, Mo	P. B. M. 124	177.166	581.252
	Top of cap over same	178.403	585.311
Do	P. B. M. 125	175.386	575.412
Do	T. B. M. 242	173.684	569.828
Near Geigers Landing, Mo.	T. B. M. 243	174.215	571.570
Near Wolf Point, Mo	P. B. M. 126=$\frac{3}{4}$	176.430	578.837
	Top of cap over same	177.669	582.902
Wolf Point, Mo	P. B. M. 127=$\frac{3}{4}$	178.932	587.046
	Top of cap over same	180.173	591.118
Do	T. B. M. 250	177.077	580.960
Do	P. B. M. 128	184.662	605.845
Mount Vernon Landing, Mo.	P. B. M. 129	179.122	587.669
	Top of cap over same	180.358	591.725
Do	T. B. M. 253	172.156	564.815
Do	P. B. M. 130	175.595	576.098
Near Terrapin Island, Mo	P. B. M. 131=$\frac{3}{4}$	177.632	582.781
	Top of cap over same	178.874	586.856
Near Rocheport, Mo	P. B. M. 132	175.834	576.882
	Top of cap over same	177.072	580.944
Near Overton, Mo	P. B. M. 133=$\frac{3}{4}$	180.743	592.988
	Top of cop over same	181.986	597.066
Near Boonville, Mo	P. B. M. 134	179.614	589.284
Near Elliotts Landing, Mo.	P. B. M. 135	179.050	587.433
	Top of cap over same	180.287	591.492
Elliotts Landing, Mo	P. B. M. 136	181.272	594.723
Do	P. B. M. 137=$\frac{3}{4}$	182.238	597.892
	Top of cap over same	183.475	601.951
Near Franklin Island, Mo	T. B. M. 271	175.883	577.043
Near Boonville, Mo	P. B. M. 138	178.354	585.150
Do	P. B. M. 139	177.316	581.744
	Top of cap over same	178.559	585.822
Do	T. B. M. 276	178.382	585.242
Do	P. B. M. 140=$\frac{4}{5}$	179.082	587.538
	Top of cap over same	180.319	591.597
Boonville, Mo	T. B. M. 279	182.710	599.441
Do	Highwater mark, 1844 (Main Street).	182.532	598.857
Do	P. B. M. 144=Old B. M. 121.	178.824	586.692
Do	U. S. Signal Service gauge.	172.460	565.813
Do	Highwater mark, 1844 (bridge).	182.469	598.650
Do	P. B. M. 141	181.774	596.370
Do	P. B. M. 142=40½, Boonville.	181.569	595.698
	Top of cap over same	182.811	599.772
Do	T. B. M. 280	186.161	610.763
Do	P. B. M. 143	186.162	610.766
Do	P. B. M. 145	185.294	607.919
Near Franklin, Mo	P. B. M. 146	180.866	593.391
	Top of cap over same	182.108	597.466
Near Boonville, Mo	P. B. M. 147=$\frac{3}{5}$ (new position).	181.804	596.469
	Top of cap over same	183.040	600.524
Do	T. B. M. 286	183.856	603.201
Do	P. B. M. 148	182.994	600.373
	Top of cap over same	184.233	604.438
Near Lisbon, Mo	P. B. M. 149	184.260	604.526
	Top of cap over same	185.497	608.585
Do	P. B. M. 150	183.554	602.210
Do	P. B. M. 151=$\frac{4}{5}$	188.898	619.743
	Top of cap over same	190.137	623.808
Do	T. B. M. 295	183.602	602.368
Do	P. B. M. 152=$\frac{4}{5}$	187.199	614.169
	Top of cap over same	188.439	618.237
Do	T. B. M. 297	188.481	618.375
Do	P. B. M. 153	184.986	606.908
Do	T. B. M. 300	184.406	605.005
Do	P. B. M. 154=$\frac{4}{5}$	182.969	600.291
	Top of cap over same	184.193	604.307
Do	T. B. M. 301	184.390	604.953
Do	T. B. M. 302	185.145	607.430
Do	T. B. M. 303	187.539	615.284
Near Bluffport, Mo	T. B. M. 304	186.330	611.318
Near Richland Creek, Mo	P. B. M. 155	186.404	611.560
	Top of cap over same	187.643	615.625
Near Bluffport, Mo	P. B. M. 156	188.903	619.759
Near Richland Creek, Mo	T. B. M. 305	188.522	618.509
Near Glasgow, Mo	P. B. M. 157=$\frac{4}{5}$	186.084	610.511
	Top of cap over same	187.322	614.572
Do	T. B. M. 309	186.036	610.353
Glasgow, Mo	P. B. M. 159=$\frac{4}{5}$	188.247	617.607
	Top of cap over same	189.483	621.662
Do	P. B. M. 160	194.264	637.348
Do	T. B. M. 314	191.897	629.582
Do	T. B. M. 315=Old B. M. 141 (a).	187.093	613.821
Near Glasgow, Mo	P. B. M. 161	202.218	663.444
Do	P. B. M. 158=$\frac{4}{5}$	188.446	618.260
	Top of cap over same	189.684	622.322
Near Cambri , Mo	P. B. M. 162	190.555	625.179
	Top of cap over same	191.795	629.247
Cambridge, Mo	P. B. M. 163	194.344	637.610
Do	T. B. M. 325	193.706	635.517
Do	P. B. M. 164=$\frac{4}{5}$	191.261	627.495
	Top of cap over same	192.497	631.551
Do	T. B. M. 326	192.387	631.190
Near Salt Creek, Mo	P. B. M. 165	188.742	619.231
	Top of cap over same	189.979	623.289
New Frankfort, Mo	P. B. M. 166=$\frac{4}{5}$	190.875	626.229
	Top of cap over same	192.118	630.307
Near New Frankfort, Mo	P. B. M. 167	190.935	626.426
	Top of cap over same	192.171	630.481
Near Buckhorn Point, Mo	P. B. M. 168=$\frac{4}{5}$	191.980	629.854
	Top of cap over same	193.221	633.926
Cromwell Point, Mo	P. B. M. 169	192.895	632.856
	Top of cap over same	194.135	636.925
Near Grand River, Mo	P. B. M. 170=$\frac{3}{4}$	193.517	634.897
	Top of cap over same	194.757	638.965
Near Dewitt, Mo	P. B. M. 171=$\frac{3}{4}$	193.767	635.717
	Top of cap over same	195.003	639.772
Near Miami, Mo	P. B. M. 172	194.565	638.335
	Top of cap over same	195.807	642.410
Do	P. B. M. 173	195.682	642.000
Do	T. B. M. 357=B. M. C. of 1878.	196.841	645.803
Miami, Mo	P. B. M. 175=$\frac{3}{4}$	196.412	644.395
	Top of cap over same	197.655	648.473
Do	T. B. M. 358	197.574	648.207
Near Miami, Mo	P. B. M. 176	195.211	640.455
Do	T. B. M. 359	194.452	637.965
Do	T. B. M. 360	198.239	650.389
Do	P. B. M. 177=$\frac{3}{4}$	196.023	643.119
	Top of cap over same	197.266	647.197
Near Teteseau Bend, Mo	P. B. M. 178	197.209	647.010
	Top of cap over same	198.441	651.052
Near Laynesville, Mo	P. B. M. 179=$\frac{3}{4}$	198.482	651.186
	Top of cap over same	199.722	655.255
Malta Bend Landing, Mo	P. B. M. 180	198.727	651.990
	Top of cap over same	199.967	656.058
Near Malta Bend Landing, Mo.	P. B. M. 181	199.431	654.300
	Top of cap over same	200.670	658.365
Near Waverly, Mo	P. B. M. 182=$\frac{4}{5}$	200.751	658.631
	Top of cap over same	201.994	662.709
Do	P. B. M. 183	205.351	673.722
	Top of cap over same	206.590	677.787
Do	T. B. M. 389	204.782	671.856
Do	P. B. M. 184=$\frac{3}{4}$	200.900	659.119
	Top of cap over same	202.141	663.191
Do	T. B. M. 392	207.025	679.215
Waverly, Mo	P. B. M. 185=$\frac{4}{5}$	208.627	684.470
	Top of cap over same	209.874	688.562
Near Waverly, Mo	P. B. M. 186	204.919	672.305
Do	T. B. M. 396	206.335	676.951
Do	P. B. M. 187	205.794	675.176
Do	T. B. M. 397	206.338	676.961
Do	P. B. M. 188	205.610	674.572
	Top of cap over same	206.846	678.627
Do	P. B. M. 189=$\frac{4}{5}$	212.573	697.417
	Top of cap over same	213.813	701.485
Near Edwards, Mo	P. B. M. 190	209.376	686.928
Do	T. B. M. 402	208.842	685.176
Edwards, Mo	P. B. M. 191	208.160	682.938
Do	P. B. M. 192	205.527	674.300
	Top of cap over same	206.770	78.378
Do	T. B. M. 403	206.735	678.263
Near Dover, Mo	P. B. M. 193=$\frac{4}{5}$	207.501	680.776
	Top of cap over same	208.741	684.844
Do	T. B. M. 407	207.518	680.832
Do	T. B. M. 408	208.174	682.984
Dover, Mo	P. B. M. 194	206.407	677.187
	Top of cap over same	207.647	681.255
Berlin, Mo	P. B. M. 195=$\frac{3}{4}$	207.982	682.354
	Top of cap over same	209.217	686.406
Do	P. B. M. 196	208.751	684.877
Do	T. B. M. 411	209.377	686.931
Near Northrup, Mo	P. B. M. 197	207.845	681.905
Do	T. B. M. 412	208.107	682.764
Northrup, Mo	P. B. M. 198	209.960	688.844
	Top of cap over same	211.195	692.896
Near Northrup, Mo	T. B. M. 415	210.786	691.554
Near Lexington, Mo	P. B. M. 199=$\frac{3}{4}$	206.135	676.295
	Top of cap over same	207.380	680.379
Do	T. B. M. 419	211.846	695.031
Do	P. B. M. 200	212.242	696.331
Do	T. B. M. 420	214.713	704.438
Do	P. B. M. 201	213.025	698.900
	Top of cap over same	214.265	702.968

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Lexington, Mo	P. B. M. 202	212.034	695.648
Do	T. B. M. 422	210.452	690.458
Lexington, Mo	P. B. M. 203=$\frac{42}{1}$	209.670	687.892
	Top of cap over same	210.910	691.961
Do	T. B. M. 423	211.050	692.420
Do	P. B. M. 204	209.613	687.705
Do	T. B. M. 424	209.360	686.875
Do	P. B. M. 205=Old B. M. 190.	219.389	719.779
Near Lexington, Mo	T. B. M. 425=Old B. M. 191.	212.239	696.321
Do	P. B. M. 206	211.396	693.555
Do	P. B. M. 207	211.054	692.433
	Top of cap over same	212.295	696.505
Near Wellington, Mo	P. B. M. 208	212.360	696.718
	Top of cap over same	213.593	700.763
Do	T. B. M. 429=Old B. M. 194.	212.271	696.426
Do	P. B. M. 209=$\frac{24}{1}$	214.390	703.378
	Top of cap over same	215.634	707.459
Wellington, Mo	P. B. M. 210	218.336	716.324
Do	T. B. M. 431	219.163	719.037
Near Waterloo, Mo	P. B. M. 211	212.033	695.645
	Top of cap over same	213.269	699.700
Napoleon, Mo	P. B. M. 212=$\frac{60}{1}$	215.412	706.731
	Top of cap over same	216.653	710.802
Near Napoleon, Mo	T. B. M. 436	219.508	720.169
Do	P. B. M. 213	215.347	706.518
	Top of cap over same	216.584	710.576
Near Sibley Bridge, Mo	P. B. M. 214=$\frac{27}{1}$	216.623	710.704
	Top of cap over same	217.863	714.772
Matthews Landing, Mo	T. B. M. 445=Old B. M. 210.	218.620	717.256
Near Sibley, Mo	P. B. M. 215	217.937	715.015
	Top of cap over same	219.172	719.067
Sibley, Mo	P. B. M. 216	227.413	746.104
Near Sibley, Mo	P. B. M. 217=Cap over $\frac{88}{1}$.	215.926	708.417
Near New Sibley, Mo	P. B. M. 218	217.328	713.017
	Top of cap over same	218.561	717.062
Do	T. B. M. 457	222.957	731.485
Little Blue River, Mo	T. B. M. 458	223.600	733.594
Near Missouri City, Mo	P. B. M. 219=$\frac{40}{1}$	218.354	716.383
	Top of cap over same	219.597	720.461
Atherton, Mo	P. B. M. 220	222.205	729.018
	Top of cap over same	223.442	733.076
Near Atherton, Mo	P. B. M. 221	224.557	736.734
	Top of cap over same	225.790	740.779
Blue Mills Landing, Mo	T. B. M. 465	227.767	747.266
Do	T. B. M. 466=Old B. M. 33 of 1878.	223.238	732.407
Do	T. B. M. 467=Old B. M. 228.	220.739	724.208
Courtney, Mo	P. B. M. 222	223.283	732.554
	Top of cap over same	224.514	736.593
Near Courtney, Mo	T. B. M. 470	226.109	741.826
Near Independence, Mo	T. B. M. 471	229.721	753.676
Do	P. B. M. 223=$\frac{71}{1}$	223.266	732.499
	Top of cap over same	224.508	736.573
Wayne, Mo	P. B. M. 224	227.420	746.127
Near Wayne, Mo	P. B. M. 225	228.041	748.165
	Top of cap over same	229.277	752.220
Near Independence, Mo	P. B. M. 226	226.506	743.128
Near Kansas City, Mo	P. B. M. 227	223.895	734.562
	Top of cap over same	225.132	738.621
Do	P. B. M. 228=$\frac{72}{1}$	223.807	734.273
	Top of cap over same	225.048	738.345
Kansas City, Mo	T. B. M. 478=Old B. M. 240.	226.127	741.885
Do	T. B. M. 479	228.062	748.233
Do	P. B. M. 229	228.228	748.778
Do	T. B. M. 480=Old B. M. 242.	233.540	766.206
Do	P. B. M. 230=$\frac{73}{1}$	227.376	745.983
	Top of cap over same	228.621	750.067
Do	T. B. M. 481	229.352	752.466
Do	P. B. M. 233	228.726	750.412
Do	T. B. M. 482	227.859	747.567
Kansas City, Kans	P. B. M. 234	229.527	753.040
Do	T. B. M. 483	228.262	748.890
Do	P. B. M. 235	225.997	741.458
Do	T. B. M. 484	225.465	739.713
Do	T. B. M. 485=Old B. M. 248.	236.971	777.462
Do	T. B. M. 486=City B. M.	237.236	778.332
Do	T. B. M. 487	232.393	762.443
Do	P. B. M. 236	228.402	749.349
	Top of cap over same	229.640	753.411
Do	P. B. M. 237	229.264	752.177
Near Quindaro, Kans	P. B. M. 238=$\frac{74}{1}$	227.538	746.514
	Top of cap over same	228.779	750.586
Do	T. B. M. 492	235.587	772.922
Near Nearman, Kans	P. B. M. 239	227.678	746.974
	Top of cap over same	228.909	751.012
Near Pomeroy, Kans	P. B. M. 240	230.957	757.731
Do	T. B. M. 495	230.957	757.731
Near Pomeroy, Kans	P. B. M. 241	230.378	755.832
	Top of cap over same	231.615	759.890
Pomeroy, Kans	P. B. M. 242	236.160	774.802
Do	P. B. M. 243	229.549	753.112
	Top of cap over same	230.782	757.157
Near Pomeroy, Kans	P. B. M. 244=Old B. M. 260.	235.855	773.801
Do	T. B. M. 499	229.711	753.643
Connors, Kans	P. B. M. 245=$\frac{76}{1}$	229.948	754.421
	Top of cap over same	231.190	758.496
Do	P. B. M. 246	235.193	771.629
Near Connors, Kans	P. B. M. 247	230.255	755.428
	Top of cap over same	231.489	759.477
Popes, Kans	T. B. M. 506	232.157	761.668
Near Leavenworth Junction, Kans.	P. B. M. 248=$\frac{77}{1}$	243.622	799.283
	Top of cap over same	244.865	803.361
Leavenworth Junction, Kans.	P. B. M. 249	230.499	756.229
	Top of cap over same	231.738	760.294
Near Leavenworth, Kans	T. B. M. 513	232.574	763.037
Do	T. B. M. 514	234.797	770.330
Do	P. B. M. 250=$\frac{78}{1}$	246.181	807.679
	Top of cap over same	247.420	811.744
Do	T. B. M. 515	233.826	767.144
Leavenworth, Kans	P. B. M. 251	238.257	781.681
Do	P. B. M. 252	239.731	786.517
Do	T. B. M. 516=Old B. M. 270.	234.375	768.945
Do	P. B. M. 253	236.157	774.792
Do	T. B. M. 517	235.061	771.196
Near Leavenworth, Kans	T. B. M. 518	237.218	778.273
Fort Leavenworth, Kans	P. B. M. 254=$\frac{79}{1}$	240.062	787.603
	Top of cap over same	241.308	791.691
Do	P. B. M. 255	240.201	788.059
Do	T. B. M. 520	238.250	781.659
Do	T. B. M. 521=gauge B. M.	239.326	785.189
Do	P. B. M. 256	236.390	775.556
Near Fort Leavenworth, Kans.	P. B. M. 257	235.579	772.895
	Top of cap over same	236.818	776.960
Do	P. B. M. 258=$\frac{80}{1}$	234.311	768.735
	Top of cap over same	235.554	772.813
Near Wade, Kans	T. B. M. 525	235.697	773.283
Near Kickapoo, Kans	P. B. M. 259	235.713	773.335
	Top of cap over same	236.950	777.393
Do	P. B. M. 260	242.023	794.037
Do	T. B. M. 529=Old B. M. 278.	242.147	794.444
Do	T. B. M. 530	241.576	792.571
Kickapoo, Kans	P. B. M. 261=$\frac{81}{1}$	244.125	800.933
	Top of cap over same	245.363	804.995
Do	T. B. M. 531	242.801	796.590
Near Oak Mills, Kans	P. B. M. 262	235.916	774.001
	Top of cap over same	237.147	778.040
Oak Mills, Kans	P. B. M. 263	240.710	789.729
Do	P. B. M. 264=$\frac{82}{1}$	237.879	780.441
	Top of cap over same	239.119	784.510
Near Oak Mills, Kans	P. B. M. 265	239.240	784.907
	Top of cap over same	240.471	788.945
Do	T. B. M. 540	239.370	785.333
Near Atchison, Kans	P. B. M. 266=$\frac{83}{1}$	239.011	784.155
	Top of cap over same	240.238	788.181
Do	T. B. M. 542	240.064	787.610
Do	P. B. M. 267	242.530	795.701
	Top of cap over same	243.768	799.762
Do	T. B. M. 543	240.714	789.743
Do	P. B. M. 268=Old B. M. 287	243.447	798.709
Atchison, Kans	P. B. M. 269=$\frac{84}{1}$	243.190	797.866
	Top of cap over same	244.416	801.888
Do	T. B. M. 548=City B. M.	244.190	801.147
Do	P. B. M. 270	255.689	838.873
Do	T. B. M. 549	254.948	836.442
Do	T. B. M. 550=Old gauge B. M.	240.982	790.622
Do	P. B. M. 271	243.289	798.191
Do	P. B. M. 272	242.551	795.769
Do	T. B. M. 551	243.026	797.328
Near East Atchison, Mo	P. B. M. 273=$\frac{85}{2}$	238.519	782.541
	Top of cap over same	239.749	786.577
Near Rushville, Mo	P. B. M. 274	240.186	788.010
	Top of cap over same	241.418	792.052
Rushville, Mo	P. B. M. 275=$\frac{86}{2}$	245.712	806.140
	Top of cap over same	246.941	810.172
Near Halls, Mo	P. B. M. 276=$\frac{87}{2}$	245.604	805.786
	Top of cap over same	246.836	809.828
Halls, Mo	P. B. M. 277	243.196	797.886
	Top of cap over same	244.433	801.944
Near Kenmoor, Mo	P. B. M. 278=$\frac{87}{2}$	249.204	817.597
	Top of cap over same	250.433	821.629
Near St. Joseph, Mo	P. B. M. 279	245.406	805.136
	Top of cap over same	246.648	809.211
Do	P. B. M. 280=$\frac{88}{2}$	251.444	824.946
	Top of cap over same	252.670	828.968
St. George, Mo	P. B. M. 281	251.187	824.103
	Top of cap over same	252.421	828.151
Do	T. B. M. 579	250.322	821.265

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
St. Joseph, Mo	T. B. M. 580	251.823	826.189
Do	P. B. M. 282	249.978	820.136
Do	T. B. M. 582=Old B. M. 313.	250.949	823.322
Do	T. B. M. 583=Old B. M. 312.	250.728	822.597
Do	P. B. M. 283=$\frac{89}{3}$	249.882	819.821
	Top of cap over same	251.108	823.843
Do	P. B. M. 284	253.660	832.216
Do	T. B. M. 584	252.773	829.306
Do	P. B. M. 285	266.463	874.221
Do	P. B. M. 286	256.356	841.061
Do	T. B. M. 585=City B. M.	255.113	836.983
Do	T. B. M. 586	252.352	827.925
Near St. Joseph, Mo	P. B. M. 287=89½	248.922	816.672
	Top of cap over same	250.142	820.674
Do	P. B. M. 288	247.585	812.285
	Top of cap over same	248.818	816.330
Do	T. B. M. 589	249.872	819.788
Do	P. B. M. 289	250.858	823.023
Do	P. B. M. 290=$\frac{90}{2}$	249.911	819.916
	Top of cap over same	251.101	823.821
Near Amazonia, Mo	P. B. M. 291	254.476	834.893
	Top of cap over same	255.702	838.916
Do	P. B. M. 292=$\frac{91}{2}$	252.896	829.710
	Top of cap over same	254.108	833.686
Do	P. B. M. 293	252.002	826.777
	Top of cap over same	253.227	830.796
Do	P. B. M. 294=$\frac{93}{3}$	253.926	833.089
	Top of cap over same	255.136	837.059
Near Nodaway, Mo	P. B. M. 295	253.504	831.704
Do	P. B. M. 296=$\frac{93}{3}$	257.048	843.332
	Top of cap over same	258.259	847.305
Near Forbes, Mo	P. B. M. 297	255.524	838.332
	Top of cap over same	256.730	842.288
Do	P. B. M. 298=$\frac{94}{3}$	260.269	853.899
	Top of cap over same	261.474	857.853
Near Curzons, Mo	P. B. M. 299	257.378	844.414
	Top of cap over same	258.608	848.450
Do	P. B. M. 300=$\frac{95}{3}$	258.304	847.452
	Top of cap over same	259.517	851.432
Near Forest City, Mo	T. B. M. 632	260.247	853.827
Do	P. B. M. 301=$\frac{97}{3}$	262.677	861.799
	Top of cap over same	263.887	865.769
Forest City, Mo	P. B. M. 302	261.593	858.243
Near Forest City, Mo	P. B. M. 303	258.877	849.332
	Top of cap over same	260.101	853.348
Napier, Mo	P. B. M. 304	257.983	846.399
	Top of cap over same	259.214	850.438
Near Bigelow, Mo	P. B. M. 305	258.447	847.922
	Top of cap over same	259.672	851.941
Bigelow, Mo	P. B. M. 306	260.398	854.322
	Top of cap over same	261.625	858.348
Near Bigelow, Mo	P. B. M. 307	261.069	856.524
	Top of cap over same	262.298	860.556
Near Craig, Mo	P. B. M. 308	263.249	863.676
Do	P. B. M. 309	263.310	863.876
	Top of cap over same	264.534	867.892
Do	P. B. M. 310	264.011	866.176
Near Corning, Mo	P. B. M. 311	264.182	866.737
	Top of cap over same	265.410	870.766
Corning, Mo	P. B. M. 312	266.642	874.808
Near Corning, Mo	P. B. M. 313	266.370	873.916
	Top of cap over same	267.592	877.925
Nishnabotna, Mo	P. B. M. 314	265.965	872.587
	Top of cap over same	267.191	876.609
Near Nishnabotna, Mo	P. B. M. 315	269.200	883.200
Near Langdon, Mo	P. B. M. 316	268.965	882.429
	Top of cap over same	270.191	886.452
Near Phelps, Mo	P. B. M. 317	269.539	884.313
	Top of cap over same	270.766	888.338
Phelps, Mo	P. B. M. 318=$\frac{99}{3}$	270.448	887.295
	Top of cap over same	271.671	891.307
Near Watson, Mo	P. B. M. 319	271.098	889.427
	Top of cap over same	272.325	893.453
Do	P. B. M. 320=$\frac{107}{3}$	273.220	896.389
	Top of cap over same	274.442	900.398
Watson, Mo	P. B. M. 321	272.567	894.247
	Top of cap over same	273.790	898.259
Near Watson, Mo	P. B. M. 322	274.812	901.612
	Top of cap over same	276.039	905.638
Near Hamburg, Iowa	P. B. M. 323	276.859	908.328
	P. B. M. 324	275.240	903.017
Do	Top of cap over same	276.468	907.045
	P. B. M. 325=$\frac{119}{2}$	276.006	905.530
Do	Top of cap over same	277.222	909.519
Near Nebraska City Junction, Iowa.	P. B. M. 326	279.160	915.877
	Top of cap over same	280.386	919.900
Do	P. B. M. 327	280.314	919.664
	Top of cap over same	281.541	923.689
Near Percival, Iowa	P. B. M. 328	280.466	920.162
	Top of cap over same	281.691	924.181
Percival, Iowa	P. B. M. 329	282.304	926.192
	Top of cap over same	283.532	930.221
Near McPaul, Iowa	P. B. M. 330=$\frac{134}{3}$	283.879	931.360
	Top of cap over same	285.096	935.352
Do	P. B. M. 331	285.560	936.875
	Top of cap over same	286.784	940.890
Near Bartlett, Iowa	P. B. M. 332	285.991	938.289
	Top of cap over same	287.215	942.305
Do	P. B. M. 333	286.986	941.553
	Top of cap over same	288.211	945.572
Near Haynies, Iowa	P. B. M. 334=$\frac{112}{3}$	287.898	944.545
	Top of cap over same	289.119	948.551
Haynies, Iowa	P. B. M. 335	288.860	947.702
	Top of cap over same	290.083	951.714
Near Pacific Junction, Iowa	P. B. M. 336=$\frac{137}{3}$	289.414	949.519
	Top of cap over same	290.639	953.538
Do	P. B. M. 337	291.049	954.883
	Top of cap over same	292.272	958.896
Near Hentons, Iowa	P. B. M. 338	291.998	957.997
	Top of cap over same	293.225	962.022
Hentons, Iowa	P. B. M. 339	293.285	962.219
	Top of cap over same	294.507	966.228
Near Hentons, Iowa	P. B. M. 340	295.357	969.017
	Top of cap over same	296.580	973.030
Near Island Park, Iowa	P. B. M. 341	294.961	967.718
	Top of cap over same	296.186	971.737
Near Council Bluffs, Iowa.	P. B. M. 342	295.797	970.461
	Top of cap over same	297.020	974.473
Council Bluffs, Iowa	P. B. M. 343	299.010	981.002
Omaha, Nebr	City B. M., Omaha	317.288	1040.969
Do	P. B. M. 344	316.972	1039.932
Do	P. B. M. 345	299.155	981.478
Do	P. B. M. 346=gauge B. M.	296.158	971.645
	Top of cap over same	297.367	975.612
Near Omaha, Nebr	T. B. M. 804	306.609	1005.933
Council Bluffs, Iowa	P. B. M. 347	300.707	986.570
Do	P. B. M. 348=$\frac{121}{2}$	301.856	990.339
	Top of cap over same	303.080	994.355
Do	P. B. M. 349=$\frac{122}{2}$	297.291	975.362
	Top of cap over same	298.515	979.378
Near Council Bluffs, Iowa.	P. B. M. 350	303.464	995.615
	Top of cap over same	304.685	999.621
Do	P. B. M. 351	300.759	986.740
	Top of cap over same	301.983	990.756
Crescent, Iowa	P. B. M. 352	301.277	988.440
	Top of cap over same	302.502	992.459
Near Honey Creek, Iowa	P. B. M. 353	303.611	996.097
	Top of cap over same	304.833	1000.106
Honey Creek, Iowa	P. B. M. 354	306.266	1004.808
Near Honey Creek, Iowa	P. B. M. 355	304.996	1000.641
	Top of cap over same	306.221	1004.660
Loveland, Iowa	P. B. M. 356	304.837	1000.119
Near Missouri Valley, Iowa	P. B. M. 357	303.275	994.995
	Top of cap over same	304.498	999.007
Missouri Valley, Iowa	P. B. M. 358	306.766	1006.448
Near Missouri Valley, Iowa	P. B. M. 359	305.299	1001.635
	Top of cap over same	306.524	1005.654
Near California Junction, Iowa.	P. B. M. 360=$\frac{127}{2}$	305.555	1002.475
	Top of cap over same	306.776	1006.481
Do	P. B. M. 361	306.414	1005.293
	Top of cap over same	307.637	1009.306
Near Modale, Iowa	P. B. M. 362	307.466	1008.745
	Top of cap over same	308.683	1012.737
Do	P. B. M. 363	307.886	1010.123
	Top of cap over same	309.108	1014.132
Near Mondamin, Iowa	P. B. M. 364	309.006	1013.797
	Top of cap over same	310.230	1017.813
Mondamin, Iowa	P. B. M. 365	312.433	1025.041
Near Mondamin, Iowa	P. B. M. 366	311.507	1022.003
	Top of cap over same	312.727	1026.005
Do	P. B. M. 367=$\frac{132}{2}$	311.051	1020.506
	Top of cap over same	312.268	1024.499
Near River Sioux, Iowa	P. B. M. 368	312.680	1025.851
	Top of cap over same	313.901	1029.857
Do	P. B. M. 369=$\frac{134}{3}$	314.550	1031.986
	Top of cap over same	315.768	1035.982
Do	P. B. M. 370	313.616	1028.922
	Top of cap over same	314.837	1032.928
Near Blencoe, Iowa	P. B. M. 371	314.290	1031.133
	Top of cap over same	315.510	1035.136
Do	P. B. M. 372=$\frac{142}{3}$	.....	.....
	Top of cap over same	314.533	1031.930
Do	P. B. M. 373	315.204	1034.132
	Top of cap over same	316.424	1038.134
Blencoe, Iowa	P. B. M. 374=$\frac{143}{4}$	316.148	1037.229
	Top of cap over same	317.364	1041.218
Near Onawa, Iowa	P. B. M. 375	317.684	1042.268
	Top of cap over same	318.910	1046.291
Do	P. B. M. 376	318.368	1044.512
	Top of cap over same	319.594	1048.535
Onawa, Iowa	P. B. M. 377	320.783	1052.436
Do	P. B. M. 378=$\frac{154}{3}$	319.328	1047.662
	Top of cap over same	320.567	1051.727
Near Onawa, Iowa	P. B. M. 379	319.508	1048.252
	Top of cap over same	320.727	1052.252
Near Whiting, Iowa	P. B. M. 380	320.402	1051.186
	Top of cap over same	321.629	1055.211

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Whiting, Iowa	P. B. M. 381	322.192	1057.058
	Top of cap over same	323.433	1061.130
Do	P. B. M. 382	323.224	1060.444
	Top of cap over same	324.448	1064.460
Near Sloan, Iowa	P. B. M. 383=$1\frac{3}{4}^{2}$	323.950	1062.826
	Top of cap over same	325.188	1066.888
Do	P. B. M. 384	325.550	1068.075
	Top of cap over same	326.770	1072.078
Sloan, Iowa	P. B. M. 385	328.155	1076.622
Near Sloan, Iowa	P. B. M. 386=$1\frac{1}{4}^{2}$	326.022	1069.624
	Top of cap over same	327.243	1073.630
Near Salix, Iowa	P. B. M. 387	326.693	1071.825
	Top of cap over same	327.920	1075.851
Do	P. B. M. 388	328.794	1078.718
	Top of cap over same	330.014	1082.721
Do	P. B. M. 389	330.877	1085.552
	Top of cap over same	332.098	1089.558
Near Sargents Bluff, Iowa	P. B. M. 390	330.787	1085.257
	Top of cap over same	332.011	1089.273
Sargents Bluff, Iowa	P. B. M. 391=$1\frac{1}{4}^{2}$	332.316	1090.273
	Top of cap over same	333.532	1094.263
Near Sargents Bluff, Iowa	P. B. M. 392	333.159	1093.039
	Top of cap over same	334.383	1097.055
Sioux City, Iowa	P. B. M. 393	334.681	1098.033
	Top of cap over same	335.908	1102.058
Do	P. B. M. 394	337.009	1105.670
Do	T. B. M. 966	337.875	1108.512
Harrisburg, Pa	P. R. R. No. 1	97.518	319.940
Do	P. R. R. No. 2	102.734	337.053
Do	364 Harrisburg 1899	110.884	363.792
Do	P. R. R. No. 4	101.124	331.771
Near Rockville, Pa	P. R. R. No. 5	106.464	349.291
Do	P. R. R. No. 6	106.501	349.412
Near Perdix, Pa	P. R. R. No. 7	105.266	345.360
Perdix, Pa	P. R. R. No. 8	106.082	348.037
Cove, Pa	P. R. R. No. 9	105.170	345.045
Near Cove, Pa	P. R. R. No. 10	106.231	348.526
Do	P. R. R. No. 11	105.762	346.987
Cove Creek, Pa	P. R. R. No. 12	107.152	351.548
Shermans Creek, Pa	P. R. R. No. 13	108.275	355.232
Duncannon, Pa	P. R. R. No. 14	111.884	367.073
Juniata Bridge, Pa	P. R. R. No. B	109.503	359.261
Near Juniata Bridge, Pa	P. R. R. No. 15	110.625	362.942
Near Aqueduct, Pa	P. R. R. No. 16	113.654	372.880
Aqueduct, Pa	P. R. R. No. 17	113.127	371.151
Alters Run Bridge, Pa	P. R. R. No. 18	114.971	377.201
Loshs Run, Pa	P. R. R. No. 19	113.791	373.329
Near Loshs Run, Pa	P. R. R. No. 20	117.558	385.688
Bailey, Pa	P. R. R. No. 22	117.204	384.527
Near Bailey, Pa	P. R. R. No. 23	120.483	395.285
Trimmers Rock, Pa	P. R. R. No. 24	119.620	392.453
Near Newport, Pa	P. R. R. No. 25	120.098	394.022
Newport, Pa	P. R. R. No. 26	120.744	396.141
Near Newport, Pa	P. R. R. No. 27	120.899	396.649
Do	P. R. R. No. 28	122.374	401.489
Near Old Ferry Station, Pa.	P. R. R. No. 29	122.069	400.488
Millerstown, Pa	P. R. R. No. 31	124.699	409.117
Near Durward, Pa	P. R. R. No. 32	125.031	410.206
Durward, Pa	P. R. R. No. 33	128.822	422.644
Near Durward, Pa	P. R. R. No. 34	128.389	421.223
Thompsontown, Pa	P. R. R. No. 35	128.029	420.042
Near Thompsontown, Pa	P. R. R. No. 36	127.617	418.690
Do	P. R. R. No. 37	128.065	420.160
Vandyke, Pa	P. R. R. No. C	129.729	425.619
Near Vandyke, Pa	P. R. R. No. 39	129.778	425.780
Tuscarora, Pa	P. R. R. No. 40	131.060	429.986
Mexico, Pa	P. R. R. No. 41	130.770	429.035
Near Port Royal, Pa	P. R. R. No. 42	131.874	432.657
Port Royal, Pa	P. R. R. No. 43	134.373	440.855
Near Mifflin, Pa	P. R. R. No. 45	134.866	442.473
Mifflin, Pa	P. R. R. No. 46	135.527	444.641
Near Mifflin, Pa	P. R. R. No. 47	136.216	446.902
Denholm, Pa	P. R. R. No. 49	138.272	453.647
Near Denholm, Pa	P. R. R. No. 50	141.902	465.557
Near Narrows Station, Pa.	P. R. R. No. 51	142.038	466.003
Do	P. R. R. No. 52	144.342	473.562
Bixler Water Station, Pa	P. R. R. No. 53	145.144	476.193
Lewistown Junction, Pa	P. R. R. No. 54	151.898	498.352
Mayes Bridge, Pa	P. R. R. No. 57	152.275	499.589
Granville, Pa	P. R. R. No. 58	150.492	493.739
Anderson, Pa	P. R. R. No. 59	150.217	492.837
Near Longfellow Station, Pa.	P. R. R. No. 61	151.548	497.204
Near Horingford Station, Pa.	P. R. R. No. 62	152.419	500.061
Do	P. R. R. No. 63	159.563	523.500
McVeytown, Pa	P. R. R. No. 64	160.154	525.439
Near McVeytown, Pa	P. R. R. No. 65	154.223	505.980
Do	P. R. R. No. 66	154.302	506.239
Near Ryde, Pa	P. R. R. No. 67	155.679	510.757
Ryde, Pa	P. R. R. No. 68	157.047	515.245
Near Ryde, Pa	P. R. R. No. 69	162.540	533.267
Manayunk Bridge, Pa	P. R. R. No. 70	164.085	538.336
Near Vineyard Station, Pa.	P. R. R. No. 71	171.622	563.063
Do	P. R. R. No. 72	178.175	584.562
Near Newton Hamilton, Pa.	P. R. R. No. 73	179.821	589.963
Newton Hamilton, Pa	P. R. R. No. 74	182.631	599.182
Near Mount Union, Pa	P. R. R. No. 75	183.346	601.528
Mount Union, Pa	P. R. R. No. 76	183.011	600.429
Near Mount Union, Pa	P. R. R. No. 77	177.558	582.538
Jackstown, Pa	P. R. R. No. 78	180.974	593.746
Mapleton, Pa	P. R. R. No. 79	181.968	597.007
Vandevanders Bridge, Pa.	P. R. R. No. 80	183.159	600.914
Bridgeport, Pa	P. R. R. No. 81	183.147	600.875
Mill Creek, Pa	P. R. R. No. 82	184.865	606.511
Do	P. R. R. No. 83	183.250	601.213
Near Mill Creek, Pa	P. R. R. No. 84	183.591	602.331
Ardenheim, Pa	P. R. R. No. 85	183.901	603.349
Near Ardenheim, Pa	P. R. R. No. 86	189.214	620.780
Huntingdon, Pa	P. R. R. No. 87	190.308	624.369
Do	P. R. R. No. 88	190.347	624.497
Near Warrior Ridge, Pa	P. R. R. No. D	203.654	668.155
Warrior Ridge, Pa	P. R. R. No. 90	205.906	675.543
Near Petersburg, Pa	P. R. R. No. 91	205.881	675.461
Petersburg, Pa	P. R. R. No. 92	207.457	680.632
Near Petersburg, Pa	P. R. R. No. 93	211.029	692.351
Do	P. R. R. No. 94	211.394	693.548
Do	P. R. R. No. 95	213.232	699.579
Near Barree, Pa	P. R. R. No. 96	219.554	720.320
Do	P. R. R. No. 97	222.166	728.890
Do	P. R. R. No. 98	231.355	759.037
Do	P. R. R. No. 99	231.934	760.937
Near Union Furnace, Pa	P. R. R. E	238.591	782.777
Do	P. R. R. No. 101	239.682	786.357
Union Furnace, Pa	P. R. R. No. 102	243.458	798.745
Near Union Furnace, Pa	P. R. R. No. 103	250.325	821.275
Shoenberger, Pa	P. R. R. No. 104	255.506	838.273
Near Birmingham, Pa	P. R. R. No. 105	261.502	857.944
Birmingham, Pa	P. R. R. No. 106	264.101	866.471
Near Birmingham, Pa	P. R. R. No. 107	270.599	887.790
Near Tyrone, Pa	P. R. R. No. 108	271.425	890.500
Tyrone, Pa	P. R. R. No. 109	273.040	895.799
Do	P. R. R. No. 110	277.554	910.608
Near Tyrone, Pa	P. R. R. No. 111	281.010	921.947
Do	P. R. R. No. 112	284.711	934.089
Near Grazierville, Pa	P. R. R. F	287.411	942.948
Do	P. R. R. No. 113	289.740	950.589
Tipton, Pa	P. R. R. No. 114	302.730	993.207
Near Fostoria, Pa	P. R. R. No. 115	313.163	1027.436
Bellwood, Pa	P. R. R. No. 116	323.708	1062.032
Near Bellwood, Pa	P. R. R. No. 117	322.525	1058.151
Elizabeth Furnace, Pa	P. R. R. No. 118	327.768	1075.352
Near Elizabeth Furnace, Pa.	P. R. R. No. 119	335.214	1099.781
Blair Furnace, Pa	P. R. R. No. 120	340.742	1117.918
Near Blair Furnace, Pa	P. R. R. No. 121	345.226	1132.629
Haggerty Run, Pa	P. R. R. No. 122	348.103	1142.068
Altoona, Pa	P. R. R. No. 123	353.939	1161.215
Do	P. R. R. No. 124	354.378	1162.655
Do	P. R. R. No. 125	356.612	1169.985
Do	P. R. R. No. 126	359.987	1181.057
Do	P. R. R. No. 127	363.263	1191.805
Kittanning Point, Pa	P. R. R. No. 2	495.655	1626.161
Allegrippus, Pa	P. R. R. No. 3	589.898	1935.357
Bennington, Pa	P. R. R. No. 4	618.930	2030.606
Allegheny Tunnel, Pa	P. R. R. No. 5	648.102	2126.315
Gallitzin, Pa	P. R. R. No. 6	659.761	2164.566
Cresson, Pa	P. R. R. No. 7	616.216	2021.702
Near Lilly, Pa	P. R. R. No. 8	594.462	1950.331
Lilly, Pa	P. R. R. No. 9	575.716	1888.828
Portage, Pa	P. R. R. No. 12	514.249	1687.165
Near Portage, Pa	P. R. R. No. 13	494.799	1623.353
Wilmore, Pa	P. R. R. No. 14	476.301	1562.664
Near Wilmore, Pa	P. R. R. No. 15	475.124	1558.803
Near Ehrenfeld, Pa	P. R. R. No. 16	476.209	1562.362
Ehrenfeld, Pa	P. R. R. No. 17	463.023	1519.101
Near Ehrenfeld, Pa	P. R. R. No. 18	452.296	1483.908
Conemaugh Viaduct, Pa	P. R. R. No. 20	444.274	1457.589
Mineral Point, Pa	P. R. R. No. 21	431.530	1415.778
Near Mineral Point, Pa	P. R. R. No. 22a	414.802	1360.896
Do	P. R. R. No. 23	404.332	1326.546
Near Conemaugh, Pa	P. R. R. No. 24	399.507	1310.716
Conemaugh, Pa	P. R. R. No. 26	373.930	1226.802
Woodvale, Pa	P. R. R. No. 27	361.262	1185.240
Johnstown, Pa	P. R. R. No. 28	361.969	1187.560
Do	P. R. R. No. 28a	359.735	1180.231
Near Sang Hollow, Pa	P. R. R. No. 30a	349.874	1147.878
Sang Hollow, Pa	P. R. R. No. 31	348.810	1144.387
Near Big Spring Run, Pa	P. R. R. No. 34	343.381	1126.576
Big Spring Run, Pa	P. R. R. No. 36	333.536	1094.276
Piney Run, Pa	P. R. R. No. 36a	332.703	1091.543
Near New Florence, Pa	P. R. R. No. 36b	329.386	1080.661
Do	P. R. R. No. 37	327.106	1073.180
New Florence, Pa	P. R. R. No. 37a	329.245	1080.198
Near Lockport, Pa	P. R. R. No. 40	317.751	1042.488
Do	P. R. R. No. 41	320.280	1050.785
Lockport, Pa	P. R. R. No. 42	321.508	1054.814
Bolivar Junction, Pa	P. R. R. No. 43	314.826	1032.892

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Bolivar Junction, Pa	P. R. R. No. 44	315.582	1035.372
Do	P. R. R. No. 44a	315.698	1035.753
Near Bolivar, Pa	P. R. R. No. 45	330.798	1085.293
Pack Saddle, Pa	P. R. R. No. 46	336.881	1105.250
Do	P. R. R. No. 46a	337.405	1106.970
Blairsville Intersection, Pa	P. R. R. No. 47	341.288	1119.709
Near Blairsville, Pa	P. R. R. No. 48	339.466	1113.731
Millwood, Pa	P. R. R. No. 51	355.262	1165.555
Near Millwood, Pa	P. R. R. No. 52	350.611	1150.296
Derry, Pa	P. R. R. No. 53	356.217	1168.689
Do	P. R. R. No. 54	360.292	1182.058
Bradenville, Pa	P. R. R. No. 56	331.011	1085.992
Do	P. R. R. No. 56a	330.740	1085.103
Loyalhanna, Pa	P. R. R. No. 57	316.777	1039.293
Latrobe, Pa	P. R. R. No. 58	307.375	1008.446
Do	P. R. R. No. 58a	301.386	988.797
Near Latrobe, Pa	P. R. R. No. 59	324.231	1063.748
Beatty, Pa	P. R. R. No. 60	328.328	1077.189
Carney, Pa	P. R. R. No. 61	351.442	1153.023
Near Carney, Pa	P. R. R. No. 62	368.678	1209.571
George, Pa	P. R. R. No. 63	365.552	1199.315
Greensburg, Pa	P. R. R. No. 65	330.973	1085.867
Do	P. R. R. No. 66	339.398	1113.508
Radebaugh, Pa	P. R. R. No. 67	354.194	1162.051
Do	P. R. R. No. 68	354.996	1164.683
Do	P. R. R. No. 68a	352.819	1157.540
Do	P. R. R. No. 69	349.637	1147.101
Do	P. R. R. No. 69a	347.717	1140.802
Near Grapeville, Pa	P. R. R. No. 70	336.238	1103.141
Grapeville, Pa	P. R. R. No. 71	322.953	1059.555
Penn, Pa	P. R. R. No. 72	296.750	973.587
Near Penn, Pa	P. R. R. No. 72a	299.889	983.886
Near Manor, Pa	P. R. R. No. 73	288.697	947.167
Irwin, Pa	P. R. R. No. 76a	267.951	879.103
Near Larimer, Pa	P. R. R. No. 77a	262.788	862.164
Ardara, Pa	P. R. R. No. 78	254.678	835.556
Moss Side, Pa	P. R. R. No. 81	232.626	763.207
Wall, Pa	P. R. R. No. 82	229.033	751.419
Turtle Creek, Pa	P. R. R. No. 84	228.351	749.182
Brinton, Pa	P. R. R. No. 85	229.254	752.144
Do	P. R. R. No. 86	230.629	756.655
Near West Penn Jct., Pa	P. R. R. No. 27	237.774	780.097
Near Bagdad, Pa	P. R. R. No. 28	236.351	775.428
Do	P. R. R. No. 29	239.089	784.411
Near Leechburg, Pa	P. R. R. No. 30	237.356	778.725
Leechburg, Pa	P. R. R. No. 31	240.505	789.057
Near Leechburg, Pa	P. R. R. No. 32	237.753	780.028
Near Hyde Park, Pa	P. R. R. No. 33	242.463	795.481
Near Vandergrift, Pa	P. R. R. No. 34	247.280	811.284
Vandergrift, Pa	P. R. R. No. 35	244.166	801.068
Near Vandergrift, Pa	P. R. R. No. 36	243.295	798.210
Near Paulton, Pa	P. R. R. No. 37	245.707	806.124
Do	P. R. R. No. 38	246.744	809.526
Do	P. R. R. No. 39	250.094	820.517
Near Roaring Run, Pa	P. R. R. No. 40	251.945	826.590
Do	P. R. R. No. 41	252.377	828.007
Near Salina, Pa	P. R. R. No. 42	254.507	834.995
Do	P. R. R. No. 43	253.066	830.267
Do	P. R. R. No. 44	257.486	844.769
Do	P. R. R. No. 45	257.285	844.109
Near Edri, Pa	P. R. R. No. 46	256.322	840.950
Do	P. R. R. No. 47	254.366	834.532
Do	P. R. R. No. 48	256.492	841.507
Near Saltsburg, Pa	P. R. R. No. 49	256.297	840.868
Saltsburg, Pa	P. R. R. No. 50	260.772	855.549
Near White Rock, Pa	P. R. R. No. 51	265.849	872.206
Near Tunnelton, Pa	P. R. R. No. 52	264.283	867.068
Near Bow, Pa	P. R. R. No. 53	274.734	901.356
Do	P. R. R. No. 54	275.603	904.207
Near Livermore, Pa	P. R. R. No. 55	281.306	922.918
Do	P. R. R. No. 56	284.526	933.482
Near Social Hall, Pa	P. R. R. No. 57	293.363	962.475
Social Hall, Pa	P. R. R. No. 58	293.888	964.198
Near Blairsville, Pa	P. R. R. No. 59	304.606	999.362
Blairsville, Pa	P. R. R. No. 60	308.425	1011.891
Near Blairsville, Pa	P. R. R. No. 61	298.420	979.066
Do	P. R. R. No. 62	294.940	967.648
Near Bolivar Junction, Pa	P. R. R. No. 63	305.896	1003.594
Near Hecks, Pa	P. R. R. No. 1	105.520	346.194
Hecks, Pa	P. R. R. No. 1a	106.038	347.893
Near Dauphin, Pa	P. R. R. No. 2	105.668	346.679
Do	P. R. R. No. 3	106.376	349.002
Do	P. R. R. No. 4	105.931	347.542
Near Geiger Point, Pa	P. R. R. No. 5	106.808	350.715
Near Clarks Ferry, Pa	P. R. R. No. 6	106.478	349.337
Do	P. R. R. No. 7	107.402	352.368
Do	P. R. R. No. 8	111.185	364.779
Do	P. R. R. No. 9	111.469	365.711
Do	P. R. R. No. 10	113.170	371.292
Do	P. R. R. No. 11	111.628	366.233
Do	P. R. R. No. 12	112.537	369.215
Near Inglenook, Pa	P. R. R. No. 12a	113.806	373.379
Near Halifax, Pa	P. R. R. No. 13	113.956	373.871
Do	P. R. R. No. 14	115.087	377.581
Do	P. R. R. No. 15	114.771	376.545
Do	P. R. R. No. 16	115.539	379.064
Do	P. R. R. No. 17	115.153	377.798
Do	P. R. R. No. 18	114.635	376.098
Do	P. R. R. No. 19	118.519	388.841
Near Millersburg, Pa	P. R. R. No. 20	120.239	394.484
Do	P. R. R. No. 21	119.164	390.957
Do	P. R. R. No. 22	120.386	394.966
Near Liverpool, Pa	P. R. R. No. 23	121.509	398.651
Liverpool, Pa	P. R. R. No. 24	120.680	395.931
Near Liverpool, Pa	P. R. R. No. 25	121.196	397.624
Do	P. R. R. No. 26	122.480	401.836
Do	P. R. R. No. 26a	122.895	403.198
Mahantongo, Pa	P. R. R. No. 27	122.398	401.567
Near Mahantongo, Pa	P. R. R. No. 28	122.567	402.122
Near Georgetown, Pa	P. R. R. No. 29	123.829	406.262
Do	P. R. R. No. 30	125.887	413.014
Do	P. R. R. No. 31	126.649	415.514
Do	P. R. R. No. 32	125.187	410.718
Do	P. R. R. No. 32a	126.385	414.648
Do	P. R. R. No. 33	126.693	415.659
Do	P. R. R. No. 34	127.398	417.972
Near Herndon, Pa	P. R. R. No. 35	127.993	419.924
Do	P. R. R. No. 36	127.929	419.714
Do	P. R. R. No. 36a	127.835	419.405
Herndon, Pa	P. R. R. No. 37	130.384	427.768
Near Herndon, Pa	P. R. R. No. 38	129.385	424.491
Do	P. R. R. No. 39	131.418	431.161
Do	P. R. R. No. 40	131.517	431.485
Fishers Ferry, Pa	P. R. R. No. 41	131.517	431.485
Near Selinsgrove Jct., Pa	P. R. R. No. 42	133.109	436.708
Do	P. R. R. No. 43	133.268	437.230
Selinsgrove Junction, Pa	P. R. R. No. 44	132.079	433.329
Near Selinsgrove Jct., Pa	P. R. R. No. 45	132.946	436.174
Do	P. R. R. No. 46	134.440	441.075
Near Sunbury, Pa	P. R. R. No. 47	134.687	441.886
Do	P. R. R. No. 48	134.234	440.399
Sunbury, Pa	P. R. R. No. 49	134.496	441.259
Do	P. R. R. No. 50	135.545	444.701
Near Sunbury, Pa	P. R. R. No. 1	135.475	444.471
Do	P. R. R. No. 2	135.469	444.451
Near Northumberland, Pa	P. R. R. No. 3	137.737	451.892
Do	P. R. R. No. 4	137.567	451.334
Do	P. R. R. No. 5	138.244	453.556
Do	P. R. R. No. 6	137.672	451.679
Do	P. R. R. No. 7	137.251	450.298
Near Kapps, Pa	P. R. R. No. 8	138.559	454.589
Do	P. R. R. No. 9	139.157	456.551
Do	P. R. R. No. 10	137.231	450.232
Near Montandon, Pa	P. R. R. No. 11	137.570	451.344
Do	P. R. R. No. 12	137.970	452.657
Montandon, Pa	P. R. R. No. 13	139.916	459.041
Near Montandon, Pa	P. R. R. No. 14	141.108	462.952
Do	P. R. R. No. 15	142.239	466.662
Near Dougal, Pa	P. R. R. No. 16	142.721	468.244
Milton, Pa	P. R. R. No. 17	145.182	476.318
Near Milton, Pa	P. R. R. No. 18	144.274	473.339
Do	P. R. R. No. 19	142.799	468.500
Near Watsontown, Pa	P. R. R. No. 20	143.236	469.933
Do	P. R. R. No. 21	143.614	471.174
Watsontown, Pa	P. R. R. No. 22	148.150	486.055
Do	P. R. R. No. 23	147.678	484.507
Near Watsontown, Pa	P. R. R. No. 24	147.078	482.538
Near Dewart, Pa	P. R. R. No. 25	147.304	483.280
Do	P. R. R. No. 26	149.509	490.514
Near Montgomery, Pa	P. R. R. No. 27	148.452	487.046
Do	P. R. R. No. 28	149.190	489.468
Do	P. R. R. No. 29	147.538	484.048
Montgomery, Pa	P. R. R. No. 30	150.565	493.979
Do	P. R. R. No. 31	149.859	491.662
Near Montgomery, Pa	P. R. R. No. 32	152.810	501.344
Near Muncy, Pa	P. R. R. No. 33	153.941	505.055
Do	P. R. R. No. 34	156.106	512.158
Do	P. R. R. No. 35	156.552	513.621
Do	P. R. R. No. 36	155.952	511.653
Do	P. R. R. No. 37	157.227	515.836
Near Loyalsock, Pa	P. R. R. No. 38	157.614	517.105
Do	P. R. R. No. 39	158.042	518.509
Do	P. R. R. No. 40	157.353	516.249
Do	P. R. R. No. 41	158.052	518.542
Do	P. R. R. No. 42	158.208	519.054
Near Williamsport, Pa	P. R. R. No. 43	156.983	515.035
Do	P. R. R. No. 44	159.321	522.706
Do	P. R. R. No. 45	160.044	525.078
Williamsport, Pa	P. R. R. No. 45a	159.252	522.479
Do	P. R. R. No. 46	160.079	525.193
Do	P. R. R. No. 46a	161.009	528.244
Do	P. R. R. No. 47	161.088	528.503
Washington, D. C	P. R. R. No. 139A	3.242	10.636
Do	B. & O. No. 2	12.572	41.247
Eckington, D. C	B. & O. No. 3	29.104	95.485
Near Brookland, D. C	B. & O. No. 3A	32.750	107.447

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Brookland, D. C.	B. & O. No. 4	39.366	129.153
Near Brookland, D. C.	B. & O. No. 5	48.972	160.669
Stotts, D. C.	B. & O. No. 6	62.378	204.652
Near Takoma Park, D. C.	B. & O. No. 7	81.359	266.925
Near Silver Spring, Md.	B. & O. No. 8	99.844	327.572
Near Woodside, Md.	B. & O. No. 9	98.563	323.369
Near Linden, Md.	B. & O. No. 10	97.586	320.163
Near Capitol View, Md.	B. & O. No. 11	94.386	309.665
Kensington, Md.	B. & O. No. 12	91.655	300.705
Near Garrett Park, Md.	B. & O. No. 13	87.028	285.524
Near Windham, Md.	B. & O. No. 14	96.992	318.215
Near Halpine, Md.	B. & O. No. 15	113.603	372.713
Do	B. & O. No. 16	120.042	393.838
Near Rockville, Md.	B. & O. No. 17	128.530	421.686
Near Westmore, Md.	B. & O. No. 18	134.806	442.276
Do	B. & O. No. 19	139.375	457.266
Derwood, Md.	B. & O. No. 20	144.952	475.563
Near Washington Grove, Md.	B. & O. No. 21	151.534	497.158
Near Gaithersburg, Md.	B. & O. No. 22	158.138	518.824
Near Ward, Md.	B. & O. No. 23	149.556	490.668
Do	B. & O. No. 24	136.020	446.259
Near Clopper, Md.	B. & O. No. 25	123.253	404.373
Waring, Md.	B. & O. No. 26	111.074	364.415
Near Germantown, Md.	B. & O. No. 27	121.889	399.897
Do	B. & O. No. 28	134.762	442.132
Near Darby, Md.	B. & O. No. 29	128.801	422.575
Near Boyd, Md.	B. & O. No. 30	127.122	417.066
Near Buck Lodge, Md.	B. & O. No. 31	131.629	431.853
Do	B. & O. No. 32	134.603	441.610
Near Barnesville, Md.	B. & O. No. 33	150.855	494.930
Do	B. & O. No. 34	155.125	508.939
Do	B. & O. No. 35	138.022	452.827
Near Dickerson, Md.	B. & O. No. 36	120.990	396.948
Do	B. & O. No. 37	104.948	344.317
Do	B. & O. No. 38	86.700	284.448
Near Tuscarora, Md.	B. & O. No. 39	77.678	254.849
Do	B. & O. No. 40A	68.913	226.092
Do	B. & O. No. 41	69.112	226.745
Do	B. & O. No. 42	69.137	226.827
Near Washington Jct., Md.	B. & O. No. 43	71.356	234.107
Washington Jct., Md.*	B. & O. No. 44A	71.066	233.156
Near Catoctin, Md.	B. & O. No. 45	72.621	238.257
Catoctin, Md.	B. & O. No. 46	72.868	239.068
Near Catoctin, Md.	B. & O. No. 47	73.958	242.644
Do	B. & O. No. 48	74.896	245.721
Near Brunswick, Md.	B. & O. No. 49	75.452	247.545
Do	B. & O. No. 50	75.503	247.713
Do	B. & O. No. 51	76.330	250.426
Near Knoxville, Md.	B. & O. No. 52	79.105	259.530
Knoxville, Md.	B. & O. No. 53	78.652	258.044
Near Weverton, Md.	B. & O. No. 54	78.665	258.087
Do	B. & O. No. 55	80.261	263.323
Do	B. & O. No. 56	85.426	280.268
Harpers Ferry, W. Va.	B. & O. No. 56A	87.000	285.432
Near Harpers Ferry, W. Va.	B. & O. No. 57	88.641	290.816
Near Engle, W. Va.	B. & O. No. 58	94.470	309.940
Do	B. & O. No. 59	108.127	354.747
Do	B. & O. No. 60	117.818	386.541
Do	B. & O. No. 61	125.342	411.226
Near Duffields, W. Va.	B. & O. No. 62	134.385	440.895
Duffields, W. Va.	B. & O. No. 63	147.606	484.271
Near Shenandoah Junction, W. Va.	B. & O. No. 64	161.738	530.635
Do	B. & O. No. 65	170.787	560.324
Near Hobbs, W. Va.	B. & O. No. 66	177.982	583.929
Near Kerneysville, W. Va.	B. & O. No. 67	172.034	564.415
Do	B. & O. No. 68	161.044	528.359
Near Van Clevesville, W. Va.	B. & O. No. 69	151.652	497.545
Do	B. & O. No. 70	145.721	478.086
Do	B. & O. No. 71	137.343	450.599
Do	B. & O. No. 72	123.119	403.933
Near Opequon, W. Va.	B. & O. No. 73	117.062	384.061
Near Martinsburg, W. Va.	B. & O. No. 74	121.717	399.333
Do	B. & O. No. 75	131.952	432.913
Do	B. & O. No. 76	143.153	469.661
Do	B. & O. No. 77	149.431	490.258
Near Tabb, W. Va.	B. & O. No. 78	160.654	527.079
Do	B. & O. No. 79	159.300	522.637
Do	B. & O. No. 80	157.918	518.103
Near N. Mountain, W. Va.	B. & O. No. 81	154.515	506.938
Do	B. & O. No. 82	160.903	527.896
Do	B. & O. No. 83	161.078	528.470
Do	B. & O. No. 84	153.655	504.116
Near Back Creek, W. Va.	B. & O. No. 85	140.769	461.840
Do	B. & O. No. 86	129.967	426.400
Near Cherry Run, W. Va.	B. & O. No. 87	119.371	391.636
Do	B. & O. No. 88	117.298	384.835
Do	B. & O. No. 89	120.883	396.597
Near Miller, W. Va.	B. & O. No. 90	123.242	404.336
Do	B. & O. No. 91	120.793	396.302
Near Sleepy Creek, W. Va.	B. & O. No. 92	121.672	399.186
Sleepy Creek, W. Va.	B. & O. No. 92A	120.567	395.560
Near Sleepy Creek, W. Va.	B. & O. No. 93	122.301	401.249
Do	B. & O. No. 94	123.683	405.783
Do	B. & O. No. 95	124.038	406.948
Near Hancock, W. Va.	B. & O. No. 96	123.462	405.058
Do	B. & O. No. 97	124.688	409.081
Hancock, W. Va.	B. & O. No. 97A	127.220	417.388
Near Hancock, W. Va.	B. & O. No. 98	127.634	418.746
Do	B. & O. No. 99	127.168	417.217
Near Round Top, W. Va.	B. & O. No. 100	126.676	415.603
Round Top, W. Va.	B. & O. No. 101	130.037	426.630
Near Round Top, W. Va.	B. & O. No. 102	129.958	426.371
Near Sir Johns Run, W. Va.	B. & O. No. 103	129.523	424.943
Do	B. & O. No. 104	130.058	426.699
Do	B. & O. No. 105	130.028	426.600
Near Great Cacapon, W. Va.	B. & O. No. 106	132.995	436.334
Do	B. & O. No. 107	132.775	435.613
Do	B. & O. No. 108	138.068	452.978
Near Woodmont, W. Va.	B. & O. No. 109	137.293	450.435
Near Lineburg, W. Va.	B. & O. No. 110	138.431	454.169
Do	B. & O. No. 111	139.664	458.214
Do	B. & O. No. 112	142.869	468.729
Near Orleans Road, W. Va.	B. & O. No. 113	148.697	487.850
Do	B. & O. No. 114	153.704	504.277
Near Rockwells Run, W. Va.	B. & O. No. 115	159.412	523.004
Doe Gully, W. Va.	B. & O. No. 116	166.620	546.652
Near Doe Gully, W. Va.	B. & O. No. 117	165.829	544.057
Near Hansrotte, W. Va.	B. & O. No. 118	158.638	520.465
Do	B. & O. No. 119	150.638	494.218
Do	B. & O. No. 120	151.756	497.886
Near Baird, W. Va.	B. & O. No. 121	151.682	497.643
Do	B. & O. No. 122	149.320	489.894
Near Magnolia, W. Va.	B. & O. No. 123	150.594	494.074
Do	B. & O. No. 124	151.678	497.630
Do	B. & O. No. 125	153.033	502.076
Do	B. & O. No. 126	155.912	511.521
Near Paw Paw, W. Va.	B. & O. No. 127	157.346	516.226
Do	B. & O. No. 128	160.524	526.652
Do	B. & O. No. 129	162.784	534.067
Do	B. & O. No. 130	162.176	532.072
Near Little Cacapon, W. Va.	B. & O. No. 131	161.194	528.851
Do	B. & O. No. 132	160.952	528.057
Near Okonoko, W. Va.	B. & O. No. 133	162.909	534.477
Do	B. & O. No. 134	164.095	538.368
Do	B. & O. No. 135	163.703	537.082
Near French, W. Va.	B. & O. No. 136	164.832	540.786
Do	B. & O. No. 137	168.861	554.005
Do	B. & O. No. 138	169.536	556.219
Near Green Spring, W. Va.	B. & O. No. 139	168.230	551.935
Do	B. & O. No. 140	170.456	559.238
Do	B. & O. No. 141	171.321	562.076
Do	B. & O. No. 142	170.590	559.677
Near Dans Run, W. Va.	B. & O. No. 143	172.167	564.851
Do	B. & O. No. 144	172.480	565.878
Near Patterson Creek Cut-off, W. Va.	B. & O. No. 145	172.997	567.574
Patterson Creek Cut-off, W. Va.	B. & O. No. 145A	173.412	568.936
Do	574 Patterson Creek	174.896	573.805
Near Patterson Creek, W. Va.	B. & O. No. 146	175.310	575.163
Near North Branch, Md.	B. & O. No. 147	182.364	598.306
North Branch, Md.	B. & O. No. 147A	183.647	602.515
Near North Branch, Md.	B. & O. No. 148	190.554	625.176
Do	B. & O. No. 149	194.175	637.056
Near Evitts Creek, Md.	B. & O. No. 150	191.850	629.428
Do	B. & O. No. 151	194.595	638.434
Near Cumberland, Md.	B. & O. No. 152	197.550	648.129
Cumberland, Md.	B. & O. No. 153	192.817	632.600
Do	B. & O. No. 153A	195.000	639.762
Do	B. & O. No. 154	196.395	644.339
Near Cumberland, Md.	B. & O. No. 155	199.166	653.430
Do	B. & O. No. 156	200.010	656.199
Near Mount Savage Junction, Md.	B. & O. No. 157	207.712	681.468
Mount Savage Jct., Md.	B. & O. No. 158	216.543	710.441
Ellerslie, Md.	B. & O. No. 160A	221.886	727.971
Near Ellerslie, Md.	B. & O. No. 160B	225.977	741.393
Near Cooks Mills, Pa.	B. & O. No. 161A	228.373	749.254
Do	B. & O. No. 163A	237.552	779.369
Do	B. & O. No. 165A	256.497	841.524
Near Hyndman, Pa.	B. & O. No. 167A	275.471	903.774
Do	P. R. R. No. 5	288.123	945.284
Do	B. & O. No. 168A	291.983	957.948
Near Hoblitzell, Pa.	B. & O. No. 170	333.644	1094.630
Do	B. & O. No. 171	359.612	1179.827
Williams, Pa.	B. & O. No. 172	382.198	1253.928
Near Fairhope, Pa.	B. & O. No. 173	405.420	1330.115
Do	B. & O. No. 174	427.150	1401.408
Do	B. & O. No. 174A	440.047	1443.721
Near Foley, Pa.	B. & O. No. 175	457.038	1499.465
Foley, Pa.	B. & O. No. 176	465.151	1526.083

* Called Point of Rocks in the description of the bench mark, p. 730, Appendix No. 3, Report for 1903.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Valley Falls, W. Va.	986 Pittsburgh	300.243	985.047
Near Powells, W. Va.	899 Pittsburgh	273.861	898.492
Bentons Ferry, W. Va.	885 Pittsburgh	269.610	884.545
Near Fairmont, W. Va.	885 Pittsburgh	269.600	884.513
Near Catawba, W. Va.	873 Pittsburgh	265.818	872.105
Near Little Falls, W. Va.	859 Pittsburgh	261.636	858.384
Uffington, W. Va.	828 Pittsburgh	252.208	827.452
Morgantown, W. Va.	821 Pittsburgh	250.075	820.454
Do	U. S. E	250.072	820.445
Near Van Vorhis, W. Va.	815 Pittsburgh	248.359	814.824
Near Point Marion, Pa.	813 Pittsburgh	247.659	812.528
Near Outcrop, Pa.	1084 Pittsburgh	330.254	1083.508
Fairchance, Pa.	1065 Pittsburgh	324.576	1064.880
Uniontown, Pa.	999 Pittsburgh	304.361	998.558
Near Upper Middletown, Pa.	920 Pittsburgh	280.249	919.450
Near Tippecanoe, Pa.	868 Pittsburgh	264.335	867.239
Near West Brownsville Junction, Pa.	778 Pittsburgh	236.945	777.377
Do	P. R. R. No. 54	236.944	777.374
Near Woods Run, Pa.	764 Pittsburgh	233.192	765.064
Near Charleroi, Pa.	760 Pittsburgh	230.913	757.587
Lock No. 4, Pa.	Lock No. 4	226.626	743.522
Baird, Pa.	755 Pittsburgh	230.075	754.838
Near River View, Pa.	753 Pittsburgh	229.511	752.987
Near Peters Creek, Pa.	740 Pittsburgh	225.368	739.395
Near Coal Valley, Pa.	P. R. R. No. 19	224.412	736.258
Near Thomson, Pa.	767 Pittsburgh	233.741	766.865
Do	P. R. R. No. 11	232.820	763.844
Near Bessemer, Pa.	760 Pittsburgh	231.491	759.483
Braddock, Pa.	P. R. R. No. 88	252.600	828.738
Homewood, Pa.	P. R. R. No. 92	281.443	923.368
Near Benvenue, Pa.	818 Pittsburgh	249.383	818.184
Solomon, Kans.	C_1	358.367	1175.743
New Cambria, Kans.	D_1	365.718	1199.860
Near New Cambria, Kans.	E_1	365.374	1198.731
Do	Salina East Base	365.766	1200.017
Near Salina, Kans.	Salina West Base	371.859	1220.008
Salina, Kans.	F_1	373.230	1224.506
Do	G_1	373.633	1225.828
Do	H_1	373.677	1225.972
Mentor, Kans.	A_4	385.707	1265.440
Assaria, Kans.	B_4	390.788	1282.110
Bridgeport, Kans.	C_4	396.694	1301.487
Lindsborg, Kans.	D_4	407.252	1336.126
Johnstown, Kans.	E_4	424.336	1392.176
Hilton, Kans.	F_4	462.837	1518.491
McPherson, Kans.	G_4	455.922	1495.804
Do	H_4	456.260	1496.913
Near McPherson, Kans.	I_4	453.922	1489.242
Groveland, Kans.	J_4	451.762	1482.155
Inman, Kans.	K_4	462.868	1518.593
Medora, Kans.	L_4	450.207	1477.054
Near Hutchinson, Kans.	M_4	467.712	1534.485
Hutchinson, Kans.	N_4	467.085	1532.428
Do	O_4	466.143	1529.338
Fernie, Kans.	P_4	471.833	1548.005
Darlow, Kans.	Q_4	474.497	1556.745
Castleton, Kans.	R_4	446.851	1466.044
Pretty Prairie, Kans.	S_4	480.015	1574.849
Near Pretty Prairie, Kans.	T_4	481.112	1578.448
Varner, Kans.	U_4	463.273	1519.922
Lashmet, Kans.	V_4	460.876	1512.057
Kingman, Kans.	W_4	460.292	1510.142
Near Kingman, Kans.	X_4	505.041	1656.955
Carvel, Kans.	Y_4	496.374	1628.520
Basil, Kans.	Z_4	487.358	1598.940
Rago, Kans.	A_5	440.972	1446.756
Duquoin, Kans.	B_5	482.808	1584.013
Harper, Kans.	C_5	433.328	1421.677
Ascot, Kans.	D_5	432.739	1419.744
Anthony, Kans.	E_5	422.191	1385.139
Near Anthony, Kans.	Anthony SE. Base	419.544	1376.453
Do	Anthony NW. Base	425.248	1395.168
Anthony, Kans.	F_5	409.712	1344.197
Bowie, Tex.	1124 GAINV	342.556	1123.869
Do	A	329.258	1080.241
Do	B	349.050	1145.175
Near Bowie, Tex.	C	289.773	950.697
Near Bellevue, Tex.	Bowie NW. Base	327.377	1074.069
Do	Bowie SE. Base	333.315	1093.551
Near Bowie, Tex.	989 GAINV	301.557	989.358
Do	D	292.569	959.870
Stoneburg, Tex.	E	285.030	935.136
Do	936 GAINV	285.363	936.228
Near Stoneburg, Tex.	876 GAINV	267.014	876.028
Near Ringgold, Tex.	F	268.794	881.868
Do	897 GAINV	273.242	896.461
Ringgold, Tex.	894 GAINV	272.604	894.368
Near Terral, Okla.	G	248.582	815.556
Do	809 Terral	246.635	809.108
Terral, Okla.	A	258.112	846.822
Near Terral, Okla.	B	253.300	831.035
Near Ryan, Okla.	827 Ryan	252.230	827.525
Do	C	252.070	827.000
Near Sugden, Okla.	Geol. Sugden	257.392	844.460
Do	844 Sugden	257.359	844.352
Sugden, Okla.	D	258.411	847.803
Near Sugden, Okla.	875 Boundary	266.666	874.887
Near Addington, Okla.	883 Addington	269.323	883.614
Do	E	277.359	909.969
Addington, Okla.	918 Addington	279.793	917.954
Near Addington, Okla.	F	283.617	930.500
Near Comanche, Okla.	G	295.002	967.852
Comanche, Okla.	H	300.770	986.776
Near Comanche, Okla.	I	309.852	1016.573
Near Duncan, Okla.	1104 Boundary	336.525	1104.083
Do	Duncan △	373.193	1224.384
Do	Check B. M.	373.166	1224.295
Duncan, Okla.	J	343.344	1126.455
Near Duncan, Okla.	1127 Duncan	343.705	1127.639
Near Marlow, Okla.	K	395.646	1298.049
Marlow, Okla.	L	400.462	1313.849
Do	Marlow Long. Sta.	400.030	1312.432
Near Marlow, Okla.	1331 Marlow	405.991	1331.989
Do	M	386.784	1268.974
Rush Springs, Okla.	N	393.835	1292.107
Do	1349 Rush Springs	411.451	1349.902
Near Rush Springs, Okla.	1292 Rush Springs	393.955	1292.501
Near Ninnekah, Okla.	T. B. M. 95	383.518	1258.258
Do	O	373.390	1225.030
Do	P	328.094	1076.422
Near Chickasha, Okla.	1084 Chickasha	330.658	1084.833
Chickasha, Okla.	1091 Chickasha	332.745	1091.681
Do	Q	333.064	1092.728
Near Chickasha, Okla.	R	332.243	1090.034
Do	1105 Boundary	336.967	1105.532
Do	S	331.956	1089.092
Do	T. B. M. 114	335.701	1101.379
Near Minco, Okla.	Carson △	435.699	1429.455
Do	1284 Minco	391.626	1284.860
Minco, Okla.	T	395.329	1297.009
Do	U	396.502	1300.857
Near Union, Okla.	1266.5 Union	386.419	1267.776
Union, Okla.	A	406.872	1334.879
Near El Reno, Okla.	El Reno East Base	440.047	1443.721
Do	El Reno West Base	466.784	1531.441
El Reno, Okla.	T. B. M. 142	416.176	1365.404
Do	B	414.586	1360.188
Do	1357 El Reno	414.207	1358.944
Do	City El Reno	413.794	1357.589
Reno Junction, Okla.	1327 Reno Junction	405.061	1328.938
Darlington, Okla.	C	407.346	1336.434
Near Caddo, Okla.	T. B. M. 148	416.406	1366.158
Okarche, Okla.	D	377.736	1239.289
Kingfisher, Okla.	E	320.963	1053.026
Do	F	322.287	1057.370
Do	G	321.988	1056.389
Dover, Okla.	H	315.136	1033.909
Hennessey, Okla.	I	354.238	1162.196
Do	J	354.361	1162.600
Bison, Okla.	K	378.003	1240.164
Waukomis, Okla.	L	385.323	1264.180
Near Waukomis, Okla.	Waukomis △	388.723	1275.335
Do	Waukomis E	384.606	1261.828
Enid, Okla.	M	377.171	1237.436
Do	N	380.141	1247.179
North Enid, Okla.	O	380.978	1249.926
Near North Enid, Okla.	Enid △	385.073	1263.360
Kremlin, Okla.	P	341.666	1120.949
Pond Creek, Okla.	Q	320.157	1050.382
Near Jefferson, Okla.	R	319.400	1047.898
Medford, Okla.	S	331.399	1087.265
Do	T	335.071	1099.312
Do	U	335.026	1099.164
Clyde, Okla.	V	339.319	1113.249
Wakita, Okla.	W	360.263	1181.963
Gibbon, Okla.	X	360.596	1183.056
Manchester, Okla.	Y	392.742	1288.521
Spring, Kans.	G_5	416.840	1367.583
Forth Worth, Tex.	V	188.749	619.254
Handley, Tex.	W	176.294	578.391
Arlington, Tex.	X	188.347	617.935
Grand Prairie, Tex.	Y	159.939	524.733
Eagle Ford, Tex.	Z	134.392	440.918
Dallas, Tex.	A_2	132.274	433.969
Do	B_2	136.402	447.512
Do	C_2	132.761	435.567
Fisher, Tex.	D_2	161.096	528.529
Garland, Tex.	E_2	167.923	550.927
Rowlett, Tex.	F_2	153.872	504.828
Rockwall, Tex.	G_2	181.536	595.589
Fate, Tex.	H_2	180.064	590.760
Royse, Tex	I_2	170.848	560.524
Caddo Mills, Tex	J_2	161.684	530.458
Greenville, Tex.	K_2	164.876	540.931

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Greenville, Tex	L_2	168.928	554.225
Do	M_2	167.143	548.368
Near Greenville, Tex	N_2	173.272	568.477
Campbell, Tex	O_2	178.531	585.730
Cumby, Tex	P_2	197.849	649.110
Brashear, Tex	Q_2	156.974	515.006
Sulphur Springs, Tex	R_2	153.502	503.614
Como, Tex	S_2	162.234	532.263
Pickton, Tex	T_2	163.639	536.872
Winnsboro, Tex	U_2	162.575	533.382
Scroggins, Tex	V_2	108.462	355.846
Near Leesburg, Tex	W_2	119.135	390.862
Near Pittsburg, Tex	X_2	117.822	386.554
Pittsburg, Tex	Y_2	121.279	397.897
Cason, Tex	Z_2	99.377	326.039
Daingerfield, Tex	A_3	122.766	402.775
Hughes, Tex	B_3	115.273	378.192
Avinger, Tex	C_3	120.456	395.196
Near Avinger, Tex	D_3	121.790	399.572
Lasater, Tex	E_3	101.994	334.626
Kellyville, Tex	F_3	89.432	293.411
Jefferson, Tex	G_3	57.743	189.445
Norwood, Tex	I_3	63.097	207.010
Karnack, Tex	J_3	70.484	231.247
Blocker, Tex	K_3	80.730	264.862
Waskom, Tex	L_3	91.211	299.248
Greenwood, La	C	66.948	219.646
Nichols, La	D	83.931	275.364
Jewella, La	E	74.466	244.311
Shreveport, La	F	57.616	189.028
Do	G	62.269	204.294
Do	H	55.421	181.827
Do	I	55.991	183.697
Solomon, Kans	W_2	355.930	1167.747
Do	X_2	*357.327	1172.330
Abilene, Kans	B_1	352.740	1157.281
Do	Z_2	352.780	1157.412
Do	Y_2	350.467	1149.824
Talmage, Kans	A_3	369.191	1211.254
Manchester, Kans	B_3	394.628	1294.708
Longford, Kans	C_3	400.725	1314.712
Oak Hill, Kans	D_3	386.823	1269.102
Catlin, Kans	E_3	404.735	1327.868
Miltonvale, Kans	F_3	419.486	1376.264
Sulphur Springs, Kans	G_3	479.582	1573.428
Aurora, Kans	H_3	451.579	1481.555
Huscher, Kans	I_3	446.728	1465.640
Concordia, Kans	J_3	422.358	1385.686
Do	City	419.286	1375.607
Do	K_3	416.873	1367.690
Hannum, Kans	L_3	415.447	1363.012
Oneonta, Kans	M_3	425.777	1396.903
Kackley, Kans	N_3	461.341	1513.583
Courtland, Kans	O_3	457.387	1500.611
Lovewell, Kans	P_3	470.953	1545.119
Webber, Kans	Q_3	508.308	1667.673
Near Superior, Nebr	R_3	472.510	1550.227
Superior, Nebr	B	479.614	1573.534
Near Superior, Nebr	Superior 2	476.432	1563.095
Bostwick, Nebr	C	488.780	1603.606
Guide Rock, Nebr	D	507.298	1664.360
Amboy, Nebr	E	515.319	1690.676
Cowles, Nebr	F	546.352	1792.491
Near Blue Hill, Nebr	G	593.832	1948.264
Do	Blue Hill △	621.968	2040.574
Blue Hill, Nebr	H	600.833	1971.233
Ayr, Nebr	I	560.076	1837.516
Brickton, Nebr	J	557.550	1829.228
Hastings, Nebr	K	588.426	1930.528
Do	Bank	588.534	1930.882
Do	Tower	588.876	1932.004
Hansen, Nebr	L	591.904	1941.938
Doniphan, Nebr	M	592.675	1944.468
Rivers, Nebr	N	570.940	1873.159
Near Grand Island, Nebr	O	572.065	1876.850
Grand Island, Nebr	P	568.095	1863.825
Do	Q	565.625	1855.721
Near Grand Island, Nebr	R	579.427	1901.003
Near Alda, Nebr	S	590.752	1938.158
Wood River, Nebr	T	599.017	1965.275
Shelton, Nebr	Shelton East Base	615.554	2019.530
Lockwood, Nebr	U	549.702	1803.480
Chapman, Nebr	V	539.556	1770.193
Paddock, Nebr	W	524.656	1721.309
Central City, Nebr	X	518.579	1701.372
Thummel, Nebr	Y	505.386	1658.087
Clarks, Nebr	Z	495.416	1625.378
Havens, Nebr	A_1	482.808	1584.013
Silver Creek, Nebr	B_1	471.571	1547.145
Duncan, Nebr	C_1	454.792	1492.097
Near Columbus, Nebr	Columbus 2	443.044	1453.553
Do	Columbus 3	439.678	1442.511
Columbus, Nebr	D_1	†440.805	1446.207
Do	E_1	441.242	1447.642
Near Columbus, Nebr	F_1	445.953	1463.098
Oconee, Nebr	G_1	‡454.949	1492.612
Platte Center, Nebr	H_1	468.527	1537.159
Tarnov, Nebr	I_1	495.047	1624.167
Humphrey, Nebr	J_1	515.926	1692.668
Near Madison, Nebr	K_1	494.637	1622.822
Madison, Nebr	L_1	484.567	1589.784
Near Madison, Nebr	M_1	517.150	1696.683
Near Norfolk, Nebr	N_1	463.756	1521.506
Norfolk, Nebr	O_1	464.912	1525.298
Do	P_1	464.148	1522.792
Near Norfolk, Nebr	Norfolk 3	461.820	1515.154
Hope, Nebr	Q_1	473.437	1553.268
Hoskins, Nebr	R_1	507.928	1666.427
Apex, Nebr	S_1	543.892	1784.419
Winside, Nebr	T_1	476.528	1563.409
Wayne, Nebr	U_1	444.490	1458.298
Wakefield, Nebr	V_1	430.746	1413.206
Ridge, Nebr	W_1	462.700	1518.042
Emerson, Nebr	X_1	434.377	1425.118
Nacora, Nebr	Y_1	428.924	1407.228
Hubbard, Nebr	Z_1	352.369	1156.064
Coburn, Nebr	A_2	336.189	1102.980
Dakota City, Nebr	M. R. C. Dakota City	334.496	1097.426
South Sioux City, Nebr	B_2	335.865	1101.917
Sioux City, Iowa	P. B. M. 395 Gauge B. M.	.....	.....
	Top of cap	333.475	1094.076
Do	P. B. M. 396—$\frac{1}{32}$	337.176	1106.218
	Top of cap	338.401	1110.237
Near Sioux City, Iowa	P. B. M. 397	335.371	1100.296
	Top of cap	336.595	1104.312
Hadar, Nebr	C_2	474.371	1556.332
Pierce, Nebr	D_2	485.008	1591.231
Foster, Nebr	E_2	490.392	1638.422
Plainview, Nebr	F_2	517.313	1697.217
Do	G_2	517.330	1697.273
Brunswick, Nebr	H_2	565.071	1853.903
Savage, Nebr	I_2	569.295	1867.762
Orchard, Nebr	J_2	591.636	1941.059
Page, Nebr	K_2	596.101	1955.708
Near Page, Nebr	L_2	611.107	2004.941
Do	M_2	625.529	2052.257
Do	Page SW. Base	626.053	2053.976
Near O'Neill, Nebr	N_2	595.480	1953.670
O'Neill, Nebr	O_2	605.608	1986.899
Do	P_2	609.574	1999.910
Emmet, Nebr	Q_2	616.196	2021.636
Near Atkinson, Nebr	R_2	629.582	2065.554
Atkinson, Nebr	S_2	642.912	2109.287
Near Stuart, Nebr	T_2	652.125	2139.513
Stuart, Nebr	U_2	656.988	2155.468
Newport, Nebr	V_2	679.914	2230.684
Near Bassett, Nebr	W_2	693.308	2274.628
Bassett, Nebr	X_2	709.040	2326.242
Long Pine, Nebr	Y_2	732.269	2402.453
Ainsworth, Nebr	Z_2	768.980	2522.896
Near Johnstown, Nebr	A_3	789.126	2588.991
Near Woodlake, Nebr	B_3	809.734	2656.602
Do	C_3	823.465	2701.651
Near Arabia, Nebr	D_3	831.154	2726.877
Thatcher, Nebr	E_3	808.847	2653.692
Valentine, Nebr	F_3	787.914	2585.014
Near Crookston, Nebr	G_3	795.791	2610.858
Do	H_3	829.740	2722.229
Georgia, Nebr	I_3	888.466	2914.908
Nenzil, Nebr	J_3	947.931	3110.003
Cody, Nebr	K_3	944.424	3098.498
Near Cody, Nebr	L_3	955.973	3136.388
Near Ell, Nebr	M_3	981.003	3218.508
Do	N_3	973.157	3192.766
Near Merriman, Nebr	O_3	988.349	3242.608
Do	P_3	1015.392	3331.332
Irwin, Nebr	Q_3	1047.970	3438.215
Near Gordon, Nebr	R_3	1080.363	3544.491
Gordon, Nebr	S_3	1083.193	3553.776
Do	T_3	1083.960	3556.292
Near Clinton, Nebr	U_3	1129.182	3704.658
Rushville, Nebr	V_3	1139.712	3739.205
Near Rushville, Nebr	W_3	1144.959	3756.420
Hay Springs, Nebr	X_3	1166.786	3828.031
Near Bordeaux, Nebr	Y_3	1137.318	3731.351
Near Chadron, Nebr	Z_3	1038.043	3389.242
Chadron, Nebr	A_4	1023.878	3369.015
Do	B_4	1033.806	3391.745
Near Chadron, Nebr	C_4	1017.080	3336.870
Do	D_4	1005.523	3298.964
Whitney, Nebr	E_4	1039.130	3409.212

* Reported destroyed, 1900. † Reported destroyed, 1910. ‡ Reported disturbed, 1911.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Crawford, Nebr	F_4	1095.710	3594.843
Crawford, Nebr	G_4	1121.040	3677.945
Fort Robinson, Nebr	H_4	1153.302	3783.792
Near Glen, Nebr	I_4	1221.023	4005.973
Near Andrews, Nebr	J_4	1346.023	4416.077
Near Harrison, Nebr	K_4	1482.348	4863.337
Harrison, Nebr	L_4	1486.757	4877.802
Near Harrison, Nebr	M_4	1463.089	4800.151
Near Van Tassel, Wyo	U_1	1452.236	4764.544
Node Ranch, Wyo	V_1	1504.600	4936.341
Lusk, Wyo	W_1	1528.490	5014.721
Manville, Wyo	X_1	1598.734	5245.180
Keeline, Wyo	Y_1	1611.802	5288.053
Lost Spring, Wyo	Z_1	1522.327	4994.501
Shawnee, Wyo	A_2	1531.335	5024.055
Fisher, Wyo	B_2	1451.007	4760.512
Near Silver Crown, Wyo	X	1915.568	6284.659
Silver Crown, Wyo	Y	1951.404	6402.231
Near Volente, Wyo	Z	2057.351	6749.825
Islay, Wyo	A_1	2043.763	6705.246
Near Horse Creek, Wyo	B_1	1985.299	6513.435
Near Iron Mountain, Wyo	C_1	1983.870	6508.746
Do	D_1	1871.948	6141.550
Near Diamond, Wyo	E_1	1763.810	5786.766
Do	F_1	1668.124	5472.836
Near Chugwater, Wyo	G_1	1585.650	5202.254
Near Bordeaux, Wyo	H_1	1507.983	4947.441
Near Wheatland, Wyo	I_1	1439.799	4723.740
Wheatland, Wyo	4737 CHYN	1442.674	4733.173
Do	J_1	1444.514	4739.209
Uva, Wyo	K_1	1361.934	4468.278
Near Buckhorn, Wyo	L_1	1445.539	4742.572
Hartville Junction, Wyo	M_1	1393.371	4571.418
Wendover, Wyo	N_1	1354.790	4444.840
Cassa, Wyo	O_1	1367.706	4487.215
Near Glendo, Wyo	P_1	1431.850	4697.661
Near Bona, Wyo	Q_1	1432.982	4701.375
Near Orin Junction, Wyo	R_1	1424.448	4673.377
Orin Junction, Wyo	S_1	1434.067	4704.935
Near Orin Junction, Wyo	T_1	1429.803	4690.945
Near Denver, Colo	N_2	1564.767	5133.740
Near Hazeltine, Colo	O_2	1552.383	5093.110
Near Henderson, Colo	P_2	1534.995	5036.062
Near Brighton, Colo	Q_2	1526.433	5007.972
Brighton, Colo	R_2	1514.212	4967.878
Near Lupton, Colo	S_2	1505.058	4937.845
Lupton, Colo	T_2	1495.297	4905.821
Near Lupton, Colo	U_2	1484.614	4870.771
Near Platteville, Colo	V_2	1474.824	4838.652
Do	W_2	1469.342	4820.666
Do	X_2	1462.018	4796.637
Near Nantes, Colo	Y_2	1440.388	4725.673
Near La Salle, Colo	Z_2	1417.821	4651.635
Greeley, Colo	A_3	1418.106	4652.569
Lucerne, Colo	B_3	1446.847	4746.864
Eaton, Colo	C_3	1473.051	4832.835
Pierce, Colo	D_3	1534.592	5034.741
Dover, Colo	E_3	1648.189	5407.434
Carr, Colo	F_3	1738.374	5703.315
Athol, Wyo	A	1920.696	6301.484
Cheyenne, Wyo	B	1847.183	6060.300
Do	C	1846.994	6059.680
Do	D	1846.956	6059.555
Do	E	1858.568	6097.652
Borie, Wyo	F	2013.899	6607.267
Otto, Wyo	G	2119.560	6953.923
Granite Canyon, Wyo	H	2229.055	7313.158
Sherman, Wyo	I	2514.704	8250.325
Do	J	2524.309	8281.837
Dale Creek, Wyo	K	2440.418	8006.605
Do	L	2439.507	8003.616
Red Buttes, Wyo	M	2226.376	7304.369
Laramie, Wyo	N	2184.368	7166.547
Do	O	2174.162	7133.063
Howell, Wyo	P	2165.317	7104.044
Wyoming, Wyo	Q	2157.870	7079.612
Coopers Lake, Wyo	R	2147.266	7044.822
Lookout, Wyo	S	2186.434	7173.326
Harper, Wyo	T	2136.708	7010.183
Near Rock Creek, Wyo	U	2043.797	6705.357
Rock Creek, Wyo	V	2043.604	6704.724
Rock Creek, Wyo	W	*2043.664	6704.921
Near Wilcox, Wyo	C_2	2110.385	6923.821
Near Aurora, Wyo	D_2	2056.154	6745.899
Medicine Bow, Wyo	E_2	2001.247	6565.758
Do	F_2	1999.644	6560.498
Allen, Wyo	G_2	2015.824	6613.583
Near Como, Wyo	H_2	2063.255	6769.196
Hanna, Wyo	I_2	2066.353	6779.360
Near Hanna, Wyo	J_2	2064.969	6774.820
Dana, Wyo	K_2	2070.262	6792.185
Edson, Wyo	L_2	2061.622	6763.838
Near Walcott, Wyo	M_2	2013.224	6605.052
Fort Steele, Wyo	N_2	1985.638	6514.547
Near Greenville, Wyo	Geol. Surv. West Base.	2006.650	6583.484
Do	O_2	2007.028	6584.724
Rawlins, Wyo	P_2	2056.948	6748.504
Do	Q_2	2058.786	6754.534
Do	R_2	2068.804	6787.401
Solon, Wyo	S_2	2110.597	6924.517
Near Daleys Ranch, Wyo	T_2	2035.616	6678.517
Riner, Wyo	U_2	2059.601	6757.207
Fillmore, Wyo	V_2	2126.816	6977.729
Creston, Wyo	W_2	2167.142	7110.032
Near Latham, Wyo	X_2	2111.867	6928.684
Wamsutter, Wyo	Y_2	2044.932	6709.081
Near Red Desert, Wyo	A_3	2049.342	6723.550
Red Desert, Wyo	B_3	2048.110	6719.508
Near Red Desert, Wyo	Z_2	2051.347	6730.128
Tipton, Wyo	C_3	2132.975	6997.935
Near Table Rock, Wyo	D_3	2088.236	6851.154
Near Monell, Wyo	U. P. 779	2057.563	6750.522
Monell, Wyo	E_3	2056.983	6748.618
Bitter Creek, Wyo	F_3	2040.946	6696.004
Near Black Buttes, Wyo	G_3	2020.892	6630.210
Black Buttes, Wyo	U. P. 793	2017.137	6617.890
Hallville, Wyo	H_3	1998.675	6557.319
Do	U. P. 799	1998.912	6558.097
Near Point of Rocks, Wyo	U. P. 804	1985.499	6514.092
Do	I_3	1984.366	6510.374
Do	U. P. 810	1968.912	6459.672
Near Salt Wells, Wyo	J_3	1948.857	6393.875
Near Baxter, Wyo	U. P. 823	1920.912	6302.192
Baxter, Wyo	K_3	1922.347	6306.900
Rock Springs, Wyo	L_3	1909.795	6265.719
Do	M_3	1908.945	6262.930
Do	N_3	1913.275	6277.136
Do	O_3	1917.016	6289.410
Ah Say, Wyo	U. P. 835	1895.812	6219.843
Near Wilkins, Wyo	P_3	1890.518	6202.475
Wilkins, Wyo	U. P. 839	1884.782	6183.656
Green River, Wyo	Q_3	1855.507	6087.609
Do	R_3	1865.232	6119.516
Do	S_3	1858.853	6098.587
Do	T_3	1855.697	6088.233
Near Peru, Wyo	U_3	1941.620	6370.131
Near Bryan, Wyo	V_3	1884.623	6183.134
Near Marston, Wyo	W_3	1883.690	6180.073
Do	X_3	1902.348	6241.287
Near Azusa, Wyo	Y_3	1897.545	6225.529
Do	T. B. M. 105	1902.022	6240.217
Ogden, Utah	B	1310.364	4299.086
Do	A	1309.370	4295.825
Do	Transit	1332.056	4370.253
Do	C	1311.014	4301.218
Uinta, Utah	D	1370.813	4497.409
Near Devils Gate, Utah	E	1468.956	4819.400
Near Strawberry, Utah	F	1473.728	4835.056
Near Morgan, Utah	G	1535.371	5037.296
Morgan, Utah	H	1543.212	5063.021
Near Croydon, Utah	I	1596.655	5238.359
Echo, Utah	J	1664.942	5462.397
Do	Geol. Echo	1666.389	5467.145
Near Emory, Utah	K	1749.429	5739.586
Emory, Utah	L	1803.105	5915.687
Castle Rock, Utah	M	1899.679	6232.530
Wasatch, Utah	N	2077.532	6816.037
Wyuta, Utah	O	2052.256	6733.110
Evanston, Wyo	6770 Evanston	2055.956	6745.249
Do	A_6	2057.298	6749.652
Do	6779 Evanston	2058.613	6753.966
Knight, Wyo	B_6	2152.606	7062.341
Altamont, Wyo	C_6	2200.596	7219.789
Springvalley, Wyo	D_6	2137.390	7012.420
Leroy, Wyo	E_6	2040.596	6694.856
Bridger, Wyo	F_6	2020.784	6629.855
Near Bridger, Wyo	G_6	2006.245	6582.155
Carter, Wyo	H_6	†1981.166	6499.876
Do	I_6	1981.963	6502.490
Elkhurst, Wyo	J_6	1959.408	6428.491
Near Hampton, Wyo	K_6	1951.706	6403.222
Church Buttes, Wyo	L_6	1935.646	6350.532
Do	M_6	1936.624	6353.741
Garrett, Wyo	N_6	1933.335	6342.950
Near Granger, Wyo	O_6	1911.636	6271.759
Granger, Wyo	P_6	1910.436	6267.822

* Elevation from line of 1902 only. The bench mark had apparently settled about 5 mm. since determination in 1899.
† This bench mark was reported in 1905 as having sunk about 0.052 meter.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Hot Springs, Utah	P	1301.873	4271.228
Willard, Utah	Q	1300.253	4265.913
Brigham, Utah	R	1309.150	4295.103
Honeyville, Utah	S	1298.631	4260.592
Dewey, Utah	T	1317.551	4322.665
Bear River, Utah	U	1370.488	4496.343
Cache Junction, Utah	V	1356.012	4448.849
Do	W	1353.767	4441.484
Ransom, Utah	X	1359.322	4459.709
Near Cornish, Utah	Y	1379.029	4524.364
Weston, Idaho	A	1403.477	4604.574
Dayton, Idaho	B	1446.207	4744.764
Garner, Idaho	C	1448.063	4750.853
Do	D	1446.597	4746.044
Near Oxford, Idaho	E	1447.186	4747.976
Near Swan Lake, Idaho	F	1455.978	4776.821
Downey, Idaho	G	1480.592	4857.576
Marsh Valley, Idaho	H	1446.022	4744.157
McCammon, Idaho	I	1449.186	4754.538
Near Onyx, Idaho	J	1408.231	4620.171
Inkom, Idaho	K	1379.126	4524.683
Do	L	1377.702	4520.011
Portneuf, Idaho	M	1367.604	4486.881
Pocatello, Idaho	A_3	1358.740	4457.799
Do	B_3	1360.328	4463.009
Pocatello, Idaho	C_3	1363.616	4473.797
Do	City	1360.304	4462.931
Do	D_3	1360.774	4464.473
Do	E_3	1362.027	4468.584
Near Pocatello, Idaho	F_3	1344.024	4409.519
Near Michaud, Idaho	G_3	1350.085	4429.404
Bannock, Idaho	H_3	1344.720	4411.802
Near American Falls, Idaho	I_3	1336.574	4385.076
American Falls, Idaho	O. S. L.	1321.820	4336.671
Near American Falls, Idaho*	O. S. L.	1320.20	4331.36
American Falls, Idaho	J_3	1319.540	4329.191
Near Napati, Idaho	K_3	1364.580	4476.960
Near Wapi, Idaho	L_3	1347.742	4421.717
Wapi, Idaho	O. S. L.	1341.421	4400.978
Near Wapi, Idaho	M_3	1316.324	4318.640
Near Yale, Idaho	N_3	1298.147	4259.004
Minidoka, Idaho	O. S. L.	1305.453	4282.973
Do	O_3	1303.845	4277.698
Near Colburne, Idaho	P_3	1298.370	4259.736
Do	Q_3	1322.292	4338.219
Kimama, Idaho	O. S. L.	1302.483	4273.229
Do	R_3	1299.512	4263.482
Senter, Idaho	S_3	1285.192	4216.501
Owinza, Idaho	T_3	1281.781	4205.310
Near Owinza, Idaho	U_3	1260.534	4135.602
Dietrich, Idaho	V_3	1240.894	4071.166
Shoshone, Idaho	W_3	1209.758	3969.014
Do	X_3	1208.287	3964.188
Do	Y_3	1209.414	3967.885
Near Tunupa, Idaho	Z_3	1142.222	3747.440
Do	A_4	1129.858	3706.876
Gooding, Idaho	B_4	1088.226	3570.288
Fuller, Idaho	C_4	1036.651	3401.079
Bliss, Idaho	D_4	993.490	3259.475
Ticeska, Idaho	E_4	938.806	3080.066
King Hill, Idaho	F_4	772.660	2534.968
Glenns Ferry, Idaho	G_4	779.967	2558.942
Do	H_4	785.508	2577.120
Near Glenns Ferry, Idaho	I_4	760.045	2493.581
Medbury, Idaho	J_4	779.136	2556.215
Chalk Spur, Idaho	K_4	879.666	2886.037
Near Mountain Home, Idaho	L_4	937.460	3075.650
Mountain Home, Idaho	M_4	958.736	3145.453
Do	N_4	956.760	3138.970
Do	O_4	957.985	3142.989
Near Mountain Home Idaho	P_4	969.848	3181.909
Cleft, Idaho	Q_4	981.355	3219.663
Near Orchard, Idaho	R_4	963.189	3160.063
Do	S_4	958.658	3145.197
Near Owyhee, Idaho	T_4	912.233	2992.884
Do	U_4	909.295	2983.246
Owyhee, Idaho	V_4	903.644	2964.705
Do	W_4	903.902	2965.552
Near Mora, Idaho	X_4	862.564	2829.929
Mora, Idaho	Y_4	843.208	2766.425
Near Mora, Idaho	Z_4	838.156	2749.850
Near Kuna, Idaho	A_5	806.007	2644.374
Do	B_5	805.268	2641.950
Do	C_5	798.769	2620.628
Near Nampa, Idaho	D_5	775.774	2545.185
Nampa, Idaho	E_5	758.232	2487.632
Do	F_5	759.126	2490.566
Do	G_5	758.375	2488.102
Do	H_5	758.210	2487.560
Nampa, Idaho	I_5	757.150	2484.083
Do	O. S. L.	757.197	2484.237
Near Nampa, Idaho	J_5	743.617	2439.683
Do	K_5	738.189	2421.875
Near Caldwell, Idaho	L_5	725.578	2380.500
Caldwell, Idaho	M_5	723.928	2375.087
Do	N_5	723.286	2372.980
Do	O_5	722.043	2368.902
Do	P_5	723.241	2372.833
Near Caldwell, Idaho	Q_5	717.398	2353.663
Do	R_5	711.502	2334.319
Near Notus, Idaho	S_5	703.703	2308.732
Do	T_5	698.203	2290.688
Near Parma, Idaho	U_5	682.555	2239.349
Do	O. S. L.	677.840	2223.880
Do	V_5	672.667	2206.908
In Idaho, near Nyssa, Oreg.	W_5	671.185	2202.046
Do	X_5	667.461	2189.829
Near Nyssa, Oreg	F	665.942	2184.845
Do	G	664.799	2181.095
Do	H	660.712	2167.686
Near Ontario, Oreg	J	657.891	2158.431
Do	I	658.526	2160.514
Ontario, Oreg	2143 H	655.807	2151.594
Do	K	657.090	2155.802
Do	L	656.882	2155.121
Do	M	657.066	2155.724
Do	N	654.888	2148.578
Near Payette, Idaho	Y_5	654.787	2148.247
Do	2139 H (1)	654.602	2147.640
Do	Z_5	653.627	2144.442
Payette, Idaho	A_6	655.075	2149.192
Do	B_6	656.038	2152.351
Do	C_6	655.596	2150.901
Near Payette, Idaho	2139 H (2)	654.360	2146.846
Near Crystal, Idaho	2123 H	649.611	2131.265
Do	D_6	648.253	2126.810
Near Weiser, Idaho	2112 H	646.259	2120.268
Do	E_6	644.207	2113.535
Do	2113 H	646.478	2120.987
Do	F_6	642.490	2107.902
Weiser, Idaho	2107 H	645.055	2116.317
Do	G_6	646.788	2122.004
Do	H_6	645.875	2119.009
Near Eaton, Idaho	2122 H	649.308	2130.272
Do	J_6	644.482	2114.438
Do	2097 H	641.535	2104.770
Do	J_6	639.696	2098.736
Near Olds Ferry, Idaho	2087 H	638.496	2094.799
Do	2086 H	638.211	2093.864
Olds Ferry, Idaho	K_6	631.868	2073.054
Near Olds Ferry, Idaho	2070 H	633.324	2077.831
Do	2069 H	633.187	2077.381
Near Huntington, Oreg	2079 A	635.957	2086.469
Do	O	636.084	2086.886
Do	P	638.278	2094.084
Do	Q	639.131	2096.883
Huntington, Oreg	2105 A	644.146	2113.336
Do	R	644.903	2115.819
Near Huntington, Oreg	S	649.787	2131.843
Do	T	655.003	2148.956
Do	U	660.026	2165.436
Do	V	665.760	2184.248
Do	2215 A	677.544	2222.909
Do	W	679.374	2228.913
Do	X	683.585	2242.729
Do	Y	695.798	2282.797
Near Weatherby, Oreg	2369 A	724.457	2376.822
Do	Z	734.554	2409.949
Do	A_2	735.399	2412.705
Near Durkee, Oreg	2518 A	770.031	2526.343
Do	B_2	780.672	2561.254
Durkee, Oreg	2647 A	809.144	2654.667
Near Durkee, Oreg	C_2	834.180	2736.806
Do	D_2	858.848	2817.737
Unity, Oreg	3139 A	959.069	3146.546
Near Unity, Oreg	E_2	957.336	3140.860
Near Pleasant Valley, Oreg.	F_2	1077.000	3533.457
Pleasant Valley, Oreg	3818 A	1166.423	3826.839
Near Encina, Oreg	G_2	1205.350	3954.552
Near Norton, Oreg	H_2	1132.685	3716.151
Norton, Oreg	3646 A	1113.821	3654.261
Near Baker City, Oreg	I_2	1065.485	3495.678
Baker City, Oreg	3433 A	1048.780	3440.872
Do	J_2	1049.587	3443.520
Do	K_2	1050.591	3446.814
Do	L_2	1051.216	3448.864
Near Baker City, Oreg	M_2	1028.044	3372.841
Near Wingville, Oreg	3338 A	1019.898	3346.115
Near Haines, Oreg	N_2	1014.114	3327.139
Do	O_2	1018.366	3341.089
Hutchinson, Oreg	3372 A	1030.123	3379.662
Near North Powder, Oreg.	P_2	1003.625	3292.726

* On spur consisting of single line.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
North Powder, Oreg.	3233 A	988.212	3242.159
Do	Q_2	992.577	3256.479
Near North Powder, Oreg.	R_2	975.300	3199.797
Do	S_2	972.014	3189.016
Do	T_2	971.932	3188.747
Do	3228 A	986.138	3235.354
Near Telocaset, Oreg.	U_2	1005.869	3300.088
Do	V_2	1048.017	3438.369
Do	3440 A	1050.530	3446.613
Do	W_2	989.950	3247.861
Near Union Station, Oreg.	3021 A	922.670	3027.127
Do	X_2	857.384	2812.934
Union, Oreg.	Y_2	851.206	2792.665
Do	Z_2	850.117	2789.092
Do	G. S. Union	849.962	2788.583
Do	A_3	851.266	2792.862
Near Union Station, Oreg.	2705 A	826.444	2711.425
Do	B_3	823.117	2700.510
Do	2696 A	823.522	2701.838
Near Lagrande, Oreg.	C_3	825.359	2707.865
Do	D_3	832.538	2731.419
Lagrande, Oreg.	2773 A	847.144	2779.338
Do	E_3	848.897	2785.090
Do	F_3	849.833	2788.160
Do	G_3	849.318	2786.470
Do	2782 A	849.716	2787.777
Near Lagrande, Oreg.	H_3	868.014	2847.810
Do	I_3	871.401	2858.921
Perry, Oreg.	2897 A	884.839	2903.009
Near Hilgard, Oreg.	J_3	904.393	2967.163
Hilgard, Oreg.	3001 A	916.714	3007.586
Near Hilgard, Oreg.	3581 A	1093.755	3588.428
Near Kamela, Oreg.	K_3	1023.698	3358.583
Kamela, Oreg.	4199 A	1282.044	4206.173
Near Meacham, Oreg.	3958 A	1208.652	3965.385
Do	L_3	1145.262	3757.414
Meacham, Oreg.	3672 A	1121.507	3679.478
Near Meacham, Oreg.	3454 A	1054.839	3460.751
Do	M_3	1021.561	3351.572
Do	N_3	971.995	3188.953
Do	O_3	933.294	3061.982
Do	P_3	882.060	2893.892
Do	Q_3	846.388	2776.858
Near North Fork, Oreg.	2570 A	785.134	2575.894
Do	R_3	780.873	2561.914
Do	S_3	755.930	2480.080
Do	T_3	745.514	2445.908
Do	2264 A	691.742	2269.490
Do	U_3	684.919	2247.105
Do	V_3	657.911	2158.496
Near Bingham Springs, Oreg.	2023 A	618.120	2027.949
Do	W_3	580.135	1903.327
Do	X_3	554.640	1819.681
Bingham Springs, Oreg.	1744 A	533.213	1749.383
Near Bingham Springs, Oreg.	Y_3	503.980	1653.474
Near Cayuse, Oreg.	1523 A	465.783	1528.157
Do	Z_3	463.734	1521.434
Do	A_4	437.053	1433.898
Do	B_4	428.043	1404.338
Near Mission, Oreg.	1355 A	414.139	1358.721
Do	C_4*	405.307	1329.745
Mission, Oreg.	1205 A	368.549	1209.148
Pendleton, Oreg.	D_4	326.691	1071.819
Do	E_4	326.011	1069.588
Do	F_4	327.838	1075.582
Do	1074 A	328.580	1078.017
Near Pendleton, Oreg.	G_4	334.778	1098.350
Do	H_4	357.796	1173.869
Near Fulton, Oreg.	I_4	422.895	1387.448
Near McCormack, Oreg.	J_4	503.702	1652.563
Near Warren, Oreg.	K_4	530.165	1739.383
Near Helix, Oreg.	L_4	548.335	1798.995
Near Smeltz, Oreg.	M_4	542.790	1780.804
Do	N_4	507.167	1663.930
Near Stanton, Oreg.	O_4	474.431	1556.529
Near Ring, Oreg.	P_4	317.716	1042.373
Near Hunts Junction, Wash.	R_3	244.664	802.701
Do	Q_3	144.217	473.152
Seattle, Wash.	Tidal 5	6.564	21.536
Do	Tidal 4	6.054	19.862
Do	G	7.654	25.111
Do	City 1	7.570	24.836
Do	City 2	3.336	10.945
South Seattle, Wash.	City 3	3.139	10.299
Near Argo, Wash.	N. P	6.146	20.164
Near Black River, Wash.	N. P	6.524	21.404
Black River, Wash.	H	6.262	20.545
Near Black River, Wash.	I	10.427	34.209
Kent, Wash.	J	12.300	40.354
Do	K	12.928	42.414
Near Thomas, Wash.	L	16.105	52.838
Auburn, Wash.	M	22.614	74.193
Do	N	25.523	83.737
Near Auburn, Wash.	O	30.318	99.468
Near Covington, Wash.	P	100.817	330.764
Covington, Wash.	Q	105.557	346.315
Near Ravensdale, Wash.	R	175.749	576.602
Ravensdale, Wash.	S	188.553	618.611
Near Ravensdale, Wash.	T	198.474	651.160
Do	U	214.998	705.372
Near Palmer Junction, Wash.	V	258.454	847.944
Palmer Junction, Wash.	W	261.589	858.230
Near Palmer Junction, Wash.	X	284.156	932.268
Near Eagle Gorge, Wash.	1046 T	319.041	1046.721
Do	Y	329.253	1080.224
Canton, Wash.	Z	367.164	1204.604
Do	1205 T	367.624	1206.113
Maywood, Wash.	1335 T	407.223	1336.031
Hot Springs, Wash.	1531 T	466.997	1532.139
Do	A_1	462.776	1518.291
Near Hot Springs, Wash.	B_1	479.596	1573.474
Lester, Wash.	1614 T	492.293	1615.131
Near Weston, Wash.	C_1	601.904	1974.747
Near Borup, Wash.	D_1	656.982	2155.448
Stampede, Wash.	2776 T	846.538	2777.350
Near Stampede, Wash.	E_1	856.572	2810.270
Do	F_1	868.526	2849.489
Martin, Wash.	2782 T	848.580	2784.050
Near Easton, Wash.	G_1	682.403	2238.850
Easton, Wash.	H_1	660.437	2166.784
Do	I_1	† 661.152	2169.130
Do	I_1	‡ 661.498	2170.265
Near Nelson, Wash.	J_1	632.210	2074.176
Nelson, Wash.	2030 T	619.219	2031.554
Cle Elum, Wash.	K_1	582.338	1910.554
Do	L_1	583.386	1913.993
Do	M_1	582.041	1909.579
Teanaway, Wash.	1838 T	560.365	1838.464
Bristol, Wash.	1784 T	544.114	1785.147
Near Bristol, Wash.	N_1	533.846	1751.460
Near Thorp, Wash.	O_1	521.732	1711.715
Do	1658 T	505.698	1659.111
Thorp, Wash.	1634 T	498.152	1634.354
Do	P_1	497.891	1633.497
Near Thorp, Wash.	U. S. Base	483.086	1584.925
Ellensburg, Wash.	Q_1	462.113	1516.116
Do	1571 T	479.026	1571.604
Do	R_1	468.430	1536.841
Do	S_1	461.765	1514.974
Thrall, Wash.	T_1	435.354	1428.324
Umtanum, Wash.	1350 T	411.540	1350.194
Near Umtanum, Wash.	U_1	407.717	1337.652
Canyon, Wash.	V_1	395.155	1296.438
Roza, Wash.	1249 T	380.830	1249.440
Do	W_1	379.564	1245.286
Selah, Wash.	1147 T	349.833	1147.743
Near Selah, Wash.	X_1	347.150	1138.942
Near Wenas, Wash.	Y_1	334.590	1097.734
North Yakima Wash.	1067 T	325.342	1067.393
Do	Z_1	324.673	1065.198
Do	A_2	325.445	1067.730
Do	B_2	323.912	1062.701
Do	C_2	325.759	1068.761
Near Yakima City, Wash.	D_2	290.346	952.577
Wapato, Wash.	855 T	260.703	855.323
Do	E_2	260.251	853.840
Near Wapato, Wash.	F_2	247.735	812.777
Toppenish, Wash.	755 T	230.312	755.615
Do	G_2	229.908	754.289
Do	H_2	230.495	756.215
Near Alfalfa, Wash.	717 T	218.506	716.882
Alfalfa, Wash.	I_2	217.828	714.657
Satus, Wash.	674 T	205.495	674.195
Near Satus, Wash.	J_2	203.904	668.975
Near Mabton, Wash.	717 T	218.410	716.566
Mabton, Wash.	715 T	218.058	715.412
Near Mabton, Wash.	K_2	217.452	713.424
Byron, Wash.	696 T	212.318	696.580
Near Byron, Wash.	L_2	210.683	691.216
Prosser, Wash.	M_2	201.479	661.019
Do	661 T	201.618	661.475
Do	N_2	203.406	667.342
Do	O_2	201.672	661.653
Near Prosser, Wash.	P_2	205.331	673.656
Gibbon, Wash.	627 T	191.252	627.460

* Reported disturbed.
† Elevation as originally determined.
‡ Elevation after relocation in 1907. The difference in elevation between the old position of the bench mark and the new was determined by the engineers of the Chicago, Milwaukee & St. Paul Railway.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Chandler, Wash	534 T	162.916	534.500
Near Kiona, Wash	Q_2	148.484	487.151
Kiona, Wash	515 T	156.944	514.907
Do	R_2	156.711	514.143
Near Kiona, Wash	S_2	164.360	539.238
Near Badger, Wash	640 T	195.216	640.471
Badger, Wash	T_2	206.248	676.666
Near Badger, Wash	605 T	184.478	605.242
Relief, Wash	567 T	172.842	567.065
Near Relief, Wash	U_2	171.712	563.359
Kennewick, Wash	V_2	112.089	367.745
Do	362 T	110.312	361.916
Do	W_2	108.258	355.176
Near Kennewick, Wash	X_2	107.382	352.303
Near Pasco, Wash	Y_2	107.308	352.059
Do	Z_2	114.847	376.794
Pasco, Wash	378 T	115.222	378.025
Do	A_3	115.277	378.204
Near Pasco, Wash	B_3	108.966	357.499
Do	C_3	109.008	357.637
Do	D_3	109.000	357.610
Do	E_3	108.998	357.604
Do	F_3	109.008	357.637
Do	G_3	108.992	357.585
Do	H_3	109.007	357.633
Do	I_3	108.973	357.523
Near Hunts Junction, Wash.	341 A	104.550	343.012
Do	J_3	99.852	327.597
Do	K_3	104.213	341.906
Hunts Junction, Wash	L_3	99.016	324.855
Do	M_3	97.825	320.948
Near Hunts Junction, Wash.	N_3	121.455	398.474
Do	O_3	122.787	402.844
Do	P_3	127.431	418.080
East St. Cloud, Minn	Hydrant 1	316.122	1037.144
St. Cloud, Minn	P. B. M. $\frac{23}{2}$	312.488	1025.221
Do	P. B. M. $\frac{23}{2}$, top of cap.	*313.695	1029.181
Do	P. B. M. $\frac{23}{2}$, top of cap.	†313.710	1029.231
Do	A	316.374	1037.971
Do	Hydrant 2	315.900	1036.416
Do	Hydrant 3	315.815	1036.136
Do	Hydrant 4	316.685	1038.991
Do	B	319.638	1048.679
Near St. Cloud, Minn	C	319.368	1047.794
Do	D	317.936	1043.095
St. Joseph, Minn	E	332.210	1089.925
Collegeville, Minn	F	333.928	1095.562
Do	G	333.659	1094.680
Near Avon, Minn	H	344.662	1130.779
Avon, Minn	I	344.957	1131.747
Do	J	344.324	1129.669
Near Albany, Minn	K	360.703	1183.406
Albany, Minn	Hydrant 5	368.152	1207.846
Do	L	367.674	1206.277
Freeport, Minn	M	377.924	1239.906
Do	N	379.028	1243.528
Do	Hydrant 6	379.746	1245.884
Near Melrose, Minn	O	360.120	1181.494
Melrose, Minn	P	369.078	1210.884
Do	City 1	369.923	1213.655
Do	City 2	369.942	1213.718
Do	City 3	370.071	1214.141
Do	City 4	369.654	1212.773
Do	Q	367.926	1207.104
Near Melrose, Minn	R	369.456	1212.124
Near Sauk Center, Minn	S	381.970	1253.180
Sauk Center, Minn	T	383.484	1258.147
Do	U	383.723	1258.931
Do	Hydrant 7	382.799	1255.899
Do	Hydrant 8	381.642	1252.104
Do	Hydrant 9	381.038	1250.122
Near West Union, Minn	V	391.562	1284.649
West Union, Minn	W	406.186	1332.629
Do	X	408.496	1340.207
Near West Union, Minn	Y	408.094	1338.889
Near Osakis, Minn	Z	414.289	1359.213
Do	A_1	424.258	1391.919
Do	Osakis △	428.028	1404.288
Osakis, Minn	B_1	409.733	1344.266
Do	C_1	411.809	1351.076
Do	D_1	410.330	1346.224
Near Osakis, Minn	E_1	423.196	1388.436
Near Nelson, Minn	F_1	411.610	1350.424
Nelson, Minn	G_1	416.912	1367.819
Near Alexandria, Minn	Alexandria △	450.870	1479.229
Do	Alexandria Reference Mark.	450.373	1477.599
Do	H_1	431.202	1414.702
Alexandria, Minn	I_1	423.890	1390.713
Do	J_1	424.396	1392.373
Do	K_1	427.928	1403.961
Do	Alexandria Magnetic Station.	428.504	1405.850
Do	L_1	431.356	1415.207
Do	City	430.977	1413.964
Near Garfield, Minn	M_1	423.177	1388.374
Garfield, Minn	N_1	433.534	1422.353
Near Brandon, Minn	O_1	430.346	1411.893
Do	P_1	430.147	1411.241
Do	Q_1	432.020	1417.385
Brandon, Minn	R_1	422.764	1387.019
Evansville, Minn	S_1	414.271	1359.154
Do	T_1	414.230	1359.020
Erdahl, Minn	U_1	385.686	1265.371
Thorsborg, Minn	V_1	366.853	1203.584
Near Elbow Lake, Minn	Elbow △	389.667	1278.432
Do	W_1	372.381	1221.720
Elbow Lake, Minn	X_1	369.573	1212.508
Do	Y_1	369.450	1212.104
Near Elbow Lake, Minn	Z_1	366.386	1202.052
Do	A_2	363.000	1190.942
Near Hereford, Minn	B_2	344.032	1128.712
Do	C_2	313.547	1028.695
Tintah, Minn	D_2	303.734	996.501
Do	E_2	304.976	1000.575
Near Tintah, Minn	F_2	301.989	990.776
Near Yarmouth, Minn	G_2	300.326	985.319
Do	H_2	299.002	981.173
Childs, Minn	I_2	297.084	974.683
Near Fairmount, N. Dak	A	299.750	983.429
Do	B	297.325	975.474
Do	979 W	*298.531	979.430
Do	979 W	†298.298	978.666
Do	971 W	295.691	970.113
Near Childs, Minn	Foss △	296.807	973.774
Do	Foss Reference Mark	296.905	974.096
Do	J_2	295.548	969.643
Near Fairmount, N. Dak	969 W	295.314	968.876
Fairmount, N. Dak	C	300.163	984.785
Do	D	300.090	984.545
Near Blackmer, N. Dak	E	296.515	972.816
Do	F	297.027	974.496
Do	G	296.824	973.830
White Rock, S. Dak	A	297.129	974.830
Do	B	297.483	975.992
Do	C	296.495	972.750
Near White Rock, S. Dak	K_2	301.786	990.110
Do	L_2	307.074	1007.459
Near Wheaton, Minn	M_2	315.714	1035.805
Near White Rock, S. Dak	Oscarson △	317.129	1040.447
Do	Oscarson Reference Mark.	316.303	1037.737
Wheaton, Minn	N_2	310.859	1019.876
Do	City	310.763	1019.561
Do	O_2	310.951	1020.178
Near Wheaton, Minn	P_2	312.070	1023.850
Near Dumont, Minn	Q_2	317.020	1040.090
Dumont, Minn	R_2	318.885	1046.209
Do	S_2	317.203	1041.019
Near Dumont, Minn	T_2	320.450	1051.343
Collis, Minn	U_2	324.654	1065.135
Near Collis, Minn	V_2	326.186	1070.162
Near Graceville, Minn	W_2	329.074	1079.637
Do	X_2	335.387	1100.349
Graceville, Minn	City	338.799	1111.543
Do	Y_2	338.464	1110.444
Do	Z_2	338.760	1111.415
Do	A_3	337.647	1107.763
Near Graceville, Minn	B_3	338.533	1110.671
Do	C_3	348.131	1142.160
Do	D_3	352.633	1156.930
Near Clinton, Minn	E_3	360.918	1184.112
Clinton, Minn	F_3	354.028	1161.507
Do	G_3	354.132	1161.848
Near Clinton, Minn	H_3	349.405	1146.339
Near Ortonville, Minn	I_3	351.677	1153.793
Do	J_3	338.202	1109.585
Do	K_3	336.217	1103.072
Ortonville, Minn	L_3	311.401	1021.655
Do	U. S. E. 1	298.221	978.413
Do	U. S. E. 2	295.179	968.433
Do	U. S. E. 3	295.946	970.949
Near Bigstone City, S. Dak	D	296.636	973.213
Do	E	319.851	1049.377
Do	F	319.643	1048.696
Near Milbank, S. Dak	G	324.490	1064.597
Do	H	349.185	1145.618
Milbank, S. Dak	I	350.591	1150.230
Near Milbank, S. Dak	J	350.562	1150.135
Near Twinbrooks, S. Dak	K	377.638	1238.968
Twinbrooks, S. Dak	L	384.515	1261.530
Stockholm, S. Dak	M	506.927	1663.143

* Original elevation. † Elevation as reset.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
South Shore, S. Dak.	N	567.649	1862.361
Do	O	569.990	1870.042
Near South Shore, S. Dak.	Mound △	634.442	2081.498
Do	Mound Reference Mark.	625.730	2052.916
Near Forestville, S. Dak.	P	578.206	1896.998
Near Watertown, S. Dak.	Q	543.717	1783.845
Do	R	530.101	1739.173
Do	S	526.638	1727.811
Watertown, S. Dak.	T	530.246	1739.649
Do	City 1	530.533	1740.590
Do	U	528.993	1735.538
Do	City 2	530.408	1740.180
Do	Watertown Magnetic Station.	528.435	1733.707
Watertown, S. Dak.	V	523.563	1717.723
Near Grover, S. Dak.	W	532.351	1746.555
Grover, S. Dak.	X	530.414	1740.200
Near Grover, S. Dak.	Y	523.458	1717.378
Hazel, S. Dak.	Z	538.554	1766.906
Do	A_1	538.494	1766.709
Do	B_1	536.402	1759.846
Near Hazel, S. Dak.	C_1	546.298	1792.312
Do	D_1	545.976	1791.256
Near Vienna, S. Dak.	E_1	546.031	1791.437
Do	F_1	557.759	1829.915
Vienna, S. Dak.	G_1	557.763	1829.927
Near Vienna, S. Dak.	H_1	553.781	1816.863
Near Bryant, S. Dak.	I_1	558.342	1831.827
Do	J_1	558.460	1832.214
Do	S. C. 1	562.495	1845.452
Bryant, S. Dak.	K_1	561.969	1843.727
Do	L_1	564.321	1851.443
Near Bryant, S. Dak.	M_1	557.495	1829.048
Do	S. C. 2	546.780	1793.894
Erwin, S. Dak.	N_1	567.723	1862.605
Near Erwin, S. Dak.	O_1	560.845	1840.039
Do	P_1	550.191	1805.085
Near Lake Preston, S. Dak.	Q_1	519.070	1702.982
Lake Preston, S. Dak.	R_1	525.285	1723.373
Do	S_1	524.044	1719.301
Do	Preston	524.002	1719.163
Near Lake Preston, S. Dak.	T_1	523.260	1716.729
Do	U_1	515.841	1692.388
Do	S. C. 3	522.190	1713.218
Do	Hansen △	529.162	1736.093
Do	Hansen Reference Mark.	526.954	1728.848
Oldham, S. Dak.	V_1	524.412	1720.508
Do	W_1	526.209	1726.404
Near Oldham, S. Dak.	X_1	526.804	1728.356
Do	Y_1	527.244	1729.800
Ramona, S. Dak.	Z_1	549.595	1803.130
Near Ramona, S. Dak.	A_2	548.779	1800.452
Do	B_2	548.098	1798.218
Do	C_2	541.649	1777.060
Do	D_2	529.640	1737.661
Do	S. C. 4	527.031	1729.101
Do	S. C. 5	539.198	1769.018
Do	S. C. 6	547.488	1796.217
Do	E_2	563.507	1848.772
Do	S. C. 7	558.572	1832.582
Do	Crane Reference Mark	553.158	1814.819
Do	Crane △	565.413	1855.026
Near Madison, S. Dak.	F_2	528.250	1733.100
Madison, S. Dak.	G_2	513.226	1683.809
Do	H_2	510.036	1673.343
Do	I_2	510.855	1676.030
Do	City 2	509.408	1671.283
Do	City 3	509.189	1670.564
Near Madison, S. Dak.	J_2	521.260	1710.167
Do	K_2	519.789	1705.341
Wentworth, S. Dak.	L_2	516.544	1694.695
Do	M_2	516.028	1693.002
Near Wentworth, S. Dak.	N_2	512.024	1679.866
Colman, S. Dak.	O_2	516.825	1695.617
Near Colman, S. Dak.	P_2	517.447	1697.657
Do	Q_2	524.116	1719.538
Do	R_2	512.568	1681.650
Do	S_2	505.722	1659.190
Near Egan, S. Dak.	T_2	461.347	1513.603
Do	U_2	460.725	1511.562
Near Trent, S. Dak.	S. C. 8	458.112	1502.989
Trent, S. Dak.	V_2	457.187	1499.954
Near Trent, S. Dak.	W_2	454.123	1489.902
Dell Rapids, S. Dak.	X_2	456.157	1496.575
Do	City 1	457.214	1500.043
Do	Y_2	456.726	1498.442
Do	City 2	456.906	1499.033
Do	Z_2	453.692	1488.488
Near Dell Rapids, S. Dak.	A_3	454.666	1491.684
Do	B_3	449.949	1476.208
Do	S. C. 9	449.026	1473.180
Baltic, S. Dak.	C_3	448.968	1472.989
Near Baltic, S. Dak.	D_3	444.807	1459.338
Do	E_3	443.039	1453.537
Do	F_3	442.346	1451.263
Renner, S. Dak.	G_3	438.122	1437.405
Do	H_3	437.559	1435.558
Near Sioux Falls, S. Dak.	I_3	433.870	1423.455
Do	J_3	433.148	1421.087
Sioux Falls, S. Dak.	City 1	425.818	1397.038
Do	City 2	427.360	1402.097
Do	City 4	427.090	1401.211
Do	L_3	428.459	1405.703
Do	City 3	430.260	1411.611
Do	U. S. G. S. Astronomic Station.	434.317	1424.922
Do	K_3	427.067	1401.136
Near Harrisburg, S. Dak.	1484 YNKTN	452.192	1483.566
Do	M_3	450.589	1478.307
Do	N_3	441.658	1449.006
Harrisburg, S. Dak.	O_3	435.464	1428.684
Near Harrisburg, S. Dak.	1419 YNKTN	432.434	1418.744
Do	P_3	422.500	1386.152
Do	Q_3	424.172	1391.637
Near Canton, S. Dak.	R_3	408.435	1340.007
Canton, S. Dak.	S_3	388.068	1273.186
Do	T_3	386.539	1268.170
Beloit, Iowa	A	379.226	1244.177
Do	B	380.059	1246.911
Near Beloit, Iowa	C	376.866	1236.435
Near Elm Springs, Iowa	D	390.178	1280.109
Fairview, S. Dak.	U_3	370.074	1214.151
Near Fairview, S. Dak.	V_3	368.296	1208.318
Do	W_3	369.313	1211.655
Do	X_3	367.298	1205.044
Near Austin, Iowa	E	365.856	1200.313
Hudson, S. Dak.	Y_3	372.744	1222.911
Do	Z_3	372.328	1221.546
Near Hudson, S. Dak.	A_4	369.588	1212.557
Do	B_4	365.522	1199.217
Near Hawarden, Iowa	F	360.455	1182.593
Do	G	358.899	1177.488
Calliope, Iowa	H	360.142	1181.566
Hawarden, Iowa	I	359.863	1180.650
Do	City	358.856	1177.347
Near Hawarden, Iowa	J	357.432	1172.675
Do	K	357.003	1171.267
Do	L	355.203	1165.361
Chatsworth, Iowa	M	352.168	1155.405
Do	N	353.518	1159.833
Do	O	354.103	1161.753
Near Chatsworth, Iowa	P	351.846	1154.348
Near Akron, Iowa	Q	347.058	1138.640
Akron, Iowa	R	349.388	1146.283
Do	City	349.038	1145.135
Near Akron, Iowa	S	346.358	1136.343
Do	T	345.900	1134.841
Near Westfield, Iowa	U	344.200	1129.263
Do	V	344.402	1129.926
Do	W	341.967	1121.937
Do	X	343.579	1127.225
Do	Y	340.270	1116.369
Do	Z	340.794	1118.088
Near Elk Point, S. Dak.	C_4	341.833	1121.497
Elk Point, S. Dak.	P. B. M. $\frac{222}{3}$	342.325	1123.112
Near Elk Point, S. Dak.	D_4	343.192	1125.956
Do	E_4	341.937	1121.838
Do	F_4	340.082	1115.752
Jefferson, S. Dak.	G_4	339.202	1112.866
Do	P. B. M. $\frac{222}{5}$	338.079	1109.180
Do	H_4	339.977	1115.408
Do	I_4	339.674	1114.414
Near Jefferson, S. Dak.	J_4	339.340	1113.318
Do	K_4	338.422	1110.306
McCook, S. Dak.	L_4	337.533	1107.389
Do	P. B. M. $\frac{220}{2}$	336.827	1105.074
Near McCook, S. Dak.	M_4	337.490	1107.248
Do	N_4	336.114	1102.734
Near Sioux City, Iowa	P. B. M. 399	334.783	1098.368
	Top of cap over same	336.004	1102.374
Do	P. B. M. 398	336.139	1102.816
	Top of cap over same	337.361	1106.825
Near Evansville, Minn.	M_3	417.053	1368.281
Melby, Minn.	N_3	389.276	1277.150
Near Melby, Minn.	O_3	372.619	1222.500
Ashby, Minn.	P_3	394.501	1294.292
Do	Q_3	395.708	1298.252
Near Ashby, Minn.	R_3	383.867	1259.404
Dalton, Minn.	S_3	420.934	1381.015
Do	Dalton Astronomic Station.	419.624	1376.716
Do	T_3	416.117	1365.210
Near Dalton, Minn.	Dalton △	422.888	1387.425
Do	U_3	378.600	1242.123

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Parkdale, Minn	V_3	375.545	1232.101
Near Fergus Falls, Minn	W_3	367.115	1204.443
Fergus Falls, Minn	X_3	364.014	1194.270
Do	Y_3	364.107	1194.575
Do	City	362.491	1189.273
Do	Z_3	363.173	1191.510
Near Fergus Falls, Minn	A_4	366.341	1201.903
Do	B_4	359.935	1180.887
Carlisle, Minn	C_4	373.056	1223.935
Near Carlisle, Minn	D_4	373.142	1224.217
Near Rothsay, Minn	E_4	421.563	1383.078
Rothsay, Minn	F_4	363.971	1194.128
Do	G_4	365.829	1200.195
Do	H_4	368.568	1209.210
Near Rothsay, Minn	I_4	343.822	1128.023
Lawndale, Minn	J_4	325.724	1068.646
Near Lawndale, Minn	K_4	317.670	1042.223
Near Barnesville, Minn	L_4	314.931	1033.236
Do	M_4	312.316	1024.656
Barnesville, Minn	N_4	315.177	1034.043
Do	O_4	312.270	1024.505
Near Barnesville, Minn	Q_4	290.156	951.953
Do	P_4	301.126	987.944
Downer, Minn	R_4	294.339	965.677
Do	S_4	294.903	967.527
Near Downer, Minn	T_4	290.748	953.896
Near Crawford, Minn	U_4	283.466	930.005
Near Glyndon, Minn	V_4	281.602	923.889
Glyndon, Minn	W_4	281.329	922.993
Near Averill, Minn	X_4	279.257	916.196
Averill, Minn	Y_4	279.391	916.635
Near Felton, Minn	Z_4	279.316	916.390
Felton, Minn	A_5	277.993	912.048
Do	B_5	277.875	911.662
Near Borup, Minn	C_5	277.055	908.972
Borup, Minn	D_5	276.820	908.200
Do	E_5	277.043	908.932
Wheatville, Minn	F_5	275.472	903.778
Ada, Minn	G_5	276.625	907.560
Do	U. S. G. S. Meridian Mark.	275.749	904.686
Do	H_5	276.263	906.372
Do	I_5	275.769	904.752
Hadler, Minn	J_5	274.443	900.401
Near Hadler, Minn	K_5	275.980	905.444
Lockhart, Minn	L_5	272.019	892.449
Beltrami, Minn	M_5	275.407	903.564
Do	N_5	275.610	904.230
Near Beltrami, Minn	O_5	274.517	900.644
Russia, Minn	P_5	272.303	893.380
Near Russia, Minn	Q_5	271.124	889.513
Kittson, Minn	R_5	269.366	883.745
Near Kittson, Minn	S_5	268.247	880.074
Do	T_5	267.986	879.217
Crookston, Minn	U_5	264.923	869.168
Do	V_5	266.238	873.483
Do	City	264.485	867.731
Do	W_5	271.591	891.045
Near Crookston, Minn	X_5	271.684	891.350
Shirley, Minn	Y_5	275.186	902.839
Near Shirley, Minn	Z_5	275.257	903.073
Near Euclid, Minn	A_6	273.848	898.450
Euclid, Minn	B_6	271.611	891.111
Near Euclid, Minn	C_6	270.458	887.328
Near Angus, Minn	D_6	262.044	859.723
Angus, Minn	E_6	265.656	871.573
Near Angus, Minn	F_6	264.897	869.083
Warren, Minn	G_6	260.270	853.903
Do	H_6	261.252	857.124
Do	I_6	261.085	856.576
Do	J_6	261.344	857.426
Near Warren, Minn	K_6	260.066	853.233
Near Argyle, Minn	L_6	258.198	847.105
Argyle, Minn	M_6	257.783	845.743
Do	N_6	259.119	850.127
Near Argyle, Minn	O_6	259.848	852.518
Near Stephen, Minn	P_6	255.133	837.049
Stephen, Minn	Q_6	253.267	830.927
Do	R_6	253.354	831.212
Do	S_6	252.658	828.928
Near Stephen, Minn	T_6	253.227	830.795
Do	Stephen West Base △	253.115	830.428
Near Holland, Tex	W_4	154.684	507.493
Holland, Tex	Z_4	*160.506	526.593
Near Bartlett, Tex	A_5	180.196	591.193
Granger, Tex	B_5	175.457	575.645
Do	C_5	175.427	575.547
Near Circleville, Tex	D_5	164.576	539.947
Taylor, Tex	E_5	166.002	544.625
Do	F_5	168.437	552.614
Coupland, Tex	526 Coupland	157.591	517.030
Near Coupland, Tex	G_5	160.359	526.111
Elgin, Tex	576 S. A	173.128	568.004
Littig, Tex	K_5	140.544	461.101
Manor, Tex	L_5	163.002	534.783
Daffan, Tex	M_5	185.453	608.440
Near Austin, Tex	N_5	137.145	449.950
Austin, Tex	Geol. Austin	141.897	465.541
Do	P_5	146.092	479.304
Do	O_5	149.448	490.314
Do	North Meridian Mark	166.100	544.947
Do	508 Austin	153.043	502.109
Near Austin, Tex	476 Austin	143.243	469.956
Do	Barton △	315.700	1035.759
Elgin, Tex	H_5	175.252	574.973
Near Elgin, Tex	I_5	166.068	544.841
Near Sayers, Tex	J_5	120.969	396.879
Do	Q_5	130.810	429.166
Do	449 S. A	134.417	441.000
Near Bastrop, Tex	460 S. A	137.939	452.555
Do	R_5	132.264	433.936
Do	365 S. A	108.937	357.404
Bastrop, Tex	372 Bastrop	111.728	366.561
Do	Geol. Bastrop	111.999	367.450
Do	377 Bastrop	113.247	371.545
Do	S_5	113.393	372.024
Near Bastrop, Tex	T_5	109.162	358.142
Hills Prairie, Tex	359 Hills Prairie	107.749	353.507
Near Upton, Tex	U_5	101.822	334.061
Upton, Tex	349 Upton	104.712	343.543
Near Upton, Tex	V_5	109.962	360.767
Smithville, Tex	329 Smithville	98.670	323.720
Do	W_5	100.622	330.124
Do	X_5	100.658	330.242
Do	Y_5	99.525	326.525
Near Smithville, Tex	433 S. A	129.664	425.406
Do	460 S. A	137.936	452.545
Do	Z_5	150.508	493.792
Rosanky, Tex	512 S. A	153.729	504.359
Near Hemkens, Tex	451 S. A	134.950	442.748
Do	T. B. M. 117	136.046	446.344
Do	A_6	135.952	446.035
Red Rock, Tex	491 S. A	147.148	482.768
Bateman, Tex	B_6	144.027	472.529
Near Dale, Tex	C_6	152.427	500.088
Near Lockhart, Tex	D_6	130.791	429.103
Lockhart, Tex	Geol. Lockhart	153.834	504.704
Do	E_6	160.254	525.766
Do	F_6	159.747	524.103
Near Lockhart, Tex	G_6	162.831	534.222
Near Clear Fork, Tex	Geol. Clear Fork	173.659	569.747
Maxwell, Tex	Geol. Maxwell	184.074	603.916
Near Maxwell, Tex	H_6	177.680	582.938
Near Reedville, Tex	100 S. A	177.091	581.006
San Marcos, Tex	I_6	178.334	585.084
Do	J_6	188.596	618.752
Do	K_6	189.988	623.319
Near San Marcos, Tex	585 San Marcos	176.100	577 755
Near Hunter, Tex	L_6	205.077	672.823
Do	627 Yorks	189.481	621.656
Do	M_6	197.796	648.936
Goodwin, Tex	N_6	210.440	690.418
Do	695 S. A	210.365	690.173
Near New Braunfels, Tex	T_6	187.743	615.953
Do	Seguin West Base	189.104	620.418
Near Seguin, Tex	Seguin East Base	181.883	596.728
Near New Braunfels, Tex	O_6	190.288	624.303
Do	638 Comal	193.028	633.293
New Braunfels, Tex	P_6	194.679	638.709
Do	Q_6	193.622	635.242
Do	R_6	192.180	630.511
Do	S_6	193.183	633.801
Primms Spur, Tex	316 Primms Spur	94.686	310.649
Near Kirtley, Tex	U_6	94.982	311.620
West Point, Tex	292 West Point	87.355	286.598
Do	V_6	90.317	296.315
Plum, Tex	W_6	91.317	299.596
Do	X_6	91.280	299.474
Near La Grange, Tex	Y_6	86.125	282.562
La Grange, Tex	Z_6	82.191	269.655
Do	A_7	82.038	269.153
Do	B_7	83.609	274.307
Near Halsted, Tex	C_7	99.383	326.059
Halsted, Tex	D_7	94.057	308.585
Fayetteville, Tex	E_7	127.249	417.483
Do	F_7	120.089	393.992
Boggy Tank, Tex	G_7	82.634	271.108
Near New Ulm, Tex	H_7	109.433	359.032
New Ulm, Tex	I_7	122.557	402.089
Do	J_7	119.906	393.391
Near New Ulm, Tex	K_7	110.185	361.490
Cat Spring, Tex	L_7	92.578	303.733

*This is the elevation determined in November, 1903, after the bench mark had apparently settled about 0.071 meter between that time and the date of its establishment in April, 1903.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Sealy, Tex.	M_7	69.047	226.532
Do.	N_7	66.604	218.516
Sealy, Tex.	O_7	62.046	203.563
Do.	P_7	62.240	204.199
Do.	Q_7	61.074	200.374
Near San Felipe, Tex.	R_7	45.029	147.733
Near McDowell, Tex.	S_7	37.954	124.520
Near Brookshire, Tex.	T_7	36.605	120.095
Brookshire, Tex.	U_7	49.521	162.470
Near Brookshire, Tex.	V_7	47.902	157.158
Near Katy, Tex.	W_7	43.811	143.737
Katy, Tex.	X_7	43.085	141.355
Do.	Y_7	43.430	142.487
Near Katy, Tex.	Z_7	40.992	134.488
Burnap, Tex.	A_8	38.044	124.816
Barker, Tex.	B_8	32.149	105.476
Lettitia, Tex.	C_8	29.362	96.332
Near Hillendahl, Tex.	D_8	27.403	89.905
Do.	E_8	26.540	87.073
Do.	F_8	23.966	78.628
Do.	G_8	21.894	71.831
Eureka, Tex.	H_8	20.908	68.595
Houston Heights, Tex.	I_8	18.598	61.017
Houston, Tex.	J_8	13.718	45.006
Do.	K_8	12.910	42.356
Do.	L_8	13.289	43.599
Do.	City	13.967	45.824
Near Houston, Tex.	M_8	13.210	43.339
Near Harrisburg, Tex.	N_8	7.120	23.359
Harrisburg, Tex.	R. M.	11.665	38.271
Near Harrisburg, Tex.	O_8	11.431	37.503
Do.	M. M. 9	10.762	35.308
Do.	P_8	11.670	38.287
Near Genoa, Tex.	Q_8	11.342	37.212
Do.	M. M. 12	12.590	41.306
Genoa, Tex.	R_8	15.193	49.846
Do.	S_8	14.338	47.040
Near Genoa, Tex.	M. M. 16	13.281	43.573
Do.	M. M. 18	9.499	31.165
Near Webster, Tex.	T_8	9.603	31.506
Webster, Tex.	U_8	8.199	26.900
Near Webster, Tex.	M. M. 22	8.212	26.943
League City, Tex.	V_8	7.177	23.547
Near League City, Tex.	W_8	6.995	22.949
Near Dickinson, Tex.	X_8	6.493	21.303
Dickinson, Tex.	Y_8	5.679	18.632
Near Dickinson, Tex.	Z_8	5.894	19.337
Near Lamarque, Tex.	M. M. 32	6.356	20.853
Do.	M. M. 34	5.485	17.995
Lamarque, Tex.	A_9	5.674	18.615
Do.	B_9	5.275	17.307
Texas City Jct., Tex.	C_9	2.585	8.481
Near Texas City Jct., Tex.	M. M. 41	1.319	4.327
Virginia Point, Tex.	D_9	1.497	4.911
Near Galveston, Tex.	E_9	0.741	2.431
Galveston, Tex.	F_9	2.028	6.653
Do.	G_9	2.376	7.795
Do.	Tidal 19	2.940	9.646
Do.	Tidal 18	1.733	5.686
Do.	Tidal 17	2.576	8.451
Do.	City	3.097	10.161
Do.	Tidal 16	1.882	6.175
Do.	Tidal 15	1.953	6.407
Do.	Tidal 14	1.924	6.312
Do.	Tidal 13	2.379	7.805
Do.	Tidal 12	2.606	8.550
Do.	Tidal 11	2.490	8.169
Do.	Tidal 10	2.614	8.576
Do.	Tidal 9	0.964	3.162
Do.	Tidal 4	2.451	8.041
Do.	Tidal 3	2.299	7.543
Do.	Tidal 2	1.628	5.341
Do.	Tidal 8	2.602	8.537
Do.	Tidal 7	2.576	8.451
Do.	Tidal 6	2.410	7.906
Do.	Tidal 5	1.042	3.419
Near Grafton, Ill.	T. B. M. 2	132.896	436.010
Do.	P. B. M. 1	136.494	447.814
	Top of cap over same	137.714	451.817
Near Rosedale, Ill.	T. B. M. 8	134.110	439.993
Do.	T. B. M. 9	134.290	440.583
Do.	P. B. M. 2	138.558	454.586
Do.	T. B. M. 10	136.280	447.112
Do.	P. B. M. 3	132.004	433.083
	Top of cap over same	133.220	437.073
Near Nutwood, Ill.	P. B. M. 4	132.035	433.185
Nutwood, Ill.	P. B. M. 5	132.232	433.831
	Top of cap over same	133.450	437.827
Near Spankey, Ill.	P. B. M. 6	128.322	421.003
	Top of cap over same	129.536	424.986
Spankey, Ill.	P. B. M. 7	134.303	440.626
	Top of cap over same	135.516	444.605
Near Spankey, Ill.	T. B. M. 27	136.303	447.187
Near Spankey, Ill.	P. B. M. 8	130.932	429.566
	Top of cap over same	132.144	433.542
Eldred, Ill.	P. B. M. 9	137.024	449.553
	Top of cap over same	138.233	453.519
Near Eldred, Ill.	P. B. M. 10	142.452	467.361
	Top of cap over same	143.657	471.315
Near Bridgewater, Ill.	P. B. M. 11	144.474	473.995
	Top of cap over same	145.684	477.965
Do.	P. B. M. 12	131.992	433.044
	Top of cap over same	133.204	437.020
Pegram, Ill.	P. B. M. 13	131.536	431.548
	Top of cap over same	132.743	435.508
Near Hillview, Ill.	P. B. M. 14	133.011	436.387
	Top of cap over same	134.210	440.321
Do.	P. B. M. 15	143.847	471.938
	Top of cap over same	145.058	475.911
Near Glasgow, Ill.	P. B. M. 16	134.662	441.804
	Top of cap over same	135.860	445.734
Near Bloomfield, Ill.	P. B. M. 17	135.019	442.975
	Top of cap over same	136.217	446.905
Do.	P. B. M. 18	133.662	438.523
	Top of cap over same	134.871	442.489
Near Oxville, Ill.	P. B. M. 19	136.002	446.200
	Top of cap over same	137.207	450.153
Bluffs, Ill.	P. B. M. 20	142.303	466.872
	Top of cap over same	143.505	470.816
Near Bluffs, Ill.	P. B. M. 21	147.882	485.176
	Top of cap over same	149.077	489.097
Near Meredosia, Ill.	P. B. M. 22	145.322	476.777
	Top of cap over same	146.519	480.704
Near Lydda, Ill.	P. B. M. 23	137.148	449.960
	Top of cap over same	138.344	453.884
Near Beardstown, Ill.	P. B. M. 24	138.283	453.683
	Top of cap over same	139.478	457.604
Do.	P. B. M. 25	134.073	439.871
	Top of cap over same	135.279	443.828
Beardstown, Ill.	B. M.	136.008	446.220
Do.	P. B. M. 26	135.439	444.353
Do.	P. B. M. 27	135.232	443.674
Near Beardstown, Ill.	P. B. M. 28	135.863	445.744
	Top of cap over same	137.063	449.681
Do.	P. B. M. 29	144.476	474.002
	Top of cap over same	145.682	477.958
Near Chandlerville, Ill.	P. B. M. 30	147.693	484.556
	Top of cap over same	148.894	488.496
Chandlerville, Ill.	P. B. M. 31	140.151	459.812
	Top of cap over same	141.352	463.752
Saidora, Ill.	P. B. M. 32	143.834	471.895
	Top of cap over same	145.035	475.836
Bath, Ill.	P. B. M. 33	139.742	458.470
	Top of cap over same	140.946	462.420
Do.	P. B. M. 34	141.882	465.491
Matanzas, Ill.	P. B. M. 35	140.499	460.954
	Top of cap over same	141.701	464.897
Near Havana, Ill.	P. B. M. 36	144.355	473.605
	Top of cap over same	145.559	477.555
Havana, Ill.	P. B. M. 37	137.575	451.361
Do.	P. B. M. 38	143.542	470.937
Do.	P. B. M. 39	144.574	474.323
Do.	P. B. M. 40	143.453	470.645
Near Havana, Ill.	P. B. M. 41	142.381	467.128
	Top of cap over same	143.589	471.092
Do.	T. B. M. 186	135.821	445.606
Near Liverpool, Ill.	P. B. M. 42	146.697	481.288
	Top of cap over same	147.899	485.232
Near Topeka, Ill.	P. B. M. 43	150.606	494.113
	Top of cap over same	151.809	498.060
Near Manito, Ill.	P. B. M. 44	156.209	512.496
	Top of cap over same	157.418	516.462
Near Marshalls Landing, Ill.	P. B. M. 45	155.652	510.668
	Top of cap over same	156.857	514.622
Do.	P. B. M. 46	155.059	508.723
	Top of cap over same	156.264	512.676
Near Gales Landing, Ill.	P. B. M. 47	136.945	449.294
	Top of cap over same	138.155	453.264
Near Stoehrs, Ill.	T. B. M. 228	138.473	454.307
Do.	U. S. G. S.	138.474	454.310
Near Pekin, Ill.	P. B. M. 48	142.587	467.804
	Top of cap over same	143.788	471.744
Do.	T. B. M. 235	141.034	462.709
Pekin, Ill.	T. B. M. 237	137.522	451.187
Do.	P. B. M. 49	138.813	455.422
Do.	T. B. M. 238	141.155	463.106
Near Pekin, Ill.	T. B. M. 239	142.031	465.980
Do.	T. B. M. 240	141.092	462.899
Do.	P. B. M. 50	140.630	461.384
	Top of cap over same	141.834	465.334
Wesley, Ill.	P. B. M. 51	136.292	447.151
	Top of cap over same	137.500	451.115
Wesley Junction, Ill.	T. B. M. 249	138.387	454.025
Peoria, Ill.	P. B. M. 52	139.158	456.554
Do.	T. B. M. 250	139.097	456.354
Do.	T. B. M. 251	138.920	455.773
Do.	T. B. M. 253	139.847	458.815
Do.	B. M.	139.849	458.821

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Peoria, Ill	P. B. M. 53	137.951	452.594
Do	P. B. M. 54	138.904	455.721
Do	T. B. M. 254	143.343	470.284
Averyville, Ill	T. B. M. 256	143.684	471.403
Near Peoria, Ill	T. B. M. 257	139.520	457.742
Do	P. B. M. 55	138.244	453.556
	Top of cap over same	139.452	457.519
Do	B. M. 1 P	138.147	453.237
Do	T. B. M. 258	141.627	464.655
Do	P. B. M. 56	144.173	473.008
	Top of cap over same	145.383	476.977
Mossville, Ill	P. B. M. 57	142.652	468.017
	Top of cap over same	143.854	471.961
Near Mossville, Ill	P. B. M. 58	139.923	459.064
	Top of cap over same	141.123	463.011
Rome, Ill	P. B. M. 59	140.658	461.475
	Top of cap over same	141.853	465.396
Chillicothe, Ill	P. B. M. 60	148.102	485.898
	Top of cap over same	149.314	489.874
Near Chillicothe, Ill	T. B. M. 283	146.998	482.276
Do	P. B. M. 61	145.858	478.536
Do	P. B. M. 62	140.163	459.851
	Top of cap over same	141.370	463.811
Near Sparland, Ill	T. B. M. 291	141.485	464.189
Sparland, Ill	P. B. M. 63	138.906	455.727
	Top of cap over same	140.112	459.684
Near Sparland, Ill	T. B. M. 293	138.576	454.645
Near Henry, Ill	P. B. M. 64	143.484	470.747
	Top of cap over same	144.688	474.697
Do	T. B. M. 297	142.115	466.256
Do	T. B. M. 299	148.615	487.581
Do	P. B. M. 65	148.490	487.171
	Top of cap over same	149.691	491.111
Do	T. B. M. 303	158.769	520.895
Do	T. B. M. 304	159.218	522.368
Near Putnam, Ill	P. B. M. 66	157.691	517.358
	Top of cap over same	158.888	521.285
Putnam, Ill	P. B. M. 67	159.354	522.814
	Top of cap over same	160.565	526.787
Near Putnam, Ill	P. B. M. 68	143.794	471.764
	Top of cap over same	144.993	475.698
Near Bureau, Ill	T. B. M. 314	141.082	462.867
Do	T. B. M. 317	143.046	469.310
Do	P. B. M. 69	139.856	458.844
	Top of cap over same	141.059	462.791
Bureau, Ill	T. B. M. 319	143.984	472.388
Near Bureau, Ill	T. B. M. 321	142.999	469.156
Do	P. B. M. 70	143.605	471.144
	Top of cap over same	144.805	475.081
Near Depue, Ill	T. B. M. 324	142.608	467.873
Do	P. B. M. 71	145.398	477.027
	Top of cap over same	146.604	480.983
Near Marquette, Ill	T. B. M. 328	141.414	463.956
Do	R. R. B. M	141.365	463.795
Do	T. B. M. 330	140.814	461.987
Near Spring Valley, Ill	T. B. M. 332	140.991	462.568
Do	P. B. M. 72	142.500	467.519
	Top of cap over same	143.705	471.472
Do	T. B. M. 333	141.218	463.313
Spring Valley, Ill	P. B. M. 73	140.911	462.306
Do	Sanitary B. M	141.715	464.943
Near Spring Valley, Ill	T. B. M. 335	140.987	462.555
Do	P. B. M. 74	139.793	458.638
	Top of cap over same	140.997	462.588
Near Peru, Ill	T. B. M. 336	141.574	464.481
Do	T. B. M. 337	141.365	463.795
Peru, Ill	T. B. M. 338	143.598	471.121
Do	P. B. M. 75	139.890	458.956
Near Peru, Ill	Sanitary B. M	139.887	458.946
Lasalle, Ill	B. M. 70 A (Seddon)	136.689	448.454
Do	B. M. 38 (1883)	136.673	448.401
Do	P. B. M. 76	142.683	468.119
Do	T. B. M. 340	140.589	461.249
Do	Sanitary B. M	140.682	461.554
Do	P. B. M. 77	148.670	487.761
Near Lasalle, Ill	T. B. M. 343	136.853	448.992
Near Utica, Ill	P. B. M. 78	137.593	451.420
	Top of cap over same	138.799	455.376
Do	T. B. M. 347	138.576	454.645
Do	B. M. 69 (Seddon)	138.579	454.655
Do	U. S. B. M	141.751	465.061
Do	P. B. M. 79	141.722	464.966
Do	T. B. M. 348	137.435	450.901
Do	T. B. M. 349	136.871	449.051
Do	P. B. M. 80	141.018	462.657
	Top of cap over same	142.222	466.607
Near Ottawa, Ill	P. B. M. 81	145.515	477.410
Do	P. B. M. 82	140.840	462.073
	Top of cap over same	142.045	466.026
Do	T. B. M. 357	147.901	485.239
Ottawa, Ill	B. M. 64 (Seddon)	145.360	476.902
Do	P. B. M. 83	144.428	473.844
Do	B. M. 63 (Seddon)	146.349	480.147
Do	T. B. M. 361	147.422	483.667
Do	P. B. M. 84	144.488	474.041
Near Ottawa, Ill	T. B. M. 363	150.122	492.525
Near Ottawa, Ill	B. M. 62 (Seddon)	150.133	492.561
Do	T. B. M. 366	147.473	483.834
Do	P. B. M. 85	147.586	484.205
	Top of cap over same	148.782	488.129
Marseilles, Ill	T. B. M. 371	149.941	491.931
Do	P. B. M. 86	146.884	481.902
Do	B. M. 59 (Seddon)	149.425	490.239
Do	P. B. M. 87	151.554	497.223
Do	B. M. (Ward 1902)	154.093	505.553
Near Marseilles, Ill	P. B. M. 88	152.922	501.712
	Top of cap over same	154.128	505.668
Do	B. M. 10 (Ward 1899)	152.410	500.032
Near Seneca, Ill	T. B. M. 378	152.625	500.737
Do	B. M. 15 (Ward 1899)	152.414	500.045
Do	T. B. M. 380	156.032	511.915
Do	P. B. M. 89	154.523	506.964
	Top of cap over same	155.731	510.927
Do	P. B. M. 90	154.632	507.322
	Top of cap over same	155.842	511.292
Near Morris, Ill	P. B. M. 91	154.702	507.551
	Top of cap over same	155.959	511.675
Morris, Ill	T. B. M. 394	153.992	505.222
Do	T. B. M. 395	154.904	508.214
Do	P. B. M. 92	153.638	504.061
Do	B. M. 45 A (Seddon)	155.065	508.742
Do	B. M. 45 B (Seddon)	148.538	487.328
Near Morris, Ill	T. B. M. 398	154.241	506.039
Do	T. B. M. 400	155.039	508.657
Do	P. B. M. 93	151.896	498.345
	Top of cap over same	153.104	502.309
Do	T. B. M. 402	152.976	501.889
Do	P. B. M. 94	156.311	512.830
Do	B. M. 39 (Seddon)	156.318	512.853
Do	P. B. M. 95	154.765	507.758
	Top of cap over same	155.972	511.718
Do	T. B. M. 404	152.786	501.265
Near Channahon, Ill	T. B. M. 405	155.373	509.753
Do	B. M. 38 A (Seddon)	159.310	522.670
Do	P. B. M. 96	160.042	525.071
	Top of cap over same	161.249	529.031
Channahon, Ill	P. B. M. 97	159.150	522.145
Do	B. M.	159.154	522.158
Near Channahon, Ill	P. B. M. 98	160.081	525.199
	Top of cap over same	161.287	529.156
Do	S. D. 144	164.482	539.638
Do	S. D. 143	165.070	541.567
Do	P. B. M. 99	157.447	516.557
	Top of cap over same	158.650	520.504
Millsdale, Ill	B. M. 25 A (Seddon)	155.366	509.730
Do	S. D. 141	174.357	572.036
Near Joliet, Ill	T. B. M. 424	155.932	511.587
Do	P. B. M. 100	158.532	520.117
	Top of cap over same	159.736	524.067
Do	T. B. M. 427	159.339	522.765
Near Rockdale, Ill	T. B. M. 429	161.253	529.044
Do	S. D. 135	159.474	523.208
Rockdale, Ill	P. B. M. 101	159.218	522.368
	Top of cap over same	160.422	526.318
Do	S. D. 130	162.063	531.702
Near Rockdale, Ill	P. B. M. 102	158.327	519.444
Joliet, Ill	T. B. M. 432	166.335	545.717
Do	T. B. M. 433	164.956	541.193
Do	P. B. M. 103	164.024	538.135
Do	S. D. 127	166.173	545.186
Do	T. B. M. 434	165.849	544.123
Do	T. B. M. 435	167.520	549.605
Do	P. B. M. 104	167.332	548.988
Do	T. B. M. 436	166.099	544.943
Do	P. B. M. 105	167.045	548.047
Near Joliet, Ill	P. B. M. 106	168.860	554.002
Do	S. D. 117	170.532	559.487
Do	T. B. M. 437	170.763	560.245
Near Lockport, Ill	T. B. M. 438	173.579	569.484
Do	S. D. 109	173.585	569.503
Lockport, Ill	S. D. 107	177.250	581.528
Do	S. D. 106	177.260	581.561
Do	P. B. M. 107	174.741	573.296
Do	P. B. M. 108	174.974	574.061
Do	S. D. 116	183.542	602.171
Do	S. D. 114	178.349	585.133
Do	T. B. M. 440	171.936	564.093
Do	P. B. M. 109	171.942	564.113
Do	P. B. M. 110	173.391	568.867
Do	P. B. M. 111	175.137	574.595
Near Lockport, Ill	T. B. M. 441	178.307	584.996
Do	Sanitary B. M	178.312	585.012
Do	T. B. M. 442	178.302	584.979
Near Romeo, Ill	T. B. M. 443	178.290	584.940
Do	T. B. M. 444	177.938	583.785
Do	P. B. M. 112	177.756	583.188
Romeo, Ill	S. D. 94	179.606	589.257
Do	P. B. M. 113	181.508	595.497
Do	S. D. 93	181.093	594.136
Do	Sanitary B. M	179.701	589.569
Near Romeo, Ill	T. B. M. 445	177.744	583.148
Do	T. B. M. 446	177.642	582.814

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Romeo, Ill	T. B. M. 447	177.868	583.555
Near Lemont, Ill	T. B. M. 449	178.284	584.920
Do	T. B. M. 450	178.242	584.782
Lemont, Ill	T. B. M. 451	179.631	589.339
Do	P. B. M. 114	181.093	594.136
Do	P. B. M. 115	179.866	590.110
Do	S. D. 88	184.534	605.425
Do	S. D. 30	184.176	604.251
Do	S. D. 79	179.125	587.679
Near Lemont, Ill	T. B. M. 452	178.372	585.209
Do	P. B. M. 116	178.288	584.933
Do	T. B. M. 453	178.336	585.091
Do	P. B. M. 117	178.312	585.012
Do	Lower Sanitary B. M.	178.322	585.045
Do	Upper Sanitary B. M.	178.303	584.982
Do	T. B. M. 454	178.302	584.979
Sag Bridge Station, Ill	T. B. M. 455	178.292	584.946
Near Willow Springs, Ill	T. B. M. 456	178.303	584.982
Do	P. B. M. 118	178.251	584.812
Do	S. D. 62	179.793	589.871
Do	S. D. 63	180.618	592.578
Do	S. D. 64	180.189	591.170
Do	T. B. M. 457	178.337	585.094
Do	T. B. M. 458	178.316	585.025
Do	P. B. M. 119	178.413	585.343
Willow Springs, Ill	T. B. M. 459	181.362	595.018
Do	Sanitary B. M	178.790	586.580
Do	S. D. 54	184.484	605.261
Do	S. D. 51	182.323	598.171
Do	S. D. 50	182.423	598.499
Do	P. B. M. 120	180.485	592.141
Do	P. B. M. 121	187.910	616.501
Do	S. D. 57	186.406	611.567
Mount Forest, Ill	T. B. M. 460	180.794	593.155
Do	S. D. 49	180.238	591.331
Do	S. D. 48	180.780	593.109
Near Mount Forest, Ill	T. B. M. 461	181.296	594.802
Do	T. B. M. 462	180.931	593.604
Near Summit, Ill	T. B. M. 463	181.016	593.883
Do	T. B. M. 464	181.013	593.873
Do	T. B. M. 465	180.811	593.211
Do	P. B. M. 122	181.302	594.822
Do	S. D. 40	180.923	593.578
Do	S. D. 39	183.722	602.761
Do	Sanitary B. M	183.036	600.511
Do	P. B. M. 123	186.314	611.265
	Top of cap over same	187.518	615.215
Do	Chicago West Base	187.858	616.331
Summit, Ill	T. B. M. 466	180.555	592.371
Do	P. B. M. 124	182.765	599.621
Do	Sanitary B. M	182.769	599.635
Near Summit, Ill	T. B. M. 468	181.550	595.635
Do	P. B. M. 125	181.390	595.110
Do	P. B. M. 126	183.187	601.006
	Top of cap over same	184.394	604.966
Near Chicago, Ill	S. D. 22	181.019	593.893
Do	T. B. M. 470	180.643	592.660
Do	T. B. M. 471	180.703	592.856
Chicago, Ill	T. B. M. 472	180.025	590.632
Do	P. B. M. 127	183.317	601.433
Do	S. D. 24	180.606	592.538
Do	S. D. 18	182.534	598.864
Do	P. B. M. 128	180.909	593.532
	Top of cap over same	182.118	597.499
Do	T. B. M. 474	180.597	592.509
Do	P. B. M. 129	182.626	599.165
Do	Sanitary B. M	183.097	600.711
Do	S. D. 16	182.982	600.333
Do	S. D. 15	182.206	597.788
Do	S. D. 14	181.746	596.278
Do	T. B. M. 475	181.899	596.780
Do	P. B. M. 130	182.999	600.389
Do	Sanitary B. M	183.908	603.371
Do	P. B. M. 131	181.570	595.701
Do	South Sanitary B. M	183.844	603.162
Do	North Sanitary B. M	183.835	603.132
Do	T. B. M. 476	179.877	590.146
Do	T. B. M. 477	180.861	593.375
Do	T. B. M. 478	180.886	593.457
Do	P. B. M. 132	182.029	597.207
Do	P. B. M. 133	181.616	595.852
Do	P. B. M. 134	181.496	595.458
Do	West Sanitary B. M.	183.003	600.402
Do	East Sanitary B. M.	182.991	600.363
Do	T. B. M. 479	181.728	596.219
Do	S. D. 9	180.657	592.706
Do	T. B. M. 480	179.041	587.404
Do	P. B. M. 135	179.459	588.775
Do	S. D. 7	180.375	591.780
Do	S. D. 6	180.353	591.708
Do	S. D. 2	178.304	584.986
Do	S. D. 1	179.641	589.372
Do	T. B. M. 481	179.952	590.393
Do	T. B. M. 482	180.394	591.843
Chicago, Ill	T. B. M. 483	179.213	587.968
Do	P. B. M. 136	180.917	593.559
Do	T. B. M. 484	181.116	594.211
Do	City 7	180.845	593.322
Do	T. B. M. 485	181.109	594.188
Do	P. B. M. 137	180.789	593.139
Do	P. B. M. 138	181.134	594.270
Do	P. B. M. 139	181.171	594.392
Do	T. B. M. 486	179.892	590.196
Do	T. B. M. 488	180.802	593.181
Do	P. B. M. 98	182.417	598.480
Do	City 9	180.700	592.847
Do	B. M. VII	181.540	595.602
Do	B. M. VI	181.444	595.288
Do	P. B. M. 96	182.375	598.342
Pekin, Ill	A=City	146.028	479.094
Do	B	146.024	479.080
Near Leslie, Ill	D	207.868	681.980
Tremont, Ill	E	196.116	643.424
Near Menert, Ill	F	175.454	575.635
Do	G	177.740	583.135
Mackinaw, Ill	H	196.974	646.239
Lilly, Ill	I	244.836	803.266
Woodruff, Ill	J	256.093	840.198
Danvers, Ill	K	246.666	809.270
Near Twin Grove, Ill	L	230.108	754.946
Twin Grove, Ill	M	248.845	816.419
Near Bloomington, Ill	N	227.467	746.281
Do	O	241.996	793.949
Bloomington, Ill	P	252.923	829.798
Near Gillum, Ill	Q	253.849	832.836
Gillum, Ill	R	250.063	820.415
Downs, Ill	S	242.094	794.270
Near Ford Woods, Ill	T	241.201	791.340
Le Roy, Ill	U	237.715	779.903
Empire, Ill	V	230.301	755.579
Near Farmer City, Ill	W	222.723	730.717
Farmer City, Ill	X	223.269	732.508
Harris, Ill	Y	219.954	721.632
Mansfield, Ill	Z	221.678	727.289
Near Mahomet, Ill	A_1	219.963	721.662
Mahomet, Ill	B_1	217.054	712.118
Near Mahomet, Ill	C_1	223.580	733.529
Rising, Ill	D_1	223.752	734.093
Near Champaign, Ill	E_1	228.090	748.325
Champaign, Ill	F_1	219.792	721.101
Do	G_1	220.302	722.774
Olney, Ill	A_3	147.415	483.644
Near Olney, Ill	B_3	141.893	465.527
Do	C_3	144.874	475.307
Near Dundas, Ill	D_3	146.698	481.292
Near West Liberty, Ill	E_3	146.686	481.252
Do	F_3	154.573	507.128
Near Boos, Ill	G_3	160.086	525.215
Near Newton, Ill	H_3	156.359	512.988
Do	I_3	164.228	538.805
Near Falmouth, Ill	J_3	172.176	564.881
Roschill, Ill	K_3	172.710	566.633
Near Hidalgo, Ill	L_3	177.478	582.276
Do	M_3	180.942	593.641
Greenup, Ill	N_3	165.717	543.690
Near Greenup, Ill	O_3	168.673	553.388
Near Toledo, Ill	P_3	183.753	602.863
Near Bradbury, Ill	Q_3	185.359	608.132
Do	R_3	206.223	676.583
Near Janesville, Ill	S_3	224.314	735.937
Lerna, Ill	T_3	229.916	754.316
Near Lerna, Ill	U_3	215.978	708.588
Do	V_3	187.620	615.550
Charleston, Ill	W_3	205.071	672.804
Do	X_3	209.257	686.537
Near Charleston, Ill	Y_3	209.357	686.865
Near Fairgrange, Ill	Z_3	209.423	687.082
Near Bushton, Ill	A_4	203.176	666.587
Near Rardin, Ill	B_4	200.665	658.348
Near Oakland, Ill	C_4	199.042	653.024
Do	D_4	201.654	661.593
Do	E_4	201.834	662.184
Near Brockton, Ill	F_4	206.856	678.660
Do	G_4	200.030	656.265
Near Hume, Ill	H_4	196.992	646.298
Do	I_4	211.401	693.571
Near Hildreth, Ill	J_4	210.917	691.984
Sidell, Ill	K_4	208.845	685.186
Near Sidell, Ill	L_4	207.222	679.861
Jamaica, Ill	M_4	206.628	677.912
Near Jamaica, Ill	N_4	203.715	668.355
Near Fairmount Jct., Ill	O_4	199.499	654.523
Do	P_4	204.942	672.381
Near Catlin, Ill	Q_4	200.375	657.397
Near Fairmount, Ill	R_4	199.906	655.858
Do	S_4	202.507	664.392

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Homer, Ill.	T_4	205.583	674.484
Do	U_4	203.615	668.027
Sidney, Ill.	V_4	205.001	672.574
Deers, Ill.	W_4	210.908	691.954
Mira, Ill.	X_4	212.167	696.085
Near Urbana, Ill.	Y_4	214.775	704.641
Near Renick, Ohio	A	187.964	616.679
Near Locks, Ohio	B	185.938	610.032
Do	C	179.592	589.211
Near Higby, Ohio	D	179.446	588.732
Omega, Ohio	E	181.550	595.635
Near Omega, Ohio	F	174.052	571.036
Near Waverly, Ohio	G	173.683	569.825
Near Glen Jean, Ohio	H	171.246	561.830
Piketon, Ohio	I	176.253	578.257
Near Sargents, Ohio	J	176.680	579.658
Near Wakefield, Ohio	K	167.924	550.931
Clifford, Ohio	L	169.493	556.078
Near Lucasville, Ohio	M	168.880	554.067
Near Davis, Ohio	N	170.310	558.759
Do	O	170.039	557.870
Near Vera, Ohio	P	162.680	533.726
Portsmouth, Ohio	U. S. E	163.108	535.130
Chillicothe, Ohio	A	196.046	643.194
Near Chillicothe, Ohio	C	189.070	620.307
Delano, Ohio	D	210.542	690.753
Do	E	211.517	693.952
Kingston, Ohio	F	235.936	774.067
Near Kingston, Ohio	G	227.598	746.711
Near Haysville, Ohio	H	217.523	713.657
Near Circleville, Ohio	I	215.352	706.534
Do	J	210.372	690.195
Circleville, Ohio	K	211.400	693.568
Near Circleville, Ohio	L	211.239	693.040
Near Cromley, Ohio	M	216.293	709.621
Duvalls, Ohio	N	217.048	712.098
Near Duvalls, Ohio	O	218.200	715.878
Lockbourne, Ohio	P	218.121	715.619
Near Rees, Ohio	Q	220.330	722.866
Near Valley Crossing, Ohio	R	229.190	751.934
Columbus, Ohio	T	237.013	777.600
Do	S=City	237.866	780.399
Near Bannon, Ohio	A	229.357	752.482
Near Truro, Ohio	T. B. M. 6	233.891	767.357
Near Brice, Ohio	T. B. M. 9	243.157	797.758
Near Harley, Ohio	C	263.664	865.038
Basil, Ohio	D	264.393	867.429
Thurston, Ohio	E	270.169	886.379
Near Thurston, Ohio	F	285.040	935.169
Near New Salem, Ohio	G	290.100	951.770
Thornport, Ohio	H	274.289	899.896
Near Thornport, Ohio	I	268.244	880.064
Glenford, Ohio	J	258.809	849.109
Do	844 Glenford	257.422	844.559
Near Glassrock, Ohio	K	251.735	825.901
Mount Perry, Ohio	L	244.298	801.501
Near Mount Perry, Ohio	M	243.105	797.587
Near Fultonham, Ohio	N	232.543	762.935
Near White Cottage, Ohio	O	218.523	716.938
Near South Zanesville, Ohio.	P	216.279	709.575
Zanesville, Ohio	Q	221.200	725.720
Do	725 Zanesville	221.193	725.697
Do	U. S. E. 2	213.147	699.300
Do	U. S. E. 1	213.091	699.116
Near Zanesville, Ohio	R	237.296	778.529
Sonora, Ohio	S	246.481	808.663
Near Sonora, Ohio	T	237.326	778.627
Do	U	234.758	770.202
Sundale, Ohio	V	270.085	886.104
New Concord, Ohio	W	257.040	843.305
Near New Concord, Ohio	X	248.399	814.956
Cassells, Ohio	Y	245.119	804.195
Near Cassells, Ohio	Z	245.215	804.510
Cambridge, Ohio	A′	270.031	885.927
Near Cambridge, Ohio	B′	245.235	804.575
Do	C′	238.920	783.857
Do	D′	239.965	787.285
Kimbolton, Ohio	E′	239.968	787.295
Birds Run, Ohio	G′	234.982	770.937
Guernsey, Ohio	H′	237.975	780.756
Near Guernsey, Ohio	I′	252.547	828.565
Newcomerstown, Ohio	J′	245.479	805.376
Near Newcomerstown, Ohio.	K′	245.339	804.916
Near Port Washington, Ohio.	P. R. R	249.351	818.079
Do	L′	249.346	818.063
Seventeen, Ohio	M′	254.533	835.080
Gnadenhutten, Ohio	N′	254.440	834.775
Near Tuscarawas, Ohio	O′	257.549	844.975
Uhrichsville, Ohio	B. & O. No. 48	262.822	862.275
Near Uhrichsville, Ohio	P′	262.585	861.498
Near Dennison, Ohio	P. R. R	261.826	859.007
Station 15 P. O., Ohio	868 Steubenville	264.756	868.620
Washington, D. C	B. & O. No. 1	12.800	41.995
Do	B. & O. No. 2	17.768	58.294
Near Winthrop Heights, D. C.	B. & O. No. 3	20.662	67.789
Langdon, D. C	B. & O. No. 4	20.858	68.432
Rives, Md	B. & O. No. 5	18.207	59.734
Near Hyattsville, Md	B. & O. No. 6	10.578	34.705
Alexandria Junction, Md	B. & O. No. 7	14.999	49.209
Riverdale, Md	B. & O. No. 7A	15.844	51.982
Near Riverdale, Md	B. & O. No. 8	16.217	53.205
Near College Park, Md	B. & O. No. 9	16.142	52.959
Near Berwyn, Md	B. & O. No. 9A	16.166	53.038
Near Branchville, Md	B. & O. No. 10	20.019	65.679
Do	B. & O. No. 11	23.636	77.546
Near Sunnyside, Md	B. & O. No. 12	30.886	101.332
Near Beltsville, Md	B. & O. No. 13	38.233	125.436
Near Ammendale, Md	B. & O. No. 14	42.013	137.838
Near Muirkirk, Md	B. & O. No. 14A	46.523	152.634
Do	B. & O. No. 15	48.057	157.667
Near Contee, Md	B. & O. No. 16	54.642	179.271
Do	B. & O. No. 17	53.621	175.922
Near Oak Crest, Md	B. & O. No. 17A	51.720	169.685
Near Laurel, Md	B. & O. No. 18	47.280	155.118
Laurel, Md	B. & O. No. 19	45.481	149.216
Near Savage Station, Md	B. & O. No. 20	52.699	172.897
Do	B. & O. No. 21	47.031	154.301
Near Annapolis Jct., Md	B. & O. No. 22	53.200	174.540
Near Bridewell, Md	B. & O. No. 23	51.924	170.354
Do	B. & O. No. 24	51.411	168.671
Near Jessups, Md	B. & O. No. 25	48.255	158.317
Near Montevideo, Md	B. & O. No. 26	41.799	137.136
Near Dorsey, Md	B. & O. No. 27	53.882	176.778
Near Harwood, Md	B. & O. No. 28	26.888	88.215
Near Hanover, Md	B. & O. No. 29	24.644	80.853
Near Elk Ridge, Md	B. & O. No. 30	21.673	71.106
Relay, Md	B. & O. No. 31	21.859	71.716
Near St. Denis, Md	B. & O. No. 31A	20.632	67.690
Do	B. & O. No. 32	22.523	73.894
Near Halethorpe, Md	B. & O. No. 33	20.665	67.798
Near Lansdowne, Md	P. R. R. No. 101	11.206	36.765
Lansdowne, Md	B. & O. No. 34	21.010	68.930
Near Lansdowne, Md	B. & O. No. 35	24.113	79.111
West Baltimore, Md	B. & O. No. 36	22.053	72.352
Baltimore, Md	B. & O. No. 39	2.784	9.134
Do	City 1288	38.728	127.060
Do	B. & O. No. 41	21.603	70.876
Do	B. & O. No. 42	28.562	93.707
Do	B. & O. No. 43	45.528	149.370
Do	City 1240	43.402	142.395
Baltimore, Md	Tidal 2	1.410	4.626
Do	Tidal 1	1.354	4.442
Do	Tidal 3	2.773	9.098
Do	Tidal 4	8.393	27.536
Do	City 1181	9.334	30.623
Do	L	21.312	69.921
Do	M	2.741	8.993
Do	B. & O. No. 40	7.663	25.141
Mount Winans, Md	B. & O. No. 38	6.593	21.631
Do	B. & O. No. 37	11.206	36.765
Near Relay, Md	B. & O. No. 100	20.309	66.630
Vineyard, Md	B. & O. No. 101	21.632	70.971
Near Vineyard, Md	B. & O. No. 102	23.487	77.057
Near Orange Grove, Md	B. & O. No. 103	28.952	94.987
Ilchester, Md	B. & O. No. 104	33.276	109.173
Gray, Md	B. & O. No. 105	37.029	121.486
Ellicott City, Md	B. & O. No. 106	44.006	144.376
Oella, Md	B. & O. No. 106A	45.121	148.034
Near Oella, Md	B. & O. No. 107	51.340	168.438
Near Hollofield, Md	B. & O. No. 108	57.160	187.532
Do	U. S. G. S	57.183	187.608
Do	B. & O. No. 109	58.712	192.624
Hollofield, Md	B. & O. No. 110	60.959	199.996
Near Hollofield, Md	B. & O. No. 111	65.749	215.712
Alberton, Md	B. & O. No. 112	67.773	222.352
Near Alberton, Md	B. & O. No. 113	72.254	237.053
Do	B. & O. No. 114	74.623	244.826
Near Davis, Md	B. & O. No. 115	76.019	249.406
Davis, Md	B. & O. No. 116	78.870	258.759
Near Woodstock, Md	B. & O. No. 117	82.773	271.564
Do	B. & O. No. 118	87.850	288.221
Near Marriottsville, Md	B. & O. No. 119	88.880	291.600
Marriottsville, Md	B. & O. No. 120	89.258	292.841
Near Henryton, Md	B. & O. No. 121	91.184	299.160
Near Gorsuch, Md	B. & O. No. 122	94.776	310.944
Gorsuch, Md	B. & O. No. 123	98.645	323.638
Near Sykesville, Md	B. & O. No. 124	107.007	351.072
Sykesville, Md	B. & O. No. 125	114.588	375.944
Near Gaither, Md	B. & O. No. 126	124.596	408.779
Do	B. & O. No. 127	127.783	419.235

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Hoods Mills, Md	B. & O. No. 128	130.484	428.096
Hoods Mills, Md	B. & O. No. 129	134.672	441.836
Near Morgan, Md	B. & O. No. 130	140.434	460.741
Near Woodbine, Md	B. & O. No. 131	148.124	485.970
Woodbine, Md	B. & O. No. 131A	151.142	495.872
Near Woodbine, Md	B. & O. No. 132	156.586	513.733
Near Watersville, Md	B. & O. No. 133	167.796	550.511
Do	B. & O. No. 134	180.905	593.519
Do	B. & O. No. 135	189.604	622.059
Do	B. & O. No. 136	214.336	703.201
Do	B. & O. No. 136A	207.242	679.926
Near Plane No. 4, Md	B. & O. No. 137	200.356	657.335
Do	B. & O. No. 138	177.185	581.314
Near Bartholows, Md	B. & O. No. 139	167.686	550.150
Bartholows, Md	B. & O. No. 140	161.058	528.404
Near Monrovia, Md	B. & O. No. 141	149.198	489.494
Do	B. & O. No. 142	144.324	473.503
Monrovia, Md	B. & O. No. 143	130.227	427.253
Near Monrovia, Md	B. & O. No. 144	119.184	391.023
Do	B. & O. No. 145	114.954	377.145
Near Ijamsville, Md	B. & O. No. 146	109.764	360.117
Do	B. & O. No. 147	107.267	351.925
Do	B. & O. No. 148	100.450	329.560
Do	B. & O. No. 149	96.026	315.045
Near Reels Mill, Md	B. & O. No. 150	88.943	291.807
Reels Mill, Md	B. & O. No. 151	83.534	274.061
Frederick Junction, Md	B. & O. No. 152	81.122	266.148
Near Frederick Jct., Md	B. & O. No. 152A	86.853	284.950
Near Frederick, Md	B. & O. No. 152B	92.226	302.578
Frederick, Md	B. & O. No. 152C	88.177	289.294
Near Frederick Jct., Md	B. & O. No. 153	76.881	252.234
Do	B. & O. No. 153A	76.579	251.243
Near Lime Kiln, Md	B. & O. No. 154	82.874	271.896
Do	B. & O. No. 155	86.453	283.638
Near Buckeystown Station, Md.	B. & O. No. 156	84.590	277.526
Buckeystown Station, Md.	B. & O. No. 156A	86.003	282.162
Near Buckeystown, Md	B. & O. No. 157	91.180	299.146
Near Adamstown, Md	B. & O. No. 158	94.588	310.327
Near Doubs, Md	B. & O. No. 159	87.027	285.521
Do	B. & O. No. 160	88.510	290.387
Near Washington Jct., Md.	B. & O. No. 161	87.379	286.676
Do	B. & O. No. 162	78.500	257.545
Washington Junction, Md.	B. & O. No. 44	71.898	235.885
Near Adamstown, Md	B. & O. No. 163	86.853	284.950
Near Doubs, Md	B. & O. No. 164	82.490	270.636
Near Washington Jct., Md.	B. & O. No. 165	76.832	252.073
Glencoe, Pa	B. & O. No. 177	489.306	1605.331
Near Glencoe, Pa	B. & O. No. 178	502.214	1647.680
Do	B. & O. No. 179	514.706	1688.665
Philson, Pa	B. & O. No. 180	546.044	1791.479
Near Philson, Pa	B. & O. No. 181	574.370	1884.412
Do	B. & O. No. 182	605.689	1987.165
Near Mance, Pa	B. & O. No. 182A	610.377	2002.545
Do	B. & O. No. 183	628.761	2062.860
Do	B. & O. No. 184	641.072	2103.250
Do	B. & O. No. 185	676.448	2219.313
Near Sand Patch, Pa	B. & O. No. 186	693.100	2273.946
Sand Patch, Pa	B. & O. No. 187	687.279	2254.848
Keystone, Pa	B. & O. No. 188	660.884	2168.250
Near Myersdale, Pa	B. & O. No. 189	642.193	2106.928
Myersdale, Pa	B. & O. No. 190	625.958	2053.664
Near Salisbury Jct., Pa	B. & O. No. 191	608.123	1995.150
Do	B. & O. No. 192	592.429	1943.661
Near Garrett, Pa	B. & O. No. 193	590.575	1937.578
Do	B. & O. No. 194	588.502	1930.777
Do	B. & O. No. 195	587.868	1928.697
Do	B. & O. No. 196	583.028	1912.821
Do	B. & O. No. 197	577.024	1893.120
McSpadden, Pa	B. & O. No. 198	569.381	1868.044
Near McSpadden, Pa	B. & O. No. 199	566.407	1858.287
Near Rockwood, Pa	B. & O. No. 200	562.552	1845.639
Do	B. & O. No. 201	556.884	1827.044
Rockwood, Pa	B. & O. No. 202	551.749	1810.196
Near Rockwood, Pa	B. & O. No. 203	547.541	1796.391
Do	B. & O. No. 204	542.847	1780.991
Near Casselman, Pa	B. & O. No. 205	537.506	1763.468
Casselman, Pa	B. & O. No. 206	529.261	1736.417
Near Casselman, Pa	B. & O. No. 207	523.052	1716.046
Near Markleton, Pa	B. & O. No. 208	516.933	1695.971
Markleton, Pa	B. & O. No. 209	511.013	1676.548
Pinkerton, Pa	B. & O. No. 210	499.942	1640.226
Near Pinkerton, Pa	B. & O. No. 211	490.182	1608.205
Fort Hill, Pa	B. & O. No. 212	482.012	1581.401
Near Fort Hill, Pa	B. & O. No. 213	472.193	1549.187
Do	B. & O. No. 214	457.908	1502.320
Near Ursina, Pa	B. & O. No. 215	442.257	1450.971
Near Confluence, Pa	B. & O. No. 216	425.627	1396.411
Confluence, Pa	B. & O. No. 217	405.991	1331.989
Near Confluence, Pa	B. & O. No. 218	402.867	1321.739
Do	B. & O. No. 219	396.201	1299.869
Near Bidwell, Pa	B. & O. No. 220	394.880	1295.535
Bidwell, Pa	B. & O. No. 221	391.878	1285.686
Near Bidwell, Pa	B. & O. No. 222	392.596	1288.042
Near Sipes, Pa	B. & O. No. 223	393.644	1291.480
Near Sipes, Pa	B. & O. No. 224	384.214	1260.542
Near Ohiopyle, Pa	B. & O. No. 225	375.280	1231.231
Do	B. & O. No. 226	368.474	1208.902
Near Bear Run, Pa	B. & O. No. 227	358.886	1177.445
Bear Run, Pa	B. & O. No. 228	351.150	1152.065
Near Bear Run, Pa	B. & O. No. 229	342.404	1123.370
Near Stewarton, Pa	B. & O. No. 230	333.974	1095.713
Do	B. & O. No. 231	327.275	1073.735
Do	B. & O. No. 232	318.647	1045.428
Near Indian Creek, Pa	B. & O. No. 233	310.068	1017.281
Indian Creek, Pa	B. & O. No. 234	295.371	969.063
Do	U. S. G. S.	295.655	969.995
Near Indian Creek, Pa	B. & O. No. 235	289.915	951.163
Do	B. & O. No. 236	286.650	940.451
Do	B. & O. No. 237	285.843	937.803
Do	B. & O. No. 238	280.090	918.929
Near South Connellsville, Pa.	B. & O. No. 239	277.487	910.389
Near Connellsville, Pa	B. & O. No. 240	269.552	884.355
Connellsville, Pa	B. & O. No. 240A= U. S. G. S.	269.599	884.509
Near Connellsville, Pa	B. & O. No. 241	267.140	876.442
Do	B. & O. No. 242	266.273	873.597
Near Broad Ford Junction, Pa.	B. & O. No. 243	263.776	865.405
Broad Ford, Pa	B. & O. No. 244	261.300	857.282
Near Broad Ford, Pa	B. & O. No. 245	260.527	854.746
Do	B. & O. No. 246	260.432	854.434
Near Dawson, Pa	B. & O. No. 246A	259.187	850.349
Do	B. & O. No. 247	258.261	847.311
Do	B. & O. No. 248	254.964	836.494
Do	B. & O. No. 249	255.829	839.332
Near Lavenia, Pa	B. & O. No. 250	254.424	834.723
Lavenia, Pa	B. & O. No. 251	254.060	833.529
Near Layton, Pa	B. & O. No. 253	246.629	809.149
Layton, Pa	B. & O. No. 254	245.519	805.507
Near Layton, Pa	B. & O. No. 255	244.503	802.174
Do	B. & O. No. 256	241.502	792.328
Near Banning, Pa	B. & O. No. 257	240.811	790.061
Near Jacobs Creek, Pa	B. & O. No. 258	238.765	783.348
Near Eureka, Pa	B. & O. No. 259	237.006	777.577
Smithton, Pa	B. & O. No. 260	236.409	775.619
Near Port Royal, Pa	B. & O. No. 261	236.942	777.367
Do	B. & O. No. 262	235.925	774.031
Near Reduction, Pa	B. & O. No. 263	235.881	773.886
Do	B. & O. No. 264	234.824	770.418
Griffin, Pa	B. & O. No. 264A	233.780	766.993
Near West Newton, Pa	B. & O. No. 265	234.302	768.706
West Newton, Pa	B. & O. No. 266	233.797	767.049
Near West Newton, Pa	B. & O. No. 266A	232.877	764.031
Do	B. & O. No. 267	233.234	765.202
Near Gratztown, Pa	B. & O. No. 268	231.648	759.998
Do	B. & O. No. 269	233.252	765.261
Suter, Pa	B. & O. No. 270	232.066	761.370
Near Scott Haven, Pa	B. & O. No. 271	233.088	764.723
Vista, Pa	B. & O. No. 273	232.870	764.008
Shaner, Pa	B. & O. No. 274	231.284	758.804
Guffey, Pa	B. & O. No. 275	229.616	753.332
Near Coulter, Pa	B. & O. No. 276	229.697	753.598
Do	B. & O. No. 277	229.404	752.636
Do	B. & O. No. 278	229.377	752.548
Do	B. & O. No. 279	229.390	752.590
Near Versailles, Pa	B. & O. No. 280	229.717	753.663
Do	B. & O. No. 280A	228.474	749.585
Versailles, Pa	B. & O. No. 281	227.966	747.918
Near Christy Park, Pa	B. & O. No. 282	228.602	750.005
Near McKeesport, Pa	B. & O. No. 283	228.575	749.916
McKeesport, Pa	B. & O. No. 284	228.890	750.950
Do	B. & O. No. 285	228.620	750.064
Demmler, Pa	B. & O. No. 286	228.745	750.474
Near Bessemer, Pa	B. & O. No. 287	229.304	752.308
Do	B. & O. No. 287A	227.552	746.560
Bessemer, Pa	B. & O. No. 288	229.320	752.361
Near Braddock, Pa	B. & O. No. 289	228.300	749.014
Rankin, Pa	B. & O. No. 290	229.979	754.523
Near Rankin, Pa	B. & O. No. 291	229.180	751.901
Near Highland, Pa	B. & O. No. 292	228.679	750.258
Highland, Pa	B. & O. No. 292A	225.698	740.478
Wheeling Junction, Pa	B. & O. No. 293	231.914	760.871
Near Glenwood, Pa	B. & O. No. 294	234.740	770.143
Marion Junction, Pa	B. & O. No. 295	233.410	765.779
Laughlin Junction, Pa	B. & O. No. 296	230.128	755.012
Pittsburgh, Pa	B. & O. No. 297	227.396	746.048
Do	B. & O. No. 298	228.380	749.277
Do	B. & O. No. 299	226.647	743.591
Do	B. & O. No. 300	227.722	747.118
Near Laughlin Jct., Pa	B. & O. No. 301	234.007	767.738
Do	B. & O. No. 302	249.132	817.361
Do	B. & O. No. 303	256.428	841.298
Do	B. & O. No. 304	250.737	822.626
Do	B. & O. No. 305	243.973	800.435
Pittsburgh, Pa	B. & O. No. 306	229.841	754.070
Lawrenceville, Pa	P. R. R. No. 96	239.001	784.122
Pittsburgh, Pa	B. & O. No. 306A	227.112	745.117
Near Pittsburgh, Pa	B. & O. No. 307	226.631	743.539

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Allegheny, Pa.	B. & O. No. 308A	223.415	732.987
Do	B. & O. No. 308B	220.121	722.180
Do	B. & O. No. 308C	218.701	717.522
Do	B. & O. No. 308D	221.106	725.412
Near Sharpsburg, Pa.	B. & O. No. 310=P. R. R. No. 5.	223.429	733.033
Do	B. & O. No. 310A	221.551	726.872
Sharpsburg, Pa.	B. & O. No. 311	222.657	730.501
Near Sharpsburg, Pa.	B. & O. No. 311A	225.204	738.857
Do	B. & O. No. 312	230.840	757.348
Witmer, Pa.	B. & O. No. 313	236.378	775.517
Glenshaw, Pa.	B. & O. No. 314	240.521	789.109
Mount Royal, Pa.	B. & O. No. 314A	248.228	814.395
Elfinwild, Pa.	B. & O. No. 315	253.971	833.237
Allison Park, Pa.	B. & O. No. 316	256.513	841.576
Near Allison Park, Pa.	B. & O. No. 316A	260.025	853.099
Do	B. & O. No. 317	265.907	872.397
Near Bryant, Pa.	B. & O. No. 318	272.130	892.813
Do	B. & O. No. 318A	275.086	902.511
Wildwood, Pa.	B. & O. No. 319	278.945	915.172
Near Wildwood, Pa.	B. & O. No. 319A	283.474	930.031
Do	B. & O. No. 320	292.306	959.007
Do	B. & O. No. 321	305.838	1003.403
Near Gibsonia, Pa.	B. & O. No. 322	325.500	1067.911
Do	U. S. G. S.	314.167	1030.730
Near Bakerstown, Pa.	B. & O. No. 323	350.550	1150.096
Do	B. & O. No. 324	358.415	1175.900
Near Valencia, Pa.	B. & O. No. 325	336.486	1103.954
Near Downieville, Pa.	B. & O. No. 326	321.026	1053.233
Do	B. & O. No. 326A	315.764	1035.969
Mars, Pa.	B. & O. No. 327	312.580	1025.523
Near Mars, Pa.	B. & O. No. 328	305.929	1003.702
Do	B. & O. No. 329	301.280	988.449
Near Callery Junction, Pa.	B. & O. No. 330	298.223	978.420
Callery Junction, Pa.	B. & O. No. 330A	296.334	972.222
Near Callery Junction, Pa.	B. & O. No. 331	295.705	970.159
Near Evans City, Pa.	B. & O. No. 332	290.850	954.230
Evans City, Pa.	B. & O. No. 333	286.003	938.328
Near Evans City, Pa.	B. & O. No. 334	283.309	929.490
Do	B. & O. No. 335	281.599	923.879
Do	B. & O. No. 335A	278.490	913.679
Near Harmony Junction, Pa.	B. & O. No. 336	279.101	915.684
Near Harmony, Pa.	B. & O. No. 337	278.235	912.843
Do	B. & O. No. 338	278.997	915.343
Near Zelienople, Pa.	B. & O. No. 339	277.024	908.870
Do	B. & O. No. 340	273.520	897.374
Old Furnace, Pa.	B. & O. No. 341	274.274	899.847
Near Old Furnace, Pa.	B. & O. No. 341A	271.611	891.110
Near Fombell, Pa.	B. & O. No. 342	269.848	885.326
Fombell, Pa.	B. & O. No. 343	267.616	878.003
Goehring, Pa.	B. & O. No. 344	266.423	874.089
Celia, Pa.	B. & O. No. 345	265.672	871.626
Near Hazen, Pa.	B. & O. No. 346	264.239	866.924
Near McKimms, Pa.	B. & O. No. 347	264.362	867.328
Do	B. & O. No. 348	264.185	866.747
North Sewickley, Pa.	B. & O. No. 348A	267.721	878.348
Near Ellwood City, Pa.	B. & O. No. 349	271.400	890.418
Ellwood City, Pa.	B. & O. No. 349A	274.582	900.858
Near Ellwood City, Pa.	B. & O. No. 350	267.121	876.379
Near West Ellwood Jct., Pa.	A_2	237.739	779.982
Homewood, Pa.	Br. 38 (1906)	290.140	951.901
Near Homewood, Pa.	Br. 39 (1906)	291.975	957.921
Summit, Pa.	Br. 40	319.418	1047.957
Mayfield, Pa.	Br. 34	261.775	858.840
Geneva, Pa.	Geneva Depot (1906)	252.618	828.798
Beaver Falls, Pa.	B. F. Depot (1906)	240.560	789.237
Kenwood, Pa.	Br. 29	228.410	749.375
New Brighton, Pa.	New Brighton Depot	229.380	752.558
Near New Brighton, Pa.	Br. 27½	223.795	734.234
Do	Br. 26	217.147	712.423
Monaca, Pa.	25A	229.739	753.735
Do	25C	209.228	686.442
Near Rock Point, Pa.	B. & O. No. 351	265.949	872.534
Do	B. & O. No. 352	262.198	860.228
Chewton, Pa.	B. & O. No. 353	258.437	847.889
Near Chewton, Pa.	B. & O. No. 354	249.561	818.768
Do	B. & O. No. 355	245.240	804.592
West Pittsburgh, Pa.	B. & O. No. 356	245.348	804.946
Near West Pittsburgh, Pa.	B. & O. No. 357	243.892	800.169
Near New Castle Jct., Pa.	B. & O. No. 359	241.763	793.184
Do	B. & O. No. 359A	243.062	797.446
Mahoningtown, Pa.	U. S. G. S.	239.429	785.527
Near Mahoningtown, Pa.	B. & O. No. 360	240.737	789.818
Do	B. & O. No. 361	239.848	786.901
Do	B. & O. No. 362	239.991	787.370
Do	B. & O. No. 363	239.916	787.124
Do	B. & O. No. 364	241.071	790.914
Near Edenburg, Pa.	B. & O. No. 365	241.024	790.760
Do	B. & O. No. 366	242.020	794.027
Do	B. & O. No. 367	243.439	798.683
Near Edenburg, Pa.	B. & O. No. 368	244.065	800.737
Do	B. & O. No. 369	246.156	807.597
Near Lowellville, Ohio	B. & O. No. 370	246.419	808.460
Do	B. & O. No. 371	246.690	809.349
Lowellville, Ohio	B. & O. No. 372	250.167	820.756
Near Lowellville, Ohio	B. & O. No. 373	254.175	833.906
Near Struthers, Ohio	B. & O. No. 374	255.874	839.480
Do	B. & O. No. 375	252.791	829.365
Near Alliance, Ohio	Br. 66	334.071	1096.031
Alliance, Ohio	Q_6	336.192	1102.996
Do	City	336.843	1105.126
Do	R_6	341.136	1119.210
Do	Lunch room	331.468	1087.491
Near Alliance, Ohio	Br. 65 (1906)	321.567	1055.008
Do	Br. 64 (1906)	323.829	1062.429
Near Sebring, Ohio	West Culvert	338.277	1109.830
Do	East Culvert	337.122	1106.041
Near Snodes, Ohio	S_6	332.371	1090.454
Near Berlin Center, Ohio	T_6	331.955	1089.089
Do	U_6	330.668	1084.866
Berlin Center, Ohio	V_6	337.156	1106.153
Ellsworth, Ohio	W_6	341.580	1120.667
Rosemont, Ohio	X_6	326.580	1071.455
Do	Y_6	329.452	1080.877
Do	Z_6	324.782	1065.556
North Jackson, Ohio	A_7	309.267	1014.653
Do	B_7	312.306	1024.624
Near North Jackson, Ohio	C_7	305.246	1001.461
Lordstown, Ohio	D_7	289.259	949.011
Near Lordstown, Ohio	E_7	280.369	919.844
Near Boenna Crossing, Ohio.	F_7	274.120	899.342
Near Niles, Ohio	G_7	268.034	879.375
Near Girard, Ohio	H_7	268.151	879.759
Near Youngstown, Ohio	I_7	269.401	883.860
Do	J_7	263.748	865.313
Do	B. & O. No. 381	256.671	842.095
Youngstown, Ohio	B. & O. No. 380	257.162	843.706
Do	R. R.	258.202	847.118
Hazelton, Ohio	837 ADJ	254.951	836.452
Near Struthers, Ohio	B. & O. No. 377	258.207	847.134
Struthers, Ohio	B. & O. No. 376	257.485	844.765
Akron, Ohio	B. & O. No. 441	307.601	1009.188
Do	B. & O. No. 442	302.945	993.912
Near Akron, Ohio	B. & O. No. 443	297.771	976.937
Barberton, Ohio	B. & O. No. 444=P. R. R.	295.080	968.108
Near Barberton, Ohio	B. & O. No. 445	294.204	965.234
Do	B. & O. No. 446	296.118	971.514
Near Turkeyfoot Junction, Ohio.	B. & O. No. 447	295.207	968.525
Messenger, Ohio	P. R. R.	292.739	960.428
Near Clinton, Ohio	B. & O. No. 448	288.246	945.687
Near Warwick, Ohio	B. & O. No. 449	292.100	958.331
Do	B. & O. No. 450	292.188	958.620
Do	B. & O. No. 451	288.762	947.380
Near Easton, Ohio	B. & O. No. 452	288.954	948.010
Do	B. & O. No. 453	290.879	954.326
Do	B. & O. No. 454	292.301	958.991
Easton, Ohio	B. & O. No. 455	292.803	960.638
Near Easton, Ohio	B. & O. No. 456	291.211	955.415
Near Rittman, Ohio	B. & O. No. 457	291.726	957.104
Do	B. & O. No. 458	293.173	961.852
Do	B. & O. No. 459	295.417	969.214
Do	B. & O. No. 460	295.627	969.903
Near Sterling, Ohio	B. & O. No. 460A=U. S. G. S.	293.730	963.679
Do	B. & O. No. 461	295.798	970.464
Do	B. & O. No. 462	297.187	975.021
Do	B. & O. No. 463	299.480	982.544
Near Creston, Ohio	B. & O. No. 464	300.937	987.324
Do	B. & O. No. 465	296.949	974.240
Do	B. & O. No. 466	293.190	961.908
Do	B. & O. No. 467	294.668	966.757
Near Lodi, Ohio	B. & O. No. 468	295.730	970.241
Do	B. & O. No. 469	290.226	952.183
Do	B. & O. No. 470	284.040	931.888
Lodi, Ohio	B. & O. No. 471	278.524	913.791
Near Lodi, Ohio	B. & O. No. 472	278.525	913.794
Do	B. & O. No. 473	278.699	914.365
Do	B. & O. No. 474	287.586	943.522
Do	B. & O. No. 475	302.124	991.218
Near Homer, Ohio	B. & O. No. 476	308.193	1011.130
Do	B. & O. No. 477	327.404	1074.158
Near Newtons, Ohio	B. & O. No. 478	333.843	1095.283
Do	B. & O. No. 479	333.609	1094.516
Do	B. & O. No. 480	335.588	1101.008
Near Sullivan, Ohio	B. & O. No. 481	341.162	1119.296
Sullivan, Ohio	1136 Canton	346.693	1137.442
Do	B. & O. No. 482	342.066	1122.262
Near Sullivan, Ohio	B. & O. No. 483	343.465	1126.851
Near Nova, Ohio	B. & O. No. 484	345.845	1134.660

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Nova, Ohio	B. & O. No. 485	342.394	1123.338
Nova, Ohio	B. & O. No. 485A	338.649	1111.051
Do	1127 ADJ	343.606	1127.314
Near Nova, Ohio	B. & O. No. 486	336.484	1103.948
Do	B. & O. No. 487	326.606	1071.540
Near Hereford, Ohio	B. & O. No. 488	320.082	1050.136
Do	B. & O. No. 489	316.260	1037.596
Do	B. & O. No. 490	309.340	1014.893
Do	B. & O. No. 491	301.283	988.459
Near Ramey, Ohio	B. & O. No. 492	305.016	1000.707
Near Greenwich, Ohio	B. & O. No. 493	313.635	1028.984
Do	B. & O. No. 494	317.742	1042.459
Do	B. & O. No. 495	316.675	1038.958
Near Greenwich, Ohio	B. & O. No. 496	313.830	1029.624
Do	B. & O. No. 497	307.673	1009.424
Do	B. & O. No. 498	310.128	1017.478
Do	B. & O. No. 499	315.678	1035.687
Near Boughtonville, Ohio	B. & O. No. 500	310.937	1020.132
Boughtonville, Ohio	B. & O. No. 501	301.242	988.325
Near Boughtonville, Ohio	B. & O. No. 502	293.947	964.391
Near Boughtonville, Ohio	B. & O. No. 503	290.696	953.725
Near Chicago Junction, Ohio	B. & O. No. 504	285.136	935.484
Do	B. & O. No. 505	285.901	937.994
Do	B. & O. No. 506	282.908	928.174
Chicago Junction, Ohio	B. & O. No. 507	278.829	914.791
Do	F_5	279.850	918.141
Do	G_5	283.363	929.667
Do	H_5	282.205	925.868
Near Chicago Junction, Ohio	I_5	278.160	912.597
Do	J_5	277.655	910.940
Do	K_5	281.084	922.190
Siam, Ohio	L_5	290.529	953.177
Do	M_5	291.202	955.385
Near Siam, Ohio	N_5	290.997	954.713
Near Scipio, Ohio	O_5	283.077	928.728
Near Republic, Ohio	859 Republic	262.236	860.353
Do	883 Col	269.488	884.145
Do	P_5	265.871	872.278
Near Seneca, Ohio	Q_5	250.704	822.518
Near Tiffin, Ohio	R_5	240.979	790.612
Do	S_5	232.401	762.469
Tiffin, Ohio	757 Col	231.113	758.243
Do	775 Tiffin	236.311	775.297
Do	T_5	226.101	741.800
Near Tiffin, Ohio	U_5	232.012	761.193
Near Bascom, Ohio	V_5	233.100	764.762
Do	W_5	237.208	778.240
Bascom, Ohio	776 Bascom	236.686	776.527
Do	766 Tol	233.875	767.305
Near Bascom, Ohio	X_5	234.200	768.371
Near Fostoria, Ohio	Y_5	233.996	767.702
Do	Z_5	234.166	768.260
Fostoria, Ohio	778 Fostoria	237.700	779.854
Do	A_6	238.071	781.071
Do	B_6	238.621	782.876
Near Fostoria, Ohio	C_6	235.789	773.584
Near Godsend, Ohio	D_6	229.958	754.454
Near Bloomdale, Ohio	740 Tol	225.743	740.625
Do	E_6	226.459	742.974
Bloomdale, Ohio	749 Bloomdale	228 531	749.772
Do	F_6	229.283	752.239
Bairdstown, Ohio	H_6	225.416	739.552
Galatea, Ohio	I_6	221.730	727.459
North Baltimore, Ohio	J_6	223.729	734.018
Near North Baltimore, Ohio	726 Tol	221.480	726.639
Do	K_6	221.760	727.558
Do	L_6	218.640	717.321
Do	M_6	217.948	715.051
Near Hoytville, Ohio	N_6	215.670	707.577
Do	O_6	216.192	709.290
Near Deshler, Ohio	P_6	216.887	711.570
Near Warwick, Ohio	B. & O. No. 449	292.100	958.331
Do	B. & O. No. 1	290.284	952.373
Do	B. & O. No. 2	289.182	948.758
Near Canal Fulton, Ohio	B. & O. No. 3	289.527	949.890
Canal Fulton, Ohio	B. & O. No. 4	288.713	947.219
Near Canal Fulton, Ohio	B. & O. No. 5	289.073	948.400
Do	B. & O. No. 6	287.906	944.572
Near Pauls, Ohio	B. & O. No. 7	286.235	939.089
Near Crystal Spring, Ohio	B. & O. No. 8	287.262	942.459
Do	B. & O. No. 9	286.636	940.405
Do	B. & O. No. 10	289.055	948.341
Near Massillon, Ohio	B. & O. No. 11	284.519	933.459
Do	B. & O. No. 12	284.717	934.109
Do	P. R. R.	287.206	942.275
Do	B. & O. No. 13	286.927	941.360
Do	P. R. R. Br. No. 5	286.294	939.283
Near Massillon, Ohio	B. & O. No. 14	285.079	935.297
Do	B. & O. No. 15	284.493	933.374
Do	B. & O. No. 16	282.719	927.554
Do	B. & O. No. 17	286.543	940.100
Near Navarre, Ohio	B. & O. No. 18	298.994	980.949
Do	B. & O. No. 19	305.879	1003.538
Near Justus, Ohio	B. & O. No. 20	304.929	1000.421
Do	B. & O. No. 21	297.722	976.776
Do	B. & O. No. 22	297.175	974.982
Near Beach City, Ohio	B. & O. No. 23	297.534	976.159
Beach City, Ohio	B. & O. No. 24	295.517	969.542
Near Beach City, Ohio	B. & O. No. 25	293.227	962.029
Do	B. & O. No. 26	287.946	944.703
Near Strasburg, Ohio	B. & O. No. 27	283.396	929.775
Do	B. & O. No. 28	281.897	924.857
Strasburg, Ohio	B. & O. No. 29	278.655	914.221
Near Strasburg, Ohio	B. & O. No. 30	278.221	912.797
Do	B. & O. No. 31	277.316	909.828
Do	B. & O. No. 32	274.848	901.730
Do	B. & O. No. 33	273.464	897.190
Near Canal Dover, Ohio	B. & O. No. 34	270.107	886.176
Do	B. & O. No. 35	268.808	881.914
Do	B. & O. No. 36	266.657	874.857
Do	B. & O. No. 37	269.754	885.018
Do	B. & O. No. 38	272.211	893.079
Near New Philadelphia, Ohio.	B. & O. No. 38A	272.242	893.181
Do	B. & O. No. 39	270.777	888.374
New Philadelphia, Ohio	B. & O. No. 40	267.832	878.712
Near New Philadelphia, Ohio.	B. & O. No. 41	264.192	866.770
Do	B. & O. No. 42	261.899	859.247
Do	B. & O. No. 43	260.962	856.173
Near Goshen, Ohio	B. & O. No. 44	260.877	855.894
Do	B. & O. No. 45	259.287	850.677
Near Midvale, Ohio	B. & O. No. 46	259.104	850.077
Do	B. & O. No. 47	260.109	853.374
Cumberland, Md	B. & O. No. 1	197.419	647.699
Near Robert Station, Md	B. & O. No. 3	192.912	632.912
Do	B. & O. No. 4	194.303	637.476
Near Cedar Cliff, Md	B. & O. No. 5	197.673	648.532
Do	B. & O. No. 6	197.421	647.705
Near Brady, Md	B. & O. No. 6A	197.290	647.276
Do	B. & O. No. 7	201.214	660.150
Do	B. & O. No. 7A	203.201	666.669
Near McKenzie Station, Md.	B. & O. No. 8	207.496	680.760
Potomac Station, Md	B. & O. No. 9	209.808	688.345
Near Pinto, Md	B. & O. No. 10	204.973	672.482
Near Lowndes, Md	B. & O. No. 11	208.252	683.240
Near Cresap, Md	B. & O. No. 12	213.002	698.824
Rawlings, Md	B. & O. No. 13	214.450	703.575
Near Rawlings, Md	B. & O. No. 14	218.944	718.319
Near Black Oak, Md	B. & O. No. 15	220.969	724.962
Black Oak, Md	B. & O. No. 16	226.712	743.804
Near Black Oak, Md	B. & O. No. 17	225.629	740.251
Near Dawson, Md	B. & O. No. 18	230.453	756.078
Do	B. & O. No. 19	235.561	772.896
Do	B. & O. No. 20	236.579	776.176
Do	B. & O. No. 21	240.863	790.231
Near Keyser, W. Va	B. & O. No. 22	244.054	800.700
Keyser, W. Va	B. & O. No. 23	252.070	827.000
Near Keyser, W. Va	B. & O. No. 24	255.300	837.597
Do	B. & O. No. 25	260.476	854.578
Near Piedmont, W. Va	B. & O. No. 26	265.567	871.281
Do	B. & O. No. 26A	271.051	889.273
Do	B. & O. No. 27	276.175	906.084
Do	B. & O. No. 28	284.353	932.915
Near W. Va. Central Junction, W. Va.	B. & O. No. 28A	289.043	948.302
Near Bloomington, Md	B. & O. No. 29	307.501	1008.860
Do	B. & O. No. 30	333.318	1093.561
Near Black Bear, Md	B. & O. No. 31	368.816	1210.024
Do	B. & O. No. 31A	390.091	1279.824
Do	B. & O. No. 32	393.742	1291.802
Near Bond Station, Md	U. S. G. S.	420.759	1380.440
Do	B. & O. No. 33	440.544	1445.351
Crabtree, Md	B. & O. No. 34	476.744	1564.118
Near Frankville, Md	B. & O. No. 35	509.125	1670.354
Do	B. & O. No. 36	549.890	1804.097
Do	B. & O. No. 37	582.450	1910.921
Do	B. & O. No. 38	617.946	2027.378
Near Swanton, Md	B. & O. No. 39	666.134	2185.475
Do	B. & O. No. 40	692.372	2271.557
Do	B. & O. No. 40A	700.218	2297.299
Do	B. & O. No. 41	725.860	2381.426
Do	B. & O. No. 42	742.449	2435.851
Near Altamont, Md	B. & O. No. 43	774.794	2541.970
Do	B. & O. No. 44	800.997	2627.938
Do	B. & O. No. 45	785.929	2578.502
Near Deer Park, Md	B. & O. No. 46	770.071	2526.475
Deer Park, Md	B. & O. No. 47	753.923	2473.496
Do	B. & O. No. 47A	746.487	2449.099
Do	U. S. G. S.	745.903	2447.183

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Deer Park, Md	B. & O. No. 48	742.766	2436.891
Near Mountain Lake Park, Md.	B. & O. No. 49	738.351	2422.407
Do	B. & O. No. 50	732.949	2404.683
Do	B. & O. No. 51	730.605	2396.993
Near Oakland, Md	B. & O. No. 52	726.382	2383.138
Oakland, Md	B. & O. No. 53	722.659	2370.924
Near Oakland, Md	B. & O. No. 53A	724.547	2377.118
Do	B. &. O. No. 54	724.727	2377.708
Do	B. & O. No. 55	732.232	2402.331
Do	B. & O. No. 56	744.541	2442.715
Near Skipnish, Md	B. & O. No. 57	748.118	2454.450
Near Hutton, Md	B. & O. No. 58	756.599	2482.275
Do	B. & O. No. 59	745.409	2445.563
Near Corinth, W. Va	B. & O. No. 59A	742.140	2434.838
Near Rinard, W. Va	B. & O. No. 60	747.540	2452.554
Near Riggs, W. Va	B. & O. No. 61	756.370	2481.524
Near Terra Alta, W. Va	B. & O. No. 62	769.349	2524.106
Terra Alta, W. Va	B. & O. No. 63	775.790	2545.238
Near Terra Alta, W. Va	B. & O. No. 64	765.887	2512.748
Do	B. & O. No. 65	730.141	2395.471
Do	B. & O. No. 66	689.827	2263.207
Do	B. & O. No. 67	654.391	2146.948
Near Rodamers, W. Va	B. & O. No. 68	637.401	2091.206
Near Amblersburg, W. Va.	B. & O. No. 69	587.754	1928.323
Do	B. & O. No. 70	552.163	1811.555
Do	B. & O. No. 71	517.413	1697.546
Amblersburg, W. Va	B. & O. No. 72	494.882	1623.625
Near Amblersburg, W. Va.	B. & O. No. 73	462.182	1516.342
Near Rowlesburg, W. Va	B. & O. No. 74	449.022	1473.166
Do	B. & O. No. 74A	442.074	1450.371
Do	B. & O. No. 75	426.982	1400.857
Do	B. & O. No. 76	454.349	1490.643
Do	B. & O. No. 76A	465.962	1528.744
Do	B. & O. No. 77	481.918	1581.093
Do	B. & O. No. 78	516.904	1695.876
Near Buckhorn, W. Va	B. & O. No. 78A	525.744	1724.878
Do	B. & O. No. 79	548.574	1799.780
Near Anderson, W. Va	B. & O. No. 80	566.088	1857.240
Near Tunnelton, W. Va	B. & O. No. 81	557.291	1828.379
Do	B. & O. No. 82	556.698	1826.433
Do	B. & O. No. 83	543.658	1783.651
Near West End, W. Va	B. & O. No. 83A	531.179	1742.710
Near Austen, W. Va	B. & O. No. 84	496.181	1627.887
Do	B. & O. No. 85	473.262	1552.694
Do	B. & O. No. 86	440.091	1443.865
Near Newburg, W. Va	B. & O. No. 87	407.977	1338.505
Do	B. & O. No. 88	379.474	1244.991
Near Independence, W. Va.	B. & O. No. 90	349.706	1147.327
Near Hardman, W. Va	B. & O. No. 91	337.765	1108.151
Near Ironton, W. Va	B. & O. No. 92	335.727	1101.464
Do	B. & O. No. 93	327.598	1074.794
Do	B. & O. No. 94	324.444	1064.447
Near Thornton, W. Va	B. & O. No. 95	320.568	1051.730
Thornton, W. Va	B. & O. No. 96	317.043	1040.165
Near Thornton, W. Va	B. & O. No. 97	316.889	1039.660
Do	B. & O. No. 98	315.188	1034.079
Do	B. & O. No. 99	315.202	1034.125
Near Grafton, W. Va	B. & O. No. 100	311.291	1021.294
Do	B. & O. No. 101	306.977	1007.140
Grafton, W. Va	B. & O. No. 102	303.292	995.050
Near Grafton, W. Va	B. & O. No. 103	302.299	991.793
Fetterman, W. Va	B. & O. No. 103A	299.503	982.619
Near Fetterman, W. Va	B. & O. No. 104	301.386	988.797
Do	B. & O. No. 105	301.722	989.900
Do	B. & O. No. 105A	299.374	982.196
Do	B. & O. No. 106	298.901	980.644
Near Bush, W. Va	B. & O. No. 107A	298.652	979.827
Do	B. & O. No. 108	299.284	981.901
Near Valley Falls, W. Va	B. & O. No. 109	299.592	982.911
Valley Falls, W. Va	B. & O. No. 110	296.922	974.152
Near Valley Falls, W. Va	B. & O. No. 111	288.017	944.936
Near Hammond, W. Va	B. & O. No. 112	285.858	937.852
Do	B. & O. No. 113	278.720	914.434
Near Powells, W. Va	B. & O. No. 114	273.840	898.423
Do	B. & O. No. 115	273.981	898.886
Near Colfax, W. Va	B. & O. No. 116	271.103	889.444
Colfax, W. Va	B. & O. No. 117	270.820	888.515
Near Colfax, W. Va	B. & O. No. 118	269.867	885.389
Near Bentons Ferry, W. Va.	B. & O. No. 119	270.398	887.131
Bentons Ferry, W. Va	B. & O. No. 120	270.771	888.355
Kingmont, W. Va	B. & O. No. 121	270.755	888.302
Near Kingmont, W. Va	B. & O. No. 122	268.700	881.560
Do	B. & O. No. 122A	268.631	881.334
Gaston Junction, W. Va	B. & O. No. 123	269.824	885.248
Fairmont, W. Va	B. & O. No. 124	270.243	886.622
Near Fairmont, W. Va	B. & O. No. 125	269.514	884.231
Do	B. & O. No. 125A	264.770	868.666
Near Barnesville, W. Va	B. & O. No. 126	266.257	873.545
Do	B. & O. No. 127	267.734	878.391
Near Barrackville, W. Va.	B. & O. No. 128	270.492	887.439
Do	B. & O. No. 129	272.475	893.945
Barrackville Station, W. Va.	B. & O. No. 130	274.770	901.475
Near Barrackville, W. Va	B. & O. No. 131	277.136	909.237
Do	B. & O. No. 132	278.395	913.368
Near Katy, W. Va	B. & O. No. 133	280.166	919.178
Near Farmington, W. Va	B. & O. No. 134	281.167	922.462
Do	B. & O. No. 135	284.003	931.766
Underwood Station, W. Va.	B. & O. No. 136	284.855	934.562
Near Farmington, W. Va	B. & O. No. 137	285.669	937.232
Do	B. & O. No. 138	286.615	940.336
Near Downs, W. Va	B. & O. No. 139	288.999	948.158
Do	B. & O. No. 139A	290.497	953.072
Do	U. S. G. S.	290.504	953.095
Downs, W. Va	B. & O. No. 140	293.278	962.196
Near Downs, W. Va	B. & O. No. 141	293.512	962.964
Near Mannington, W. Va	B. & O. No. 142	295.266	968.719
Do	B. & O. No. 143	295.642	969.952
Mannington, W. Va	B. & O. No. 144	297.024	974.486
Do	U. S. G. S.	297.164	974.946
Near Mannington, W. Va.	B. & O. No. 145	297.141	974.870
Do	B. & O. No. 146	299.274	981.868
Do	B. & O. No. 147	301.604	989.512
Do	B. & O. No. 148	302.111	991.176
Near Metz, W. Va	B. & O. No. 149	304.739	999.798
Do	B. & O. No. 150	305.823	1003.354
Do	B. & O. No. 151	310.248	1017.872
Near Glover Gap, W. Va	B. & O. No. 152	315.513	1035.146
Do	B. & O. No. 153	322.400	1057.741
Do	B. & O. No. 153A	330.516	1084.368
Do	B. & O. No. 154	341.055	1118.945
Near Cottonwood, W. Va	B. & O. No. 155	343.309	1126.340
Cottonwood, W. Va	B. & O. No. 156	332.442	1090.687
Burton, W. Va	B. & O. No. 157	324.704	1065.300
Near Burton, W. Va	B. & O. No. 158	316.736	1039.158
Near Hundred, W. Va	B. & O. No. 159	313.988	1030.142
Do	B. & O. No. 160	308.731	1012.895
Do	B. & O. No. 161	303.436	995.523
Do	B. & O. No. 161A	300.586	986.173
Near Littleton, W. Va	B. & O. No. 162	295.433	969.266
Do	B. & O. No. 163	289.709	950.487
Do	B. & O. No. 163A	287.905	944.568
Littleton, W. Va	B. & O. No. 164	286.914	941.317
Near Littleton, W. Va	B. & O. No. 165	309.737	1016.195
Near Board Tree, W. Va	B. & O. No. 166	337.983	1108.866
Do	B. & O. No. 167	330.375	1083.905
Do	B. & O. No. 168	308.542	1012.275
Near Bellton, W. Va	B. & O. No. 169	284.436	933.187
Do	B. & O. No. 170	273.570	897.538
Near Denver Station, W. Va.	B. & O. No. 170A	270.980	889.040
Near Bellton, W. Va	B. & O. No. 171	277.633	910.868
Near Woodruff, W. Va	B. & O. No. 172	288.601	946.852
Do	B. & O. No. 173	308.379	1011.740
Near Cogley, W. Va	B. & O. No. 174	331.448	1087.426
Do	B. & O. No. 175	356.050	1168.141
Near Cameron, W. Va	B. & O. No. 176	365.524	1199.223
Do	B. & O. No. 177	343.038	1125.450
Do	B. & O. No. 178	323.949	1062.823
Do	B. & O. No. 179	315.456	1034.959
Loudenville, W. Va	B. & O. No. 180	303.512	995.772
Near Loudenville, W. Va	B. & O. No. 181	300.664	986.428
Near Glen Easton, W. Va	B. & O. No. 182	298.075	977.934
Do	B. & O. No. 183	294.041	964.700
Do	B. & O. No. 184	282.408	926.534
Do	B. & O. No. 184A	282.578	927.091
Do	B. & O. No. 185	275.047	902.383
Near Rosbys Rock, W. Va.	B. & O. No. 186	262.691	861.845
Do	B. & O. No. 187	258.352	847.610
Do	B. & O. No. 188	245.194	804.441
Do	B. & O. No. 189	240.490	789.008
Do	B. & O. No. 190	232.994	764.414
Do	B. & O. No. 191	226.084	741.744
Do	B. & O. No. 192	218.913	718.217
Do	B. & O. No. 193= U. S. G. S.	207.415	680.494
Near Moundsville, W. Va	B. & O. No. 194	197.974	649.520
Do	B. & O. No. 195= U. S. G. S.	197.056	646.508
Do	B. & O. No. 196	196.851	645.835
Do	B. & O. No. 197	203.668	668.201
Do	B. & O. No. 198	203.480	667.584
Do	B. & O. No. 199	204.031	669.392
Near Benwood Junction, W. Va.	B. & O. No. 200	200.717	658.519
Do	B. & O. No. 200A	200.544	657.951
Do	B. & O. No. 201	202.856	665.537
Do	B. & O. No. 202	203.829	668.729
Do	B. & O. No. 114	209.762	688.194
Benwood, W. Va	U. S. E. 94A	197.521	648.033
Marietta, Ohio	U. S. E. 171B	180.231	591.308
San Diego, Cal	Tidal 7	0.597	1.959
Do	Tidal 6	2.608	8.556
Do	Tidal 3	1.880	6.168
Do	Tidal 2	3.074	10.085

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
San Diego, Cal	Tidal 5	2.372	7.782
Do	Tidal 4	3.806	12.487
Do	Tidal 1	2.659	8.724
Roseville, Cal	35 Sea	10.760	35.302
Near Roseville, Cal	A	10.158	33.327
Near San Diego, Cal	B	6.288	20.630
San Diego, Cal	C	7.184	23.570
Do	42 S. D	12.909	42.353
Do	City	14.061	46.131
Old Town, Cal	D	7.753	25.436
American Park, Cal	25 S. D	7.757	25.449
Near Atwood, Cal	E	19.191	62.962
Near Ladrillo, Cal	F	29.585	97.063
Selwyn, Cal	G	70.857	232.470
Linda Vista, Cal	376 S. D	114.838	376.764
Sorrento, Cal	31 S. D	9.644	31.640
Do	H	12.330	40.452
Near Del Mar, Cal	I	46.342	152.040
Del Mar, Cal	J	27.608	90.577
Near Encinitas, Cal	K	22.184	72.782
Encinitas, Cal	L	28.040	91.995
Near Carlsbad, Cal	M	13.477	44.216
Carlsbad, Cal	N	16.933	55.554
Oceanside, Cal	O	13.559	44.484
Do	P	25.565	83.875
Do	Q	20.634	67.697
Do	R	19.661	64.505
Near Las Flores, Cal	S	22.869	75.029
Do	T	17.801	58.402
Las Flores, Cal	84 S. B	25.854	84.822
Don, Cal	U	41.704	136.824
Near Don, Cal	165 S. B	50.525	165.764
San Onofre, Cal	28 S. B	8.765	28.757
Near San Onofre, Cal	V	3.070	10.072
Near Mateo, Cal	W	4.637	15.213
Near Serra, Cal	X	12.605	41.355
San Juan Capistrano, Cal	103 S. B	31.709	104.032
Do	Y	36.843	120.875
Do	Z	35.313	115.856
Near El Toro, Cal	A_1	85.377	280.107
Do	278 S. B	85.108	279.225
El Toro, Cal	444 S. B	135.641	445.016
Near Irvine, Cal	B_1	78.706	258.221
Irvine, Cal	C_1	59.147	194.052
Near Aliso, Cal	D_1	24.808	81.391
Santa Ana, Cal	E_1	32.248	105.800
Do	F_1	37.525	123.114
Do	City	39.065	128.166
Do	G_1	37.883	124.288
Do	H_1	40.686	133.484
Orange, Cal	I_1	57.052	187.178
Do	J_1	60.245	197.654
Near Orange, Cal	K_1	57.492	188.622
Olive, Cal	L_1	83.617	274.334
Near Olive, Cal	M_1	73.529	241.236
Richfield, Cal	N_1	75.143	246.532
Near Yorba, Cal	RR	88.545	290.501
Horse Shoe Bend, Cal	O_1	116.424	381.968
Near Gypsum, Cal	P_1	122.564	402.112
Near Crary, Cal	Q_1	143.307	470.167
Crary, Cal	494 S. B	150.806	494.769
Near Crary, Cal	R_1	154.635	507.332
Corona, Cal	S_1	184.856	606.482
Do	T_1	208.998	685.688
Do	City	205.433	673.991
Riverside, Cal	U_1	204.088	669.579
Do	687 May	209.706	688.010
Do	V_1	219.634	720.583
Do	814 Arlington	248.565	815.500
Do	W_1	257.959	846.320
Do	X_1	258.397	847.757
Do	861 Casa Blanca	262.732	861.980
Do	863 Olivewood	263.241	863.650
Do	Y_1	258.534	848.207
Do	851 Riverside	259.642	851.842
Do	Z_1	261.418	857.669
Highgrove, Cal	945 Highgrove	288.278	945.792
Colton, Cal	A_2	298.149	978.177
San Bernardino, Cal	B_2	327.687	1075.087
Do	1048 San Bernardino	319.656	1048.738
Do	C_2	320.375	1051.097
Do	City	318.545	1045.093
Do	D_2	335.303	1100.074
Near Verdemont, Cal	1420 S. B	433.150	1421.093
Do	E_2	460.617	1511.208
Verdemont, Cal	F_2	529.096	1735.876
Devore, Cal	G_2	616.427	2022.394
Near Devore, Cal	2008 S. B	612.539	2009.639
Keenbrook, Cal	H_2	756.013	2480.353
Near Cajon, Cal	I_2	802.008	2631.255
Dell, Cal	2768 S. B	843.866	2768.584
Cajon, Cal	J_2	892.396	2927.803
Near Gish, Cal	K_2	994.646	3263.268
Near Cajon, Cal	2685 S. B	1123.346	3685.511
Summit, Cal	L_2	1165.442	3823.621
Near Summit, Cal	M_2	1137.021	3730.376
Near Summit, Cal	3462 S. B	1055.576	3463.169
Near Hesperia, Cal	N_2	995.438	3265.866
Hesperia, Cal	3190 S. B	972.600	3190.938
Do	O_2	969.334	3180.223
Near Hesperia, Cal	2856 Hesperia	870.896	2857.264
Near Victorville, Cal	P_2	837.276	2746.963
Victorville, Cal	2723 S. B	830.185	2723.699
Do	Q_2	829.323	2720.870
Do	R_2	832.370	2730.867
Near Victorville, Cal	S_2	824.332	2704.496
Oro Grande, Cal	T_2	807.086	2647.915
Do	U_2	808.606	2652.901
Near Oro Grande, Cal	V_2	785.133	2575.891
Near Helen, Cal	W_2	768.958	2522.823
Do	X_2	757.353	2484.749
Helen, Cal	Y_2	740.656	2429.970
Near Helen, Cal	Z_2	740.239	2428.601
Do	A_3	724.245	2376.127
Near Cottonwood, Cal	B_3	710.375	2330.622
Cottonwood, Cal	C_3	692.559	2272.171
Near Cottonwood, Cal	D_3	688.491	2258.824
Do	E_3	684.788	2246.675
Near Todd, Cal	F_3	680.143	2231.436
Near Barstow, Cal	G_3	651.898	2138.769
Barstow, Cal	H_3	640.701	2102.033
Do	I_3	643.569	2111.443
Do	J_3	648.970	2129.163
Near Pocatello, Idaho	L_6	1361.664	4467.393
Near Ross Fork, Idaho	M_6	1361.967	4468.387
Ross Fork, Idaho	N_6	1358.812	4458.036
Do	O_6	1354.354	4443.410
Gibson, Idaho	P_6	1360.490	4463.541
Near Blackfoot, Idaho	Q_6	1366.210	4482.307
Do	O. S. L. 4	1368.312	4489.204
Blackfoot, Idaho	R_6	1371.625	4500.073
Do	S_6	1371.111	4498.387
Do	T_6	1370.998	4498.016
Do	U_6	1372.216	4502.012
Near Wapello, Idaho	V_6	1382.966	4537.281
Wapello, Idaho	W_6	1384.365	4541.871
Near Wapello, Idaho	X_6	1389.917	4560.086
Firth, Idaho	Y_6	1391.240	4564.427
Do	Z_6	1393.170	4570.759
Monroe, Idaho	A_7	1403.786	4605.588
Near Monroe, Idaho	B_7	1405.162	4610.102
Shelley, Idaho	C_7	1411.023	4629.331
Do	D_7	1410.225	4626.713
Near Idaho Falls, Idaho	E_7	1422.102	4665.680
Idaho Falls, Idaho	O. S. L. 7	1434.130	4705.141
Do	F_7	1435.540	4709.767
Do	G_7	1433.738	4703.855
Do	City	1434.365	4705.912
Do	H_7	1435.044	4708.140
Do	O. S. L. 6	1433.391	4702.717
Near Payne, Idaho	I_7	1439.261	4721.975
Do	J_7	1447.162	4747.897
Near Bassett, Idaho	K_7	1453.447	4768.517
Market Lake, Idaho	L_7	1455.520	4775.318
Do	M_7	1456.082	4777.162
Near Market Lake, Idaho	N_7	1456.946	4779.997
Do	O_7	1461.402	4794.616
Near Hawgood, Idaho	O. S. L. 8	1469.228	4820.292
Do	P_7	1475.852	4842.024
Hawgood, Idaho	Q_7	1469.193	4820.177
Hamer, Idaho	R_7	1463.596	4801.814
Near Camas, Idaho	S_7	1463.873	4802.723
Camas, Idaho	T_7	1468.499	4817.900
Near Camas, Idaho	U_7	1475.718	4841.585
Jones, Idaho	V_7	1492.541	4896.778
Near Jones, Idaho	W_7	1511.833	4960.072
Dubois, Idaho	X_7	1567.728	5143.454
Do	Y_7	1569.812	5150.291
Near High Bridge, Idaho	Z_7	1671.905	5485.242
Do	A_8	1683.093	5521.948
High Bridge, Idaho	B_8	1690.069	5544.835
Do	O. S. L. 10	1701.482	5582.279
Near Spencer, Idaho	C_8	1779.595	5838.555
Spencer, Idaho	D_8	1793.295	5883.502
Do	E_8	1792.551	5881.061
Do	O. S. L. 11	1793.455	5884.027
Near Spencer, Idaho	F_8	1804.488	5920.224
Do	G_8	1834.719	6019.407
Near Humphrey, Idaho	H_8	1852.842	6078.866
Humphrey, Idaho	I_8	1979.376	6494.003
Do	J_8	1985.671	6514.656
Near Monida, Mont	K_8	2047.081	6716.132
Monida, Mont	A	2071.329	6795.685
Do	B	2069.551	6789.852
Near Monida, Mont	C	2030.968	6663.267
Near Williams, Mont	D	2023.890	6640.046
Do	E	2006.774	6583.891
Do	F	1995.410	6546.608
Do	G	1954.053	6410.922
Lima, Mont	H	1907.318	6257.592

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Lima, Mont	O. S. L. 14	1908.202	6260.493
Do	I	1906.723	6255.640
Near Dell, Mont	J	1852.520	6077.809
Do	K	1834.844	6019.817
Dell, Mont	L	1833.586	6015.690
Do	M	1830.273	6004.821
Near Crab Tree, Mont	N	1786.501	5861.212
Crab Tree, Mont	O	1772.985	5816.868
Near Crab Tree, Mont	P	1738.970	5705.271
Red Rock, Mont	Q	1706.020	5597.167
Do	R	1705.181	5594.415
Armstead, Mont	S	1673.984	5492.062
Near Armstead, Mont	T	1665.212	5463.283
Near Grayling, Mont	U	1657.970	5439.523
Grayling, Mont	V	1641.135	5384.290
Near Barratts, Mont	W	1608.654	5277.726
Do	X	1579.148	5180.921
Near Dillon, Mont	Y	1572.082	5157.739
Dillon, Mont	O. S. L. 16	1553.457	5096.633
Do	Z or Magnetic Station	1560.361	5119.284
Do	A_2	1552.855	5094.658
Do	B_2	1550.519	5086.994
Do	City	1551.557	5090.400
Near Bond, Mont	C_2	1550.606	5087.280
Bond, Mont	D_2	1573.105	5161.095
Near Apex, Mont	E_2	1622.228	5322.260
Apex, Mont	F_2	1653.926	5426.255
Near Glen, Mont	G_2	1513.173	4964.468
Glen, Mont	H_2	1522.818	4996.112
Do	I_2	1524.498	5001.624
Near Lavon, Mont	J_2	1538.915	5048.924
Lavon, Mont	K_2	1540.241	5053.274
Browne, Mont	L_2	1544.488	5067.208
Near Melrose, Mont	M_2	1563.468	5129.478
Melrose, Mont	N_2	1580.078	5183.973
Do	O_2	1579.296	5181.407
Near Big Hole, Mont	P_2	1604.992	5265.711
Big Hole, Mont	Q_2	1612.688	5290.960
Maiden Rock, Mont	R_2	1620.621	5316.987
Near Divide, Mont	S_2	1629.149	5344.966
Divide, Mont	T_2	1644.468	5395.225
Woodin, Mont	U_2	1694.077	5557.984
Near Woodin, Mont	V_2	1698.487	5572.453
Beaudines Spur, Mont	W_2	1733.299	5686.665
Feely, Mont	X_2	1772.368	5814.844
Near Buxton, Mont	Y_2	1697.986	5570.809
Do	O. S. L.	1697.001	5567.577
Buxton, Mont	Z_2	1682.842	5521.124
Silver Bow, Mont	A_3	1626.865	5337.473
Do	5327 Butte	1627.111	5338.280
Near Butte, Mont	5388 Butte	1645.772	5399.504
Do	B_3	1650.709	5415.701
Do	C_3	1657.159	5436.862
Do	R. H. C. 5441	1659.618	5444.930
Butte, Mont	D_3	*1674.299	5493.096
Do	E_3	*1691.666	5550.074
Do	R. H. C. 5563	*1696.856	5567.102
Do	R. H. C. 5631	*1717.357	5634.362
Do	R. H. C. 5767	*1758.365	5768.902
Do	5712 Butte	*1741.980	5715.146
Do	City	*1758.224	5768.440
Do	R. H. C. 5811	*1770.240	5807.862
Do	R. H. C. 5716	*1742.835	5717.951
Do	R. H. C. 5566	*1697.422	5568.959
Do	F_3	*1679.410	5509.864
Do	R. H. C. 5485	*1673.112	5489.202
Near Evona, Utah	A_1	1321.547	4335.775
Near Roy, Utah	B_1	1342.868	4405.726
Do	C_1	1352.224	4436.421
Near Syracuse Junction, Utah.	D_1	1351.689	4434.666
Near Syracuse Grove, Utah	Salt Lake Northwest Base.	1289.475	4230.553
Near Syracuse, Utah	K. S. 8	1292.556	4240.660
Near Kaysville, Utah	Salt Lake Southeast Base.	1283.940	4212.393
Near Layton, Utah	H_1	1355.674	4447.741
Layton, Utah	I_1	1327.635	4355.749
Kaysville, Utah	J_1	1308.657	4293.485
Near Farmington, Utah	K_1	1295.546	4250.470
Do	L_1	1295.029	4248.774
Farmington, Utah	M_1	1298.635	4260.605
Near Farmington, Utah	N_1	1286.863	4221.983
Centerville, Utah	O_1	1294.064	4245.608
Woods Cross, Utah	P_1	1308.433	4292.751
Simkins, Utah	Q_1	1304.697	4280.493
Stockyard Junction, Utah	R_1	1298.484	4260.110
Near Salt Lake City, Utah	S_1	1287.627	4224.490
Salt Lake City, Utah	T_1	1298.492	4260.136
Do	U_1	1319.998	4330.693
Do	V_1	1298.310	4259.539
Salt Lake City, Utah	W_1	1290.123	4232.678
Near Nebo, Cal	K_3	629.370	2064.858
Do	L_3	616.733	2023.398
Daggett, Cal	M_3	611.389	2005.865
Near Daggett, Cal	N_3	602.680	1977.293
Minneola, Cal	O_3	583.699	1915.019
Near Minneola, Cal	P_3	574.067	1883.418
Newberry, Cal	Q_3	557.761	1829.921
Near Newberry, Cal	R_3	549.622	1803.218
Troy, Cal	S_3	541.415	1776.293
Near Troy, Cal	T_3	546.554	1793.153
Hector, Cal	U_3	567.715	1862.578
Near Pisgah, Cal	V_3	614.599	2016.397
Pisgah, Cal	W_3	655.072	2149.182
Near Pisgah, Cal	X_3	660.959	2168.497
Lavic, Cal	Y_3	661.946	2171.735
Near Lavic, Cal	Z_3	649.110	2129.621
Arctic, Cal	A_4	617.080	2024.536
Near Arctic, Cal	B_4	587.143	1926.318
Near Ludlow, Cal	C_4	555.506	1822.523
Ludlow, Cal	D_4	540.434	1773.074
Near Ludlow, Cal	E_4	534.353	1753.123
Near Ash Hill, Cal	F_4	554.666	1819.766
Ash Hill, Cal	G_4	592.406	1943.585
Near Ash Hill, Cal	H_4	561.560	1842.384
Near Klondike, Cal	I_4	547.471	1796.161
Do	J_4	526.669	1727.913
Klondike, Cal	K_4	501.914	1646.696
Near Siberia, Cal	L_4	440.408	1444.905
Siberia, Cal	M_4	389.108	1276.599
Near Siberia, Cal	N_4	337.522	1107.354
Nome, Cal	O_4	305.736	1003.069
Near Nome, Cal	P_4	273.093	895.972
Bagdad, Cal	Q_4	241.113	791.052
Near Bagdad, Cal	R_4	222.648	730.471
Amboy, Cal	S_4	186.356	611.403
Near Bengal, Cal	T_4	205.585	674.490
Bengal, Cal	U_4	216.137	709.109
Near Cadiz, Cal	V_4	206.488	677.453
Do	W_4	231.545	759.661
Cadiz, Cal	X_4	249.599	818.892
Near Siam, Cal	Y_4	291.280	955.641
Siam, Cal	Z_4	316.295	1037.711
Near Danby, Cal	A_5	360.800	1183.724
Danby, Cal	B_5	412.117	1352.087
Near Arimo, Cal	C_5	448.685	1472.060
Arimo, Cal	D_5	467.237	1532.927
Near Arimo, Cal	E_5	498.268	1634.734
Essex, Cal	F_5	527.098	1729.321
Near Fenner, Cal	G_5	582.552	1911.256
Fenner, Cal	H_5	638.998	2096.446
Near Piute, Cal	I_5	676.434	2219.267
Piute, Cal	J_5	709.834	2328.847
Near Goffs, Cal	K_5	753.568	2472.331
Goffs, Cal	L_5	786.800	2581.360
Near Goffs, Cal	M_5	784.060	2572.371
Near Vontrigger, Cal	N_5	905.892	2972.081
Vontrigger, Cal	O_5	1026.878	3369.016
Near Blackburn, Cal	P_5	1068.477	3505.495
Blackburn, Cal	Q_5	1130.730	3709.737
Near Ledge, Cal	R_5	1244.849	4084.142
Ledge, Cal	S_5	1326.211	4351.077
Near Ledge, Cal	T_5	1339.723	4395.408
Purdy, Cal	U_5	1378.992	4524.243
Near Barnwell, Cal	V_5	1443.139	4734.699
Barnwell, Cal	W_5	1465.445	4807.881
Near Barnwell, Cal	X_5	1393.668	4572.392
Vanderbilt, Cal	Y_5	1266.042	4153.673
Near Vanderbilt, Cal	Z_5	1183.295	3882.194
Leastalk, Cal	A_6	1069.509	3508.880
Near Leastalk, Cal	B_6	1036.855	3401.749
Moore, Cal	C_6	1000.954	3283.963
Near Nipton, Cal	D_6	957.056	3139.941
Nipton, Cal	E_6	922.039	3025.057
Near Nipton, Cal	F_6	888.732	2915.781
Lyons, Cal	G_6	854.618	2803.856
Calada, Cal	H_6	836.770	2745.303
Roach, Nev	A	796.333	2612.636
Borax, Nev	B	823.987	2703.364
Jean, Nev	C	873.661	2866.336
Near Jean, Nev	D	903.195	2963.233
Sutor, Nev	E	924.622	3033.531
Near Erie, Nev	F	942.246	3091.352
Erie, Nev	G	951.631	3122.143
Near Sloan, Nev	H	871.562	2859.450
Sloan, Nev	I	862.216	2828.787
Near Sloan, Nev	J	828.306	2717.534
Bard, Nev	K	784.798	2574.792
Near Arden, Nev	L	758.689	2489.132
Do	M	732.007	2401.593
Do	2336B	711.595	2334.624
Bracken, Nev	N	660.661	2167.519
Near Bracken, Nev	2136B	650.564	2134.392

*A number of bench marks in Butte, Mont., and vicinity have changed in elevation, probably as a result of the mining operations. The elevations published here for that section should be used with caution, and any engineering or surveying operations should be started from at least two bench marks, the relation between which has not been disturbed, as shown by the new leveling done.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Las Vegas, Nev	O	618.357	2028.727
Do	2024B	616.443	2022.447
Do	P	615.356	2018.880
Do	2033B	619.170	2031.393
Near Butte, Mont	G_3	1709.923	5609.972
Skones, Mont	H_3	1792.915	5882.255
Highview, Mont	I_3	1927.704	6324.475
Homestake, Mont	J_3	1929.928	6331.772
Lewis Spur, Mont	K_3	1874.955	6151.415
Near Lewis Spur, Mont	L_3	1812.438	5946.307
Welch, Mont	M_3	1732.862	5685.231
Near Welch, Mont	N_3	1661.526	5451.190
Spire Rock, Mont	O_3	1589.422	5214.629
Near Pipestone, Mont	P_3	1523.756	4999.189
Pipestone, Mont	Q_3	1432.994	4701.414
Near Whitehall, Mont	R_3	1348.223	4423.295
Whitehall, Mont	S_3	1327.458	4355.168
Do	T_3	*1329.776	4362.773
Do	T_3	†1329.204	4360.897
Near Whitehall, Mont	U_3	1313.405	4309.063
Jefferson Island, Mont	V_3	1302.594	4273.594
Near Lime Spur, Mont	W_3	1301.334	4269.460
Lime Spur, Mont	X_3	1293.803	4244.752
Near Lime Spur, Mont	Y_3	1291.562	4237.400
Near Sappington, Mont	Z_3	1284.835	4215.329
Sappington, Mont	A_4	1276.042	4186.481
Near Sappington, Mont	B_4	1268.734	4162.505
Willow Creek, Mont	C_4	1265.726	4152.636
Near Willow Creek, Mont	D_4	1251.283	4105.251
Near Three Forks, Mont	E_4	1244.466	4082.885
Three Forks, Mont	F_4	1239.194	4065.589
Do	I Three Forks	1237.188	4059.008
Old Gallatin City, Mont	S. B. Gallatin	1234.555	4050.369
Near Old Gallatin City, Mont.	G_4	1231.046	4038.857
Do	Gauge B. M.	1232.230	4042.741
Near Logan, Mont	H_4	1240.749	4070.691
Logan, Mont	I_4	1250.116	4101.422
Near Manhattan, Mont	J_4	1282.374	4207.255
Manhattan, Mont	K_4	1292.913	4241.832
Near Manhattan, Mont	L_4	1299.471	4263.348
Central Park, Mont	M_4	1320.000	4330.700
Near Belgrade, Mont	N_4	1341.393	4400.887
Belgrade, Mont	O_4	1357.443	4453.544
Near Belgrade, Mont	P_4	1369.350	4492.609
Storey, Mont	Q_4	1402.371	4600.945
Bozeman, Mont	R_4	1448.802	4753.278
Near Bozeman, Mont	S_4	1473.408	4834.006
Near Gordon, Mont	T_4	1549.013	5082.053
Chestnut, Mont	U_4	1601.428	5254.018
Near West End, Mont	V_4	1652.806	5422.581
West End, Mont	W_4	1687.643	5536.875
Muir, Mont	X_4	1688.049	5538.207
Near Hoppers, Mont	Y_4	1627.948	5341.026
Hoppers, Mont	Z_4	1585.822	5202.818
Near Coal Spur, Mont	A_5	1489.059	4885.354
Do	B_5	1409.374	4623.921
Livingston, Mont	C_5	1371.774	4500.562
Do	D_5	1370.344	4495.870
Near Africa, Mont	E_5	1355.866	4448.370
Africa, Mont	F_5	1352.903	4438.649
Mission, Mont	G_5	1334.980	4379.847
Near Elton, Mont	H_5	1323.698	4342.832
Elton, Mont	I_5	1307.849	4290.835
Near Springdale, Mont	J_5	1298.143	4258.991
Springdale, Mont	K_5	1287.300	4223.417
Near Springdale, Mont	L_5	1277.883	4192.521
Carney, Mont	M_5	1265.517	4151.950
Dehart, Mont	N_5	1252.456	4109.099
Near Dehart, Mont	O_5	1256.002	4120.733
Bigtimber, Mont	P_5	1244.040	4081.488
Near Bigtimber, Mont	Q_5	1232.724	4044.362
Near Reynolds, Mont	R_5	1204.210	3950.812
Near Greycliff, Mont	S_5	1197.577	3929.051
Greycliff, Mont	T_5	1196.868	3926.724
Near Patcum, Mont	U_5	1175.702	3857.282
Patcum, Mont	V_5	1177.798	3864.159
Near Quebec, Mont	W_5	1162.136	3812.774
Reedpoint, Mont	X_5	1140.620	3742.184
Near Reedpoint, Mont	Y_5	1136.449	3728.500
Oneida, Mont	Z_5	1130.119	3707.732
Near Oneida, Mont	A_6	1128.682	3703.017
Merrill, Mont	B_6	1117.257	3665.534
Near Merrill, Mont	C_6	1115.228	3658.877
Wataga, Mont	D_6	1107.084	3632.158
Near Wataga, Mont	E_6	1099.340	3606.751
Columbus, Mont	F_6	1097.159	3599.596
Do	G_6	1092.838	3585.419
Near Columbus, Mont	H_6	1078.861	3539.563
Misko, Mont	I_6	1080.210	3543.989
Near Rapids, Mont	J_6	1068.704	3506.240
Rapids, Mont	K_6	1063.590	3489.461
Near Rapids, Mont	L_6	1059.146	3474.881
Youngs Point, Mont	M_6	1044.752	3427.657
Near Park City, Mont	N_6	1039.764	3411.292
Park City, Mont	O_6	1035.024	3395.741
Near Park City, Mont	P_6	1025.432	3364.271
Near Laurel, Mont	Q_6	1018.941	3342.976
Laurel, Mont	R_6	1005.144	3297.710
Near Laurel, Mont	S_6	994.178	3261.732
Foster, Mont	T_6	983.447	3226.526
Near Yegen, Mont	U_6	979.327	3213.009
Yegen, Mont	V_6	971.597	3187.648
Near Billings, Mont	W_6	961.216	3153.589
Billings, Mont	X_6	953.254	3127.467
Do	Y_6	953.232	3127.395
Do	Z_6	953.325	3127.700
Do	A_7	951.148	3120.558
Near Billings, Mont	B_7	947.828	3109.666
Near Lockwood, Mont	C_7	948.754	3112.704
Do	D_7	928.731	3047.012
Near Huntley, Mont	U. S. R. S. 1	925.124	3035.178
Do	U. S. R. S. 2	923.472	3029.758
Do	U. S. R. S. 3	922.745	3027.373
Stewart, Nev	Q	580.977	1906.089
Near Valley, Nev	R	601.646	1973.901
Valley, Nev	S	612.282	2008.795
Near Valley, Nev	T	650.762	2135.042
Dike, Nev	U	685.661	2249.540
Near Dike, Nev	V	735.535	2413.168
Apex, Nev	W	754.150	2474.240
Near Apex, Nev	X	709.291	2327.066
Garnet, Nev	Y	683.429	2242.216
Do	Z	681.925	2237.283
Near Dry Lake, Nev	A_1	651.639	2137.919
Dry Lake, Nev	B_1	638.121	2093.568
Do	C_1	636.441	2088.057
Near Dry Lake, Nev	D_1	639.779	2099.008
Crystal, Nev	E_1	619.781	2033.398
Ute, Nev	F_1	588.959	1932.276
Byron, Nev	G_1	544.169	1785.328
Near Moapa, Nev	H_1	484.368	1589.130
Moapa, Nev	I_1	508.269	1667.546
Do	J_1	507.988	1666.624
Do	K_1	510.894	1676.158
Do	L_1	514.019	1686.411
Acton, Nev	M_1	532.902	1748.362
Guelph, Nev	N_1	531.829	1744.842
Near Rox, Nev	O_1	546.981	1794.553
Rox, Nev	P_1	580.460	1904.393
Do	Q_1	589.179	1932.998
Hoya, Nev	R_1	617.905	2027.243
Galt, Nev	S_1	684.069	2244.316
Near Galt, Nev	T_1	724.871	2378.181
Vigo, Nev	U_1	741.844	2433.867
Near Vigo, Nev	V_1	747.299	2451.763
Near Carp, Nev	W_1	769.394	2524.253
Carp, Nev	X_1	789.415	2589.939
Do	Y_1	788.910	2588.282
Do	Z_1	790.860	2594.680
St. George, Nev	A_2	821.470	2695.106
Leith, Nev	B_2	894.055	2933.245
Near Leith, Nev	C_2	913.604	2997.383
Do	D_2	958.498	3144.672
Kyle, Nev	E_2	986.132	3235.335
Near Kyle, Nev	F_2	1001.555	3285.935
Elgin, Nev	G_2	1051.688	3450.413
Do	H_2	1056.580	3466.463
Do	I_2	1056.018	3464.619
Boyd, Nev	J_2	1150.866	3775.800
Near Boyd, Nev	K_2	1196.782	3926.442
Stine, Nev	L_2	1228.894	4031.796
Cana, Nev	M_2	1237.721	4060.756
Near Stine, Nev	N_2	1266.809	4156.189
Etna, Nev	O_2	1299.463	4263.321
Caliente, Nev	P_2	1337.994	4389.735
Do	Q_2	1341.793	4402.200
Do	R_2	1355.196	4446.172
Do	S_2	1342.559	4404.713
Do	T_2	1344.924	4412.471
Eccles, Nev	U_2	1409.706	4625.010
Near Minto, Nev	V_2	1437.344	4715.686
Minto, Nev	W_2	1466.294	4810.666
Big Springs, Nev	X_2	1542.892	5061.971
Islen, Nev	Y_2	1592.226	5223.828
Barclay, Nev	Z_2	1625.437	5332.788
Acoma, Nev	A_3	1681.859	5517.899
Do	B_3	1682.842	5521.124
Do	C_3	1684.329	5526.003
Near Acoma, Nev	D_3	1709.336	5608.046
Brown, Nev	E_3	1761.902	5780.507
Crestline, Nev	F_3	1823.661	5983.128
Do	G_3	1824.001	5984.244
Lien, Nev	H_3	1769.005	5803.811
Uvada, Utah	A_8	1723.456	5654.372
Tomas, Utah	B_8	1683.278	5522.555

* As originally set.

† As moved. New elevation from measurements by the local authorities.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Modena, Utah	C_8	1678.808	5507.889
Modena, Utah	D_8	1664.782	5461.872
Do	E_8	1667.195	5469.789
Do	F_8	1665.792	5465.186
Do	G_8	1668.414	5473.788
Escalante, Utah	H_8	1616.625	5303.877
Near Morton, Utah	I_8	1588.878	5212.844
Morton, Utah	J_8	1577.766	5176.387
Beryl, Utah	K_8	1569.923	5150.656
Do	L_8	1570.447	5152.375
Do	M_8	1568.791	5146.942
Sahara, Utah	N_8	1587.773	5209.219
Do	O_8	1585.523	5201.837
Ford, Utah	P_8	1569.300	5148.612
Lund, Utah	Q_8	1549.696	5084.294
Do	R_8	1549.364	5083.205
Do	S_8	1548.672	5080.935
Do	5092 RLund	1548.836	5081.473
Kerr, Utah	T_8	1549.391	5083.293
Latimer, Utah	U_8	1546.594	5074.117
Near Nada, Utah	V_8	1544.239	5066.391
Nada, Utah	W_8	1546.358	5073.343
Near Thermo, Utah	X_8	1536.862	5042.188
Thermo, Utah	Y_8	1533.366	5030.718
Do	Z_8	1535.949	5039.193
Do	A_9	1534.616	5034.819
Laho, Utah	B_9	1523.448	5008.021
Upton, Utah	C_9	1518.294	4981.270
Near Milford, Utah	D_9	1514.875	4970.052
Milford, Utah	E_9	1513.605	4965.886
Do	F_9	1512.807	4963.268
Do	G_9	1511.242	4958.133
Do	5084 FRR	1510.784	4956.631
Opal, Utah	H_9	1514.831	4969.908
Near Zenda, Utah	I_9	1511.087	4957.625
Salt Lake City, Utah	4251 Slak	1296.288	4252.905
Do	4352 Slak	1327.285	4354.601
Do	X_1	1288.501	4227.357
Do	O. S. L. 4222.57	1288.644	4227.827
Near Buena Vista, Utah	Y_1	1289.086	4229.276
Do	Z_1	1287.798	4225.051
Do	A_2	1288.990	4228.961
Near Riter, Utah	B_2	1285.830	4218.594
Near Garfield, Utah	C_2	1286.950	4222.268
Do	D_2	1288.096	4226.028
Garfield, Utah	E_2	1292.307	4239.844
Do	F_2	1287.592	4224.375
Near Garfield, Utah	G_2	1288.538	4227.478
Do	H_2	1290.688	4234.533
Lake Point, Utah	I_2	1292.438	4240.273
Near Lake Point, Utah	J_2	1298.177	4259.103
Near Morris, Utah	K_2	1324.363	4345.014
Morris, Utah	L_2	1335.025	4379.994
Erda, Utah	M_2	1382.518	4535.811
Near Erda, Utah	N_2	1412.907	4635.512
Shields, Utah	O_2	1438.753	4720.309
Near Tooele, Utah	P_2	1472.027	4829.476
Do	Q_2	1500.586	4923.173
Near Stockton, Utah	R_2	1522.824	4996.132
Stockton, Utah	S_2	1544.657	5067.762
Near Stockton, Utah	T_2	1534.009	5032.828
Do	U_2	1516.005	4973.760
St. John, Utah	V_2	1530.130	5020.102
Near Ajax, Utah	W_2	1536.320	5040.410
Do	X_2	1542.984	5062.273
Faust, Utah	Y_2	1600.918	5252.345
Near Faust, Utah	Z_2	1614.843	5298.031
Do	A_3	1646.442	5401.702
Vernon, Utah	B_3	1679.866	5511.360
Near Vernon, Utah	C_3	1686.393	5532.774
Dunbar, Utah	D_3	1716.049	5630.071
Near Dunbar, Utah	E_3	1728.248	5670.093
Near Lofgreen, Utah	F_3	1751.339	5745.851
Lofgreen, Utah	G_3	1768.661	5802.682
Near Boulter, Utah	H_3	1821.394	5975.690
Boulter, Utah	I_3	1835.908	6023.308
Near Boulter, Utah	J_3	1835.012	6020.368
Near Tintic, Utah	K_3	1811.323	5942.649
Tintic, Utah	L_3	1785.800	5858.912
Near Tintic, Utah	M_3	1833.549	6015.569
Eureka, Utah	U. S. G. S. 6394	1949.523	6396.060
Near Tintic, Utah	N_3	1745.028	5725.146
McIntyre, Utah	O_3	1701.272	5581.590
Near McIntyre, Utah	P_3	1660.212	5446.879
Jericho, Utah	Q_3	1618.851	5311.180
Near Jericho, Utah	R_3	1593.002	5226.374
Do	S_3	1565.600	5136.472
Dyer, Utah	T_3	1549.307	5083.018
Near Dyer, Utah	U_3	1536.453	5040.846
Champlin, Utah	V_3	1509.760	4953.271
Near Lynn Junction, Utah	W_3	1468.042	4816.401
Do	X_3	1460.818	4792.700
Do	Y_3	1458.636	4785.541
Lynn Junction, Utah	Z_3	1458.146	4783.934
Near Lynn Junction, Utah	A_4	1456.747	4779.344
Near Lynn Junction, Utah	B_4	1458.476	4785.017
Near Cline, Utah	C_4	1452.804	4766.407
Do	D_4	1449.876	4756.801
Near Akin, Utah	E_4	1419.252	4656.330
Akin, Utah	F_4	1414.110	4639.456
Near Oasis, Utah	G_4	1404.206	4606.966
Oasis, Utah	U. S. G. S. 4592	1400.173	4593.734
Do	H_4	1401.037	4596.569
Near Oasis, Utah	I_4	1395.324	4577.826
Van, Utah	J_4	1393.369	4571.411
Jerome, Utah	K_4	1392.244	4567.720
Clear Lake, Utah	L_4	1395.720	4579.125
Near Neels, Utah	M_4	1418.695	4654.502
Near Borden, Utah	N_4	1450.634	4759.288
Near Goss, Utah	O_4	1466.046	4809.853
Goss, Utah	P_4	1451.584	4762.406
Near Goss, Utah	Q_4	1463.547	4801.654
Cruz, Utah	R_4	1485.303	4873.031
Near Cruz, Utah	S_4	1476.652	4844.649
Near Pumice, Utah	T_4	1473.228	4833.416
Pumice, Utah	U_4	1480.868	4858.481
Near Pumice, Utah	V_4	1478.552	4850.883
Black Rock, Utah	W_4	1479.167	4852.901
Do	X_4	1479.385	4853.615
Malone, Utah	Z_4	1490.379	4889.685
Near Read, Utah	A_5	1484.912	4871.749
Read, Utah	B_5	1488.771	4884.410
Do	C_5	1488.574	4883.763
Near Read, Utah	D_5	1495.301	4905.834
Zenda, Utah	E_5	1505.984	4940.882
Crawford, Nebr	N_4	1118.173	3668.539
Near Crawford, Nebr	O_4	1129.375	3705.291
Horn, Nebr	P_4	1122.153	3681.597
Near Horn, Nebr	Q_4	1135.319	3724.792
Near Joder, Nebr	R_4	1131.038	3710.747
Do	S_4	1129.108	3704.415
Joder, Nebr	T_4	1136.410	3728.372
Orella, Nebr	U_4	1166.732	3827.853
Near Orella, Nebr	V_4	1127.090	3697.794
Mansfield, Nebr	W_4	1105.438	3626.758
Near Ardmore, S. Dak	N-S. D. 204 M	1089.511	3574.504
Ardmore, S. Dak	O_4	1084.910	3559.409
Do	3553 D. W	1083.633	3555.219
Near Ardmore, S. Dak	3527 D. W	1075.680	3529.127
Near Rumford, S. Dak	3487 D. W	1063.523	3489.242
Rumford, S. Dak	3500 D. W	1067.481	3502.227
Near Rumford, S. Dak	3532 D. W	1077.263	3534.320
Near Provo, S. Dak	3632 D. W	1107.727	3634.268
Provo, S. Dak	3708 D. W	1130.934	3710.406
Near Provo, S. Dak	P_4	1103.225	3619.497
Near Dennis, S. Dak	Q_4	1091.199	3580.042
Do	3528 D. W	1076.044	3530.321
Near Edgemont, S. Dak	R_4	1065.560	3495.925
Edgemont, S. Dak	S_4	1053.059	3454.911
Do	T_4	1053.323	3455.777
Do	3449 D. W	1051.990	3451.404
Do	U_4	1048.440	3439.757
Near Edgemont, S. Dak	3463 D. W	1056.242	3465.354
Marietta, S. Dak	3486 D. W	1063.235	3488.297
Near Marietta, S. Dak	3544 D. W	1080.961	3546.453
Argentine, S. Dak	3632 D. W	1107.757	3634.366
Do	V_4	1104.085	3622.319
Near Dewey, S. Dak	W_4	1124.362	3688.844
Do	X_4	1126.198	3694.868
Dewey, S. Dak	3704 D. W	1129.510	3705.734
Near Dewey, S. Dak	S. D.-WY. 38.24 M	1141.917	3746.439
Dakoming, Wyo	Q_6	1168.397	3833.316
Clifton, Wyo	R_6	1202.746	3946.009
Do	S_6	1200.670	3939.198
Near Clifton, Wyo	T_6	1214.909	3985.914
Do	3971 D. W	1210.890	3972.728
Near Spencer, Wyo	4120 D. W	1256.355	4121.891
Spencer, Wyo	4195 D. W	1279.181	4196.780
Near Newcastle, Wyo	4344 D. W	1324.774	4346.363
Johnson Siding, Wyo	U_6	1323.294	4341.507
Newcastle, Wyo	V_6	1315.786	4316.875
Do	W_6	1317.653	4323.000
Do	X_6	1329.945	4363.328
Do	4332 D. W	1321.096	4334.296
Do	U. S. G. S. M. M	1318.977	4327.344
Near Newcastle, Wyo	4171 D. W	1272.018	4173.279
Pedro, Wyo	Y_6	1281.319	4203.794
Near Pedro, Wyo	4218 D. W	1286.320	4220.201
Near Osage, Wyo	Z_6	1315.100	4314.624
Do	4312 D. W	1314.979	4314.227
Jerome, Wyo	A_7	1283.662	4211.481
Do	B_7	1283.170	4209.867
Near Jerome, Wyo	C_7	1273.002	4176.507
Near Upton, Wyo	D_7	1288.102	4226.048
Upton, Wyo	E_7	1290.621	4234.312
Do	F_7	1290.619	4234.306
Do	G_7	1290.731	4234.673
Thornton, Wyo	H_7	1317.812	4323.521
Near Kara, Wyo	I_7	1324.576	4345.713
Kara, Wyo	J_7	1325.924	4350.136

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Kara, Wyo	K_7	1324.364	4345.018
Near Kara, Wyo	L_7	1327.323	4354.725
Near Moorcroft, Wyo	M_7	1334.270	4377.517
Do	N_7	1305.468	4283.023
Moorcroft, Wyo	O_7	1282.278	4206.940
Do	P_7	1282.255	4206.865
Do	Q_7	1280.208	4200.149
Near Moorcroft, Wyo	R_7	1267.306	4157.820
Do	S_7	1267.127	4157.232
Near Wessex, Wyo	T_7	1282.946	4209.132
Wessex, Wyo	U_7	1285.724	4218.246
Rozet, Wyo	V_7	1305.562	4283.331
Near Rozet, Wyo	W_7	1328.548	4358.745
Minturn, Wyo	X_7	1340.204	4396.986
Near Gillette, Wyo	Y_7	1356.253	4449.640
Gillette, Wyo	Z_7	1384.298	4541.651
Do	A_8	1385.907	4546.930
Do	B_8	1385.033	4544.062
Near Gillette, Wyo	C_8	1422.118	4665.732
Sparta, Wyo	D_8	1446.990	4747.333
Oriva, Wyo	E_8	1417.624	4650.988
Do	F_8	1414.606	4641.086
Near Oriva, Wyo	G_8	1405.703	4611.877
Kier, Wyo	H_8	1352.967	4438.859
Near Felix, Wyo	I_8	1311.201	4301.832
Felix, Wyo	J_8	1295.242	4249.473
Do	K_8	1290.774	4234.814
Near Felix, Wyo	L_8	1251.018	4104.382
Echeta, Wyo	M_8	1244.061	4081.557
Do	N_8	1243.231	4078.834
Near Echeta, Wyo	O_8	1217.989	3996.019
Croton, Wyo	P_8	1205.175	3953.978
Do	Q_8	1207.222	3960.694
Near Lariat, Wyo	Rail△	1188.801	3900.258
Lariat, Wyo	R_8	1182.866	3880.786
Arvada, Wyo	S_8	1114.209	3655.534
Do	T_8	1113.439	3653.008
Do	U_8	1113.996	3654.835
Kendrick, Wyo	V_8	1179.360	3869.284
Cadiz, Wyo	W_8	1138.026	3733.674
Huntley, Mont	U. S. R. S. 4	921.546	3023.439
Near Huntley, Mont	U. S. R. S. 5	919.800	3017.710
Do	U. S. R. S. 6	918.543	3013.586
Do	U. S. R. S. 7	917.638	3010.617
Do	U. S. R. S. 8	919.658	3017.245
Near Ballantine, Mont	U. S. R. S. 9	917.744	3010.965
Do	U. S. R. S. 10	918.240	3012.592
Do	U. S. R. S. 11	915.214	3002.665
Do	E_7	909.370	2983.491
Ballantine, Mont	U. S. G. S. 2982	914.371	2999.899
Near Ballantine, Mont	U. S. R. S. 12	916.016	3005.296
Do	U. S. R. S. 13	925.901	3037.727
Do	U. S. R. S. 14	924.557	3033.317
Do	U. S. R. S. 15	923.502	3029.856
Near Anita, Mont	U. S. R. S. 16	924.517	3033.186
Anita, Mont	U. S. G. S. 3056	930.524	3052.894
Near Anita, Mont	F_7	922.859	3027.747
Do	G_7	920.650	3020.499
Corinth, Mont	U. S. G. S. 3144	940.310	3085.000
Toluca, Mont	U. S. G. S. 3303	989.018	3244.803
Near Toluca, Mont	H_7	953.250	3127.454
Do	I_7	944.014	3097.153
Near Hardin, Mont	J_7	897.171	2943.468
Do	U. S. G. S. 2989	892.780	2929.062
Hardin, Mont	K_7	884.669	2902.452
Near Hardin, Mont	L_7	882.882	2896.589
Do	M_7	882.900	2896.648
Do	N_7	882.404	2895.020
Dunmore, Mont	O_7	903.513	2964.276
Near Dunmore, Mont	P_7	908.557	2980.824
Do	Q_7	917.267	3009.400
Crow Agency, Mont	R_7	925.545	3036.559
Near Crow Agency, Mont	S_7	926.231	3038.810
Do	T_7	932.386	3059.003
Garryowen, Mont	U_7	951.280	3120.991
Near Garryowen, Mont	V_7	962.282	3157.087
Near Ionia, Mont	W_7	989.321	3245.797
Ionia, Mont	X_7	998.489	3275.876
Near Lodgegrass, Mont	Y_7	1020.158	3346.968
Lodgegrass, Mont	Z_7	1024.714	3361.916
Near Lodgegrass, Mont	A_8	1026.993	3369.393
Near Little Horn, Mont	B_8	1067.228	3501.397
Near Wyola, Mont	C_8	1096.576	3597.683
Wyola, Mont	D_8	1131.589	3712.555
Do	E_8	1129.337	3705.166
Near Aberdeen, Mont	F_8	1186.711	3893.401
Aberdeen, Mont	G_8	1205.161	3953.932
In Montana near Parkman, Wyo.	H_8	1246.487	4089.516
Parkman, Wyo	U. S. G. S. 4292	1311.103	4301.510
Ohlman, Wyo	U. S. G. S. 4138	1264.162	4147.505
Near Ranchester, Wyo	U. S. G. S. 4011	1223.591	4014.398
Ranchester, Wyo	U. S. G. S. 3788	1155.547	3791.157
Do	Ranchester south-east base △ (U. S. G. S.)	1155.571	3791.236
Do	U. S. G. S. 3751	1146.024	3759.914
Near Ranchester, Wyo	U. S. G. S. 3698	1130.049	3707.502
Near Monarch, Wyo	U. S. G. S. 3660	1118.371	3669.189
Do	Z_3	1118.533	3669.720
Alger, Wyo	A_4	1107.647	3634.005
Near Dietz, Wyo	B_4	1104.687	3624.294
Near Sheridan, Wyo	U. S. G. S. 3682	1125.228	3691.685
Do	C_4	1133.019	3717.246
Sheridan, Wyo	Astro	1138.097	3733.907
Do	D_4	1141.413	3744.786
Do	U. S. G. S. 3738	1142.175	3747.286
Do	E_4	1144.558	3755.104
Wakely, Wyo	F_4	1143.312	3751.016
Arno, Wyo	G_4	1150.753	3775.429
Near Verona, Wyo	H_4	1173.488	3850.019
Verona, Wyo	I_4	1222.660	4011.344
Ulm, Wyo	J_4	1354.028	4442.340
Near Ulm, Wyo	K_4	1301.329	4269.444
Near Clearmont, Wyo	L_4	1217.442	3994.224
Clearmont, Wyo	M_4	1194.744	3919.756
Do	N_4	1194.972	3920.504
Big Corral, Wyo	O_4	1158.251	3800.028
Rising, Cal	I_6	735.380	2412.659
Near Homer, Cal	J_6	610.387	2002.578
Ibis, Cal	K_6	443.116	1453.790
Near Java, Cal	L_6*	347.803	1141.083
Do	M_6*	299.178	981.553
Hartoum, Cal	N_6	225.624	740.235
Needles, Cal	O_6	147.113	482.653
Do	P_6	147.574	484.166
Do	Q_6	148.717	487.916
Do	Needles, Astro	153.469	503.506
Do	△Bar†	168.300	552.361
Near Needles, Cal	R_6	145.034	475.832
Do	U. S. G. S. 473	144.473	473.992
Do	S_6	142.892	468.805
Near Beal, Cal	T_6	141.049	462.758
Do	U_6	144.688	474.697
Do	V_6	153.778	504.520
Topock, Ariz	U. S. G. S. 504	153.855	504.772
Do	△U. S. G. S. Topog.	154.015	505.298
Do	A	153.831	504.694
Near Topock, Ariz	B	161.613	530.225
Do	C	171.963	564.182
Near Powell, Ariz	D	214.530	703.838
Powell, Ariz	U. S. G. S. 762	232.411	762.502
Franconia, Ariz	U. S. G. S. 1101	335.529	1100.815
Near Franconia, Ariz	E	380.892	1249.643
Do	F	386.178	1266.986
Do	G	386.237	1267.179
Do	H	391.074	1283.048
Near Haviland, Ariz	I	405.578	1330.633
Do	J	458.166	1503.166
Do	K	467.363	1533.340
Do	L	486.304	1595.482
Near Yucca, Ariz	M	501.914	1646.696
Do	N	515.915	1692.631
Do	O	532.149	1745.892
Yucca, Ariz	P	550.873	1807.322
Near Yucca, Ariz	Q	555.870	1823.717
Do	R	589.415	1933.772
Near Kaster, Ariz	S	694.731	2279.297
Near Drake, Ariz	T	767.074	2516.642
Drake, Ariz	U	795.130	2608.689
Near Drake, Ariz	V	806.598	2646.314
Do	W	822.814	2699.516
Hancock, Ariz	X	838.821	2752.032
Near McConnico, Ariz	Y	883.690	2899.239
Near Kingman, Ariz	Z	984.289	3229.288
Kingman, Ariz	A_1	1018.272	3340.781
Do	B_1	1014.971	3329.951
Berry, Ariz	C_1	1028.792	3375.295
Near Hualapai, Ariz	D_1	995.510	3266.103
Hualapai, Ariz	E_1	1005.573	3299.117
Do	F_1	1011.934	3319.986
Near Hualapai, Ariz	G_1	1022.319	3354.058
Do	H_1	1042.371	3419.846
Antares, Ariz	I_1	1098.979	3605.567
Near Hackberry, Ariz	J_1	1083.732	3555.544
Do	K_1	1080.281	3544.222
Hackberry, Ariz	L_1	1083.227	3553.887
Near Hackberry, Ariz	M_1	1094.740	3591.659
Tinnaka, Ariz	N_1	1164.473	3820.442
Crozier, Ariz	O_1	1209.762	3969.028
Near Crozier, Ariz	P_1	1256.876	4123.601
Near Truxton, Ariz	Q_1	1277.354	4190.786
Near Cherokee, Ariz	R_1	1385.752	4546.421
Near Peach Springs, Ariz	S_1	1405.026	4609.656

* Probably moved by the Atchison, Topeka & Santa Fe Railway in 1911.

† Probably destroyed.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Peach Springs, Ariz	T_1	1459.325	4787.802
Nelson, Ariz	U_1	1559.394	5116.112
Near Nelson, Ariz	V_1	1590.536	5218.283
Near Yampai, Ariz	W_1	1662.277	5453.653
Yampai, Ariz	X_1	1701.928	5583.742
Near Yampai, Ariz	Y_1	1644.828	5396.407
Near Pica, Ariz	Z_1	1587.973	5209.875
Do	A_2	1581.846	5189.773
Near Audley, Ariz	B_2	1578.096	5177.470
Audley, Ariz	C_2	1570.503	5152.559
Near Audley, Ariz	D_2	1568.209	5145.032
Near Chino, Ariz	E_2	1612.664	5290.882
Do	F_2	1619.586	5313.591
Near Seligman, Ariz	G_2	1594.083	5229.921
Do	H_2	1592.746	5225.534
Seligman, Ariz	I_2	1597.582	5241.401
Near Pan, Ariz	J_2	1665.972	5465.777
Near Crookton, Ariz	K_2	1710.997	5613.496
Gleed, Ariz	L_2	1654.279	5427.414
Near Pineveta, Ariz	M_2	1557.210	5108.947
Do	N_2	1534.486	5034.393
Near Ash Fork, Ariz	O_2	1536.149	5039.849
Ash Fork, Ariz	U. S. G. S. 5141	1566.512	5139.464
Do	P_2	1569.398	5148.933
Near Ash Fork, Ariz	U. S. G. S. 5134	1564.440	5132.667
Near Holmes, Ariz	U. S. G. S. 5446	1659.457	5444.401
Do	Q_2	1688.270	5538.933
Near Fairview, Ariz	U. S. G. S. 5713	1740.956	5711.787
Fairview, Ariz	U. S. G. S. 5964	1809.222	5935.756
Near Fairview, Ariz	R_2	1824.088	5984.529
Do	S_2	1847.314	6060.729
Do	T_2	1885.711	6186.704
Near McLellan, Ariz	U_2	1922.633	6307.839
McLellan, Ariz	V_2	1957.985	6423.822
Near McLellan, Ariz	U. S. G. S. 6568	2001.584	6566.863
Near Supai, Ariz	W_2	2104.556	6904.697
Supai, Ariz	U. S. G. S. 6961	2121.413	6960.002
Near Williams, Ariz	X_2	2067.258	6782.329
Williams, Ariz	U. S. G. S. 6770	2062.437	6766.512
Do	Y_2	2062.641	6767.182
Near Williams, Ariz	Z_2	2105.394	6907.447
Do	U. S. G. S. 6952	2118.566	6950.662
Do	U. S. G. S. 6930	2111.942	6928.930
Near Davern, Ariz	U. S. G. S. 6953	2119.034	6952.197
Chalender, Ariz	U. S. G. S. 6869	2093.191	6867.411
Near Chalender, Ariz	A_3	2091.689	6862.483
Do	U. S. G. S. 6852	*2087.986	6850.333
Near Maine, Ariz	B_3	2134.256	7002.138
Maine, Ariz	U. S. G. S. 7086	2159.522	7085.032
Near Maine, Ariz	U. S. G. S. 7178	2187.349	7176.328
Near Arey, Ariz	U. S. G. S. 7193	2192.122	7191.987
Near Bellemont, Ariz	U. S. G. S. 7131	2173.130	7129.677
Do	C_3	2173.526	7130.976
Do	U. S. G. S. 7186	2189.880	7184.632
Near Riordan, Ariz	U. S. G. S. 7273	2216.550	7272.131
Near Agassiz, Ariz	U. S. G. S. 7091	2160.814	7089.271
Do	D_3	2150.386	7055.058
Flagstaff, Ariz	U. S. G. S. 6907	2104.810	6905.530
Do	E_3	2102.963	6899.471
Near Flagstaff, Ariz	U. S. G. S. 6844	2084.559	6839.091
Do	U. S. G. S. 6843	2085.166	6841.082
Near Cosnino, Ariz	F_3	1966.444	6451.575
Winona, Ariz	G_3	1899.717	6232.655
Near Winona, Ariz	H_3	1849.604	6068.242
Near Angell, Ariz	I_3	1767.069	5797.459
Near Hibbard, Ariz	J_3	1701.705	5583.010
Do	K_3	1699.870	5576.990
Do	L_3	1672.074	5485.796
Near Canyon Diablo, Ariz	M_3	1659.697	5445.189
Do	N_3	1655.104	5430.120
Do	O_3	1655.125	5430.189
Near Sunshine, Ariz	P_3	1631.900	5353.992
Do	Q_3	1630.389	5349.035
Do	R_3	1612.731	5291.102
Do	S_3	1572.445	5158.930
Near Dennison, Ariz	T_3	1537.976	5045.843
Do	U_3	1527.648	5011.958
Near Winslow, Ariz	V_3	1486.110	4875.680
Do	W_3	1498.857	4917.500
Winslow, Ariz	X_3	†1479.840	4855.109
Near Winslow, Ariz	Y_3	1482.042	4862.333
Do	Z_3	1481.980	4862.129
Near Hobson, Ariz	A_4	1490.099	4888.766
Near Hardy, Ariz	B_4	1501.599	4926.496
Near Manila, Ariz	C_4	1511.663	4959.514
Near Joseph City, Ariz	D_4	1521.550	4991.952
Do	E_4	1527.442	5011.282
Near Penzance, Ariz	F_4	1536.214	5040.062
Do	G_4	1538.663	5048.097
Near Holbrook, Ariz	H_4	1542.302	5060.036
Holbrook, Ariz	I_4	1549.426	5083.408
Near Holbrook, Ariz	J_4	1556.278	5105.888
Near Aztec, Ariz	K_4	1563.002	5127.949
Do	L_4	1581.530	5188.736
Do	M_4	1583.696	5195.843
Near Carrizo, Ariz	N_4	1590.952	5219.648
Near Adamana, Ariz	O_4	1607.789	5274.888
Adamana, Ariz	P_4	1614.676	5297.483
Near Adamana, Ariz	Q_4	1626.104	5334.976
Near Pinta, Ariz	R_4	1664.974	5462.502
Do	S_4	1672.541	5487.329
Do	T_4	1685.721	5530.570
Do	U_4	1701.938	5583.775
Near Navajo, Ariz	V_4	1702.250	5584.798
Do	W_4	1708.481	5605.241
Do	X_4	1731.275	5680.025
Near Chambers, Ariz	Y_4	1744.954	5724.903
Chambers, Ariz	Z_4	1752.615	5750.038
Near Sanders, Ariz	A_5	1776.240	5827.547
Sanders, Ariz	B_5	1777.138	5830.494
Near Sanders, Ariz	C_5	1784.940	5856.090
Near Houck, Ariz	D_5	1808.434	5933.171
Do	E_5	1811.578	5943.486
Houck, Ariz	F_5	1815.926	5957.750
Near Allantown, Ariz	G_5	1854.216	6083.373
Near Lupton, Ariz	H_5	1870.786	6137.737
Do	I_5	1875.460	6153.071
Near Manuelito, N. Mex	A	1891.744	6206.497
Do	B	1905.926	6253.025
Do	C	1909.332	6264.200
Do	D	1919.826	6298.629
Near Defiance, N. Mex	E	1938.811	6360.915
Near West Yard, N. Mex	F	1968.197	6457.326
Gallup, N. Mex	G	1983.181	6506.486
Near Gallup, N. Mex	H	1995.748	6547.716
Do	I	2001.438	6566.385
Near Zuni, N. Mex	J	2003.474	6573.064
Do	K	2021.500	6632.205
Wingate, N. Mex	L	2054.301	6739.819
Near Perea, N. Mex	M	2115.481	6940.540
Guam, N. Mex	N	2133.209	6998.703
Near Guam, N. Mex	O	2169.245	7116.931
Near Gonzales, N. Mex	P	2183.606	7164.048
Gonzales, N. Mex	Q	2210.739	7253.066
Near Gonzales, N. Mex	R	2200.096	7218.149
Thoreau, N. Mex	S	2174.184	7133.135
Near Thoreau, N. Mex	T	2152.934	7063.418
Near Chaves, N. Mex	U	2125.171	6972.332
Near Baca, N. Mex	V	2082.720	6833.057
Do	W	2070.318	6792.368
Do	X	2057.675	6750.889
Near Bluewater, N. Mex	Y	2049.248	6723.241
Do	Z	2045.719	6711.663
Do	A_1	2008.467	6589.445
Near Toltec, N. Mex	B_1	1989.918	6528.589
Near Grants, N. Mex	C_1	1986.282	6516.660
Grants, N. Mex	D_1	1970.928	6466.286
Near Grants, N. Mex	E_1	1967.530	6455.138
Near Horace, N. Mex	F_1	1943.580	6376.562
Do	G_1	1917.551	6291.165
Near McCartys, N. Mex	H_1	1894.856	6216.707
Do	I_1	1889.999	6200.772
McCartys, N. Mex	J_1	1879.092	6164.988
Near Alaska, N. Mex	K_1	1845.695	6055.418
Do	L_1	1825.149	5988.010
Near Cubero, N. Mex	M_1	1807.230	5929.221
Do	N_1	1794.550	5887.620
Near Laguna, N. Mex	O_1	1785.586	5858.210
Do	P_1	1777.633	5832.118
Laguna, N. Mex	Q_1	1767.015	5797.282
Do	Laguna Astro	1765.277	5791.580
Near Laguna, N. Mex	R_1	1749.438	5739.615
Do	S_1	1742.006	5715.231
El Rito, N. Mex	T_1	1726.742	5665.153
Near El Rito, N. Mex	U_1	1715.303	5627.623
Near Armijo, N. Mex	V_1	1711.929	5616.554
Do	W_1	1683.656	5523.795
Do	X_1	1681.769	5517.604
Suwanee, N. Mex	Y_1	1661.336	5450.566
Near Suwanee, N. Mex	Z_1	1628.412	5342.548
Near Garcia, N. Mex	A_2	1613.126	5292.398
Do	B_2	1583.538	5195.325
Do	C_2	1572.135	5157.913
Near Rio Puerco, N. Mex	D_2	1553.752	5097.601
Do	E_2	1538.747	5048.372
Near Pavo, N. Mex	F_2	1558.709	5113.865
Do	G_2	1579.990	5183.683
Do	H_2	1584.533	5198.589
Near Sandia, N. Mex	I_2	1622.203	5322.178
Do	J_2	1581.730	5189.393
Near Manzana, N. Mex	K_2	1558.431	5112.952
Do	L_2	1546.532	5073.914
Near Isleta, N. Mex	M_2	1519.955	4986.719
Do	U. S. G. S. 4891	1490.802	4891.073

* Elevation as moved to the south abutment, 2087.992 meters or 6850.354 feet.

†According to a letter, dated April 21, 1910, from Mr. H. C. Phillips, chief engineer of the Atchison, Topeka & Santa Fe Railway Co., the position of this bench mark has been changed, the new elevation being 1479.865 meters or 4855.189 feet.

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Isleta, N. Mex	N_2	1492.820	4897.694
Near Isleta, N. Mex	O_2	1494.056	4901.749
Do	U. S. G. S. 4902	1494.056	4901.749
Do	U. S. G. S. 4904	1494.750	4904.026
Near Albuquerque, N. Mex	U. S. G. S. 4928	1502.078	4928.068
Do	U. S. G. S. 4932	1503.115	4931.470
Albuquerque, N. Mex	P_2	1510.907	4957.034
Do	U. S. G. S. 4954	1509.739	4953.202
Do	Albuquerque Astro.	1520.300	4987.851
Do	U. S. G. S. 4951	1509.026	4950.863
Fort Reno, Okla	A_2	425.350	1395.502
Calumet, Okla	B_2	419.559	1376.503
Near Calumet, Okla	C_2	440.236	1444.341
Geary, Okla	D_2	469.428	1540.115
Do	E_2	472.411	1549.901
Do	F_2	482.624	1583.409
Do	G_2	484.752	1590.391
Near Geary, Okla	H_2	435.931	1430.315
Do	I_2	428.992	1407.452
Bridgeport, Okla	J_2	434.597	1425.840
Near Bridgeport, Okla	K_2	435.531	1428.904
McCool, Okla	L_2	440.231	1444.423
Near Hydro, Okla	M_2	447.784	1469.105
Hydro, Okla	N_2	474.721	1557.480
Do	O_2	453.856	1489.020
Near Hydro, Okla	P_2	456.479	1497.631
Near Weatherford, Okla	Q_2	477.503	1563.608
Weatherford, Okla	R_2	501.674	1645.999
Do	S_2	505.846	1659.595
Near Weatherford, Okla	T_2	516.341	1694.029
Do	U_2	525.375	1723.668
Do	V_2	548.423	1799.234
Near Indianapolis, Okla	W_2	511.460	1678.015
Indianapolis, Okla	X_2	507.850	1666.172
Near Indianapolis, Okla	Y_2	466.360	1530.049
Near Clinton, Okla	Z_2	454.237	1490.374
Clinton, Okla	A_3	462.436	1517.175
Do	B_3	477.163	1565.492
Do	C_3	477.404	1566.283
Near Clinton, Okla	D_3	456.109	1496.417
Do	E_3	471.643	1547.382
Near Parkersburg, Okla	F_3	470.878	1544.872
Parkersburg, Okla	G_3	464.737	1524.725
Near Parkersburg, Okla	H_3	481.039	1578.238
Foss, Okla	I_3	495.505	1625.669
Do	J_3	500.146	1640.893
Do	K_3	496.383	1628.559
Near Foss, Okla	L_3	535.883	1758.153
Canute, Okla	M_3	580.110	1903.244
Near Canute, Okla	N_3	592.680	1944.484
Near Elk City, Okla	O_3	592.186	1942.854
Elk City, Okla	P_3	583.409	1914.235
Do	Q_3	587.136	1926.295
Do	R_3	588.600	1931.098
Near Elk City, Okla	S_3	637.718	2092.243
Meritt, Okla	T_3	625.220	2051.242
Doxey, Okla	U_3	560.222	1837.995
Do	V_3	560.075	1837.513
Near Sayre, Okla	W_3	560.713	1839.606
Do	X_3	554.113	1817.933
Sayre, Okla	Y_3	550.807	1807.105
Do	Z_3	551.835	1810.577
Near Sayre, Okla	A_4	562.310	1844.845
Hext Ranch, Okla	B_4	588.428	1930.534
Near Erick, Okla	C_4	617.075	2024.521
Erick, Okla	D_4	628.316	2061.400
Do	E_4	628.332	2061.453
Near Erick, Okla	F_4	616.333	2022.085
Texola, Okla	G_4	654.511	2147.342
Do	H_4	655.755	2151.423
Bononing, Tex	H_9	653.998	2145.658
Fuller, Tex	I_9	665.989	2184.939
Near Shamrock, Tex	J_9	700.433	2298.004
Shamrock, Tex	K_9	711.034	2332.784
Do	L_9	713.864	2342.068
Near Shamrock, Tex	M_9	730.020	2395.074
Lela (formerly Story), Tex	N_9	735.617	2413.436
Near Ramsdell, Tex	O_9	759.674	2492.354
Ramsdell, Tex	P_9	780.015	2559.099
Do	Q_9	781.795	2564.943
Near Ramsdell, Tex	R_9	833.257	2733.777
McLean, Tex	S_9	871.344	2858.734
Do	T_9	873.249	2864.985
Near McLean, Tex	U_9	902.748	2961.765
Near Alanreed, Tex	V_9	916.951	3008.363
Alanreed, Tex	W_9	928.571	3045.487
Do	X_9	922.767	3027.445
Near Alanreed, Tex	Y_9	946.118	3104.055
Rockledge, Tex	Z_9	965.480	3167.579
Near Jericho, Tex	A_{10}	967.194	3173.293
Jericho, Tex	B_{10}	976.056	3202.310
Fort Worth, Tex	C_{10}	190.315	624.392
Near Fort Worth, Tex	D_{10}	169.854	557.262
Near Fort Worth, Tex	E_{10}	175.614	576.160
Near Benbrook, Tex	F_{10}	189.979	623.230
Benbrook, Tex	G_{10}	201.982	662.669
Near Benbrook, Tex	H_{10}	239.965	787.285
Iona, Tex	I_{10}	298.797	980.303
Aledo, Tex	J_{10}	270.678	888.049
Do	K_{10}	271.892	892.032
Near Aledo, Tex	L_{10}	245.637	805.894
Do	M_{10}	249.345	818.059
Near Anneta, Tex	N_{10}	261.192	856.927
Near Earls, Tex	O_{10}	274.745	901.392
Earls, Tex	P_{10}	276.192	906.140
Near Weatherford, Tex	Q_{10}	285.976	938.240
Weatherford, Tex	R_{10}	301.666	989.716
Do	S_{10}	320.789	1052.456
Do	T_{10}	308.128	1010.917
Near Weatherford, Tex	U_{10}	319.776	1049.131
Do	V_{10}	347.342	1139.571
Lambert, Tex	W_{10}	353.079	1158.393
Near Millsap, Tex	X_{10}	295.369	969.056
Millsap, Tex	Y_{10}	250.534	821.960
Near Millsap, Tex	Z_{10}	229.805	753.952
Bennetts, Tex	A_{11}	229.659	753.473
Near Brazos, Tex	B_{11}	248.068	813.870
Do	C_{11}	238.862	783.667
Brazos, Tex	D_{11}	246.326	808.155
Near Santo, Tex	E_{11}	239.974	787.315
Do	F_{11}	245.361	804.989
Santo, Tex	G_{11}	250.686	822.459
Near Santo, Tex	H_{11}	268.527	880.993
Judd, Tex	I_{11}	278.574	913.955
Near Gordon, Tex	J_{11}	284.829	934.476
Gordon, Tex	K_{11}	294.819	967.252
Near Mingus, Tex	L_{11}	291.388	955.996
Mingus, Tex	M_{11}	292.031	958.105
Near Mingus, Tex	N_{11}	290.617	953.466
Strawn, Tex	O_{11}	303.560	995.930
Do	P_{11}	304.030	997.472
Near Strawn, Tex	Q_{11}	317.522	1041.737
Do	R_{11}	328.052	1076.284
Near Wiles, Tex	S_{11}	344.531	1130.349
Wiles, Tex	T_{11}	354.284	1162.347
Near Wiles, Tex	U_{11}	361.966	1187.550
Near Tiffin, Tex	V_{11}	400.667	1314.522
Tiffin, Tex	W_{11}	426.448	1399.105
Ranger, Tex	X_{11}	441.791	1449.443
Do	Y_{11}	440.123	1443.970
Near Ranger, Tex	Z_{11}	446.498	1464.886
Do	A_{12}	446.947	1466.359
Olden, Tex	B_{12}	476.087	1561.962
Near Eastland, Tex	C_{12}	455.250	1493.599
Eastland, Tex	D_{12}	435.950	1430.279
Near Eastland, Tex	E_{12}	446.315	1464.285
Lem, Tex	F_{12}	458.234	1503.389
Cisco, Tex	G_{12}	495.940	1627.096
Do	H_{12}	493.725	1619.829
Near Cisco, Tex	I_{12}	504.774	1656.079
Near Dothan, Tex	Lamb △	534.706	1754.282
Do	Lamb Ref. Mark	534.578	1753.862
Dothan, Tex	J_{12}	493.305	1618.451
Near Putnam, Tex	K_{12}	478.727	1570.623
Putnam, Tex	L_{12}	488.631	1603.117
Do	M_{12}	490.095	1607.920
Near Putnam, Tex	N_{12}	459.069	1506.129
Chatauqua, Tex	O_{12}	465.011	1525.624
Near Chatauqua, Tex	P_{12}	485.215	1591.910
Near Baird, Tex	Q_{12}	497.437	1632.008
Baird, Tex	R_{12}	523.822	1718.573
Do	S_{12}	525.736	1724.852
Near Baird, Tex	T_{12}	580.226	1903.625
Clyde, Tex	U_{12}	605.654	1987.050
Near Clyde, Tex	V_{12}	612.299	2008.852
Elmdale, Tex	W_{12}	543.403	1782.815
Abilene, Tex	X_{12}	522.001	1712.598
Do	Y_{12}	525.969	1725.617
Do	Z_{12}	525.690	1724.702
Do	A_{13}	524.107	1719.508
Near Abilene, Tex	B_{13}	525.118	1722.825
Tye, Tex	C_{13}	548.452	1799.380
Do	D_{13}	546.965	1794.501
Near Merkel, Tex	E_{13}	541.447	1776.397
Merkel, Tex	F_{13}	570.120	1870.469
Do	G_{13}	571.580	1875.259
Do	H_{13}	570.506	1871.735
Near Merkel, Tex	I_{13}	566.941	1860.039
Trent, Tex	J_{13}	583.651	1914.861
Do	K_{13}	584.550	1917.810
Near Eskota, Tex	L_{13}	595.834	1954.832
Eskota, Tex	M_{13}	590.784	1938.264
Near Sweetwater, Tex	N_{13}	607.414	1992.824
Do	O_{13}	609.881	2000.918
Sweetwater, Tex	P_{13}	663.299	2176.174
Do	Q_{13}	662.839	2174.664
Near Sweetwater, Tex	R_{13}	719.923	2361.947
Roscoe, Tex	S_{13}	727.300	2386.150
Near Roscoe, Tex	Patterson △	726.544	2383.670

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Roscoe, Tex	T_{13}	727.413	2386.521
Do	U_{13}	726.387	2383.154
Near Loraine, Tex	V_{13}	704.033	2309.815
Loraine, Tex	W_{13}	690.112	2264.142
Do	X_{13}	688.176	2257.791
Near Colorado, Tex	Y_{13}	675.693	2216.836
Colorado, Tex	Z_{13}	630.225	2037.663
Do	A_{14}	631.413	2071.561
Do	B_{14}	630.965	2070.091
Near Westbrook, Tex	C_{14}	636.437	2088.043
Westbrook, Tex	D_{14}	650.509	2134.212
Near Westbrook, Tex	E_{14}	676.730	2220.239
Iatan, Tex	F_{14}	673.961	2211.154
Near Iatan, Tex	G_{14}	705.406	2314.320
Near Coahoma, Tex	H_{14}	722.321	2369.815
Coahoma, Tex	I_{14}	733.654	2406.997
Near Coahoma, Tex	J_{14}	739.053	2424.709
Near Big Spring, Tex	K_{14}	731.888	2401.203
Big Spring, Tex	L_{14}	732.073	2401.809
Do	M_{14}	731.927	2401.330
Do	South End Meridian Line.	741.741	2433.529
Near Big Spring, Tex	N_{14}	736.228	2415.441
Do	O_{14}	738.566	2423.112
Morita, Tex	P_{14}	754.562	2475.592
Near Morita, Tex	Q_{14}	753.765	2472.977
Near Stanton, Tex	R_{14}	784.385	2573.436
Do	Stanton △	825.448	2708.157
Stanton, Tex	S_{14}	814.888	2673.512
Do	T_{14}	811.744	2663.197
Near Stanton, Tex	U_{14}	827.074	2713.492
Do	Stanton, S. B. △	821.058	2693.755
Germania, Tex	V_{14}	838.692	2751.609
Near Germania, Tex	W_{14}	844.165	2769.565
Near Midland, Tex	X_{14}	848.916	2785.152
Do	Y_{14}	840.134	2756.340
Midland, Tex	Z_{14}	847.715	2781.212
Do	A_{15}	845.571	2774.177
Near Midland, Tex	B_{15}	866.313	2842.229
Near Warfield, Tex	Scar △	880.646	2889.253
Warfield, Tex	C_{15}	874.611	2869.453
Near Warfield, Tex	D_{15}	871.840	2860.361
Near Odessa, Tex	E_{15}	878.658	2882.731
Do	Odessa △	898.564	2948.039
Odessa, Tex	F_{15}	883.371	2898.193
Do	G_{15}	884.705	2902.569
Near Odessa, Tex	H_{15}	897.270	2943.793
Douro, Tex	I_{15}	939.593	3082.648
Near Douro, Tex	J_{15}	943.606	3095.814
Metz, Tex	K_{15}	872.570	2862.757
Near Metz, Tex	L_{15}	883.892	2899.902
Do	M_{15}	856.349	2809.539
Near Sand Hills, Tex	N_{15}	837.235	2746.828
Sand Hills, Tex	O_{15}	825.380	2707.935
Near Sand Hills, Tex	P_{15}	814.566	2672.456
Monahans, Tex	Q_{15}	799.338	2622.495
Near Monahans, Tex	R_{15}	796.068	2611.766
Do	S_{15}	794.168	2305.533
Aroya, Tex	T_{15}	812.572	2365.914
Near Aroya, Tex	U_{15}	808.718	2353.269
Pyote, Tex	V_{15}	798.516	2319.798
Do	W_{15}	800.249	2325.484
Near Pyote, Tex	X_{15}	795.051	2308.429
Quito, Tex	Y_{15}	818.849	2386.507
Near Quito, Tex	Z_{15}	812.044	2364.181
Do	A_{16}	810.573	2359.355
Do	B_{16}	809.386	2355.461
Near Barstow, Tex	C_{16}	808.131	2351.343
Do	Hays △	853.060	2798.748
Do	D_{16}	781.706	2564.647
Barstow, Tex	E_{16}	782.432	2567.029
Near Barstow, Tex	F_{16}	782.092	2565.913
Near Pecos, Tex	G_{16}	782.557	2567.439
Do	H_{16}	783.881	2571.783
Pecos, Tex	I_{16}	788.503	2585.947
Do	J_{16}	787.644	2584.129
Near Pecos, Tex	K_{16}	805.961	2344.224
Near Hermosa, Tex	L_{16}	819.458	2388.505
Hermosa, Tex	M_{16}	832.237	2730.431
Near Hermosa, Tex	N_{16}	850.054	2788.886
Near Toyah, Tex	O_{16}	868.348	2848.905
Toyah, Tex	P_{16}	886.309	2907.832
Do	Q_{16}	890.629	2922.005
Do	R_{16}	891.415	2924.584
Near Toyah, Tex	S_{16}	920.099	3018.692
Do	T_{16}	955.747	3135.647
Gomez, Tex	U_{16}	998.409	3275.613
Near Gomez, Tex	V_{16}	1029.637	3378.068
Near San Martine, Tex	W_{16}	1135.497	3725.377
San Martine, Tex	X_{16}	1132.483	3715.488
Do	Y_{16}	1133.339	3718.296
Near San Martine, Tex	Z_{16}	1167.207	3829.412
Near Kent, Tex	A_{17}	1215.515	3987.902
Do	B_{17}	1260.925	4136.885
Kent, Tex	C_{17}	1283.983	4212.544
Near Kent, Tex	D_{17}	1311.597	4303.131
Do	E_{17}	1319.019	4327.481
Boracho, Tex	F_{17}	1358.961	4458.525
Near Boracho, Tex	G_{17}	1341.317	4400.638
Near Plateau, Tex	H_{17}	1245.660	4086.802
Do	I_{17}	1225.101	4019.352
Plateau, Tex	J_{17}	1201.566	3942.137
Near Plateau, Tex	U. S. G. S. 3889 Vn Hn.	1187.962	3897.505
Do	K_{17}	1177.843	3864.307
Near Wild Horse, Tex	U. S. G. S. 3840 Vn Hn.	1172.998	3848.411
Do	U. S. G. S. 3826 Vn Hn.	1168.586	3833.936
Wild Horse, Tex	L_{17}	1173.468	3849.953
Near Wild Horse, Tex	U. S. G. S. 3867 Vn Hn.	1181.080	3874.927
Do	M_{17}	1177.459	3863.047
Near Van Horn, Tex	N_{17}	1199.203	3934.385
Van Horn, Tex	O_{17}	1233.910	4048.253
Do	U. S. G. S. 4039 Vn Hn.	1233.669	4047.462
Near Van Horn, Tex	U. S. G. S. 4239 Vn Hn.	1294.520	4247.105
Do	U. S. G. S. 4395 Vn Hn.	1342.148	4403.364
Near Allamore, Tex	U. S. G. S. 4603 Vn Hn.	1405.683	4611.812
Do	P_{17}	1384.910	4543.659
Allamore, Tex	Allamore △	1387.186	4551.126
Near Allamore, Tex	Q_{17}	1378.156	4521.500
Do	R_{17}	1358.912	4458.364
Near Eagle Flat, Tex	S_{17}	1361.059	4465.407
Eagle Flat, Tex	T_{17}	1359.283	4459.581
Near Eagle Flat, Tex	U_{17}	1347.112	4419.650
Near Sierra Blanca, Tex	V_{17}	1328.206	4357.622
La Valley, Tex	W_{17}	1335.060	4380.110
Near Sierra Blanca, Tex	X_{17}	1339.954	4396.165
Sierra Blanca, Tex	Y_{17}	1377.669	4519.902
Near Sierra Blanca, Tex	Z_{17}	1389.156	4557.590
Etholen, Tex	A_{18}	1417.923	4651.969
Near Etholen, Tex	B_{18}	1398.971	4589.790
Lasca, Tex	C_{18}	1365.263	4479.200
Near Torcer, Tex	D_{18}	1326.418	4351.756
Torcer, Tex	E_{18}	1303.723	4277.308
Near Torcer, Tex	F_{18}	1287.095	4222.744
Do	G_{18}	1235.465	4053.354
Near Finlay, Tex	H_{18}	1214.752	3985.399
Finlay, Tex	I_{18}	1204.154	3950.629
Tinaja, Tex	J_{18}	1177.879	3864.425
Madden, Tex	K_{18}	1119.267	3672.128
Nulo, Tex	L_{18}	1087.764	3568.772
Fort Hancock, Tex	M_{18}	1095.558	3594.343
Near Fort Hancock, Tex	N_{18}	1096.851	3598.586
Iser, Tex	O_{18}	1118.347	3669.110
Near Polvo, Tex	P_{18}	1125.182	3691.535
Do	Q_{18}	1123.033	3684.484
Polvo, Tex	R_{18}	1113.099	3651.892
Near Polvo, Tex	S_{18}	1090.226	3576.850
Do	U. S. G. S. 3530	1089.258	3573.674
Near Fabens, Tex	T_{18}	1096.282	3596.719
Fabens, Tex	U_{18}	1103.501	3620.403
Do	V_{18}	1103.156	3619.271
Near Fabens, Tex	U. S. R. S. 3572.14	1101.760	3614.691
Near Clint, Tex	U. S. R. S. 3586.94	1106.253	3629.432
Clint, Tex	U. S. R. S. 3592.95	1108.082	3635.432
Do	W_{18}	1108.126	3635.577
Near Clint, Tex	X_{18}	1109.134	3638.884
Do	U. S. R. S. 3600.09	1110.257	3642.568
Belen, Tex	Y_{18}	1115.051	3658.296
Do	U. S. G. S. 3614.68	1114.657	3657.004
Do	Z_{18}	1114.495	3656.472
Ysleta, Tex	A_{19}	1118.552	3669.782
Near Ysleta, Tex	B_{19}	1122.568	3682.958
Alfalfa, Tex	C_{19}	1125.659	3693.100
Near Alfalfa, Tex	D_{19}	1127.113	3697.870
El Paso, Tex	E_{19}	1129.605	3706.045
Do	F_{19}	1129.141	3704.523
Do	G_{19}	1130.644	3709.454
Do	H_{19}	1129.904	3707.027
Do	U. S. G. S. 3698	1131.085	3710.902
Do	U. S. G. S. 365	1130.771	3709.871
Do	U. S. G. S. 365	1130.972	3710.531
Do	City B. M.	1131.239	3711.407
Near Jericho, Tex	I_{19}	972.203	3189.636
Boydston, Tex	J_{19}	985.022	3231.693
Groom, Tex	K_{19}	994.872	3264.010
Near Groom, Tex	L_{19}	1003.446	3292.139
Do	M_{19}	1007.812	3306.463
Lark, Tex	N_{19}	1028.184	3373.300
Near Conway, Tex	O_{19}	1043.943	3425.003
Conway, Tex	P_{19}	1053.616	3456.739
Near Conway, Tex	Q_{19}	1057.696	3470.124
Yarnall, Tex	R_{19}	1074.279	3524.530
Near Yarnall, Tex	S_{19}	1072.723	3519.425
Royal, Tex	T_{19}	1096.756	3598.274
Near Amarillo, Tex	U_{19}	1100.206	3609.593

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Amarillo, Tex	V_{19}	1113.779	3654.123
Do	W_{19}	1114.272	3655.741
Amarillo, Tex	X_{19}	1117.840	3667.447
Do	Y_{19}	1116.702	3663.713
Zita, Tex	Z_{19}	1112.930	3651.338
Near Zita, Tex	A_{20}	1113.594	3653.516
Haney, Tex	B_{20}	1109.841	3641.203
Near Canyon, Tex	C_{20}	1095.053	3592.686
Canyon, Tex	D_{20}	1082.440	3551.306
Do	E_{20}	1090.290	3577.060
Do	F_{20}	1090.404	3577.434
Near Canyon, Tex	G_{20}	1093.107	3586.302
Lester, Tex	H_{20}	1117.813	3667.358
Umbarger, Tex	I_{20}	1147.843	3765.881
Near Umbarger, Tex	J_{20}	1144.374	3754.500
Dawn, Tex	K_{20}	1156.122	3793.043
Near Dawn, Tex	L_{20}	1150.682	3775.196
Joel, Tex	M_{20}	1148.220	3767.118
Near Joel, Tex	N_{20}	1147.858	3765.931
Hereford, Tex	O_{20}	1162.046	3812.479
Do	P_{20}	1165.212	3822.866
Do	Q_{20}	1164.261	3819.746
Near Hereford, Tex	R_{20}	1177.518	3863.240
Summerfield, Tex	S_{20}	1199.459	3935.225
Near Summerfield, Tex	T_{20}	1197.516	3928.850
Do	U_{20}	1198.874	3933.306
Black, Tex	V_{20}	1217.421	3994.155
Near Friona, Tex	W_{20}	1220.450	4004.093
Friona, Tex	X_{20}	1220.957	4005.756
Near Friona, Tex	Y_{20}	1252.429	4109.011
Parmerton, Tex	Z_{20}	1272.994	4176.481
Near Parmerton, Tex	A_{21}	1258.247	4128.098
Bovina, Tex	B_{21}	1240.315	4069.267
Near Bovina, Tex	C_{21}	1234.690	4050.812
Do	D_{21}	1245.149	4085.126
Wilsey, Tex	E_{21}	1270.591	4168.597
Near Wilsey, Tex	F_{21}	1259.565	4132.423
Texico, N. Mex	Q_2	1264.190	4147.597
Do	R_2	1264.794	4149.578
Near Texico, N. Mex	S_2	1279.751	4198.650
Near Clovis, N. Mex	T_2	1287.882	4225.326
Clovis, N. Mex	U_2	1297.553	4257.055
Do	V_2	1299.295	4262.770
Do	W_2	1301.390	4269.644
Near Clovis, N. Mex	X_2	1313.103	4308.072
Near Blacktower, N. Mex	Y_2	1313.574	4309.617
Blacktower, N. Mex	Z_2	1316.613	4319.588
Do	A_3	1318.486	4325.733
Near Blacktower, N. Mex	B_3	1328.525	4358.669
Do	C_3	1331.470	4368.331
Near St. Vrain, N. Mex	D_3	1340.507	4397.980
Near Melrose, N. Mex	E_3	1341.020	4399.663
Melrose, N. Mex	F_3	1340.814	4398.987
Near Melrose, N. Mex	G_3	1332.242	4370.864
Cantara, N. Mex	H_3	1343.484	4407.747
Near Krider, N. Mex	I_3	1321.860	4336.802
Krider, N. Mex	J_3	1313.396	4309.033
Near Krider, N. Mex	K_3	1305.823	4284.188
Tolar, N. Mex	L_3	1282.214	4206.730
Near Tolar, N. Mex	M_3	1274.747	4182.232
Taiban, N. Mex	N_3	1257.594	4125.956
Near Taiban, N. Mex	O_3	1256.400	4122.039
Near La Lande, N. Mex	P_3	1240.255	4069.070
La Lande, N. Mex	Q_3	1254.299	4115.146
Near Fort Sumner, N. Mex	R_3	1255.356	4118.614
Do	S_3	1236.327	4056.183
Fort Sumner, N. Mex	T_3	1237.162	4058.922
Do	U_3	1240.520	4069.939
Near Fort Sumner, N. Mex	V_3	1235.403	4053.151
Fort Sumner, N. Mex	U. S. G. S. Ft. Sumner.	1233.584	4047.183
Near Fort Sumner, N. Mex	W_3	1243.462	4079.592
Do	X_3	1246.299	4088.899
Do	Y_3	1266.187	4154.148
Agudo, N. Mex	Z_3	1297.880	4258.128
Ricardo, N. Mex	A_4	1345.408	4414.059
Near Ricardo, N. Mex	B_4	1362.207	4469.174
Evanola, N. Mex	C_4	1395.849	4579.548
Near Yeso, N. Mex	D_4	1431.455	4696.365
Yeso, N. Mex	E_4	1455.218	4774.328
Do	F_4	1456.622	4778.934
Largo, N. Mex	G_4	1514.022	4967.254
Near Largo, N. Mex	H_4	1521.552	4991.958
Buchanan, N. Mex	I_4	1563.154	5128.448
Near Buchanan, N. Mex	J_4	1567.914	5144.064
Do	K_4	1587.152	5207.181
Cardenas, N. Mex	L_4	1614.285	5296.200
Near Cardenas, N. Mex	M_4	1623.238	5325.573
Duoro, N. Mex	N_4	1658.032	5439.727
Near Duoro, N. Mex	O_4	1670.448	5480.461
Do	P_4	1694.192	5558.362
Casaus, N. Mex	Q_4	1712.744	5619.228
Near Casaus, N. Mex	R_4	1726.158	5663.237
Iden, N. Mex	S_4	1772.054	5813.814
Near Vaughn, N. Mex	T_4	1793.111	5882.898
Vaughn, N. Mex	U_4	1818.101	5964.886
Vaughn, N. Mex	V_4	1818.483	5966.140
Near Vaughn, N. Mex	W_4	1823.254	5981.792
Do	X_4	1828.931	6000.418
Tejon, N. Mex	Y_4	1856.220	6089.948
Near Carnero, N. Mex	Z_4	1883.922	6180.834
Carnero, N. Mex	A_5	1896.543	6222.241
Near Encino, N. Mex	B_5	1877.454	6159.614
Encino, N. Mex	C_5	1865.997	6122.025
Near Encino, N. Mex	D_5	1878.972	6164.594
Near Negra, N. Mex	E_5	1879.908	6167.665
Negra, N. Mex	F_5	1889.611	6199.499
Near Pedernal, N. Mex	G_5	1919.352	6297.074
Pedernal, N. Mex	H_5	1940.938	6367.894
Dunmoor, N. Mex	I_5	1942.614	6373.393
Near Dunmoor, N. Mex	J_5	1931.050	6335.453
Near Lucy, N. Mex	K_5	1895.501	6218.823
Do	L_5	1881.276	6172.153
Lucy, N. Mex	M_5	1882.545	6176.316
Near Lucy, N. Mex	N_5	1858.455	6097.281
Near Silio, N. Mex	O_5	1854.510	6084.338
Willard, N. Mex	P_5	1858.018	6095.847
Do	Q_5	1857.512	6094.187
Do	R_5	1861.409	6106.973
Near Willard, N. Mex	S_5	1891.647	6206.178
Broncho, N. Mex	T_5	1923.751	6311.506
Do	U_5	1926.324	6319.948
Near Mountainair, N. Mex	V_5	1946.894	6387.435
Mountainair, N. Mex	W_5	1977.301	6487.195
Do	X_5	1980.966	6499.219
Near Mountainair, N. Mex	Y_5	1966.179	6450.706
Do	Z_5	1930.083	6332.281
Abo, N. Mex	A_6	1876.218	6155.559
Near Abo, N. Mex	B_6	1872.193	6142.353
Do	C_6	1822.495	5979.302
Near Scholle, N. Mex	D_6	1768.399	5801.822
Do	E_6	1757.798	5767.042
Do	F_6	1728.370	5670.494
Near Sais (Siding), N. Mex	G_6	1673.721	5491.200
Sais (Siding), N. Mex	H_6	1659.628	5444.963
Becker, N. Mex	I_6	1578.898	5180.101
Do	J_6	1577.631	5175.944
Near Bodega, N. Mex	K_6	1526.583	5008.464
Near Madrone, N. Mex	L_6	1498.819	4917.375
Madrone, N. Mex	M_6	1481.786	4861.493
Near Belen, N. Mex	N_6	1466.638	4811.795
Do	O_6	1465.345	4807.553
Do	U. S. G. S. 4793	1461.252	4794.124
Belen, N. Mex	P_6	1466.300	4810.686
Do	Q_6	1465.151	4806.916
Near Belen, N. Mex	U. S. G. S. 4808	1465.878	4809.301
Near Los Lunas, N. Mex	U. S. G. S. 4821	1469.799	4822.166
Do	U. S. G. S. 4833	1473.414	4834.026
Do	R_6	1475.099	4839.554
Los Lunas, N. Mex	S_6	1480.235	4856.404
Do	U. S. G. S. 4851	1479.024	4852.431
Near Los Lunas, N. Mex	T_6	1481.910	4861.900
Louisville, Ky	U. S. E. B. M. No. 10(=602 B).	127.146	417.145
Do	U. S. E. B. M. 603	126.777	415.935
Do	U. S. E. B. M. 604M	131.175	430.363
Do	P. B. M. 604	130.941	429.595
Do	Guard Pier	135.464	444.435
Do	P. B. M 604A	121.469	398.520
Do	P. B. M. 605	122.781	402.824
Do	P. B. M. 606	124.211	407.514
Do	P. B. M. 607	124.320	407.872
Do	P. B. M. 607A	122.748	402.716
Do	P. B. M. 608	126.778	415.938
Do	P. B. M. 609	123.388	404.814
Near Louisville, Ky	P. B. M. 610	122.379	401.504
Do	P. B. M. 611	126.377	414.622
Do	P. B. M. 612	123.574	405.425
Do	P. B. M. 613	124.723	409.195
In Kentucky, near Bridgeport, Ind.	P. B. M. 614	124.929	409.872
Do	P. B. M. 614A	129.971	426.412
Near Greenwood Landing, Ky.	P. B. M. 615	123.451	405.022
Greenwood Landing, Ky	P. B. M. 616	126.361	414.569
In Kentucky, near Stewarts Landing, Ind.	P. B. M. 617	126.839	416.138
Near Valley Station, Ky	P. B. M. 618	126.720	415.748
Near Johnsontown, Ky	P. B. M. 619	125.736	412.518
Near Bethany, Ky	P. B. M. 620	120.728	396.087
Near Kosmosdale, Ky	P. B. M. 621	126.641	415.489
Do	P. B. M. 622	123.246	404.348
Do	P. B. M. 623	123.990	406.791
Kosmosdale, Ky	P. B. M. 623A	130.269	427.390
Do	P. B. M. 624	126.189	414.004
Near Kosmosdale, Ky	P. B. M. 625	125.582	412.014
Near West Point, Ky	P. B. M. 626	121.060	397.178
West Point, Ky	U. S. G. S. 441	134.342	440.753
Do	P. B. M. 627	130.283	427.436
Near West Point, Ky	P. B. M. 628	125.020	410.171

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
In Kentucky, near Evans Landing, Ind.	P. B. M. 629	121.827	399.695
In Kentucky, near Browns Landing, Ind.	P. B. M. 630	120.287	394.642
Do	P. B. M. 631	120.856	396.510
In Kentucky, near Mosquito Creek, Ind.	P. B. M. 632	124.593	408.770
Near Rock Haven, Ky	P. B. M. 633	123.838	406.292
Do	P. B. M. 634	124.860	409.644
Rock Haven, Ky	P. B. M. 635	119.305	391.419
Do	P. B. M. 635A	115.696	379.579
Near Rock Haven, Ky	P. B. M. 636	121.990	400.230
Near Dittoes Landing, Ky	P. B. M. 637	125.177	410.684
Do	P. B. M. 638	120.508	395.366
In Kentucky, near Tobacco Landing, Ind.	P. M. G. 639	121.978	400.188
Near Brandenburg, Ky	P. B. M. 640	122.153	400.765
Do	P. B. M. 641	127.458	418.169
Do	P. B. M. 642	119.835	393.159
Brandenburg, Ky	P. B. M. 643	135.920	445.931
Do	P. B. M. 643A	137.521	451.183
Near Brandenburg, Ky	P. B. M. 644	121.503	398.630
In Kentucky, near Mauckport, Ind.	P. B. M. 645	120.370	394.915
Do	P. B. M. 646	122.881	403.153
Do	P. B. M. 647	124.721	409.188
Do	P. B. M. 648	120.134	394.140
Do	P. B. M. 651	126.042	413.522
Near Crecelius, Ky	P. B. M. 654	121.625	399.032
Do	P. B. M. 655	127.466	418.195
Do	P. B. M. 656	121.201	397.640
Do	P. B. M. 657	119.027	390.509
Near Peckenpaugh, Ky	P. B. M. 658	120.739	396.125
In Kentucky, near Leavenworth, Ind.	P. B. M. 660	129.243	424.025
Do	P. B. M. 661	127.868	419.513
Leavenworth, Ind	P. B. M. 661A	128.076	420.197
Do	High Water 1883	130.553	428.324
Do	High Water 1884	131.011	429.824
In Kentucky, near Leavenworth, Ind.	P. B. M. 662	120.457	395.199
Do	P. B. M. 663	122.125	400.673
Near Crecelius, Ky	P. B. M. 664	121.106	397.329
Do	P. B. M. 665	121.056	397.166
Crecelius, Ky	P. B. M. 666	120.227	394.446
Near Crecelius, Ky	P. B. M. 667	112.737	369.872
Do	P. B. M. 668	118.766	389.652
Near Cedar Branch, Ky	P. B. M. 669	116.765	383.086
Do	P. B. M. 670	117.221	384.581
Near Wolf Creek, Ky	P. B. M. 671	117.883	386.754
Do	P. B. M. 672	117.834	386.595
Do	P. B. M. 673	117.635	385.941
Do	P. B. M. 674	119.320	391.469
In Kentucky, near Alton, Ind.	P. B. M. 678	120.024	393.779
Near Concordia, Ky	P. B. M. 679	121.957	400.122
Do	P. B. M. 680	124.616	408.843
Do	P. B. M. 681	119.001	390.422
Do	P. B. M. 682	116.652	382.716
Concordia, Ky	P. B. M. 683	123.852	406.338
Near Concordia, Ky	P. B. M. 684	117.469	385.397
Do	P. B. M. 685	116.875	383.447
Flint Island, Ky	P. B. M. 686	117.191	384.485
Do	P. B. M. 687	117.636	385.943
Do	P. B. M. 687A	112.897	370.395
Burchs Landing, Ky	P. B. M. 688	117.315	384.890
Near Chenault, Ky	P. B. M. 689	119.586	392.342
Chenault, Ky	P. B. M. 690	122.360	401.443
Near Chenault, Ky	P. B. M. 691	118.898	390.084
Near Lahant, Ky	P. B. M. 692	115.828	380.012
Do	P. B. M. 693	117.627	385.913
Near Ammons, Ky	P. B. M. 694	115.823	379.996
Do	P. B. M. 695	116.541	382.352
Near Stephensport, Ky	P. B. M. 696	120.210	394.389
Do	P. B. M. 697	126.573	415.264
Stephensport, Ky	P. B. M. 697A	116.897	383.519
Near Stephensport, Ky	P. B. M. 698	117.420	385.234
Near Addison, Ky	P. B. M. 699	116.174	381.148
Do	P. B. M. 700	120.770	396.225
Holt, Ky	P. B. M. 701	121.792	399.580
Near Holt, Ky	P. B. M. 702	118.685	389.386
Do	P. B. M. 703	116.753	383.048
Near Cloverport, Ky	P. B. M. 704	118.261	387.996
Do	P. B. M. 705	115.111	377.659
Do	P. B. M. 706	116.562	382.422
Cloverport, Ky	P. B. M. 707	115.750	379.755
Do	P. B. M. 707A	125.825	412.812
Do	High Water 1884	126.991	416.637
Do	P. B. M. 708	126.747	415.835
Near Cloverport, Ky	P. B. M. 709	116.519	382.279
Do	P. B. M. 710	120.493	395.317
Near Skillman, Ky	P. B. M. 711	121.441	398.428
Do	P. B. M. 712	118.816	389.814
Do	P. B. M. 713	116.307	381.583
Do	P. B. M. 714	114.621	376.051
In Kentucky, opposite Deer Creek, Ind.	P. B. M. 715	120.039	393.829
Do	P. B. M. 715A	120.208	394.381
Near Landis Landing, Ky	P. B. M. 716	119.380	391.665
Near Hawesville, Ky	P. B. M. 717	118.391	388.421
Do	P. B. M. 717A	119.004	390.432
Do	P. B. M. 718	117.553	385.671
Do	P. B. M. 719	114.712	376.350
Hawesville, Ky	P. B. M. 720	114.642	376.122
Do	P. B. M. 720A	119.037	390.539
Do	U. S. G. S. 422	127.973	419.857
Near Hawesville, Ky	P. B. M. 721	115.308	378.307
Do	P. B. M. 722	115.957	380.437
Do	P. B. M. 723	115.945	380.397
Beachams Landing, Ky	P. B. M. 724	113.934	373.799
In Hancock County, Ky., above Troy, Ind.	P. B. M. 725	115.609	379.295
Do	P. B. M. 726	121.209	397.667
In Hancock County, Ky., below Troy, Ind.	P. B. M. 727	119.140	390.878
Do	P. B. M. 728	115.602	379.271
Do	P. B. M. 728A	116.979	383.788
Near Lewisport, Ky	P. B. M. 729	115.718	379.651
Do	P. B. M. 730	114.333	375.108
Do	P. B. M. 731	113.833	373.468
Do	P. B. M. 732	116.375	381.807
Do	P. B. M. 733	114.650	376.148
Lewisport, Ky	P. B. M. 733A	121.504	398.634
Do	P. B. M. 734	113.241	371.525
Near Lewisport, Ky	P. B. M. 735	118.823	389.838
Do	P. B. M. 736	120.972	396.889
Do	P. B. M. 737	117.805	386.500
In Kentucky, opposite Grand View, Ind.	P. B. M. 738	112.479	369.024
Do	P. B. M. 739	112.103	367.791
In Kentucky, near Rockport, Ind.	P. B. M. 740	112.764	369.960
Do	P. B. M. 741	117.190	384.480
Do	P. B. M. 742	117.114	384.233
Do	P. B. M. 743	114.389	375.291
Iceland Landing, Ky	P. B. M. 744	113.298	371.713
Near mouth of Puppy Creek, Ky.	P. B. M. 745	115.804	379.933
Puppy Creek, Ky	P. B. M. 746	113.330	371.818
Near Owensboro, Ky	P. B. M. 747	112.574	369.336
Do	P. B. M. 749	113.079	370.994
Do	P. B. M. 750	107.957	354.190
Do	P. B. M. 751	120.582	395.609
Owensboro, Ky	P. B. M. 752	109.424	359.003
Do	U. S. G. S. 396	120.287	394.642
Do	High Water 1884	118.234	387.906
Do	Water gauge	103.384	339.187
Near Owensboro, Ky	P. B. M. 753	108.202	354.992
Do	P. B. M. 754	108.923	357.357
Do	P. B. M. 755	115.570	379.165
Near Little Hurricane Island, Ky.	P. B. M. 756	112.719	369.813
Do	P. B. M. 757	113.915	373.736
Do	P. B. M. 758	114.573	375.896
Do	P. B. M. 759	110.678	363.117
Near French Island, Ky	P. B. M. 760	109.144	358.083
Do	P. B. M. 761	113.657	372.889
Do	P. B. M. 762	113.431	372.148
Do	P. B. M. 763	113.811	373.394
Do	P. B. M. 764	113.392	372.019
Do	P. B. M. 765	112.039	367.581
Do	P. B. M. 766	108.314	355.361
Near Carlinburg, Ky	P. B. M. 767	108.624	356.377
Near Scuffletown, Ky	P. B. M. 768	107.373	352.274
Do	P. B. M. 769	108.010	354.364
Do	P. B. M. 771	113.292	371.692
Do	P. B. M. 773	109.386	358.878
Near mouth of Green River, Ky.	P. B. M. 777	109.802	360.241
Do	P. B. M. 778	109.161	358.138
Do	P. B. M. 779	108.000	354.331
In Kentucky, near Evansville, Ind.	P. B. M. 780	109.432	359.028
Do	P. B. M. 781	111.968	367.349
Do	P. B. M. 782	107.319	352.095
Do	P. B. M. 783	111.573	366.053
Do	P. B. M. 784	112.048	367.611
Do	P. B. M. 785	112.502	369.101
Do	P. B. M. 786	111.739	366.596
Do	P. B. M. 787	109.326	358.681
Do	P. B. M. 788	110.237	361.670
Do	P. B. M. 789	111.714	366.515
Do	P. B. M. 790	107.434	352.474
Evansville, Ind	High water marks	114.834 114.905	376.751 376.983
Do	U. S. G. S. 394	120.154	394.206
Dutch Bend, Ky	P. B. M. 791	110.698	363.181
Do	P. B. M. 792	108.842	357.092
Near Henderson, Ky	P. B. M. 793	107.048	351.206
Do	P. B. M. 794	106.888	350.683

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Henderson, Ky	P. B. M. 795	107.614	353.065
Do	P. B. M. 796	109.914	360.610
Do	P. B. M. 797	107.401	352.364
Henderson, Ky	Ref. Point	103.306	338.929
Do	Old B. M	103.200	338.581
Do	High water, 1884	115.025	377.378
Do	P. B. M. 797A	114.752	376.483
Do	P. B. M. 798	118.177	387.718
Near Henderson, Ky	P. B. M. 799	107.692	353.319
Do	P. B. M. 800	108.433	355.752
Do	P. B. M. 801	110.839	363.644
Do	P. B. M. 802	110.604	362.872
Near McDonalds Landing, Ky.	P. B. M. 803	117.042	383.995
Do	P. B. M. 805	112.466	368.983
Do	P. B. M. 806	110.516	362.585
Near Cypress Bend, Ky	P. B. M. 807	110.422	362.276
Do	P. B. M. 808	107.390	352.329
Cypress Bend, Ky	P. B. M. 809	106.227	348.514
In Kentucky, near West Franklin, Ind.	P. B. M. 810	106.544	349.552
Do	P. B. M. 811	105.670	346.685
Near Diamond Island, Ky.	P. B. M. 812	106.236	348.543
Do	P. B. M. 813	109.017	357.668
Do	P. B. M. 815	108.411	355.678
Do	P. B. M. 816	109.431	359.025
Near Alzey, Ky	P. B. M. 817	104.220	341.927
Do	P. B. M. 818	108.192	354.959
In Kentucky, near Mount Vernon, Ind.	P. B. M. 819	109.429	359.019
Do	P. B. M. 820	108.807	356.978
Do	P. B. M. 821	109.657	359.765
Do	P. B. M. 822	106.169	348.323
Do	P. B. M. 823	105.193	345.121
Do	P. B. M. 824	105.592	346.429
Near Slim Island, Ky	P. B. M. 825	103.565	339.780
Do	P. B. M. 826	108.682	356.568
Do	P. B. M. 827	107.588	352.979
Do	P. B. M. 828	105.038	344.612
Do	P. B. M. 829	107.140	351.508
Do	P. B. M. 830	104.416	342.570
Near Uniontown, Ky	P. B. M. 831	104.256	342.048
Do	P. B. M. 833	107.847	353.828
Do	P. B. M. 834	105.735	346.900
Do	P. B. M. 835	101.941	334.451
Do	P. B. M. 836	105.096	344.802
Do	P. B. M. 837	104.966	344.375
Near Wabash Island, Ky	P. B. M. 838	104.847	343.987
Do	P. B. M. 839	103.583	339.839
Do	P. B. M. 840	102.867	337.490
Do	P. B. M. 841	103.228	338.675
Do	P. B. M. 842	103.082	338.195
Do	P. B. M. 843	100.911	331.072
Near Raleigh, Ky	P. B. M. 844	107.661	353.219
Raleigh, Ky	P. B. M. 845	106.790	350.361
Near Browns Island, Ky	P. B. M. 846	106.866	350.609
Do	P. B. M. 847	106.559	349.601
In Kentucky, near Shawneetown, Ill.	P. B. M. 848	105.159	345.009
Do	P. B. M. 849	101.276	332.271
Do	P. B. M. 850	105.349	345.631
Do	P. B. M. 851	105.079	344.746
Do	P. B. M. 852	101.605	333.348
Near Cincinnati Towhead, Ky.	P. B. M. 853	101.755	333.842
Do	P. B. M. 854	99.695	327.082
Do	P. B. M. 855	103.866	340.768
Near Dekoven, Ky	P. B. M. 856	103.250	338.746
Do	P. B. M. 857	101.019	331.426
Do	P. B. M. 858	98.939	324.602
Do	P. B. M. 859	101.888	334.279
Do	P. B. M. 860	101.035	331.479
Do	P. B. M. 860A	103.690	340.189
Near Caseyville, Ky	P. B. M. 862	103.912	340.917
Do	P. B. M. 863	102.635	336.728
Do	P. B. M. 864	104.208	341.888
Near Weston, Ky	P. B. M. 865	100.787	330.665
Do	P. B. M. 866	105.315	345.520
Near Fords Ferry, Ky	P. B. M. 867	104.744	343.649
Fords Ferry, Ky	P. B. M. 868	99.630	326.868
In Kentucky, near Cave-in-Rock, Ill.	P. B. M. 869	102.833	337.379
Do	P. B. M. 870	103.376	339.160
Do	P. B. M. 871	99.908	327.781
Near Tolu, Ky	P. B. M. 872	100.728	330.472
Do	P. B. M. 873	102.883	337.541
Do	P. B. M. 874	102.721	337.009
Do	P. B. M. 875	97.839	320.992
Tolu, Ky	P. B. M. 876	103.211	338.618
Near Carrsville, Ky	P. B. M. 880	99.903	327.764
Do	P. B. M. 881	99.190	325.427
Do	P. B. M. 882	98.507	323.184
Do	P. B. M. 883	101.711	333.698
Do	P. B. M. 884	104.308	342.217
Do	P. B. M. 885	96.623	317.003
Do	P. B. M. 886	103.654	340.070
Do	P. B. M. 887	96.969	318.140
Near Berry Ferry, Ky	P. B. M. 888	98.220	322.243
Do	P. B. M. 889	97.524	319.959
Do	P. B. M. 890	98.497	323.153
Do	P. B. M. 891	101.779	333.920
Do	P. B. M. 892	96.240	315.747
Golconda, Ill	High Water 1883	106.451	349.249
Do	High Water 1884	106.899	350.719
Near Berry Ferry, Ky	P. B. M. 893	97.695	320.522
Do	P. B. M. 894	101.262	332.225
Near Pryors Island, Ky	P. B. M. 895	97.821	320.934
Near Bayou, Ky	P. B. M. 896	100.887	330.993
Do	P. B. M. 897	99.678	327.027
Do	P. B. M. 898	96.865	317.799
Do	P. B. M. 899	102.065	334.857
Do	P. B. M. 900	97.109	318.597
Bayou, Ky	P. B. M. 901	99.459	326.308
Near Birdsville, Ky	P. B. M. 902	104.650	343.339
Birdsville, Ky	P. B. M. 903	101.234	332.133
Do	P. B. M. 903A	102.335	335.743
Near Birdsville, Ky	P. B. M. 904	96.587	316.886
Do	P. B. M. 905	95.327	312.753
Near Smithland, Ky	P. B. M. 906	98.835	324.261
Do	P. B. M. 907	99.684	327.047
Do	P. B. M. 908	97.761	320.736
Smithland, Ky	P. B. M. 909	98.965	324.689
Do	P. B. M. 909A	103.299	338.678
Near Smithland, Ky	P. B. M. 910	97.159	318.763
Do	P. B. M. 911	99.514	326.488
Do	P. B. M. 913	95.992	314.934
Near Ledbetter, Ky	P. B. M. 914	95.990	314.928
Do	P. B. M. 915	98.544	323.307
Do	P. B. M. 916	100.144	328.555
Do	P. B. M. 917	94.793	311.001
Near Paducah, Ky	P. B. M. 918	93.934	308.181
Do	P. B. M. 919	99.352	325.957
Do	P. B. M. 920	98.819	324.208
Do	P. B. M. 921	93.433	306.538
Do	P. B. M. 922	98.750	323.982
Paducah, Ky	P. B. M. 923	99.530	326.542
Do	P. B. M. 923A	91.533	300.303
Do	P. B. M. 924	93.523	306.834
Near Paducah, Ky	P. B. M. 925	95.029	311.774
Do	P. B. M. 926	93.977	308.324
Do	P. B. M. 927	94.359	309.577
In Kentucky, near Metropolis, Ill.	P. B. M. 929	93.050	305.283
Do	P. B. M. 930	95.291	312.634
Do	P. B. M. 931	93.021	305.185
Do	P. B. M. 932	94.409	309.741
Do	P. B. M. 933	94.424	309.788
Do	P. B. M. 934	94.596	310.355
Do	P. B. M. 935	93.685	307.365
Near Ragland, Ky	P. B. M. 936	94.481	309.976
Do	P. B. M. 937	93.314	306.147
Do	P. B. M. 938	94.493	310.017
Do	P. B. M. 939	98.003	321.531
Do	P. B. M. 940	96.749	317.417
Do	P. B. M. 941	92.593	303.783
Near Ogden, Ky	P. B. M. 942	96.611	316.964
Do	P. B. M. 943	97.239	319.024
Do	P. B. M. 944	95.151	312.174
Do	P. B. M. 945	96.606	316.948
In Kentucky, near Grand Chain, Ill.	P. B. M. 947	97.773	320.778
Do	P. B. M. 948	96.732	317.362
Do	P. B. M. 949	93.370	306.331
Do	P. B. M. 950	94.051	308.566
In Kentucky, near Caledonia, Ill.	P. B. M. 951	94.494	310.020
Do	P. B. M. 952	92.595	303.788
Do	P. B. M. 953	96.163	315.494
Do	P. B. M. 954	94.433	309.820
Near Humphries Creek, Ky.	P. B. M. 955	93.858	307.933
Do	P. B. M. 956	92.320	302.887
Near Holloway, Ky	P. B. M. 957	91.958	301.700
Do	P. B. M. 958	97.286	319.178
Do	P. B. M. 959	96.864	317.794
Do	P. B. M. 960	97.190	318.865
Holloway, Ky	P. B. M. 961	97.320	319.292
Near Holloway, Ky	P. B. M. 962	96.269	315.841
Do	P. B. M. 963	94.850	311.186
Near East Cairo, Ky	P. B. M. 964	96.267	315.836
Do	P. B. M. 965	95.153	312.180
Do	P. B. M. 966	94.296	309.369
Do	P. B. M. 967	93.663	307.293
Do	P. B. M. 968	93.647	307.241
Terre Haute, Ind	P. B. M. Traverse	151.307	496.413
Do	P. B. M. Vandalia	146.951	482.122
Do	P. B. M. 1, Bolt	143.611	471.164
	Cap	144.846	475.216
Do	P. B. M. Wabash	148.379	486.807
Do	P. B. M. Brewery	151.722	497.775
Do	P. B. M. 2, Bolt	149.003	488.854
	Cap	150.237	492.903
Near Prairieton, Ind	P. B. M. 3, Bolt	147.335	483.381
	Cap	148.574	487.446

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Prairieton, Ind	P. B. M. 4, Bolt	142.486	467.472
	Cap	143.719	471.518
Do	P. B. M. 5, Bolt	137.462	450.990
	Cap	138.693	455.028
In Indiana, near Darwin, Ill.	P. B. M. 6, Bolt	137.386	450.740
	Cap	138.626	454.808
Do	P. B. M. 7, Bolt	136.153	446.695
	Cap	137.368	450.682
Near York, Ill	P. B. M. 8, Bolt	138.386	454.021
	Cap	139.626	458.089
Do	P. B. M. 9, Bolt	135.302	443.903
	Cap	136.534	447.945
York, Ill	P. B. M. 10, Bolt	136.058	446.383
	Cap	137.294	450.439
Near York, Ill	P. B. M. 11, Bolt	137.627	451.531
	Cap	138.859	455.573
Hutsonville, Ill	P. B. M. Hutsonville	137.614	451.489
Do	P. B. M. 12, Bolt	136.330	447.276
	Cap	137.567	451.334
Near Hutsonville, Ill	P. B. M. 13, Bolt	133.421	437.732
	Cap	134.657	441.787
In Illinois, near Merom, Ind.	P. B. M. Plunkett	133.680	438.582
Do	P. B. M. 14, Bolt	132.575	434.957
	Cap	133.811	439.012
Riverton, Ind	P. B. M. Riverton	134.942	442.722
Near Riverton, Ind	P. B. M. 15, Bolt	134.561	441.472
	Cap	135.791	445.507
Do	P. B. M. 16, Bolt	130.729	428.900
	Cap	131.965	432.955
Do	P. B. M. 17, Bolt	129.642	425.334
	Cap	130.878	429.389
In Indiana, near Russellville, Ill.	P. B. M. 18, Bolt	128.827	422.660
	Cap	130.053	426.683
Do	P. B. M. 19, Bolt	127.257	417.509
	Cap	128.474	421.502
Russellville, Ill	P. B. M. 20, Bolt	130.222	427.237
	Cap	131.463	431.308
Near Russellville, Ill	P. B. M. 21, Bolt	128.734	422.354
	Cap	129.967	426.400
In Illinois, near Vincennes, Ind.	P. B. M. 22, Bolt	128.390	421.226
	Cap	129.613	425.239
Do	B. & O. No. 1	128.139	420.402
Vincennes, Ind	B. & O. No. 2	128.178	420.530
Near Vincennes, Ind	P. B. M. 2, 1903, Cap	127.727	419.051
Do	P. B. M. 23, Bolt	125.425	411.498
	Cap	126.658	415.544
Do	P. B. M. 3, 1903	128.100	420.275
In Indiana, near St. Francisville, Ill.	P. B. M. 24, Bolt	123.736	405.957
	Cap	124.956	409.959
Do	P. B. M. Big Four	126.963	416.545
Do	P. B. M. 25, Bolt	124.869	409.674
	Cap	126.099	413.710
Do	P. B. M. 26, Bolt	122.440	401.706
	Cap	123.676	405.760
Near Little Rock, Ind	P. B. M. 27, Bolt	122.128	400.682
	Cap	123.358	404.717
Little Rock, Ind	P. B. M. 10, 1903	122.885	403.165
Near Little Rock, Ind	P. B. M. 28, Bolt	122.248	401.075
	Cap	123.483	405.127
In Indiana, near Mount Carmel, Ill.	P. B. M. 29, Bolt	122.262	401.121
	Cap	123.491	405.154
Do	P. B. M. 12, 1903	121.114	397.354
Do	P. B. M. 13, 1903	120.936	396.770
Do	P. B. M. Grand Rapids.	120.934	396.765
Do	P. B. M. 30, Bolt	119.222	391.147
	Cap	120.451	395.180
Do	P. B. M. 15, 1903	119.471	391.965
Do	P. B. M. 31, Bolt	117.796	386.469
	Cap	119.024	390.498
In Indiana, near Rochester, Ill.	P. B. M. 17, 1903	118.886	390.045
Near Crowleyville, Ind	P. B. M. 32, Bolt	117.551	385.666
	Cap	118.792	389.736
Do	P. B. M. 18, 1903	118.443	388.591
In Indiana, near Grayville, Ill.	P. B. M. 33, Bolt	116.879	383.460
	Cap	118.093	387.443
Do	P. B. M. 20, 1903	117.766	386.370
Do	P. B. M. 34, Bolt	116.293	381.538
	Cap	117.519	385.561
Do	P. B. M. 35, Bolt	115.858	380.111
	Cap	117.089	384.149
Do	P. B. M. 22, 1903	115.885	380.199
Do	P. B. M. 36, Bolt	115.203	377.961
	Cap	116.439	382.017
Do	P. B. M. 23, 1903	116.258	381.423
Do	P. B. M. 37, Bolt	114.273	374.910
	Cap	115.506	378.956
Do	P. B. M. 25, 1903	118.597	389.097
Do	P. B. M. 38, Bolt	114.796	376.627
	Cap	116.018	380.636
Near New Harmony, Ind	P. B. M. 39, Bolt	115.568	379.160
	Cap	116.787	383.159
Do	P. B. M. 28, 1903	115.369	378.506
New Harmony, Ind	U. S. G. S. 392 Vin	117.165	384.399
Do	U. S. G. S. 387 Vin	117.937	386.931
New Harmony, Ind	P. B. M. New Harmony.	115.475	378.854
Do	P. B. M. 40, Bolt	114.946	377.118
	Cap	116.182	381.174
Near New Harmony, Ind	P. B. M. △4, 1903	113.291	371.689
Do	P. B. M. 41, Bolt	112.521	369.162
	Cap	113.755	373.211
Do	P. B. M. △10, 1903	113.003	370.744
Do	P. B. M. 42, Bolt	111.504	365.826
	Cap	112.743	369.892
Do	P. B. M. △9, 1903	112.518	369.153
In Indiana, near Maunie, Ill.	P. B. M. 43, Bolt	110.804	363.530
	Cap	112.036	367.572
Do	P. B. M. 44, Bolt	110.452	362.374
	Cap	111.694	366.449
Do	P. B. M. Aldrich	113.516	372.427
Do	P. B. M. 31, 1903	109.424	359.002
Do	P. B. M. L&N	113.781	373.296
Do	P. B. M. 45, Bolt	109.140	358.070
	Cap	110.366	362.092
Maunie, Ill	U. S. G. S. 375	114.352	375.169
In Indiana, near Maunie, Ill.	P. B. M. 33, 1903	109.919	360.625
Do	P. B. M. 46, Bolt	108.678	356.555
	Cap	109.901	360.567
In Indiana, near mouth of Little Wabash.	P. B. M. 47, Bolt	109.536	359.369
	Cap	110.764	363.398
Do	P. B. M. 48, Bolt	110.356	362.060
	Cap	111.587	366.098
Do	P. B. M. 49, Bolt	109.540	359.382
	Cap	110.780	363.450
In Indiana, near mouth of Wabash.	P. B. M. 50, Bolt	108.813	356.998
	Cap	110.048	361.049
Do	P. B. M. 39, 1903	106.290	348.719
Do	P. B. M. 51, Bolt	104.628	343.267
	Cap	105.872	347.349
Do	P. B. M. 52, Bolt	102.809	337.299
	Cap	104.047	341.361
Wabash Id., Ky	P. B. M. 53, Bolt	105.092	344.789
	Cap	106.322	348.825
In Kentucky, near mouth of Wabash.	P. B. M. 54, Bolt	113.299	371.715
	Cap	114.517	375.711
Blackburn, Ky., opposite Shawneetown, Ill.	P. B. M. Kentucky	105.925	347.522
Near Belen, N. Mex	U. S. G. S. 4795	1461.412	4794.649
Near Sabinal, N. Mex	U. S. G. S. 4770	1453.817	4769.731
Do	U. S. G. S. 4762	1451.537	4762.251
Do	U. S. G. S. 4743	1445.640	4742.903
Do	U. S. G. S. 4740	1444.796	4740.135
Near Lajoya, N. Mex	U. S. G. S. 4720	1438.583	4719.751
Do	U. S. G. S. 4691	1429.759	4690.801
Near Alamillo, N. Mex	U. S. G. S. 4698	1432.022	4698.226
Do	U. S. G. S. 4696	1431.199	4695.525
Alamillo, N. Mex	U. S. G. S. 4653	1418.223	4652.954
Near Alamillo, N. Mex	U. S. G. S. 4635	1412.615	4634.555
Do	U. S. G. S. 4626	1410.147	4626.457
Near Socorro, N. Mex	U. S. G. S. 4597	1401.312	4597.471
Socorro, N. Mex	U. S. G. S. 4593	1400.008	4593.193
Do	U. S. G. S. SOCR 4568.	1394.204	4574.151
Do	U. S. G. S. 4566	1391.700	4565.936
Do	U. S. G. S. 4548	1386.351	4548.387
San Antonio, N. Mex	U. S. G. S. 4539	1383.633	4539.469
Near San Antonio, N. Mex.	U. S. G. S. 4533	1381.574	4532.714
Do	U. S. G. S. 4509	1374.454	4509.354
Near Elmendorf, N. Mex	U. S. G. S. 4498	1371.194	4498.659
Near San Marcial, N. Mex	U. S. G. S. 4489	1368.325	4489.247
Do	U. S. G. S. 4472	1363.183	4472.376
San Marcial, N. Mex	U. S. G. S. 106	1358.959	4458.518
Do	U. S. G. S. 4458	1358.780	4457.931
Near San Marcial, N. Mex	U. S. G. S. 107	1360.314	4462.963
Do	U. S. G. S. 110	1371.441	4499.469
Pope, N. Mex	U. S. G. S. 113	1396.560	4581.881
Near Pope, N. Mex	U. S. G. S. 116	1415.296	4643.350
Do	U. S. G. S. 119	1438.908	4720.817
Lava, N. Mex	U. S. G. S. 122	1439.158	4721.638
Near Lava, N. Mex	U. S. G. S. 123	1436.085	4711.556
Do	U. S. G. S. 125	1427.574	4683.632
Do	U. S. G. S. 129	1417.853	4651.739
Do	U. S. G. S. 132	1440.135	4724.843
Near Crocker, N. Mex	U. S. G. S. 135	1458.869	4786.306
Do	U. S. G. S. 138	1476.331	4843.596
Do	U. S. G. S. 141	1458.856	4786.264
Engle, N. Mex	U. S. R. S. 4727	1453.980	4770.266
Near Engle, N. Mex	U. S. G. S. 147	1446.838	4746.834
Do	U. S. G. S. 150	1430.739	4694.016
Do	U. S. G. S. 150½	1430.517	4693.287
Near Cutter, N. Mex	U. S. G. S. 153	1437.310	4715.575
Do	U. S. G. S. 156	1428.268	4685.909
Near Aleman, N. Mex	U. S. G. S. 159	1415.362	4643.567
Do	U. S. G. S. 162	1401.572	4598.324
Near Upham, N. Mex	U. S. G. S. 165	1386.557	4549.063
Do	U. S. G. S. 168	1369.123	4491.865
Do	U. S. G. S. 171	1349.784	4428.416
Do	U. S. G. S. 174	1329.806	4362.872

Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.
Near Grama, N. Mex	U. S. G. S. 177	1299.055	4261.983
Near Rincon, N. Mex	U. S. G. S. 180	1252.296	4108.575
Rincon, N. Mex	U. S. G. S. 283B	1238.547	4063.467
Do	U. S. G. S. 283½B	1238.364	4062.866
Near Rincon, N. Mex	U. S. G. S. 286B	1226.743	4024.739
Near Detroit, N. Mex	U. S. G. S. 290B	1222.900	4012.131
Near Tonuco, N. Mex	U. S. G. S. 293B	1217.123	3993.178
Do	U. S. G. S. 296B	1215.920	3989.230
Near Selden, N. Mex	U. S. G. S. 299B	1209.644	3968.641
Do	U. S. G. S. 3932	1210.918	3972.820
Do	U. S. G. S. 303B	1206.068	3956.908
Stewarts Ranch, N. Mex	U. S. G. S. 306B	1209.974	3969.723
Near Stewarts Ranch, N. Mex.	U. S. G. S. 309B	1198.570	3932.309
Near Dona Ana, N. Mex	U. S. G. S. 312B	1192.813	3913.420
Do	U. S. G. S. 315B	1188.912	3900.622
Las Cruces, N. Mex	U. S. R. S. 3855	1187.575	3896.236
Do	U. S. R. S. 3855A	1187.602	3896.325
Do	U. S. G. S. 318B	1186.923	3894.096
Mesilla Park, N. Mex	U. S. G. S. 3837	1182.132	3878.378
Near Mesilla Park, N. Mex.	U. S. G. S. 323B	1178.477	3866.387
Do	U. S. G. S. 3813	1174.856	3854.507
Do	U. S. G. S. 328B	1171.549	3843.657
Mesquite, N. Mex	U. S. G. S. 3794	1169.114	3835.668
Near Mesquite, N. Mex	U. S. G. S. 332B	1165.532	3823.916
Vado, N. Mex	U. S. G. S. 3782	1165.514	3823.857
Berino, N. Mex	U. S. G. S. 336B	1159.202	3803.148
Near Berino, N. Mex	U. S. G. S. 3760	1158.823	3801.905
Do	U. S. G. S. 340B	1156.644	3794.756
Near La Tuna, Tex	U. S. G. S. 3780	1156.086	3792.926
Vinton, Tex	U. S. G. S. 3774	1154.273	3786.977
Canutillo, Tex	U. S. G. S. 350B	1147.504	3764.769
Near Montoya, Tex	U. S. G. S. 354B	1143.332	3751.081
Near Whites Spur, Tex	U. S. G. S. 357B	1140.000	3740.150
Do	U. S. G. S. 359B	1137.942	3733.398
Near El Paso, Tex	Boundary No. 1	1135.822	3726.443
Duquoin, Ill	U. S. G. S. 468	142.777	468.428
Near Duquoin, Ill	U. S. G. S. 396	120.824	396.403
Near McDonald, Ill	U. S. G. S. 402	122.497	401.893
Mulkeytown, Ill	U. S. G. S. 449	136.861	449.018
Christopher, Ill	U. S. G. S. 443	135.287	443.854
Near Christopher, Ill	U. S. G. S. 392	119.773	392.955
Do	U. S. G. S. 438	133.852	439.146
Benton, Ill	U. S. G. S. 474	145.028	475.812
Near Benton, Ill	U. S. G. S. 405	123.928	406.587
Smothers, Ill	U. S. G. S. 479	146.296	479.973
Parrish, Ill	U. S. G. S. 438	133.953	439.477
Thompsonville, Ill	U. S. G. S. 494	150.990	495.373
West End, Ill	U. S. G. S. 429	131.210	430.479
Near Rileyville, Ill	U. S. G. S. 392	119.844	393.188
Galatia, Ill	U. S. G. S. 397	*121.356	398.148
Near Galatia, Ill	U. S. G. S. Milepost.	120.202	394.362
Near Raleigh, Ill	U. S. G. S. 390	119.194	391.056
Eldorado, Ill	U. S. G. S. 388	118.219	387.857
Near Grayson, Ill	U. S. G. S. Grayson.	119.665	392.601
Do	U. S. G. S. Crossroads	110.640	362.992
Equality, Ill	U. S. G. S. Station	110.404	362.217
Near Equality, Ill	U. S. G. S. Fowler	114.869	376.866
Do	U. S. G. S. Six Mile.	107.620	353.084
Near Cypress Junction, Ill.	U. S. G. S. Five Mile.	120.838	396.449
Shawneetown, Ill	P. B. M. Station	106.538	349.534
Do	P. B. M. Hotel	111.492	365.787
Yockey, Ind	U. S. G. S. 590	179.948	590.380
Near Yockey, Ind	U. S. G. S. 508	154.875	508.119
Bedford, Ind	U. S. G. S. 700	213.237	699.595
Dark Hollow, Ind	U. S. G. S. 503	153.291	502.923
Avoca, Ind	U. S. G. S. 557	169.705	556.774
Springville, Ind	U. S. G. S. 644	196.177	643.624
Near Springville, Ind	U. S. G. S. 575	175.362	575.333
Armstrong, Ind	U. S. G. S. 551	167.799	550.521
Near Armstrong, Ind	U. S. G. S. 565	172.059	564.497
Owensburg, Ind	U. S. G. S. 641	195.304	640.760
Robison, Ind	U. S. G. S. 543	165.369	542.548
Near Robison, Ind	U. S. G. S. 755	230.027	754.680
Cincinnati, Ind	U. S. G. S. 880	268.330	880.346
Koleen, Ind	U. S. G. S. 519	158.321	519.425
Near Mineral City, Ind	U. S. G. S. 509	155.002	508.536
Do	U. S. G. S. 509a	155.168	509.080
Bloomfield, Ind	U. S. G. S. 534	162.732	533.897
Do	U. S. G. S. 541	164.834	540.792
Near Elliston, Ind	U. S. G. S. 503	153.366	503.168
Do	U. S. G. S. 507	154.410	506.593
Worthington, Ind	U. S. G. S. 526	160.388	526.206
Near Worthington, Ind	U. S. G. S. 521	158.663	520.547
Do	U. S. G. S. 562	171.174	561.593
Coal City, Ind	U. S. G. S. 659	200.976	659.368
Near Coal City, Ind	U. S. G. S. 596	181.617	595.855
Clay City, Ind	U. S. G. S. 588	179.155	587.778
Near Clay City, Ind	U. S. G. S. 558	170.167	558.289
Saline City, Ind	U. S. G. S. 569	173.525	569.307
Cory, Ind	U. S. G. S. 634	193.138	633.653
Near Cory, Ind	U. S. G. S. 608	185.172	607.518
Riley, Ind	U. S. G. S. 669	173.375	568.814
Near Riley, Ind	U. S. G. S. 524	159.631	523.722
Near Spring Hill, Ind	U. S. G. S. 493	150.145	492.601
Terre Haute, Ind	U. S. G. S. 495	150.798	494.743
Do	U. S. G. S. 513	156.259	512.660
Near Terre Haute, Ind	U. S. E. 482	146.968	482.178
West Terre Haute, Ind	U. S. G. S. 477	145.211	476.413
Near Liggett, Ind	U. S. G. S. 508	154.685	507.496
Near Farrington, Ill	U. S. G. S. 580	176.640	579.526
Marley, Ill	U. S. G. S. 644	196.359	644.221
Near Marley, Ill	U. S. G. S. 673	205.195	673.210
Do	U. S. G. S. 728	221.931	728.119
Paris, Ill	U. S. G. S. 739	225.330	739.270
May, Ill	U. S. G. S. 691	210.452	690.458
Near May, Ill	U. S. G. S. 681	207.437	680.566
Redmon, Ill	U. S. G. S. 691	210.411	690.323
Near Borton, Ill	U. S. G. S. 664	203.979	669.221
Near Isabel, Ill	U. S. G. S. 645	196.500	644.684
Near Oakland, Ill	U. S. G. S. 659	200.778	658.719
Mitchell, Ind	U. S. G. S. 688	209.728	688.082
Near Mitchell, Ind	U. S. G. S. 707	215.526	707.104
Orleans, Ind	U. S. G. S. 636	193.907	636.176
Near Leipsic, Ind	U. S. G. S. 709	216.120	709.054
Do	U. S. G. S. 735	223.942	734.717
Near Saltillo, Ind	U. S. G. S. 774	235.858	773.811
Near Campbellsburg, Ind	U. S. G. S. 839	255.599	838.578
Near Hitchcock, Ind	U. S. G. S. 886	270.025	885.906
Hitchcock, Ind	U. S. G. S. 880	268.290	880.215
Near Salem, Ind	U. S. G. S. 721	219.783	721.071
Salem, Ind	U. S. G. S. 728	221.805	727.705
Near Salem, Ind	U. S. G. S. 728a	221.955	728.197
Do	U. S. G. S. 760	231.603	759.851
Near Norris, Ind	U. S. G. S. 835	254.493	834.949
Near Farabee, Ind	U. S. G. S. 814	248.026	813.732
Near Pekin, Ind	U. S. G. S. 704	214.525	703.821
Near Borden, Ind	U. S. G. S. 577	175.803	576.781
Do	U. S. G. S. 520	158.609	520.369
Bridgeport, Ind	U. S. G. S. 504	153.542	503.746
Near Wilson, Ind	U. S. G. S. 545	166.121	545.015
St. Joseph, Ind	U. S. G. S. 547	166.676	546.836
Near New Albany, Ind	U. S. G. S. 536	163.192	535.406
New Albany, Ind	U. S. G. S. 456	138.908	455.734
Do	464 Ind	141.360	463.778
Louisville, Ky	R. R. Bridge	136.481	447.771
Georgetown, Ky	U. S. G. S. 866	263.818	865.543
Near Georgetown, Ky	U. S. G. S. 798	243.142	797.709
Duvall, Ky	U. S. G. S. 840	256.152	840.392
Stamping Ground, Ky	U. S. G. S. 802	244.555	802.344
Near Stamping Ground, Ky.	U. S. G. S. 714	217.500	713.581
Switzer, Ky	U. S. G. S. 732	223.282	732.551
Near Switzer, Ky	U. S. B. M. 744	226.912	744.460
Elkhorn, Ky	U. S. G. S. 673	205.199	673.224
Stedmantown, Ky	U. S. G. S. 714	217.752	714.408
Near Stedmantown, Ky	U. S. B. M. 675	205.677	674.792
Frankfort, Ky	U. S. G. S. 511	155.816	511.206
Do	U. S. G. S. 512	156.159	512.332
Near Kennebec, Ky	U. S. G. S. 537	163.665	536.958
Do	U. S. B. M. 562	171.281	561.945
Near Benson, Ky	Bridge	182.802	599.743
Do	U. S. G. S. 600	182.802	599.743
Hatton, Ky	U. S. G. S. 714	217.772	714.474
Near Hatton, Ky	U. S. G. S. 829	252.862	829.598
Do	U. S. G. S. 881	268.415	880.625
Bagdad, Ky	U. S. G. S. 912	277.959	911.937
Christiansburg, Ky	U. S. G. S. 903	275.357	903.401
Near Christiansburg, Ky	U. S. B. M. 882	268.819	881.951
Do	U. S. G. S. 849	258.901	849.411
Do	U. S. G. S. 724	220.664	723.962
Shelbyville, Ky	U. S. G. S. 760	231.560	759.709
Scotts Station, Ky	U. S. G. S. 750	228.643	750.139
Near Field Station, Ky	U. S. G. S. 725	220.962	724.939
Simpsonville, Ky	U. S. G. S. 825	251.395	824.785
Connor, Ky	U. S. G. S. 701	213.797	701.433
Long Run, Ky	U. S. G. S. 629	191.841	629.398
Near Eastwood, Ky	U. S. G. S. 640	195.070	639.992
Near Beckley, Ky	U. S. G. S. 595	181.424	595.222
Do	U. S. G. S. 634	193.338	634.310
Near Avoca, Ky	U. S. G. S. 652	198.914	652.603
Anchorage, Ky	U. S. G. S. 724	220.756	724.264
Lyndon, Ky	U. S. G. S. 561	171.141	561.485
Near Warwick Villa, Ky	U. S. G. S. 539	164.282	538.982
St. Matthews, Ky	U. S. G. S. 550	167.635	549.982
Near St. Matthews, Ky	U. S. G. S. 548	166.989	547.863
Do	U. S. G. S. 553	168.759	553.670
Louisville, Ky	No. 49	163.958	537.919
Do	B. M. 86 or No. 16	138.481	454.333
Do	B. M. 13	138.388	454.028

*Probably destroyed.

ELEVATIONS AT RAILROAD STATIONS.

In recent years the elevation of the rail in front of each railroad station, on the lines of precise leveling by the Coast and Geodetic Survey, has been determined usually by a single rod reading.

The following list contains the elevations of the rail at stations determined since early in 1906.

The name in italics of a railroad applies to all stations which follow it until the name of a second railroad is given in the list, and so on. Exceptions to this rule are indicated by footnotes. The elevations of the rails in this list were computed on the same basis as the standard elevations.

Additional elevations of rails at railroad stations appeared in the following publications of the Coast and Geodetic Survey:

Appendix 1 of the Report for 1898.
Appendix 2 of the Report for 1898.
Appendix 3 of the Report for 1898.
Appendix 5 of the Report for 1899.
Appendix 6 of the Report for 1899.
Appendix 7 of the Report for 1899.
Appendix 8 of the Report for 1899.
Appendix 3 of the Report for 1903.
Appendix 6 of the Report for 1904.
Appendix 7 of the Report for 1904.
Appendix 4 of the Report for 1905.
Precise Leveling in the United States, 1903–1907.

In all except one of these publications the elevations of rails as given are on the same basis as the tabulated results of the observations before adjustment. The exception is Appendix 4 of the Report for 1905, in which the rail elevations are given on the same basis as the corrected or adjusted elevations.

The observed elevations of the rail previously published (excepting those in Appendix 4 of the Report for 1905) may be changed to the standard elevations by the following equation:

Standard elevation of rail = observed elevation of rail + standard elevation of a bench mark in its vicinity − observed elevation of that bench mark.

Example: To find the standard elevation of the rail at Kingfisher, Okla. On page 311 of Appendix 3, Report for 1903, the elevation of the rail at Kingfisher is given as 320.39 meters and that of E, an adjacent bench mark, as 320.8366 meters. The standard elevation of E is 320.963. (See p. 129 of this publication.)

Therefore,

Standard elevation of rail at Kingfisher = 320.39 + 320.963 − 320.8366 = 320.52 meters.

The rail elevations in Appendix 4 of 1905 may be converted into standard elevations by the following equation:

Standard elevation of rail = "corrected" elevation of rail + standard elevation of a bench mark in its vicinity − "corrected" elevation of that bench mark.

Example: To find the standard elevation of the rail at Yakima City, Wash. On page 214 of Appendix 4, Report for 1905, the rail elevation is given as 298.91 meters. As is stated on page 212, it is computed on the same basis as the "corrected" elevations in the tabulation immediately preceding. The "corrected" elevation of D_2, a bench mark near Yakima City, was 290.2937 meters (see p. 211, Report for 1905). The standard elevation of D_2 is 290.346 meters. (See p. 133 of this publication.)

Therefore,

Standard elevation of rail at Yakima City = 298.91 + 290.346 − 290.2937 = 298.96 meters.

Table of elevations at railroad stations.

Place.	Standard elevation.	
	Meters.	Feet.
Atchison, Topeka & Santa Fe Ry.:		
Ladrillo, Cal	16.43	53.90
Selwyn, Cal	71.97	236.12
Sorrento, Cal	9.68	31.76
Del Mar, Cal	33.90	111.22
Encinitas, Cal	24.79	81.33
Merle, Cal	16.96	55.64
La Costa, Cal	12.08	39.63
Carlsbad, Cal	12.76	41.86
Oceanside, Cal	13.71	44.98
Las Flores, Cal	25.85	84.81
Don, Cal	41.64	136.61
San Onofre, Cal	9.44	30.97
Mateo, Cal	4.98	16.34
Serra, Cal	5.61	18.41
San Juan Capistrano, Cal	31.68	103.94
El Toro, Cal	129.09	423.52
Irvine, Cal	59.88	196.46
Aliso, Cal	28.54	93.63
Santa Ana, Cal	40.64	133.33
Olive, Cal	68.18	223.69
Yorba, Cal	81.13	266.17
Esperanza, Cal	102.99	337.89
Horseshoe Bend, Cal	117.40	385.17
Gypsum, Cal	127.45	418.14
Crary, Cal	148.74	487.99
Corona, Cal	183.57	602.26
Porphyry, Cal	191.92	629.66
May, Cal	211.35	693.40
Arlington, Cal	248.21	814.34
Casa Blanca, Cal	262.80	862.20
Pachappa, Cal	263.87	865.71
Salt Lake, Cal	268.56	881.10
Highgrove, Cal	287.98	944.81
Colton, Cal	297.91	977.39
San Bernardino, Cal	328.49	1077.72
Verdemont, Cal	531.29	1743.07
Keenbrook, Cal	756.02	2480.38
Cajon, Cal	891.79	2925.81
Dell, Cal	1057.08	3468.10
Summit, Cal	1165.40	3823.48
Lugo, Cal	1069.49	3508.82
Hesperia, Cal	972.06	3189.17
Victorville, Cal	827.90	2716.20
Oro Grande, Cal	803.19	2635.13
Helen, Cal	740.72	2430.18
Cottonwood, Cal	694.41	2278.24
Todd, Cal	683.38	2242.06
Barstow, Cal	641.79	2105.61
Oregon Short Line R. R.:		
Pocatello, Idaho	1360.27	4462.82
Tyhee, Idaho	1359.37	4459.87
Ross Fork, Idaho	1355.26	4446.38
Gibson, Idaho	1361.04	4465.34
Blackfoot, Idaho	1371.30	4499.00
Wapello, Idaho	1384.89	4543.59
Firth, Idaho	1392.39	4568.20
Monroe, Idaho	1403.94	4606.09
Shelley, Idaho	1410.42	4627.35
Idaho Falls, Idaho	1433.87	4704.29
Payne, Idaho	1446.12	4744.48
Bassett, Idaho	1453.92	4770.07
Market Lake, Idaho	1455.48	4775.19
Hawgood, Idaho	1469.60	4821.51
Hamer, Idaho	1463.41	4801.20
Camas, Idaho	1467.94	4816.07
Jones, Idaho	1492.29	4895.95
Dubois, Idaho	1569.31	5148.64
High Bridge, Idaho	1689.50	5542.97
Spencer, Idaho	1793.10	5882.86
Humphrey, Idaho	1984.85	6511.96
Monida, Mont	2071.85	6797.39
Williams, Mont	2006.15	6581.84
Lima, Mont	1907.14	6257.01
Dell, Mont	1833.08	6014.03
Crab Tree, Mont	1773.77	5819.44
Red Rock, Mont	1705.60	5595.79
Armstead, Mont	1673.67	5491.03
Grayling, Mont	1642.17	5387.69
Dalys, Mont	1623.07	5325.02
Barratts, Mont	1600.86	5252.15
Dillon, Mont	1552.81	5094.51
Bond, Mont	1573.76	5163.24
Apex, Mont	1653.84	5425.97
Glen, Mont	1524.18	5000.58
Lavon, Mont	1539.44	5050.65
Browne, Mont	1545.76	5071.38
Melrose, Mont	1579.95	5183.55
Big Hole, Mont	1614.46	5296.77
Maiden Rock, Mont	1620.82	5317.64
Keith, Mont	1623.23	5325.55
Divide, Mont	1644.96	5396.84
Oregon Short Line R. R.—Continued.		
Dyers, Mont	1665.57	5464.46
Woodin, Mont	1693.47	5555.99
Beaudines Spur, Mont	1734.69	5691.23
Feely, Mont	1772.19	5814.26
Buxton, Mont	1684.44	5526.37
Silver Bow, Mont	1627.06	5338.11
Butte, Mont	1672.62	5487.59
Roy, Utah	1350.80	4431.75
Syracuse Junction, Utah	1367.02	4484.96
Layton, Utah	1327.61	4355.67
Evona, Utah	1318.20	4324.79
Farmington, Utah	1297.32	4256.29
Kaysville, Utah	1308.46	4292.84
Centerville, Utah	1294.27	4246.28
Woods Cross, Utah	1308.24	4292.12
Simkims, Utah	1305.16	4282.01
Hatch, Utah	1304.55	4280.01
Stockyard Junction, Utah	1298.70	4260.82
Becks, Utah	1286.93	4222.20
Salt Lake City, Utah	1297.16	4255.77
Atchison, Topeka & Santa Fe Ry.:		
Nebo, Cal	621.95	2040.51
Daggett, Cal	611.64	2006.69
Minneola, Cal	583.59	1914.66
Newberry, Cal	557.98	1830.64
Troy, Cal	542.43	1779.62
Hector, Cal	567.73	1862.63
Pisgah, Cal	654.58	2147.57
Lavic, Cal	662.10	2172.24
Arctic, Cal	616.52	2022.70
Ludlow, Cal	542.39	1779.49
Ash Hill, Cal	592.39	1943.53
Klondike, Cal	503.45	1651.74
Siberia, Cal	389.61	1278.25
Nome, Cal	306.17	1004.49
Bagdad, Cal	239.97	787.30
Amboy, Cal	187.16	614.04
Bengal, Cal	216.08	708.92
Cadiz, Cal	250.45	821.68
Siam, Cal	316.12	1037.14
Danby, Cal	412.28	1352.62
Arimo, Cal	469.05	1538.87
Essex, Cal	527.78	1731.56
Fenner, Cal	638.87	2096.03
Piute, Cal	710.81	2332.05
Goffs, Cal	787.62	2584.05
Ventrigger, Cal	1026.95	3369.25
Blackburn, Cal	1131.01	3710.65
Ledge, Cal	1326.48	4351.96
Purdy, Cal	1379.34	4525.38
Barnwell, Cal	1466.12	4810.09
Vanderbilt, Cal	1266.28	4154.45
Leastalk, Cal	1071.22	3514.49
San Pedro, Los Angeles & Salt Lake R. R.:		
Moore, Cal	1003.12	3291.07
Nipton, Cal	922.78	3027.49
Lyons, Cal	855.27	2806.00
Calada, Cal	837.19	2746.68
Roach, Nev	796.44	2612.99
Borax, Nev	817.75	2682.90
Jean, Nev	874.31	2868.47
Sutor, Nev	926.74	3040.48
Erie, Nev	950.85	3119.58
Sloan, Nev	862.56	2829.92
Bard, Nev	785.81	2578.11
Arden, Nev	736.75	2417.15
Bracken, Nev	661.61	2170.63
Las Vegas, Nev	618.88	2030.44
Northern Pacific Ry.:		
Skones, Mont	1789.76	5871.90
Highview, Mont	1927.79	6324.76
Homestake, Mont	1930.59	6333.94
Lewis Spur, Mont	1876.71	6157.17
Welch, Mont	1732.55	5684.21
Spire Rock, Mont	1588.40	5211.28
Pipestone, Mont	1432.39	4699.43
Whitehall, Mont	1327.91	4356.65
Jefferson Island, Mont	1303.63	4276.99
Lime Spur, Mont	1294.21	4246.09
Sappington, Mont	1277.29	4190.58
Willow Creek, Mont	1265.31	4151.27
Three Forks, Mont	1239.27	4065.84
Gallatin, Mont	1234.35	4049.70
Logan, Mont	1250.96	4104.19
Manhattan, Mont	1293.66	4244.28
Central Park, Mont	1319.52	4329.12
Belgrade, Mont	1358.58	4457.27
Storey, Mont	1401.52	4598.15
Bozeman, Mont	1452.03	4763.87
Gordon, Mont	1519.30	4984.57
Chestnut, Mont	1603.79	5261.77

Table of elevations at railroad stations—Continued.

Place.	Standard elevation.	
	Meters.	Feet.
Northern Pacific Ry.—Continued.		
West End, Mont	1690.51	5546.28
Muir, Mont	1689.74	5543.75
Hoppers, Mont	1583.71	5195.89
Coal Spur, Mont	1454.12	4770.72
Livingston, Mont	1371.48	4499.60
Africa, Mont	1352.98	4438.90
Mission, Mont	1338.09	4390.05
Elton, Mont	1308.70	4293.63
Springdale, Mont	1287.00	4222.43
Carney, Mont	1266.52	4155.24
Dehart, Mont	1251.17	4104.88
Bigtimber, Mont	1244.47	4082.90
Reynolds, Mont	1206.94	3959.77
Greycliff, Mont	1197.53	3928.90
Patcum, Mont	1177.29	3862.49
Quebec, Mont	1158.83	3801.93
Reedpoint, Mont	1141.68	3745.66
Oneida, Mont	1130.78	3709.90
Merrill, Mont	1117.95	3667.81
Wataga, Mont	1108.39	3636.44
Columbus, Mont	1092.72	3585.03
Misko, Mont	1080.20	3543.96
Rapids, Mont	1064.13	3491.23
Youngs Point, Mont	1045.15	3428.96
Park City, Mont	1035.55	3397.47
Laurel, Mont	1005.42	3298.62
Foster, Mont	984.22	3229.06
Yegen, Mont	972.56	3190.81
Billings, Mont	953.08	3126.90
Lockwood, Mont	936.06	3071.06
San Pedro, Los Angeles & Salt Lake R. R.:		
Las Vegas, Nev	618.84	2030.31
Stewart, Nev	581.57	1908.03
Valley, Nev	613.20	2011.81
Dike, Nev	683.25	2241.63
Summit of Grade, Nev	752.97	2470.37
Apex, Nev	750.34	2461.74
Garnet, Nev	676.86	2220.66
Dry Lake, Nev	636.82	2089.30
Crystal, Nev	618.72	2029.92
Ute, Nev	587.47	1927.39
Byron, Nev	541.71	1777.26
Moapa, Nev	508.02	1666.73
Acton, Nev	532.06	1745.60
Guelph, Nev	530.81	1741.50
Rox, Nev	580.08	1903.15
Hoya, Nev	619.66	2033.00
Galt, Nev	686.02	2250.72
Vigo, Nev	742.00	2434.38
Carp, Nev	788.21	2585.99
St. George, Nev	821.10	2693.89
Leith, Nev	888.85	2916.17
Kyle, Nev	985.01	3231.65
Elgin, Nev	1055.21	3461.97
Boyd, Nev	1156.86	3795.46
Stine, Nev	1226.16	4022.83
Caliente, Nev	1337.60	4388.44
Eccles, Nev	1407.28	4617.05
Minto, Nev	1466.13	4810.13
Big Springs, Nev	1544.50	5067.25
Islen, Nev	1593.66	5228.53
Barclay, Nev	1619.52	5313.37
Acoma, Nev	1682.64	5520.46
Brown, Nev	1760.95	5777.38
Crestline, Nev	1823.10	5981.29
Lien, Nev	1768.22	5801.23
Utah-Nevada Line	1730.32	5676.89
Uvada, Utah	1723.98	5656.09
Tomas, Utah	1684.62	5526.96
Modena, Utah	1666.64	5467.97
Escalante, Utah	1615.98	5301.76
Morton, Utah	1578.55	5178.96
Beryl, Utah	1571.26	5155.04
Sahara, Utah	1586.86	5206.22
Ford, Utah	1570.72	5153.27
Lund, Utah	1549.46	5083.52
Kerr, Utah	1550.45	5086.77
Latimer, Utah	1547.56	5077.29
Nada, Utah	1544.75	5068.07
Thermo, Utah	1535.08	5036.34
Laho, Utah	1527.85	5012.62
Upton, Utah	1519.52	4985.29
Milford, Utah	1511.57	4959.21
Opal, Utah	1514.58	4969.08
Buena Vista, Utah	1289.95	4232.11
Riter, Utah	1287.07	4222.66
Garfield, Utah	1288.53	4227.45
Morris, Utah	1336.96	4386.34
Shields, Utah	1438.66	4720.00
Tooele, Utah	1490.79	4891.03
Buehl, Utah	1538.95	5049.04
Stockton, Utah	1544.98	5068.82
San Pedro, Los Angeles & Salt Lake R. R.—Con.		
St. John, Utah	1530.90	5022.63
Ajax, Utah	1540.74	5054.91
Faust, Utah	1601.75	5255.07
Vernon, Utah	1679.37	5509.73
Lofgreen, Utah	1769.21	5804.48
Boulter, Utah	1838.97	6033.35
Tintic, Utah	1785.73	5858.68
Mammoth, Utah	1836.82	6026.30
Jericho, Utah	1618.29	5309.34
Champlin, Utah	1510.08	4954.32
Adams, Utah	1485.19	4872.66
Lynndyl, Utah	1458.57	4785.32
Cline, Utah	1457.15	4780.67
Akin, Utah	1414.34	4640.21
Oasis, Utah	1400.97	4596.35
Van, Utah	1394.74	4575.91
Neels, Utah	1407.68	4618.36
Borden, Utah	1438.17	4718.40
Goss, Utah	1453.43	4768.46
Cruz, Utah	1486.31	4876.33
Pumice, Utah	1478.76	4851.56
Black Rock, Utah	1479.00	4852.35
Malone, Utah	1491.35	4892.87
Zenda, Utah	1506.78	4943.49
Chicago, Burlington & Quincy R. R.:		
Crawford, Nebr	1119.88	3674.14
Horn, Nebr	1122.42	3682.47
Joder, Nebr	1136.50	3728.67
Orella, Nebr	1164.22	3819.61
Mansfield, Nebr	1107.04	3632.01
Ardmore, S. Dak	1084.80	3559.05
Rumford, S. Dak	1068.27	3504.81
Provo, S. Dak	1130.40	3708.65
Dennis, S. Dak	1083.11	3553.50
Edgemont, S. Dak	1052.08	3451.70
Paine, S. Dak	1048.55	3440.12
Marietta, S. Dak	1064.13	3491.23
Argentine, S. Dak	1108.41	3636.51
Dewey, S. Dak	1130.02	3707.41
Dakoming, Wyo	1168.16	3832.54
Clifton, Wyo	1202.70	3945.86
Owens, Wyo	1230.80	4038.05
Spencer, Wyo	1279.43	4197.60
Johnson, Wyo	1322.05	4337.43
Newcastle, Wyo	1315.69	4316.56
Pedro, Wyo	1280.70	4201.76
Osage, Wyo	1315.81	4316.95
Jerome, Wyo	1283.27	4210.19
Upton, Wyo	1290.73	4234.67
Thornton, Wyo	1317.96	4324.01
Kara, Wyo	1327.73	4356.06
Moorcroft, Wyo	1282.44	4207.47
Wessex, Wyo	1285.76	4218.36
Rozet, Wyo	1306.00	4284.77
Minturn, Wyo	1340.84	4399.07
Gillette, Wyo	1384.48	4542.25
Sparta, Wyo	1447.00	4747.37
Oriva, Wyo	1417.57	4650.81
Kier, Wyo	1352.04	4435.82
Felix, Wyo	1290.69	4234.54
Echeta, Wyo	1243.44	4079.52
Croton, Wyo	1206.13	3957.11
Lariat, Wyo	1180.58	3873.29
Arvada, Wyo	1113.92	3654.59
Kendrick, Wyo	1179.50	3869.74
Cadiz, Wyo	1138.89	3736.51
Huntley, Mont	922.60	3026.90
Ballantine, Mont	915.26	3002.82
Anita, Mont	931.71	3056.78
Corinth, Mont	940.62	3086.02
Toluca, Mont	988.49	3243.07
Peritsa, Mont	909.44	2983.72
Hardin, Mont	884.87	2903.11
Dunmore, Mont	904.20	2966.53
Crow Agency, Mont	926.63	3040.12
Garryowen, Mont	952.59	3125.29
Ionia, Mont	999.61	3279.55
Lodgegrass, Mont	1025.31	3363.87
Little Horn, Mont	1049.58	3443.50
Wyola, Mont	1130.97	3710.52
Aberdeen, Mont	1203.10	3947.17
Parkman, Wyo	1307.88	4290.94
Ohlman, Wyo	1242.40	4076.11
Ranchester, Wyo	1149.64	3771.78
Riverdale, Wyo	1126.21	3694.91
Kooi, Wyo	1122.77	3683.62
Monarch, Wyo	1111.16	3645.53
Alger, Wyo	1107.22	3632.60
Tongue River, Wyo	1111.74	3647.43
Dietz, Wyo	1113.20	3652.22
Sheridan, Wyo	1137.24	3731.09
Wakeley, Wyo	1144.64	3755.37

Table of elevations at railroad stations—Continued.

Place.	Standard elevation.	
	Meters.	Feet.
Chicago, Burlington & Quincy R. R.—Contd.		
Arno, Wyo	1148.78	3768.96
Verona, Wyo	1221.67	4008.09
Alki, Wyo	1267.19	4157.44
Regis, Wyo	1241.63	4073.58
Clearmont, Wyo	1194.03	3917.41
Atchison, Topeka & Santa Fe Ry.:		
Goffs, Cal	787.66	2584.18
Rising, Cal	736.07	2414.92
Homer, Cal	650.15	2133.03
Bannock, Cal	539.57	1770.24
Ibis, Cal	443.42	1454.79
Klinefelter, Cal	370.83	1216.63
Java, Cal	293.53	963.02
Hartoum, Cal	219.59	720.44
Needles, Cal	147.22	483.00
Beal, Cal	147.55	484.09
Topock, Ariz	154.07	505.48
Powell, Ariz	232.99	764.40
Franconia, Ariz	337.22	1106.36
Haviland, Ariz	446.66	1465.42
Yucca, Ariz	549.94	1804.26
Signal, Ariz	651.69	2138.09
Kaster, Ariz	719.85	2361.71
Drake, Ariz	797.71	2617.15
Hancock, Ariz	844.82	2771.71
McConnico, Ariz	905.55	2970.96
Maguire, Ariz	919.16	3015.61
Kingman, Ariz	1016.73	3335.72
Louise, Ariz	1067.94	3503.73
Berry, Ariz	1029.14	3376.44
Antares, Ariz	1099.72	3608.00
Hackberry, Ariz	1083.14	3553.60
Tinnaka, Ariz	1154.56	3787.92
Crozier, Ariz	1210.49	3971.42
Truxton, Ariz	1281.47	4204.29
Cherokee, Ariz	1362.39	4469.77
Peach Springs, Ariz	1459.84	4789.49
Nelson, Ariz	1556.19	5105.60
Yampai, Ariz	1700.85	5580.20
Fields, Ariz	1642.71	5389.46
Pica, Ariz	1599.37	5247.27
Audley, Ariz	1572.55	5159.27
Chino, Ariz	1623.39	5326.07
Seligman, Ariz	1597.84	5242.25
Pan, Ariz	1672.98	5488.77
Crookton, Ariz	1734.63	5691.03
Gleed, Ariz	1661.80	5452.09
Pineveta, Ariz	1559.04	5114.95
Ash Fork, Ariz	1567.82	5143.76
Holmes, Ariz	1679.02	5508.58
Fairview, Ariz	1809.14	5935.49
McClellan, Ariz	1960.04	6430.56
Supai, Ariz	2117.08	6945.79
Williams, Ariz	2061.01	6761.83
Davern, Ariz	2127.26	6979.18
Chalender, Ariz	2093.76	6869.28
Maine, Ariz	2159.11	7083.68
Arey, Ariz	2193.09	7195.16
Bellemont, Ariz	2173.85	7132.04
Riordan, Ariz	2228.44	7311.14
Agassiz, Ariz	2166.76	7108.78
Flagstaff, Ariz	2101.80	6895.65
Cliffs, Ariz	2081.59	6829.35
Cosnino, Ariz	1970.77	6465.77
Winona, Ariz	1903.23	6244.18
Angell, Ariz	1801.22	5909.50
Hibbard, Ariz	1690.85	5547.40
Canyon Diablo, Ariz	1654.77	5429.02
Sunshine, Ariz	1628.05	5341.36
Dennison, Ariz	1527.26	5010.69
Moqui, Ariz	1513.62	4965.93
Winslow, Ariz	1479.59	4854.29
Hobson, Ariz	1487.25	4879.42
Hardy, Ariz	1506.24	4941.72
Manila, Ariz	1510.73	4956.45
Joseph City, Ariz	1523.60	4998.68
Penzance, Ariz	1540.11	5052.84
Holbrook, Ariz	1548.27	5079.62
Aztec, Ariz	1568.99	5147.59
Carrizo, Ariz	1593.80	5228.99
Adamana, Ariz	1615.01	5298.58
Bibo, Ariz	1647.04	5403.66
Pinta, Ariz	1682.62	5520.40
Navajo, Ariz	1716.99	5633.16
Chambers, Ariz	1753.71	5753.63
Sanders, Ariz	1778.70	5835.62
Querino, Ariz	1798.62	5900.97
Houck, Ariz	1817.99	5964.52
Allantown, Ariz	1845.58	6055.04
Lupton, Ariz	1879.05	6164.85
Manuelito, N. Mex	1907.95	6259.67
Defiance, N. Mex	1943.70	6376.96

Place.	Standard elevation.	
	Meters.	Feet.
Atchison, Topeka & Santa Fe Ry.—Continued.		
West Yard, N. Mex	1970.77	6465.77
Gallup, N. Mex	1982.25	6503.43
Zuni, N. Mex	2013.67	6606.51
Wingate, N. Mex	2055.39	6743.39
Perea, N. Mex	2088.92	6853.40
Guam, N. Mex	2133.33	6999.10
Gonzales, N. Mex	2209.78	7249.92
Thoreau, N. Mex	2174.88	7135.42
Chaves, N. Mex	2132.17	6995.29
Baca, N. Mex	2077.30	6815.27
Bluewater, N. Mex	2022.15	6634.34
Toltec, N. Mex	1995.52	6546.97
Grants, N. Mex	1970.37	6464.45
Horace, N. Mex	1926.70	6321.18
McCartys, N. Mex	1879.69	6166.95
Alaska, N. Mex	1841.35	6041.16
Cubero, N. Mex	1807.30	5929.45
Laguna, N. Mex	1767.05	5797.40
El Rito, N. Mex	1726.48	5664.29
Armijo, N. Mex	1698.80	5573.48
Suwanee, N. Mex	1662.67	5454.94
Garcia, N. Mex	1597.71	5241.82
Rio Puerco, N. Mex	1539.06	5049.40
Pavo, N. Mex	1547.23	5076.20
Cortez, N. Mex	1614.23	5296.02
Sandia, N. Mex	1611.21	5286.11
Manzana, N. Mex	1545.15	5069.38
Isleta, N. Mex	1492.40	4896.32
Barr, N. Mex	1498.00	4914.69
Abajo, N. Mex	1507.26	4945.07
Albuquerque, N. Mex	1510.06	4954.25
Chicago, Rock Island & Pacific Ry.:		
El Reno, Okla	414.30	1359.25
Choctaw Crossing, Okla	406.44	1333.46
Reno Junction, Okla	405.98	1331.95
Fort Reno, Okla	408.79	1341.17
Calumet, Okla	418.48	1372.96
Geary, Okla	468.65	1537.56
Bridgeport, Okla	435.03	1427.26
McCool, Okla	441.79	1449.44
Hydro, Okla	454.31	1490.52
Weatherford, Okla	500.80	1643.04
Indianapolis, Okla	507.08	1663.64
Washita, Okla	455.50	1494.42
Frisco Junction, Okla	454.52	1491.20
Clinton, Okla	462.55	1517.55
Parkersburg, Okla	464.97	1525.49
Foss, Okla	495.91	1627.00
Canute, Okla	580.94	1905.97
Elk City, Okla	583.69	1914.99
Merritt, Okla	625.29	2051.47
Doxey, Okla	560.12	1837.66
Sayre, Okla	552.53	1812.76
Hext Ranch, Okla	588.73	1931.52
Erick, Okla	627.90	2060.04
Chicago, Rock Island & Gulf Ry.:		
Texola, Tex	655.66	2151.11
Benonine, Tex	653.71	2144.71
Fuller, Tex	665.33	2182.84
Shamrock, Tex	710.63	2331.46
Lela, Tex	736.20	2415.35
Ramsdell, Tex	781.65	2564.46
McLean, Tex	871.45	2859.08
Alanreed, Tex	927.41	3042.68
Rockledge, Tex	965.41	3167.35
Jericho, Tex	976.30	3203.08
Texas & Pacific Ry.:		
Benbrook, Tex	202.73	665.12
Iona, Tex	293.08	961.55
Earls, Tex	276.53	907.25
Lambert, Tex	352.89	1157.77
Bennets, Tex	229.89	754.23
Santo, Tex	250.87	823.06
Judd, Tex	279.48	916.93
Mingus, Tex	290.70	953.74
Strawn, Tex	305.81	1003.31
Wiles, Tex	354.49	1163.02
Ranger, Tex	439.07	1440.51
Eastland, Tex	436.82	1433.13
Lem, Tex	458.70	1504.92
Cisco, Tex	493.53	1619.19
Dothan, Tex	493.76	1619.94
Putnam, Tex	489.35	1605.48
Chatauqua, Tex	465.61	1527.59
Baird, Tex	523.89	1718.80
Clyde, Tex	606.29	1989.14
Abilene, Tex	524.14	1719.62
Tye, Tex	548.93	1800.95
Merkel, Tex	570.56	1871.91
Trent, Tex	583.83	1915.45
Eskota, Tex	591.68	1941.20
Sweetwater, Tex	660.29	2166.30

Table of elevations at railroad stations—Continued.

Place.	Standard elevation.	
	Meters.	Feet.
Texas & Pacific Ry.—Continued.		
Roscoe, Tex	727.81	2387.82
Loraine, Tex	690.97	2266.96
Colorado, Tex	630.92	2069.94
Westbrook, Tex	650.66	2134.71
Iatan, Tex	675.00	2214.56
Coahoma, Tex	735.32	2412.46
Big Spring, Tex	731.82	2400.98
Morita, Tex	754.39	2475.03
Stanton, Tex	811.98	2663.97
Germania, Tex	838.79	2751.93
Midland, Tex	846.48	2777.16
Warfield, Tex	874.76	2869.94
Odessa, Tex	882.84	2896.45
Douro, Tex	940.23	3084.74
Judkins, Tex	880.16	2887.66
Metz, Tex	871.57	2859.48
Sand Hills, Tex	826.02	2710.03
Monahans, Tex	799.22	2622.11
Aroya, Tex	813.03	2667.42
Pyote, Tex	799.07	2621.62
Quito, Tex	815.66	2676.04
Barstow, Tex	781.91	2565.32
Pecos, Tex	787.62	2584.05
Hermosa, Tex	832.58	2731.56
Toyah, Tex	888.30	2914.36
Gomez, Tex	998.98	3277.49
San Martine, Tex	1133.41	3718.53
Kent, Tex	1283.78	4211.87
Boracho, Tex	1359.11	4459.01
Plateau, Tex	1202.37	3944.78
Wild Horse, Tex	1173.99	3851.67
Van Horn, Tex	1233.71	4047.60
Allamore, Tex	1386.94	4550.32
Eagle Flat, Tex	1359.91	4461.64
Sierra Blanca, Tex	1377.12	4518.10
Galveston, Harrisburg & San Antonio Ry.:		
Etholen, Tex	1418.47	4653.76
Lasca, Tex	1365.61	4480.34
Torcer, Tex	1302.74	4274.07
Finlay, Tex	1204.27	3951.01
Tinaja, Tex	1173.35	3849.57
Madden, Tex	1119.36	3672.43
Nulo, Tex	1088.36	3570.73
Fort Hancock, Tex	1095.93	3595.56
Iser, Tex	1121.82	3680.50
Polvo, Tex	1114.90	3657.80
Tornillo, Tex	1093.18	3586.54
Fabens, Tex	1103.26	3619.61
Belen, Tex	1113.84	3654.32
Ysleta, Tex	1118.48	3669.55
Alfalfa, Tex	1125.52	3692.64
Chicago, Rock Island & Gulf Ry.:		
Groom, Tex	995.02	3264.49
Lark, Tex	1028.63	3374.76
Conway, Tex	1054.19	3458.62
Royal, Tex	1097.05	3599.24
Atchison, Topeka & Santa Fe Ry.:		
Haney, Tex	1110.50	3643.37
Canyon, Tex	1088.51	3571.22
Lester, Tex	1118.25	3668.79
Umbarger, Tex	1148.52	3768.10
Dawn, Tex	1159.03	3802.58
Hereford, Tex	1162.66	3814.49
Joel, Tex	1148.87	3769.25
Summerfield, Tex	1200.09	3937.29
Black, Tex	1217.60	3994.74
Friona, Tex	1221.42	4007.28
Parmerton, Tex	1273.71	4178.83
Bovina, Tex	1240.31	4069.25
Wilsey, Tex	1271.07	4170.17
Texico, N. Mex	1263.17	4144.25
Clovis, N. Mex	1299.96	4264.95
Blacktower, N. Mex	1317.02	4320.92
St. Vrain, N. Mex	1240.03	4068.33
Melrose, N. Mex	1339.38	4394.28
Cantara, N. Mex	1344.42	4410.82
Krider, N. Mex	1314.33	4312.10
Tolar, N. Mex	1283.57	4211.18
Taiban, N. Mex	1257.85	4126.80
La Lande, N. Mex	1254.96	4117.31
Fort Summer, N. Mex	1239.02	4065.02
Agudo, N. Mex	1299.46	4263.31
Ricardo, N. Mex	1344.23	4410.19
Evanola, N. Mex	1396.02	4580.11
Largo, N. Mex	1515.60	4972.43
Yeso, N. Mex	1455.07	4773.84
Buchanan, N. Mex	1564.22	5131.94
Cardenas, N. Mex	1614.68	5297.50
Duoro, N. Mex	1658.76	5442.11
Casaus, N. Mex	1715.13	5627.06
Iden, N. Mex	1774.18	5820.79
Vaughn, N. Mex	1816.55	5959.80
Tejon, N. Mex	1853.90	6082.34
Carnero, N. Mex	1898.20	6227.68
Encino, N. Mex	1864.46	6116.98
Negra, N. Mex	1890.21	6201.46
Pedernal, N. Mex	1941.50	6369.74
Dunmoor, N. Mex	1942.93	6374.43
Lucy, N. Mex	1883.60	6179.78
Silio, N. Mex	1855.55	6087.75
Willard, N. Mex	1860.02	6102.41
Broncho, N. Mex	1925.20	6316.26
Mountainair, N. Mex	1979.47	6494.31
Abo, N. Mex	1873.57	6146.87
Scholle, N. Mex	1774.38	5821.44
Sais Crusher, N. Mex	1678.34	5506.35
Sais, N. Mex	1658.32	5440.67
Becker, N. Mex	1576.05	5170.76
Bodega, N. Mex	1536.33	5040.44
Madrone, N. Mex	1488.34	4882.99
Belen, N. Mex	1464.82	4805.83
Los Lunas, N. Mex	1479.21	4853.04

DESCRIPTIONS OF BENCH MARKS.*

GENERAL NOTES DESCRIBING DIFFERENT FORMS AND MARKINGS OF BENCH MARKS CONNECTED WITH THE LEVEL NET.

The notes in Precise Leveling in the United States, 1903–7, describing the various types of bench marks, have been reproduced in this publication, and the numbering has not been changed in any case. In order that the series may remain intact, some notes are included in the list which refer to bench marks described only in previous publications. Observers should adhere to these notes in describing their bench marks and should use the corresponding numbers in their descriptions.

NOTE 1.—This type of bench mark is the red metal disk designed by the Coast and Geodetic Survey, lettered "U. S. Coast and Geodetic Survey, B. M. $250 fine or imprisonment for disturbing this mark." The disk is 3 inches in diameter, with a 3-inch tenon upon the back for setting it, and is set in cement flush with a horizontal or vertical surface. In the latter case a horizontal mark cut on it, or the horizontal mark of a cross, is the bench mark.

NOTE 2.—This type of bench mark has the same lettering as that referred to in note 1, and is a 3-inch red metal cap, somewhat curved, screwed upon a 4-foot or 4½-foot iron pipe set in the ground and usually cemented at the base, from 4 to 6 inches being exposed above the ground. The base of the pipe is split and spread to a diameter of about a foot. For placing the foot of the level rod accurately a square or a small circle was cut in outline in the center of the cap.

NOTE 3.—This type of bench mark is a stone post 4 feet long set in the ground with 6 inches exposed, and this portion is dressed. The upper surface is 6 inches square and plane, being marked in the center with a ½-inch copper

*Any person who finds that one of the bench marks here described is disturbed, or that the description is not in accordance with the facts, is requested to notify the Superintendent of the Coast and Geodetic Survey, Washington, D. C.

bolt, 2 inches long, set flush with the surface; the top of the bolt is the bench mark; the upper surface of the stone is lettered "U. S. B. M." and when the post is set near the railroad these letters face the track.

NOTE 4.—This type of bench mark is a brass or copper bolt, usually set in lead or cement, flush with a horizontal or vertical surface. In the latter case, a horizontal mark cut on the face of the bolt, or the horizontal mark of a cross, is the bench mark.

NOTE 5.—This type of bench mark is the bottom of a hole in a horizontal surface, 25 millimeters square, 4 millimeters deep, lettered "U. S. B. M."

NOTE 6.—Where a hydrant has been used the bench mark is the highest point, a brass nut used as a check valve. These may not be considered stable points. They are, however, the most accurately defined of the city bench marks.

NOTE 7.—Bench marks referred to this note are upon a Coast and Geodetic Survey triangulation station mark or witness mark, a terra cotta pipe filled and surrounded with concrete, from which projects the point of a nail. The bench mark is a square hole cut near the nail.

NOTE 8.—This type of bench mark is the smooth bottom of a round cut, or shallow drill hole, 8 millimeters deep and 25 millimeters in diameter, in a horizontal stone surface.

NOTE 9.—Bench marks referred to this note are upon a Coast and Geodetic Survey triangulation station mark, a terra cotta pipe filled and surrounded with concrete, from which projects the point of a nail, against which the rod was held.

NOTE 10.—Bench marks referred to this note consist of a copper bolt in a bench mark stone, set 4 feet underground, covered by a 3-inch iron pipe marked "U. S. B. M."

NOTE 11.—The bottom of hole about 25 millimeters square and about 4 to 5 millimeters deep, cut in the top of a stone or cement post about 4 feet long and with rectangular top from 4 to 8 inches on a side, projecting about 6 inches from the ground. The top of the post is lettered "U. S. B. M." Limestone posts are used between Holland and New Braunfels, Tex., and black lava posts between Pocatello and Owyhee, Idaho.

NOTE 12.—The top of a copper bolt cemented in the top of a 4-foot reenforced concrete post, 7 inches square, with edges beveled, projecting about 6 inches from the ground, with the top marked "U. S. B. M."

NOTE 13.—The surface within an outlined square, 1 inch on each side, on a horizontal surface of masonry or metal, unlettered.

NOTE 14.—The surface within an outlined square, 1 inch on each side, on a horizontal surface of masonry, lettered "U. S."

NOTE 15.—The bottom of a hole in a horizontal surface, 25 millimeters square and 4 to 6 millimeters deep, lettered "U. S."

NOTE 16.—The bottom of a hole in a horizontal surface, 25 to 30 millimeters square, 4 millimeters deep, not lettered.

NOTE 17.—A 3-inch aluminum or bronze disk* lettered "U. S. Geological Survey B. M. $250 fine or imprisonment for disturbing this mark. Elevation above sea — feet. Datum —." Each disk is stamped with the approximate elevation in feet and a letter or letters to indicate the datum plane. This elevation and the datum letter or letters usually form the name by which the bench mark is designated in this publication.

NOTE 18.—This type of bench mark has the same lettering as that referred to in note 17, and is a 3-inch aluminum or bronze cap riveted upon a 3-inch iron pipe, set in the ground, 5 to 6 inches being exposed above the ground. A cross cut in the center of the top is the bench mark.

NOTE 19.—A bench mark referred to this note was established by the Corps of Engineers, U. S. Army. It is the top of a long section of iron rail driven in the center of the railroad track on the south jetty, Galveston, Tex.

NOTE 20.—A cross on the top of a section of rail set vertically in the ground. Those designated "M. M." (mile monument) mark the exact mile which is indicated by the numeral following; the others are designated "R. M." (rail monument).

NOTE 21.—A bench mark of the Baltimore and Ohio Railroad, being a section of rail, sometimes marked with a cross, set vertically between the tracks; when there are several tracks it is set between the rails of the main track.

NOTE 22.—A bench mark of the Baltimore and Ohio Railroad, consisting of a section of rail set vertically in the ground near the track. It is to the right, when proceeding from Warwick, Ohio, to Wheeling, W. Va.

NOTE 23.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt set in an abutment of a bridge. It is in the right-hand end of the farther abutment, when proceeding from Cumberland, Md., toward Wheeling, W. Va.

NOTE 24.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt in the bridge seat of an abutment. It is in the right-hand end of the bridge seat of the farther abutment, when proceeding from Cumberland, Md., toward Wheeling, W. Va.

NOTE 25.—This type of bench mark is a square post of concrete made of Portland cement and fine gravel, of the grade called artificial stone, somewhat finer than that of which sidewalk blocks are made. It is 4 feet long, projecting 3 inches above the ground, 6 inches square at the base, and 4 inches square at the top, with a copper bolt set flush with the top surface, which is lettered "U. S. B. M."

NOTE 26.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt set in a culvert or bridge. It is in the farther end of the right-hand coping, when proceeding from Cumberland, Md., toward Wheeling, W. Va.

* See illustration on p. 550, Appendix 8, Report for 1899; and U. S. Geological Survey Report, 1896-97, Part I, pp. 226-228; also bulletins of the U. S. Geological Survey giving the results of leveling in the various States.

NOTE 27.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt set in rock in place, on the left-hand side of the track when proceeding from Cumberland, Md., toward Wheeling, W. Va.

NOTE 28.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt set in rock in place, on the right-hand side of the track when proceeding from Foley, Pa., toward Chicago Junction, Ohio.

NOTE 29.—A bench mark of the Baltimore and Ohio Railroad, consisting of a section of rail set vertically in the ground on the left-hand side of the track, when proceeding from Foley, Pa., toward Chicago Junction, Ohio.

NOTE 30.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt set in the end of the bridge seat of a bridge. When proceeding from Foley, Pa., toward Chicago Junction, Ohio, it is in the right-hand end of the nearer of the two abutments of the bridge.

NOTE 31.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt set in the end of the bridge seat of a bridge. When proceeding from Foley, Pa., toward Chicago Junction, Ohio, it is in the right-hand end of the farther of the two abutments of the bridge.

NOTE 32.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt set in an abutment of a bridge or culvert. It is on the right-hand end of the nearer abutment when proceeding from Foley, Pa., toward Chicago Junction, Ohio.

NOTE 33.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt set in an abutment of a bridge or culvert. It is on the right-hand end of the farther abutment when proceeding from Foley, Pa., toward Chicago Junction, Ohio.

NOTE 34.—This type of bench mark is a stone post of Sioux quartzite, or so-called pink jasper, 4 feet long, set in the ground with 6 inches exposed, and this portion is rough dressed. The upper surface is 6 inches square, being marked in the center with a ⅜-inch copper bolt, 2 inches long, set flush with the surface; the top of the bolt is the bench mark; the upper surface of the stone is lettered "U. S. B. M." and when the post is set near the railroad these letters face the track.

NOTE 35.—The bottom of a hole 1 inch square and about ¼ inch deep, cut in the top of a reinforced concrete post, 4 feet long and 7 inches square, projecting about 6 inches above the ground. The top of the post is lettered "U. S. B. M."

NOTE 36.—This type of bench mark is a ⅜-inch copper bolt, 2 inches long, set in lead or cement, flush with a horizontal or vertical surface, lettered "U. S." In the latter case, a horizontal mark on the face of the bolt is the bench mark.

NOTE 37.—A bench mark referred to this note was described by the Baltimore and Ohio Railroad as "a copper bolt set as described above in foundation for P. & L. E. R. R. signal bridge." The reference "as above" is to the description of B. & O. 359A, immediately preceding: "Copper bolt set in a concrete foundation of P. & L. E. R. R. signal bridge * * * in the more easterly of two northern pedestals." In the original descriptions of all the Baltimore and Ohio Railroad bench marks the expressions "easterly," "northerly," etc., referred to the general direction of the railroad and not to the actual direction at the point.

NOTE 38.—These bench marks were set and located geodetically in the winter of 1892–93, and their geographical positions are published in Report of 1893, pages 3608–3619.

Each stone-line bench mark consists of a vitrified tile 18 by 18 by 4 inches. A copper bolt is leaded vertically in the center of this tile, the upper end projecting slightly above face of tile. On the surface of the tile surrounding the bolt is the inscription "Mississippi River Commission."

U. S.
B. [ ] M.
1893.

The tile is buried in the ground from 18 to 40 inches deep, the depth varying with the nature of the material.

On top of the tile a 4-inch wrought-iron gas pipe 4 feet long is set concentric with the copper bolt. The lower end of the pipe is expanded and fits in a circular groove molded in the tile. A cast-iron cap fits over the top of the pipe and is fastened thereto with bronze bolts. The top of the cap bears an inscription similar to that on the tile. (See Report of Chief of Engineers for 1894, Part 5, p. 2768.)

NOTE 39.—All bench-mark monuments referred to as pipestone benches consist of pieces of limestone 46 centimeters square and 15 centimeters thick, marked $\frac{\text{U S}}{\text{B M}}$, with spherical-headed copper bolts leaded in upper faces, and buried 1.2 meters under ground, access being given through 12-centimeter iron pipes set on top. Each pipe has a cast-iron cap, fastened by a horizontal bolt through cap and pipe. The cap has a small boss and the letters $\frac{\text{USE}}{\text{B M}}$ raised on top. Elevations apply to the top of the bolt in the underground stone. Elevation of boss of pipe cap can be found in any case by adding 1.24 meters to elevation of copper bolt. (See Report of Chief of Engineers for 1902, Part 2, p. 1467.)

NOTE 40.—All bench-mark monuments referred to as pipe-flange benches consist of 4-centimeter gas pipes about 1.6 meters long, capped at upper end and having a 12-centimeter circular flange attached near lower end by lock nuts. Monuments are set with about 0.1 meter above ground surface. Flanges are surrounded in the usual case by a

matrix of neat cement, approximately doubling the bearing area of the monument. Elevations apply to the top of cap. (See Report of Chief of Engineers for 1902, Part 2, p. 1467.)

NOTE 41.—A permanent bench mark (P. B. M.) referred to this note consists of a ⅜-inch copper bolt leaded vertically into the center of the dressed upper surface of a limestone block 18 inches square by about 6 inches thick. The bolt projects a little above the surface of the stone, on which are inscribed the words "Ill. River U. S. Survey 1903." This stone is set about 3.5 feet below the level of the ground, with its upper surface in a horizontal position. On the top of the stone so placed is set vertically and concentric with the copper bolt a 3-inch wrought-iron pipe 4 feet long, split at the bottom, and expanded into two flat foot-like bases which rest on the stone and also serve to prevent the pipe from being pulled up. A nipple, having an external diameter equal to the internal diameter of the pipe and being of sufficient length to extend from the stone up into the pipe a short distance above the split, is placed at the bottom of the pipe to prevent the earth from closing around the copper bolt. A cast-brass cap fits over the top of the pipe, to which it is riveted by two bolts at right angles to each other passing through the pipe and the flange of the cap. On the top of the cap is inscribed in sunken letters, "Illinois River Survey. $250 fine for disturbing this mark. 1903. U. ○ S. Latitude □. Longitude □. Elevation above sea □." Two elevations are obtained for such benches—the elevation of the top of the copper bolt in the stone in the ground and the elevation of the center mark, between the letters "U" and "S," on the top of the cap. (See Document No. 263, House of Representatives, 59th Cong., 1st sess.)

NOTE 42.—A bench mark referred to this note is the highest point in a square cut in stone and marked thus:

U □ S

NOTE 43.—A bench mark referred to this note consists of a copper bolt leaded vertically into stone, the top of the bolt being the bench mark. It is lettered thus:

U S
○
P B M

NOTE 44.—A bench mark referred to this note is the center of a cross (+) cut on the cross section or end of a piece of railway rail set vertically in the ground.

NOTE 45.—A bench mark referred to this note is the highest point in a square cut in a stone surface and marked:

S D
□
P B M

NOTE 46.—A bench mark referred to this note is center punch mark in the end of a copper bolt leaded into stone, and lettered:

S D
○
P B M

NOTE 47.—A bench mark referred to this note is similar to that described in note 46 except it is lettered "U. S. P. B. M." instead of "S. D. P. B. M."

NOTE 48.—The bench marks in the line Fort Adams to Vicksburg, 1905–6, were said to be "the regulation tile pipe and bronze cap used by the Mississippi River Commission for some years." They were therefore of the same type as those described in the Report of the Chief of Engineers for 1900, Part 7, as follows: "The new precise bench marks established on lines Biloxi, Miss., to New Orleans, La., and Baton Rouge, La., to Fort Adams, Miss., are of the B. M. form as used in 1898 above St. Paul, Minn., for ordinary bench marks, and consist of tile and pipe as follows: A vitrified tile 18 by 18 by 4 inches, in the center of which is set vertically with lead a three-eighths inch copper bolt, the upper end being a little above the upper surface of the tile. Surrounding the bolt on the surface of the tile is the inscription, 'Mississippi River Commission, 1898, U. S. B. M.' This tile is buried in the ground about 3 feet beneath the surface. On top the tile is placed a 4-inch wrought-iron gas pipe 4 feet long, concentric with copper bolt; the lower end of the pipe is split into quarters and spread out to prevent its being pulled up. A cast brass cap fits over the top of the pipe and is riveted thereto. The cap has the following inscription in sunken letters: 'Mississippi River Commission, $250 fine for disturbing this mark, 1898, P B. M. U. S., latitude □, longitude □, elevation above sea□.' The P is put on with a prick punch. The elevation of the top of the cap is determined; the structure has thus two bench marks."

NOTE 49.—A bench mark referred to in this note is the top of a copper bolt set vertically in the top of a truncated square pyramid of concrete built below the ground surface and surmounted by a square cast-iron cover with removable lid.

NOTE 50.—A 3-inch aluminum or bronze disk* lettered "U. S. Geological Survey B. M. $250 fine or imprisonment for disturbing this mark."

NOTE 51.—This type of bench mark is a 3-inch aluminum or bronze cap * (lettered as in note 50) riveted upon a 3-inch iron pipe set in the ground.

NOTE 52.—This type of bench mark is a plain iron cap, marked with a chisel "U + S" and screwed upon a 4-foot or 4½-foot iron pipe set in the ground. The base of the pipe is usually split and spread to a diameter of about a foot and set in cement.

NOTE 53.—A type of bench mark set by the Missouri River Commission, and consisting of a 4-inch iron pipe, 4 feet long, resting on a stone about 18 inches square and projecting about 6 inches above the ground. The pipe has

* See footnote on page 163.

bolted to its top a cast-iron cap, marked with a triangle raised about ⅜ inch above the surface; at the center of the triangle there is a copper bolt.

NOTE 54.—This type of bench mark is a 3-inch aluminum or bronze disk lettered "U. S. Reclamation Service B. M. $250 fine or imprisonment for disturbing this mark. Elevation above sea level — feet. Datum —." The elevation and datum are stamped on the bench mark, and it is refered to in the same manner as in Note 17.

NOTE 55.—This type of bench mark is the upper flat end of a section of railroad rail, from 2 to 2½ feet long, set in stones with 4 to 6 inches exposed. The upper end of the rail is stamped with a cross and the letters "U. S. B. M."

NOTE 56.—A copper bolt set, usually with lead, into stone or brick, with the letters "U. S. B. M." surrounding the bolt. When the bolt is set in a vertical support, the exact point defined by the bench mark is indicated by a horizontal line or by the intersection of cross lines on the head of the bolt in a horizontal surface; otherwise the top of the bolt is the bench mark.

NOTE 57.—A copper bolt set, usually with lead, into stone or brick; its head is divided into quadrants by cross lines, each quadrant containing one of the letters "U. S. B. M." The intersection of the cross lines is the bench mark.

NOTE 58.—A bench mark of the Union Pacific Railroad, being a spike in a milepost or mile pole, the number of which is part of the designation of the bench mark.

NOTE 59.—A brass plate, 10 centimeters in diameter, cemented into stone or brick flush with the surface. The raised center is marked by cross lines, the intersection of which is the bench, and by the letters "U. S. B. M."

NOTE 60.—A type of bench mark set by the U. S. Army Engineers. It consists of a concrete slab 16 by 16 by 4 inches set about 3 feet in the ground. A copper bolt is embedded in the concrete slab, which is also surmounted by an iron pipe 4 inches in diameter and 4 feet long with a cap bolted to its top. The center of the cap is directly above the bolt in the slab. Elevations are usually taken on both the bolt and the center of the cap.

NOTE 61.—A type of bench mark set by the U. S. Army Engineers. It consists of an iron pipe, 3 inches in diameter and 5 feet long, set 4½ feet into the ground and covered with a cap. Elevations are taken on the knob of the cap.

DESCRIPTIONS OF PERMANENT BENCH MARKS FROM RED DESERT TO AZUSA, WYO., 1903.

Z_2.—Near *Red Desert, Sweetwater County, Wyo.* (Appendix 3, Report for 1903, p. 805).—The bench mark has been moved slightly since it was determined in 1903.

B_3.—At *Red Desert, Sweetwater County, Wyo.* (Appendix 3, Report for 1903, p. 805).

C_3.—At *Tipton, Sweetwater County, Wyo.*, 75 feet north of the center of the main tracks, in line with the west end of the depot.† (Note 11*.)

D_3.—About 1 mile east of *Table Rock, Sweetwater County, Wyo.*, on the first deck plate-girder bridge east of Table Rock, about 4½ telegraph poles west of mile pole 773, on the south end of the east abutment (concrete), a square hole about 18 inches from retaining wall and 16 feet from outer edge and end of horizontal surface.† (Note 5*.)

U. P. 779—Near *Monell, Sweetwater County, Wyo.*† (Note 58*.)

E_3.—At *Monell, Sweetwater County, Wyo.*, directly opposite the station sign, 12 feet west of the second telegraph pole east of mile pole 779½, 42 feet south of the main tracks.† (Note 11.*)

F_3.—At *Bitter Creek, Sweetwater County, Wyo.*, in the station park, 18 feet from the south fence and 18 feet from the east fence, 2 rails west of the west end of the depot, and 53 feet north of the center of the main track.† (Note 11.*)

G_3.—About 2 miles east of *Black Buttes, Sweetwater County, Wyo.*, about 2 telegraph poles east of the half-mile post 791½, on a through plate-girder bridge, on the south side of the east wall, on the top of the stone extending from under the retaining wall.† (Note 5.*)

U. P. 793.—At *Black Buttes, Sweetwater County, Wyo.*† (Note 58.*)

H_3.—At *Hallville, Sweetwater County, Wyo.*, directly opposite mile pole 799, about 100 yards west of the section house and 4 rails east of the car house, 78 feet south of the center of the main track and 34 feet south of the fence.† (Note 11.*)

U. P. 799.—At *Hallville, Sweetwater County, Wyo.*† (Note 58.*)

U. P. 804.—Near *Point of Rocks, Sweetwater County, Wyo.*† (Note 58.*)

I_3.—One mile west of *Point of Rocks, Sweetwater County, Wyo.*, between the fourth and fifth telegraph poles west of mile pole 805½, 4 rails west of the station whistle post and 7 rails east of a small trestle at the point of curvature of the first curve west of Point of Rocks, 45 feet north of the track and 8 feet south of the fence.† (Note 11.*)

U. P. 810.—Near *Point of Rocks, Sweetwater County, Wyo.*† (Note 58.*)

J_3.—Two miles east of *Salt Wells, Sweetwater County, Wyo.*, 9 rails west of mile pole 814½, which also marks the junction of sections 45 and 46, near the middle of the first curve east of Salt Wells, 75 feet south of the center of the track.† (Note 11.*)

U. P. 823.—Near *Baxter, Sweetwater County, Wyo.*† (Note 58.*)

K_3.—At *Baxter, Sweetwater County, Wyo.*, 5 rails west of the telegraph station, and 1 rail east of the third telegraph pole east of mile pole 823½, 132 feet south of the main track.† (Note 11.*)

L_3.—At *Rock Springs, Sweetwater County, Wyo.*, on the north side of the depot, in the water table, 22 inches above the surface of the ground, and 22 inches from the northwest corner of the bay window; a square cut lettered U. S. B. M.†

M_3.—At *Rock Springs, Sweetwater County, Wyo.*, in the west end of the Union Pacific Railroad park west of the passenger depot, about 12 feet from the west fence, in line with the three hydrants of the park. (Note 11.*)

N_3.—At *Rock Springs, Sweetwater County, Wyo.*, in the stone wall of the City Hall, 6 inches from the pillar at the north side of west entrance, 4 feet above the surface of the ground. (Note 56.*)

* See pp. 162–166. † This bench mark is on the Union Pacific Railroad.

O_3.—At *Rock Springs, Sweetwater County, Wyo.*, in the stone wall of the high school building, on the north side, 40 feet west of the northeast corner, and 6 feet west of the north entrance; 6 feet above the surface of the ground, and 16 inches above and to the left of the first window west of the north entrance. (Note 56.*)

U. P. 835.—At *Ah Say, Sweetwater County, Wyo.*† (Note 58.*)

P_3.—About 1¾ miles east of *Wilkins, Sweetwater County, Wyo.*, 15 rails east of the east side of pump house, and 45 feet south of the center of the track, in line with the telegraph poles.† (Note 11.*)

U. P. 839.—At *Wilkins, Sweetwater County, Wyo.*† (Note 58.*)

Q_3.—At *Green River, Sweetwater County, Wyo.*, in the west end of the Union Pacific Railroad park, about equidistant from north and south sides and 12 feet from the fence. (Note 11.*) Stone broken in shipment and cemented together.

R_3.—At *Green River, Sweetwater County, Wyo.*, in the sandstone water table of the county courthouse, 4 feet north of the southeast corner, about 4 feet above the surface of the ground. (Note 56.*)

S_3.—At *Green River, Sweetwater County, Wyo.*, in the west wall of the Sweetwater Brewing Company's stone office and saloon, about 16 inches from the southwest corner, and about 4 feet from the ground. (Note 56,* except the letters U. S. B. M. were below the bolt.)

T_3.—At *Green River, Sweetwater County, Wyo.*, on the Union Pacific Railroad bridge over Green River, on south end of the middle red sandstone pier.† (Note 5.*)

U_3.—Near *Peru, Sweetwater County, Wyo.*, between the sixth and seventh telegraph poles east of the office pole at Peru, 45 feet south of the center of the track, 5 feet from the railroad fence, and 5 feet from the crossing fence.† (Note 11.*) The stone post is 3 feet 6 inches in the ground, projecting 1 foot, and of this depth 16 inches is rock.

V_3.—Two miles west of *Bryan, Sweetwater County, Wyo.*, two telegraph poles east of C signpost, three rails east of a small stone culvert, and between the eighth and ninth telegraph poles west of mile pole 860; 70 feet north of the railroad track and 30 feet south of the railroad fence.† (Note 11.*)

W_3.—Between *Bryan* and *Marston, Sweetwater County, Wyo.*, about 4 telegraph poles west of mile pole 863, at the north end of the sandstone abutment of the Union Pacific Railroad bridge over Black River, on the top stone of the retaining wall, 8 inches from the west side of the stone and 6 inches from the north end. (Note 5.*)

X_3.—Two and one-eighth miles west of *Marston, Sweetwater County, Wyo.*, 1⅜ miles east of *Azusa, Wyo.*, 10 feet south of the fourth telegraph pole west of mile pole 868, 3 poles west of the station sign for Azusa, 55 feet south of track, and 45 feet from the railroad fence.† (Note 11.*)

Y_3.—Four and three-fourths miles east of *Granger* and 1¼ miles west of *Azusa, Sweetwater County, Wyo.*, on the north end of the red sandstone retaining wall of the Union Pacific Railroad bridge over Black River, in the top of the stone, 10 inches from the east edge and 10 inches from the capstone.† (Note 5.*)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN OGDEN, UTAH, AND AZUSA, WYO., 1903.

Transit.—On a low hill west of *Ogden, Weber County, Utah*, near the San Pedro, Los Angeles & Salt Lake Railroad and about 2000 feet from Weber River, on the site where Wheeler Observatory formerly stood. Two sandstone piers, about 5 feet above ground, are still standing, and the bench mark is a square cut on the top of the eastern one.

A.—At *Ogden, Weber County, Utah*, on the iron railway bridge across the Weber River, northeast of the site of Wheeler Observatory; a square cut on the northeast corner of the east abutment.

B.—At *Ogden, Weber County, Utah*, on the corner of Twenty-fourth Street and Wall Avenue, on the east side of the brick building occupied by F. J. Kiesel, wholesale grocer; near the southeast corner, in the stone water table. (Note 57.*)

C.—At *Ogden, Weber County, Utah*, on the corner of Twenty-fifth Street and Wall Avenue, on the brick and stone building occupied by the Healy Hotel; on the west side, 1 foot from the southwest corner. (Note 57.*)

D.—At *Uinta, Weber County, Utah*, 60 feet east of the large gate across the tracks from the railroad station, 30 feet south of the road and 4 feet north of the fence.† (Note 11.*)

E.—On the second iron bridge east of *Devils Gate, Morgan County, Utah*, ½ mile from the station sign; a square cut on the top of the northeast abutment.†

F.—On the second iron bridge west of *Strawberry, Morgan County, Utah*, a square cut in the top of the southeast corner of the east abutment.†

G.—One and one-third miles west of *Morgan, Morgan County, Utah*, at mile pole 1008; a square cut in the stone culvert on the south side of the Union Pacific Railroad tracks.

H.—At *Morgan, Morgan County, Utah*, 100 yards west of the depot, in the space south of the track, halfway between the street and the track.† (Note 11.*)

I.—On the first iron bridge east of *Croydon, Morgan County, Utah*, at the foot of the "Devil's Slide"; a square cut in the top of the southeast corner of the east abutment.†

J.—At *Echo, Summit County, Utah*, south of the tracks, directly opposite the water tank, in the field halfway between the easterly section house and the white cottage of the station agent, three feet from the fence.† (Note 11.*)

Geol. Echo—At *Echo, Summit County, Utah*, at the east side of a wagon road at the south end of the main street, just under a high hill; an iron post marked with a cross, established by the United States Geological Survey.

K.—Four and one-half miles east of *Echo, Summit County, Utah*, and 4½ miles west of *Emory, Summit County, Utah;* a square cut in the northeast corner of the east abutment of an iron bridge.†

L.—At *Emory, Summit County, Utah*, in a field 100 yards south of the water tank and 50 feet north of the railroad track.† (Note 11.*)

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* See pp. 102-106.

† This bench mark is on the Union Pacific Railroad.

M.—At *Castle Rock, Summit County, Utah,* near a fence, 200 feet north of the Union Pacific Railroad tracks and directly opposite the depot. (Note 11.*)

N.—At *Wasatch, Summit County, Utah,* on the side of a hill, a little north of the road, directly behind the depot, 100 yards north of the Union Pacific Railroad tracks. (Note 11.*)

O.—A square cut in the first stone culvert west of *Wyuta, Rich County, Utah,* 200 yards west of the station sign, 25 feet south of the Union Pacific Railroad tracks.

6770 Evanston.—At *Evanston, Uinta County, Wyo.,* in the front yard of the Pacific Hotel, in the corner of the yard west of the walk, about 19 feet south of the south rail of the south track; an iron post marked 6770, established by the United States Geological Survey.†

6779 Evanston.—At *Evanston, Uinta County, Wyo.,* in the south part of the courthouse grounds, 6 feet north of the south fence, nearly in line with the east face of the courthouse; a tablet set in the top of a stone post and marked 6779, established by the United States Geological Survey.

A_6.—At *Evanston, Uinta County, Wyo.,* in the stone corner post on the southeast corner of the depot, in the east face, a few inches from the corner, and 4 feet from the ground.† (Note 57.*)

B_6.—At *Knight, Uinta County, Wyo.,* 100 yards east of the station and in line with the front of the section house, 150 paces south of the mail stand and the Union Pacific Railroad tracks. (Note 11.*)

C_6.—At *Altamont, Uinta County, Wyo.,* near the west entrance of the "Aspen Tunnel," south of the tracks, opposite a point on the track halfway between the station and the section house, about 100 yards from the track, near the right of way fence.† (Note 11.*)

D_6.—At *Springvalley, Uinta County, Wyo.,* 100 feet west of the water tank, 40 feet north of the Union Pacific Railroad tracks. (Note 11.*)

E_6.—At *Leroy, Uinta County, Wyo.,* 200 yards east of the section house, in the Union Pacific right of way south of the tracks, 2 feet from the fence, and nearly opposite the roadway which leads up the hill on the other side of the tracks. (Note 11.*)

F_6.—At *Bridger, Uinta County, Wyo.,* 200 feet northwest of mile pole 914, in the right of way, 80 feet north of the Union Pacific Railroad tracks and north of the station sign, 6 feet from the fence. (Note 11.*)

G_6.—Three miles east of *Bridger, Uinta County, Wyo.,* in a culvert at mile pole 911; a square cut in the top stone on the arch north of the tracks.†

H_6.—At *Carter, Uinta County, Wyo.,* west of the station and opposite mile pole 904; a square cut in the south-southeast base stone of the water tank.†

I_6.—At *Carter, Uinta County, Wyo.,* on the west side of the roadway leading up the hill, 400 feet north of the Union Pacific Railroad tracks, 5 feet west of a telephone pole. (Note 11.*)

J_6.—At *Elkhurst, Uinta County, Wyo.,* in the Union Pacific right of way, 150 feet north of the tracks and at a deflection angle of 45° with the tracks from a point at the east switch of the siding. (Note 11.*)

K_6.—One and two-thirds miles west of *Hampton, Uinta County, Wyo.,* in the south arch of a stone culvert; a square cut on the top of the southwest corner.†

L_6.—At *Church Buttes, Uinta County, Wyo.,* southwest of the station, 4 feet south of the second telegraph pole west of the depot, 100 feet south of the Union Pacific Railroad tracks. (Note 11.*).

M_6.—At *Church Buttes, Uinta County, Wyo.,* a square cut in the south-southwest base stone of the water tank.†

N_6.—At *Garrett, Uinta County, Wyo.,* directly opposite the station sign, 200 feet north of the tracks, about halfway between the tracks and the fence.† (Note 11.*)

O_6.—On the first iron bridge west of *Granger, Sweetwater County, Wyo.,* over Black Fork, in the northeast red sandstone abutment; a square cut on a shelf about 1 foot below the track level.†

P_6.—At *Granger, Sweetwater County, Wyo.,* 100 paces north of main tracks opposite a point 40 paces west of the west water tank.† (Note 11.*)

Y_3.—Near *Azusa, Sweetwater County, Wyo.* (See p.167.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN OGDEN, UTAH, AND POCATELLO, IDAHO, 1903.

B.—At *Ogden, Weber County, Utah.* (See p. 167.)

P.—At *Hot Springs, Boxelder County, Utah,* one-third of a mile south of mile pole 9,400 feet south of the cattle guard south of the station, in the right of way of the Oregon Short Line Railroad, 40 feet east of the tracks. (Note 11.*)

Q.—At *Willard, Boxelder County, Utah,* behind the depot and on a line with the south side of the depot, 100 feet east of the tracks and 10 feet east of the wagon road.‡ (Note 11.*)

R.—At *Brigham, Boxelder County, Utah,* 50 feet south of the second road crossing north of the station, in a field west of the tracks, inside and 2 feet from the fence, very nearly halfway between mile poles 21 and 22, and 5 or 6 feet above the level of the tracks.‡ (Note 11.*)

S.—At *Honeyville, Boxelder County, Utah,* 450 feet south of the south cattle guard and 30 feet north of the south switch, in the right of way of the Oregon Short Line Railroad, east of the tracks, 7 feet from the fence. (Note 11.*)

T.—At *Dewey, Boxelder County, Utah* (post office, Deweyville), 600 feet south of the depot, in the right of way of the Oregon Short Line Railroad, east of the tracks, 50 feet from the main tracks. (Note 11.*)

U.—At *Bear River, Boxelder County, Utah,* near the entrance to Bear River Canyon, behind the second telegraph pole north of the station sign, 75 feet west of the main tracks.‡ (Note 11.*)

* See pp. 162-166. † This bench mark is on the Union Pacific Railroad. ‡ This bench mark is on the Oregon Short Line Railroad.

V.—At *Cache Junction, Cache County, Utah,* on the foundation of the water tank, in the northernmost of the two foundation stones parallel to the tracks.† (Note 57.*)

W.—At *Cache Junction, Cache County, Utah,* opposite the north end of the long curve, between the guy-wire pole and the telegraph pole, the first pole north of mile pole 49.† (Note 11.*)

X.—At *Ransom, Cache County, Utah,* 300 feet south of the north switch of the siding, 8 feet back of the second telegraph pole south of mile pole 57, 35 paces west of the main tracks.† (Note 11.*)

Y.—In *Cache County, Utah,* about 150 feet south of the depot at *Cornish,* through which passes the State line between Utah and Idaho, in the foundation of the water tank; a square cut in the northernmost of the two foundation stones parallel to the tracks.†

A.—At *Weston, Oneida County, Idaho,* 100 feet west of the tracks and 400 feet north of the road leading to the town.† (Note 11.*)

B.—At *Dayton, Oneida County, Idaho,* in the northwest corner of a plat of ground adjacent to the station sign and mail stand, 10 feet east of the sidetrack and nearly opposite the first pole north of mile pole 71, 100 feet east of the whistle post.† (Note 11.*)

C.—At *Garner, Oneida County, Idaho,* in the foundation of the water tank; a square cut in the northernmost of the two foundation stones parallel to the tracks.†

D.—At *Garner, Oneida County, Idaho,* 135 paces west of the tracks, opposite the station sign, 10 feet from the wire fence.† (Note 11.*)

E.—Near *Oxford, Bannock County, Idaho,* in the yard of an abandoned creamery, 12 feet south of the gate, 30 paces east of the main tracks.† (Note 11.*)

F.—3.7 miles north of *Swan Lake, Bannock County, Idaho,* at mile pole 88, 1 foot north of the white fence on the north side of the first road crossing the tracks south of the hill, known as "Red Rock," in the angle made by the main right-of-way fence and the roadway fence, 100 feet east of the tracks.† (Note 11,* except that the post is set nearly flush with the ground.)

G.—At *Downey, Bannock County, Idaho,* in the southwest corner of the Commercial Hotel yard, 5 feet from the south and west fences, 100 yards east of the railway station.† (Note 11.*)

H.—At *Marsh Valley, Bannock County, Idaho,* opposite a point on the tracks 150 feet north of the station sign, 180 feet northwest of the semaphore, and 100 feet west of the tracks.† (Note 11.*)

I.—At *McCammon, Bannock County, Idaho,* opposite a point on the tracks 150 feet north of the station, 20 feet southeast of the third telephone pole north of the schoolhouse, 225 feet west of the tracks, 4 feet from the fence on the west side of the main highway.† (Note 11.*)

J.—About 1 mile north of *Onyx, Bannock County, Idaho,* near the signboard "One mile to Onyx," west of the third telegraph pole south of mile pole 197, 24 feet west of the right-of-way fence on the west side of the tracks.† (Note 11.*)

K.—At *Inkom, Bannock County, Idaho,* in the foundation of the water tank in the westernmost of the two foundation stones parallel to the tracks; a square cut in the southeast corner.†

L.—At *Inkom, Bannock County, Idaho,* near the first telegraph pole west of the station, 50 feet south of the tracks, between the guy wire and the mail pole.† (Note 11.*)

M.—At *Portneuf, Bannock County, Idaho,* 4 feet south of the telephone pole opposite the midpoint between the two east switches of the siding, 60 feet north of the tracks, 10½ feet north of the north right of way fence.† (Note 11.*)

A_3.—At *Pocatello, Bannock County, Idaho.* (See below.)

B_3.—*Pocatello, Bannock County, Idaho.* (See below.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN POCATELLO AND OWYHEE, IDAHO, 1903.

A_3.—At *Pocatello, Bannock County, Idaho,* in the south end of the railroad park east of the Oregon Short Line Railroad tracks, opposite the Oregon Short Line Hotel, about 35 feet south of the hydrant for the park, and about 12 feet from the south end fence, in line with the center row of trees. (Note 11.*)

B_3.—At *Pocatello, Bannock County, Idaho,* in the sloping surface of the white lavatic water table of the Masonic Temple, about 16 inches from the large side display window of the hardware store on the first floor of the building, about 12 feet from the northwest corner and about 18 inches above the sidewalk; a square hole lettered U. S. B. M.

C_3.—At *Pocatello, Bannock County, Idaho,* on the south end of the stone schoolhouse west of the Oregon Short Line Railroad tracks, in the sandstone water table, 6 feet from the ground and 12 feet from the southeast corner. (Note 56.*)

City.—At *Pocatello, Bannock County, Idaho,* on the rock sill of the entrance to the Pioneer Block on West Center Street.

D_3.—At *Pocatello, Bannock County, Idaho,* in the lava foundation of the county courthouse, about 30 inches east of the northwest corner, opposite the corner of Fifth and Clark Streets, about 4 inches above the surface of the ground; a square hole lettered U. S. B. M.

E_3.—At *Pocatello, Bannock County, Idaho,* in the southwest corner of the public school building east of the Oregon Short Line Railroad tracks, about 5 feet east of the southwest corner, and about 5 feet 6 inches from the ground, opposite the corner of Sixth Avenue and Clark Street. (Note 56.*)

F_3.—Four miles west of *Pocatello, Bannock County, Idaho,* on the top of the east retaining wall on the north side of the concrete abutment of a deck plate-girder bridge, the first bridge with concrete abutment west of Pocatello; 8 inches from the west edge of wall and 1 foot from the north end.† (Note 5.*)

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* See pp. 162-166. † This bench mark is on the Oregon Short Line Railroad.

G_3.—Two and one-half miles west of *Michaud, Oneida County, Idaho,* 15 feet west of the first pole east of mile pole 225, at the beginning of the first cut west of Michaud, 45 feet south of the center of the track, and 5 feet north of the railroad fence, in line with the telegraph poles.† (Note 11.*)

H_3.—At *Bannock, Oneida County, Idaho,* 4 telegraph poles west of the station sign, and 25 rails east of west switch stand, 75 feet south of the center of the track, and 25 feet south of the fence.† (Note 11.*)

I_3.—About 2½ miles east of *American Falls, Oneida County, Idaho,* between the third and fourth telegraph poles east of mile pole 237, 40 feet north from the railroad fence, 60 feet south from the center of track, and 12 feet south of line of telegraph poles.† (Note 11.*)

O. S. L.—At *American Falls, Oneida County, Idaho,* on top of southeast corner of southeast capstone of water-tank foundation.†

O. S. L.—Near *American Falls, Oneida County, Idaho,* on bridge 217, over Snake River, on southwest corner of stone abutment at east end.†

J_3.—About ¾ of a mile west of *American Falls, Oneida County, Idaho,* on the north side of the track, on the capstone of the west abutment of the Oregon Short Line Railroad bridge over Snake River, 10 inches from north end and 1 foot from east edge of sandstone cap. (Note 5.*)

K_3.—One-half mile east of *Napati, Blaine County, Idaho,* 20 feet west of mile pole 247, 50 feet south of the center of the track, and 50 feet from the fence, in line with the telgraph poles.† (Note 11.*)

L_3.—Three miles east of *Wapi, Blaine County, Idaho,* 150 feet north of the center of the track and 50 feet north of the railroad fence.† (Note 11.*)

O. S. L.—At *Wapi, Blaine County, Idaho,* on southeast corner of southeast capstone of tank foundation.†

M_3.—Three miles west of *Wapi, Blaine County, Idaho,* opposite the west end of the first curve west of Wapi, 85 feet north of the center of the track, 15 feet inside the Oregon Short Line Railroad fence. (Note 11.*)

N_3.—One mile west of *Yale* (siding), *Blaine County, Idaho,* 70 feet south of the center of the tracks, 30 feet north of the railroad fence, and 21 feet south of the line of telegraph poles.† (Note 11.*)

O. S. L.—At *Minidoka, Lincoln County, Idaho,* on southeast corner of southeast capstone, tank foundation.†

O_3.—At *Minidoka, Lincoln County, Idaho,* directly behind mile pole 273, which is also the boundary of sections 40 and 41, 4 telegraph poles west of the office pole, 54 feet south of the pole, and 100 feet south of the tracks.† (Note 11.*)

P_3.—About 6 miles west of *Minidoka, Lincoln County, Idaho,* and about 1½ miles east of *Colburn, Idaho,* opposite the second telegraph pole west of mile pole 279, about 60 feet north of the center of the tracks.† (Note 11.*)

Q_3.—Four miles west of *Colburne* and about 5 miles east of *Kimama, Lincoln County, Idaho,* 30 feet south of mile pole 284½, and 85 feet south of the center of the tracks.† (Note 11.*)

O. S. L.—At *Kimama, Lincoln County, Idaho,* on southeast corner of southeast capstone of water-tank foundation.†

R_3.—At *Kimama, Lincoln County, Idaho,* 10 rails east of the station semaphore, 120 feet south of the center of the tracks, directly behind and 65 feet south of the pole marking the boundary line between sections 42 and 43.† (Note 11.*)

S_3.—At *Senter, Lincoln County, Idaho,* 7½ poles west of mile pole 296, directly north of the station sign, 45 feet north of the center of the tracks.† (Note 11.*)

T_3.—At *Owinza, Lincoln County, Idaho,* in the foundation of the Oregon Short Line Railroad water tank, in the top of the southwest corner of the southeast white sandstone cap. (Note 5.*)

U_3.—About 4 miles west of *Owinza, Lincoln County, Idaho,* about 30 feet east of the second telegraph pole west of mile pole 308, about 9 feet south of the line of telegraph poles and about 75 feet south of the railroad tracks.† (Note 11.*)

V_3.—At *Dietrich, Lincoln County, Idaho,* directly opposite and 54 feet south of the station sign, 66 feet south of the center of the tracks, and 15 feet south of the line of telegraph poles.† (Note 11.*)

W_3.—At *Shoshone, Lincoln County, Idaho,* in the sandstone capstone of the foundation of the Oregon Short Line Railroad water tank, in the northeast corner of the interior column on the north side. (Note 5.*)

X_3.—At *Shoshone, Lincoln County, Idaho,* in the northwest corner of the courthouse yard, in line with the row of trees along the west side ,about 50 feet south of the northwest corner, and 5 feet from the fence inclosing the yard. (Note 11.*)

Y_3.—At *Shoshone, Lincoln County, Idaho,* in the red lavatic water table of the highschool building, 5 feet east of the northwest corner of the building, and 4 feet from the ground. (Note 56.*)

Z_3.—One mile east of *Tunupa, Lincoln County, Idaho,* 12 feet south of mile pole 330, opposite the station signal for Tunupa, and 70 feet south of the center of tracks.† (Note 11.*)

A_4.—At *Tunupa, Lincoln County, Idaho,* 14 rails west of the west end of the siding, 11 poles east of mile pole 332, on the first bridge west of Tunupa, a bridge of the through plate-girder type with concrete abutments and sandstone caps and steps; in a corner of the third step on the south side of the west abutment.† (Note 5.*)

B_4.—At *Gooding, Lincoln County, Idaho,* 2 rails west of the station sign, 10 feet east of the second pole west of mile pole 338, 60 feet south of center of tracks.† (Note 11.*)

C_4.—At *Fuller, Lincoln County, Idaho,* about 7 poles east of mile pole 345, 60 feet south of center of tracks, 4 feet south of the line of telegraph poles.† (Note 11.*)

D_4.—At *Bliss, Lincoln County, Idaho,* in the west end of the small railroad park west of the water tank, and nearly opposite mile pole 351, 3½ rails east of the station semaphore, and 20 feet north of the center of the main track.† (Note 11.*)

E_4.—At *Ticeska, Lincoln County, Idaho,* 4 rails east of the station sign, 45 feet east of the fifth pole east of mile pole 358 and the third pole east of the one marking the boundary line between Lincoln and Elmore counties; in line with the telegraph poles, and about 60 feet south of the center of the tracks.† (Note 11.*)

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* See pp. 162-166.

† This bench mark is on the Oregon Short Line Railroad.

F_4.—At *King Hill, Elmore County, Idaho*, 3½ rails east of the station sign, 10 feet east of the fifth pole east of mile pole 366, in line with the poles, and 40 feet south of the center of the tracks.† (Note 11.*)

G_4.—At *Glenns Ferry, Elmore County, Idaho*, in the center of the west end of the Oregon Short Line Railroad park west of the depot, about 8 feet inside of the west fence. (Note 11.*)

H_4.—At *Glenns Ferry, Elmore County, Idaho*, on the Oregon Short Line Railroad water tank, about 2 blocks south of the depot, and about halfway to the river, where the pumping plant is located; on the northwest corner of the sandstone cap of the lava foundation for the northwest pillar supporting the tank. (Note 5.*)

I_4.—About 4.6 miles west of *Glenns Ferry, Elmore County, Idaho*, about ½ pole east of mile pole 379 and 60 feet north of the center of the tracks.† (Note 11.*)

J_4.—At *Medbury, Elmore County, Idaho*, directly opposite the station sign, 135 feet north of the center of the main track and 90 feet north of the line of telegraph poles.† (Note 11.*)

K_4.—At *Chalk Spur, Elmore County, Idaho*, directly behind mile pole 391, 120 feet north of the center of the main track and 70 feet north of the line of telegraph poles.† (Note 11.*)

L_4.—Six miles east of *Mountain Home, Elmore County, Idaho*, about 33 feet west of mile pole 398, which also marks the boundary of sections 58 and 59, 150 feet north of the center of the tracks and 54 feet north of the line of telegraph poles.† (Note 11.*)

M_4.—At *Mountain Home, Elmore County, Idaho*, on the foundation of the Oregon Short Line Railroad water tank, in the southeast corner of the southeast capstone, 5 inches from the south and 5 inches from the west side. (Note 5.*) After this bench mark was established it was learned that the tank was likely to be removed within a few years.

N_4.—At *Mountain Home, Elmore County, Idaho*, in the east end of the Oregon Short Line Railroad Park, about equidistant from north and south fences and about 6 feet from east fence. (Note 11.*)

O_4.—At *Mountain Home, Elmore County, Idaho*, at the left-hand side of the Canyon Street entrance to the office of the Turner Hotel, in the sandstone water table, about 2½ feet above sidewalk and 8 inches from corner of stone. (Note 56.*)

P_4.—About 5½ miles west of *Mountain Home, Elmore County, Idaho*, about 20 feet west of the first pole east of mile pole 409½, about 60 feet north of the center of the tracks, in line with the telegraph poles.† (Note 11.*)

Q_4.—At *Cleft, Elmore County, Idaho*, opposite the station sign, 1 pole west of mile pole 415, 120 feet south of the tracks.† (Note 11.*)

R_4.—About 3 miles east of *Orchard, Ada County, Idaho*, on a concrete culvert, about 3½ poles east of mile pole 422, about 1 foot from the retaining wall and 1 foot from the edge of the abutment.† (Note 5.*)

S_4.—About 2½ miles west of *Orchard, Ada County, Idaho*, 5 feet south of mile pole 428, 55 feet north of the center of the tracks, and south of Orchard Farm fence.† (Note 11.*)

T_4.—About 1 mile east of *Owyhee, Ada County, Idaho*, 5 feet north of mile pole 436, and about 45 feet south of the center of the tracks.† (Note 11.*)

U_4.—Three-fourths of a mile east of *Owyhee, Ada County, Idaho*, in the capstone of the south end of the east abutment of an Oregon Short Line Railroad bridge, about 14 inches from end of stone and equidistant from the sides. (Note 5.*)

V_4.—At *Owyhee, Ada County, Idaho*, 3 poles east of the station sign, 10 feet west of mile pole 437, 60 feet south of the center of the tracks, in line with the telegraph poles.† (Note 11.*)

W_4.—At *Owyhee, Ada County, Idaho*, in the surface of the southwest corner of the capstone for the southwest column supporting the Oregon Short Line Railroad water tank, about 3 inches from the south edge and 4 inches from the west edge of the stone. (Note 5.*)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN HOLLAND AND NEW BRAUNFELS, TEX., 1903–4.

X_4.—At *Holland, Tex.* (Appendix 3, Report for 1903, p. 791.)

Z_4.—At *Holland, Tex.* (Appendix 3, Report for 1903, p. 792.)

W_4.—Near *Holland, Tex.* (Appendix 3, Report for 1903, p. 791.)

A_5.—About three-fourths mile north of *Bartlett, Williamson County, Tex.*, on the line of the Missouri, Kansas & Texas Railway, about 20 feet south of mile pole 902, on the west side of the track, 6 feet east of a telegraph pole and 3 feet east of the barbed wire fence. (Note 11.*)

B_5.—At *Granger, Williamson County, Tex.*, in the southwest corner of the yard of the house of Charles Shoemaker, corner of Commerce and Ash Streets; 2½ feet northeast of the picket fences surrounding the yard and about 140 feet east of the track of the Missouri, Kansas & Texas Railway. (Note 11.*)

C_5.—At *Granger, Williamson County, Tex.*, at the northeast corner of the main entrance to the building of the First National Bank of Granger; a copper bolt, unlettered, leaded vertically in the top of the triangular limestone step, about 6 millimeters below the wearing surface.

D_5.—About two-fifths mile north of *Circleville, Williamson County, Tex.*, on the line of the Missouri, Kansas & Texas Railway, about 60 meters south of the south abutment of the railway bridge over the San Gabriel Creek; at the railroad water tank, about 2 meters west of the track; the bottom of a square hole, 1 by 1 by ¼ inch deep, in the top of the sandstone base of the southeast column, which is 3 feet square and 2½ feet high above ground.

E_5.—At *Taylor, Williamson County, Tex.*, in the grass plot or gore park east of the station of the International & Great Northern Railroad; 25.5 meters east from the east wall of the station and 17.8 meters north from the center of the track nearest the station. (Note 11.*)

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* See pp. 162–166.

† This bench mark is on the Oregon Short Line Railroad.

F_5.—At *Taylor, Williamson County, Tex.*, in the south wall of the Taylor National Bank, corner of Main and Second Streets, a brick building, with first story granite; 20 feet west of the east entrance; in the wall, 2½ feet above the sidewalk. (Note 57.*)

526 Coupland.—A United States Geological Survey bench mark at *Coupland, Williamson County, Tex.*, opposite the station, 50 feet east of main track of Missouri, Kansas & Texas Railway and 5 feet east of the southwest corner of the fence inclosing the section-house yard; an iron post, marked 526.

G_5.—About one-fourth mile south from *Coupland, Williamson County, Tex.*, on the line of the Missouri, Kansas & Texas Railway, 9½ rails north from mile pole 927; opposite the south end of the first switch west of the main track, about 35 feet west of the main track and 4 feet east of the right-of-way fence. (Note 11.*)

576 S. A.—A United States Geological Survey bench mark at *Elgin, Bastrop County, Tex.*, at Union passenger station, 7 feet east of the southeast corner of a small park, 115 feet east of the crossing of the Missouri, Kansas & Texas Railway and the Houston & Texas Central Railroad, 20 feet north of Houston & Texas Central Railroad main track; an iron post, marked 576 S. A.

K_5.—At *Littig, Travis County, Tex.*, in the southwest corner of the yard of section house 115, almost opposite the east end of the switch and about 8 meters north of the main track of the Houston & Texas Central Railroad; about 1.2 meters north and east, respectively, of the south and west fences bounding the yard. (Note 11.*)

L_5.—At *Manor, Travis County, Tex.*, in the front wall of the brick building facing on the main street of the town, owned by Mr. Harris and occupied by W. H. Richardson, hardware and general merchandise; the center of a cross cut in the face of a copper bolt, unlettered, leaded horizontally into the street facing of the west wall of the building, about 1.4 meters above the sidewalk and about 0.6 meter west of the show window.

M_5.—About 445 meters west of the Houston & Texas Central Railroad depot at *Daffan, Travis County, Tex.*, about 56 meters west of the first cattle guard west of the station; about 1 meter south of the line of telegraph poles and about 7 meters north of the main track. (Note 11.*)

N_5.—About 5½ miles east of the Houston & Texas Central Railroad passenger depot, at *Austin, Travis County, Tex.*, on the west stone abutment of the railway bridge over Walnut Creek; in the top layer of the backing; 1.35 meters north of the main track; the top of a copper bolt leaded vertically into the top of the stone, 0.18 meter west of the east edge, and roughly lettered U. S. B. M.

O_5.—At *Austin, Travis County, Tex.*, in the Driskill Hotel building, corner of Brazos and Sixth Streets; the top of a copper bolt, unlettered, leaded vertically into the top of the limestone step to the first door west of the entrance to the American National Bank; about 1.2 meters from the door and 0.5 meter from the wall.

P_5.—At *Austin, Travis County, Tex.*, in the passenger depot of the Houston & Texas Central Railroad, corner of Congress Avenue and East Third Street; in the south wall, bay projection, just west of the large door of the general truck or baggage room; in the face of the wall about 1.75 meters from the ground and 0.2 meter from the inside corner. (Note 4.*)

Geol. Austin.—A United States Geological Survey bench mark at *Austin, Travis County, Tex.*, in the freight yard of the Houston & Texas Central Railroad, 60 meters west of the office door of the freight depot; an iron post close to a telegraph pole and 5 meters north of the northernmost track.

North Meridian Mark.—At *Austin, Travis County, Tex.*, on Capitol Hill; a cross on the copper bolt in the center of the top of the square stone pillar marking the north end of the meridian line established in 1872.

508 Austin.—A United States Geological Survey bench mark at *Austin, Travis County, Tex.*, on the southwest corner of the post office, facing Colorado Street. (Note 17.*)

476 Austin.—A United States Geological Survey bench mark at *Austin, Travis County, Tex.*, on the highway bridge over Colorado River, in the west end of the south rock pier; a copper bolt, marked 476 feet.

Barton△.—About 6 miles W. 19° N. of *Austin, Travis County, Tex.*, on the north side of the Austin and Bee Caves road, on very rough ground, upon a prominent wooded hill, abreast and north of the 8-mile post from Austin. The station mark is a 2-inch iron pipe embedded in and filled with concrete, with a nail projecting from the concrete. The bench mark is a chisel mark on the rim of the iron pipe.

H_5.—At *Elgin, Bastrop County, Tex.*, on the east side of the station of the Missouri, Kansas & Texas Railway and the Houston & Texas Central Railroad, in the brick wall of the bay projection, 4 feet above the ground, 4 inches above the base of the bay window toward the Missouri, Kansas & Texas Railway track, and 2 feet south of the window along the wall. (Note 4.*)

I_5.—About 1¼ miles south of the station at *Elgin, Bastrop County, Tex.*, on the line of the Missouri, Kansas & Texas Railway, about 15 feet south from mile pole 936, and 3 feet inside of the west right-of-way fence. (Note 11.*)

J_5.—About one-half mile north of the freight shed or station at *Sayers (Sayersville post office), Bastrop County, Tex.*, on the line of the Missouri, Kansas & Texas Railway, about 130 feet north of mile pole 943, 5 feet inside the east right-of-way fence. (Note 11.*)

Q_5.—About 1⅜ miles south of *Sayers (Sayersville P. O.), Bastrop County, Tex.*, on the line of the Missouri, Kansas & Texas Railway, on a large concrete culvert, about 140 meters north of a public road crossing; in the concrete of the culvert in the south corner of the east end, about 0.1 meter from each of the two edges of the corner of the culvert. (Note 4.*)

449 S. A.—A United States Geological Survey bench mark, about 1½ miles south of *Sayers (Sayersville P. O.), Bastrop County, Tex.*, and 8¾ miles north of Bastrop, 4½ telegraph poles south of mile pole 945, 5 feet east of the northwest corner of the right-of-way fence at the public road crossing; an iron post, marked 449 S. A.†

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* See pp. 162-166.

† This bench mark is on the Missouri, Kansas & Texas Railway.

R_5.—About 4 miles north of *Bastrop, Bastrop County, Tex.*, along the line of the Missouri, Kansas & Texas Railway, about 70 meters south of mile pole 950; a stone post in the line of telegraph poles, 8.5 meters east of the track and about 6.5 meters west of barbed-wire fence bounding the right of way. (Note 11*, except that the post is but 3 feet long and projects 3 inches.)

460 S. A.—A United States Geological Survey bench mark, 4½ miles north of *Bastrop, Bastrop County, Tex.*, at the crossing of the Bastrop and Elgin public road, 3 feet outside of the southeast corner of the right-of-way fence; an iron post, marked 460 S. A.†

365 S. A.—A United States Geological Survey bench mark, 1.66 miles north of *Bastrop, Bastrop County, Tex.*, at the northeast end of the east rock pier of the bridge over Piney Creek; a copper bolt, marked 365 S. A., in the top of the coping.†

372 Bastrop.—A United States Geological Survey bench mark at *Bastrop, Bastrop County, Tex.*, 100 feet southwest of the freight depot and 50 feet south of the Bastrop and Lagrange County road; an iron post, marked 372.†

Geol. Bastrop.—A United States Geological Survey bench mark at *Bastrop, Bastrop County, Tex.*, in the northeast part of the courthouse grounds, close to the iron fence on the north side of the grounds, and about 15 meters east of the pathway leading to the main entrance to the courthouse; a bronze tablet in the top of a square stone post. The post had been pulled up and reset since it was established.

377 Bastrop.—A United States Geological Survey bench mark at *Bastrop, Bastrop County, Tex.*, at the northwest side of the main entrance to the courthouse; a bronze tablet set in the brick wall, marked 377.

S_5.—At *Bastrop, Bastrop County, Tex.*, on the east side of the county jail, about 1.6 meters south of the northeast corner, and 1.2 meters above the ground; in the plaster-covered brick wall, 0.85 meter north of the window on the east side of the building nearest the northeast corner, and about 0.1 meter below the level of the window sill. (Note 4.*)

T_5.—About 2 miles south of *Bastrop, Bastrop County, Tex.*, on the north stone abutment of the Missouri, Kansas & Texas Railway bridge over Colorado River, 1.2 meters west of main track and 0.3 meter below the top of the rails, in the top of the rough plaster-covered stone wall which forms the backing for the abutment. (Note 4.*)

359 Hills Prairie.—A United States Geological Survey bench mark at *Hills Prairie, Bastrop County, Tex.*, 28 feet east of the south head block, near the right-of-way fence; an iron post, marked 359.†

U_5.—About 2 miles north of *Upton, Bastrop County, Tex.*, on the south stone abutment of the Missouri, Kansas & Texas Railway bridge over Cedar Creek, on the southwest corner; the bottom of a square hole, 1¼ inches square and ¼ inch deep, cut in the top stone, about 0.11 meter from the north and east edges, lettered U. S. B. M.

349 Upton.—A United States Geological Survey bench mark at *Upton, Bastrop County, Tex.*, about 45 feet east of the head block at the south end of the switch, near the right-of-way fence; an iron post, marked 349.†

V_5.—About 1⅓ miles south of *Upton, Bastrop County, Tex.*, on the line of the Missouri, Kansas & Texas Railway, about 420 meters north of mile pole 964; a stone post in the line of telegraph poles on the east side of the track, about midway between the track and the right-of-way fence. (Note 11.*)

329 Smithville.—A United States Geological Survey bench mark at *Smithville, Bastrop County, Tex.*, 10 feet east of the second telegraph pole south of mile pole 969, also the second telegraph pole north of the station; an iron post, marked 329.†

W_5.—At *Smithville, Bastrop County, Tex.*, in the brick building on Main Street owned by Ed. Eagleston and occupied by the American Express Co., in the partition wall between the express office and a barber shop, in a slight recess, 0.22 meter from either edge of the protruding wall and 1.13 meters above the pavement. (Note 4.*)

X_5.—At *Smithville, Bastrop County, Tex.*, in the brick building of the Bank of Smithville, corner of Main and Second Streets, in the wall, 1.2 meters above pavement and 0.5 meter from the edge of the wall at the window on Second Street. (Note 4.*)

Y_5.—At *Smithville, Bastrop County, Tex.*, in the Masonic Building (of brick), corner of Main and Third Streets; the bottom of a square hole, unlettered, cut in the concrete ledge to the window on Third Street, 0.15 meter from the edge of the corner brick pillar and 0.12 meter from the window.

433 S. A.—A United States Geological Survey bench mark about 3⅓ miles west of *Smithville, Bastrop County, Tex.*, about ¼ mile east of mile pole 972, 25 feet northwest of a road crossing; an iron post, marked 433 S. A. Reported in very poor condition in 1904.†

460 S. A.—A United States Geological Survey bench mark about 4½ miles west of *Smithville, Bastrop County, Tex.*, near the second telegraph pole east of mile pole 974, 65 feet northeast of the road crossing; an iron post in a corner of the fence, marked 460 S. A.†

Z_5.—Near *Rosanky, Bastrop County, Tex.*, in the right of way of the Missouri. Kansas & Texas Railway, 103 meters east of mile post 977 and 48 meters west of a road crossing, in the line of telegraph poles on the south side of the track. (Note 11.*)

512 S. A.—A United States Geological Survey bench mark, 120 yards west of the railroad station at *Rosanky, Bastrop County, Tex.*, 50 feet south of the crossing of the Rosanky and Jeddo public road; an iron post, marked 512 S. A.†

451 S. A.—A United States Geological Survey bench mark, ¼ mile east of the section house at *Hemkens, Bastrop County, Tex.*, 4 miles west of Rosanky and 6 miles east of Red Rock, 45 feet southwest of the settlement road crossing and about halfway between mile poles 983 and 984; an iron post, marked 451 S. A.†

T. B. M. 117.—Just west of *Hemkens, Bastrop County, Tex.*, the bottom of a square hole cut on the red rock base to the column at the northwest corner of the old water tank.†

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* See pp. 162–166.

† This bench mark is on the Missouri, Kansas & Texas Railway.

A_6.—About ¾ mile west of *Hemkens, Bastrop County, Tex.*, on the right of way of the Missouri, Kansas & Texas Railway, 282 meters west of a water tank near mile pole 984, in a red sandstone culvert, in the northwest corner of the side north of the track, 0.37 meter from the north and west edges. (Note 56.*)

491 S. A.—A United States Geological Survey bench mark at *Red Rock, Bastrop County, Tex.*, 1200 feet southeast of the passenger station on the Lockhart branch of the Missouri, Kansas & Texas Railway, 125 feet south of the track at the intersection of the Waelder and Red Rock and the Red Rock and Rosanky public roads; an iron post, marked 491 S. A. Reported unstable in 1904.

B_6.—At *Bateman, Bastrop County, Tex.*, on the San Antonio branch of the Missouri, Kansas & Texas Railway; 18.6 meters northeast of the signboard "Bateman," and about 18 meters south of Red Rock-Taylorville road and railroad crossing; 4.87 meters from the middle of the south rail, 3.3 meters from the line of telegraph poles; the top of a copper bolt leaded vertically in an outcrop of red sandstone, 1.5 meters long by 0.4 meter wide, by 0.2 meter high, with the letters U. S. cut in the stone below the bolt.

C_6.—Three-fourth mile east of *Dale, Caldwell County, Tex.*, on the right of way of the Missouri, Kansas & Texas Railway, on a red sandstone culvert, 2.3 meters east of mile pole 997; the top of a copper bolt leaded vertically into the center of the top of the upper southwest corner stone, 0.25 meter from the south and west edges of the culvert, roughly lettered U. S. B. M.

D_6.—Two and a half miles east of *Lockhart, Caldwell County, Tex.*, on the right of way of the Missouri, Kansas & Texas Railway, in the west limestone pier of the bridge over Plum Creek; the bottom of a square hole, unlettered, cut in the northwest corner of the top of the southernmost topstone, 0.2 meter from the joint, 0.1 meter from the west edge, and 0.9 meter south of the south rail of the track.

Geol. Lockhart.—A United States Geological Survey bench mark at *Lockhart, Caldwell County, Tex.*, 30 feet south of the track of the Missouri, Kansas & Texas Railway, 200 feet west of the transfer track of the San Antonio & Aransas Pass Railway, and 40 feet west of the road; an iron post. Reported slightly loose in 1904.

E_6.—At *Lockhart, Caldwell County, Tex.*, on the county courthouse; in the east wall, about 1.2 meters from the northeast corner and about 1.2 meters above the ground; about 0.52 meter south of the granite corner stone, and 0.14 meter above the layer of red sandstone; a cross cut in the face of a copper bolt, leaded horizontally into a block of limestone dressed ready for lettering, but not lettered.

F_6.—At *Lockhart, Caldwell County, Tex.*, in the Eugene Clark Library building, about 0.42 meter north of the southeast corner of the front wall of the building, and about 1.2 meters from the ground; a cross in the face of a copper bolt, leaded horizontally into the limestone window ledge, lettered U S C.

G_6.—About ½ mile west of the Missouri, Kansas & Texas Railway depot at *Lockhart, Caldwell County, Tex.*, about 100 meters west of the westernmost switch in the yards, in the line of telegraph poles on the railway right of way, south of the track. (Note 11.*)

Geol. Clear Fork.—A United States Geological Survey bench mark, 400 feet east of the spur at *Clear Fork, Caldwell County, Tex.*, 25 feet north of the center of the track and 50 feet south of the San Marcos and Lockhart road crossing; an iron post. Reported very slightly loose in 1904.†

Geol. Maxwell.—A United States Geological Survey bench mark at *Maxwell, Caldwell County, Tex.*, 30 feet south of the center of the main track, directly in front of the station; an iron post.†

H_6.—About 1¼ miles west of *Maxwell, Caldwell County, Tex.*, 38 meters west of milepole 1014, on the right of way of the Missouri, Kansas & Texas Railway; 10 meters south of track. (Note 11.*)

100 S. A.—A United States Geological Survey bench mark about ⅝ mile west of *Reedville, Caldwell County, Tex.*, 10 feet west of the ninth telegraph pole east of milepole 1018, 40 feet south of the track and 30 feet east of the wagon road; an iron post marked 100 S. A.†

I_6.—At *San Marcos, Hays County, Tex.*, opposite the freight depot of the International & Great Northern Railroad and just south of the track; in the middle of the southeast face of the octagonal limestone base (3 meters high) of the steel water tank, 1 meter above the ground. (Note 4.*)

J_6.—At *San Marcos, Hays County, Tex.*, at the east entrance of the courthouse, in the face of the corner pillar of dressed limestone, about 1.5 meters north from the entrance and 1.5 meters above the ground. (Note 4.*)

K_6.—At *San Marcos, Hays County, Tex.*, in the building of the Glover National Bank, in the top of the limestone ledge step below the window at the left of the entrance, in the center of the step. (Note 4.*)

585 San Marcos.—A United States Geological Survey bench mark near *San Marcos, Hays County, Tex.*, on the International & Great Northern Railroad bridge over San Marcos River, in the west end of the north rock pier; a copper bolt, marked 585 feet.

L_6.—2.8 miles east of *Hunter, Comal County, Tex.*, 25 meters east of milepole 214, on the right of way of the International & Great Northern Railroad, 6 meters south from the track. (Note 11.*)

627 Yorks.—A United States Geological Survey bench mark near *Hunter, Comal County, Tex.*, on the International & Great Northern Railroad bridge over Yorks Creek, near milepole 219, in the top of the west end of the north rock p er; copper bolt, marked 627 feet.

M_6.—1 mile west of *Hunter, Comal County, Tex.*, 210 meters east of milepole 218, opposite post with sign "Hunter, 1 mile," 4.5 meters east of a crossing, on the right of way of the International & Great Northern Railroad. (Note 11.*)

N_6.—200 meters east of *Goodwin, Comal County, Tex.*, opposite the switch block at the east end of the siding, on the right of way of the International & Great Northern Railroad, 16 meters north of the track. (Note 11.*)

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* See pp. 162-166. † This bench mark is on the Missouri, Kansas & Texas Railway.

695 S. A.—A United States Geological Survey bench mark at *Goodwin, Comal County, Tex.*, opposite the station, in the right of way of the International & Great Northern Railroad, 50 meters north of milepole 223 and 12 meters east of the track; an iron post, marked 92 S. A. 695 feet.

T_6.—In *Guadalupe County, Tex.*, about 4 miles southeast of *New Braunfels* on the New Braunfels-Seguin highway, about 10 meters east from the center of the road, in the northwest corner of the front yard of Gottfried Janer, 1 meter from both the north and west yard fences. (Note 11.*)

Seguin West Base △.—6½ miles from *New Braunfels, Comal County, Tex.*, 1100 meters west of the Seguin-New Braunfels road and about 400 meters east of Guadalupe River, on a small hill covered with scattering mesquite brush, on the land of Henry Steinman. The base monument is a limestone block set in concrete and carrying on its top surface a bronze station mark, 80 millimeters in diameter, with an inner circle, countersunk, 37 millimeters in diameter, and the letters "U. S. C. & G. S." cast on the space between the inner and outer circles. The center of the inner circle is the bench mark.

Seguin East Base △.—Near *Seguin, Guadalupe County, Tex.*, about 2 miles northwest of Von Beckman's store and gin, 1050 meters east of the main road between Van Beckman's and New Braunfels, on the land of Henry Soefje, at the western edge of the live oak timber. The monument and mark are similar to those at Seguin West Base △.

O_6.—1.35 miles east of *New Braunfels, Comal County, Tex.*, in the top of the northeast limestone pier of the bridge of the International & Great Northern Railroad, over Guadalupe River; the bottom of a square hole, unlettered, 0.2 meter from the east edge and 0.6 meter from the north edge of the pier.

638 Comal.—A United States Geological Survey bench mark near *New Braunfels, Comal County, Tex.*, on the International & Great Northern Railroad bridge over Comal Dry Creek, in the top of the north end of the east rock pier; a copper bolt, marked 638 feet.

P_6.—At *New Braunfels, Comal County, Tex.*, on the Opera House (of yellow brick) owned by Louis and Otto Seekatz, about 1.4 meters from the sidewalk, at the base of the window just to the left of the entrance on San Antonio Street. (Note 56.*)

Q_6.—At *New Braunfels, Comal County, Tex.*, in the Comal County prison, at the left of the entrance to the building (of limestone), in the face of the square corner limestone pillar, about 1.5 meters above the sidewalk. (Note 56.*)

R_6.—At *New Braunfels, Comal County, Tex.*, in the square park at the intersection of San Antonio and Seguin Streets, in the northwest part, about 8 meters west of the center line of San Antonio Street, and 20 meters north of the center line of Seguin Street. (Note 11.*)

S_6.—At *New Braunfels, Comal County, Tex.*, in the courthouse (of limestone), in the top of the low limestone wall, top-dressed, at the right of the steps leading to the side entrance on San Antonio Street; the bottom of a square hole, 3 centimeters square and 0.6 centimeter deep, lettered "U. S. C. & G. S."

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN OWYHEE, IDAHO, AND HUNTS JUNCTION, WASH., 1904.

V_4.—At *Owyhee, Ada County, Idaho*.—See page 171 of this publication.

W_4.—At *Owyhee, Ada County, Idaho*.—See page 171 of this publication.

X_4.—Three miles east of *Mora, Ada County, Idaho*, on the railroad right of way, 1 telegraph pole east of mile pole 442, 30 meters south of the track, on a limestone post.† (Note 11.*)

Y_4.—At *Mora, Ada County, Idaho*, directly opposite station sign, 2 poles west of mile pole 445, about 22 meters south of the center of the track, on the railroad right of way, on a lava stone post.† (Note 16.*)

Z_4.—About 1 mile west of *Mora, Ada County, Idaho*, 8½ telegraph poles east of mile pole 446 and 4 meters north of the track; in the top of the capstone of a red sandstone culvert, 7.5 centimeters from the north edge and 7.5 centimeters from the west edge.† (Note 16.*)

A_5.—About 2 miles west of *Kuna, Ada County, Idaho*, 20 meters east of mile pole 451, in an offset of the west abutment of bridge 222, south of the track; 35 centimeters from the east edge and 30 centimeters from the south edge.† (Note 16.*)

B_5.—Nearly 2½ miles west of *Kuna, Ada County, Idaho*, 4½ poles east of mile pole 451½, in the right of way, about 18 meters south of the center of the track and about 1 meter south of the line of telegraph poles, on a lava stone post.† (Note 16.*)

C_5.—About 3½ miles west of *Kuna, Ada County, Idaho*, on the railroad right-of-way, 2 poles east of mile pole 452½ and about 3 meters south of the center of the track in the native rock of a deep lava cut, about 0.7 meter above the ground.† (Note 14.*)

D_5.—About 4 miles east of *Nampa, Canyon County, Idaho*, 3 poles east of mile pole 455, on the right of way, about 27 meters south of the center of the track and about 0.7 meter from the fence, on a sandstone post.† (Note 11.*)

O. S. L.—At *Nampa, Canyon County, Idaho*, east of the station, near mile pole 459, the top of the southeast corner of the southeast capstone supporting a column of the water tank.†

E_5.—At *Nampa, Canyon County, Idaho*, in the west end of the Dewey Palace Hotel lawn, about 4.5 meters from the sidewalk along the west end of the lawn and equidistant from the walks along the sides of the lawn, on a lava stone post. (Note 11.*)

F_5.—At *Nampa, Canyon County, Idaho*, in the west face of the Citizens' State Bank building (of brick), about 25 centimeters from the southwest corner. (Note 4.*)

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* See pp. 162-166.

† This bench mark is on the Oregon Short Line Railroad.

G_5.—At *Nampa, Canyon County, Idaho*, in the north face of the brick building occupied by the Tuttle Mercantile Co., 0.9 meter from the northeast corner of the building and 1 meter above the ground. (Note 4.*)

H_5.—At *Nampa, Canyon County, Idaho*, in the east face of the brick building occupied by Leeson Furniture Co., 0.2 meter from the northeast corner and 1 meter above the ground. (Note 4.*)

I_5.—At *Nampa, Canyon County, Idaho*, in the brick depot of the Oregon Short Line Railroad, in the top of the lower step at the women's entrance facing the track, 0.15 meter from the west edge and 0.20 meter from the north edge of the step. (Note 16.*)

J_5.—Near *Nampa, Canyon County, Idaho*, opposite the eighth telegraph pole west of mile pole 462, about 5 meters north of the track, in the top of a red sandstone culvert, 0.3 meter from the west edge and 0.15 meter from the north edge of the capstone.† (Note 16.*)

K_5.—About 5 miles west of *Nampa, Canyon County, Idaho*, at mile pole 464, on the railroad right of way, about 18 meters south of the center of the track on a sandstone post.† (Note 11.*)

L_5.—Three-fourths of a mile east of *Caldwell, Canyon County, Idaho*, south of the track, in the west abutment of a bridge, 0.3 meter from the east edge and 0.3 meter from the south edge.† (Note 5.*)

M_5.—At *Caldwell, Canyon County, Idaho*, in the brick building occupied by Baker Bros.' grocery, in the face of the west wall, 6 meters from the northwest corner of the building and 1.2 meters above the ground. (Note 4.*)

N_5.—At *Caldwell, Canyon County, Idaho*, in the brick building occupied by the Steunenberg Banking & Trust Co., in the face of the west wall, about halfway between the north and south corners of the building and 1.2 meters above the sidewalk. (Note 4.*)

O_5.—At *Caldwell, Canyon County, Idaho*, in the brick building occupied by the Saratoga Hotel, in the limestone step of the first door south of the northeast corner of the building, about 0.15 meter from the east edge and 0.1 meter from the south edge. (Note 16.*)

P_5.—At *Caldwell, Canyon County, Idaho*, in the brick building occupied by the First National Bank, in the east wall of the building, 0.6 meter from the southeast corner and 1.2 meters from the ground. (Note 4.*)

Q_5.—One mile west of *Caldwell, Canyon County, Idaho*, 10 meters east of mile pole 469, on the railroad bridge over the Boise River, south of the track, in the top of the west abutment, 0.2 meter from the east edge and 0.2 meter from the south edge.† (Note 16.*)

R_5.—About 2½ miles west of *Caldwell, Canyon County, Idaho*, 5 poles west of mile pole 470½, south of the track, in the offset of the west abutment (of concrete) of bridge 312, 0.3 meter from the south edge and 0.3 meter from the east edge of the abutment.† (Note 16.*)

S_5.—Near *Notus, Canyon County, Idaho*, 3¾ poles west of mile pole 475, in the top of the west wall of a culvert of concrete, 8 meters south of the track, 0.1 meter from the east edge and 0.1 meter from the south edge.† (Note 16.*)

T_5.—About 2 miles west of *Notus, Canyon County, Idaho*, 1 pole west of mile pole 477, 45 meters north of the track, in the southwest corner of the ranch of Asa Anderson, 2.4 meters east of a telephone pole and 6 meters north of the road on a sandstone post.† (Note 11.*)

U_5.—About 2 miles east of *Parma, Canyon County, Idaho*, 4½ poles west of mile pole 481, 6 meters north of the track, in the top of the east wall of the sandstone culvert, 0.1 meter from the north edge and 0.1 meter from the west edge.† (Note 16.*)

O. S. L.—Near *Parma, Canyon County, Idaho*, 1.5 meters west of mile pole 483, section 70, on the right of way, 15 meters south of the track; the top of an iron rod sunk in a concrete bed, projecting 5 centimeters above the ground.†

V_5.—About 2 miles west of *Parma, Canyon County, Idaho*, 4½ poles east of mile pole 485, in the west wall of a sandstone culvert north of the track, 0.2 meter from the east edge and 0.2 meter from the north edge.† (Note 16.*)

W_5.—In *Canyon County, Idaho*, about 3 miles east of *Nyssa, Malheur County, Oreg.*, 6½ poles north of mile pole 487½, on the railroad right of way, 30 meters west of the track, 3 meters north of the road, and 3 meters east of the fence, on a sandstone post.† (Note 11.*)

X_5.—In *Canyon County, Idaho*, about 1¾ miles south of *Nyssa, Malheur County, Oreg.*, in the north (sandstone) abutment of bridge 327 of the Oregon Short Line Railroad over the Boise River; in the top of the offset east of the track, 0.1 meter from the south edge and 0.1 meter from the east edge. (Note 16.*)

F.—About 1 mile south of *Nyssa, Malheur County, Oreg.*, in the north abutment of bridge 328 of the Oregon Short Line Railroad over Snake River; in the sandstone offset east of the track, 0.2 meter from the south edge and 0.25 meter from the east edge. (Note 5.*)

G.—At *Nyssa, Malheur County, Oreg.*, in the capstone (sandstone) of the northeast pillar of the railroad water tank, 0.1 meter from the north edge and 0.1 meter from the east edge.† (Note 16.*)

H.—About 2 miles north of *Nyssa, Malheur County, Oreg.*, on the railroad right of way, opposite mile pole 493, 27 meters east of the track, on a sandstone post.† (Note 11.*)

I.—About 4 miles south of *Ontario, Malheur County, Oreg.*, in the north abutment of bridge 331 of the Oregon Short Line Railroad, 6½ poles south of mile pole 497, 0.2 meter from the west edge, and 0.2 meter from the south edge of the offset, in concrete. (Note 16.*)

J.—About 5 miles south of *Ontario, Malheur County, Oreg.*, one-half pole south of mile pole 496, in a limestone culvert of the Oregon Short Line Railroad, about 6 meters east of the track, 0.07 meter from the east edge, and 0.1 meter from the north edge of the culvert. (Note 16.*)

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* See pp. 162–166. † This bench mark is on the Oregon Short Line Railroad.

2143 H.—At *Ontario, Malheur County, Oreg.*, at the corner of Main Street and the street leading to the railroad station, 3.6 meters east of the northeast corner, at the Carter House. (Note 18.*)

K.—At *Ontario, Malheur County, Oreg.*, in the west face of the brick building of the Carter House, 1 meter north of the side door, and 1.5 meters above the ground. (Note 4.*)

L.—At *Ontario, Malheur County, Oreg.*, in the north face of the brick building occupied by the Oregon Forwarding Co., 1.5 meters east (?) of the northeast corner, and 1.5 meters above the ground. (Note 4.*)

M.—At *Ontario, Malheur County, Oreg.*, in the south face of the brick building occupied by Griffin & Staples's dry goods store, 1 meter west of the southeast corner, and 1.5 meters above the ground. (Note 4.*)

N.—About 1 mile north of *Ontario, Malheur County, Oreg.*, in the top of the north abutment of bridge 334 of the Oregon Short Line Railroad over Malheur River, in the top of the sandstone offset, west of the track, 0.35 meter from the west edge, and 0.4 meter from the south edge. (Note 16.*)

Y_5.—Near *Payette, Canyon County, Idaho*, about 1¾ miles north of *Ontario, Malheur County, Oreg.*, in the north abutment of bridge 335 of the Oregon Short Line Railroad over the Snake River, east of the track in the sandstone offset, 0.3 meter from the south edge, and 0.35 meter from the east edge. (Note 5.*)

2139 H(1).—2.2 miles south of *Payette, Canyon County, Idaho*, on the right of way of the Oregon Short Line Railroad, 85 meters south of mile pole 503, 3 meters east of the track. (Note 18.*)

Z_5.—About two-fifths mile south of *Payette, Canyon County, Idaho*, in the north abutment of bridge 338 of the Oregon Short Line Railroad over the Payette River, east of the track, in the sandstone offset, 0.35 meter from the east edge, and 0.45 meter from the south edge. (Note 16.*)

A_6.—At *Payette, Canyon County, Idaho*, in the sandstone capstone of the middle pillar on the west side of the railroad water tank, 0.1 meter from the west edge, and 0.1 meter from the south edge.† (Note 16.*)

B_6.—At *Payette, Canyon County, Idaho*, in the north wall of the brick building occupied by the Moss Mercantile Co., 1.2 meters from the ground, and 1.2 meters west of the northeast corner. (Note 4.*)

C_6.—At *Payette, Canyon County, Idaho*, in the north wall of the brick building occupied by the First National Bank, 1.2 meters above the ground, and 1.2 meters west of the northeast corner. (Note 4.*)

2139 H(2).—0.9 mile north of *Payette, Canyon County, Idaho*, on the right of way of the Oregon Short Line Railroad, 8 meters south of mile pole 506, at the fence line west of the track. (Note 18.*)

2123 H.—In *Canyon County*, 2.6 miles south of *Crystal, Washington County, Idaho*, on the right of way of the Oregon Short Line Railroad, at the first telegraph pole north of mile pole 509, west of the track. (Note 18.*)

D_6.—About 2.6 miles south of *Crystal, Washington County, Idaho*, 4 poles north of mile pole 509, in a sandstone culvert, east of the track, 0.2 meter from the east edge, and 0.15 meter from the south edge.† (Note 16.*)

2112 H.—6.3 miles south of *Weiser, Washington County, Idaho*, on the right of way of the Oregon Short Line Railroad, at the first telegraph pole south of mile pole 512, west of the track. (Note 18.*)

E_6.—About 3½ miles south of *Weiser, Washington County, Idaho*, 6 poles south of mile pole 515, in the south abutment of bridge 342, in the offset west of the track, 0.2 meter from the west edge, and 0.12 meter from the north edge.‡ (Note 16.*)

2113 H.—3.3 miles south of *Weiser, Washington County, Idaho*, on the right of way of the Oregon Short Line Railroad, 1.2 meters north of mile pole 515, west of the track. (Note 18.*)

F_6.—About one-third mile southeast of *Weiser, Washington County, Idaho*, in the top of the north abutment of the bridge over the Weiser River, in the sandstone offset east of the track, about 0.3 meter from the south edge, and about 0.5 meter from the east edge.† (Note 5.*)

2107 H.—At *Weiser, Washington County, Idaho*, at the railroad station, on the north margin of the highway, 9 meters east of the main track of the Oregon Short Line Railroad. (Note 18.*)

G_6.—At *Weiser, Washington County, Idaho*, in the north wall of the brick building occupied by the Masonic Lodge, 3 meters north of the southwest corner, and 1.2 meters above the ground. (Note 57.*)

H_6.—At *Weiser, Washington County, Idaho*, in the west wall of the brick courthouse at Oldtown, Weiser, about 1 mile east of the railroad station. (Note 1.*)

2122 H.—3.2 miles southeast of *Eaton, Washington County, Idaho*, on the right of way of the Oregon Short Line Railroad, at the first telegraph pole west of mile pole 521, south of the track. (Note 18.*)

I_6.—About 1 mile east of *Eaton, Washington County, Idaho*, 6 poles west of mile pole 522½, 27 meters south of the track of the Oregon Short Line Railroad, 1 meter south of the fence; on a sandstone post. (Note 11.*)

2097 H.—0.3 mile southeast of *Eaton, Washington County, Idaho*, on the right of way of the Oregon Short Line Railroad, at mile pole 524, west of the track. (Note 18.*)

J_6.—About 1 mile west of *Eaton, Washington County, Idaho*, on the railroad right of way, 2 poles west of mile pole 525, 15 meters south of the track, and 4 meters east of a telegraph pole.† (Note 2.*)

2087 H.—5.2 miles east of *Olds Ferry, Washington County, Idaho*, on the right of way of the Oregon Short Line Railroad, 4.5 meters east of the fifth pole east of mile pole 527, 3 meters north of the track. (Note 18.*)

2086 H.—2.2 miles east of *Olds Ferry, Washington, County, Idaho*, 21 meters west of the seventh pole east of mile pole 530, 3 meters north of the track, on the right of way of the Oregon Short Line Railroad. (Note 18.*)

K_6.—At *Olds Ferry, Washington County, Idaho*, on the railroad right of way, 27 meters east of the track and 1 meter from the fence, 9 poles north of mile pole 532, and 3 poles south of the station sign; on a limestone post.† (Note 11.*)

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* See pp. 162-166.

† This bench mark is on the Oregon Short Line Railroad.

2070 H.—About three-fourths mile west of *Olds Ferry, Washington County, Idaho*, on the right of way of the Oregon Short Line Railroad, 5.4 meters east of the track, opposite mile pole 533. (Note 18.*)

2069 H.—About 4 miles west of *Olds Ferry, Washington County, Idaho*, on the right of way of the Oregon Short Line Railroad, at the first telegraph pole west of mile pole 536, 2.4 meters from the fence north of the track. (Note 18.*)

2079 A.—2.4 miles northeast of *Huntington, Baker County, Oreg.*, on the right of way of the Oregon Short Line Railroad, in a bridge over the Snake River, 1 meter east of the west end, on a stone stringer south of the track. (Note 17.*)

O.—About 2 miles northeast of *Huntington, Baker County, Oreg.*, 12 poles south of mile pole 539, in the north abutment of bridge 380 of the Oregon Short Line Railroad over Burnt River, in the concrete offset east of the track, 0.3 meter from the east edge, and 0.2 meter from the south edge. (Note 16.*)

P.—About 1½ miles northeast of *Huntington, Baker County, Oreg.*, 2 poles south of mile pole 540, in the north abutment of bridge 381 of the Oregon Short Line Railroad over Burnt River, in the sandstone offset east of the track, 0.2 meter from the south edge and 0.25 meter from the east edge. (Note 16.*)

Q.—About 1 mile northeast of *Huntington, Baker County, Oreg.*, east of the track, 7 poles south of mile pole 540, in the south abutment of bridge 382 of the Oregon Short Line Railroad over Burnt River, 0.3 meter from the south edge and 0.28 meter from the east edge of the sandstone offset east of the track. (Note 16.*)

2105 A.—At *Huntington, Baker County, Oreg.*, on Washington Street, in the front wall of the brick building of the Oregon Commercial Co., near the stairway between the grocery store and the drug store, in the sixth row of bricks above the stone foundation. (Note 17.*) Reported loose, 1903.

R.—At *Huntington, Baker County, Oreg.*, in the front wall of the brick building occupied by the Owl Drug Co. and the post office, midway between the show window and the stairway, west of the entrance to the store, 1.2 meters above the ground. (Note 57.*)

S.—About 1 mile north of *Huntington, Baker County, Oreg.*, in the north abutment of bridge 365 of the Oregon-Washington Railroad & Navigation Co., in the concrete offset east of the track, 0.25 meter from the south edge and 0.4 meter from the east edge. (Note 16.*)

T.—About 2 miles north of *Huntington, Baker County, Oreg.*, in the north abutment of bridge 364 of the Oregon-Washington Railroad & Navigation Co., in the concrete offset east of the track, 0.25 meter from the south edge, and 0.5 meter from the east edge. (Note 16.*)

U.—About 3 miles north of *Huntington, Baker County, Oreg.*, in the north abutment of bridge 362, in the concrete offset east of the track, 0.25 meter from the south edge and 0.5 meter from the east edge.† (Note 16.*)

V.—About 3¾ miles north of *Huntington, Baker County, Oreg.*, in the north abutment of bridge 360, in the concrete offset east of the track, 0.25 meter from the south edge and 0.5 meter from the east edge.† (Note 16.*)

2215 A.—About 5 miles northwest of *Huntington, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 108 meters south of bridge 356, 9 meters east of the track, 4 meters west of the fence. (Note 18.*)

W.—About 5½ miles northwest of *Huntington, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., about ½ mile north of mile pole 400, about 10 meters west of the track and 5 meters west of the whistle board on a limestone post. (Note 11.*)

X.—About 6½ miles north of *Huntington, Baker County, Oreg.*, about ½ mile north of mile pole 399, in the south concrete abutment of bridge 355, 2.5 meters east of the track, in an offset of the abutment, 35 centimeters from the north edge, and 35 centimeters from the east edge.† (Note 16.*)

Y.—About 8 miles north of *Huntington, Baker County, Oreg.*, 3 poles north of mile pole 397, in the north concrete abutment of bridge 353, in an offset of the abutment east of the track, 1 meter from the east edge and 0.3 meter from the south edge.† (Note 16.*)

2369 A.—About 1½ miles south of *Weatherby, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 180 meters west of the west portal of tunnel 6, 12 meters north of the track, 2.5 meters from the east corner of the fence. (Note 18.*)

Z.—About ¼ mile north of the station sign at *Weatherby, Baker County, Oreg.*, and about 7 miles south of Durkee, on the right of way of the Oregon-Washington Railroad & Navigation Co., 1 pole north of mile pole 391, 15 meters west of the track. (Note 2.*)

A_2.—About ¾ mile north of *Weatherby, Baker County, Oreg.*, about 6½ miles south of Durkee, in the north abutment of bridge 343, east of the track, in the concrete offset of the abutment, 45 centimeters from the south edge and 62 centimeters from the east edge.† (Note 16.*)

2518 A.—About 4¾ miles south of *Durkee, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., about 300 meters north of mile pole 389, 4 meters south of the wagon road, 7 meters north of the track, and 1.2 meters south of the fence. (Note 18.*)

B_2.—About 2¾ miles southeast of *Durkee, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., about 1 pole north of mile pole 387, 15 meters east of the track. (Note 2.*)

2647 A.—At *Durkee, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 0.6 meter east of the depot platform, 11 meters north of the track. (Note 18.*)

C_2.—About 2 miles west of *Durkee, Baker County, Oreg.*, in the west concrete abutment of bridge 324, south of the track; in the offset of the abutment, 0.6 meter from the south edge and 0.4 meter from the west edge.† (Note 16.*)

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* See pp. 162-166. † This bench mark is on the line of the Oregon-Washington Railroad & Navigation Co.

D_2.—About 3¼ miles west of *Durkee, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 9 meters west of mile pole 381, 0.6 meter from the fence, on a limestone post. (Note 11.*)

3139 A.—55 meters north of the section house at *Unity, Baker County, Oreg.*, and about 7 miles northwest of Durkee, east of the track, just east of a wagon road.† (Note 18.*)

E_2.—About ¼ mile north of the station sign at *Unity, Baker County, Oreg.*, and about 7½ miles northwest of Durkee, in the south concrete abutment of bridge 320, 4 poles north of mile pole 377, in the offset of the abutment east of the track, 0.2 meter west of the east edge and 0.2 meter from the north edge.† (Note 16.*)

F_2.—About 3½ miles southeast of *Pleasant Valley, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 1.5 meters south of mile pole 373. (Note 11.*)

3818 A.—At *Pleasant Valley, Baker County, Oreg.*, 30 meters south of the track, 4.5 meters south of the southwest corner of the railroad house.† (Note 18.*) (Reported in battered condition 1904).

G_2.—About ½ mile east of *Encina, Baker County, Oreg.*, 4 poles east of mile pole 367, 12 meters south of the track of the Oregon-Washington Railroad & Navigation Co., at a road crossing 3 meters east of a telegraph pole. (Note 2.*)

H_2.—About 1 mile southeast of the siding at *Norton, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 2 poles east of mile pole 364, in a concrete culvert south of the track. (Note 16.*)

3646 A.—At *Norton, Baker County, Oreg.*, 45 meters north of the section house.† (Note 18.*)

I_2.—About 2 miles south of *Baker City, Baker County, Oreg.*, in the north concrete abutment of bridge No. 307, east of the track, in an offset of the abutment, 45 centimeters from the east edge.† (Note 16.*)

3433 A.—At *Baker City, Baker County, Oreg.*, in the astronomic pier in the front yard of the public high school. (Note 17.*)

J_2.—At *Baker City, Baker County, Oreg.*, in the north face of the brick building of the Sage & Grace Mercantile Co., 1.2 meters above the ground and 3 meters east of the northwest corner of the building. (Note 57.*)

K_2.—At *Baker City, Baker County, Oreg.*, in the east face of the limestone building of the Order of Elks known as Elks Hall, 0.6 meter from the northeast corner, 1.2 meters above the ground. (Note 1.*)

L_2.—At *Baker City, Baker County, Oreg.*, in the north face of the limestone city hall building, 0.6 meter from the northwest corner, 1.2 meters above the ground. (Note 1.*)

M_2.—About 3 miles north of *Baker City, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., at mile pole 354, 2 meters east of the track, on a limestone post. (Note 11.*)

3338 A.—1.5 miles north of *Wingville, Baker County, Oreg.*, about 6 miles north of Baker City, 180 meters east of Jenning's house, on the main road between Haines and Baker City, 20 meters west of the railroad track.† (Note 18.*)

N_2.—1.5 miles south of *Haines, Baker County, Oreg.*, and about 9 miles north of Baker City, on the right of way of the Oregon-Washington Railroad & Navigation Co., at mile pole 348, 27 meters west of the track. (Note 2.*)

O_2.—About 2 miles north of *Haines, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., ¼ mile north of mile pole 345, 15 meters east of the track at the fence corner north of the road crossing. (Note 2.*)

3372 A.—At *Hutchinson, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 8 meters north of mile pole 342 and 13 meters west of the track. (Note 18.*)

P_2.—About 2 miles southwest of *North Powder, Union County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 2½ poles south of mile pole 339, 15 meters east of the track at a fence corner. (Note 2.*)

3233 A.—At *North Powder, Union County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 36 meters southwest of the station, and 10 meters south of the center of the track, at the northeast corner of the fence, 4 meters south of the wagon road. (Note 18.*)

Q_2.—At *North Powder, Union County, Oreg.*, in the southeast wall of the limestone building of the I. O. O. F., 1.2 meters southwest from the east corner and 1.4 meters above the ground. (Note 57.*)

R_2.—About 2¾ miles northeast of *North Powder, Union County, Oreg.*, on the Oregon-Washington Railroad & Navigation Co. right of way, about ¼ mile west of mile pole 334; the center of a cross in a square cut in the face of native lava rock, about 3 meters north of the center of the track, and lettered "U. S. B. M."

S_2.—About 3¼ miles northeast of *North Powder, Union County, Oreg.*, on the Oregon-Washington Railroad & Navigation Co. right of way, in the west concrete abutment of bridge 271, north of the track. (Note 5.*)

T_2.—About 3½ miles northeast of *North Powder, Union County, Oreg.*, on the Oregon-Washington Railroad & Navigation Co. right of way, in the west concrete abutment of bridge 270, north of the track. (Note 5.*)

3228 A.—About 4½ miles northeast of *North Powder, Union County, Oreg.*, on the Oregon-Washington Railroad & Navigation Co. right of way, 54 meters north of the north portal of tunnel 5, 4.2 meters east of the track. (Note 18.*)

U_2.—About 3 miles southwest of *Telocaset, Union County, Oreg.*, on the Oregon-Washington Railroad & Navigation Co. right of way, 27 meters north of the track, at mile pole 331. (Note 2.*)

V_2.—About ¼ mile south of *Telocaset, Union County, Oreg.*, on the Oregon-Washington Railroad & Navigation Co. right of way, 4 poles south of mile pole 328, in the northwest fence corner of a road crossing. (Note 11.*)

3440 A.—At *Telocaset, Union County, Oreg.*, on the railroad right of way, 1 meter east of the east corner of the fence at the section house and 5.4 meters north of the center of the tracks.† (Note 18.*)

W_2.—About 3 miles north of *Telocaset, Union County, Oreg.*, on the railroad right of way, east of the track and in the line of the telegraph poles, 2 meters north of mile pole 325.† (Note 2.*)

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* See pp. 162-166. † This bench mark is on the line of the Oregon-Washington Railroad & Navigation Co.

3021 A.—About 4¼ miles south of *Union Station, Union County, Oreg.*, on the railroad right of way, 300 meters west of the second snowshed southeast of Union Station, 4.5 meters south of the track.† (Note 18.*)

X_2.—About 1¼ miles southeast of *Union Station, Union County, Oreg.*, on the railroad right of way, 8 poles southeast of mile pole 319, 12 meters east of the track.† (Note 2.*)

Y_2.—At *Union, Union County, Oreg.*, in the east face of the brick and stone building occupied by Joseph Wright's store, 0.5 meter from the southeast corner and 1.2 meters above the ground. (Note 57.*)

Z_2.—At *Union, Union County, Oreg.*, in the brick building occupied by the Foster Brown Co., dry goods; in the top of the stone stringer on the north side of the building, 0.6 meter from the northeast corner. (Note 1.*)

G. S. Union.—At *Union, Union County, Oreg.*, in the brick and stone building owned and occupied by the Grande Ronde Valley Lodge, No. 56, of Ancient Free and Accepted Masons; in the top of the stone stringer on the east face of the building, 1 meter from the southeast corner. (Note 17,* the elvevation and datum letter are not given.)

A_3.—At *Union, Union County, Oreg.*, in the west face of the brick building of the First National Bank, 1 meter from the northwest corner and 1.2 meters above the ground. (Note 57.*)

2705 A.—About ¾ mile northwest of *Union Station, Union County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 16 meters northeast of milepost 317, 2 meters south of fence. Iron post marked "2705 A."

B_3.—About 3 miles northwest of *Union Station, Union County, Oreg.*, on the railroad right of way, ¼ mile southeast of mile pole 315, and 3 meters northwest of a telegraph pole, 15 meters northeast of the track.† (Note 2.*)

2696 A.—About 6 miles northwest of *Union Station, Union County, Oreg.*, on the railroad right of way, 0.3 mile northwest of mile pole 312, 15 meters south of the track.† (Note 18.*)

C_3.—About 4 miles southeast of *Lagrande, Union County, Oreg.*, on the railroad right of way, 5 meters northwest of the first pole northwest of mile pole 310 and 12 meters northeast of the track.† (Note 2.*)

D_3.—About 2 miles southeast of *Lagrande, Union County, Oreg.*, on the railroad right of way, at trestle 212, 18 meters southwest of the track.† (Note 2.*)

2773 A.—At *Lagrande, Union County, Oreg.*, on the railroad right of way, 50 meters northeast of the road crossing at First Street, 9 meters north of the northwest corner of the railroad tool house, and 1.2 meters west of a telegraph pole.† (Note 18.*)

E_3.—At *Lagrande, Union County, Oreg.*, in the north face of the brick building occupied by the grocery store of J. W. White, 0.3 meter from the northeast corner of the building and 1.2 meters above the ground. (Note 57.*)

F_3.—At *Lagrande, Union County, Oreg.*, in the front of the brick and stone building occupied by the Chicago Dry Goods Co., in the limestone pillar just south of the entrance to the stairway, 1.2 meters above the ground. (Note 1.*)

G_3.—At *Lagrande, Union County, Oreg.*, in the front of the brick and stone building occupied by the Lewis printing offices, near the southwest corner and in the top of the stone stringer below the window. (Note 1.*)

2782 A.—At *Lagrande, Union County, Oreg.*, in the north face of the brick building of the Foley Hotel in the third course of plaster facing of the wall on the Chestnut Street side. (Note 17.*)

H_3.—About 2½ miles north of *Lagrande, Union County, Oreg.*, on the railroad right of way, in the south concrete abutment of bridge 205, in an offset west of the track 1.2 meters from the nearer rail, 0.2 meter from the inside edge of the steel stringers.† (Note 16.*)

I_3.—About 3 miles north of *Lagrande, Union County, Oreg.*, on the railroad right of way, 6 poles north of mile pole 303, 10 meters south of the track near the road crossing.† (Note 2.*)

2897 A.—At *Perry, Union County, Oreg.*, 0.6 meter east of the office of the Grande Ronde Lumber Co., 14 meters north of the center of the track.† (Note 18.*)

J_3.—About 1½ miles south of *Hilgard, Union County, Oreg.*, on the railroad right of way, 1 pole west of mile pole 299, 12 meters north of the track and 3 meters east of the pole.† (Note 2.*)

3001 A.—At *Hilgard, Union County, Oreg.*, on the railroad right of way, 12 meters west of the first telegraph pole west of the depot, 7 meters north of the center of the track.† (Note 18.*) (Slightly loose.)

3581 A.—About 5½ miles north of *Hilgard, Union County, Oreg.*, on the railroad right of way, 36 meters east of mile pole 292, 5 meters south of the center of the track.† (Note 18.*)

K_3.—About 2½ miles south of *Kamela, Union County, Oreg.*, on the railroad right of way, 5 poles north of mile pole 289, 4 poles west of the signboard "Spring Spur," 15 meters east of the track.† (Note 2.*)

4199 A.—At *Kamela, Union County, Oreg.*, on the railroad right of way, 13 meters south of the telegraph office, 0.4 meter north of the railroad tank, 4 meters west of the center of the track.† (Note 18.*)

3958 A.—About 3½ miles south of *Meacham, Umatilla County, Oreg.*, on the railroad right of way, 9 meters southwest of mile pole 284, 7 meters south of the center of the track.† (Note 18.*)

L_3.—About 1½ miles south of *Meacham, Umatilla County, Oreg.*, on the railroad right of way, 4 meters south of mile pole 282, 12 meters east of the track on a lava stone post.† (Note 11.*)

3672 A.—At *Meacham, Umatilla County, Oreg.*, on the railroad right of way, 50 meters north of the station and 5 meters east of the center of the track.† (Note 18.*)

3454 A.—About 2½ miles east of *Meacham, Umatilla County, Oreg.*, on the railroad right of way, 4 meters east of mile pole 278 and 4.5 meters north of the center of the track.† (Note 18.*)

M_3.—About 3½ miles east of *Meacham, Umatilla County, Oreg.*, on the railroad right of way, 2 poles south of mile pole 277, and 10 meters west of the track, on a lava stone post.† (Note 11.*)

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* See pp. 162-166. † This bench mark is on the line of the Oregon-Washington Railroad & Navigation Co.

N_3.—About 5 miles southeast of *Meacham, Umatilla County, Oreg.*, on the railroad right of way, in the southwest concrete abutment of bridge 145, in the top of the offset west of the track.† (Note 5.*)

O_3.—About 6 miles southeast of *Meacham, Umatilla County, Oreg.*, on the railroad right of way, in the south abutment of bridge 137, in the offset west of the track.† (Note 5.*)

P_3.—About 8 miles southeast of *Meacham, Umatilla County, Oreg.*, on the railroad right of way, in the north concrete abutment of bridge 131, in the top of the offset east of the track.† (Note 5.*)

Q_3.—About 9½ miles southeast of *Meacham, Umatilla County, Oreg.*, on the railroad right of way, ⅙ mile east of mile pole 271, 12 meters south of the track.† (Note 2.*)

2570 A.—About 4½ miles west of *North Fork, Umatilla County, Oreg.*, on the railroad right of way, 162 meters south of the south end of bridge 115, 9 meters east of the center of the track.† (Note 18.*)

R_3.—About 4½ miles west of *North Fork, Umatilla County, Oreg.*, on the railroad right of way, in the north concrete abutment of bridge 115, in the top of an offset west of the track.† (Note 5.*)

S_3.—About 3 miles south of *North Fork, Umatilla County, Oreg.*, 0.5 mile south of mile pole 266, in the south abutment of a steel bridge in the offset east of the track.† (Note 16.*)

T_3.—About 2.5 miles south of *North Fork, Umatilla County, Oreg.*, at mile pole 266, 12 meters east of the track.† (Note 11.*)

2264 A.—About ½ mile north of *North Fork, Umatilla County, Oreg.*, 45 meters east of the section house, 10 meters south of the track.† (Note 18.*)

U_3.—About 1 mile northwest of *North Fork, Umatilla County, Oreg.*, in the north abutment of bridge 106, in the top of the offset east of the track.† (Note 1.*)

V_3.—About 2½ miles northwest of *North Fork, Umatilla County, Oreg.*, 4 poles northwest of mile pole 261, iron pipe in the line of the poles northeast of the track.† (Note 2.*)

2023 A.—About 6 miles southeast of *Bingham Springs (Gibbon), Umatilla County, Oreg.*, ½ mile east of mile pole 258, 7 meters south of the track, 10 meters east of the whistling post.† (Note 18.*)

W_3.—About 3½ miles southeast of *Bingham Springs (Gibbon), Umatilla County, Oreg.*, 2 poles southeast of mile pole 256, 18 meters west of the track.† (Note 2.*)

X_3.—About 1½ miles southeast of *Bingham Springs (Gibbon), Umatilla County, Oreg.*, in the east abutment of bridge 86, in the top of the offset north of the track.† (Note 1.*)

1744 A.—At *Bingham Springs (Gibbon), Umatilla County, Oreg.*, 47 meters east of the depot, 11 meters north of the track, 1.2 meters east of the first telegraph pole from the depot.† (Note 18.*)

Y_3.—About 2½ miles west of *Bingham Springs (Gibbon), Umatilla County, Oreg.*, opposite mile pole 250, 12 meters north of the track.† (Note 11.*)

1523 A.—About 4 miles east of *Cayuse, Umatilla County, Oreg.*, about ½ mile west of mile pole 247, 90 meters west of a road crossing, 4 meters north of the track, and 1.2 meters east of a telegraph pole.† (Note 18.*)

Z_3.—About 3½ miles east of *Cayuse, Oreg.*, in the top of a pillar of bridge 66, 2.4 meters from the south rail, 0.6 meter from the west edge, 0.9 meter from the south edge.† (Note 16.*)

A_4.—About ½ mile east of *Cayuse, Umatilla County, Oreg.*, one-half pole west of mile pole 243 and 6 meters north of the track.† (Note 2.*)

B_4.—About 0.3 mile west of *Cayuse, Umatilla County, Oreg.*, in the east abutment of a steel bridge, in the offset north of the track.† (Note 16.*)

1355 A.—About 5½ miles east of *Mission, Umatilla County, Oreg.*, 270 meters west of mile pole 241, 6 meters south of the track and 4 meters north of a wagon road.† (Note 18.*)

C_4.—About 3 miles east of *Mission, Umatilla County, Oreg.*, 6 poles east of mile pole 239, 5 meters south of the track. Reported disturbed, 1912.† (Note 11.*)

1205 A.—At *Mission, Umatilla County, Oreg.*, 225 meters northeast of mile pole 236, 7.5 meters north of the track, 1 meter east of the telegraph pole west of the switch for the siding.† (Note 18.*)

D_4.—At *Pendleton, Umatilla County, Oreg.*, at the entrance to the brick building of the Cruise Hotel, opposite the side entrance of the St. George Hotel, in the top of the west end of the stone step. (Note 1.*)

E_4.—At *Pendleton, Umatilla County, Oreg.*, in the stone runner of the entrance to the building of brick occupied by the Delta confectionery store, on Main Street. (Note 1.*)

F_4.—At *Pendleton, Umatilla County, Oreg.*, in the east wall of the brick building of the Umatilla Implement Co., 1.2 meters above the ground, 0.2 meter from the southeast corner. (Note 57.*)

1074 A.—At *Pendleton, Umatilla County, Oreg.*, in the second block of the plaster base of the west entrance (on south side) of the Umatilla County courthouse. (Note 17.*)

G_4.—About 1 mile east of *Pendleton, Umatilla County, Oreg.*, in the west abutment of the steel bridge over the Umatilla River, in the top of the offset, north of the track.† (Note 1.*)

H_4.—About 2.5 miles northeast of *Pendleton, Umatilla County, Oreg.*, on the right of way of the Northern Pacific Railway, 10 meters north of the track. (Note 11.*)

I_4.—About 2 miles southwest of *Fulton, Umatilla County, Oreg.*, at mile pole 35, on the right of way of the Northern Pacific Railway, 10 meters west of the track. (Note 2.*)

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* See pp. 162-166. † This bench mark is on the line of the Oregon-Washington Railroad & Navigation Co.

J_4.—About 1 mile north of *McCormack, Umatilla County, Oreg.*, at mile pole 31, on the right of way of the Northern Pacific Railway, 10 meters north of the track. (Note 2.*)

K_4.—About 1 mile north of *Warren, Umatilla County, Oreg.*, at mile pole 27, on the right of way, 10 meters west of the track.† (Note 2.*)

L_4.—About 1.2 miles north of *Helix, Umatilla County, Oreg.*, at mile pole 22, on the right of way, 12 meters west of the track.† (Note 2.*)

M_4.—Near *Smeltz* (formerly *Killian Junction*), *Umatilla County, Oreg.*, 1 pole south of mile pole 19; a square hole cut in a concrete culvert, east of the track, on the right of way.† (Note 16.*)

N_4.—Near *Smeltz* (formerly *Killian Junction*), *Umatilla County, Oreg.*, at mile pole 18, on the right of way, 15 meters west of the track.† (Note 2.*)

O_4.—About 1 mile north of *Stanton, Umatilla County, Oreg.*, at mile pole 17, in the concrete culvert west of the track.† (Note 5.*)

P_4.—About 1.2 miles south of *Ring* (formerly *Canon*), *Umatilla County, Oreg.*, 1 pole north of mile pole 12, on the right of way, 5 meters west of the track.† (Note 11.*)

R_3.—About 10 miles south of *Hunts Junction, Wallawalla County, Wash.*, 0.3 mile north of mile pole 10, on the right of way, 10 meters west of the track.† (Note 11.*)

Q_3.—About 6 miles southeast of *Hunts Junction, Wallawalla County, Wash.*, at mile pole 6, on the right of way, 15 meters west of the track.† (Note 11.*)

P_3.—Near *Hunts Junction, Wallawalla County, Wash.* (See p. 188.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN SEATTLE AND HUNTS JUNCTION, WASH., 1904.

Tidal 4=City.—At *Seattle, King County, Wash.*, a square cut on the northern end of the doorsill on the west side of the Rainier Grand Building on Post Street, about 1.368 meters south of Madison Street and about 0.2 meter from the edge of the sill on Post Street. As a city bench mark, its elevation is given as 13.790 feet above city datum.

Tidal 5.—At *Seattle, King County, Wash.*, the top surface of an iron hinge on a window in the rear of the old Seattle Athletic Club Building, now the Seneca Hotel, on Post Street, 2.402 meters north of Seneca Street and 0.681 meter above the lower edge of the widnow sill.

G.—At *Seattle, King County, Wash.*, in the Pioneer Park at the intersection of First Avenue, James Street, and Yesler Way, 5.350 meters from the east fence of the park, 5.430 meters from the west fence, and 4.070 meters south of the totem pole, on a granite post. (Note 11.*)

City 1.—At *Seattle, King County, Wash.*, at the entrance of the Puget Sound National Bank, corner of James Street and First Avenue; a square outlined in the granite step, 0.020 meter from the edge of the step and 0.030 meter from the granite base supporting the column at the side of the doorway, the face of which is inscribed "City Datum."

City 2.—At *Seattle, King County, Wash.*, on the foundation for the chimney of the Rainier Heat, Light & Power Co.'s generating plant, 76 meters southeast of Hill's gas works and 5 meters from the siding of the Columbia & Puget Sound Railway; a cross cut in the upper surface of the top stone on the west side of the foundation, 0.03 meter from the west edge of the stone.

City 3.—At *South Seattle, King County, Wash.*, 23 meters west of the intersection of Charlestown Street and Eighth Avenue south and about 11 meters north of C. M. Felt's fence; the top of a tack or nail driven into the root of a maple tree. As that portion of the root is dead it is not likely to last many years. (1904.)

N. P.—About ⅞ kilometer south of *Argo, King County, Wash.*, 65 meters south of the south cattle guard for the first railroad crossing south of Argo, 11.55 meters from the east right of way fence, 3.055 meters from the center of the nearest Columbia & Puget Sound rail, and 1.53 meters from the center of the nearest Northern Pacific rail; a shallow circular depression in the center of a cylindrical post of concrete set flush with the surface of the gravel between the tracks and marked N P on the top.

N. P.—About 4 kilometers north of *Black River* and near the old spur known as Van Asselts in *King County, Wash.*, 14 meters south of the crossing for logging teams, 1.52 meters from the center of the nearest Northern Pacific rail, and 1.66 meters from the nearest Columbia & Puget Sound rail; a shallow circular depression in the center of a cylindrical post of concrete set flush with the surface of the gravel between the tracks and marked N P on the top.

H.—At *Black River, King County, Wash.*, opposite the Northern Pacific Railway depot, 11.55 meters east of the nearest Columbia & Puget Sound rail and 1.925 meters west of the right of way fence, on a granite post. (Note 11.*)

I.—About ¼ kilometer south of *Black River, King County, Wash.*, on the sandstone abutment for the approach to the Northern Pacific Railway bridge over Black River, on the north end of the bridge and on the west side of the track; a copper bolt (Note 56*) leaded into the concrete cap, 1.34 meters from the nearest rail, 0.42 meter from the south, and 0.190 meter from the west edge of the abutment.

J.—At *Kent, King County, Wash.*, in the southwest corner of Mr. Ed. Brotchi's yard on Railroad Avenue, 0.2 meter from the west fence and 0.2 meter from the south fence inclosing the yard, on a granite post. (Note 11.*)

K.—At *Kent, King County, Wash.*, at the southwest corner of Gowe Street and First or Front Street, as commonly known in the town, a cross cut in the head of the northeast corner bolt holding the cap of the water hydrant, 2.8 meters

* See pp. 162-166. † This bench mark is on the Northern Pacific Railway.

south of the edge of Gowe Street pavement and 3.8 meters from the corner of a store building; 0.26 meter above the ground.

L.—About 2 kilometers south of *Kent*, and 0.8 kilometer north of *Thomas, King County, Wash.*, on the concrete abutment west of the track at the north end of the Northern Pacific Railway bridge over White River; a copper bolt leaded into the upper surface of the northwest corner of the abutment, 0.1 meter from each edge and 2.22 meters from the nearest rail. (Note 56.*)

M.—At *Auburn, King County, Wash.*, 73 meters north of the small Northern Pacific Railway station, in Mr. Gilmore's yard, about 20 meters northeast of his house, 2 meters west of the fence inclosing his yard, and 14.35 meters from the nearest rail. (Note 11.*)

N.—At *Auburn, King County, Wash.*, in front of R. C. Kinleyside's hardware and furniture store; a metal disk in the cement sidewalk, 2.74 meters from its outer edge and 0.16 meter from the building. (Note 59.*)

O.—About ¾ kilometer east of *Auburn, King County, Wash.*, in the top of the concrete abutment for the approach of the Northern Pacific Railway bridge over White River; the bottom of a hole 32 millimeters square, cut 6.4 millimeters deep, 0.365 meter from the east edge, 0.18 meter from the south edge of the abutment, and 1.465 meters from the nearest rail. (Note 5.*)

P.—0.9 kilometer west of the station at *Covington, King County, Wash.*, in the west abutment of the concrete approach to the Northern Pacific Railway bridge No. 2 over Jenkins Creek, 6 rails west of the nearest switch stand; a metal disk (Note 59 *), flush with the upper surface, 0.3 meter from the east, 0.2 meter from the south edge of the abutment, and 1.5 meters south of the nearest rail of the track.

Q.—At *Covington, King County, Wash.*, 36 meters west of the station of the Northern Pacific Railway, 9 meters south of the main-line track, and 10 meters south of milepost 224; about in the line of telegraph poles and in the Northern Pacific Railway right of way, on a granite post. (Note 11.*)

R.—1.9 kilometers west of *Ravensdale, King County, Wash.*, on the Northern Pacific Railway concrete arch culvert 1Q, 3 meters north of the track, in the upper surface at the northeast corner, 0.35 meter from the east and 0.1 meter from the north edge of the culvert. (Note 57.*)

S.—At *Ravensdale, King County, Wash.*, 60 meters west of the Northern Pacific Railway station, 20 meters south of the main track, and 0.6 meter east of the railway section house. (Note 11.*)

T.—1.7 kilometers east of *Ravensdale, King County, Wash.*, on the Northern Pacific Railway concrete arch culvert 1L over Beaver Creek, 4.3 meters south of the railway track; a copper bolt in the upper surface of the culvert, 0.157 meter from the east and 0.15 meter from the south edge. (Note 57.*)

U.—3.2 kilometers east of *Ravensdale, King County, Wash.*, on a concrete arch culvert, near mile pole 215, 2.5 meters north of the Northern Pacific Railway track; a copper bolt in the upper surface, 0.15 meter from the west and 0.15 meter from the north edge. (Note 57.*)

V.—Between *Kanashat* and *Palmer Junction, King County, Wash.*, about 50 meters east of mile pole 211, in the top of the concrete abutment for the approach at the west end of the bridge of the Northern Pacific Railway over Green River, the tenth crossing over that stream; a copper bolt, 0.17 meter from the east, 0.11 meter from the south edge, and 1.5 meters south of the nearest rail. (Note 57.*)

W.—At *Palmer Junction, King County, Wash.*, about 90 meters west of the Northern Pacific Railway station, 2 meters south of the line of telegraph poles, and 9.19 meters south of the nearest rail on the Tacoma branch of the Northern Pacific Railway, on a granite post. (Note 11.*)

X.—About 4 kilometers east of *Palmer Junction, King County, Wash.*, 6 meters east of tunnel No. 8 and 3 meters north of the Northern Pacific Railway bridge 211 over Green River; a copper bolt set in the natural rock.

1046 T.—About 2.4 kilometers west of *Eagle Gorge, King County, Wash.*, on the south end of the east concrete abutment of the Northern Pacific Railway bridge 210 over Green River; a copper bolt about 3 centimeters in diameter set vertically in the top of the abutment, 0.56 meter from the west and 0.53 meter from the south edge, 1.15 meters south of the nearest rail; the head of the bolt was marked U. S. G. S. B. M. 1046T.

Y.—About 0.8 kilometer west of *Eagle Gorge, King County, Wash.*, on the south end of the east concrete abutment of Northern Pacific Railway bridge 209 over Green River; a copper bolt, set in the top of the abutment, 0.15 meter from its west edge and 1.55 meters from the rail. (Note 57.*)

Z.—At *Canton, King County, Wash.*, 60 meters east of the station, in the Northern Pacific Railway section-house yard, 12.2 meters south of the section house, and 9.7 meters north of the nearest main-track rail, on a granite post. (Note 11.*)

1205 T.—At *Canton, King County, Wash.*, 120 meters east of the railway station, 2.48 meters east of the tool house of the Northern Pacific Railway, 5.77 meters from the nearest rail. (Note 18.*)

1335 T.—At *Maywood, King County, Wash.*, about 0.34 kilometers east of the station in the Northern Pacific Railway section-house yard, 0.58 meter east of the section house, and 16.7 meters north of the nearest rail of the main track. (Note 18.*)

1531 T.—At *Hot Springs, King County, Wash.*, about 17 meters east of the southeast corner of the depot, about 5½ meters north of the center of the main track of the Northern Pacific Railway, and about 1 meter east of the first telegraph pole east of the depot. The bench mark was loose and leaning badly; it was straightened up and made firm with concrete, care being taken to disturb its elevation as little as possible. (Note 18.*)

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* See pp. 162-166.

A_1.—At *Hot Springs, King County, Wash.*, in the lawn of the Kloeber Hotel, about 10 meters east of the walk leading to the depot, and about 3 meters south of the south porch of the hotel on a granite post. (Note 11.*)

B_1.—About 1.85 kilometers east of *Hot Springs, King County, Wash.*, in the top of the retaining wall for the east concrete abutment of Northern Pacific Railway bridge 201, 0.3 meter from the east and 1.65 meters from the north edge, 1.3 meters north of the rail. (Note 1.*) Reported about to be destroyed by raising abutments, June 1, 1907.

1614 T.—At *Lester, King County, Wash.*, in the brick projection at the southwest corner of the Northern Pacific Railway roundhouse, about 1.5 meters above the ground. (Note 17.*) This bench mark is reported to have been removed and placed in a different position when the roundhouse was repaired.

C_1.—About 1.5 kilometers east of *Weston, King County, Wash.*, in the vertical surface of the side of a rock cut, 16 meters west of mile pole 183, 2.45 meters north of the nearest rail, and 0.7 meter above the level of the top of the rail.† (Note 1.*)

D_1.—About 2.2 kilometers west of *Borup, King County, Wash.*, on the Northern Pacific Railway right of way, about 31 meters east of the west end of the third rock cut east of mile pole 182, 1.95 meters south of the nearest rail; a copper bolt stenciled B M set vertically in the natural rock.

2776 T.—At *Stampede, King County, Wash.*, about 23 meters southwest of the Notrhern Pacific Railway station, about 3 meters north of the edge of the bluff forming the north bank of Deer Creek, and about 15 meters south of the main track. (Note 18.*) This bench mark was loose and was made firm with concrete, care being taken to disturb its elevation as little as possible.

E_1.—About 370 meters east of *Stampede, King County, Wash.*, at the south side of the west entrance to Stampede Tunnel, in the vertical surface of the rock, about 3 meters south of the nearest rail, and about 1 meter above the level of the rails at that point.† (Note 1.*)

F_1.—About 1.7 kilometers east of *Stampede, King County, Wash.*, on the north side of the track in Stampede Tunnel, near the half-way point and at the head of the grade in the tunnel, in the vertical brick wall forming the west side of a manhole, 2.15 meters north of the nearest rail, 1.55 meters above the floor, and 0.45 meter north of the side of the tunnel.† (Note 1.*)

2782 T.—About 340 meters east of the station at *Martin, Kittitas County, Wash.*, on the bank above the track, about 12 meters east of the old station house, about 6 meters south of the main track. This bench mark was loose and was made firm with concrete, care being taken not to disturb its elevation.† (Note 18.*)

G_1.—About 4.5 kilometers west of *Easton, Kittitas County, Wash.*, at the south end of the west concrete abutment of Northern Pacific Railway bridge 161 over Cabin Creek, about 195 meters east of mile pole 168 Pasco; a copper bolt stenciled B. M. set in the upper surface, 0.35 meter from the east and 0.18 meter from from the south edge, and 1.67 meters south of the nearest rail.

H_1.—At *Easton, Kittitas County, Wash.*, in front and 5.5 meters south of A. O. Johnson's house, 2.35 meters east of Johnson Bros.' store, and 2.2 meters north of the fence inclosing the yard, a granite post. (Note 11.*)

I_1.—At *Easton, Kittitas County, Wash.*, originally established in the northeast corner of the yard surrounding A. J. Adams's residence, about 14 meters north of the house, 0.74 meter from the north fence, and 0.62 meter west of the east fence inclosing the yard; about 100 meters south of the Northern Pacific Railway main track. In 1907 the stone was moved to a position 44.6 feet S. 48° 33′ W. of the original position. It is now 2 feet from the right-of-way fence and 48 feet from the track of the Chicago, Milwaukee & St. Paul Railway. The cap is marked with a cross. (Note 2.*)

J_1.—About 1.8 kilometers west of *Nelson, Kittitas County, Wash.*, on the west concrete abutment of bridge 151; a copper bolt (Note 56.*) leaded firmly into the top surface, 0.35 meter from the west edge and 0.18 meter from the south edge of the abutment, 1.67 meters south of the nearest rail. The top of the bolt was hammered into a rounded form.†

2030 T.—At *Nelson, Kittitas County, Wash.*, about 70 meters south of the main track, 0.3 meter north of the fence, and 3.2 meters east of the wagon road.† (Note 18.*)

K_1.—At *Cle Elum, Kittitas County, Wash.*, at the corner of Pennsylvania Avenue and Railroad Street, 3.17 meters east of the southeast corner of D. B. Burcham's building and 17.8 meters northwest of the band stand; a cross cut in the head of the southeast bolt used in fastening the cap of a fire hydrant.

L_1.—At *Cle Elum, Kittitas County, Wash.*, at the corner of Pennsylvania Avenue and First Street; in the stone wall at the northwest corner of Mr. Heckman's store, facing Pennsylvania Avenue, 0.24 meter from the northwest corner of the building, 0.37 meter north of the south edge of the stone, and 1.2 meters above the sidewalk. (Note 1.*)

M_1.—At *Cle Elum, Kittitas County, Wash.*, in the northeast corner of Mrs. E. F. Shipman's yard, 2 meters northeast of the northeast corner of the house, 1.65 meters west of the east fence, and 2 meters south of the north fence. (Note 2.*)

1838 T.—At *Teanaway, Kittitas County, Wash.*, about 45 meters west of the station signboard and about 40 meters north of the main track.† (Note 18.*)

1784 T.—At *Bristol, Kittitas County, Wash.*, 0.6 meter southeast of the southeast corner of the station and 1.64 meters north of the nearest rail.† (Note 18.*)

N_1.—About 4.4 kilometers east of *Bristol, Kittitas County, Wash.*, about 155 meters east of mile pole 141, a copper bolt in the upper surface of a rock projecting from the side of a rock cut, 2.41 meters north of the nearest rail.† (Note 57.*)

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* See pp. 162-166.

† This bench mark is on the Northern Pacific Railway.

O_1.—About 5.5 kilometers west of *Thorp, Kittitas County, Wash.*, about 45 meters east of mile pole 138, on a culvert over an irrigation ditch; a copper bolt 1.5 meters west of the east edge, 0.2 meter north of the south edge of the abutment, and 1.5 meters south of the nearest rail.† (Note 57.*)

1658 T.—About 2.5 kilometers west of *Thorp, Kittitas County, Wash.*, at the first road crossing west of Thorp, about 42 meters north of the track.† (Note 18.*)

1634 T.—At *Thorp, Kittitas County, Wash.*, at the intersection of Main Street and Taneum Creek road. (Note 18.*)

P_1.—At *Thorp, Kittitas County, Wash.*, in the southwest corner of A. J. Schele's yard, 0.65 meter east of west fence, 0.65 meter north of south fence, and 12.67 meters southwest of the southwest corner of the house. (Note 2.*)

U. S. Base.—About 4.7 kilometers east of *Thorp, Kittitas County, Wash.*, about 18 meters east of the road crossing and about 10 meters north of the track; the bottom of a hole 2.5 centimeters square, cut about 6 millimeters deep, in the top of a stone post marked "U. S. Base."†

Q_1.—At *Ellensburg, Kittitas County, Wash.*, in the stone foundation of the Northern Pacific Railway roundhouse, on the west side of the building, about 8 meters south of the northwest door; the bottom of a hole 2.5 centimeters square, cut about 6 millimeters deep, lettered U. S. B. M.

1571 T.—At *Ellensburg, Kittitas County, Wash.*, in the stone coping forming the top of a brick pier, marked "ASTR PIER," in the State Normal School grounds. (Note 17.*)

R_1.—At *Ellensburg, Kittitas County, Wash.*, in the north stone front of the Washington State Bank, about 1.25 meters above the sidewalk. (Note 1.*)

S_1.—At *Ellensburg, Kittitas County, Wash.*, in the yard surrounding the residence of Ernest Maddux, 1.33 meters from the east fence, and 1.15 meters north of the south fence. (Note 2.*)

T_1.—At *Thrall, Kittitas County, Wash.*, opposite mile pole 122, about 20 meters south of the nearest rail, and 10 meters north of the wagon road.† (Note 2.*)

1350 T.—At *Umtanum, Kittitas County, Wash.*, about 25 meters west of the depot, and opposite the section house, about 16 meters south of the nearest rail.† (Note 18.*)

U_1.—About 0.9 kilometer east of *Umtanum, Kittitas County, Wash.*, on the east concrete abutment of the bridge over Umtanum Creek; in the upper surface, 0.25 meter north of the south edge, 0.25 meter from the west edge of the abutment, and 1.55 meters south of the nearest rail.† (Note 57*)

V_1.—At the siding at *Canyon, Kittitas County, Wash.*, in the top of the granite foundation of the water tank, at the northeast corner; the bottom of a rectangular hole, 5 centimeters long, 2.5 centimeters wide, and 6 millimeters deep. The letters U. S. B. M. were cut near the bench mark.†

1249 T.—At *Roza, Kittitas County, Wash.*, opposite the station, about 55 meters south of the nearest rail and 0.8 meter north of the right-of-way fence.† (Note 18.*)

W_1.—At *Roza, Kittitas County, Wash.*, in the southwest corner of the section house yard, 1 meter north of the fence, 1.55 meters east of the first telegraph pole east of the depot.† (Note 2.*)

1147 T.—At *Selah, Yakima County, Wash.*, 0.85 meter west of the fence inclosing the section house yard, and 4.75 meters south of the nearest rail.† (Note 18.*)

X_1.—About 0.8 kilometer east of *Selah, Yakima County, Wash.*, in the upper surface of the center pier of masonry for the Northern Pacific Railway bridge over the Yakima River, about 2 meters below the level of the rail and about 1 meter outside the line of the north rail. (Note 6.*)

Y_1.—75 meters west of the station at *Wenas, Yakima County, Wash.*, opposite mile pole 94 and about 10 meters north of the nearest rail.† (Note 2.*)

1067 T.—At *North Yakima, Yakima County, Wash.*, in the pilaster of the northwest corner of the entrance to the city hall building, on Front Street, about 0.5 meter above the level of the sidewalk. (Note 17.*)

Z_1.—At *North Yakima, Yakima County, Wash.*, in the west end of the east Northern Pacific Railway park, about 6.1 meters east of the west fence inclosing the park. (Note 2.*)

A_2.—At *North Yakima, Yakima County, Wash.*, in the vertical stone wall at the northeast corner of Sloan's drug store; 0.32 meter east of the door, 0.33 meter from the edge of the wall, and about 1.2 meters above the sidewalk. (Note 1.*)

B_2.—At *North Yakima, Yakima County, Wash.*, in the upper surface of the stone doorsill of the stairway entrance on the east side of the First National Bank Building, 0.18 meter from the outer edge of the doorsill. (Note 57.*)

C_2.—At *North Yakima, Yakima County, Wash.*, in the surface of the cement walk leading from the residence of Mrs. Moore, 222 North Second Street, to the sidewalk, about 2.7 meters west of the sidewalk and 0.61 meter south of the north edge of the cement walk. (Note 1.*)

D_2.—About 1½ miles east of *Yakima City, Yakima County, Wash.*, on the east concrete abutment of the Northern Pacific Railway bridge over Atanum Creek; the bottom of a hole 2½ centimeters square and 6 millimeters deep, lettered "U. S. B. M.", 0.25 meter east of the west edge, 0.3 meter north of the south end of the abutment, and about 1.3 meters south of the nearest rail.

855 T.—At *Wapato, Yakima County, Wash.*, about 40 meters east of the depot and 11 meters south of the nearest rail on the main track.† (Note 18.*)

E_2.—At *Wapato, Yakima County, Wash.*, in Alexander E. McCredy's yard, 9.05 meters west of the house, 8.60 meters south of the front fence, and about 19 meters east of his store. (Note 2.*)

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* See pp. 162–166.

† This bench mark is on the Northern Pacific Railway.

F_2.—About 4.5 kilometers east of *Wapato, Yakima County, Wash.*, in the upper surface of the south end of the east concrete abutment for the Northern Pacific Railway bridge 77, over an irrigation ditch, 0.2 meter from the west and south edges of the abutment, and 1.5 meters south of the nearest rail. (Note 1.*)

775 T.—At *Toppenish, Yakima County, Wash.*, 32.9 meters east of the Northern Pacific Railway depot, 6.85 meters south of the nearest rail of the main track, and very near the northeast corner of the little park east of the depot. (Note 18.*)

G_2.—At *Toppenish, Yakima County, Wash.*, 21.07 meters west of the northwest corner of the section house, about 1 meter inside the fence inclosing the yard, and 11.34 meters south of the nearest rail of the main track.† (Note 2.*)

H_2.—At *Toppenish, Yakima County, Wash.*, in the upper surface of the concrete foundation supporting the pillars for the Northern Pacific Railway water tank, under the northern one of the two western pillars, 0.26 meter north of the south edge, and 0.25 meter from the east (?) edge, 7 meters north of the nearest rail of the main track. (Note 57,* not leaded.)

717 T.—At the first wagon road crossing over the railroad west of the siding at *Alfalfa, Yakima County, Wash.*, about 0.8 kilometer west of mile pole 66, 0.9 meter east of the fence for the road crossing and 13 meters south of the nearest rail.† (Note 18.*)

I_2.—At *Alfalfa, Yakima County, Wash.*, 6.20 meters west of mile pole 66, and 1.75 meters east of a telegraph pole, in line with the telegraph poles, and 14.67 meters south of the nearest rail of the main track.† (Note 2.*)

674 T.—At *Satus, Yakima County, Wash.*, 14 meters west of the northwest corner of the depot and 9.85 meters south of the nearest rail of the main track.† (Note 18.*)

J_2.—About 0.9 kilometer east of *Satus, Yakima County, Wash.*, 1.78 meters west of the second telegraph pole east of mile pole 60, 10.89 meters south of the nearest rail and in line with the telegraph poles.† (Note 2.*)

717 T.—Near *Mabton, Yakima County, Wash.*, nearly opposite milepost 56, 36 meters south of the nearest rail and 2.8 meters north of the railway fence.† (Note 18.*)

715 T.—At *Mabton, Yakima County, Wash.*, 16.50 meters east of the southeast corner of the Northern Pacific section house and just outside section house yard fence, 9.75 meters north of the nearest rail of the main track. (Note 18.*)

K_2.—About 0.5 kilometer east of *Mabton, Yakima County, Wash.*, 4.35 meters west of the first telegraph pole east of milepost 52, and in line with the telegraph poles, 15.45 meters south of the nearest rail of the main track.† (Note 2.*)

696 T.—At *Byron, Yakima County, Wash.*, 126 meters east of milepost 46, 38 meters south of the nearest rail of the main track, 4 meters south of the center of the Prosser-Mabton wagon road, near the corner of an orchard fence.† (Note 18.*)

L_2.—About 1.3 kilometers east of the siding at *Byron, Yakima County, Wash.*, 2.5 meters west of the third telegraph pole west of mile pole 45, in line with the telegraph poles, and 10 meters south of the nearest rail.† (Note 2.*)

M_2.—At *Prosser, Benton County, Wash.*, in the upper surface of the concrete foundation supporting the pillars of the Northern Pacific water tank, at the southeast side of the southern one of the two eastern pillars, 0.45 meter east of the west edge of the foundation and 0.07 meter west of the east edge, 7.55 meters south of the nearest rail of the main track. (Note 57,* not leaded.)

661 T.—At *Prosser, Benton County, Wash.*, 53.5 meters west of the northwest corner of the Northern Pacific depot, in the corner of an orchard, 12 meters north of the nearest rail of the main track and 0.8 meter east of the sidewalk. (Note 18.*)

N_2.—At *Prosser, Benton County, Wash.*, in the vertical surface of the east end of the south brick wall of the Nelson Rich block on Sixth Street, 1.51 meters above the foundation of the building and 0.21 meter from either edge of the south wall. (Note 1.*)

O_2.—At *Prosser, Benton County, Wash.*, in front of the show window of the Carl A. Jensen block on Bennett Avenue, in the top of the concrete coping, 1 meter west of the east edge and 2.95 meters east of the entrance to the drug store in the block. (Note 1.*)

P_2.—About 0.9 kilometer east of *Prosser, Benton County, Wash.*, 116 meters east of mile pole 40, opposite the third telegraph pole east of the mile pole, and 5.4 meters north of the nearest rail.† (Note 2.*)

627 T.—At *Gibbon, Benton County, Wash.*, about 0.7 kilometer east of milepost 35 and about 45 meters north of the nearest rail of the main track.† (Note 18.*)

534 T.—At *Chandler* (siding), *Benton County, Wash.*, 45 meters east of mile pole 30, about 4.7 meters north of the center of the main track and about 0.5 meter west of the southwest corner of the fence surrounding the yard of the Northern Pacific section house. (Note 18.*)

Q_2.—About 2.7 kilometers west of *Kiona, Benton County, Wash.*, 0.4 kilometer east of milepost 26, in a ledge of natural rock, 3.03 meters south of the nearest rail and on a level with the track.† (Note 57,* not leaded.)

515 T.—At *Kiona, Benton County, Wash.*, in the northeast corner of the railroad park west of the depot, 8.3 meters west of the northwest corner of the station and 3.47 meters south of the nearest rail of the main track.† (Note 18.*)

R_2.—At *Kiona, Benton County, Wash.*, in the southeast corner of the railroad park north of the track, 7.48 meters north of the nearest rail of the main track, 13.40 meters north of the northeast corner of the station and 1.40 meters northwest of the corner post of the park fence, on a granite post.† (Note 11.*)

S_2.—1.6 kilometers east of *Kiona, Benton County, Wash.*, 1.52 meters east of the second telegraph pole west of mile pole 23 and 15.5 meters south of the track, in line with the telegraph poles.† (Note 18.*)

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* See pp. 162-166.

† This bench mark is on the Northern Pacific Railway.

640 T.—Nearly 3 kilometers west of *Badger, Benton County, Wash.*, about 10 meters north of mile pole 19 and about 13 meters north of the track.† (Note 18.*)

T_2.—At *Badger, Benton County, Wash.*, 21 meters north of mile pole 17, 27.8 meters north of the nearest rail of the main track near the line of the Northern Pacific right of way, on a granite post. (Note 11.*)

605. T—About 4.7 kilometers east of *Badger, Benton County, Wash.*, 0.95 meter east of the first telegraph pole east of mile pole 14, and 15.25 meters south of the nearest rail, in line with the telegraph poles.† (Note 18.*)

567 T.—At *Relief* (siding), *Benton County, Wash.*, 0.75 meter east of the seventh telegraph pole west of mile pole 8, and 15.50 meters south of the nearest rail of the main track, in line with the telegraph poles.† (Note 18.*)

U_2.—Near *Relief, Benton County, Wash.*, 3.9 meters east of the first telegraph pole west of mile pole 8, 15.50 meters south of the track, in line with the telegraph poles, a granite post.† (Note 11.*)

V_2.—At *Kennewick, Benton County, Wash.*, near the building of the Northern Pacific Irrigation Co., on Front Street, about 38 meters west of Yakima Street, 0.5 meter from the north and west walls of an alcove in the northwest corner. (Note 2.*)

362 T.—At *Kennewick, Benton County, Wash.*, about 30 meters southeast from the southeast corner of the old station now used for a freight depot, about 10 meters southeast of the nearest rail of the main track, and about 3 meters northwest of the northwest corner of the section house.† (Note 18.*)

W_2.—At *Kennewick, Benton County, Wash.*, in the yard surrounding the residence of L. E. Moore, 5.1 meters southwest of the southwest corner of the house, 5 meters east of the fence inclosing the yard in front of the house, and 70 meters north of the main track of the Northern Pacific Railway, on a granite post. (Note 11.*)

X_2—About 2 kilometers east of *Kennewick, Benton County, Wash.*, at the west end of the Northern Pacific Railway bridge over Columbia River, on the south side of the track, in the top of the concrete cap for the concrete pier, about 0.15 meter from the east and west edges, and 2.20 meters below the level of the track. (Note 1.*)

Y_2.—About 2 kilometers west of the depot at *Pasco, Franklin County, Wash.*, at the east end of the Northern Pacific Railway bridge over Columbia River, on the south side of the track, in the top of the concrete cap for the concrete pier, about 0.15 meter from the east and west edges and about 2.20 meters below the level of the track. (Note 1.*)

Z_2.—About 1 kilometer west of *Pasco, Franklin County, Wash.*, 83 meters southwest of the first switch stand, in line with the telegraph poles, and 12.2 meters southeast of the nearest rail.† (Note 2.*)

378 T.—At *Pasco, Franklin County, Wash.*, at the northwest corner of the brick roundhouse of the Northern Pacific Railway Co., in the center of the third course of bricks above the stone foundation. (Note 17.*)

A_3.—At *Pasco, Franklin County, Wash.*, in the yard surrounding the Hotel Pasco, on Court Street, 0.70 meter west of the sidewalk in front of the hotel, 10.35 meters east of the east side of the hotel, and 57.50 meters south of the main track on a granite post.† (Note 11.*)

B_3.—Near *Pasco, Franklin County, Wash.*, on the Northern Pacific Railway bridge over Snake River, on top of the granite retaining wall for the west abutment, 0.3 meter west of the east edge of the granite capstone, and 2.3 meters south of the nearest rail. (Note 1.*)

C_3.—Near *Pasco, Franklin County, Wash.*, on the Northern Pacific Railway bridge over Snake River, at the first pier from the west end, 1.25 meters south of the nearest rail. The bench mark is the intersection of cross lines cut with a chisel in the horizontal surface of a girder at the east end of a truss; marked "U. S. B. M." in the angles.

D_3.—Near *Pasco, Franklin County, Wash.*, on the Northern Pacific Railway bridge over Snake River, on the girder at the west end of the truss at the third pier from the west end, 1.25 meters south of the nearest rail. Marked like C_3 above.

E_3.—Near *Pasco, Franklin County, Wash.*, on the Northern Pacific Railway bridge over Snake River, at the fourth pier from the west end of the bridge, 1.25 meters south of the nearest rail. Marked like C_3 above.

F_2.—Near *Pasco, Franklin County, Wash.*, on the Northern Pacific Railway bridge over Snake River, at the fifth pier from the west end of the bridge, 1.25 meters south of the nearest rail. Marked like C_3 above.

G_3.—Near *Pasco, Franklin County, Wash.*, on the Northern Pacific Railway bridge over Snake River, at the sixth pier from the west end of the bridge, 1.25 meters south of the nearest rail. Marked like C_3 above.

H_3.—Near *Pasco, Franklin County, Wash.*, on the Northern Pacific Railway bridge over Snake River, at the seventh pier from the west end of the bridge, 1.25 meters south of the nearest rail. Marked like C_3 above.

I_3.—In *Walla Walla County, Wash.*, near *Pasco, Franklin County, Wash.*, on the Northern Pacific Railway bridge over Snake River, on the top of the granite retaining wall for the east abutment, 0.3 meter east of the west edge of the granite capstone, and 1.2 meters south of the nearest rail. (Note 1.*)

J_3.—About 6.4 kilometers northwest of *Hunts Junction, Walla Walla County, Wash.*, opposite and about 25 meters northwest of mile pole 5, and 2.4 meters southeast of the first telegraph pole northwest of milepost 5, 11.2 meters northeast of the nearest rail, in the line of the telegraph poles.† (Note 2.*)

341 A.—About 7 kilometers northwest of *Hunts Junction, Walla Walla County, Wash.*, 2 meters northwest of the first telegraph pole southeast of mile pole W6, 11.2 meters northeast of the nearest rail.† (Note 18.*)

K_3.—About 3.2 kilometers northwest of *Hunts Junction, Walla Walla County, Wash.*, 1.6 meters northwest of the first telegraph pole southeast of mile pole 3, 11.2 meters northeast of the nearest rail, in line with the telegraph poles.† (Note 2.*)

L_3.—At *Hunts Junction, Walla Walla County, Wash.*, in the northeast corner of the Northern Pacific Railway section-house yard, 3 meters west of the nearest rail on the main track, 0.8 meter south of the north fence, and 0.8 meter west of the east fence inclosing the yard, on a lava post. (Note 11.*)

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* See pp. 162-166.

† This bench mark is on the Northern Pacific Railway.

M_3.—At *Hunts Junction, Walla Walla County, Wash.*, in the southeast corner of the yard surrounding the residence of the storekeeper for the Northern Pacific Railway, 18 meters west of the nearest rail of the main track and 0.7 meter from the south and east fences inclosing the yard. (Note 2.*)

N_3.—Near *Hunts Junction, Walla Walla County, Wash.*, at the west end of the Northern Pacific Railway bridge over Wallawalla River, in the top of the concrete abutment, 1.4 meters from the east and south edges and 1.8 meters south of the nearest rail. (Note 1.*)

O_3.—Near *Hunts Junction, Walla Walla County, Wash.*, at the east end of the Northern Pacific Railway bridge over Wallawalla River, in the top of the abutment, 0.8 meter west of the east edge, 0.5 meter north of the south edge, and 1.8 meters south of the nearest rail. (Note 1.*)

P_3.—About 8.4 kilometers southwest of *Hunts Junction, Walla Walla County, Wash.*, about 2 meters south of the seventh telegraph pole southwest of mile pole 5 and 12 meters south of the nearest rail.† (Note 2.*)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN SAN DIEGO AND BARSTOW, CAL., 1906.

Tidal 7.—At *San Diego, San Diego County, Cal.* The bench mark is directly under Tidal 6, described below, in the surface of a cement collar or encasement, built around the pile as a protection against destructive sea life. It is marked by a hole ¾ inch in diameter and 2 inches deep, filled with babbitt metal, toward the northwest corner of the cement encasement. A rod held upon this point clears the north side of the pier.

Tidal 6.—At *San Diego, San Diego County, Cal.*, at the United States quarantine wharf, on the north side of the long pier, at a point 12 feet east of the north and south line passing along the west side of the barracks. The mark is the head of a large iron bolt countersunk into the upper surface of the wooden sill into which copper tacks were driven flush with the surface, forming a cross and the letters "U. S. B. M."

Tidal 3.—At *San Diego, San Diego County, Cal.*, in the United States quarantine grounds, near the inner end of the pier and southwest of the blacksmith shop. The mark is the center of the top of a cement monument, 1 foot square and 2 feet long, projecting 1 foot above the ground, resting upon a pier built of rocks and cement upon the sand, 3 feet deep, 2½ by 4 feet at the bottom, and 2 by 1½ feet at the top. The monument was marked on the top by the letters "U. S. C. S. 1906," and two diagonal lines, with a light dot at the center.

Tidal 2.—At *San Diego, San Diego County, Cal.*, near the northeast corner of the residence of the United States quarantine surgeon, on the cover of a sewer, a granite slab 4 feet square, resting on a brick foundation and having an iron-covered manhole, 2 feet in diameter, in its center. The mark is a drill hole filled with lead 3½ inches from the edge of the iron cover, and northwest of the center of the hole.

Tidal 5.—At *San Diego, San Diego County, Cal.*, in the United States quarantine grounds, near the southeast corner of the cottage hospital, on the cover of a sewer, a granite slab 4 by 4 feet, cemented upon masonry and having an iron manhole 2 feet in diameter in its center. The mark is a hole ¾ inch in diameter and 2 inches deep, filled with babbitt metal flush with the surface, 6½ inches from the manhole, on the southeast corner.

Tidal 4.—At *San Diego, San Diego County, Cal.*, outside the United States quarantine grounds, near the northwest corner about 110 feet north of the fence. It is marked by a cement pier or monument similar to Tidal 3 (p.—). The soil at the depth of 3 feet and for about a foot above is almost a hardpan—a packed gravelly clay which can scarcely be penetrated without a pick.

Tidal 1.—At *San Diego, San Diego County, Cal.*, about 400 feet almost due north of the northwest corner of the United States quarantine grounds. The mark is the center of the top of a granite block 10 inches square which is tilted slightly so that the east side of the top is ¾ inch lower than the west side, and the south side is ½ inch lower than the north side.

35 Sea.—At *Roseville, Point Loma, San Diego County, Cal.*, an iron pipe, marked "35 Sea," in the northeast corner of the public-school grounds. (Note 18.*)

A.—About 1¼ miles north of *Roseville, Point Loma, San Diego County, Cal.*, at the inside corner of the public road leading from Roseville to Old Town, in range with the telephone poles, and 1 meter south of the pole set in the corner. The mark is set in hardpan. (Note 2.*)

B.—About 1⅔ miles north of *San Diego, San Diego County, Cal.*, on the Atchison, Topeka & Santa Fe Railway right of way, about 50 meters north of mile pole 266, in the center of the horizontal surface at the west end of concrete culvert "C 266," and 2½ meters below the rail. (Note 1.*)

C.—At *San Diego, San Diego County, Cal.*, at the southwest corner of Fir and California Streets, on the Atchison, Topeka & Santa Fe Railway right of way, 3 meters west of the track, and on the west side of the iron rim to a manhole. (Note 13.*)

42 S. D.—At *San Diego, San Diego County, Cal.*, in the foundation pile 4 feet above the ground just north of the southeast corner of the east wing of the courthouse. (Note 17.*)

City.—At *San Diego, San Diego County, Cal.*, at the southwest corner of Third and D Streets; the north corner of the granite base of the west column at the main entrance to the San Diego Union Building (old City Hall). It corresponds to 40.00 feet of the city datum.

D.—At *Old Town, San Diego County, Cal.*, about 100 meters east of the Atchison, Topeka & Santa Fe Railway, in the southwest corner of the public-school grounds. The mark is set in hardpan. (Note 11.*)

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* See pp. 162-166. † This bench mark is on the Northern Pacific Railway.

25 S. D.—At *American Park, San Diego County, Cal.*, about 215 meters north of the railway station, at the southwest angle of the junction of the road to Pacific Beach. (Note 18.*)

E.—About 1 mile north of *Atwood, San Diego County, Cal.*, on the Atchison, Topeka & Santa Fe Railway right of way; in the center of the horizontal surface at the west end of concrete culvert F260. (Note 4.*)

F.—About 1¼ miles northwest of *Ladrillo, San Diego County, Cal.*, and 25 meters northwest of mile pole 258 and ⅓ meter east of the Atchison, Topeka & Santa Fe Railway right of way. The mark is set in clay in a fence corner. (Note 2.*)

G.—About 80 meters west of the signboard at *Selwyn, San Diego County, Cal.*, and 16 meters north of the Atchison, Topeka & Santa Fe track. (Note 11.*)

376 S. D.—At *Linda Vista, San Diego County, Cal.*, 8 meters west of the section house, 3 meters east of the siding, in the northwest corner of the yard. (Note 18.*)

31 S. D.—At *Sorrento, San Diego County, Cal.*, 11 meters north of the station; 5 meters northwest of the section house, 8 meters east of a road crossing. (Note 18.*)

H.—At *Sorrento, San Diego County, Cal.*, about 75 meters southwest of the Atchison, Topeka & Santa Fe Railway station; in the corner of the fence, on land owned by John Works. (Note 11.*)

I.—About 1 mile south of *Del Mar, San Diego County, Cal.*, 1 meter south of the second telegraph pole south of the road crossing, 15 meters east of the Atchison, Topeka & Santa Fe track and 3 meters above the rail. The mark is set in sand. (Note 2.*)

J.—At *Del Mar, San Diego County, Cal.*, in the center of the east face of an old cement foundation on west Tenth Street, about 100 meters west of the Atchison, Topeka & Santa Fe Railway, and on land owned by J. W. Bennett. (Note 4.*)

K.—About 1¼ miles southeast of *Encinitas, San Diego County, Cal.*, in the center of the horizontal surface of the coping at the southwest end of concrete culvert A240 of the Atchison, Topeka & Santa Fe Railway. (Note 4.*)

L.—At *Enrinitas, San Diego County, Cal.*, about ¼ mile west of the Atchison, Topeka & Santa Fe Railway station, in the middle of the front yard of the public-school grounds at the corner of Third and E Streets. The mark is set in cement about 35 meters east of the schoolhouse. (Note 2.*)

M.—About ⅔ of a mile southeast of *Carlsbad, San Diego County, Cal.*, on a public highway, near the intersection of the Atchison, Topeka & Santa Fe Railway right-of-way fence and the cattle guard at the eastern corner of the crossing. (Note 11.*)

N.—At *Carlsbad, San Diego County, Cal.*, about 175 meters southwest of the Atchison, Topeka & Santa Fe Railway station, at the south end of the first concrete basement step at the east corner of the most northerly house in the park owned by the Huntington Syndicate Co. (Note 4.*)

O.—At *Oceanside, San Diego County, Cal.*, on railroad property, about 60 meters south of the Atchison, Topeka & Santa Fe station, about 10 meters southwest of the track, and ⅓ meter outside of the fence. (Note 11.*) Probably destroyed in 1913.

P.—At *Oceanside, San Diego County, Cal.*, on the south corner of First and Ditmar Streets; in the northeast side of the First Methodist Episcopal Church; ⅔ meter from the north corner, and 1 meter above the ground. (Note 4.*)

Q.—At *Oceanside, San Diego County, Cal.*, at the west corner of Second and Hill Streets, on the step of the side entrance to the Oceanside Bank building. (Note 13.*)

R.—At *Oceanside, San Diego County, Cal.*, on the northwest side of Third Street, between Tremont and Hill Streets, in the northeast side of the brick store owned by P. J. Brannen; 1 meter from the east corner and 1 meter above the ground. (Note 1.*)

S.—About ⅔ of a mile southeast of *Las Flores, San Diego County, Cal.*, 9½ telegraph poles southeast of mile pole 219, and 12 meters southwest of the Atchison, Topeka & Santa Fe Railway track. The mark is set in clay. (Note 2.*)

T.—About ⅓ mile southeast of *Las Flores, San Diego County, Cal.*, ⅓ meter from the northwest corner of the horizontal surface of the coping at the southwest end of concrete culvert A220 of the Atchison, Topeka & Santa Fe Railway. The mark is 3 meters below the rail. (Note 4.*)

84 S. B.—At *Las Flores, San Diego County, Cal.*, 3 meters southwest of the water tank on the east side of the track. (Note 18.*)

U.—About 45 meters west of the signboard at *Don* (formerly *Jerome*), *San Diego County, Cal.*, between the Atchison, Topeka & Santa Fe Railway right-of-way fence and the first telephone pole northwest of the warehouse. (Note 11.*)

165 S. B.—About 2.4 miles northwest of *Don* (formerly *Jerome*), *San Diego County, Cal.*, 16 meters east of the Atchison, Topeka & Santa Fe track, in a fence corner on the south side of the cattle crossing. (Note 18.*)

28 S. B.—At *San Onofre, San Diego County, Cal.*, in the yard, 6 meters in front of the section bunk house. (Note 18.*)

V.—About $^2/_5$ mile west of *San Onofre, San Diego County, Cal.*, about 150 meters west of the crossing of the county road and the Atchison, Topeka & Santa Fe Railway, on the north side of the road and ⅓ meter south of the railroad right of way. (Note 11.*)

W.—About ⅓ mile northwest of *Mateo, Orange County, Cal.*, about 75 meters east of the Atchison, Topeka & Santa Fe Railway, 3 meters north of the county road, and 4 meters west of the bridge, near the corner of the fence. (Note 2.*)

X.—About ⅔ mile north of *Serra, Orange County, Cal.*, opposite the second telegraph pole southwest of mile pole 199; ½ meter southeast of the Atchison, Topeka & Santa Fe Railway right of way; in the corner of a fence, at the foot of a hill. (Note 2.*)

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* See pp. 162-166.

103 S. B.—At *San Juan Capistrano* (railroad station, *Capistrano*), *Orange County, Cal.*, in the northwest corner of the lower plot south of the Atchison, Topeka & Santa Fe station and east of the track. (Note 18.*)

Y.—At *San Juan Capistrano* (railroad station, *Capistrano*), *Orange County, Cal.*, northeast of the Capistrano Mission; in the southwest corner of the public-school grounds. (Note 11.*)

Z.—At *San Juan Capistrano* (railroad station, *Capistrano*), *Orange County, Cal.*, ¼ mile north of the Atchison, Topeka & Santa Fe Railway station, and about 100 meters north of mile pole 197, at the east end of a large concrete culvert, ⅓ meter from the north end of the horizontal surface of the coping. (Note 1.*)

A_1.—About 4⅓ miles south of *El Toro, Orange County, Cal.*, in the center of the horizontal surface of the coping at the west end of concrete culvert A193 of the Atchison, Topeka & Santa Fe Railway. (Note 14.)

278 S. B.—About 4⅓ miles south of *El Toro, Orange County, Cal.*, about 13 meters east of the Atchison, Topeka & Santa Fe track, in a fence corner at a road crossing. (Note 18.*)

444 S. B.—At *El Toro, Orange County, Cal.*, about 2 feet from the front of the schoolhouse in the angle formed by the porch and the building. (Note 18.*)

B_1.—About 1½ miles southeast of *Irvine, Orange County, Cal.*, opposite half-mile pole 194½; at the corner of the public road, ⅓ meter north of the Atchison, Topeka & Santa Fe Railway right of way. (Note 11.*)

C_1.—At *Irvine, Orange County, Cal.*, 40 meters south of the Atchison, Topeka & Santa Fe Railway station; in the north corner of the public-school grounds. (Note 11.*)

D_1.—About ½ mile southeast of *Aliso, Orange County, Cal.*, on the public highway, at the southwest corner of the road crossing, near mile pole 178. (Note 2.*)

E_1.—At *Santa Ana, Orange County, Cal.*, about 1½ miles southeast of the Atchison, Topeka & Santa Fe Railway station and 3½ telegraph poles west of mile pole 177, in the horizontal surface of the irrigation culvert, on the south side of the track, at the road crossing. (Note 4.*)

F_1.—At *Santa Ana, Orange County, Cal.*, the largest point of the star on the top of the hydrant on the north side of Chestnut Street, between the Southern Pacific Railway and the Atchison, Topeka & Santa Fe Railway.

City.—At *Santa Ana, Orange County, Cal.*, a copper wire set in the center of a cement block, on the northeast corner of Third and Garfield Streets.

G_1.—At *Santa Ana, Orange County, Cal.*, in the water table facing Third Street at the northwest corner of the city hall, and 1¼ meters above the walk. (Note 1.*)

H_1.—At *Santa Ana, Orange County, Cal.*, on the southeast corner of the east granite balustrade, at the main entrance to the courthouse, 1 meter above the walk. (Note 13.*)

I_1.—At *Orange, Orange County, Cal.*, in the center of the west side of the plaza, 5 meters east of the west fence. (Note 2.*)

J_1.—At *Orange, Orange County, Cal.*, in the vertical surface of the concrete water table at the north side of the main entrance to the Union High School building, and ⅓ meter above the balustrade. (Note 1.*)

K_1.—About 1¼ miles north of *Orange, Orange County, Cal.*, about 45 meters north of mile pole 46, and just southeast of a road crossing, on land owned by N. T. Edwards. (Note 11.*)

L_1.—At *Olive, Orange County, Cal.*, about 225 meters northeast of the Atchison, Topeka & Santa Fe Railway station in the public-school grounds on the west side of the front entrance to the schoolhouse and near the main building. The mark is set in gravel. (Note 2.*)

M_1.—About ⅞ mile north of *Olive, Orange County, Cal.*, at the northeast corner of the steel base of the plate girder bridge A44 of the Atchison, Topeka & Santa Fe Railway, and about ⅔ meter below the rail. (Note 13.*)

N_1.—At *Richfield, Orange County, Cal.*, about 40 meters north of the railroad station, at the northwest corner of the highway crossing, and in range with the telephone poles. (Note 11.*)

R. R.—About 1 mile east of *Yorba, Orange County, Cal.*, near the junction of two public roads. The mark is a wire nail inclosed in an outlined square in the center of the horizontal surface at the north end of concrete culvert D40 of the Atchison, Topeka & Santa Fe Railway.

O_1.—1½ telegraph poles southwest of the signboard at *Horse Shoe Bend, Orange County, Cal.*, on the sloping surface of the concrete canal, at the road crossing, and 8 meters south of the small highway bridge. (Note 1.*)

P_1.—About 1⅓ miles west of *Gypsum, Orange County, Cal.*, ⅓ meter from the east end of the horizontal surface of the coping at the north end of concrete culvert C35 of the Atchison, Topeka & Santa Fe Railway. The mark is lettered "U. S." (Note 4.*)

Q_1.—About 1 mile southwest of *Crary, Riverside County, Cal.*, 23 meters south of mile pole 29, and 14 meters west of the Atchison, Topeka & Santa Fe track, on the north slope of a small knoll. (Note 2.*)

494 S. B.—At *Crary (Rincon), Riverside County, Cal.*, on north side of street at southeast corner of post office and store. (Note 18.*)

R_1.—About ⅔ mile northeast of *Crary (Rincon), Riverside County, Cal.*, on the Atchison, Topeka & Santa Fe Railway right of way; at the northwest corner of the road crossing. (Note 11.*)

S_1.—At *Corona, Riverside County, Cal.*, directly south of the Atchison, Topeka & Santa Fe Railway station, in the center of the triangular park belonging to the railroad company. (Note 2.*)

T_1.—At *Corona, Riverside County, Cal.*, on the west side of Main Street; in the northeast corner of the Masonic Block, ½ meter from the east face, and 1⅓ meters above the walk. (Note 4.*)

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* See pp. 162-166.

City.—At *Corona, Riverside County, Cal.*, at the northwest corner of Main and Sixth Streets, 2 meters southeast of the main entrance to the Citizens' Bank. The mark is a metal plug set in the cement walk, and corresponds to 171.20 feet, city datum.

U_1.—Within the city limits of *Riverside, Riverside County, Cal.*, 1 telegraph pole southwest of signboard "ALVORD," near the eastern corner of a road crossing, and on land owned by J. T. Hamner. (Note 2.*)

687 May.—Within the city limits of *Riverside, Riverside County, Cal.*, ¼ mile southwest of signboard "MAY," in the boulevard, about 75 meters northeast of the Magnolia Avenue crossing. (Note 18.*)

V_1.—Within the city limits of *Riverside, Riverside County, Cal.*, about 2¾ miles southwest of Arlington; at the southernmost corner of the road crossing, near mile pole 19, and 1 meter northwest of a telephone pole. (Note 11.*)

814 Arlington.—Within the city limits of *Riverside, Riverside County, Call*, in the center of the park at the Southern California Railway depot at Arlington. (Note 18.*)

W_1.—Within the city limits of *Riverside, Riverside County, Cal.*, ½ mile northeast of Arlington, and 4 telegraph poles northeast of mile pole 16; at the northwest corner of a road crossing, and on land owned by R. L. Carpenter. (Note 11.*)

X_1.—Within the city limits of *Riverside, Riverside County, Cal.*, about 1 mile southwest of Casa Blanca, on the horizontal surface, at the angle, of the northwest side of the northeast abutment of trestle D15 of the Atchison, Topeka & Santa Fe Railway. (Note 13.*)

861 Casa Blanca.—Within the city limits of *Riverside, Riverside County, Cal.*, in the southeast concrete foundation pier of the depot platform at Casa Blanca. The mark is a copper bolt, stamped "861," 1 foot underground, and protected by a covered concrete cylinder 4 inches high.

863 Olivewood.—About 1½ miles south of the Atchison, Topeka & Santa Fe station at *Riverside, Riverside County, Cal.*, and 4 telegraph poles south of mile pole 12, at the northwest corner of the road crossing and about two meters east of the canal. The mark is an iron post marked "863." (Note 18.*)

Y_1.—At *Riverside, Riverside County, Cal.*, 2 meters west of the northeast corner of the county courthouse, in the center of the small projection, and ⅓ meter above the ground. (Note 4.*)

851 Riverside.—At *Riverside, Riverside County, Cal.*, in an alcove on the right of the main entrance to the Loring Opera House, and 4 feet above the sidewalk. (Note 17.*)

Z_1.—At *Riverside, Riverside County, Cal.*, on the horizontal surface of the cement balustrade, at the east side of the main entrance to the Carnegie Public Library, ⅓ meter from the building. (Note 1.*)

945 Highgrove.—At *Highgrove, Riverside County, Cal.*, at the south end of the depot park. (Note 18.*)

A_2.—At *Colton, San Bernardino County, Cal.*, on the east end of the lowest cement step at the main entrance to the Colton Grain & Milling Co.'s building. (Note 13.*)

B_2.—At *San Bernardino, San Bernardino County, Cal.*, about 1 mile southwest of the Atchison, Topeka & Santa Fe Railway station, at the southwest corner of the Walnut Street crossing, in the corner of a fence, and on land owned by the city of Colton. (Note 2.*)

1048 San Bernardino.—At *San Bernardino, San Bernardino County, Cal.*, in the stone foundation at the northwest corner of courthouse building. (Note 17.*)

C_2.—At *San Bernardino, San Bernardino County, Cal.*, on the south corner of the granite balustrade at the southeast side of the main entrance to the public library. (Note 13.*)

City.—At *San Bernardino, San Bernardino County, Cal.*, on the north side of Third Street near E Street, in the west end of the water table on the Katz Building. (Note 13.*)

D_2.—At *San Bernardino, San Bernardino County, Cal.*, 1 mile northeast of the Atchison, Topeka & Santa Fe Railway station; at the southeast corner of Ninth and I Streets; in the corner of a fence, on land owned by J. B. Schmitzen. (Note 2.*)

1420 S. B.—About 2.8 miles southward from *Verdemont, San Bernardino County, Cal.*, 50 feet east of the Atchison, Topeka & Santa Fe track at a point where three wagon roads pass over one common crossing. (Note 18.*)

E_2.—About 2.0 miles southeast of *Verdemont, San Bernardino County, Cal.*, on the sloping surface of the southwest end of the southeast concrete abutment of trestle B76 of the Atchison, Topeka & Santa Fe Railway. (Note 4.*)

F_2.—1 telegraph pole southeast of signboard at *Verdemont, San Bernardino County, Cal.*, and 15 meters southwest of the Atchison, Topeka & Santa Fe track. (Note 2.*)

G_2.—At *Devore, San Bernardino County, Cal.*, near the county road crossing, about 55 meters northwest of mile pole 71 and 13 meters east of the road, at the inside corner of a stone wall, on land owned by J. A. Devore. (Note 2.*)

2008 S. B.—About ½ mile west of *Devore, San Bernardino County, Cal.*, at the northeast corner of the crossroads at the Glen Helen ranch. (Note 18.*)

H_2.—1 telegraph pole west of signboard at *Keenbrook, San Bernardino County, Cal.*, and 25 meters southeast of the road crossing. (Note 2.*)

I_2.—About 2½ miles south of *Cajon, San Bernardino County, Cal.*, on the west side of the track, in the center of the coping of the large concrete arch bridge A66 of the Atchison, Topeka & Santa Fe Railway. (Note 1.*)

2768 S. B.—At *Dell, San Bernardino County, Cal.*, at the road station, inside of the garden fence east of the county road. (Note 18.*)

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* See pp. 162-166.

J_2.—At *Cajon, San Bernardino County, Cal.*, 18 meters northwest of the Atchison, Topeka & Santa Fe station, in the northwest end of the flower plat. (Note 11.*)

K_2.—About ⅓ mile south of *Gish, San Bernardino County, Cal.*, 2 telegraph poles north of mile pole 60, and 12 meters west of the Atchison, Topeka & Santa Fe track. (Note 2.*)

3685 S. B.—About 4¾ miles north of *Cajon, San Bernardino County, Cal.*, on the west side of track, at a point where the county road recrosses the Atchison, Topeka & Santa Fe Railway. (Note 18.*)

L_2.—At *Summit, San Bernardino County, Cal.*, at the northwest corner of the Atchison, Topeka & Santa Fe station and 9 meters northwest of the track. (Note 11.*)

M_2.—About 1¾ miles northeast of *Summit, San Bernardino County, Cal.*, at the road crossing, 1 telegraph pole southeast of mile pole 54, ¾ meter east of the Atchison, Topeka & Santa Fe Railway right of way. (Note 2.*)

3462 S. B.—2 miles north of *Summit, San Bernardino County, Cal.*, 13 meters west of the Atchison, Topeka & Santa Fe Railway track and 7 meters north of the second wagon road that crosses the railroad. (Note 18.*)

N_2.—About 1¼ miles south of *Hesperia, San Bernardino County, Cal.*, in the southeast corner of the reservoir tract of the Hesperia Land & Water Co., near a road crossing and 45 meters west of the Atchison, Topeka & Santa Fe track. (Note 2.*)

3190 S. B.—At *Hesperia, San Bernardino County, Cal.*, at the northeast corner of the brick hotel building. (Note 18.)

O_2.—At *Hesperia, San Bernardino County, Cal.*, near a road crossing 5 meters north of mile pole 45, and on range with the telegraph poles along the Atchison, Topeka & Santa Fe Railway. (Note 11.*)

2856 Hesperia.—4¾ miles north of *Hesperia, San Bernardino County, Cal.*, the mark is a cross in the north end of the coping at the west end of the small cement culvert A41 of the Atchison, Topeka & Santa Fe Railway.

P_2.—About 1½ miles south of *Victorville, San Bernardino County, Cal.*, 7½ telegraph poles southeast of mile pole 38, at an offset in the Atchison, Topeka & Santa Fe Railway right of way fence. (Note 2.*)

2723 S. B.—At *Victorville, San Bernardino County, Cal.*, at the south corner of the road crossing near the first telegraph pole east of mile pole 37,100 meters north of the wagon bridge over the Mojave River and 20 meters west of the Atchison, Topeka & Santa Fe Railwav track. (Note 18.*)

Q_2.—At *Victorville, San Bernardino County, Cal.*, about 90 meters south of the Atchison, Topeka & Santa Fe Railway station, in the front face of the northerly corner of the cement stone building owned by J. C. Turner, 1⅓ meters above the walk. (Note 1.*)

R_2.—At *Victorville, San Bernardino County, Cal.*, about 150 meters south of the Atchison, Topeka & Santa Fe Railway station, in the northeast corner of the public school grounds. (Note 11.*)

S_2.—About ½ mile northwest of *Victorville, San Bernardino County, Cal.*, on the red sandstone base at the east side of the north end of steel trestle A37 of the Atchison, Topeka & Santa Fe Railway. (Note 15.*)

T_2.—At *Oro Grande, San Bernardino County, Cal.*, ⅓ mile southeast of the Atchison, Topeka & Santa Fe Railway station, and 7 telegraph poles northwest of mile pole 32, in range with the poles. (Note 2.*)

U_2.—At *Oro Grande, San Bernardino County, Cal.*, east of the Atchison, Topeka & Santa Fe Railway station, in the public-school grounds, ⅓ meter southwest of the south porch of the schoolhouse. (Note 11.*)

V_2.—About 2½ miles northwest of *Oro Grande, San Bernardino County, Cal.*, on the westerly corner of concrete abutment to trestle A30 of the Atchison, Topeka & Santa Fe Railway right of way, 3⅔ telegraph poles southeast of mile pole 29. (Note 14.*)

W_2.—About 5 miles south of *Helen, San Bernardino County, Cal.*, midway between the Atchison, Topeka & Santa Fe Railway track and the public road, opposite mile pole 26. (Note 2.*)

X_2.—About 3 miles south of *Helen, San Bernardino County, Cal.*, in the corner of the fence about 80 meters west of mile pole 24. (Note 2.*)

Y_2.—At *Helen, San Bernardino County, Cal.*, about 20 meters northeast of the water tank, on the Atchison, Topeka & Santa Fe Railway right of way, in range with the telegraph poles. (Note 11.*)

Z_2.—About 1½ miles north of *Helen, San Bernardino County, Cal.*, in range with the telegraph poles on the Atchison, Topeka & Santa Fe Railway right of way at mile pole 19½, and 1½ meters above the rail. (Note 2.*)

A_3.—About 4½ miles north of *Helen, San Bernardino County, Cal.*, in the center of the horizontal surface of the south coping of concrete culvert A17 of the Atchison, Topeka & Santa Fe Railway. (Note 14.*)

B_3.—About 2 miles southwest of *Cottonwood, San Bernardino County, Cal.*, 1 telegraph pole northeast of mile pole 14 on the Atchison, Topeka & Santa Fe Railway right of way, in range with poles. (Note 2.*)

C_3.—At *Cottonwood, San Bernardino County, Cal.*, on the Atchison, Topeka & Santa Fe Railway right of way, 2½ telegraph poles north of mile pole 12, at the northwest corner of the section house, 1½ meters below the rail. (Note 11.*)

D_3.—About 2.0 miles north of *Cottonwood, San Bernardino County, Cal.*, on the Atchison, Topeka & Santa Fe Railway right of way, 2 telegraph poles southwest of mile pole 10, in the center of the horizontal surface of the northwest coping of concrete culvert A11. (Note 14.*)

E_3.—About 3½ miles north of *Cottonwood, San Bernardino County, Cal.*, in range with the telegraph poles on the Atchison, Topeka & Santa Fe Railway right of way, at mile pole 8½. (Note 2.*)

F_3.—About 1¼ miles northeast of *Todd, San Bernardino County, Cal.*, at the road crossing, 11 meters southeast of the ninth telegraph pole northeast of mile pole 5. (Note 2.*)

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* See pp. 162–166.

G_3.—About 1 mile south of *Barstow, San Bernardino County, Cal.*, on the Atchison, Topeka & Santa Fe Railway right of way, 1½ telegraph poles south of mile pole 1, and ¼ meter from the north end of the horizontal surface of the east coping of concrete culvert A2, lettered "U. S." (Note 4.*)

H_3.—At *Barstow, San Bernardino County, Cal.*, about 215 meters west of the Atchison, Topeka & Santa Fe Railway station, 2½ telegraph poles east of mile pole 747, 35 meters north of the railway track, in a fence corner, on land owned by Charles O'Donnell. (Note 11.*)

I_3.—At *Barstow, San Bernardino County, Cal.*, on the Atchison, Topeka & Santa Fe Railway right of way, on the northwest corner of the west concrete foundation, at the south end of the viaduct over the railroad tracks. (Note 1.*)

J_3.—At *Barstow, San Bernardino County, Cal.*, about 100 meters south of the Atchison, Topeka & Santa Fe Railway station, in the public-school grounds, at the southwest corner of the school building; set in cement. (Note 2.*)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN POCATELLO, IDAHO, AND BUTTE, MONT., 1906.

A_3.—At *Pocatello, Bannock County, Idaho.* (See p. 169.)

B_3.—At *Pocatello, Bannock County, Idaho.* (See p. 169.)

L_6.—About 4½ miles north of *Pocatello, Bannock County, Idaho*, on the Oregon Short Line Railroad right of way, 6 telegraph poles south of mile pole 139; at the east end of a stone culvert, on the north abutment, in the middle of the extreme coping. (Note 15.*)

M_6.—In *Bannock County, Idaho*, about $2^1/_5$ miles due south of *Ross Fork, Bingham County, Idaho*, opposite mile pole 143½, 45 meters west of the Oregon Short Line Railroad right of way, at the angle of the telephone line, in the center of the four braced poles No. 358. (Note 2.*)

N_6.—At *Ross Fork, Bingham County, Idaho*, about 180 meters east of the Oregon Short Line Railroad station; in the south face of the Government warehouse, at the southwest corner, 1⅔ meters above ground. (Note 1.*)

O_6.—At *Ross Fork, Bingham County, Idaho*, at the road crossing, about 100 meters north of the Oregon Short Line Railroad station, 45 meters west of the track, on land of the Fort Hall Indian Reservation. (Note 11.*)

P_6.—At *Gibson, Bingham County, Idaho*, on the Oregon Short Line Railroad right of way at mile pole 151, 15 meters northwest of the signboard "Gibson." (Note 2.*)

Q_6.—About 2⅔ miles south of *Blackfoot, Bingham County, Idaho*, at the road crossing, 12 telegraph poles north of mile pole 155, ½ meter west of the Oregon Short Line Railroad right of way, in the southeast corner of the public road junction. (Note 2.*)

O. S. L. 4.—About 1 mile south of *Blackfoot, Bingham County, Idaho*, on the top of the southwest bolt of the southwest pedestal of girder bridge No. 619.

R_6.—At *Blackfoot, Bingham County, Idaho*, at the Oregon Short Line Railroad water tank, on the northeast corner of the northeasterly foundation stone. (Note 16.*)

S_6.—At *Blackfoot, Bingham County, Idaho*, at the corner of East Main and Judicial Streets, in the northwest corner of the Bingham County courthouse grounds, 3 meters from the west fence. (Note 11.*)

T_6.—At *Blackfoot, Bingham County, Idaho*, on the north side of Bridge Street, at the southeast corner of the Odd Fellows' Hall, on the northeast corner of the projecting lava foundation. (Note 16.*)

U_6.—At *Blackfoot, Bingham County, Idaho*, on West Main Street in the D. W. Standrod & Co.'s bank building, on the vertical surface of the red sandstone window sill, at the north end. (Note 1.*)

V_6.—About ⅓ mile south of *Wapello, Bingham County, Idaho*, on the Oregon Short Line Railroad right of way, 2½ telegraph poles north of mile pole 163½, 15 meters west of the track at the southwest corner of the road crossing. (Note 2.*)

W_6.—At *Wapello, Bingham County, Idaho*, at the road crossing, 35 meters west of signboard "Wapello," in range with the telephone poles. (Note 11.*)

X_6.—About 2 miles north of *Wapello, Bingham County, Idaho*, on the Oregon Short Line Railroad right of way, 45 meters northwest of mile pole 166; at the northwest corner of the road crossing. (Note 2.*)

Y_6.—At *Firth, Bingham County, Idaho*, 30 meters northwest of signboard "Firth," on the north side of the public road, in range with the telephone poles. (Note 2.*)

Z_6.—At *Firth, Bingham County, Idaho*, ¼ mile northeast of signboard "Firth," on the base of the westerly central iron column of the Oregon Short Line Railroad water tank. (Note 13.*)

A_7.—At *Monroe, Bingham County, Idaho*, 4½ telegraph poles north of signboard "Monroe," at the road crossing, in the northeast corner of the junction of the two highways, ⅔ meter west of the Oregon Short Line Railroad right of way. (Note 2.*)

B_7.—About 1½ miles north of *Monroe, Bingham County, Idaho*, 3 telegraph poles south of mile pole 174 of the Oregon Short Line Railroad, near the edge of the horizontal surface of the north abutment of a stone culvert, at the west end. (Note 15.*)

C_7.—At *Shelley, Bingham County, Idaho*, on Main Street, opposite the Oregon Short Line Railroad station, in the front face at the northeast corner of the Shelley Banking Co.'s building, 1 meter above the walk. (Note 1.*)

D_7.—At *Shelley, Bingham County, Idaho*, in the center of the southeast section of the public-school grounds, 25 meters southeast of the main entrance to the school building. (Note 2.*)

* See pp. 162-166.

E_7.—About $3^4/_5$ miles south of *Idaho Falls, Bingham County, Idaho*, on the Oregon Short Line Railroad right of way, at the road crossing, 5 telegraph poles north of mile pole 180, 15 meters west of the track. (Note 11.*)

O. S. L. 7.—At *Idaho Falls, Bingham County*, Idaho, on the north column on the west side of the Oregon Short Line Railroad water tank; on the highest point of the nut on the pin through the brace.

F_7.—At *Idaho Falls, Bingham County, Idaho*, at the northeast corner of Water Avenue and Walnut Street, in the public high-school building, on the east side of the main entrance, in the vertical surface of the stone, 1 meter above the ground. (Note 1.*)

G_7.—At *Idaho Falls, Bingham County, Idaho*, at the corner of Broadway and Sharp Streets, at the northwest corner of the building owned by Crow & Changnon, on the northwest corner of the projecting stone foundation. (Note 14.*)

City.—At *Idaho Falls, Bingham County, Idaho*, at the east door of the Clark-Fanning Building; a cross cut in the east end of the stone sill and lettered "B.M."

H_7.—At *Idaho Falls, Bingham County, Idaho*, in the building used as the post office, in the front face, at the southeast corner, 1⅓ meters above the walk. (Note 4.*)

O. S. L. 6.—At *Idaho Falls, Bingham County, Idaho*, on the east end of the south end pin of the east truss of the south span of bridge 623 over the Snake River. (These directions are based on the assumption that the railroad line toward Butte runs northward.)

I_7.—About 2¾ miles south of *Payne, Bingham County, Idaho*, on the Oregon Short Line Railroad right of way, 3½ telegraph poles south of mile pole 188, in the center of the horizontal surface of the second step from the top, at the west end of the south abutment of a trestle. (Note 5.*)

J_7.—About 1¼ miles northwest of *Payne, Bingham County, Idaho*, at Payne post office, on the River Lea Ranch, owned by C. C. Wilson, opposite the tenth telegraph pole southeast of mile pole 192, in the north corner of the yard. (Note 2.*)

K_7.—About $^2/_5$ mile northwest of *Bassett, Fremont County, Idaho*, at the north corner of the road crossing, 7 telegraph poles northwest of mile pole 196, ⅓ meter northeast of the Oregon Short Line Railroad right of way, in the corner of a fence. (Note 2.*)

L_7.—At *Market Lake, Fremont County, Idaho*, ¼ mile west of the Oregon Short Line Railroad, at the main entrance to the public-school building, in the center of the horizontal surface of the top stone step. (Note 1.*)

M_7.—At *Market Lake, Fremont County, Idaho*, on the Oregon Short Line Railroad water tank, 35 meters north of the station, in the center, on the west side of the slanting surface of the northwest foundation. (Note 15.)

N_7.—About $^4/_5$ mile north of *Market Lake, Fremont County, Idaho*, 3 telegraph poles north of mile pole 202, in the center of the highest surface, on the west end of the south concrete abutment of the Oregon Short Line Railroad steel trestle 627. (Note 14.*)

O_7.—About 4¼ miles north of *Market Lake, Fremont County, Idaho*, on the Oregon Short Line Railroad right of way, at the first telegraph pole south of mile pole 205½, 17 meters east of the track, on the highest point of a large lava rock 3 meters above the ground. (Note 15.*)

O. S. L. 8.—Near *Hawgood, Fremont County, Idaho*, a spike in mile marker 209.

P_7.—About 1⅔ miles southeast of *Hawgood, Fremont County, Idaho*, 15 meters northeast of mile pole 210, ½ meter outside the Oregon Short Line Railroad right-of-way fence. (Note 11.*)

Q_7.—At *Hawgood, Fremont County, Idaho*, on the Oregon Short Line Railroad right of way, 23 meters east of signboard "Hawgood," 14 meters northeast of the track, in range with the telegraph poles. (Note 11,* except post is only 2½ feet long.)

R_7.—At *Hamer, Fremont County, Idaho*, 25 meters southwest of signboard "Hamer" in range with the telegraph poles, outside the Oregon Short Line Railroad right of way. (Note 11.*)

S_7.—About 2⅔ miles south of *Camas, Fremont County, Idaho*, 19 meters east of mile pole 220, and ¾ meter east of the Oregon Short Line Railroad right of way. (Note 52.*)

T_7.—At *Camas, Fremont County, Idaho*, on the north corner of the most northern foundation stone of the Oregon Short Line Railroad water tank, 4 meters southwest of the center of the track. (Note 13.*)

U_7.—About 2¼ miles north of *Camas, Fremont County, Idaho*, on the Oregon Short Line Railroad right of way, 4 telegraph poles south of mile pole 225, on the southwest corner of the west coping of a stone culvert. (Note 16.*)

V_7.—At *Jones, Fremont County, Idaho*, 30 meters west of signboard "Jones," ½ meter west of the Oregon Short Line Railroad right of way. (Note 11.*)

W_7.—About $1^4/_5$ miles north of *Jones, Fremont County, Idaho*, 3½ telegraph poles north of mile pole 229½, at the northeast corner of the road crossing, ½ meter east of the Oregon Short Line Railroad right of way. (Note 52.*)

X_7.—At *Dubois, Fremont County, Idaho*, 95 meters south of the Oregon Short Line Railroad station, opposite the freight depot, in the east corner of the public-school grounds. (Note 11.*)

Y_7.—At *Dubois, Fremont County, Idaho*, 40 meters north of the station, in the center of the west side of the northwest foundation stone, of the Oregon Short Line Railroad water tank, 4 meters east of the center of the track. (Note 5.*)

Z_7.—About 1 mile south of *High Bridge, Fremont County, Idaho*, in range with the telegraph poles on the Oregon Short Line Railroad right of way, 13 meters east of signboard "High Bridge, 1 mile," ⅔ meter below the level of the rail. (Note 2.*)

A_8.—About ⅓ mile south of *High Bridge, Fremont County, Idaho*, 2 telegraph poles north of mile pole 242, 10 meters north of the southwest corner of the road crossing, ⅔ meter west of the Oregon Short Line Railroad right of way. (Note 11.*)

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* See pp. 162–166.

B_8.—At *High Bridge, Fremont County, Idaho*, 4/5 mile north of signboard "High Bridge," 8½ telegraph poles north of mile pole 243, on the horizontal surface at the north end of the west coping of the large Oregon Short Line Railroad stone culvert, 10 meters below the level of the rail. (Note 1.*)

O. S. L. 10.—At *High Bridge, Fremont County, Idaho*, on the bottom sill of the water tank.

C_8.—About 2 miles south of *Spencer, Fremont County, Idaho*, at *China Point*, 40 meters east of mile pole 246, in the north corner of the road crossing, 30 meters northeast of the Oregon Short Line Railroad track. (Note 2.*)

D_8.—At *Spencer, Fremont County, Idaho*, 65 meters southwest of the Oregon Short Line Railroad station, 11 meters north of the north corner of the public-school building. (Note 11.*)

E_8.—At *Spencer, Fremont County, Idaho*, 35 meters northeast of the Oregon Short Line Railroad, at the west corner, in the southwest face of the building owned by the Spencer Harwood Company, 1 meter above the walk. (Note 1.*)

O. S. L. 11.—At *Spencer, Fremont County, Idaho*, 40 meters west of the station on the east corner of the most easterly foundation stone of the Oregon Short Line Railroad water tank, 4 meters southwest of the center of the track. (Note 14.*)

F_8.—About 1⅔ miles north of *Spencer, Fremont County, Idaho*, 10 telegraph poles southeast of mile pole 250, on the Oregon Short Line Railroad right of way, in the center of the horizontal surface of the northeast end of the southeast concrete abutment of trestle No. 642. (Note 4.*)

G_8.—About 3¾ miles north of *Spencer, Fremont County, Idaho*, in beaver canyon at the old discontinued station "Beaver," about 15 meters east of the Oregon Short Line Railroad track, on the public highway at the northeast corner of the road crossing. (Note 2.*)

H_8.—About 3¾ miles southeast of *Humphrey, Fremont County, Idaho*, at the third telegraph pole south of mile pole 253, on the Oregon Short Line Railroad right of way, 2⅓ meters from the east end of the south concrete abutment of trestle No. 645½, 1 meter below the base of the rail. (Note 16.*)

I_8.—At *Humphrey, Fremont County, Idaho*, on the Oregon Short Line Railroad right of way, in range with the telegraph poles at the ninth pole south of the station, 8 meters east of the center of the track. (Note 2.*)

J_8.—At *Humphrey, Fremont County, Idaho*, on the Oregon Short Line Railroad 50 meters north of the station, on the northeast corner of the northeasterly foundation stone of the railroad water tank, 4 meters west of the center of the track. (Note 5.*)

K_8.—In *Fremont County, Idaho*, 2¼ miles east of *Monida, Beaverhead County, Mont.*, 17 meters northeast of mile pole 262, ¾ meter northeast of the Oregon Short Line Railroad right of way. (Note 2.*)

A.—At *Monida, Beaverhead County, Mont.*, 50 meters west of the station on the Oregon Short Line Railroad, on the center of the south side of the southwestern foundation stone of the railroad water tank, 4 meters north of the center of the track. (Note 14.*)

B.—At *Monida, Beaverhead County, Mont.*, 100 meters northwest of the Oregon Short Line Railroad station, ½ meter west of the telephone pole at the southwest corner of the building owned by B. H. Paul. (Note 11.*)

C.—About 3⅔ miles west of *Monida, Beaverhead County, Mont.*, 1⅓ telegraph poles east of mile pole 268, ⅓ meter north of the Oregon Short Line Railroad right of way, in range with the telephone poles; set in fine gravel. (Note 2.*)

D.—East of *Williams, Beaverhead County, Mont.*, on the Oregon Short Line Railroad right of way 4 telegraph poles west of mile pole 270, on the northwest corner of the north coping of a stone culvert, 1 meter below the base of the rail. (Note 16.*)

E.—At *Williams, Beaverhead County, Mont.*, 65 meters east of the signboard "Williams" on the Oregon Short Line Railroad, on the southeast corner of the southeast foundation stone of the railroad water tank, 4 meters north of the center of the track. (Note 5.*)

F.—About 4/5 mile west of *Williams, Beaverhead County, Mont.*, 6½ telegraph poles west of mile pole 273, at the northwest corner of the road crossing, ¾ meter north of the Oregon Short Line Railroad right of way, in range with the telephone poles. (Note 2.*)

G.—About 3½ miles west of *Williams, Beaverhead County, Mont.*, on the Oregon Short Line Railroad right of way 2 telegraph poles east of mile pole 276, 3 meters south of the north end of the east concrete abutment of trestle No. 675, 1 meter below the base of the rail. (Note 16.*)

H.—At *Lima, Beaverhead County, Mont.*, about 155 meters southwest of the main track of the Oregon Short Line Railroad, 60 meters east of the east corner of the public-school building, in the east corner of the grounds. (Note 11.*)

O. S. L. 14.—At *Lima, Beaverhead County, Mont.*, on the Oregon Short Line Railroad station (wooden), at the south corner, on the southeast side of the bay window, 1 meter above ground, the lower edge of a horizontal scratch in the wood, marked "7-17-97, No. 1."

I.—At *Lima, Beaverhead County, Mont.*, on the Oregon Short Line Railroad, 65 meters northeast of the station, on the southwest end of the middle southeast concrete foundation of the railroad water tank. (Note 4.*)

J.—About 3½ miles east of *Dell, Beaverhead County, Mont.*, 1 telegraph pole west of mile pole 284, ½ meter north of the Oregon Short Line Railroad right of way. (Note 2.*)

K.—About 1¼ miles southeast of *Dell, Beaverhead County, Mont.*, on the Oregon Short Line Railroad right of way, 4 telegraph poles east of mile pole 286½ on the west abutment of trestle No. 683, 4 meters south of the center of the track. (Note 13.*)

L.—At *Dell, Beaverhead County, Mont.*, on the Oregon Short Line Railroad 50 meters southeast of the station, on the east corner of the most easterly foundation stone of the railroad water tank, 4⅓ meters southwest of the center of the track. (Note 15.*)

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* See pp. 162-166.

M.—At *Dell, Beaverhead County, Mont.*, ¼ mile northwest of the Oregon Short Line Railroad station, 50 meters northeast of the track, in the south corner of the public-school grounds, 23 meters southeast of the building. (Note 11.*)

N.—About 1½ miles southeast of *Crab Tree, Beaverhead County, Mont.*, 17 meters northeast of mile pole 292, 1 meter northeast of the Oregon Short Line Railroad right of way. (Note 2.*)

O.—At *Crab Tree, Beaverhead County, Mont.*, opposite the Oregon Short Line Railroad station, 30 meters southwest of the track, ⅔ meter southwest of the right of way. (Note 11.*)

P.—About 4½ miles northwest of *Crab Tree, Beaverhead County, Mont.*, 2 meters northeast of the fifth pole north of mile pole 298, on the Oregon Short Line Railroad right of way, 18 meters from the track and 1 meter below the base of the rail. (Note 2.*)

Q.—At *Red Rock, Beaverhead County, Mont.*, 40 meters southeast of the Oregon Short Line Railroad station on the east corner of the most easterly foundation stone of the railway water tank, 4 meters southwest of the center of the main track. (Note 5.*)

R.—At *Red Rock, Beaverhead County, Mont.*, 40 meters northeast of and directly opposite the Oregon Short Line Railroad station, ¾ meter northeast of the telephone pole at the west corner of the property owned by J. Shineberger. (Note 11.*)

S.—At *Armstead, Beaverhead County, Mont.*, 3 poles northwest of mile pole 306½, 30 meters southwest of the Oregon Short Line Railroad right of way, 40 meters southwest of the track, 1 meter below the base of the rail, on a rough-shaped stone set ⁴/₅ meter in black loamy soil, on land owned by J. W. Scott. (Note 16.*)

T.—About 2½ miles north of *Armstead, Beaverhead County, Mont.*, 1¾ telegraph poles southwest of mile pole 309, 12 meters west of the Oregon Short Line Railroad track, and ½ meter west of the right of way, 2 meters above the base of the rail. (Note 2.*)

U.—About 2 miles south of *Grayling, Beaverhead County, Mont.*, 6½ telegraph poles south of mile pole 310½, in a horizontal concrete surface near the west end of the south abutment of the Oregon Short Line Railroad's riveted steel-truss bridge No. 696. (Note 4.*)

V.—At *Grayling, Beaverhead County, Mont.*, 20 meters west of and directly opposite signboard "Grayling," ½ meter west of the Oregon Short Line Railroad right of way, 1 meter below the base of the rail. (Note 11.*)

W.—About 1¼ miles south of *Barratts, Beaverhead County, Mont.*, 6½ telegraph poles north of mile pole 318½; at the west end of the south abutment of the Oregon Short Line Railroad riveted steel-truss bridge No. 703; in the horizontal surface of the top concrete step 1 meter from the west end, 2 meters from the track. (Note 13.*)

X.—About 3 miles north of *Barratts, Beaverhead County, Mont.*, 3¼ telegraph poles north of mile pole 323; 10 meters west of the Oregon Short Line Railroad track, ½ meter west of the right of way, on property owned by Benj. Taylor. (Note 11.*)

Y.—About 3 miles south of *Dillon, Beaverhead County, Mont.*, 5 telegraph poles south of mile pole 324½, on the south abutment of the Oregon Short Line Railroad bridge 707½; in the horizontal stone surface of the west end of the top step, 2½ meters west of the track. (Note 16.*)

O. S. L. 16.—At *Dillon, Beaverhead County, Mont.*, on the Oregon Short Line Railroad, 30 meters south of the station on the southwest corner of the most southerly foundation stone of the railroad water tank, outside the railroad park lot 3 meters west of the track. (Note 16.*)

Z or Magnetic Station.—At *Dillon, Beaverhead County, Mont.*, 70 meters southwest of the northeast corner of the grounds of the State Normal College, 65 meters southeast of the southeast corner of the most northerly dormitory building, 130 meters east of the entrance to the main building; a 6-inch glazed pipe about 10 inches in diameter, filled with cement set flush with the ground and marked "U. S. C. & G. S. 1905." The bench mark is a 1-centimeter outlined square scratched between the center and the "19."

A_2.—At *Dillon, Beaverhead County, Mont.*, in the center of the water sill of the county courthouse, on Bannock Street, at the end of Pacific Street, 3 meters south of the center of the main steps, 1 meter above the sidewalk. (Note 1.*)

B_2.—At *Dillon, Beaverhead County, Mont.*, at the southeast corner of the block occupied by the county high school, on the northwest corner of Center and Atlantic Streets; ½ meter from either sidewalk and inside the wire fence inclosing the high-school block. (Note 2.*)

City.—At *Dillon, Beaverhead County, Mont.*, on the top granite step of the Pacific Street entrance to the county high-school building, 8 meters from the center of the sidewalk. The point determined in 1906 was the extreme southwest corner of the step, approximately on a level with a ledge cut into the building stone and above which was cut "5197.60."

C_2.—About 2 miles southwest of *Bond, Beaverhead County, Mont.*, 1 telegraph pole north of mile pole 332, 28 meters east of the track and ⅔ meter east of the Oregon Short Line Railroad right of way. (Note 2.*)

D_2.—At *Bond, Beaverhead County, Mont.*, 20 meters northeast of and directly opposite signboard "Bond," on the Oregon Short Line Railroad, in a line with the signboard and mile post 334, ½ meter east of the right of way, on property owned by Nels P. Nelson. (Note 11.*)

E_2.—About 2½ miles southeast of *Apex, Beaverhead County, Mont.*, 3 telegraph poles northwest of mile pole 337½, at the southeast corner of the public road crossing, in a fence corner, on property owned by J. E. Morse; 24 meters east of the Oregon Short Line Railroad track and ⅔ meter east of the right of way. (Note 2.*)

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* See pp. 162-166.

F_2.—At *Apex, Beaverhead County, Mont.*, 32 meters west of and directly opposite signboard "Apex," on the Oregon Short Line Railroad, ½ meter west of the right of way, on property owned by J. E. Morse. (Note 2.*)

G_2.—About 2¼ miles southeast of *Glen, Beaverhead County, Mont.*, on the Oregon Short Line Railroad, opposite mile pole 346, 15 meters southeast of the track and ⅔ meter west of the right of way. (Note 2.*)

H_2.—At *Glen, Beaverhead County, Mont.*, 25 meters east of and directly opposite signboard "Glen," on the Oregon Short Line Railroad, 8½ telegraph poles northwest of mile pole 348, ⅔ meter east of the right of way, 1½ meters below the base of the rail, on property belonging to the estate of Joseph A. Browne. (Note 11.*)

I_2.—At *Glen, Beaverhead County, Mont.*, 110 meters northwest of the signboard "Glen" on the Oregon Short Line Railroad on the northwest corner of the most northerly of the two most westerly foundation stones of the Oregon Short Line Railroad water tank, 3 meters east of the track and ½ meter above the base of the rail. (Note 15.*)

J_2.—About ⅓ mile south of *Lavon, Madison County, Mont.*, 3¾ telegraph poles southwest of mile pole 351, on the north abutment of the deck plate-girder approach of the Oregon Short Line Railroad pin-connected truss bridge 724; at the east end of the top step, 3 meters east of the track and ¼ meter below the base of the rail. (Note 4.*)

K_2.—At *Lavon, Madison County, Mont.*, about 325 meters northwest of signboard "Lavon" on the Oregon Short Line Railroad opposite the railway park 15 meters east of the track and ½ meter east of the right of way, on property belonging to the estate of Joseph A. Browne. (Note 2.*)

L_2.—At *Browne, Madison County, Mont.*, 20 meters north of the station on the Oregon Short Line Railroad, opposite Browne's bridge, 18 meters northeast of the public road crossing, 11 meters east of the right of way. (Note 11.*)

M_2.—About 2½ miles southeast of *Melrose, Silver Bow County, Mont.*, 1½ meters east of the first telegraph pole north of mile pole 356; on the right of way, 12 meters east of the Oregon Short Line Railroad track, and ⅔ meter below the base of the rail. (Note 2.*)

N_2.—At *Melrose, Silver Bow County, Mont.*, 50 meters southeast of the Oregon Short Line Railroad station, on the southeast corner of the more southerly of the two most easterly foundation stones of the railroad water tank, 4 meters southwest of the track and ½ meter above the base of the rail. (Note 5.*)

O_2.—At *Melrose, Silver Bow County, Mont.*, at the southwest corner of Broad and Hecla Streets, 175 meters southwest of the Oregon Short Line Railroad station, in the northeast corner of the public schoolhouse lot, ⅔ meter inside the wire fence. (Note 11.*)

P_2.—About 1½ miles southeast of *Big Hole, Silver Bow County, Mont.*, 2½ telegraph poles northwest of mile pole 363, 20 meters east of the Oregon Short Line Railroad track, and ½ meter east of the right of way. (Note 2.*)

Q_2.—At *Big Hole, Silver Bow County, Mont.*, 2⅔ telegraph poles west of mile pole 364½, 25 meters south of and directly opposite signboard "Big Hole" on the Oregon Short Line Railroad, 2 meters below the base of the rail. (Note 11.*)

R_2.—At *Maiden Rock, Silver Bow County, Mont.*, 43 meters east of the station platform, 7½ telegraph poles south of mile pole 366, on the southeast corner of the north coping of a red sandstone culvert (unnumbered) on the Oregon Short Line Railroad, 3 meters east of the track. (Note 13.*)

S_2.—About 2 miles south of *Divide, Silver Bow County, Mont.*, 15 meters east of the Oregon Short Line Railroad track, 1 meter east of the right of way, and 2½ meters below the base of the rail. (Note 2.*)

T_2.—At *Divide, Silver Bow County, Mont.*, 16 meters west of the Oregon Short Line Railroad station and directly opposite the semaphore pole, in the right of way, ½ meter below the base of the rail. (Note 2.*)

U_2.—At *Woodin, Silver Bow County, Mont.*, 29 meters due east of signboard "Woodin," 26 meters east of the Oregon Short Line Railroad track, and ½ meter east of the right of way. (Note 2.*)

V_2.—About ½ mile north of *Woodin, Silver Bow County, Mont.*, 3⅔ telegraph poles south of mile pole 374½, on the northeast corner of the more northerly of the two most easterly foundation stones of the Oregon Short Line Railroad water tank, 3 meters west of the track and ½ meter above the base of the rail. (Note 16.*)

W_2.—At *Beaudines Spur, Silver Bow County, Mont.*, 21 meters east of the signboard "Beaudines," 60 meters north of the public crossing, 17 meters east of the Oregon Short Line Railroad track, 1 meter east of the right of way. (Note 2.*)

X_2.—At *Feely, Silver Bow County, Mont.*, 35 meters west of the station on the Oregon Short Line Railroad and opposite the semaphore pole, 4 meters south of the public road crossing, ⅔ meter west of the right of way. (Note 2.*)

Y_2.—About 1 mile south of *Buxton, Silver Bow County, Mont.*, 3 telegraph poles south of mile pole 383½, on the north stone abutment of the Oregon Short Line Railroad plate-girder bridge (unnumbered), in the center of the top step at the east end, ¼ meter from the end of the step, 3 meters east of the track and ¼ meter below the base of the rail. (Note 16.*)

O. S. L.—About 1 mile south of *Buxton, Silver Bow County, Mont.*, on the southeast corner of the same end of the same abutment to the bridge on which Y_2 is located; a cross scratched on the stone.

Z_2.—At *Buxton, Silver Bow County, Mont.*, about 120 meters northeast of the signboard "Buxton," directly opposite the first telegraph pole northeast of mile pole 384½, 15 meters northwest of the Oregon Short Line Railroad track, ⅔ meter west of the right of way. (Note 2.*)

A_3.—At *Silver Bow, Silver Bow County, Mont.*, about 45 meters southeast of "Silver Bow Junction," a station of the Oregon Short Line Railroad and the Northern Pacific Railway, about 40 meters south of the crossing of the county road and Oregon Short Line Railroad, 5 meters east of the county road. (Note 11.*)

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* See pp. 162-166.

5327 Butte.—At *Silver Bow, Silver Bow County, Mont.*, about 55 meters south of the Oregon Short Line and Northern Pacific Railway station "Silver Bow Junction;" about 50 meters south of the Oregon Short Line tracks at the county road crossing, 20 meters west of the county road, and 27 meters southwest of A_3. (Note 18.*)

5388 Butte.—Near *Butte, Silver Bow County, Mont.*, about 0.3 mile southeast of the Butte, Anaconda & Pacific Railway water tank at Rocker, about 45 meters southeast of the public road and the Northern Pacific Railway crossing, 28 meters south of the Northern Pacific Railway right of way. (Note 18.*)

B_3.—About 2¼ miles southwest of the Northern Pacific Railway depot at *Butte, Silver Bow County, Mont.*, about 14 meters northwest of the Northern Pacific Railway track at the public road crossing, on the top of a large black granite rock, 6 meters north of the right of way, 1 meter above the base of the rail. (Note 1.*)

C_3.—About 1⅔ miles southwest of the Northern Pacific Railway depot at *Butte, Silver Bow County, Mont.*, about 17 meters south of a road crossing of the Northern Pacific Railway track, at the northwest corner of the grounds of the Colorado smelter (now in disuse), ⅔ meter west of the 8-foot board fence surrounding the smelter grounds. (Note 2.*)

5441 R. H. C.—At *Butte, Silver Bow County, Mont.*, in the store room of the electric lighting plant just south of the Northern Pacific Railway tracks. The bench mark is about 5 meters within the large doors which open on Montana street and is reached by raising a wooden lid about one-half meter square which covers the hole in the floor above the bench mark. (Note 17.*)

D_3.—At *Butte, Silver Bow County, Mont.*, about 10 meters southeast of the center of Front Street and ¼ meter north of the depot grounds, about 55 meters northwest of the Northern Pacific Railway tracks at the station. (Note 11.*)

E_3.—At *Butte, Silver Bow County, Mont.*, on the southeast corner of Iron and Wyoming Streets, in the stone foundation of the building occupied by the Butte Wholesale Grocery Co., 0.23 meter north of the southwest corner of the building, 1 meter above the sidewalk, and about 20 meters north of the northwest corner of the Butte, Anaconda & Pacific Railway depot. (Note 1.*)

5563 R. H. C.—At *Butte, Silver Bow County, Mont.*, at the entrance to the Webster School, located at the end of Idaho Street, on West Aluminum Street, one-half block west of Montana Street, in the horizontal top surface of the granite block at the foot of the balustrade, on the right-hand side upon entering the building, 1 meter above the sidewalk; an aluminum tablet set flush with the surface and marked "5563 R. H. C. '04." (Note 17.*)

5631 R. H. C.—At *Butte, Silver Bow County, Mont.*, at the entrance to the Garfield School on the southeast corner of Colorado and West Porphyry Streets, in the horizontal top surface of the granite block at the foot of the balustrade upon the left-hand side upon entering the building, 1 meter above the sidewalk; an aluminum tablet flush with the surface and marked "5631 R. H. C. '04." (Note 17.*)

5712 Butte.—At *Butte, Silver Bow County, Mont.*, in the Owsley block, at the northeast corner of Main and Park Streets, in the vertical surface of the corner stone, 0.17 meter east of the corner, 0.50 meter above the sidewalk, a horizontal mark on the end of a copper bolt, 1 inch in diameter, lettered "U. S. G. S. B. M. 5712 ft."

5767 R. H. C.—At *Butte, Silver Bow County, Mont.*, near the most southwesterly corner of the county courthouse, on Granite Street, about 60 meters east of Montana Street, 1 meter west of the sidewalk at the entrance to the office of the superintendent of schools, 0.55 meter above the ground, 1.32 meters east of the corner, in the vertical surface of a granite block and marked "5767 R. H. C., '04." (Note 17.*)

City.—At *Butte, Silver Bow County, Mont.*, on the county courthouse, on Granite Street about 60 meters east of Montana Street, on the most southwesterly corner, 0.15 meter north of the corner and 0.20 meter above the ground; a metal bolt presumably of brass, 0.5 inch in diameter, leaded into a small ledge cut out of the granite corner and projecting 1.5 centimeters above the ledge. Above the bench mark was cut into the stone "City B.M., elevation above sea 5,758 feet."

5811 R. H. C.—At *Butte, Silver Bow County, Mont.*, in the center of the horizontal surface of the corner of the coping at the northwest corner of the Government building, at the corner of North Main and West Copper Streets, 3.5 meters northwest of the corner of the building, 0.25 meter above the ground, and about 5 meters east of the center of the sidewalk; stamped "5811 R. H. C. '04." (Note 17.*)

5716 R. H. C.—At *Butte, Silver Bow County, Mont.*, at the Florence Hotel on Broadway, about 125 meters east of Arizona Street, in the horizontal top surface of a granite sill 6 meters west of the main entrance to the hotel, 0.60 meter above the sidewalk and 0.60 meter below the sill of the second window west of the entrance; set flush with the surface of the sill and marked "5716, R. H. C. '04." (Note 17.*)

5566 R. H. C.—At *Butte, Silver Bow County, Mont.*, on the Braund block, at the corner of Talbot and Watson Avenues, on the second door sill east of the southwest corner of the building, about 20 meters east of the corner and 3 inches above the level of the sidewalk; a metal disk set flush with the surface and stamped "5566 R. H. C. '04." (Note 17.*)

F_3.—At *Butte, Silver Bow County, Mont.*, in the southwest corner of the yard of the Monroe public school, corner of South Arizona and East First Streets, 2 meters southwest of the southwest corner of the building. (Note 2.*)

5485 R. H. C.—At *Butte, Silver Bow County, Mont.*, about 200 meters east of the station, 60 meters south of Front Street and 75 meters west of the Northern Pacific Railway bridge spanning the trolley line running along Front Street, about 15 meters north of the Northern Pacific Railway tracks, 4 meters west of the second telegraph pole west of the bridge; in the horizontal top surface of a granite block 6 by 8 by 36 inches, set 30 inches in the ground, stamped "5485 R. H. C. '04." (Note 17.*)

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* See pp. 162-166.

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN OGDEN AND SALT LAKE CITY, UTAH, 1906.

C.—At *Ogden, Weber County, Utah.* (See p. 167.)

Transit.—At *Ogden, Weber County, Utah.* (See p. 167.)

A.—At *Ogden, Weber County, Utah.* (See p. 167.)

B.—At *Ogden, Weber County, Utah.* (See p. 167.)

A_1.—About 1½ miles south of *Evona, Weber County, Utah,* north of about the sixth telegraph pole north of milepost 3, 21 meters west of Oregon Short Line Railroad track, about 5 meters south of the public road, about 0.6 meter west of the right of way. (Note 11.*)

B_1.—About 1⅓ miles north of *Roy, Weber County, Utah,* opposite milepost 5, 15 meters east of Oregon Short Line Railroad track and 0.6 meter west of the right-of-way fence. (Note 2.*)

C_1.—About 1/5 mile southeast of *Roy, Weber County, Utah,* opposite the second telegraph pole south of mile pole 6½, 21 meters east of the Oregon Short Line Railroad track, and 4 meters east of the right of way. (Note 11.*)

D_1.—About ½ mile southwest of *Syracuse Junction, Davis County, Utah,* in the southeast angle of the railway crossing of the Oregon Short Line Railroad and the Rio Grande Western Railway, 9 meters south of the Oregon Short Line track and 8 meters east of the Rio Grande Western track, ½ meter east of the Rio Grande Western right of way. (Note 11.*)

Salt Lake Northwest Base.—About 1½ miles north of *Syracuse Grove* and about 4 miles west of *Syracuse Junction, Davis County, Utah,* on pasture land owned by Jos. Holt, successor to Cato Love, about 360 meters east of the original site for the station of the Oregon Short Line Railroad, in the southeast angle of the crossroads, 51 meters from the fence on the north and 63 meters from the fence on the west; a copper bolt in the capstone of the monument which marks the base end, is about 9 feet high, and can be seen about ¼ mile. (Note 4.*)

Salt Lake Southeast Base.—About 4½ miles west of *Kaysville, Davis County, Utah,* in school section 16 T. 3 N., R. 2 W., about 5 miles southeast of the property of David Cook, Mormon bishop of the Syracuse ward, in a large pasture, about ⅜ mile west of the country road about 30 meters south of a barbed wire fence; a copper bolt in the capstone of the monument which marks the base end, is about 9 feet high, and can be seen about 2 miles. (Note 4.*)

K. S. 8.—About 1 mile east of *Syracuse, Davis County, Utah,* about 700 meters south of the Oregon Short Line Railroad spur track, about 100 meters north of the county road, in a pasture owned by Jas. T. Walker, about ¼ mile west of the residence of David Cook; a copper bolt in the stone marking the eighth kilometer from southeast base of the Salt Lake Base.

H_1.—About 2¼ miles northwest of *Layton, Davis County, Utah,* 7 meters northwest of the ninth telegraph pole southwest of mile pole 12, 18 meters northeast of Oregon Short Line Railroad track and 1 meter northeast of the right of way. (Note 2.*)

I_1.—At *Layton, Davis County, Utah,* 40 meters northeast of the Oregon Short Line Railroad track, at the entrance to the Farmers' Union General Merchandise Building on the southeast end of the doorsill, about 0.15 meter from the end and about 0.1 meter from the northeast edge. (Note 1.*)

J_1.—At *Kaysville, Davis County, Utah,* in the Oregon Short Line station grounds, about 18 meters west of the railway water tank, 31 meters east of the track, on the south side of a street leading eastward through the town. (Note 11.*)

K_1.—About 1½ miles northwest of *Farmington, Davis County, Utah,* opposite the second telegraph pole west of mile pole 20, 16 meters south of the Oregon Short Line Railroad track, and 1 meter south of the right of way, 2 meters east of and in line with pole 1003 of the Utah Light & Power Co. (Note 2.*)

L_1.—About ⅓ mile northwest of *Farmington, Davis County, Utah,* opposite the third telegraph pole southwest of mile pole 21, in the cement-covered stone coping of a red sandstone culvert, 2½ meters south of the Oregon Short Line Railroad track, and ¼ meter below the base of rail. (Note 16.*)

M_1.—At *Farmington, Davis County, Utah,* 28 meters northeast of the Oregon Short Line Railroad station, at the southeast side of a street leading through the town, 34 meters east of the track, and 2 meters east of the right of way. (Note 11.*)

N_1.—About 1.9 miles southeast of *Farmington, Davis County, Utah,* at the southeast corner of a road crossing, 14 meters southwest of the Oregon Short Line Railroad track and ⅔ meters southwest of the right of way, about 2 meters southeast of and in line with pole 1186 of Utah Light & Power Co. Reported slightly disturbed in 1907. (Note 2.*)

O_1.—At *Centerville, Davis County, Utah,* about 31 meters southeast of the Oregon Short Line Railroad station, 17 meters east of the track, and 2½ meters east of the right of way, about 3 meters west of the wagon scales. (Note 11.*)

P_1.—At *Woods Cross, Davis County, Utah,* 20 meters southeast of the Oregon Short Line Railroad station, 8 meters east of the track, 11 meters west of the Deseret Live Stock Co.'s store. (Note 2.*)

Q_1.—At *Simkins, Davis County, Utah,* 28 meters southwest of signboard "Simkins," at the northeast corner of the road crossing, 15 meters east of the Oregon Short Line Railroad track and ⅔ meter east of the right of way. (Note 11.*)

R_1.—At *Stock Yards Junction, Davis County, Utah,* 19 meters south of signboard "Stockyards Junction," at the southeast corner of road crossing, 8 meters east of the Oregon Short Line Railroad track and ½ meter east of the right of way. (Note 2.*)

S_1.—About 2½ miles north of *Salt Lake City, Salt Lake County, Utah,* in the northwest corner of the Bonneville school grounds, 54 meters west of the northwest corner of the building, 13 meters southeast of the second telegraph pole

* See pp. 162-166.

southeast of mile pole 34, 28 meters northeast of the Oregon Short Line Railroad main track, ½ meter northeast of the right of way. (Note 11.*)

T_1.—At *Salt Lake City, Salt Lake County, Utah,* on the southeast corner of South Temple and Third West Streets, 4 meters west of the saloon entrance in the Railroad Exchange Hotel Building, 65 meters southeast of the southeast corner of the Oregon Short Line Railroad passenger depot, 1½ meters east of the curb on Third West, 5½ meters south of the curb on South Temple Street. (Note 2.*)

U_1.—At *Salt Lake City, Salt Lake County, Utah,* at the southeast corner of South Temple and Main Streets, in the northeast corner of the stone foundation course of the building occupied by the State Bank of Utah, 0.5 meter south from the corner, 1.05 meters above walk. (Note 1.*)

V_1 (U. S. G. S. meridian mark).—At *Salt Lake City, Salt Lake County, Utah,* near the southeast corner of State and Fourth South Streets and near the northwest corner of the grounds of the city and county building, about 80 meters northwest of the northwest corner of the building, 18 meters east of the walk on State Street, and 16 meters south of the walk on Fourth South Street, a bronze disk stamped "Meridian Mark" and having a "+" in the center. (Note 17.*)

W_1.—At *Salt Lake City, Salt Lake County, Utah,* at the northeast corner of Third West and Fourth South Streets and the southwest corner of the Pioneer Park; on the southeast side of the diagonal drive through the park, 2 meters north of the wire fence and hedge on Fourth South Street and 6 meters east of the wire fence on Third West Street. (Note 11.*)

DESCRIPTION OF PERMANENT BENCH MARKS BETWEEN BARSTOW, CAL., AND LAS VEGAS, NEV., 1906.

H_3.—At *Barstow, San Bernardino County, Cal.* (See p. 193.)

I_3.—At *Barstow, San Bernardino County, Cal.* (See p. 193.)

J_3.—At *Barstow, San Bernardino County, Cal.* (See p.) 193.

K_3.—About 2 miles northwest of *Nebo, San Bernardino County, Cal.,* 9 telegraph poles southeast of milepost 744, 20 meters southwest of the Atchison, Topeka & Santa Fe Railway track, and about 1 meter southwest of the right of way; not lettered. (Note 11.*)

L_3.—About 1¼ miles southeast of *Nebo, San Bernardino County, Cal.,* 2½ meters northwest of milepost 740½, 16 meters south of the Atchison, Topeka & Santa Fe Railway track; set in sandy soil. (Note 2.*)

M_3.—At *Daggett, San Bernardino County, Cal.,* outside the southeast corner of the depot gardens, 17 meters south of the Atchison, Topeka & Santa Fe Railway track, 35 meters east of the southeast corner of the depot, ½ meter outside of the fence corner, composed of 3 rail connections bolted together, a chiseled cross to which the elevation refers being cut on top of the middle piece; set in sandy soil.

N_3.—About 3¼ miles east of *Daggett, San Bernardino County, Cal.,* 6 meters southwest of the second telegraph pole east of mile pole 734½, 14 meters south of the Atchison, Topeka & Santa Fe Railway track. (Note 2.*)

O_3.—At *Minneola, San Bernardino County, Cal.,* 45 meters southwest of signboard "Minneola," 32 meters north of the Atchison, Topeka & Santa Fe Railway track, opposite the seventh telegraph pole west of mile pole 731½, a chisel-cut cross in the end of a piece of railroad rail, lettered "U. S."

P_3.—About 2.4 miles east of *Minneola, San Bernardino County, Cal.,* 17 meters south of the Atchison, Topeka & Santa Fe Railway track, and 2 meters south of the sixth telegraph pole west of milepost 729. (Note 2.*)

Q_3.—At *Newberry, San Bernardino County, Cal.,* 26 meters west of the southeast corner of the Atchison, Topeka & Santa Fe Railway depot, 6 meters north of the railroad track, a piece of 80-pound railroad rail about 5¼ feet long, set on end, the top level with the base of the rail and marked by a chiseled cross and the letters "U. S."

R_3.—About ¾ mile east of *Newberry, San Bernardino County, Cal.,* 2 meters below the base of the rail, 26 meters west of the first telegraph pole west of mile pole 722½, 12 meters south of the Atchison, Topeka & Santa Fe Railway track. (Note 2.*)

S_3.—At *Troy, San Bernardino County, Cal.,* opposite the sixth telegraph pole east of mile pole 719½, about 25 meters northeast of signboard "Troy," 17 meters north of the Atchison, Topeka & Santa Fe Railway track, a chiseled cross in the top of a piece of 80-pound railroad rail, about 5½ feet long, set on end and having the top 7⅓ meters below the base of the rail.

T_3.—About 3.6 miles east of *Troy, San Bernardino County, Cal.,* 5 meters west of mile pole 716, 15 meters south of the Atchison, Topeka & Santa Fe Railway track, 1 meter above the base of the rail. (Note 2.*)

U_3.—At *Hector, San Bernardino County, Cal.,* 23 meters east of signboard "Hector," outside the southeast corner of the station park fence, 7 meters north of the Atchison, Topeka & Santa Fe Railway track; set on a level with the base of the rail. (Note 11.*)

V_3.—About 2.6 miles northwest of *Pisgah, San Bernardino County, Cal.,* 4 meters southeast of the eighth telegraph pole east of mile pole 710, 18 meters south of the Atchison, Topeka & Santa Fe Railway track, 3 meters south of the right of way; set ⅔ meter above the base of rail. (Note 2.*)

W_3.—At *Pisgah, San Bernardino County, Cal.,* 5 meters southeast of signboard "Pisgah," 11 meters northeast of the Atchison, Topeka & Santa Fe Railway track, 31 meters north of the sixth telegraph pole northeast of mile pole 707; set in sand and gravel, ½ meter above the base of the rail. (Note 11.*)

* See pp. 162-166.

X_3.—About 2¼ miles east of *Pisgah, San Bernardino County, Cal.*, 2 meters south of the second telegraph pole southeast of mile pole 705, 14 meters south of the Atchison, Topeka & Santa Fe Railway track; set in sandy soil, 1 meter above the base of the rail. (Note 2.*)

Y_3.—At *Lavic, San Bernardino County, Cal.*, at the northwest corner of the station platform, 38 meters west of the southeast corner of the Atchison, Topeka & Santa Fe Railway depot, 5 meters northeast of the railway track, ¼ meter above the base of the rail. (Note 11.*)

Z_3.—About 1.8 miles southeast of *Lavic, San Bernardino County, Cal.*, 3 meters southeast of the fifth telegraph pole southwest of mile pole 700½, 13 meters south of the Atchison, Topeka & Santa Fe Railway track; set in gravel ½ meter above the base of the rail. (Note 2.*)

A_4.—At *Arctic, San Bernardino County, Cal.*, 20 meters south of signboard "Arctic," 8 meters west of the first telegraph pole east of mile pole 698½, 14 meters south of the Atchison, Topeka & Santa Fe Railway track, ½ meter above the base of the rail. (Note 11.*)

B_4.—About 1¾ miles east of *Arctic, San Bernardino County, Cal.*, 5 meters southwest of the sixth telegraph pole east of mile pole 696½, 16 meters south of the Atchison, Topeka & Santa Fe Railway track. (Note 2.*)

C_4.—About 1⅓ miles west of *Ludlow, San Bernardino County, Cal.*, 18 meters northwest of the sixth telegraph pole southwest of mile pole 694½, on the north wing of the northeast red sandstone abutment of bridge 695B, on the horizontal surface of the second step, 3½ meters north of the Atchison, Topeka & Santa Fe Railway track, ⅔ meter below the base of the rail. (Note 15.*)

D_4.—At *Ludlow, San Bernardino County, Cal.*, outside the northwest corner of the lot inclosing the section foreman's house, 49 meters north of the Atchison, Topeka & Santa Fe Railway track, 37 meters northeast of the northeast corner of the depot. (Note 11.*)

E_4.—About 1¾ miles northeast of *Ludlow, San Bernardino County, Cal.*, 3½ telegraph poles east of mile pole 692, on the north red sandstone coping of culvert 692D, in the horizontal surface of the northeast corner, 4 meters north of the Atchison, Topeka & Santa Fe Railway track, ½ meter below the base of the rail. (Note 4*) lettered "U. S. B. M."

F_4.—About 2.8 miles west of *Ash Hill, San Bernardino County, Cal.*, 7 meters south of mile pole 689½, 17 meters south of the Atchison, Topeka & Santa Fe Railway track. (Note 2.*)

G_4.—At *Ash Hill, San Bernardino County, Cal.*, 6½ telegraph poles northwest of mile pole 656½, 31 meters east of signboard "Ash Hill," 16 meters northeast of the Atchison, Topeka & Santa Fe Railway track. (Note 11.*)

H_4.—About 1.9 miles east of *Ash Hill, San Bernardino County, Cal.*, 6½ telegraph poles east of mile pole 695, on the south wing of the southeast red sandstone abutment of bridge 695D, in the horizontal surface of the top step, 3 meters south of the Atchison, Topeka & Santa Fe Railway track, $^1/_5$ meter below the base of the rail. (Note 16.*)

I_4.—About 2.1 meters northwest of *Klondike, San Bernardino County, Cal.*, 4 telegraph poles northwest of mile pole 654, on the north wing of the northeast red sandstone abutment of bridge 655A, in the horizontal surface, 3 meters northeast of the Atchison, Topeka & Santa Fe Railway track, ¼ meter below the base of the rail. (Note 15.*)

J_4.—About 1.1 miles northwest of *Klondike, San Bernardino County, Cal.*, 4 telegraph poles northeast of mile pole 683, 3 meters east of the Atchison, Topeka & Santa Fe Railway track, in the top horizontal surface of the east wing of the southeast (red sandstone) abutment of bridge 684A. (Note 13.*)

K_4.—At *Klondike, San Bernardino County, Cal.*, 23 meters northwest of mile pole 682, 7 meters south of signboard "Klondike," 13 meters southwest of the Atchison, Topeka & Santa Fe Railway track, and 2 meters below the base of the rail; set in sand and gravel. (Note 11.*)

L_4.—About 3 miles northwest of *Siberia, San Bernardino County, Cal.*, 45 meters east of the fifth telegraph pole northeast of mile pole 679, 26 meters northwest of the Atchison, Topeka & Santa Fe Railway track, 1¼ meters below the base of the rail. (Note 2.*)

M_4.—At *Siberia, San Bernardino County, Cal.*, 5 meters southwest of the signboard "Siberia," 15 meters northwest of the seventh telegraph pole northwest of mile pole 676½, 11 meters south of the Atchison, Topeka & Santa Fe Railway track. (Note 11.*)

N_4.—About 1¾ miles east of *Siberia, San Bernardino County, Cal.*, 50 meters northwest of the third telegraph pole southwest of mile pole 698½, 17 meters north of the Atchison, Topeka & Santa Fe Railway track, ½ meter below the base of the rail; set in sand and gravel. (Note 2.*)

O_4.—At *Nome, San Bernardino County, Cal.*, 10 meters northeast of the signboard, 35 meters north of the second telegraph pole east of mile pole 673, 15 meters east of the Atchison, Topeka & Santa Fe Railway track, ½ meter below the base of the rail. (Note 11.*)

P_4.—About 1¾ miles east of *Nome, San Bernardino County, Cal.*, 3 meters southwest of the fourth telegraph pole west of mile pole 671, 17 meters south of the Atchison, Topeka & Santa Fe Railway track, and 1¼ meters below the base of the rail. (Note 2.*)

Q_4.—At *Bagdad, San Bernardino County, Cal.*, 44 meters northeast of the northwest corner of the station building of the Atchison, Topeka & Santa Fe Railway, 50 miles north of the track, 1 meter west of the southwest corner of the fences inclosing the section foreman's house. (Note 11.*)

R_4.—About 3½ miles east of *Bagdad, San Bernardino County, Cal.*, 3 meters south of the first telegraph pole east of mile pole 665½, 17 meters south of the Atchison, Topeka & Santa Fe Railway track, ½ meter below the base of the rail; set in sand and gravel. (Note 2.*)

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* See pp. 162–166.

S_4.—At *Amboy, San Bernardino County, Cal.*, 35 meters southwest of the southwest corner of the station building, 17 meters south of the Atchison, Topeka & Santa Fe Railway track, and 1 meter below the base of the rail. (Note 11.*)

T_4.—About 2.1 miles southwest of *Bengal, San Bernardino County, Cal.*, 3 meters south of the fifth telegraph pole east of mile pole 657½, 18 meters south of the Atchison, Topeka & Santa Fe Railway track, ½ meter below the base of the rail. (Note 2.*)

U_4.—At *Bengal, San Bernardino County, Cal.*, 85 meters northwest of the signboard, 35 meters northeast of the first telegraph pole west of mile pole 655, 15 meters north of the Atchison, Topeka & Santa Fe Railway track, ½ meter below the base of the rail. (Note 2.*)

V_4.—About 3.9 miles west of *Cadiz, San Bernardino County, Cal.*, 4 meters southwest of the sixth telegraph pole west of mile pole 651, 14 meters south of the Atchison, Topeka & Santa Fe Railway track, and ½ meter below the base of the rail. (Note 2.*)

W_4.—About 1.6 miles west of *Cadiz, San Bernardino County, Cal.*, 5½ telegraph poles east of mile pole 649, 3 meters north of the Atchison, Topeka & Santa Fe Railway track, in the top horizontal surface of the north red sandstone coping of bridge 649B, ⅔ meter below the base of the rail. (Note 16.*)

X_4.—At *Cadiz, San Bernardino County, Cal.*, 9 meters northeast of the signboard, 37 meters northwest of the ninth telegraph pole east of mile pole 647½, 12 meters north of the Atchison, Topeka & Santa Fe Railway track, and ½ meter below the base of the rail. (Note 11.*)

Y_4.—About 2.1 miles southwest of *Siam, San Bernardino County, Cal.*, 23 meters northeast of mile pole 644, 17 meters southeast of the Atchison, Topeka & Santa Fe Railway track, ½ meter below the base of the rail. (Note 2.*)

Z_4.—At *Siam, San Bernardino County, Cal.*, 5½ meters east of the seventh pole northeast of mile pole 642, 25 meters southeast of the signboard, 18 meters southeast of the Atchison, Topeka & Santa Fe Railway track. (Note 11.*)

A_5.—About 2¼ miles southwest of *Danby, San Bernardino County, Cal.*, 7 meters south of the seventh pole northeast of mile pole 638½, 12½ meters southeast of the Atchison, Topeka & Santa Fe Railway track, and ¼ meter below the base of the rail. (Note 2.*)

B_5.—At *Danby, San Bernardino County, Cal.*, 80 meters southwest of the southwest corner of the station building of the Atchison, Topeka & Santa Fe Railway, 41 meters west of the track. (Note 11.*)

C_5.—About 1.4 miles west of *Arimo, San Bernardino County, Cal.*, 32 meters north of the ninth pole northeast of mile pole 632 of the Atchison, Topeka & Santa Fe Railway, 16 meters northwest of the track, ½ meter below the base of the rail. (Note 2.*)

D_5.—At *Arimo, San Bernardino County, Cal.*, 39½ meters north of the sixth pole northeast of mile pole 630½ of the Atchison, Topeka & Santa Fe Railway, 10½ meters north of the signboard, 19½ meters northwest of the track, and 1 meter below the base of the rail. (Note 11.*)

E_5.—About 2.3 miles northeast of *Arimo, San Bernardino County, Cal.*, 5 meters east of mile pole 628 of the Atchison, Topeka & Santa Fe Railway, 15 meters southeast of the track, and ¼ meter below the base of the rail. (Note 2.*)

F_5.—At *Essex, San Bernardino County, Cal.*, 40 meters north of the ninth pole west of mile pole 625½, 10 meters northwest of the signboard on the Atchison, Topeka & Santa Fe Railway, 15 meters northwest of the track, ¼ meter below the base of the rail. (Note 11.*)

G_5.—About 3.4 miles southwest of *Fenner, San Bernardino County, Cal.*, 29 meters west of the sixth pole southwest of mile pole 622 of the Atchison, Topeka & Santa Fe Railway, 16 meters northwest of the track, and ½ meter below the base of the rail. (Note 2.*)

H_5.—At *Fenner, San Bernardino County, Cal.*, 41 meters east of the southwest corner of the station building of the Atchison, Topeka & Santa Fe Railway, 21 meters southeast of the track, on a level with the base of the rail. (Note 11.*)

I_5.—About 2.2 miles southwest of *Piute, San Bernardino County, Cal.*, 30 meters north of the seventh pole northeast of mile pole 616½ of the Atchison, Topeka & Santa Fe Railway, 14½ meters northeast of the track, ¼ meter below the base of the rail. (Note 2.*)

J_5.—At *Piute, San Bernardino County, Cal.*, 42 meters west of the seventh pole southwest of mile pole 614, 12 meters northwest of the signboard on the Atchison, Topeka & Santa Fe Railway, 17½ meters northwest of the track, and ¼ meter below the base of the rail. (Note 11.*)

K_5.—About 2.3 miles southwest of *Goffs, San Bernardino County, Cal.*, 27 meters west of the first pole southwest of mile pole 611½ of the Atchison, Topeka & Santa Fe Railway, 11 meters northwest of the track, ¼ meter below the base of the rail. (Note 2.*)

L_5.—At *Goffs, San Bernardino County, Cal.*, 19 meters northwest of the track of the Barnwell branch of the Atchison, Topeka & Santa Fe Railway, 41 meters northwest of the northwest corner of the station building, in front of the store of H. P. Ware, postmaster. (Note 11.*)

M_5.—About ⅓ mile west of *Goffs, San Bernardino County, Cal.*, opposite the fourth pole east of mile pole 902½, near the "Y" of the Barnwell branch of the Atchison, Topeka & Santa Fe Railway track, and about 225 meters northwest of the main track and 200 meters southwest of the branch track. (Note 2.*)

N_5.—About 3.8 miles southeast of *Vontrigger, San Bernardino County, Cal.*, 13⅔ poles southwest of mile pole 6 of the Atchison, Topeka & Santa Fe Railway, 18 meters northeast of the track, and on a level with the base of the rail; a piece of 50-pound railroad rail, about 5½ feet long, set on end on a large bowlder, the top end bearing a chiseled "U+S" to which the elevation refers.

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* See pp. 162-166.

O_5.—At *Vontrigger, San Bernardino County, Cal.*, 9 meters northeast of the Atchison, Topeka & Santa Fe Railway track, 4½ meters east of the east corner of the railway water tank. (Note 11.*)

P_5.—About 1.8 miles south of *Blackburn, San Bernardino County, Cal.*, 14 meters southwest of the Atchison, Topeka & Santa Fe Railway track, and ⅔ meter below the base of the rail. (Note 2.*)

Q_5.—At *Blackburn, San Bernardino County, Cal.*, 8 meters southeast of signboard "Blackburn" on the Atchison, Topeka & Santa Fe Railway, 18 meters northeast of the track; set on a level with the base of the rail. (Note 11.*)

R_5.—About 4.7 miles south of *Ledge, San Bernardino County, Cal.*, 3½ meters east of the tenth pole southeast of mile pole 18 of the Atchison, Topeka & Santa Fe Railway, and 15 meters northeast of the track; set on a level with the base of the rail. (Note 2.*)

S_5.—At *Ledge, San Bernardino County, Cal.*, 2½ poles northwest of mile pole 22 of the Atchison, Topeka & Santa Fe Railway, 8 meters northwest of the track; set on a level with the base of the rail. (Note 11.*)

T_5.—About 0.9 mile north of *Ledge, San Bernardino County, Cal.*, 26 meters west of the second pole north of mile pole 23 of the Atchison, Topeka & Santa Fe Railway, 14 meters west of the track; set 1 meter above the base of the rail. (Note 2.*)

U_5.—At *Purdy, San Bernardino County, Cal.*, 7 meters northeast of mile pole 25 of the Atchison, Topeka & Santa Fe Railway, 15 meters northeast of the track; set on a level with the base of the rail. (Note 11.*)

V_5.—About 2.3 miles south of *Barnwell, San Bernardino County, Cal.*, opposite the seventh pole west of mile pole 27 of the Atchison, Topeka & Santa Fe Railway, 12 meters south of the track; set 1 meter above the base of the rail. (Note 2.*)

W_5.—At *Barnwell, San Bernardino County, Cal.*, 22 meters west of the "Menvel Hotel" entrance, 12 meters east of the east corner of the Atchison, Topeka & Santa Fe Railway freight-house platform, 19 meters southeast of the railway track; set on a level with the base of the rail. (Note 11.*)

X_5.—About 2 miles north of *Barnwell, San Bernardino County, Cal.*, 7½ poles northwest of mile pole 31 of the Atchison, Topeka & Santa Fe Railway, 14 meters southwest of the track; set 2 meters below the base of the rail. (Note 2.*)

Y_5.—At *Vanderbilt, San Bernardino County, Cal.*, 4 poles west of mile pole 34 of the Atchison, Topeka & Santa Fe Railway, 15 meters north of the track; set ½ meter below the base of the rail. (Note 11.*)

Z_5.—About 1.9 miles northwest of *Vanderbilt, San Bernardino County, Cal.*, about 0.1 mile north of tin mile-marker 36, on a tie of the Atchison, Topeka & Santa Fe Railway track, 22 meters northeast of the track; set ½ meter above the base of the rail. (Note 2.*)

A_6.—At *Leastalk, San Bernardino County, Cal.*, 3 meters west of the thirteenth pole west of mile pole 268, in the north angle of the intersection of the Atchison, Topeka & Santa Fe Railway and the the San Pedro, Los Angeles & Salt Lake Railroad, 7 meters northwest of the former and 8 meters northeast of the latter, 1½ meters below the base of the rail. (Note 11.*)

B_6.—About 2.3 miles north of *Leastalk, San Bernardino County, Cal.*, 6 meters west of the fourth pole southwest of mile pole 270, 15 meters northwest of the San Pedro, Los Angeles & Salt Lake Railroad track; set 1 meter below the base of the rail. (Note 2.*)

C_6.—At *Moore, San Bernardino County, Cal.*, 4 meters northwest of the second pole northeast of mile pole 272, 14 meters west of the San Pedro, Los Angeles & Salt Lake Railroad track, opposite the signboard; set in gravel, 3 meters below the base of the rail. (Note 11.*)

D_6.—About 2.4 miles southeast of *Nipton, San Bernardino County, Cal.*, 4 meters northwest of the third pole north of mile pole 275, 15 meters west of the San Pedro, Los Angeles & Salt Lake Railroad track; set 3 meters below the base of the rail. (Note 2.*)

E_6.—At *Nipton, San Bernardino County, Cal.*, 14 meters northeast of the San Pedro, Los Angeles & Salt Lake Railroad depot, 26 meters northeast of the railway track, 37 meters south of the post office and store of the Kuhn Mercantile Co.; set 1 meter below the base of the rail. (Note 11.*)

F_6.—About 2.5 miles northwest of *Nipton, San Bernardino County, Cal.*, 1½ poles southeast of mile pole 280, 21 meters southwest of the San Pedro, Los Angeles & Salt Lake Railroad track; set 1½ meters below the base of the rail. (Note 2.*)

G_6.—At *Lyons, San Bernardino County, Cal.*, 10½ poles northwest of mile pole 282, 29 meters east of the signboard, 15 meters northeast of the San Pedro, Los Angeles & Salt Lake Railroad track; set 1½ meters below the base of the rail. (Note 11.*)

H_6.—At *Calada, San Bernardino County, Cal.*, opposite the sixth pole northwest of mile pole 287, 46 meters southwest of the signboard on the San Pedro, Los Angeles & Salt Lake Railroad, 25 meters southeast of the boundary post between San Bernardino County, Cal., and Lincoln County, Nev., 15 meters northeast of the track; set 1 meter below the base of the rail. (Note 11.*)

A.—At *Roach, Lincoln County, Nev.*, 12½ poles south of mile pole 292, 1½ poles north of the railway section foreman's house, 18 meters west of the San Pedro, Los Angeles & Salt Lake Railroad track; set 1½ meters below the base of the rail. (Note 11.*)

B.—At *Borax, Lincoln County, Nev.*, on the San Pedro, Los Angeles & Salt Lake Railroad, 21 meters east of the twelfth pole south of mile pole 297, 4½ meters east of the railway track, on the horizontal surface of the northwest

* See pp. 162-166.

corner of the most northwesterly of the 3 southerly concrete foundation piers to the steel water tank of the railroad, ½ meter above the base of the rail. (Note 15.*)

C.—At *Jean, Lincoln County, Nev.*, 13½ meters north of the third pole north of mile pole 301, 41 meters southwest of the southwest corner of the San Pedro, Los Angeles & Salt Lake Railroad depot, 17 meters west of the main railway track, 20 meters east and in front of the post office and store of Yount & Fayle; set in compact gravel, ½ meter below the base of the rail. (Note 11.*)

D.—About 2.3 miles north of *Jean, Lincoln County, Nev.*, 13 poles north of mile pole 303, 32 meters west of the San Pedro, Los Angeles & Salt Lake Railroad track; set in gravel 1½ meters below the base of the rail. (Note 52.*)

E.—At *Sutor, Lincoln County, Nev.*, 10½ poles southwest of mile pole 306, 16 meters southeast of the San Pedro, Los Angeles & Salt Lake Railroad track, 31 meters south of the signboard; set 1½ meters below the base of the rail. (Note 52.*)

F.—About 1.2 miles southwest of *Erie, Lincoln County, Nev.*, 1½ poles north of mile pole 308, 17½ meters east of the San Pedro, Los Angeles & Salt Lake Railroad track; set on a level with the base of the rail. (Note 52.*)

G.—At *Erie, Lincoln County, Nev.*, opposite the seventh pole northeast of mile pole 309, 47 meters west of the west corner of the railway depot, 16 meters northwest of the San Pedro, Los Angeles & Salt Lake Railroad track; set ½ meter above the base of the rail. (Note 11.*)

H.—About 0.7 mile southwest of *Sloan, Lincoln County, Nev.*, 11⅔ poles north of mile pole 314, in the top horizontal surface of the east end of the east concrete abutment to bridge 314 of the San Pedro, Los Angeles & Salt Lake Railroad, 2.66 meters east of the track, ¼ meter below the base of the rail. (Note 13.*)

I.—At *Sloan, Lincoln County, Nev.*, 1½ poles east of mile pole 315, 14 meters southwest of the signboard on the San Pedro, Los Angeles & Salt Lake Railroad, 19 meters southwest of the track; set ½ meter below the base of the rail. (Note 11.*)

J.—About 2.2 miles north of *Sloan, Lincoln County, Nev.*, 4 meters northeast of the sixth pole northwest of mile pole 317 of the San Pedro, Los Angeles & Salt Lake Railroad, 15 meters northeast of the track; set 2 meters below the base of the rail. (Note 52.)

K.—At *Bard, Lincoln County, Nev.*, 4½ meters north of the ninth pole northwest of mile pole 320, 11 meters east of the signboard on the San Pedro, Los Angeles & Salt Lake Railroad, 15 meters northeast of the track; set 1 meter below the base of the rail. (Note 11.*)

L.—About 2 miles south of *Arden, Lincoln County, Nev.*, 12¼ poles south of mile pole 323 of the San Pedro, Los Angeles & Salt Lake Railroad, 17 meters east of the track; set 1½ meters below the base of the rail. (Note 52.*)

M.—About 1/5 mile north of *Arden, Lincoln County, Nev.*, 5½ poles south of mile pole 325 of the San Pedro, Los Angeles & Salt Lake Railroad, 17 meters east of the track; set 1½ meters below the base of the rail. (Note 2.*)

2336 B.—About 1.5 miles north of *Arden, Lincoln County, Nev.*, 1 meter east of the second pole north of mile pole 326 of the San Pedro, Los Angeles & Salt Lake Railroad, 12½ meters east of the track; set 1½ meters below the base of the rail; iron post stamped "B 1907, 119, 2336." (Note 17.*)

N.—At *Bracken, Lincoln County, Nev.*, 25½ meters northwest of the signboard on the San Pedro, Los Angeles & Salt Lake Railroad, 19 meters east of the track; set 1 meter below the base of the rail. (Note 2.*)

2136 B.—About 0.7 mile north of *Bracken, Lincoln County, Nev.*, 3 meters east of mile pole 330 of the San Pedro, Los Angeles & Salt Lake Railroad, 14¼ meters east of the track; set 2 meters below the base of the rail; an iron post stamped "B 1907, 118, 2136." (Note 17.*)

O.—At *Las Vegas, Lincoln County, Nev.*, at the southeast corner of Main and Garcia Streets, 6 blocks south and 1 block east of the San Pedro, Los Angeles & Salt Lake Railroad depot, ½ block southeast of the plant of the Las Vegas Ice & Manufacturing Co., 7 meters south of the curb on Garcia Street, 9½ meters east of the curb on Main Street. (Note 11.*)

2024 B.—At *Las Vegas, Lincoln County, Nev.*, near the northwest corner of First and Fremont Streets, in the sidewalk at the foot of the column at the southeast corner of the First State Bank building, 1 decimeter north of the foot of the column; an aluminum tablet stamped "B 1907, 117, 2024." (Note 17.*)

P.—At *Las Vegas, Lincoln County, Nev.*, 2 blocks north and 2 blocks east of the San Pedro, Los Angeles & Salt Lake Railroad depot, at the northeast corner of Stewart and First Streets, 4 meters east of the curb on First Street, 4 meters north of the curb on Stewart Street, ½ block north of the Arizona Club. (Note 2.*)

2033 B.—At *Las Vegas, Lincoln County, Nev.*, 46 meters west of the entrance to the ladies' waiting room of the San Pedro, Los Angeles & Salt Lake Railroad depot, 31 meters west of the main track; set ½ meter above the base of the rail; an iron post stamped "B 1907, 116, 2033." (Note 17.*)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN BUTTE AND HUNTLEY, MONT., 1906.

5441 R. H. C.—At *Butte, Silver Bow County, Mont.* (For this bench mark and others at Butte see p. 198.)

G_3.—About 3 miles southeast of *Butte, Silver Bow County, Mont.*, 6½ telegraph poles southeast of milepost B 3, in the top horizontal surface of the northeast end of the northeast coping of an arched cement culvert of the Northern Pacific Railway, about 5 meters northeast of the track, and about 2 meters below the base of the rail. (Note 4.*)

H_3.—At *Skones, Silver Bow County, Mont.*, 2½ telegraph poles south of signboard "Skones" on the Northern Pacific Railway, 7½ meters west of the track, 1 meter outside of the railway right of way; set in the upper horizontal surface of a large granite projection of a ledge about 1 meter above the base of the rail. (Note 13.*)

* See pp. 162-166.

I_3.—At *Highview, Silver Bow County, Mont.*, 16 meters southwest of the fifth telegraph pole west of milepost B 10, 13 meters east of signboard "Highview" on the Northern Pacific Railway, 16 meters southeast of the track. (Note 11.*)

J_3.—At *Homestake, Jefferson County, Mont.*, 36 meters northeast of the southeast corner of the Northern Pacific Railway depot, 25 meters north of the track, 16 meters west of the west edge of the turntable and in the east edge of a wagon road. (Note 2.*)

K_3.—About 90 meters northeast of *Lewis Spur, Jefferson County, Mont.*, 36 meters north of the sixth telegraph pole west of milepost B 12 of the Northern Pacific Railway, 26 meters north of the track. (Note 11.*)

L_3.—About 2.0 miles east of *Lewis Spur, Jefferson County, Mont.*, 26 meters north of the sixth telegraph pole southwest of milepost B 14 of the Northern Pacific Railway, 16 meters north of the track; set ½ meter above the base of the rail. (Note 2.*)

M_3.—At *Welch, Jefferson County, Mont.*, 36 meters east of the southeast corner of the Northern Pacific Railway depot, 16 meters east of a large pine tree east of the depot, 14 meters northeast of the track; set ½ meter below the base of the rail. (Note 11.*)

N_3.—About 2½ miles northeast of *Welch, Jefferson County, Mont.*, at a road crossing, 341 meters east of the first trestle east of Welch, 18 meters south of the Northern Pacific Railway track, in the east slope of a small hill, 5 meters northeast of a large pine; set in a ledge of granite, about on a level with the base of the rail. (Note 2.*)

O_3.—At *Spire Rock, Jefferson County, Mont.*, 25 meters northeast of the signboard, about 200 meters north of milepost B 20 of the Northern Pacific Railway, 22 meters northeast of the track; in a ledge of granite, ⅔ meter above the base of the rail. (Note 11.*)

P_3.—About 2.6 miles northeast of *Pipestone, Jefferson County, Mont.*, 170 meters north of milepost B 23, 24 meters west of the Northern Pacific Railway track, at the south end of a railway cut; set on a level with the base of the rail. (Note 2.*)

Q_3.—At *Pipestone, Jefferson County, Mont.*, 19 meters southwest of the southwest corner of the Northern Pacific Railway depot, 36 meters northwest of the track, about 200 meters south of the station foreman's house; 1½ meters above the base of the rail. (Note 11.*)

R_3.—About 3.4 miles west of *Whitehall, Jefferson County, Mont.*, 30 meters northwest of milepost B 29, 27 meters north of the Northern Pacific Railway track, and 5 meters outside of the railway right of way; set 1 meter below the base of the rail. (Note 2.*)

S_3.—At *Whitehall, Jefferson County, Mont.*, at the northeast corner of Main and Railroad Streets, at the southwest corner of the store building occupied by Clinton & Co., general merchandise, in the vertical surface of the granite foundation to the building, ¼ meter above the sidewalk; set in lead and lettered "U.S.B.M." (Note 4.*)

T_3.—At *Whitehall, Jefferson County, Mont.*, at the north end of Main Street, 3 blocks north and ½ block west of the Northern Pacific Railway depot; originally on the public-school building (lately destroyed) on the foundation wall of the main tower, 3 meters northeast of the southeast corner of the veranda, ⅔ meter above the ground; now relocated in the south foundation wall of the new school building, near the southeast corner. (Note 1.*)

U_3.—About 3.4 miles east of *Whitehall, Jefferson County, Mont.*, 4 meters east of the fifth telegraph pole west of milepost B 36, 25 meters south of the Northern Pacific Railway track, and ⅓ meter outside of the right of way; set on a level with the base of the rail. (Note 2.*)

V_3.—At *Jefferson Island, Jefferson County, Mont.*, 32 meters southeast of the southeast corner of the Northern Pacific Railway station platform, 30 meters east of the northeast corner of Scheytt & Noble's general store, 7 meters east of the county road, 17 meters south of the railway track, ⅔ meter inside of the railway right of way; set ⅔ meter below the base of the rail. (Note 11.*)

W_3.—About 1.8 miles west of *Lime Spur, Jefferson County, Mont.*, northeast of the Jefferson River, 58 meters northeast of milepost B 42, 36 meters east of the Northern Pacific Railway track; set 1⅓ meters above the base of the rail. (Note 2.*)

X_3.—At *Lime Spur, Jefferson County, Mont.*, 3 meters south of the signboard "Lime Spur," 9 meters southwest of the third telegraph pole southwest of milepost B 44 of the Northern Pacific Railway, 12 meters south of the track, and 1 meter outside of the right of way; set on a level with the base of the rail. (Note 11.*)

Y_3.—About 2.4 miles east of *Lime Spur, Jefferson County, Mont.*, 11 meters northeast of the fifth telegraph pole east of milepost B 46 of the Northern Pacific Railway, 23 meters north of the track, and 6 meters outside of the right of way; set 1½ meters below the base of the rail. (Note 2.*)

Z_3.—About 2.7 miles west of *Sappington, Madison County, Mont.*, 24 meters west of the seventh telegraph pole northwest of mile post B 49 of the Northern Pacific Railway, 4 meters north of the track, about ⅔ meter below the the base of the rail; at the north end of a concrete arched culvert, in the upper horizontal surface of the coping, 0.2 meter from the west edge and 0.2 meter from the north edge. (Note 13.*)

A_4.—At *Sappington, Madison County, Mont.*, 35 meters south of the southwest corner of the Northern Pacific depot; 28 meters south of the railway track; 13 meters east of a public road; set 1 meter below the base of the rail. (Note 11.*)

B_4.—About 3.6 miles northeast of *Sappington, Madison County, Mont.*, 31 meters southeast of the third telegraph pole northeast of mile post B 55, of the Northern Pacific Railway, 17 meters southeast of the track, 2.5 meters outside of the right of way; set on a level with the base of the rail. (Note 2.*)

C_4.—At *Willow Creek, Gallatin County, Mont.*, 45 meters south of the southwest corner of the Northern Pacific Railway depot, 27 meters southeast of the track; 43 meters southwest of a public road crossing, 70 meters north of the

* See pp. 162-166.

store and post office in the building owned by L. F. Hare, 4 meters outside of the railway right of way; set ¼ meter above the base of the rail. (Note 11.*)

D_4.—About 2.5 miles northeast of *Willow Creek, Gallatin County, Mont.*, 32 meters southwest of the eighth telegraph pole southwest of milepost B 61 15½ meters northwest of the Northern Pacific Railway track, ½ meter inside of the railway right of way; set ½ meter below the base of the rail. (Note 2.*)

E_4.—About 2 miles west of *Three Forks, Gallatin County, Mont.*, 21 meters south of the fifth telegraph pole northeast of milepost B 63, 4 meters southeast of the Northern Pacific Railway track; in the top horizontal surface of the southeast end wall of a tile culvert, 0.2 meter from the southeast side, 0.5 meter from the northeast side, 0.5 meter from the southwest end; ⅓ meter below the base of the rail. (Note 16.*)

F_4.—At *Three Forks, Gallatin County, Mont.*, 22 meters north of the tenth telegraph pole northeast of milepost B 65; 34 meters south of signboard "Three Forks"; 22 meters southeast of the Northern Pacific Railway track, 15 meters southeast of the railway station platform; set on a level with the base of the rail. (Note 11.*)

I Three Forks.—At *Three Forks, Gallatin County, Mont.*, on the north side of Main Street; 17 meters east of State Street; at the southwest corner of the old Three Forks Hotel (now in disuse), ½ meter inside of the fence inclosing the hotel grounds and ⅓ meter from the west wall of the building. The elevation of the stone was determined and also that of a point marked by a chiseled cross in the south side of the rim of the pipe, the cap being missing from the mark. (Note 53.*)

S. B. Gallatin.—At *Old Gallatin City, Gallatin County, Mont.*, on the east side of Main Street, in an open field belonging to Frank Dunbar about 275 meters north of the southwest corner and 4 meters inside of the fence separating the field from Main Street, about 200 meters west of Moss Creek, and about 350 meters southwest of the northeast corner of section 20, T. 2 N., R. 2 E. (Note 53*, except that copper bolt is missing from cap.)

G_4.—About 0.9 mile northwest of *Old Gallatin City, Gallatin County, Mont.*, on the right bank of the Madison-Jefferson River, 25 meters east of the river and about 150 meters northwest of the west end of a row of limestone cliffs running parallel with the river, about ½ mile upstream from the mouth of the Gallatin River and about ⅓ mile southwest of "Gauge BM" (see below). (Note 53*, except that copper bolt is missing from cap.)

Gauge BM.—About 1¼ miles north of *Old Gallatin City, Gallatin County, Mont.*, on the right bank of the Madison-Jefferson River, about 500 meters south of a ranch house on the opposite side of the river, 22 meters west of the crest of a cliff and 3 meters above the river in the horizontal surface of a limestone ledge projecting into the river, about ⅛ mile upstream from the mouth of the Gallatin River, 10 meters from a path leading to a skiff landing and 15 meters southwest of two cottonwood trees on the river bank. The mark is a very crude cross chiseled into the rock and lettered BM.

H_4.—About 2.3 miles west of *Logan, Gallatin County, Mont.*, 20 meters northeast of milepost HLNA 71; about 250 meters west of a private road crossing; 24 meters northeast of the Northern Pacific Railway track; ½ meter inside of the railway right of way; set in fine loam, ¾ meter below the base of the rail. (Note 2.*)

I_4.—At *Logan, Gallatin County, Mont.*, in the center of the street south of and adjoining the Northern Pacific Railway depot; 44 meters northwest of the east corner of this street and Flower Street; 55 meters east of the southwest corner of the railway depot; set ½ meter below the base of the rail. (Note 11.*)

J_4.—About 2.4 miles west of *Manhattan, Gallatin County, Mont.*, 4 meters south of the eleventh telegraph pole west of milepost HLNA 77; 22½ meters south of the Northern Pacific Railway track; ½ mile inside of the railway right of way and outside the public road; set ⅓ meter below the base of the rail. (Note 2.*)

K_4.—At *Manhattan, Gallatin County, Mont.*, 36 meters west of the east corner of the Northern Pacific Railway depot; 20 meters southwest of the railway track; 57 meters east of the east corner of the building occupied by the Sanborn Co.; 48 meters northeast of the building occupied by the McLeod Mercantile Co.; 10 meters southeast of a public road; 2 meters southeast of a telegraph pole; set ½ meter below the base of the rail. (Note 2.*)

L_4.—About 2.0 miles southeast of *Manhattan, Gallatin County, Mont.*, about 40 meters east of the twenty-first telegraph pole southeast of milepost HLNA 80, at a Northern Pacific Railway bridge with concrete abutments, in the northwest abutment; in the upper horizontal surface at the northeast end, 0.2 meter from the northeast edge; 1 meter from the southeast edge; ¼ meter below the base of the rail. (Note 5.*)

M_4.—At *Central Park, Gallatin County, Mont.*, 84 meters southeast of the Northern Pacific Railway depot; 24 meters southwest of the railway track; in the northeast foundation under the east side of the railway water tank; 1 meter southeast of the northeast corner of the frame work under the tank; set in the upper horizontal surface 1½ meters from the east end; 0.2 meter from each of the sides lettered U. S. B. M. (Note 4.*)

N_4.—About 2.6 miles west of *Belgrade, Gallatin County, Mont.*, 8 meters southwest of the second telegraph pole west of milepost HLNA 86, of the Northern Pacific Railway, about 150 meters southwest of a farmhouse owned by W. D. Miller; 23 meters southeast of the track; 4 meters west of a private road; ⅓ meter inside of the railway right of way; set about 1 meter below the base of the rail. (Note 2.*)

O_4.—At *Belgrade, Gallatin County, Mont.*, 1 block west of the Northern Pacific Railway depot; at the northeast corner of Davis Street and Northern Pacific Avenue, 94 meters north of the railway track, in the vertical surface of the foundation to the building occupied by the Belgrade State Bank, 0.5 meter east of the southwest corner, 0.5 meter above the sidewalk; a copper bolt lettered U. S. B. M. (Note 4.*)

P_4.—About 2.4 miles southeast of *Belgrade, Gallatin County, Mont.*, 43 meters northeast of the fourteenth telegraph pole southeast of milepost HLNA 90; about 300 meters west of a farmhouse owned by D. A. Gilchrist, 23 meters north

* See pp. 162-166.

of the Northern Pacific Railway track; 1 meter inside of the railway right of way; set 1 meter below the base of the rail. (Note 2.*)

Q_4.—At *Storey, Gallatin County, Mont.*, 33 meters southeast of signboard "Storey;" in the edge of the county road; about 300 meters southwest of a farmhouse; 17 meters south of the Northern Pacific Railway track, 1 meter outside of the railway right of way; set 1 meter above the base of the rail. (Note 2.*)

R_4.—At *Bozeman, Gallatin County, Mont.*, about 0.2 mile northwest of the Northern Pacific Railway depot, 16 meters north of the eighth telegraph pole northwest of the depot; about 2 meters northeast of the railway track; in the southeast concrete abutment of a railroad bridge; in the upper horizontal surface at the north corner; 0.3 meter from the northeast edge, 0.3 meter from the northwest edge about on a level with the base of the rail. (Note 5.*)

S_4.—About 1.8 miles east of *Bozeman, Gallatin County, Mont.*, 24 meters southeast of the twenty-third telegraph pole east of milepost HLNA 99; 23 meters south of the Northern Pacific Railway track and 1 meter inside of the railway right of way; set about 2½ meters below the base of the rail. (Note 2.*)

T_4.—About 1.1 miles east of *Gordon, Gallatin County, Mont.*, 11 meters southeast of the fourth telegraph pole west of milepost HLNA 104; in the Northern Pacific Railway bridge 169; in the west concrete abutment, in the upper horizontal surface, at the northwest corner, 0.2 meter from the east edge, 0.2 meter from the north edge; 0.3 meter below the base of the rail. (Note 14.*)

U_4.—At *Chestnut, Gallatin County, Mont.*, 23 meters southeast of the southwest corner of the Northern Pacific Railway depot; 45 meters southwest of milepost HLNA 106; 28 meters south of the railway track; set about 2½ meters below the base of rail. (Note 2.*)

V_4.—About 1.3 miles southwest of *West End, Gallatin County, Mont.*, 13 meters southeast of the second telegraph pole southwest of mile post HLNA 108; 24 meters southeast of the Northern Pacific Railway track; ½ meter inside of the railway right of way; set 1 meter above the base of rail. (Note 2.*)

W_4.—At *West End, Gallatin County, Mont.*, about 125 meters west of the Northern Pacific Railway depot; 48 meters south of the fifth telegraph pole east of milepost HLNA 109; 23 meters south of the railway track; 1 meter east of a public road; 1 meter outside of the railway right of way; set on a level with the base of rail. (Note 11.*)

X_4.—At *Muir, Park County, Mont.*, 16 meters southwest of the southwest corner of the Northern Pacific Railway depot, 33 meters south of the railway track, ½ meter outside the railway right of way; set 2 meters below the base of the rail. (Note 2.*)

Y_4.—About 1.4 miles west of *Hoppers, Park County, Mont.*, about 500 meters south of the Northern Pacific Railway new double tracks, 16 meters southeast of the twenty-fourth telegraph pole west of milepost HLNA 113, 5 meters east of a private road, ⅓ meter outside of the railroad right of way; set 1 meter below the base of the rail. (Note 2.*)

Z_4.—At *Hoppers, Park County, Mont.*, about 175 meters north of a log house owned by Tom Flynn, 54 meters north of the Northern Pacific Railway water tank, 49 meters north of the railway track, in the east edge of a public road; set about 1½ meters above the base of the rail. (Note 11.*)

A_5.—About 1.6 miles west of *Coal Spur, Park County, Mont.*, 30 meters northeast of the seventeenth telegraph pole east of milepost HLNA 116 of the Northern Pacific Railway, 4 meters north of the track in the upper horizontal surface of the north granite end of a tile culvert, 0.2 meter from the edge 1½ meters from the east edge, 1½ meters from the west edge, on a level with the base of the rail. (Note 16.*)

B_5.—About 2.0 miles east of *Coal Spur, Park County, Mont.*, about 600 meters south of the new double tracks of the Northern Pacific Railway, 23 meters northeast of milepost HLNA 120, 25 meters north of the old track, ⅓ meter inside of the railway right of way; set 1 meter below the base of the rail. (Note 2.*)

C_5.—At *Livingston, Park County, Mont.*, 1 block east and 1 block south of the Northern Pacific Railway depot, at the southwest corner of Main and Callendar Streets, on the south side of Callendar Street, in the stone foundation to the building occupied by the First State Bank, in the vertical surface, ½ meter west of the northwest corner of the building, ⅔ meter above the walk. (Note 4.*)

D_5.—At *Livingston, Park County, Mont.*, 2 blocks east of the Northern Pacific Railway depot, on the north side of Park Street, 45 meters northeast of the southeast corner of B and Park Streets, 19 meters north of the curb on the south side of Park Street, 41 meters south of the railway track; set on a level with the base of the rail. (Note 11.*)

E_5.—About 1.2 miles west of *Africa, Park County, Mont.*, 12 meters west of the seventh telegraph pole northeast of milepost BGS 113 of the Northern Pacific Railway, 26 meters southeast of the track, ½ meter outside of the railway right of way; set on a level with the base of the rail. (Note 2.*)

F_5.—At *Africa, Park County, Mont.*, 6 meters east of the thirteenth telegraph pole east of milepost BGS 112, 15 meters southeast of signboard "Africa" on the Northern Pacific Railway, 26 meters southeast of the track, ½ meter outside of the railway right of way; set on the level with the base of the rail. (Note 11.*)

G_5.—At *Mission, Park County, Mont.*, in the north side of the county road, 13½ meters south of the Northern Pacific depot, 26 meters south of the railway track, 1 meter outside of the railway right of way; set 1 meter below the base of the rail. (Note 11.*)

H_5.—About 2.3 miles west of *Elton, Park County, Mont.*, 3 meters east of the sixth telegraph pole west of milepost BGS 104 of the Northern Pacific Railway, 19 meters south of the track, 6 meters inside of the railway right of way; set about 2 meters above the base of the rail. (Note 2.*)

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* See pp. 162–166.

I_5.—At *Elton, Park County, Mont.*, 70 meters southeast of milepost BGS 102 of the Northern Pacific Railway, 17 meters south of the railroad water tank, 28 meters south of the railway track, 2 meters outside of the railway right of way; set 1 meter above the base of the rail. (Note 11.*)

J_5.—About 2.9 miles west of *Springdale, Park County, Mont.*, 10 meters north of the fifth telegraph pole north of milepost BGS 99 of the Northern Pacific Railway, at the base of a cliff, 5 meters east of the track; set on a level with the base of the rail. (Note 2.*)

K_5.—At *Springdale, Park County, Mont.*, 50 meters southeast of the southeast corner of the Northern Pacific Railway depot, 41 meters south of the railway track, 37 meters northwest of the steps to the general store owned by Jno. W. Fryor; set ½ meter above the base of the rail. (Note 11.*)

L_5.—In *Sweet Grass County, Mont.*, about 2.4 miles east of *Springdale, Park County, Mont.*, about 50 meters north of the thirteenth telegraph pole east of milepost BGS 94 of the Northern Pacific Railway, 17 meters northwest of the track, 14 meters southeast of the right bank of the Yellowstone River; set on a level with the base of the rail. (Note 2.*)

M_5.—At *Carney, Sweet Grass County, Mont.*, 65 meters northeast of milepost BGS 91, 43 meters northeast of signboard "Carney" on the Northern Pacific Railway, 26 meters north of the track, and 1 meter outside of the railway right of way; set 1 meter below the base of the rail. (Note 2.*)

N_5.—At *Dehart, Sweet Grass County, Mont.*, 5 meters southeast of the seventh telegraph pole southwest of milepost BGS 86, about 300 meters northeast of signboard "Dehart" on the Northern Pacific Railway, 40 meters southwest of the south corner of the railway telegraph office, 25 meters southeast of the railroad track, 1 meter outside of the railway right of way; set ½ meter below the base of the rail. (Note 11.*)

O_5.—About 2.1 miles east of *Dehart, Sweet Grass County, Mont.*, in the northwest edge of the county road, 44 meters south of milepost BGS 84 of the Northern Pacific Railway, 26 meters southeast of the track, ⅔ meter outside of the railway right of way; set ⅔ meter below the base of the rail. (Note 2.*)

P_5.—At *Bigtimber, Sweet Grass County, Mont.*, 44 meters northwest of the Northern Pacific Railway depot, about 125 meters northeast of mile post BGS 81, 37 meters northwest of the railway track, 24 meters northeast of a public road, 3 meters southeast of a canal; set on a level with the base of the rail. (Note 11.*)

Q_5.—About 2.4 miles east of *Bigtimber, Sweet Grass County, Mont.*, 4 meters southwest of the fifteenth telegraph pole east of milepost BGS 79 of the Northern Pacific Railway, 27 meters south of the track, ½ meter inside the railway right of way; set ½ meter above the base of the rail. (Note 2.*)

R_5.—About 0.6 mile east of *Reynolds, Sweet Grass County, Mont.*, in Northern Pacific Railway bridge No. 108, at the southwest end of the southeast concrete abutment, 2 meters southwest of the railway track, in the upper horizontal surface, 0.3 meter from the southwest edge, 1 meter from the southeast edge, 1 meter from the northwest edge, 0.2 meter below the base of the rail. (Note 13.*)

S_5.—About 2.2 miles west of *Greycliff, Sweet Grass County, Mont.*, 45 meters north of the eighteenth telegraph pole east of milepost BGS 73 of the Northern Pacific Railway, 25 meters north of the track, 0.2 meter outside of the railway right of way; set 2 meters below the base of the rail. (Note 2.*)

T_5.—At *Greycliff, Sweet Grass County, Mont.*, about 50 meters west of the Northern Pacific Railway depot, 41 meters southeast of the railway track on the northwest side of the county road, about 100 meters east of the building occupied by Overhulls & Co., general merchandise, 51 meters northwest of the dance hall, 15 meters outside of the railway right of way; set ½ meter below the base of rail. (Note 11.*)

U_5.—About 1.9 miles west of *Patcum, Sweet Grass County, Mont.*, 40 meters southwest of the ninth telegraph pole west of milepost BGS 67 of the Northern Pacific Railway, about 80 meters west of the section foreman's house, 26 meters south of the track, on the north side of the county road, ½ meter outside of the railway right of way; set 1½ meters below the base of the rail. (Note 2.*)

V_5.—At *Patcum, Sweet Grass County, Mont.*, 10 meters south of signboard "Patcum," 16 meters southeast of the seventeenth telegraph pole east of milepost BGS 66 on the Northern Pacific Railway, 26 meters south of the track, ½ meter inside of the railway right of way; set 1 meter above the base of rail. (Note 11.*)

W_5.—About 1.1 miles west of *Quebec, Sweet Grass County, Mont.*, 24 meters southwest of the twelfth telegraph pole west of milepost BGS 63 of the Northern Pacific Railway, 26 meters south of the track, in the west edge of a private road, ½ meter outside of the railway right of way; set 1 meter below the base of rail. (Note 2.*)

X_5.—At *Reedpoint, Sweet Grass County, Mont.*, 17 meters south of the southwest corner of the Northern Pacific Railway depot; about 90 meters southeast of milepost BGS 57; 28 meters south of the railway track, ½ meter outside of the railway right of way; set 1½ meters below the base of the rail. (Note 11.*)

Y_5.—About 1.2 miles east of *Reedpoint, Sweet Grass County, Mont.*, 10 meters southeast of the ninth telegraph pole east of milepost BGS 56 on the Northern Pacific Railway, 29 meters south of the track, 20 meters east of a private road, 20 meters north of the county road, 4 meters outside of the railway right of way; set 1½ meters below the base of rail. (Note 2.*)

Z_5.—At *Oneida, Sweet Grass County, Mont.*, 8 meters northeast of the signboard, 42 meters northeast of the thirteenth telegraph pole east of milepost BGS 54 on the Northern Pacific Railway, 24 meters northeast of the track, 1 meter outside of the railway right of way; set 1 meter below the base of rail. (Note 11.*)

A_6.—About 2.2 miles east of *Oneida, Sweet Grass County, Mont.*, 12 meters east of the eighteenth telegraph pole east of milepost BGS 52, about 100 meters northeast of Northern Pacific Railway bridge No. 78, about 100 meters west of a

* See pp. 162-166.

private road crossing, 25 meters southeast of the railway track, ½ meter outside of the railway right of way; set ½ meter below the base of the rail. (Note 2.*)

B_6.—At *Merrill, Sweet Grass County, Mont.*, 11 meters south of the Northern Pacific Railway depot, 50 meters northwest of the house owned by Miller Bros., 25 meters south of the railway track; set ⅔ meter below the base of rail. (Note 11.*)

C_6.—About 1.2 miles east of *Merrill, Sweet Grass County, Mont.*, 4 meters northwest of the fourteenth telegraph pole east of milepost BGS 48 on the Northern Pacific Railway, 10 meters southwest of the track, ½ meter outside of the railway right of way; set 1 meter below the base of rail. (Note 2.*)

D_6.— At *Wataga, Sweet Grass County, Mont.*, 16 meters south of the signboard, 11 meters southwest of the sixth telegraph pole west of milepost BGS 45 of the Northern Pacific Railway, 26 meters south of the track, 1 meter inside of the railway right of way; set 1 meter below the base of rail. (Note 11.*)

E_6.—In *Yellowstone County, Mont.*, about 2.5 miles east of *Wataga, Sweet Grass County, Mont.*, 28 meters southwest of the ninth telegraph pole east of milepost BGS 43 on the Northern Pacific Railway, 26 meters south of the track, ½ meter inside of the railway right of way; set 1 meter below the base of rail. (Note 2.*)

F_6.—At *Columbus, Yellowstone County, Mont.*, 1½ blocks west and 1 block north of the Northern Pacific Railway depot, on the north side of the second street north of the railway track, in the vertical stone surface of the public-school building at the left on entering, 0.3 meter west of the entrance, 1 meter above the lower stone step. (Note 1.*)

G_6.—At *Columbus, Yellowstone County, Mont.*, about 50 meters northeast of the Northern Pacific Railway depot, 40 meters north of the railway track, at the northeast corner of Second Street and Pike Avenue, 3 meters west of the building occupied by Frazer & Rothwell, general merchandise; set on a level with the sidewalk. (Note 11.*)

H_6.—About 2.2 miles east of *Columbus, Yellowstone County, Mont.*, 60 meters east of milepost BGS 38 on the Northern Pacific Railway, 26 meters northeast of the track, ½ meter outside of the railway right of way; set 2 meters below the base of rail. (Note 2.*)

I_6.—At *Misko, Yellowstone County, Mont.*, 11 meters southwest of the fourth telegraph pole east of signboard "Misko," 11 meters southwest of the eighteenth telegraph pole east of milepost BGS 35 on the Northern Pacific Railway, 26 meters south of the track, ½ meter inside of the right of way; set on a level with the base of rail. (Note 11.*)

J_6.—About 1.3 miles west of *Rapids, Yellowstone County, Mont.*, 12 meters southwest of the ninth telegraph pole west of milepost BGS 33 on the Northern Pacific Railway, 26 meters south of the track, ½ meter inside of the railway right of way; set 2 meters below the base of rail. (Note 2.*)

K_6.—At *Rapids, Yellowstone County, Mont.*, about 75 meters southwest of the signboard, 80 meters southwest of milepost BGS 32 on the Nothern Pacific Railway, 26 meters south of the track, ½ meter inside of the railway right of way; set 1 meter below the base of rail. (Note 11.*)

L_6.—About 2.3 miles east of *Rapids, Yellowstone County, Mont.*, 4 meters southeast of the eleventh telegraph pole east of milepost BGS 30 on the Northern Pacific Railway, 26 meters southeast of the track, ½ meter inside of the railway right of way; set 1 meter above the base of rail. (Note 2.*)

M_6.—At *Youngs Point, Yellowstone County, Mont.*, 50 meters southeast of signboard "Youngs Point," 3 meters south of the seventh telegraph pole west of milepost BGS 27 on the Northern Pacific Railway, 26 meters southwest of the track, ¾ meter inside of the railway right of way; set on a level with the base of rail. (Note 11.*)

N_6.—About 2.2 miles west of *Park City, Yellowstone County, Mont.*, 2 meters west of the sixth telegraph pole east of milepost BGS 25 on the Northern Pacific Railway, 19 meters southeast of the track; set 1 meter below the base of rail. (Note 2.*)

O_6.—At *Park City, Yellowstone County, Mont.*, 40 meters southeast of the Northern Pacific Railway depot, 26 meters northeast of a street leading through the city and across the railway track, about 75 meters northwest of the Sieber Hotel, 61 meters southeast of the railway track; set ½ meter below the base of rail. (Note 11.*)

P_6.—About 2.1 miles east of *Park City, Yellowstone County, Mont.*, 2 meters northwest of the fifteenth telegraph pole east of milepost BGS 21 on the Northern Pacific Railway, 19 meters southeast of the track; set 1 meter below the base of rail. (Note 2.*)

Q_6.—About 2.5 miles west of *Laurel, Yellowstone County, Mont.*, 34 meters west of the third telegraph pole west of milepost BGS 18 of the Northern Pacific Railway, 24 meters southeast of the track, ½ meter inside of the railway right of way; set 1 meter below the base of rail. (Note 11.*)

R_6.—At *Laurel, Yellowstone County, Mont.*, about 75 meters west of the Northern Pacific Railway depot, 70 meters northwest of the railway track, at the east corner of Main Street and Third Avenue, 30 meters southeast of the building occupied by the Westbrook Mercantile Co. (general supply store), 40 meters east of the First National Bank; set ½ meter below the base of rail. (Note 11.*)

S_6.—About 2.4 miles east of *Laurel, Yellowstone County, Mont.*, 3 meters southwest of the sixth telegraph pole east of milepost BGS 13 on the Northern Pacific Railway, 20 meters southeast of the track; set ½ meter below the base of rail. (Note 2.*)

T_6.—At *Foster, Yellowstone County, Mont.*, 1½ meters east of signboard "Foster," 16 meters northwest of the thirteenth telegraph pole east of milepost BGS 9 on the Northern Pacific Railway, 14 meters southeast of the track, 40 meters inside of the railway right of way; set ½ meter below the base of rail. (Note 11.*)

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*See pp. 162-166.

U_6.—About 2.3 miles west of *Yegen, Yellowstone County, Mont.*, 27 meters east of the fifteenth telegraph pole east of milepost BGS 6 on the Northern Pacific Railway, 75 meters northwest and across the county road from the ranch house owned by John Summers, about 300 meters east of the ranch house on the northwest side of the county road and just west of the Summers ranch, 50 meters southwest of a public road crossing, 40 meters southeast of railway bridge No. 2, 32 meters southeast of the railway track, ½ meter inside of the railway right of way; set on a level with the base of rail. (Note 52.*)

V_6.—At *Yegen, Yellowstone County, Mont.*, about 75 meters northeast of the Northern Pacific Railway depot, 14 meters south of the fourth telegraph pole west of milepost BGS 4, 36 meters southeast of the railway track, ½ meter inside of the railway right of way; set ½ meter below the base of rail. (Note 11.*)

W_6.—About 2.0 miles west of *Billings, Yellowstone County, Mont.*, 26 meters southeast of milepost BGS 2 on the Northern Pacific Railway, 24 meters southeast of the track, 1 meter northwest of the county road and 1 meter inside of the railway right of way; set ½ meter below the base of rail. (Note 2.*)

X_6.—At *Billings, Yellowstone County, Mont.*, 1 block west of the Northern Pacific Railway passenger depot, at the southwest corner of Montana Avenue and Twenty-ninth Street, 50 meters southwest of the Thornton Hotel, 47 meters north of the railway track, 45 meters west of the Parmley Public Library in a vacant lot just inside the board sidewalks; set 0.1 meter above the level of the walks. (Note 11.*)

Y_6.—At *Billings, Yellowstone County, Mont.*, 1 block west and 4 blocks north of the Northern Pacific Railway passenger depot, at the northwest corner of Twenty-ninth Street and Fourth Avenue, on the Billings High-School grounds, 10 meters southeast of the southeast corner of the main high-school building, 0.2 meter west of the walk on Twenty-ninth Street, 0.2 meter north of the walk on Fourth Avenue, 0.2 meter above the level of the walk. (Note 2.*)

Z_6.—At *Billings, Yellowstone County, Mont.*, 2 blocks north and 1 block east of the Northern Pacific Railway passenger depot, on the north side of Second Avenue, in the vertical stone surface of the county courthouse, at the right of and 2.8 meters east of the south entrance, 0.2 meter above the ground. (Note 1.*)

A_7.—At *Billings, Yellowstone County, Mont.*, 3 blocks east of the Northern Pacific Railway passenger depot, on the north side of Montana Avenue, in the vertical stone surface of the main building of the Billings Brewing Co., 0.31 meter east from the southwest corner of the building, 0.53 meter above the ground. (Note 4.*)

B_7.—About 1.9 miles east of *Billings, Yellowstone County, Mont.*, in the northwest granite abutment of Northern Pacific Railway bridge No. 565, in the upper horizontal surface, 2½ meters northeast of the railway track, 0.3 meter from the southeast edge, 0.3 meter from the northwest edge, 0.2 meter below the base of the rail. (Note 16.*)

C_7.—About 2.2 miles west of *Lockwood, Yellowstone County, Mont.*, 70 meters south of the twelfth telegraph pole west of milepost G 221 of the Northern Pacific Railway, 70 meters southeast of the track, ½ meter inside of the railway right of way; set on a level with the base of rail. (Note 2.*)

D_7.—About 1.9 miles east of *Lockwood, Yellowstone County, Mont.*, 17 meters north of milepost G 217, 75 meters northeast of Northern Pacific Railway bridge No. 550, 14 meters northwest of the railway track, 15 meters southeast of the right bank of the Yellowstone River; set on a level with the base of rail. (Note 2.*)

U.S.R.S. 1.—About 2.8 miles west of *Huntley, Yellowstone County, Mont.*, at Huntley head gates, 12 meters east of the sixth pole east of milepost G 116 of the Northern Pacific Railway, 12 meters north of the track, in the top horizontal concrete surface of the head gate, 3 meters from the southwest edge, 3 meters from the northeast edge, 2½ meters below the base of the rail. (Note 54.*)

U.S.R.S. 2.—About 2.2 miles west of *Huntley, Yellowstone County, Mont.*, 30 meters southeast of the fifth telegraph pole west of milepost G 215 of the Northern Pacific Railway, 21 meters south of the track, at the concrete portal at the west end of tunnel No. 2, in the center of the top horizontal surface, 1 meter below the base of rail. (Note 54.*)

U.S.R.S. 3.—About 1.2 miles west of *Huntley, Yellowstone County, Mont.*, 90 meters southwest of milepost G 214 of the Northern Pacific Railway, 7 meters southeast of the track, in the center of the top horizontal concrete surface of the spillway, on a level with the base of rail. (Note 54.*)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN LAS VEGAS, NEV., AND ZENDA, UTAH, 1908.

2033 B.—At *Las Vegas, Lincoln County, Nev.* (See p. 204.)

O.—At *Las Vegas, Lincoln County, Nev.* (See p. 204.)

2024 B.—At *Las Vegas, Lincoln County, Nev.* (See p. 204.)

P.—At *Las Vegas, Lincoln County, Nev.* (See p. 204.)

Q.—At *Stewart, Lincoln County, Nev.*, about 225 meters northeast of signboard "Stewart" on the San Pedro, Los Angeles & Salt Lake Railroad, 17 paces southeast of the east rail of the main track, 4 telegraph poles southwest of mile pole 339 and 21 paces southwest of section house; set in the fence corner outside of the right of way, 2.5 feet from the north fence and 3 feet from the east fence. (Note 11.*)

R.—About 0.6 mile southwest of *Valley, Lincoln County, Nev.*, 5 telegraph poles southwest of mile pole 341, 19.7 feet southeast of east rail of main track of the San Pedro, Los Angeles & Salt Lake Railroad, and 2.8 feet from north bulkhead (produced) of bridge 341B. This bench mark is on a large porphyry block used in the riprap work on the southeast side of the bridge, the block being at the northeast end of the bridge opening. (Note 5.*)

S.—At *Valley, Lincoln County, Nev.*, 125 feet northwest of the west rail of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Valley." (Note 11.*)

* See pp. 162-166.

T.—About 2.5 miles northeast of *Valley, Lincoln County, Nev.*, 110 meters northeast of the center of bridge 344C and directly opposite mile pole 345, 20.8 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, and 6.6 meters northwest of mile pole 345. (Note 2.*)

U.—At *Dike, Lincoln County, Nev.*, about 300 meters east of signboard "Dike," 5 telegraph poles east of mile pole 347, 218 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 44 paces west of the west face of the section house and in line with the back wall produced. (Note 11.*)

V.—About 3.0 miles northeast of *Dike, Lincoln County, Nev.*, 40 meters southwest of mile pole 350 and 250 meters southwest of bridge 350A, 11.7 meters northwest of the west rail of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, and 5.8 meters above it, 1.5 meters southeast of the line between mile pole 350 and first telegraph pole south of it, set vertically in rock outcrop. (Note 4.*)

W.—At *Apex, Lincoln County, Nev.*, about 400 meters southwest of signboard "Apex," at highest point of railroad grade between Las Vegas and Moapa, 4.8 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 10 meters southwest of the southwest end of the Apex siding; set horizontally in solid rock cut 1.2 meters above the top of the rail. (Note 4.*)

X.—About 2.4 miles northeast of *Apex, Lincoln County, Nev.*, 0.4 miles northeast of mile pole 354, 28 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set vertically in the south wing wall of concrete culvert 354A, 0.9 meter above the apron of the culvert. (Note 4.*)

Y.—At *Garnet, Lincoln County, Nev.*, at the southwest end of the Garnet siding, 10 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set horizontally at the northeast corner of the concrete section house, facing the tracks and 1.5 meters above the ground. (Note 4.*)

Z.—At *Garnet, Lincoln County, Nev.*, directly beneath bench mark Y on the projecting concrete foundation of the section house at the northeast corner. (Note 5.*)

A_1.—About 3.0 miles south of *Dry Lake, Lincoln County, Nev.*, 136 feet east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, just south of mile pole 360 and bridge 359B; set in lower end of the embankment for protecting the railroad track from wash and projecting 1 foot above the ground. (Note 2.*)

B_1.—At *Dry Lake, Lincoln County, Nev.*, on the steel base of the southwest one of the two water-tank supports nearest the main track of the San Pedro, Los Angeles & Salt Lake Railroad. (Note 13.*) In addition, the letters "U.S.B.M." were cut in the face of the concrete supporting pier.

C_1.—At *Dry Lake, Lincoln County, Nev.*, about 16 meters southwest of the south wall of and on the opposite side of the track from the telegraph station at Dry Lake, 16.8 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set in hard gypsum soil, projecting 1 foot above the ground. (Note 2.*)

D_1.—About 2.0 miles northeast of *Dry Lake, Lincoln County, Nev.*, 4½ telegraph poles south of mile pole 365, and 60.4 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set on a small knoll and projecting 1 foot above the ground. (Note 2.*)

E_1.—At *Crystal, Lincoln County, Nev.*, 15 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set in the vertical wall of the concrete section house at southwest corner on side facing the tracks, at northeast end of Crystal siding and 0.1 meters above the ground. (Note 1.*)

F_1.—At *Ute, Lincoln County, Nev.*, 65 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad directly opposite signboard "Ute"; set in the dirt embankment for wash protection and projecting 1 foot above the ground. (Note 2.*)

G_1.—At *Byron, Lincoln County, Nev.*, 15 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set in the vertical wall of the concrete section house at southwest corner on side facing the tracks, 1.4 meters above the ground. (Note 1.*)

H_1.—About 1.2 miles southwest of *Moapa, Lincoln County, Nev.*, on the San Pedro, Los Angeles & Salt Lake Railroad, 35 meters southwest of the signboard "Moapa one mile," at the south corner of the top surface of the southeast parapet wall of culvert 381B, northeast of the main bridge over Muddy Creek, and about in the middle of the high fill across Muddy Valley, letters "U. S. B. M." cut in the vertical face of the wall directly beneath the bench mark. (Note 4.*)

I_1.—At *Moapa, Lincoln County, Nev.*, in front of the Muddy Valley store and hotel, on the west side of the San Pedro, Los Angeles & Salt Lake Railroad, and distant about 160 meters from the main track; set near the fence line at the northeast corner of the hotel and projecting 5 inches above the ground. (Note 2.*)

J_1.—At *Moapa, Lincoln County, Nev.*, set in the vertical concrete foundation wall of the San Pedro, Los Angeles & Salt Lake Railroad station at the northwest corner of the building, facing Railroad Avenue, about 0.5 meters above the ground. (Note 1.*)

K_1.—At *Moapa, Lincoln County, Nev.*, on the east side of the San Pedro, Los Angeles & Salt Lake Railroad tracks; set close to the porch, in front of the store of W. C. Bowman, at the northeast corner of Moapa Avenue and Railroad Avenue. (Note 2.*)

L_1.—At *Moapa, Lincoln County, Nev.*, about 640 meters north of the San Pedro, Los Angeles & Salt Lake Railroad station, in the southerly one of the two concrete piers of the water tank facing the railroad tracks on the west side of the tracks; set horizontally with letters "U.S.B.M." cut in the face of the concrete pier. (Note 4.*)

M_1.—At *Acton, Lincoln County, Nev.*, at the south end of the Acton siding, 20 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set horizontally in the vertical wall of the concrete sec-

* See pp. 162-166.

tion dwelling midway between the 2 doors facing the tracks and 1.5 meters above the ground. The section dwelling is the southerly one of the two concrete buildings at Acton. (Note 4.*)

N_1.—At *Guelph, Lincoln County, Nev.*, about 60 feet north of signboard "Guelph," 170 feet south of the center of bridge 392C and 2½ telegraph poles south of mile pole 393, 32 meters west of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad and 1 meter outside the right-of-way fence line. (Note 2.*)

O_1.—About 2.8 miles south of *Rox, Lincoln County, Nev.*, 470 meters north of Huntsman's Ranch at the entrance to the Meadow Valley Canyon, 15 meters north of first road crossing north of the entrance, 3.5 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, in the northeast corner of concrete culvert 394C, set vertically. (Note 4.*)

P_1.—At *Rox, Lincoln County, Nev.*, 15 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the side of the concrete telegraph office toward the tracks, 1.5 meters above the ground and 0.5 meter above the top of the rail. (Note 1.*)

Q_1.—At *Rox, Lincoln County, Nev.*, 52 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad set vertically in the northwest corner of the concrete support of the water tank, 8 meters above the railroad track on rocky ledge. (Note 4.*)

R_1.—At *Hoya, Lincoln County, Nev.*, 32 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad directly opposite signboard "Hoya," 0.5 meter outside the right-of-way fence, set on opposite side of tracks from bed of the Meadow Valley wash. (Note 11.*)

S_1.—At *Galt, Lincoln County, Nev.*, 15 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; at the west end of the Galt siding in the side of the concrete section house facing the tracks, 1.5 meters above the ground and 1.7 meters above the top of the rail. (Note 1.*)

T_1.—About 3.5 miles north of *Galt, Lincoln County, Nev.*, on west end of southwest concrete abutment of bridge 411A of the San Pedro, Los Angeles & Salt Lake Railroad, 3.5 meters northwest of the center line and 0.5 meter below the top of the rail; set vertically. (Note 4.*)

U_1.—At *Vigo, Lincoln County, Nev.*—36.2 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Vigo;" 5.5 meters outside of the right-of-way fence, and 0.2 meter below the top of the rail. (Note 2.*)

V_1.—About 0.5 miles north of *Vigo, Lincoln County, Nev.*, on south end of west concrete abutment of bridge 413A of the San Pedro, Los Angeles & Salt Lake Railroad in the entrance to the canyon north of Vigo, 3.5 meters south of the center line and 0.5 meter below the top of the rail; set vertically. (Note 4.*)

W_1.—About 2.0 miles south of *Carp, Lincoln County, Nev.*, 35.0 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on southeast side of highway, 25 meters south of mile pole 416 and 1.1 meters below the top of the rail; set at base of a rocky point. (Note 2.*)

X_1.—At *Carp, Lincoln County, Nev.*, 15 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the face of the concrete section house facing the tracks, 50 meters southwest of the telegraph station at Carp, and 1.6 meters above the ground. (Note 1.*)

Y_1.—At *Carp, Lincoln County, Nev.*, 70 meters northeast of the telegraph station at Carp and 20 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, in the northeast radial plane of the circular stone wall of the pump well, 0.5 meter above the ground; set horizontally. (Note 4.*)

Z_1.—At *Carp, Lincoln County, Nev.*, 500 meters northeast of the telegraph station at Carp, 25 meters southwest of the point of switch at north end of Carp siding and 48 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 0.6 meter above the top of the rail and 17 meters outside of the right-of-way fence; set at foot of rocky point. (Note 11.*)

A_2.—At *St. George, Lincoln County, Nev.*, 126.0 meters south of the signboard "St. George," 138.8 meters west of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 107.6 meters west of the right-of-way fence, and 1 meter above the top of the rail opposite the bench mark; set at foot of cliff above broad sandy wash. (Note 11.*)

B_2.—At *Leith, Lincoln County, Nev.*, 15 meters west of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad on the side of the concrete section house facing the tracks, 430 meters north of the signboard "Leith" and 1.6 meters above the ground. (Note 1.*)

C_2.—About 1.3 miles north of *Leith, Lincoln County, Nev.*, set vertically on the southwest end of the southeast concrete abutment of bridge 429B of the San Pedro, Los Angeles & Salt Lake Railroad, 100 meters northwest of signboard "Leith one mile," 3.8 meters southwest of the center line and 2.0 meters below the top of the rail. (Note 4.*)

D_2.—About 3.9 miles north of *Leith, Lincoln County, Nev.*, set vertically in the southwest end of the southeast concrete abutment of bridge 431G of the San Pedro, Los Angeles & Salt Lake Railroad, 3.4 meters southwest of the center line and 0.5 meter below the top of the rail. (Note 4.*)

E_2.—At *Kyle, Lincoln County, Nev.*, 28 meters northeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Kyle," on east side of highway which crosses tracks at this point and 1.1 meters above the top of the rail. (Note 11.*)

F_2.—About 1.4 miles north of *Kyle, Lincoln County, Nev.*, set vertically in the northeast concrete wall of culvert 434A of the San Pedro, Los Angeles & Salt Lake Railroad, 7.2 meters northeast of the center line and 2.5 meters below the top of the rail. (Note 4.*)

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* See pp. 162-166.

G_2.—At *Elgin, Lincoln County, Nev.*, 0.3 mile south of the telegraph station at Elgin, directly opposite mile pole 438, 22 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, and 2.5 meters east of the right-of-way fence line near the foot of the cliffs. (Note 11.*)

H_2.—At *Elgin, Lincoln County, Nev.*, 135 meters north of the telegraph station at Elgin, 11 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the side of the concrete section house facing the tracks, and 1.6 meters above the ground. (Note 1.*)

I_2.—At *Elgin, Lincoln County, Nev.*, 4. 9 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the steel base of the west one of the three southerly tank columns and letters "U. S. B. M." cut in the face of the concrete pier. (Note 13.*)

J_2.—At *Boyd, Lincoln County, Nev.*, 420 meters southeast of the station sign "Boyd," 75 meters northwest of the point of switch at the south end of Boyd siding, 18.2 meters northeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 2.5 meters northeast of the right-of-way fence and in line with the north fence at the highway crossing. (Note 2.*)

K_2.—About 3.9 miles north of *Boyd, Lincoln County, Nev.*, set vertically in the east wing wall of the north concrete abutment of bridge 446A of the San Pedro, Los Angeles & Salt Lake Railroad, 3.0 meters east of the center line and 3.8 meters north of the south face of the abutment, opposite Carson's ranch. (Note 4.*)

L_2.—At *Stine, Lincoln County, Nev.*, 125 meters north of the signboard "Stine," 27 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 1.9 meters outside the right-of-way fence, and 2.2 meters north of angle in fence line, 14 meters above the top of the rail; set at the foot of the white cliffs opposite the power plant of the Delamar mine. (Note 11.*)

M_2.—At *Cana, Lincoln County, Nev.*, 0.8 mile north of the signboard "Stine," 15 meters west of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad in the face of the concrete section house facing the track, 1.5 meters above the ground. (Note 1.*)

N_2.—About 3.2 miles north of *Stine, Lincoln County, Nev.*, on the southeast concrete wall of culvert 450D of the San Pedro, Los Angeles & Salt Lake Railroad, 4.1 meters southeast of the center line and 1.0 meter below the top of the rail. (Note 4.*)

O_2.—At *Etna, Lincoln County, Nev.*, 155 meters southeast of the center of bridge 453A, 340 meters southwest of the point of switch at the northeast end of the Etna siding, 48 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, and 17.5 meters outside the right-of-way fence; set with top 0.4 meter below the top of the rail. (Note 11.*)

P_2.—At *Caliente, Lincoln County, Nev.*, 11.5 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the concrete foundation of the railroad station, facing the tracks and directly beneath the agent's office, 0.3 meter above the ground. (Note 1.*)

Q_2.—At *Caliente, Lincoln County, Nev.*, at the corner of Culverwell Avenue and Market Street, on the face of the public-school building toward Culverwell Avenue, 1.8 meters above the ground. (Note 1.*)

R_2.—At *Caliente, Lincoln County, Nev.*, on the west side of South Spring Street, 294 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 36 meters west of the line (produced) of the west faces of the "Company row" houses on North Spring Street; set at foot of wash from hill, 15 meters above the railroad track. (Note 11.*)

S_2.—At *Caliente, Lincoln County, Nev.*, 50 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the face of the Caliente Mercantile Co.'s store on Clover Street, 1.5 meters above the ground. (Note 1.*)

T_2.—At *Caliente, Lincoln County, Nev.*, 45 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad,in the face of the concrete section house facing the tracks, 1.6 meters above the ground. (Note 1.*)

U_2.—At *Eccles, Lincoln County, Nev.*, 41 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 220 meters west of the east end of Eccles siding; set in a small niche in the high cliffs, 1.1 meters above the top of the rail. (Note 2.*)

V_2.—About 2.0 miles northwest of *Minto, Lincoln County, Nev.*, 3.5 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the east end of the south concrete abutment of bridge 465B; set 0.5 meter below the top of the rail. (Note 4.*)

W_2.—At *Minto, Lincoln County, Nev.*, 30.3 meters southwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 30.5 meters from the signboard "Minto"; set near the foot of the cliffs, 0.2 meter above the top of the rail. (Note 11.*)

X_2.—At *Big Springs, Lincoln County, Nev.*, 6.3 meters west of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 45 meters south of the section house on the west wall of stone culvert 470E; set vertically, 2.2 meters below the top of the rail. (Note 1.*)

Y_2.—At *Islen, Lincoln County, Nev.*, 200 meters west of signboard "Islen," and 21.1 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set at the foot of high white cliffs, 1.0 meter above the top of the rail. (Note 2.*)

Z_2.—At *Barclay, Lincoln County, Nev.*, 0.7 mile east of signboard "Barclay," and 15 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set directly in front of the fence at Wood's ranch (Barclay post office), facing the highway, 0.3 meter below the top of the rail. (Note 11.*)

* See pp. 162-166.

A_3.—At *Acoma, Lincoln County, Nev.*, 65 meters southwest of the San Pedro, Los Angeles & Salt Lake Railroad station at Acoma, and 10.4 meters northwest of the center line of the main track, 0.2 meter below the top of the rail. (Note 2.*)

B_3.—At *Acoma, Lincoln County, Nev.*, 50 meters northeast of the San Pedro, Los Angeles & Salt Lake Railroad station at Acoma, and 3.9 meters northwest of the center line of the main track; set in the southwest end of the concrete pier of the water tank nearest the main track. (Note 4.*)

C_3.—At *Acoma, Lincoln County, Nev.*, 25 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the face of the concrete bunk house toward the tracks, 0.7 meter above the top of the rail. (Note 1.*)

D_3.—About 1.8 miles northeast of *Acoma, Lincoln County, Nev.*, 5.8 meters north of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the south wall of stone culvert 483B, 2.0 meters below the top of the rail. (Note 5.*)

E_3.—At *Brown, Lincoln County, Nev.*, 19 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Brown," 1.0 meter above the top of the rail. (Note 11.*)

F_3.—At *Crestline, Lincoln County, Nev.*, 29 meters west of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the face of the concrete bunk house facing the tracks, 1.6 meters above the ground. (Note 1.*)

G_3.—At *Crestline, Lincoln County, Nev.*, 23 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, and 5 meters north (measured along the tracks) of signboard "Crestline," 0.9 meter above the top of the rail. (Note 11.*)

H_3.—At *Lien, Lincoln County, Nev.*, 19 meters north of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Lien," 0.8 meter above the top of the rail. (Note 2.*)

A_8.—At *Uvada, Iron County, Utah*, 30 meters southwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Uvada," 0.5 meter below the top of the rail. (Note 11.*)

B_8.—At *Tomas, Iron County, Utah*, 38 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 23 meters southeast of signboard "Tomas," (measured along the track); set at foot of low rocky ridge, 1.2 meters below the top of the rail. (Note 2.*)

C_8.—About 2.9 miles southwest of *Modena, Iron County, Utah*, 46 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 75 meters northeast of the center of bridge 504A (measured along the track) and 0.6 meter above the top of the rail; set vertically in the top of a large bowlder lying at the foot of the first rocky point northeast of Tomas siding. (Note 4.)*

D_8.—At *Modena, Iron County, Utah*, 33.2 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad in the yard of the United States Weather Bureau Station, 29 meters north of the north face of the Bureau building and 5 meters north of the flagstaff, 2.1 meters below the top of the rail. (Note 2.*)

E_8.—At *Modena, Iron County, Utah*, 7.1 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the east one of the two concrete piers of the water tank, which are connected with concrete intake; set vertically in cement. (Note 4.*)

F_8.—At *Modena, Iron County, Utah*, 51.2 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad and 39 meters south of the south side of the railroad station.; 0.9 meter below the top of the rail; set on the south side of highway and projecting 8 inches above the top of the ground. (Note 11.*)

G_8.—At *Modena, Iron County, Utah*, 30 meters north of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad on the side of the concrete bunk house toward the track, 1.6 meters above the ground. (Note 1.*)

H_8.—At *Escalante, Iron County, Utah*, 63 meters north of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Escalante." 0.6 meter below the top of the rail. (Note 2.*)

I_8.—About 2.4 miles west of *Morton, Iron County, Utah*, 0.8 mile west of mile pole 517, 33 meters south of the center line of the San Pedro, Los Angeles & Salt Lake Railroad, set 1.1 meters below the top of the rail. (Note 2.*)

J_8.—At *Morton, Iron County, Utah*, 26 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Morton," 0.8 meter below the top of the rail. (Note 11.*)

K_8.—At *Beryl, Iron County, Utah*, 47 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Beryl," set 1.3 meters below the top of the rail. (Note 2.*)

L_8.—At *Beryl, Iron County, Utah*, 5 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 520 meters east of signboard "Beryl," on the steel base of the north one of the three westerly water-tank columns. (Note 13.*)

M_8.—At *Beryl, Iron County, Utah*, 20 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 520 meters east of signboard "Beryl;" set vertically in the northwest concrete pier of the windmill tower, opposite water tank, 1.5 meters below the top of the rail. (Note 1.*)

N_8.—At *Sahara, Iron County, Utah*, 22 meters north of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the side of the concrete section house facing the tracks, 0.9 meter above the top of the rail and 1.6 meters above the ground. (Note 1.*)

O_8.—At *Sahara, Iron County, Utah*, 53 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Sahara," 1.4 meters below the top of the rail. (Note 11.*)

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* See pp. 162-166.

P_8.—At *Ford, Iron County, Utah*, 34 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Ford," 1.4 meters below the top of the rail. (Note 2.*)

Q_8.—At *Lund, Iron County, Utah*, 6.6 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the steel base of the middle one of the three westerly water-tank columns. (Note 13.*)

R_8.—At *Lund, Iron County, Utah*, 20 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, set vertically in the west concrete pier of the windmill tower opposite water tank, 0.2 meter below the top of the rail. (Note 1.*)

S_8.—At *Lund, Iron County, Utah*, 62 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite operator's office in railroad station and in line with two white posts lettered "R. R. Property," 0.8 meter below the top of the rail. (Note 11.*)

5092 R Lund.—At *Lund, Iron County, Utah*, 29 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 74 meters northeast of the operator's office in the railroad station; set in the southwest angle of the large Y, 0.7 meter below the top of the rail. (Note 18.*)

T_8.—At *Kerr, Iron County, Utah*, 48.5 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Kerr," and 1.0 meter below the top of the rail. (Note 2.*)

U_8.—At *Latimer, Iron County, Utah*, 30 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railway, opposite signboard "Latimer," and in line of telegraph poles, 1.2 meters below the top of the rail. (Note 11.*)

V_8.—About 0.9 mile southwest of *Nada, Iron County, Utah*, 5.5 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set vertically in the northwest wall of concrete culvert 551A, 1.3 meters below the top of the rail. (Note 4.*)

W_8.—At *Nada, Iron County, Utah*, 22 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Nada," on side of concrete section house facing the tracks, 1.5 meters above the ground. (Note 1.*)

X_8.—About 2.7 miles southwest of *Thermo, Beaver County, Utah*, 5.5 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set vertically in the southeast wall of concrete culvert 556B, 1.7 meters below the top of the rail. (Note 4.*)

Y_8.—At *Thermo, Beaver County, Utah*, 41 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Thermo" and section house, 1.7 meters below the top of the rail. (Note 11.*)

Z_8.—At *Thermo, Beaver County, Utah*, 6.5 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the middle one of the three southwesterly water-tank columns, at northeast end of Thermo siding. (Note 13.*)

A_9.—At *Thermo, Beaver County, Utah*, 25 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set vertically in the east concrete pier of the windmill tower, directly opposite the water tank at the northeast end of Thermo siding, 1.4 meters below the top of the rail. (Note 1.*)

B_9.—At *Laho, Beaver County, Utah*, 44.2 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set directly opposite signboard "Laho," 1.4 meters below the top of the rail. (Note 2.*)

C_9.—At *Upton, Beaver County, Utah*, 30 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, and 50 meters northeast (measured along the tracks) of signboard "Upton," in line with telegraph poles, 1.2 meters below the top of the rail. (Note 2.*)

D_9.—About 2.7 miles southwest of *Milford, Beaver County, Utah*, 30 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 0.7 mile southwest of the Majestic Smelter, and 0.4 mile southwest of mile pole 572; set near private road crossing of Martin ranch, 1.0 meter below the top of the rail. (Note 2.*)

E_9.—At *Milford, Beaver County, Utah*, 0.3 mile southwest of the San Pedro, Los Angeles & Salt Lake Railroad station, 51.5 meters northwest of the center line of the main track, on the wall of the most southerly concrete section house, 1.6 meters above the ground. (Note 1.*)

F_9.—At *Milford, Beaver County, Utah*, 0.3 mile southwest of San Pedro, Los Angeles & Salt Lake Railroad station, 43.6 meters southeast of the center line of the main track, set vertically in the northerly one of the concrete bases supporting the coal-chute trestles, 0.6 meter above the top of the rail. (Note 1.*)

G_9.—At *Milford, Beaver County, Utah*, 113 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 145 meters southwest (measured along the tracks) of operator's office in railroad station and 24 meters northeast of the center of highway from Milford to Minersville, 0.6 meter below the top of the rail. (Note 11.*)

5084 FRR.—At *Milford, Beaver County, Utah*, 117 meters northeast of operator 's office in railroad station, 8.0 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, and 0.5 meter below the top of the rail. (Note 18.*)

H_9.—At *Opal, Beaver County, Utah*, 20 meters west of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Opal," and section pole; set 0.2 meter above the top of the rail. (Note 2.*)

I_9.—Near *Zenda, Beaver County, Utah*, 25 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, opposite mile pole 581. (Note 2.*)

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* See pp. 162-166.

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN SALT LAKE CITY AND ZENDA, UTAH, 1908.

S_1.—At *Salt Lake City, Salt Lake County, Utah.* (See p. 199.)

T_1.—At *Salt Lake City, Salt Lake County, Utah.* (See p. 200.)

U_1.—At *Salt Lake City, Salt Lake County, Utah.* (See p. 200.)

V_1.—At *Salt Lake City, Salt Lake County, Utah.* (See p. 200.)

W_1.—At *Salt Lake City, Salt Lake County, Utah.* (See p. 200.)

X_1.—At *Salt Lake City, Salt Lake County, Utah,* at the corner of Seventh Street west and Ninth Street south, near intersection of Denver & Rio Grande Railroad track and San Pedro, Los Angeles & Salt Lake Railroad passenger track, in the west end of north abutment of the Denver & Rio Grande Railroad bridge over Ninth Street canal, 22.2 meters north of the center line of the San Pedro track, 2.75 meters west of the center line of the Denver & Rio Grande west track, 20 centimeters from face of the abutment. A ½-inch copper bolt set in lead in the horizontal surface of the concrete abutment, concrete marked "U. S."

4352 Slak.—At *Salt Lake City, Salt Lake County, Utah,* a bench mark of the United States Geological Survey, described thus: "*Salt Lake City,* corner of Eleventh Street east and Twelfth Street south, 2 feet north of sidewalk and 100 feet northeast of street crossing; iron post stamped, '4352 Slak.'" Since this bench mark was established, a laundry building, known as the Granite Laundry, has been built over it, and the pipe is under the floor of the laundry office, in the southwest corner of the building. To make connection with the point, it was necessary, in 1906, to have a hole cut in the floor of the office, insert the rod in the hole, and read from the outside through the large plate-glass window. (Note 18.*)

4251 Slak.—At *Salt Lake City, Salt Lake County, Utah,* a bench mark of the United States Geological Survey described thus: "*Salt Lake City,* meridian mark at the southwest corner of the grounds of the city and county buildings, corner of State and Fifth Streets south; bronze tablet cemented in stone post, stamped '4251 Slak.'" (Note 17.*)

O. S. L. Ry. 4222.57.—At *Salt Lake City, Salt Lake County, Utah,* at Seventh Street west and Ninth Street south, at the intersection of the Denver & Rio Grande Railroad track and the San Pedro, Los Angeles & Salt Lake Railroad track, the top of the corner of the concrete block supporting the northwest corner of the platform on the east side of semaphore tower, 0.65 meter from northeast corner of tower, 3.20 meters from south rail of the Oregon Short Line Railway track, 2.42 meters from west rail of Denver & Rio Grande Railroad track. The edge of the platform above the bench is marked with crayon, "O. S. L. B. M. 4222.57."

Y_1.—¼ mile east of *Buena Vista, Salt Lake County, Utah,* near the intersection of the freight and passenger tracks of the San Pedro, Los Angeles & Salt Lake Railroad, about 40 meters north of the former and 47.3 feet south of the center of the latter, on the east side of a stone monument, 18 inches square at the base and about 3 feet high, bearing a bronze plate on the east face marked "S. L. C. C. Limits." The bench mark is a copper bolt with a cross on the face, set vertically in cement on the east side of the monument, close to the ground. This bench is evidently one of the city or county bench marks.

Z_1.—1 mile west of *Buena Vista, Salt Lake County, Utah,* about 10 poles east of mile pole 775, on the east end of the north abutment of culvert 775A, 17.65 feet north of center line of San Pedro, Los Angeles & Salt Lake Railroad track, 10 inches from the north face of the wall, 3½ inches from the edge of the wing wall; set in the horizontal surface of the concrete abutment. (Note 36.*)

A_2.—About 3½ miles west of *Buena Vista, Salt Lake County, Utah,* at the sixth pole west of mile pole 773, 14.2 meters north of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad and 3 feet inside of the right of way. (Note 2.*)

B_2.—1 mile east of *Riter, Salt Lake County, Utah,* 2 poles east of mile pole 771, in culvert 771A, on the east side of the south abutment, 4.22 meters south of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 27 centimeters from the south face of the culvert, 20 centimeters from the edge of the angle with the wing wall. (Note 36.*)

C_2.—3 miles east of *Garfield, Salt Lake County, Utah,* near mile pole 769, on the east side of the south abutment of culvert 769A, 3.04 meters south of the center of track of San Pedro, Los Angeles & Salt Lake Railroad, 18 centimeters from the north face and 21 centimeters from the northeast face of the abutment. (Note 36.*)

D_2.—1 mile east of *Garfield, Salt Lake County, Utah,* on the San Pedro, Los Angeles & Salt Lake Railroad, 3½ poles east of mile pole 767, on the south abutment of culvert 767A, 13 inches from the angle formed by the wing and the wall, 9½ inches from the inner corner of the culvert, 2.73 meters south of the center of the track. (Note 36.*)

E_2.—At *Garfield, Salt Lake County, Utah,* in the concrete building of the Garfield Banking Co., in the northeast corner of the building, occupied by the drug store of the American Trading Co., in the north face of the building, 0.69 meter from the corner, 1.36 meters above the sidewalk. (Note 1.*)

F_2.—At *Garfield, Salt Lake County, Utah,* at the railroad depot opposite a point 12½ rails west from the telegraph office in the station and 46.0 meters south of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, in a fence corner, about 18 inches from each fence. (Note 2.*)

G_2.—1½ miles west of *Garfield, Salt Lake County, Utah,* opposite Garfield Smelter, on the San Pedro, Los Angeles & Salt Lake Railroad, on the west end of the north abutment of culvert 763A, 14 centimeters from the north face of the abutment and 11 centimeters from the edge of the wing wall. (Note 4.*)

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* See pp. 162–166.

H_2.—3 miles west of *Garfield, Salt Lake County, Utah*, 4⅔ poles west of mile pole 763 and about 1 mile west of Garfield Smelter, on the west slope of a small knoll lying south of the track of San Pedro, Los Angeles & Salt Lake Railroad just west of a long fill, about 300 meters distant from a large prominent bluff on the lake shore which marks the line between Salt Lake and Tooele Counties, 22.50 meters from the center of the track, and 7.50 meters outside the right of way, about 5½ feet below and 16 meters from the top of the knoll, about 1 meter higher than grade, a copper bolt leaded vertically into the sloping surface of the rock.

I_2.—At *Lake Point, Tooele County, Utah*, one rail east of the station sign "Lake Point," 1½ poles west of mile pole 762, 38.60 meters north of center of track of San Pedro, Los Angeles & Salt Lake Railroad, 5 feet lower than the tracks, between the section house and the tool house, 28 paces from the edge of the bluff over Great Salt Lake, the bottom of a hole ⅛ inch deep and 1 inch square, in the top of a sandstone post 2½ feet long and 6 inches square, lettered "U. S. B. M." resting on solid rock and projecting 2 inches above the ground.

J_2.—1 mile west of *Lake Point, Tooele County, Utah*, 2 poles west of mile pole 761, 9½ rails west of concrete culvert 761A, 13.9 meters south of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, a square cut on the highest point of a rock in place, pyramidal in shape, about 3 by 2½ feet, 1½ feet above ground, and about 3 feet inside of the right-of-way fence, 3 feet lower than rails, with the letters U. S. cut roughly on the sloping side toward the tracks.

K_2.—1 mile north of *Morris, Tooele County, Utah*, 2 rails south of mile pole 759, 17.0 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, on the right of way, 1.76 meters east of a wire fence, 58 paces south of the fence corner, on the sloping surface of a large rock in place, a cross cut on top of a copper bolt set in lead, 45 centimeters from south edge of rock, 37 centimeters from east edge, about 6 inches lower than highest point of rock. The rock is marked "U. S."

L_2.—At *Morris, Tooele County, Utah*, 1½ rails north of mile pole 758, 25 feet north of the mail crane, 5.79 meters west of the center of the track of San Pedro, Los Angeles & Salt Lake Railroad, about 4 feet below the grade line, in a hard rock in place, a surface 1 by 2 feet exposed, a cross on top of a copper bolt set in lead.

B. M. Ry. 4469.54.—At *Erda, Tooele County, Utah*, 6 poles east of mile pole 754, a railroad spoke driven horizontally into telegraph pole, pole marked in blue crayon, "4469.54."

M_2.—At *Erda, Tooele County, Utah*, 2 poles south of mile pole 754, 150 feet west-southwest of the corner of the station building, 59.17 meters west of the center line of San Pedro, Los Angeles & Salt Lake Railroad, 180 feet north of a large rock in place, 6 by 10 by 12 feet exposed, 3 feet east and inside of the right-of-way fence; set on a rocky ledge with 6 inches exposed. (Note 2.*)

N_2.—2 miles west of *Erda, Tooele County, Utah*, 7 poles west of mile pole 752, in concrete culvert 751B, on the east side of the north abutment, 3.73 meters north of center of the track of San Pedro, Los Angeles & Salt Lake Railroad, 17 centimeters from the face of the abutment, 26 centimeters from the edge of the wing wall. (Note 36.*)

O_2.—At *Shields, Tooele County, Utah*, 6½ poles south of mile pole 750, 10 rails south of the station sign "Shields," 20.22 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad and 3 feet east of the wire right-of-way fence. (Note 2.*)

P_2.—1 mile east of *Tooele, Tooele County, Utah*, 3 poles east of mile pole 747, in culvert 747A, in the south end of the east abutment, 4.85 meters south of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 18 centimeters from the face of the head wall, 20 centimeters from the edge of the wing wall. (Note 1.*)

Q_2.—1 mile south of *Tooele, Tooele County, Utah*, opposite mile pole 745 and 1.80 meters east of it, 8.07 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad. (Note 11.*)

R_2.—3 miles north of *Stockton, Tooele County, Utah*, 6½ poles north of mile pole 743, in culvert 743A, in the east side of the north abutment, 13 centimeters from the face of the head wall, 15 centimeters from the angle with the wing wall, 3.62 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad. (Note 36.*)

S_2.—At *Stockton, Tooele County, Utah*, 3 poles north of mile pole 740, at the northeast corner of Silver Avenue (the street leading east from the railroad station) and the railroad right of way, 59.6 meters east of the center of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 2.50 meters northwest of the corner post of a wire fence. (Note 11.*)

T_2.—1 mile south of *Stockton, Tooele County, Utah*, 3½ poles north of mile pole 739, in culvert 739A, in the east side of the north abutment, 4.32 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 20 centimeters from the face of the head wall, 30 centimeters from the angle with the wing wall. (Note 36.*)

U_2.—3 miles south of *Stockton, Tooele County, Utah*, opposite the first telegraph pole north of mile pole 737 and 1.25 meters east of it, 8.77 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad and 6½ meters inside of the right-of-way fence. (Note 2.*)

V_2.—At *St. John, Tooele County, Utah*, 11½ poles south of mile pole 734, 42.5 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 34.2 meters northwest from the southwest corner of the railroad station, 5 meters from the west side of the roadway. (Note 11.*)

W_2.—1 mile north of *Ajax, Tooele County, Utah*, opposite the fourth pole north of mile pole 728 and 7.33 meters east of it, 5.74 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad. (Note 2.*)

X_2.—1 mile south of *Ajax, Tooele County, Utah*, 5½ poles north of mile pole 726, at a road crossing at grade, 6.12 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 4.7 meters north of the center of the roadway, in the filling for the pole supporting a crossing warning sign and 0.8 meter west of it. (Note 2.*)

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* See pp. 162-166.

Y_2.—At *Faust, Tooele County, Utah,* 3½ poles south of mile pole 721, across the track from the section foreman's house, opposite station sign, 30.8 meters east of the center of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 31.55 meters northeast of the northeast corner of the telegraph office. (Note 11.*)

Z_2.—1 mile south of *Faust, Tooele County, Utah,* on the San Pedro, Los Angeles & Salt Lake Railroad, 9½ poles south of mile pole 720, on the west side of the north abutment of culvert 719A, 16 centimeters from the face of the head wall, 27 centimeters from the angle with the wing wall, 5.22 meters west of the center of the track, about 2½ meters below grade. (Note 1.*)

A_3.—4 miles south of *Faust, Tooele County, Utah,* on the San Pedro, Los Angeles & Salt Lake Railroad, 3½ poles north of mile pole 717, on the west side of the north abutment of culvert 717A, 26 centimeters from the face of the head wall, 32 centimeters from the angle with the wing wall, 5.72 meters east of the center of the track, about 2 meters below grade. (Note 36.*)

B_3.—At *Vernon, Tooele County, Utah,* 8½ poles south of mile pole 715, 19.12 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, and opposite the station sign. (Note 2.*)

C_3.—1 mile south of *Vernon, Tooele County, Utah,* on the San Pedro, Los Angeles & Salt Lake Railroad, 2½ poles north of mile pole 714, in the east end of the south abutment of culvert 714A, 7 centimeters from the face of the head wall, 21 centimeters from the angle with the wing wall, 4.00 meters east of the center of the track. (Note 36.*)

D_3.—At *Dunbar, Tooele County, Utah,* 3½ poles north of the station sign, opposite the sixth pole south of mile pole 712 and 5.9 meters west from same, 17.67 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad. (Note 2.*)

E_3.—1 mile south of *Dunbar, Tooele County, Utah,* near fourth pole south of mile pole 711 and 16.9 meters from same, opposite a "C" post on the east side of the track, 10.17 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter above grade. (Note 2.*)

F_3.—1 mile north of *Lofgreen, Tooele County, Utah,* on the San Pedro, Los Angeles & Salt Lake Railroad, 7½ poles south of mile pole 709, in the east side of the north abutment of culvert 708C, 20 centimeters from the face of the head wall, 15 centimeters from the angle with the wing wall, 5.59 meters east of the center of the track. (Note 1.*)

G_3.—At *Lofgreen, Tooele County, Utah,* 5 rails north of the station sign "Lofgreen," 21.07 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 4.85 meters northwest of the nearest telegraph pole. (Note 11.*)

H_3.—1 mile north of *Boulter, Tooele County, Utah,* 1½ poles north of mile pole 703, opposite the sign "One mile to Boulter," 10.55 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below grade. (Note 16.*)

I_3.—At *Boulter, Tooele County, Utah,* near first pole south of mile pole 702, and 4.57 meters from it, 15.47 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad. (Note 2.*)

J_3.—In *Juab County,* 2 miles south of *Boulter, Tooele County, Utah,* on the San Pedro, Los Angeles & Salt Lake Railroad, 4 poles north of mile pole 700, in the west end of the north abutment of culvert 700A, 17 centimeters from the face of the head wall, 19 centimeters from the angle with the wing wall. (Note 1.*)

K_3.—2 miles north of *Tintic, Juab County, Utah,* on the San Pedro, Los Angeles & Salt Lake Railroad, 7 poles north of mile pole 698, on the west end of the north abutment of culvert 698A, 15 centimeters from the face of the head wall, 27 centimeters from the angle with the wing wall, 4.55 meters west of the center of the track. (Note 36.*)

L_3.—At *Tintic, Juab County, Utah,* 4 poles north of mile pole 696, 42.6 meters east of the center of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 31.8 meters northeast of the northeast corner of the passenger station, 13.6 meters northeast of a telegraph pole, 3 meters east of the edge of the roadway. (Note 11.*)

M_3.—1¼ miles east of *Tintic, Juab County, Utah,* on railroad spur to Eureka, 13.50 meters west of second pole west of station sign "Mammoth Junction," 9 rails west of same sign, 8.52 meters north of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, in a flat rock in situ. (Note 36.*)

U.S.G.S. 6394.—At *Eureka, Juab County, Utah,* on Church Street, at the northeast corner of the courthouse, 45 centimeters from this corner, 21 centimeters from the courthouse wall, 10.45 meters northwest of the northeast corner of the San Pedro, Los Angeles & Salt Lake Railroad passenger station. Stamped, "Elevation above sea, 6,394 feet. Datum U. P." (Note 18.*)

N_3.—3 miles south of *Tintic, Juab County, Utah,* 3 poles south of mile pole 693, 10.57 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 6.30 meters from the north post of a rack for spare rails. (Note 2.*)

O_3.—At *McIntyre, Juab County, Utah,* opposite station sign, 1½ rails north of a highway crossing sign, 18.20 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 8.50 meters from the center of the highway. (Note 11.*)

P_3.—3 miles south of *McIntyre, Juab County, Utah,* on the San Pedro, Los Angeles & Salt Lake Railroad, 8½ poles north of mile pole 686, in the east end of the south abutment of culvert 686A, 22 centimeters from the face of the head wall, 18 centimeters from the angle with the wing wall 3.04 meters east of the center of the track. (Note 1.*)

Q_3.—At *Jericho, Juab County, Utah,* 9 rails north of the station sign, 2½ poles south of mile pole 683, 40.40 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad. (Note 2.*)

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* See pp. 162-166.

R_3.—2 miles south of *Jericho, Juab County, Utah*, 2½ poles south of mile pole 681, 21.32 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 24.8 meters from the second pole, 27.9 meters from the third pole, of above mile pole, 1 meter below grade. (Note 2.*)

S_3.—4½ miles south of *Jericho, Juab County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 2 poles south of mile pole 678.5, in the west end of the north abutment of culvert 678A, 12 centimeters from the face of the head wall, 18 centimeters from the angle with the wing wall, 3.26 meters west of the center of the track. (Note 36,* brass bolt used.)

T_3.—At *Dyer, Juab County, Utah*, near third pole north of mile pole 677, and 15.80 meters southwest of it, 26.70 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1½ meters below grade. (Note 11.*)

U_3.—1 mile south of *Dyer, Juab County, Utah*, near mile pole 676, and 17 meters south of it, 21.17 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, at grade. (Note 2.*)

V_3—At *Champlin, Juab County, Utah*, opposite station sign, 13 poles south of mile pole 673, 37.59 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, at subgrade of the present siding. (Note 11.*)

W_3.—3½ miles north of *Lynn Junction, Millard County, Utah*, opposite mile pole 667, 21.62 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below grade. (Note 2.*)

X_3.—2½ miles north of *Lynn Junction, Millard County, Utah*, opposite mile pole 666, 21.32 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below grade. (Note 2.*)

Y_3.—2 miles north of *Lynn Junction, Millard County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 11 poles north of mile pole 665, in the east end of the south abutment of culvert 665A, 10 centimeters from the face of the head wall, 16 centimeters from the angle with the wing wall, 3.71 meters east of the center of the track. (Note 36,* brass bolt used.)

Z_3.—At *Lynn Junction, Millard County, Utah*, 91.0 meters northwest of the northwest corner of the passenger station of the San Pedro, Los Angeles & Salt Lake Railroad, 14 poles south of mile pole 664, and 70.6 meters west of the center of the track. (Note 2.*)

A_4.—1½ miles west of *Lynn Junction, Millard County, Utah*, opposite mile pole 662, 23.88 meters south of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below grade. (Note 2.*)

B_4.—3½ miles west of *Lynn Junction, Millard County, Utah*, opposite mile pole 660, 27.72 meters north of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, at grade. (Note 2.*)

C_4.—2 miles west of *Cline, Millard County, Utah*, opposite mile pole 656, 26.82 meters north of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, ½ meter below grade. (Note 2.*)

D_4.—4 miles west of *Cline, Millard County, Utah*, 4½ poles east of mile pole 654, 16.82 meters north of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 28.1 meters from fourth pole and 21.0 meters from fifth pole east of mile pole. (Note 2.*)

E_4.—4 miles east of *Akin, Millard County, Utah*, ½ mile west of bridge over Sevier River, 4 poles west of mile pole 651, 11.52 meters south of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 9.0 meters from the edge of the bluff overlooking the old river channel. (Note 2.*)

F_4.—At *Akin, Millard County, Utah*, 4½ poles north of mile pole 645, opposite station sign, 26.82 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, at grade. (Note 2.*)

G_4.—2 miles east of *Oasis, Millard County, Utah*, opposite mile pole 644, 19.03 meters south of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below grade. (Note 2.*)

U.S.G.S. 4592.—At *Oasis, Millard County, Utah*, 4 poles south of mile pole 642, at the southeast corner of the Hotel Day, 25 centimeters from the corner of the building, 29.30 meters southeast of the southeast corner of the station platform, 37.22 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad. An iron pipe bearing a bronze cap stamped "U. S. Boundary Post. No. —," set in the ground with 10 inches exposed.

H_4.—At *Oasis, Millard County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 6 poles south of mile pole 642, 10 centimeters from each face of the southwest corner of the southwest foundation of the windmill tower over the railroad pumping station, 4.57 meters east of the center of the track. (Note 1.*)

I_4.—2 miles south of *Oasis, Millard County, Utah*, 13.6 meters north of mile pole 640, 12.42 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below grade. (Note 2.*)

J_4.—At *Van, Millard County, Utah*, opposite mile pole 637, 27.02 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below subgrade. (Note 2.*)

K_4.—At *Jerome, Millard County, Utah*, opposite mile pole 633, 32.0 meters northwest of station sign "Jerome," 24.70 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, on a slight rise of ground, 1 meter above grade. (Note 2.*)

L_4.—At *Clear Lake, Millard County, Utah*, near fifteenth pole south of mile pole 629, opposite north end of passenger station, 29.50 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 2 meters below grade. (Note 2.*)

M_4.—2½ miles south of *Neels, Millard County, Utah*, opposite mile pole 621, 24.50 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, at grade. (Note 2.*)

N_4.—1½ miles south of *Borden, Millard County, Utah*, opposite mile pole 617, 33.50 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 8.7 meters east of a wagon trail, at grade. (Note 2.*)

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* See pp. 162-166.

O_4.—2 miles north of *Goss Station, Millard County, Utah,* on the San Pedro, Los Angeles & Salt Lake Railroad, 6 poles north of mile pole 614, in the concrete intake to the section-house cistern, 17 centimeters east of the center of the intake pipe, 2.72 meters east of the center of the track. (Note 36.*)

P_4.—At *Goss, Millard County, Utah,* on the San Pedro, Los Angeles & Salt Lake Railroad, 6½ poles south of mile pole 612, in the west end of the north abutment of culvert 611B, 24 centimeters from the head wall, 38 centimeters from the angle with the wing wall, near the pumping station, 3.50 meters west of the center of the track. (Note 36.*)

Q_4.—2 miles south of *Goss, Millard County, Utah,* opposite mile pole 610, 30.80 meters west of the center of the tracks of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below grade. (Note 2.*)

R_4.—At *Cruz, Millard County, Utah,* opposite mile pole 607, 4½ poles south of the station sign, 33.52 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, slightly below grade. (Note 2.*)

S_4.—1 mile south of *Cruz, Millard County, Utah,* 2 poles south of mile pole 606, in the horizontal surface of the limestone coping of the northeast wing wall of culvert 605B, 24 centimeters from the inner face of the wing wall, and 55 centimeters from the end, 5.87 meters east of the center of the track. (Note 15.*)

T_4.—1 mile east of *Pumice, Millard County, Utah,* opposite mile pole 603, 25.62 meters north of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, at grade. (Note 2.*)

U_4.—At *Pumice, Millard County, Utah,* 4 poles east of mile pole 602, in the wall facing the track of the western concrete section house, 1.35 meters from the southeast corner of the house, 1.40 meters from the ground, 21.90 meters north of the track. (Note 1.*)

V_4.—½ mile west of *Pumice, Millard County, Utah,* on the San Pedro, Los Angeles & Salt Lake Railroad, 8 poles west of mile pole 602, 17 centimeters from the face, 81 centimeters from the end of the northwest wing wall, in the horizontal surface of the limestone coping of culvert 601C, 5.08 meters north of the center of the track. (Note 15.*)

W_4.—At *Black Rock, Millard County, Utah,* on the San Pedro, Los Angeles & Salt Lake Railroad, 1½ poles south of mile pole 597, in the east end of the north abutment of culvert 596A, 24 centimeters from the face of the head wall, 34 centimeters from the angle with the wing wall, 5.75 meters east of the center of the track. (Note 1.*)

X_4.—At *Black Rock, Millard County, Utah,* on the San Pedro, Los Angeles & Salt Lake Railroad, 2 poles south of mile pole 597, in the southwest corner of the main pedestal of the concrete base of the railroad water tank, 9 centimeters from each face of the pedestal, 5.85 meters east of the center of the track. (Note 16.*)

Z_4.—At *Malone, Millard County, Utah,* opposite station sign, 5½ poles north of mile pole 592, 22.0 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1½ meters below grade. (Note 55.*)

A_5.—3 miles north of *Read, Millard County, Utah,* opposite mile pole 590, 24.10 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 2 meters below grade. (Note 55.*)

B_5.—At *Read, Beaver County, Utah,* on the San Pedro, Los Angeles & Salt Lake Railroad, 6 poles north of mile pole 587B5, in the concrete inlet to the section-house cistern, 18 centimeters west of the center of the drainpipe, 2.50 meters west of the center of the track. (Note 36.*)

C_5.—At *Read, Beaver County, Utah,* opposite mile pole 587, 19.12 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below grade. (Note 11.*)

D_5.—Two miles south of *Read, Beaver County, Utah,* opposite mile pole 585, 23.30 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, ½ meter below grade. (Note 11.*)

E_5.—At *Zenda, Beaver County, Utah,* opposite station sign, 9½ poles south of mile pole 583, 26.10 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, ½ meter below grade. (Note 11.*)

I_9.—Near *Zenda, Beaver County, Utah.* (See p. 215.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN CRAWFORD, NEBR., AND CADIZ, WYO., 1908.

H_4.—At *Fort Robinson, Dawes County, Nebr.* (See Appendix 3, Report for 1903, p. 799.)

G_4.—At *Crawford, Dawes County, Nebr.* (See Appendix 3, Report for 1903, p. 799.)

N_4.—At *Crawford, Dawes County, Nebr.,* 475 meters northwest of the Chicago, Burlington & Quincy Railroad station, 125 meters northwest of the Chicago & Northwestern Railroad crossing, and 4.8 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the concrete water tank support nearest the track. (Note 4.*)

O_4.—About 2.5 miles northwest of *Crawford, Dawes County, Nebr.,* about halfway between mile poles 425 and 426, on the east wall of a concrete cattle pass, and 30 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 4.*)

P_4.—At *Horn* (formerly *Remington*), *Dawes County, Nebr.,* 25.2 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 25 meters north (measured along the tracks) of station signboard. (Note 11.*)

Q_4.—About 4.6 miles northwest of *Horn* (formerly *Remington*), *Dawes County, Nebr.,* just south of Dawes-Sioux County line, 9½ poles southeast of mile pole 484 (old numbering, or about 433.08 new numbering), 29.6 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 2.*)

R_4.—About 3.1 miles southeast of *Joder* (formerly *Adelia*), *Sioux County, Nebr.,* just north of Dawes-Sioux County line, on the southwest wall of a concrete culvert, 2.8 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 4.*)

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* See pp. 162–166.

S_4.—About 1.1 miles southeast of *Joder* (formerly *Adelia*), *Sioux County, Nebr.*, 2.8 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the southwest wall of a concrete culvert near Rosenberg's ranch. (Note 4.*)

T_4.—At *Joder* (formerly *Adelia*), *Sioux County, Nebr.*, 22.6 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 150 meters northwest of the telephone booth, and directly opposite the switch stand at the northwest end of the house track on Joder siding. (Note 11.*)

U_4.—At *Orella* (formerly *Harold siding*, and now *Adelia* postoffice), *Sioux County, Nebr.*, 30.0 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 90 meters north (measured along track) of the temporary railroad station, and directly opposite Hamilton's store. (Note 11.*)

V_4.—About 3 miles north of *Orella, Sioux County, Nebr.*, 26.5 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, about $^3/_5$ of the distance from mile pole 443 to 444, and 5 meters east of snow fence at north end of the cut on a curve. (Note 2.*)

W_4.—At *Mansfield, Sioux County, Nebr.*, 32.7 meters east of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 210 meters north of the station signboard, and 50 meters south of the section house. (Note 11.*)

N.-S.D. 204 M.—About 1.5 miles south of *Ardmore, Fall River County, S. Dak.*, 277 meters west of the center of the main track of the Chicago, Burlington & Quincy Railroad, in the center of the highway. The mark is the top surface of a 1-inch raised square on the top of the State line monument, a red granite post 1 foot square and projecting 4 feet above the ground, lettered "N" on the south face, "S.D." on the north face and "20417" on the east face.

O_4.—At *Ardmore, Fall River County, S. Dak.*, 10.0 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the south end of one of the concrete supports of the water-tank column. (Note 4.*)

3553 DW.—At *Ardmore, Fall River County, S. Dak.*, 154.5 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 195 meters northwest of the temporary railroad station, and 19 meters north of the center of the east-and-west road. (Note 18.*)

3527 DW.—About 2.3 miles north of *Ardmore, Fall River County, S. Dak.*, 164 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, about 400 meters north of bridge 452.14 over Hat Creek, and 11.6 meters east of the center of highway at a turn in the road. (Note 18.*)

3487 DW.—About 3.0 miles southeast of *Rumford, Fall River County, S. Dak.*, 202 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, about 130 meters south of bridge 455.39 over Duck Creek, and 11 meters east of the center line of the north-and-south highway. (Note 18.*)

3500 DW.—At *Rumford, Fall River County, S. Dak.*, 21.6 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 240 meters southeast of the station signboard, and 150 meters northwest of the southeast end of the siding. (Note 18.*)

3532 DW.—About 2.3 miles northwest of *Rumford, Fall River County, S. Dak.*, a short distance northwest of mile pole 461, and 23.1 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 18.*)

3632 DW.—About 3.2 miles east of *Provo, Fall River County, S. Dak.*, about ⅓ mile east of mile pole 464, and 16 meters north of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 18.*)

3708 DW.—At *Provo, Fall River County, S. Dak.*, 16.3 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and 190 meters southeast of the railroad station. (Note 18.*)

P_4.—About 2.6 miles northwest of *Provo, Fall River County, S. Dak.*, about halfway between mile poles 469 and 470 and 24.2 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 2.*)

Q_4.—About 1.5 miles southeast of *Dennis, Fall River County, S. Dak.*, on the east end of the north concrete abutment of the plate girder bridge over Coal Creek, 2.2 meters east of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 4.*)

3528 DW.—About 0.7 mile northeast of *Dennis, Fall River County, S. Dak.*, near the middle of the first curve north of Dennis siding, 20 meters southeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 23 meters northwest of the bank of Cottonwood Creek. (Note 18.*)

R_4.—About 1.7 miles southwest of *Edgemont, Fall River County, S. Dak.*, 220 meters west of the signboard "Yard Limit," 4.5 meters north of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the lowest stone at the north end of the east abutment of a small stone bridge. (Note 5.*)

S_4.—At *Edgemont, Fall River County, S. Dak.*, 113.5 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, in the southwest corner of the city park, near the public-school building, 0.5 meter from the south fence and 0.7 meter from the west fence. (Note 2.*)

T_4.—At *Edgemont, Fall River County, S. Dak.*, on the northeast corner of the store building known as the Edgemont Block, 0.2 meter above the sidewalk and 0.2 meter from the northeast corner, facing Phelan Avenue. (Note 1.*)

3449 DW.—At *Edgemont, Fall River County, S. Dak.*, 15.7 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at the north end of the Chicago, Burlington & Quincy Railroad Hotel park. (Note 18.*)

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* See pp. 162–166.

U_4.—At *Edgemont, Fall River County, S. Dak.*, 650 meters north of the Chicago, Burlington & Quincy Railroad station, on the west end of the south concrete abutment of the plate-girder bridge over the south fork of the Cheyenne River. (Note 1.*)

3463 DW.—About 4 miles northwest of *Edgemont, Fall River County, S. Dak.*, 120 meters southeast of pile-trestle bridge No. 480.48, and 31 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, just outside of the right of way. (Note 18.*)

3486 DW.—At *Marietta, Fall River County, S. Dak.*, directly opposite the section house at the northwest end of the siding, 85 meters southeast of bridge No. 484.36 and 23.4 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 18.*)

3544 DW.—About 2.7 miles northwest of *Marietta, Fall River County, S. Dak.*, 100 meters southeast of trestle No. 487.10 and 30 meters southwest of the main track of the Chicago, Burlington & Quincy Railroad. (Note 18.*)

3632 DW.—At *Argentine, Fall River County, S. Dak.*, 50 meters southeast of the north water tank (measured along the track), 29.5 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 10 meters northeast of the center of the highway. (Note 18.*)

V_4.—At *Argentine, Fall River County, S. Dak.*, at the north end of the siding, on the east end of the south concrete abutment of plate-girder bridge No. 490.44 over Pass Creek, and 2.2 meters east of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 4.*)

W_4.—About 2.0 miles southeast of *Dewey, Custer County, S. Dak.*, and about halfway between mile poles 493 and 494, 33 meters southeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the tangent between the first and second curves south of Dewey. (Note 2.*)

X_4.—About 0.8 mile southeast of *Dewey, Custer County, S. Dak.*, 2.5 meters east of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the east end of the north concrete abutment of bridge No. 495.00. (Note 4.*)

3704 DW.—At *Dewey, Custer County, S. Dak.* (formerly *S. G. Ranch*), 18 meters east of the center line of the main track of the Chicago, Burlington & Quincy Railroad, directly opposite the old water tank and 22 meters west of Matteson's general store. (Note 18.*)

S. D.-WY. 38.24.—About 2 miles north of *Dewey, Custer County, S. Dak.*, 40 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at the foot of the "Wyoming Hill." The mark is the top of a State-line monument, a yellow sandstone post 10 inches square, projecting 1 meter above the ground, lettered "S. D." on the east face, "WY" on the west face, "38.24 M" on the south face, and "1904" on the north face. (Note 5.*)

Q_6.—At *Dakoming, Weston County, Wyo.*, 29 meters east of the center line of the main track of the Chicago, Burlington & Quincy Railroad and directly opposite the station signboard. (Note 2.*)

R_6.—At *Clifton, Weston County, Wyo.*, 40 meters southeast of the railroad station, 4.5 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the northwest end of the masonry water-tank pier nearest the tracks. (Note 4.*)

S_6.—At *Clifton, Weston County, Wyo.*, 30 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and 48 meters northwest of the railroad station (measured along the track). (Note 1.*)

T_6.—About 1.6 miles northwest of *Clifton, Weston County, Wyo.*, about halfway between mile poles 505 and 506, 2.4 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the east wall of a small concrete bridge, directly over the central pier. (Note 4.*)

3971 DW.—About 2.6 miles northwest of *Clifton, Weston County, Wyo.*, 310 meters northwest of the center of the plate-girder bridge 506.48 over Whoop-Up Canyon, 23 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad and 11 meters southwest of the center of the Edgemont-Newcastle wagon road. (Note 18.*)

4120 DW.—About 2.2 miles south of *Spencer, Weston County, Wyo.*, 425 meters northeast of the center of railroad bridge 512.49, on the north side of the Edgemont-Newcastle road at the railroad crossing and 9.8 meters northwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 18.*)

4195 DW.—At *Spencer, Weston County, Wyo.*, 172 meters north of the station signboard, on the south side of the highway at the railroad crossing, and 11.3 meters east of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 18.*)

4344 DW.—About 3 miles east of *Newcastle, Weston County, Wyo.*, on the southwest side of the Newcastle-Custer wagon road at a fork in the road, about 0.5 mile northeast of a point on the Chicago, Burlington & Quincy Railroad which point is 0.5 mile southeast of the telephone booth at Johnsons siding and ⅓ mile northwest of mile pole 518. (Note 18.*)

U_6.—At *Johnson Siding, Weston County, Wyo.*, 30 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, directly opposite the telephone booth, and 85 meters southeast of bridge No. 518.80. (Note 2.*)

V_6.—At *Newcastle, Weston County, Wyo.*, 5.8 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at the northwest point of the railroad station park. (Note 2.*)

W_6.—At *Newcastle, Weston County, Wyo.*, directly opposite the Chicago, Burlington & Quincy Railroad station, at the south corner of the Riordan Building, 1.1 meters above the sidewalk. (Note 1.*)

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* See pp. 162-166.

X_6.—At *Newcastle, Weston County, Wyo.*, at the north end of the Warren Street face of the Newcastle City Hall, in the water-table stone, 0.4 meter above the sidewalk. (Note 1.*)

4332 DW.—At *Newcastle, Weston County, Wyo.*, at the north corner of Summer and Woodstock Streets, 4.0 meters north of property corner, in the center of the top of a sandstone post 8 by 8 inches, 3 feet long, set 34 inches into the ground. (Note 17.*)

U. S. G. S. M. M.—At *Newcastle, Weston County, Wyo.*, 17 meters southeast of the center line of the Cambria branch of the Chicago, Burlington & Quincy Railroad, and 61 meters southwest of pile-trestle bridge No. 0.49. The mark is a square cut on a limestone post 10 by 10 inches by 2 feet, in the center of whose top is cemented a bronze tablet. Inasmuch as the stone has probably been disturbed and is inclined at an angle of 30°, the square cut is used as the mark instead of the bronze tablet. (Note 16.*)

4171 DW.—About 5.5 miles west of *Newcastle, Weston County, Wyo.*, 290 meters east of overhead railroad bridge No. 526.12 and directly north of United States Experimental Agricultural Farm, on the north side of the wagon road and 25 meters south of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 18.*)

Y_6.—At *Pedro, Weston County, Wyo.*, 39 meters north of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at the point where the wagon road crosses the tracks, 130 meters east of the station signboard and telephone booth. (Note 2.*)

4218 DW.—About 2.2 miles northwest of *Pedro, Weston County, Wyo.*, about ¼ mile northeast of the Chicago, Burlington & Quincy Railroad tracks, at the "YT" ranch, 3 meters north of the dwelling house on the south side of the road, 20 meters west of Skull Creek. (Note 18.*)

Z_6.—About 2.3 miles southeast of *Osage, Weston County, Wyo.*, 30 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at the summit of the long grade northwest of the "YT" ranch, and near the middle of the snow fence. (Note 2.*)

4312 DW.—About 0.3 mile south of *Osage, Weston County, Wyo.*, 23 meters east of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and 9 meters north of the center of the wagon road at the railroad crossing. (Note 18.*)

A_7.—At *Jerome, Weston County, Wyo.*, 5 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the southeast end of the masonry water-tank pier nearest the tracks. (Note 4.*)

B_7.—At *Jerome, Weston County, Wyo.*, 37.8 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and 45 meters northwest of the section house, just inside the railroad right of way. (Note 2.*)

C_7.—About 2.0 miles northwest of *Jerome, Weston County, Wyo.*, on the southwest end of the northwest concrete pier of bridge No. 545.10 of the Chicago, Burlington & Quincy Railroad, 2.7 meters below the top of the rail. (Note 4.*)

D_7.—About 0.5 mile southeast of *Upton, Weston County, Wyo.*, on the northeast end of the northwest concrete abutment of bridge No. 548.42 of the Chicago, Burlington & Quincy Railroad. (Note 4.*)

E_7.—At *Upton, Weston County, Wyo.*, 170 meters southeast of the railroad station, and 2.5 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the northeast foundation wall of the coal elevator. (Note 4.*)

F_7.—At *Upton, Weston County, Wyo.*, 190 meters northeast of the Chicago, Burlington & Quincy Railroad, in the concrete window sill on the northeast side of the concrete block building known as "Upton Hall." (Note 1.*)

G_7.—At *Upton, Weston County, Wyo.*, northwest of the railroad station, 28 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the concrete water-tank foundation wall nearest the tracks. (Note 1.*)

H_7.—At *Thornton, Weston County, Wyo.*, 65 meters northwest of railroad station, 18 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the northwest side of the road crossing, just inside the railroad right of way. (Note 2.*)

I_7.—About 2.2 miles southeast of *Kara, Crook County, Wyo.*, near the middle of the second curve east of Kara siding, 14.4 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 2.*)

J_7.—At *Kara, Crook County, Wyo.*, directly opposite station signboard and 15 meters northwest of the telephone booth, 21 meters north of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 1.*)

K_7.—At *Kara, Crook County, Wyo.*, 100 meters west of the west end of Kara siding, and 10 meters south of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the middle span of a concrete culvert. (Note 4.*)

L_7.—About 0.8 mile northwest of *Kara, Crook County, Wyo.*, ¼ mile northwest of section pole D 94–D 95, 12 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the middle of the span of a concrete culvert, 8 meters below the track. (Note 4.*)

M_7.—About 4.8 miles southeast of *Moorcroft, Crook County, Wyo.*, 4.0 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the middle of the span of a small concrete culvert, 300 meters south of the first wagon road crossing north of Kara siding. (Note 4.*)

N_7.—About 2.7 miles southeast of *Moorcroft, Crook County, Wyo.*, 7 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the middle of the span of a small concrete culvert, 390 meters southeast of road crossing at a small ranch. (Note 4.*)

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* See pp. 162–166.

O_7.—At *Moorcroft, Crook County, Wyo.*, 34 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the concrete foundation of the southeast water tank, 30 meters east of railroad station; set vertically. (Note 1.*)

P_7.—At *Moorcroft, Crook County, Wyo.*, 4.6 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the masonry foundation of the northwest water tank, 40 meters northwest of railroad station. (Note 16.*)

Q_7.—At *Moorcroft, Crook County, Wyo.*, 38 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 15 meters southwest of the center of highway, 71 meters northwest of road crossing, and 140 meters northwest of railroad station. (Note 1.*)

R_7.—About 1.5 miles northwest of *Moorcroft, Crook County, Wyo.*, on the southwest end of the southeast concrete abutment of bridge No. 570.74 over the Belle Fourche, or the North Fork of the Cheyenne River. (Note 1.*)

S_7.—About 2.2 miles northwest of *Moorcroft, Crook County, Wyo.*, on the south end of the east concrete abutment of Chicago, Burlington & Quincy Railroad bridge No. 571.41 over Donkey Creek. (Note 4.*)

T_7.—About 2.0 miles southeast of *Wessex, Crook County, Wyo.*, 4.2 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the northeast end of the southeast abutment of a small concrete culvert, 1.6 meters below the top of the rail. (Note 4.*)

U_7.—At *Wessex, Crook County, Wyo.*, 350 meters west of station signboard, 28 meters north of the center line of the main track of the Chicago, Burlington & Quincy Railroad, just inside the right of way. (Note 2.*)

V_7.—At *Rozet, Crook County, Wyo.*, 29 meters south of the center line of the main track of the Chicago, Burlington & Quincy Railroad, directly opposite store and post office, on east side of railroad crossing, just inside right of way. (Note 2.*)

W_7.—About 4.4 miles west of *Rozet, Crook County, Wyo.*, on the north end of the east concrete abutment of the Chicago, Burlington & Quincy Railroad bridge No. 586.50. (Note 5.*)

X_7.—At *Minturn, Crook County, Wyo.*, 180 meters west of the station signboard and 17 meters north of the center line of the main track of the Chicago, Burlington & Quincy Railroad, just inside the right of way. (Note 1.*)

Y_7.—About 4.2 miles east of *Gillette, Crook County, Wyo.*, 8.5 meters north of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at east end of cut showing rock exposure, on top of a large flat bowlder, 2.0 meters below the top of the rail. (Note 5.*)

Z_7.—At *Gillette, Crook County, Wyo.*, 6 meters south of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at the northeast corner of the railroad station park. (Note 2.*)

A_8.—At *Gillette, Crook County, Wyo.*, at the southwest corner of Olzer's concrete store building, facing Gillette Avenue, 0.2 meter above the sidewalk. (Note 1.*)

B_8.—At *Gillette, Crook County, Wyo.*, 6 meters south of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the center of the most easterly concrete pier of the coal shutes. (Note 4.*)

C_8.—About 3.1 miles west of *Gillette, Crook County, Wyo.*, about ¼ mile west of mile pole 600, 22 meters south of the center of the main track of the Chicago, Burlington & Quincy Railroad, on a chiseled bench on the low flat outcrop of rock at the east end of a cut on a curve 0.5 meter above the top of the rail. (Note 16.*)

D_8.—At *Sparta, Crook County, Wyo.*, 300 meters east of the station signboard and 24 meters north of the center line of the main track of the Chicago, Burlington & Quincy Railroad, near railroad fence line, just west of telephone booth. (Note 2.*)

E_8.—At *Oriva, Crook County, Wyo.*, 4.3 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and 20 meters southeast of the railroad station, on the southeast end of the old masonry water-tank pier nearest the tracks. (Note 16.*)

F_8.—At *Oriva, Crook County, Wyo.*, 31 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and 80 meters northwest of the railroad station, just inside the right of way near the snow fence. (Note 2.*)

G_8.—About 1.5 miles northwest of *Oriva, Crook County, Wyo.*, 2.5 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the concrete coping of a bridge, directly over the northeast pier. (Note 4.*)

H_8.—At *Kier, Crook County, Wyo.*, 25 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, directly opposite the station signboard and north of the telephone booth, 1 meter above the top of the rail. (Note 2.*)

I_8.—About 1.3 miles southeast of *Felix, Crook County, Wyo.*, about halfway between mile poles 614 and 615, 10 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at northwest end of a cut, on the flattest of a group of rocks. (Note 16.*)

J_8.—At *Felix, Crook County, Wyo.*, about 325 meters southeast of the railroad station, 140 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, a point just outside the right-of-way fence. (Note 2.*)

K_8.—At *Felix, Crook County, Wyo.*, 4.3 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and 20 meters northwest of the railroad station, on the northwest end of the masonry water-tank pier nearest the tracks. (Note 16.*)

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* See pp. 162–166.

L_8.—About 2.9 miles northwest of *Felix, Crook County, Wyo.*, on the northeast end of the southeast concrete pier of plate-girder bridge No. 618.62 of the Chicago, Burlington & Quincy Railroad over Wild Horse Creek, 2.3 meters below the top of the rail. (Note 4.*)

M_8.—At *Echeta, Crook County, Wyo.*, 25.2 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the middle of the second concrete water-tank pier, counting from the northwest. (Note 4.*)

N_8.—At *Echeta, Crook County, Wyo.*, 27.2 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, just north of the railroad station and on the north side of the highway. (Note 2.*)

O_8.—About 2.1 miles northwest of *Echeta, Crook County, Wyo.*, and about halfway between mile poles 623 and 624, 6 meters southeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the end of the west wing wall of a concrete culvert and cattle pass, 2.5 meters below the top of the rail. (Note 4.*)

P_8.—At *Croton, Crook County, Wyo.*, 8 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the southeast end of the third masonry water-tank pier from the tracks. (Note 16.*)

Q_8.—At *Croton, Crook County, Wyo.*, 22 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, directly opposite the old railroad station and the northwest end of Croton siding, outside the right of way and just northeast of the county road. (Note 2.*)

Rail △.—About 2.5 miles south of *Lariat, Sheridan County, Wyo.*, 14.5 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at about mile pole 631.2. The mark is an aluminum tablet, set in a stone flush with the ground with triangle and circle in center, marking a station of the United States Geological Survey in the location of the Sheridan-Crook County line in 1908.

R_8.—At *Lariat, Sheridan County, Wyo.*, opposite the section house 175 meters south of the north end of Lariat siding, 36 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, just inside the right of way. (Note 2.*)

S_8.—At *Arvada, Sheridan County, Wyo.*, 450 meters south of the railroad station, on the northeast end of the northwest concrete pier of the Chicago, Burlington & Quincy Railroad bridge No. 640.73 over Powder River, 1 meter below the top of the rail. (Note 1.*)

T_8.—At *Arvada, Sheridan County, Wyo.*, 40 meters south of the railroad station, 7.5 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and just north of the mail catcher. (Note 2.*)

U_8.—At *Arvada, Sheridan County, Wyo.*, 50 meters north of the railroad station, 4.7 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad on the south end of the masonry water-tank pier nearest the track. (Note 16.*)

V_8.—At *Kendrick, Sheridan County, Wyo.*, directly opposite the road crossing and telegraph office near the northeast end of Kendrick siding, 34 meters northwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, just inside the right of way. (Note 2.*)

W_8.—At *Cadiz, Sheridan County, Wyo.*, 15 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and 20 meters northwest of the road crossing, just inside the right of way, on a sandstone bowlder flush with ground. (Note 5.*)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN HUNTLEY, MONT., AND CADIZ, WYO., 1908.

U. S. R. S. 2.—Near *Huntley, Yellowstone County, Mont.* (See p. 210.)

U. S. R. S. 3.—Near *Huntley, Yellowstone County, Mont.* (See p. 210.)

U. S. R. S. 4.—At *Huntley, Yellowstone County, Mont.*, 24 meters south of the main office building of the United States Reclamation Service, 1 meter from the Northern Pacific right-of-way fences. (Note 18.*)

U. S. R. S. 5.—About 0.7 mile east of *Huntley, Yellowstone County, Mont.*, at the first crossing of the Huntley main-line canal under the Chicago, Burlington & Quincy Railroad, in the center of the south coping, 3.52 meters south of the center of the track, and 20 centimeters from the face of the head wall. (Note 17,* unstamped.)

U. S. R. S. 6.—About 1.6 miles east of *Huntley, Yellowstone County, Mont.*, 75 meters west of a highway bridge over the Huntley main-line canal, 88.5 meters north of the center of the Chicago, Burlington & Quincy Railroad track, and 41.3 meters north of the north water line of the canal. (Note 17,* unstamped.)

U. S. R. S. 7.—About 2.2 miles east of *Huntley, Yellowstone County, Mont.*, opposite Chicago, Burlington & Quincy Railroad bridge 826.85, in a culvert crossing for a small stream under the Huntley main-line canal, in the center of the south coping of the culvert, 28.8 meters north of the center of the railroad track, 17 centimeters from the face of the head wall. (Note 17,* unstamped.)

U. S. R. S. 8.—About 3.5 miles east of *Huntley, Yellowstone County, Mont.*, opposite the Chicago, Burlington & Quincy Railroad bridge 825.50, in the concrete spillway for a small stream over the Huntley main-line canal, at the south end of the west parapet wall, 45 meters north of the center of the railroad track, and 8.5 meters south of the center of the canal. (Note 17,* unstamped.)

U. S. R. S. 9.—About 3.9 miles west of *Ballantine, Yellowstone County, Mont.*, in the second crossing of the Huntley main-line canal under the Chicago, Burlington & Quincy Railroad, in the center of the south coping, 3.2 meters south of the center of the track. (Note 17,* unstamped.)

* See pp. 162-166.

U. S. R. S. 10.—About 2.9 miles west of *Ballantine, Yellowstone County, Mont.*, opposite the Chicago, Burlington & Quincy Railroad bridge 823.12, in the east end of the southwest coping of an aqueduct over the Huntley main-line canal, 52.3 meters south of the center of the railroad track, and 14.9 meters south of the center of the canal. (Note 17,* unstamped.)

U. S. R. S. 11.—About 2.2 miles west of *Ballantine, Yellowstone County, Mont.*, in the turnout of Lateral E from the Huntley main-line canal, in the center of the top of the concrete head gate, on the north side of the canal, 27.5 meters south of the center of the Chicago, Burlington & Quincy Railroad track. (Note 54,* unstamped.)

E_7.—About 1 mile west of *Ballantine, Yellowstone County, Mont.*, in the horizontal surface of the concrete coping at the north end of the east abutment of the Chicago, Burlington & Quincy Railroad bridge 821.19, 20 centimeters from the west face and 64 centimeters from the north face. (Note 14.*)

U. S. G. S. 2982.—At *Ballantine, Yellowstone County, Mont.*, 55.9 meters northwest of the northwest corner of the platform of the railroad station, and 44.7 meters north of the center of the Chicago, Burlington & Quincy Railroad track. (Note 18,* unstamped.)

U. S. R. S. 12.—About 0.3 mile east of *Ballantine, Yellowstone County, Mont.*, in the center of the north coping of the third crossing of the Huntley main-line canal under the Chicago, Burlington & Quincy Railroad, 3.54 meters north of the center of the track and 20 centimeters from the face of the head wall. (Note 54,* unstamped.)

U. S. R. S. 13.—About 1.6 miles east of *Ballantine, Yellowstone County, Mont.*, in the center of the concrete coping of the crossing of Lateral H. A., and the Chicago, Burlington & Quincy Railroad, 3.36 meters north of the center of the track, and 13 centimeters from the face of the head wall. (Note 54,* unstamped.)

U. S. R. S. 14.—About 2.4 miles east of *Ballantine, Yellowstone County, Mont.*, in the center of the coping of the crossing of Lateral H. B. under the Chicago, Burlington & Quincy Railroad, 3.22 meters north of the center of the track, and 1 meter above the grade. (Note 54,* unstamped.)

U. S. R. S. 15.—About 3.4 miles east of *Ballantine, Yellowstone County, Mont.*, in the center of the coping of the crossing of Lateral H. C., and the Chicago, Burlington & Quincy Railroad, 3.22 meters north of the center of the track, and ½ meter above grade. (Note 54,* unstamped.)

U. S. R. S. 16.—About 2.0 miles west of *Anita, Big Horn County, Mont.*, in the center of the coping of the crossing of the high-line canal, Huntley Project, and the Chicago, Burlington & Quincy Railroad, 13.40 meters south of the center of the track. (Note 54,* unstamped.)

U. S. G. S. 3056.—At *Anita, Big Horn County, Mont.*, opposite the station sign, 24.10 meters northeast of the center of the Chicago, Burlington & Quincy Railroad track, 1 meter outside of the right-of-way fence. (Note 18,* unstamped.)

F_7.—About 2.3 miles south of *Anita, Big Horn County, Mont.*, in the east end of the north abutment of the Chicago, Burlington & Quincy Railroad bridge 811.57, in the center of the concrete coping stone, 2.56 meters east of the center of the track. (Note 4.*)

G_7.—About 3.2 miles south of *Anita, Big Horn County, Mont.*, 23.90 meters east of the center of the Chicago, Burlington & Quincy Railroad track, 1½ meters outside of the right-of-way fence, and 1 meter below the grade. (Note 2.*)

U. S. R. S. 3144.—At *Corinth, Big Horn County, Mont.*, 38.1 meters west of the center of the Chicago, Burlington & Quincy Railroad track, 12.2 meters west of the right-of-way fence, and 60.7 meters southwest of the southwest abutment of the water tank. (Note 18,* unstamped.)

U. S. G. S. 3303.—At *Toluca, Big Horn County, Mont.*, 40.6 meters south of the southeast corner of the railroad station, 40.38 meters southwest of the center of the Chicago, Burlington & Quincy main track, and 0.6 meter northeast of the right-of-way fence. (Note 18,* unstamped.)

H_7.—About 3.3 miles east of *Toluca, Big Horn County, Mont.*, in center of the concrete coping at the south end of the west abutment of bridge 794.23, 2.34 meters south of the center of the Chicago, Burlington & Quincy Railroad track. (Note 1.*)

I_7.—About 5.2 miles east of *Toluca, Big Horn County, Mont.*, opposite the west end of 1° curve, 21.4 meters north of the center of the Chicago, Burlington & Quincy Railroad track, and 1 meter south of the railroad right-of-way fence. (Note 11.*)

J_7.—About 2.6 miles west of *Hardin, Big Horn County, Mont.*, in the south end of the west abutment of girder bridge 787.40, 2.27 meters south of the center of the Chicago, Burlington & Quincy Railroad track, 41 centimeters from the iron pedestal of the bridge, and 39 centimeters from the face of the abutment. (Note 4,* stamped "U.S.B.M.")

U. S. G. S. 2989.—About 2.1 miles west of *Hardin, Big Horn County, Mont.*, at the east end of a 1° curve, and 335 meters west of the Fort Custer Canal, 21.84 meters north of the center of the Chicago, Burlington & Quincy Railroad track and 1 meter north of the right-of-way fence. (Note 18,* unstamped.) This bench mark was found to be loose, but not seriously disturbed, and was tamped solidly into place.

K_7.—At *Hardin, Big Horn County, Mont.*, 55.1 meters northwest of the northwest corner of the passenger station, 12.84 meters north of the center of the Chicago, Burlington & Quincy Railroad track, in the center of the south edge of the iron plate forming the column footing of the southwest pier of the water tank. The mark is the surface within a 1-inch outlined square, lettered "U.S.B.M."

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* See pp. 162-166.

L_7.—About 1.7 miles east of *Hardin, Big Horn County, Mont.*, in the center of the south end of the concrete coping stone at the west end of the three-span steel-truss bridge of the Chicago, Burlington & Quincy Railroad over the Big Horn River. (Note 1.*)

M_7.—About 1.8 miles east of *Hardin, Big Horn County, Mont.*, in the center of the north end of the concrete coping stone at the east end of the three-span steel-truss bridge of the Chicago, Burlington & Quincy Railroad over the Big Horn River. (Note 1.*)

N_7.—About 2.1 miles east of *Hardin, Big Horn County, Mont.*, in the south coping of the Chicago, Burlington & Quincy Railroad bridge over the Little Big Horn River, 9.92 meters south of the center of the track and 4.20 meters from the west end of the coping. (Note 4.*) Probably destroyed.

O_7.—At *Dunmore, Big Horn County, Mont.*, opposite the section house, 23.2 meters east of the center of the Chicago, Burlington & Quincy Railroad track, 1 meter east of the railroad right-of-way fence. (Note 2.*)

P_7.—About 0.6 mile south of *Dunmore, Big Horn County, Mont.*, in the west end of the north abutment of a Chicago, Burlington & Quincy Railroad bridge, 2.20 meters west of the center of the track, 13 centimeters from the face of the wing wall, and 21 centimeters from the end of the wing wall. (Note 4.*)

Q_7.—About 2.1 miles south of *Dunmore, Big Horn County, Mont.*, in the coping at the east end of the north abutment of bridge 774.51 of the Chicago, Burlington & Quincy Railroad, 1.80 meters east of the center of the track and 33 centimeters from the face of the coping. (Note 1.*)

R_7.—At *Crow Agency, Big Horn County, Mont.*, opposite and in line with the southeast end of the railroad station, and 20.7 meters from it, 34.2 meters northeast of the center of the Chicago, Burlington & Quincy Railroad track. (Note 11.*)

S_7.—About 0.4 mile south of *Crow Agency, Big Horn County, Mont.*, in the west end of the south pier of the steel-truss bridge 770.63 of the Chicago, Burlington & Quincy Railroad over the Little Big Horn River, 4.32 meters west of the center of the track, and 67 centimeters from the west point of the pier. (Note 1.*)

T_7.—About 2.5 miles south of *Crow Agency, Big Horn County, Mont.*, in the west end of the north pier of the steel-truss bridge 768.62 of the Chicago, Burlington & Quincy Railroad over the Little Big Horn River, 3.83 meters west of the center of the track, and 41 centimeters from the west point of the pier. (Note 4.*)

U_7.—At *Garryowen, Big Horn County, Mont.*, opposite the section house, 33.3 meters east of the center of the Chicago, Burlington & Quincy Railroad track, and 1 meter west of the right-of-way fence. (Note 2.*)

V_7.—About 2.7 miles south of *Garryowen, Big Horn County, Mont.*, in the coping stone at the southwest corner of the steel-truss bridge 762.76 of the Chicago, Burlington & Quincy Railroad over the Little Big Horn River, 2.0 meters west of the center of the track and 25 centimeters from the north face of the coping. (Note 4.*)

W_7.—About 2.2 miles north of *Ionia, Big Horn County, Mont.*, in the coping at the southwest corner of the steel-truss bridge 756.90 of the Chicago, Burlington & Quincy Railroad over the Little Big Horn River, 2.0 meters west of the center of the track. (Note 1.*)

X_7.—At *Ionia, Big Horn County, Mont.*, opposite the section house, 24.1 meters west of the center of the Chicago, Burlington & Quincy Railroad track and 2 meters west of the right-of-way fence. (Note 11.*)

Y_7.—About 1.6 miles north of *Lodgegrass, Big Horn County, Mont.*, in the west end of the south abutment of a concrete culvert of the Chicago, Burlington & Quincy Railroad, 3 rails north of bridge 751.82, and 2.0 meters west of the center of the track. (Note 4.*)

Z_7.—At *Lodgegrass, Big Horn County, Mont.*, between the Chicago, Burlington & Quincy Railroad station and George Pease's Indian store, 20.8 meters west of the center of the railroad track, and 1 meter east of the right-of-way fence. (Note 11.*)

A_8.—About 0.4 mile south of *Lodgegrass, Big Horn County, Mont.*, in the concrete coping at the west end of the south abutment of steel-girder bridge 749.82 of the Chicago, Burlington & Quincy Railroad, 1.85 meters west of the center of the track. (Note 4.*)

B_8.—About 2.3 miles south of *Little Horn, Big Horn County, Mont.*, in the center of the coping at the west end of the south abutment of concrete culvert 744.39 of the Chicago, Burlington & Quincy Railroad, 2.4 meters west of the center of the track. (Note 4.*)

C_8.—About 3.6 miles north of *Wyola, Big Horn County, Mont.*, at the west end of the south abutment of steel-girder bridge 740.65 of the Chicago, Burlington & Quincy Railroad over the Little Big Horn River, 3.48 meters west of the center of the track, 28 centimeters from the face of the coping, and 1.32 meters from the point of the wing wall. (Note 4.*)

D_8.—At *Wyola, Big Horn County, Mont.*, in the northwest pier of the masonry foundation of the water tank, 4.37 meters west of the center of the Chicago, Burlington & Quincy Railroad track, 31.7 meters from the passenger station. (Note 15.*)

E_8.—At *Wyola, Big Horn County, Mont.*, opposite a point 2 rails south of the Chicago, Burlington & Quincy Railroad passenger station, 75.1 meters west of the center of the track, and 64.7 meters from the northwest corner of the station. (Note 2.*)

F_8.—About 1.4 miles north of *Aberdeen, Big Horn County, Mont.*, in the west end of the north abutment of the steel-girder bridge 732.31 of the Chicago, Burlington & Quincy Railroad, 2.50 meters west of the center of the track, 37 centimeters from the face of the coping, and 55 centimeters from the angle of the wing wall (Note 1.*)

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* See pp. 162-166.

G_8.—At *Aberdeen, Big Horn County, Mont.*, 500 feet south of the section house, in the center of the coping stone at the west end of the north abutment of steel-girder bridge 730.69 of the Chicago, Burlington & Quincy Railroad, 2.68 meters west of the center of the track. (Note 1.*)

H_8.—In *Montana*, 3.6 miles north of *Parkman, Sheridan County, Wyo.*, in the west end of the south abutment of concrete bridge 727.67 of the Chicago, Burlington & Quincy Railroad, 2.72 meters west of the center of the track. (Note 4.*)

U. S. G. S. 4292.—At *Parkman, Sheridan County, Wyo.*, in front of the post office and hotel, 57.5 meters east of the Chicago, Burlington & Quincy Railroad track, and 77 meters from the passenger depot. (Note 18,* stamped "4292 Sher.")

U. S. G. S. 4138.—At *Ohlman, Sheridan County, Wyo.*, at the south corner of the crossroads near the schoolhouse, 27 meters from the fence corner, and 175 meters southwest of the center of the Chicago, Burlington & Quincy Railroad track. (Note 18,* stamped "4138 Sher.")

U. S. G. S. 4011, Ranchester northwest base reference mark.—4.4 miles northwest of *Ranchester, Sheridan County, Wyo.*, 1300 feet west of the western extremity of the first tangent on the Chicago, Burlington & Quincy Railroad, west of Ranchester, 1670 feet west of mile pole 719, and 8.2 meters north of the center of the railroad track. (Note 18,* unstamped.)

U. S. G. S. 3788, Ranchester southeast base reference mark.—At *Ranchester, Sheridan County, Wyo.*, 5.83 meters south of Ranchester southeast base △. (See below.) (Note 18,* unstamped.)

Ranchester southeast base △ (U. S. G. S.).—At *Ranchester, Sheridan County, Wyo.*, ½ mile west of the Chicago, Burlington & Quincy Railroad passenger station, 100 meters east of a highway crossing and 6.29 meters south of the center of the track. The mark is a hole 25 millimeters square and 4 millimeters deep in the top of a post of soft red sandstone, 6 by 6 inches on the top, set with 3 inches above the ground, and marked "U. S. B. M. C. & G. S. 1908."

U. S. G. S. 3751.—At *Ranchester, Sheridan County, Wyo.*, at the northwest corner of Main and Payton Streets, 3.2 meters from the corner and 32.25 meters south of the schoolhouse. (Note 18,* stamped "3751 Sher.")

U. S. G. S. 3698.—About 3.0 miles east of *Ranchester, Sheridan County, Wyo.*, about 200 meters west of the crossing of the Sheridan highway over the Chicago, Burlington & Quincy Railroad, at a small road crossing, 7 meters west of the center of the road and 8.80 meters north of the center of the track. (Note 18,* stamped "3698 Sher.")

U. S. G. S. 3660.—About 0.8 mile northwest of *Monarch, Sheridan County, Wyo.*, at the southwest corner of the crossroads, 120 meters south of Bob Hay's ranch house, 45 meters west of Slater Creek, 13.90 meters north of the center of the Chicago, Burlington & Quincy Railroad track, and 15 meters south of the center of the crossroads. (Note 18,* stamped "3660 Sher.")

Z_3.—About 0.7 mile northwest of *Monarch, Sheridan County, Wyo.*, 400 feet east of Slater Creek, in the concrete head wall for an inverted siphon, the crossing for an irrigation ditch under the Chicago, Burlington & Quincy Railroad; in the northwest corner of the wall, and 3.60 meters south of the center of the track. (Note 4.*)

A_4.—At *Alger, Sheridan County, Wyo.*, in steel-girder bridge 707.74 of the Chicago, Burlington & Quincy Railroad over Tongue River, in the coping stone at the south end of the east abutment, 45 centimeters from the side and 80 centimeters from the end of the coping stone. (Note 1.*)

B_4.—About 2.4 miles north of *Dietz, Sheridan County, Wyo.*, in steel-girder bridge 705.47 of the Chicago, Burlington & Quincy Railroad over Goose Creek, in the west end of the north abutment, in the center of the coping stone. (Note 4.*)

U. S. G. S. 3682.—About 2.1 miles north of *Sheridan, Sheridan County, Wyo.*, opposite the north barracks of Fort McKenzie, 575 feet south of a whistle post, 7.7 meters west of the center of the Chicago, Burlington & Quincy Railroad track, at the edge of the roadway just outside of the right-of-way fence. (Note 18,* stamped "3682 Sher.")

C_4.—About 1.4 miles north of *Sheridan, Sheridan County, Wyo.*, in the center of the coping of the concrete wall of the inverted siphon for an irrigation ditch under the Chicago, Burlington & Quincy Railroad, 3.22 meters west of the track. (Note 4.*)

Astro.—At *Sheridan, Sheridan County, Wyo.*, at the northeast corner of Crook and Fourth Streets, 375 feet southeast of the Chicago, Burlington & Quincy Railroad station. The mark is a cross cut on the highest point, a little to the east of the center, of the capstone of a brick pier 16 by 20 inches, projecting 30 inches above the ground. In the center of the capstone is a copper disk marked "U. S. Geological Survey," and stamped with the approximate latitude and longitude of the point.

D_4.—At *Sheridan, Sheridan County, Wyo.*, at the northwest corner of Gould and Loucks Streets, at the southeast corner of the grounds of the Federal building, 5.1 meters from the street corner, and 1 meter from the inside line of each sidewalk. (Note 11.*)

U. S. G. S. 3738.—At *Sheridan, Sheridan County, Wyo.*, in the front (east side) of the City Hall, 5.0 meters from the edge of the street and 68 centimeters from the ground. (Note 17.*)

E_4.—At *Sheridan, Sheridan County, Wyo.*, at the southwest corner of West Burkitt and South Main Streets, in the grounds of the Sheridan County courthouse, in the east face of the concrete post, 5.65 meters from the corner of the curbing, 1.25 meters from the ground. (Note 1.*)

F_4.—At *Wakely, Sheridan County, Wyo.*, about ¼ mile east of mile pole 694, in the concrete wall of the channel for an irrigation ditch under the Chicago, Burlington & Quincy Railroad, in the north end of the east wall, 7.05 meters north of the center of the track, 15 centimeters from the inner surface, and 15 centimeters from the end of the wall. (Note 4.*)

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* See pp. 162–166.

G_4.—At *Arno, Sheridan County, Wyo.*, about ⅓ mile west of mile pole 687, opposite the section house, 44.8 meters north of the center of the Chicago, Burlington & Quincy Railroad track, and 1 meter south of the right-of-way fence. (Note 2.*)

H_4.—About 3.3 miles west of *Verona, Sheridan County, Wyo.*, about ⅛ mile west of mile pole 683, in the concrete coping at the southwest corner of a concrete cattle way under the Chicago, Burlington & Quincy Railroad, 5.4 meters south of the track, 2.15 meters from the end of the coping, and 2 meters below grade. (Note 1.*)

I_4.—At *Verona, Sheridan County, Wyo.*, opposite the Chicago, Burlington & Quincy Railroad station, 27 meters north of the center of the track, and 1 meter south of the right-of-way fence. (Note 11.*)

J_4.—At *Ulm, Sheridan County, Wyo.*, opposite the first telegraph pole west of the Chicago, Burlington & Quincy Railroad station, and 53.6 meters north of the center of the track, 39.2 meters from the northwest corner of the station, and 1 meter south of the right-of-way fence. (Note 2.*)

K_4.—About 2.7 miles east of *Ulm, Sheridan County, Wyo.*, in a concrete cattle way under the Chicago, Burlington & Quincy Railroad, 3.85 meters north of the center of the track, 12 centimeters from the face and 80 centimeters from the end of the wall. (Note 4.*)

L_4.—About 3.2 miles west of *Clearmont, Sheridan County, Wyo.*, in a steel-girder bridge of the Chicago, Burlington & Quincy Railroad, in the center of the concrete coping stone, at the north end of the west abutment, and 2.61 meters north of the center of the track. (Note 1.*)

M_4.—At *Clearmont, Sheridan County, Wyo.*, in the west end of the center pier of the western water tank near the Chicago, Burlington & Quincy Railroad station, 37.96 meters north of the center of the main track, and 30 centimeters from the end of the pier. (Note 4.*)

N_4.—At *Clearmont, Sheridan County, Wyo.*, at the intersection of New York Street and Pennsylvania Avenue, 43.2 meters south of the center of the Chicago, Burlington & Quincy Railroad track, 21.7 meters northwest of the post office, and 1.4 meters north of the well building. (Note 11.*)

O_4.—At *Big Corral*, 6.7 miles east of *Clearmont, Sheridan County, Wyo.*, near the Big Corral ranch of the U-Cross outfit, about the middle of the siding of the Chicago, Burlington & Quincy Railroad, opposite the wagon scales on the road north of the track, 13.53 meters north of the center of the track, and 1 meter south of the right-of-way fence. (Note 2.*)

W_8.—At *Cadiz, Sheridan County, Wyo.* (See p. 225.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN GOFFS, CAL., AND ALBUQUERQUE, N. MEX., 1909.

L_5.—At *Goffs, San Bernardino County, Cal.* (See p. 202.)

M_5.—At *Goffs, San Bernardino County, Cal.* (See p. 202.)

I_6.—At *Rising, San Bernardino County, Cal.*, opposite the station sign, 4 poles west of mile pole 605½, and 20.6 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

J_6.—About 1½ miles east of *Homer, San Bernardino County, Cal.*, opposite the first pole west of mile pole 600, 17.3 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 1.3 meters from the east post of a rail rack. (Note 2.*)

K_6.—At *Ibis, San Bernardino County, Cal.*, 33.33 meters south of the Atchison, Topeka & Santa Fe Railway station, 26.57 meters south of the center of the main track, and 23.17 meters west of a small storehouse belonging to a mining company. (Note 2.*)

L_6.—3 miles west of *Java, San Bernardino County, Cal.*, 2 poles east of mile pole 588, in the surface of the concrete retaining wall at the south end of the east abutment of bridge D588, 3.09 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 4.*) Probably moved by the Atchison, Topeka & Sante Fa Railway in 1911.

M_6.—½ mile west of *Java, San Bernardino County, Cal.*, near mile pole 585½, 3.1 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 4½ rails east of bridge B586. (Note 2.*) Probably moved by the Atchison, Topeka & Santa Fe Railway in 1911.

N_6.—At *Hartoum, San Bernardino County, Cal.*, near the west switch, opposite a rail rack, and 12.32 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

O_6.—At *Needles, San Bernardino County, Cal.*, 58 meters south of the south track of the Atchison, Topeka & Santa Fe Railway, at the north front of the recreation hall for the railway employees, in the center line of a landing of the stone steps leading to the main entrance. The mark is a cross on an iron bolt, ½ inch in diameter, set flush with the concrete and lettered "U. S. B. M."

P_6.—At *Needles, San Bernardino County, Cal.*, in the park west of the El Garces Hotel. This bench mark has been destroyed.

Q_6.—At *Needles, San Bernardino County, Cal.*, in the north face of the concrete column at the northeast corner of the El Garces Hotel, 1.04 meters above the sidewalk. (Note 1.*)

Needles Astro.—At *Needles, San Bernardino County, Cal.*, at the corner of Third and D Streets, in a wooden observing shed, 12 meters southeast of the Catholic Church. The mark is a bronze disk of the United States Geological Survey, stamped "496 NE," in the center of the top of a concrete observing pier, 1½ by 2 feet, projecting 2 feet above the ground.

* See pp. 162-166.

△Bar.—At *Needles, San Bernardino County, Cal.*, 56 meters southwest of the southwest corner of the large stone and brick school building on a hill south of town, and on the summit of the west end of the hill. The mark is a cross on the top of a 1½-inch iron bar projecting several inches from the top of a concrete pier, 1 by 1½ feet, standing 2 feet above the ground. Probably destroyed.

R_6.—5 miles south of *Needles, San Bernardino County, Cal.*, 7 poles south of mile pole 573, in the coping stone at the northeast corner of masonry culvert C574, 5.07 meters east of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 4.*)

U. S. G. S. 473.—5 miles south of *Needles, San Bernardino County, Cal.*, 1.65 meters from mile pole 573 and 11.6 meters west of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 18.*)

S_6.—5 miles south of *Needles, San Bernardino County, Cal.*, 1 pole south of mile pole 573, in the east end of the north abutment of bridge I573, 4.42 meters east of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 10 centimeters from the face of the coping. (Note 1.*)

T_6.—3 miles south of *Beal, San Bernardino County, Cal.*, 2 poles south of mile pole 569, in the west end of the north abutment of bridge E569, 5.58 meters west of the center of the track of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face, and 30 centimeters from the end of the coping. (Note 4.*)

U_6.—5 miles south of *Beal, San Bernardino County, Cal.*, 4½ poles south of mile pole 567, in the coping at the northeast corner of bridge C567 of the Atchison, Topeka & Santa Fe Railway, 4.34 meters east of the center of the track, and 53 centimeters from the face of the coping. (Note 4.*)

V_6.—About 5½ miles south of *Beal, San Bernardino County, Cal.*, in the coping stone at the northwest corner of the large steel cantilever bridge of the Atchison, Topeka & Santa Fe Railway over the Colorado River, 2.24 meters north of the center of the track, 2.78 meters from the north side and 50 centimeters from the east side of the coping stone. (Note 1.*)

U. S. G. S. 504.—At *Topock, Mohave County, Ariz.*, in the coping stone at the southeast corner of the large steel cantilever bridge of the Atchison, Topeka & Santa Fe Railway over the Colorado River, 1.65 meters south of the center of the track, 53 centimeters from the south edge, and 53 centimeters from the west edge of the coping stone. (Note 17.*)

△Topog.—At *Topock, Mohave County, Ariz.*, at the edge of the bluff overlooking the Colorado River, 68.1 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 10 meters from the edge of the bluff. The mark is a bronze disk set in the horizontal surface of natural rock.

A.—At *Topock, Mohave County, Ariz.*, opposite the passenger station, 4.3 meters west of a corral for loading cattle, 7.3 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 2.3 meters from a telegraph pole. (Note 11.*)

B.—About 2.3 miles east of *Topock, Mohave County, Ariz.*, at mile pole 563½, in the coping stone at the northeast corner of culvert bridge B564, and 4.45 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 4.*)

C.—3 miles east of *Topock, Mohave County, Ariz.*, 5 poles east of mile pole 563 in the coping stone at the northwest corner of steel-girder bridge C563 of the Atchison, Topeka & Santa Fe Railway, and 3.1 meters north of the center of the track. (Note 1.*)

D.—1 mile west of *Powell, Mohave County, Ariz.*, opposite mile pole 560, and 23.7 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

U. S. G. S. 762.—At *Powell, Mohave County, Ariz.*, opposite the station sign, and 25 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 18.*)

U. S. G. S. 1101.—At *Franconia, Mohave County, Ariz.*, 5.7 meters south of the section house, and 17.3 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 18.*)

E.—About 2.2 miles east of *Franconia, Mohave County, Ariz.*, at the east end of a 3° curve in the coping at the northeast corner of culvert bridge B551, and 5.3 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 15.*)

F.—About 2.5 miles east of *Franconia, Mohave County, Ariz.*, in the north end of the east abutment of steel-girder bridge A551 of the Atchison, Topeka & Santa Fe Railway, 36 centimeters from the face, and 43 centimeters from the end of the wing wall. (Note 1.*)

G.—About 2.7 miles east of *Franconia, Mohave County, Ariz.*, at mile pole 550, in the north end of the west abutment of steel-girder bridge C550 of the Atchison, Topeka & Santa Fe Railway, 45 centimeters from the face, and 170 centimeters from the end of the wing wall. (Note 15.*)

H.—3 miles east of *Franconia, Mohave County, Ariz.*, in the north end of the east abutment of steel-girder bridge B550 of the Atchison, Topeka & Santa Fe Railway, 43 centimeters from the face, and 78 centimeters from the end of the wing wall. (Note 15.*)

I.—3 miles west of *Haviland, Mohave County, Ariz.*, 4 poles east of mile pole 549, in the north end of the west abutment of culvert bridge C549 of the Atchison, Topeka & Santa Fe Railway, 12 centimeters from the face, and 15 centimeters from the end of the coping. (Note 15.*)

J.—1 mile east of *Haviland, Mohave County, Ariz.*, 5½ poles west of mile pole 545, in the coping stone at the northwest corner of culvert bridge A546 of the Atchison, Topeka & Santa Fe Railway, 12 centimeters from the face, and 12 centimeters from the end of the coping. (Note 15.*)

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* See pp. 162–166.

K.—1½ miles east of *Haviland, Mohave County, Ariz.*, in the north end of the west abutment of steel-girder bridge A545 over Dry Creek, 2.93 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 42 centimeters from the face of the abutment. (Note 1.*)

L.—About 2.3 miles east of *Haviland, Mohave County, Ariz.*, 8 poles east of mile pole 544, in the coping stone at the northeast corner of culvert bridge A544 of the Atchison, Topeka & Santa Fe Railway, 15 centimeters from the face, and 20 centimeters from the end of the coping. (Note 15.*)

M.—About 2.8 miles west of *Yucca, Mohave County, Ariz.*, in the south end of the east abutment of steel-girder bridge C543 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face, and 40 centimeters from the end of the abutment. (Note 4.*)

N.—About 1.8 miles west of *Yucca, Mohave County, Ariz.*, in the north end of the west abutment of bridge C542 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face, and 40 centimeters from the end of the abutment. (Note 15.*)

O.—1 mile west of *Yucca, Mohave County, Ariz.*, 5 poles west of mile pole 541, in the coping stone at the northeast corner of culvert bridge A542 of the Atchison, Topeka & Santa Fe Railway, 20 centimeters from the face, and 20 centimeters from the end of the coping. (Note 4.*)

P.—At *Yucca, Mohave County, Ariz.*, 300 meters east of the passenger station, 2 poles west of mile pole 540, in the coping stone at the northeast corner of culvert bridge A541 of the Atchison, Topeka & Santa Fe Railway, 23 centimeters from the face, and 24 centimeters from the end of the coping. (Note 4.*)

Q.—¼ mile east of *Yucca, Mohave County, Ariz.*, 6½ poles east of mile pole 540, in the north end of the east abutment of steel-girder bridge A540 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face, and 40 centimeters from the end of the coping. (Note 1.*)

R.—2 miles east of *Yucca, Mohave County, Ariz.*, 5 poles west of mile pole 538, in the coping at the northeast corner of concrete arch bridge A539 of the Atchison, Topeka & Santa Fe Railway, 10 centimeters from the face, and 14 centimeters from the end of the coping. (Note 15.*)

S.—About 1.2 miles west of *Kaster, Mohave County, Ariz.*, 12 poles west of mile pole 532, in the north end of the west abutment of steel-girder bridge A533 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 60 centimeters from the end of the coping stone. (Note 1.*)

T.—About 1.4 miles south of *Drake, Mohave County, Ariz.*, 17 poles north of mile pole 539, in the west end of the south abutment of steel-girder bridge B529 of the Atchison, Topeka & Santa Fe Railway, 36 centimeters from the face and 40 centimeters from the end of the coping stone. (Note 1.*)

U.—At *Drake, Mohave County, Ariz.*, 6 poles south of mile pole 527, 4 poles south of the section house and 19.4 meters west of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

V.—1 mile north of *Drake, Mohave County, Ariz.*, 1½ poles south of mile pole 526, in the coping at the southwest corner of culvert bridge A527 of the Atchison, Topeka & Santa Fe Railway, 29 centimeters from the face and 32 centimeters from the end of the coping. (Note 4.*)

W.—About 2.4 miles north of *Drake, Mohave County, Ariz.*, 8 poles north of mile pole 525, in the coping stone at the west end of the north abutment of steel-girder bridge B525 of the Atchison, Topeka & Santa Fe Railway, 36 centimeters from the face, and 72 centimeters from the end of the coping. (Note 15.*)

X.—At *Hancock (Gold Flat post office), Mohave County, Ariz.*, 2½ poles south of mile pole 524, in the coping at the northwest corner of culvert bridge A525 of the Atchison, Topeka & Santa Fe Railway, 16 centimeters from the face and 25 centimeters from the end of the coping. (Note 15.*)

Y.—½ mile south of *McConnico, Mohave County, Ariz.*, 17 poles south of mile pole 21, in the coping at the west end of the south abutment of steel-girder bridge A522 of the Atchison, Topeka & Santa Fe Railway, 29 centimeters from the face, and 32 centimeters from the end of the coping. (Note 4.*)

Z.—About 1.3 miles south of *Kingman, Mohave County, Ariz.*, 8½ poles north of mile pole 518, in the coping at the center of the west side of culvert bridge C518 of the Atchison, Topeka & Santa Fe Railway, 18 centimeters from the face, and 196 centimeters from the north end of the coping. (Note 15.*)

A_1.—At *Kingman, Mohave County, Ariz.*, in the south wall of the Atchison, Topeka & Santa Fe Railway station, at the southeast corner of the ticket office, 1.25 meters from the ground and 20 centimeters from the edge of the wall. (Note 1.*)

B_1.—At *Kingman, Mohave County, Ariz.*, on the south side of South Front Street, 59.0 meters east of the east line of Fourth Street, opposite the Atchison, Topeka & Santa Fe Railway freight station, 2.9 meters from the fence line, and 4.2 meters from a telephone pole. (Note 11.*)

C_1.—At *Berry, Mohave County, Ariz.*, 15.9 meters south of station sign, 25.9 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 1 meter below grade. (Note 2.*)

D_1.—About 1.8 miles west of *Hualapai, Mohave County, Ariz.*, 4 poles west of mile pole 503, in the coping at the northwest corner of culvert bridge A504 of the Atchison, Topeka & Santa Fe Railway, 15 centimeters from the face and 15 centimeters from the end of the coping. (Note 4.*)

E_1.—At *Hualapai, Mohave County, Ariz.*, 1 pole west of mile pole 501½, in the coping at the northeast corner of culvert bridge A502 of the Atchison, Topeka & Santa Fe Railway, 15 centimeters from the face and 20 centimeters from the end of the coping. (Note 1.*)

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* See pp. 162–166.

F_1.—At *Hualapai, Mohave County, Ariz.*, near the east switch, 26.8 meters east of the first pole east of mile pole 502, and 26.0 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

G_1.—About 1.3 miles east of *Hualapai, Mohave County, Ariz.*, near mile pole 500, in the coping at the northwest corner of culvert bridge A501 of the Atchison, Topeka & Santa Fe Railway, 5 centimeters from the face and 12 centimeters from the end of the coping. (Note 15.*)

H_1.—About 2.3 miles east of *Hualapai, Mohave County, Ariz.*, 2½ poles east of mile pole 499, in the north end of the west abutment of steel-girder bridge C499 of the Atchison, Topeka & Santa Fe Railway, 34 centimeters from the face and 60 centimeters from the end of the coping stone. (Note 1.*)

I_1.—At *Antares, Mohave County, Ariz.*, 1 pole west of mile pole 495, in the coping at the northwest corner of culvert bridge A496 of the Atchison, Topeka & Santa Fe Railway, 10 centimeters from the face and 13 centimeters from the end of the coping. (Note 15.*)

J_1.—About 1.7 miles west of *Hackberry, Mohave County, Ariz.*, 10½ poles east of mile pole 491, in the coping stone at the southeast corner of culvert bridge C491 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 38 centimeters from the end of the coping. (Note 1.*)

K_1.—About 0.3 mile west of *Hackberry, Mohave County, Ariz.*, in the north end of the west abutment of steel-girder bridge A490 of the Atchison, Topeka & Santa Fe Railway, 33 centimeters from the face and 53 centimeters from the end of the coping stone. (Note 1.*)

L_1.—At *Hackberry, Mohave County, Ariz.*, in the southeast corner of the yard of the first house west of the railroad station, 0.8 meter from the corner post, 15.3 meters north of the center of track of the Atchison, Topeka & Santa Fe Railway, and 34.3 meters from the southwest corner of the railroad station. (Note 11.*)

M_1.—About 0.9 mile east of *Hackberry, Mohave County, Ariz.*, 3 poles west of mile pole 488, in the center of the coping at the north side of culvert bridge A489 of the Atchison, Topeka & Santa Fe Railway, 20 centimeters from the face of the coping. (Note 15.*)

N_1.—At *Tinnaka, Mohave County, Ariz.* (*Truxton post office*), at the Truxton Canyon Indian School, in the east wall of the masonry foundation of the main dormitory, 50 centimeters from the southeast corner and 87 centimeters from the ground. (Note 1.*)

O_1.—At *Crozier, Mohave County, Ariz.*, 10 poles west of mile pole 481, 7.5 meters east of the station sign, and 6.6 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

P_1.—About 1.9 miles east of *Crozier, Mohave County, Ariz.*, in the north end of the west abutment of steel-girder bridge D480 of the Atchison, Topeka & Santa Fe Railway, 41 centimeters from the face and 70 centimeters from the end of the coping stone. (Note 4.*)

Q_1.—About ½ mile west of *Truxton (Siding), Mohave County, Ariz.*, 6 poles west of mile pole 478, in the north end of the west abutment of steel-girder bridge A479 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 20 centimeters from the end of the coping stone. (Note 15.*)

R_1.—About 1.4 miles east of *Cherokee, Mohave County, Ariz.*, 7 poles west of mile pole 470, in the north end of the west abutment of steel-girder bridge A471 of the Atchison, Topeka & Santa Fe Railway, 33 centimeters from the face and 52 centimeters from the end of the coping. (Note 4.*)

S_1.—About 2.3 miles west of *Peach Springs, Mohave County, Ariz.*, 6 poles west of mile pole 469, in the north end of the west abutment of steel-girder bridge B470 of the Atchison, Topeka & Santa Fe Railway, 42 centimeters from the face and 60 centimeters from the end of the coping. (Note 1.*)

T_1.—At *Peach Springs, Mohave County, Ariz.*, 5 poles east of mile pole 466, in the southwest corner of the orchard adjoining the railroad station, 1.4 meters from the corner post and 7.5 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 11.*)

U_1.—At *Nelson, Mohave County, Ariz.*, 4 poles west of mile pole 459, in the north end of the west abutment of steel-girder bridge A460 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face and 30 centimeters from the end of the coping. (Note 15.*)

V_1.—About 1.3 miles east of *Nelson, Mohave County, Ariz.*, near mile pole 458, in the north end of the west abutment of steel-girder bridge E458 of the Atchison, Topeka & Santa Fe Railway, 44 centimeters from the face and 75 centimeters from the end of the coping stone. (Note 1.*)

W_1.—About 2.1 miles west of *Yampai, Yavapai County, Ariz.*, at mile pole 454, in the coping at the northwest corner of culvert bridge B454 of the Atchison, Topeka & Santa Fe Railway, 10 centimeters from the face and 12 centimeters from the end of the coping. (Note 15.*)

X_1.—At *Yampai, Yavapai County, Ariz.*, 2 poles east of mile pole 452, 32 meters west of the section house and 19.6 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

Y_1.—About 2.9 miles east of *Yampai, Yavapai County, Ariz.*, at mile pole 449, in the coping at the northeast corner of culvert bridge A450 of the Atchison, Topeka & Santa Fe Railway, 12 centimeters from the face and 12 centimeters from the end of the coping. (Note 4.*)

Z_1.—About 2.2 miles east of *Pica, Yavapai County, Ariz.*, 4 poles east of mile pole 445, in the coping at the northwest corner of culvert bridge A445 of the Atchison, Topeka & Santa Fe Railway, 8 centimeters from the face and 15 centimeters from the end of the coping. (Note 15.*)

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* See pp. 162-166.

A_2.—4 miles east of *Pica, Yavapai County, Ariz.*, 1½ poles west of mile pole 443, in the coping at the northeast corner of culvert bridge A444 of the Atchison, Topeka & Santa Fe Railway, 14 centimeters from the face and 15 centimeters from the end of the coping. (Note 4.*)

B_2.—About 1½ miles west of *Audley, Yavapai County, Ariz.*, at milepost 441, in the coping at the northwest corner of culvert bridge A441, of the Atchison, Topeka & Santa Fe Railway, 15 centimeters from the face, and 18 centimeters from the end of the coping. (Note 4.*)

C_2.—At *Audley, Yavapai County, Ariz.*, 1½ poles west of mile pole 439, and 14.4 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

D_2.—About 2.7 miles east of *Audley, Yavapai County, Ariz*, 3½ poles east of mile pole 437, in the coping at the northwest corner of culvert bridge B437 of the Atchison, Topeka & Santa Fe Railway, 14 centimeters from the face and 18 centimeters from the end of the coping. (Note 15.*)

E_2.—About 1.7 miles west of *Chino, Yavapai County, Ariz.*, 2½ poles west of mile pole 434, in the coping at the northeast corner of culvert bridge A435 of the Atchison, Topeka & Santa Fe Railway, 15 centimeters from the face and 10 centimeters from the end of the coping. (Note 15.*)

F_2.—½ mile east of *Chino, Yavapai County, Ariz.*, 6 poles west of mile pole 432, in the coping at the northeast corner of culvert bridge Z433 of the Atchison, Topeka & Santa Fe Railway, 15 centimeters from the face and 10 centimeters from the end of the coping. (Note 15.*)

G_2.—1.2 miles west of *Seligman, Yavapai County, Ariz.*, in the north end of the abutment, at the west end of steel-trestle bridge A430 of the Atchison, Topeka & Santa Fe Railway, 28 centimeters from the face and 30 centimeters from the end of the coping stone. (Note 1.*)

H_2.—About 1.1 miles west of *Seligman, Yavapai County, Ariz.*, in the south end of the abutment at the east end of steel-trestle bridge A430 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 31 centimeters from the end of the coping stone. (Note 4.*)

I_2.—At *Seligman, Yavapai County, Ariz.*, in the southwest corner of the inclosure surrounding the Santa Fe reading room, 2.4 meters from the corner post and 10.2 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 11.*)

J_2.—About 0.7 mile west of *Pan, Yavapai County, Ariz.*, 7 poles west of mile pole 424, in the coping at the northeast corner of arch-culvert bridge A425 of the Atchison, Topeka & Santa Fe Railway, 26 centimeters from the face and 51 centimeters from the end of the coping. (Note 4.*)

K_2.—About 1.9 miles south of *Crookton, Yavapai County, Ariz.*, 5 poles north of mile pole 417, in the east end of the north abutment of T-rail bridge A418 of the Atchison, Topeka & Santa Fe Railway, 20 centimeters from the face and 20 centimeters from the end of the abutment. (Note 4.*)

L_2.—At *Gleed, Yavapai County, Ariz.*, 6 rails west of the east switch, 8.8 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 2 meters below grade. (Note 2.*)

M_2.—½ mile west of *Pineveta, Yavapai County, Ariz.*, 2½ poles west of mile pole 409½, over the center pier, in the center of the coping at the north side of culvert-arch bridge A410 of the Atchison, Topeka & Santa Fe Railway, 38 centimeters from the face of the coping. (Note 1.*)

N_2.—About 1.4 miles east of *Pineveta, Yavapai County, Ariz.*, 4 poles west of mile pole 407½, in the north end of the west abutment of steel-girder bridge A408 of the Atchison, Topeka & Santa Fe Railway, 43 centimeters from the face and 89 centimeters from the end of the coping stone. (Note 4.*)

O_2.—About 2.7 miles west of *Ash Fork, Yavapai County, Ariz.*, 8½ poles west of mile pole 404, in the north end of the west abutment of steel-girder bridge A405 of the Atchison, Topeka & Santa Fe Railway, 27 centimeters from the face and 60 centimeters from the end of the coping stone. (Note 4.*)

P_2.—At *Ash Fork, Yavapai County, Ariz.*, on the south side of the Atchison, Topeka & Santa Fe Railway, in the north face of the Harvey House, in the north face of the seventh column from the west end, 47 centimeters from its west edge and 1.38 meters from the ground. (Note 1.*)

U. S. G. S. 5141.—At *Ash Fork, Yavapai County, Ariz.*, opposite the railroad freight station, 90 meters south of the main track of the Atchison, Topeka & Santa Fe Railway, and 1 meter from the fence corner at the intersection of Lewis Avenue and Third Street. (Note 18,* unstamped.)

U. S. G. S. 5134.—½ mile east of *Ash Fork, Yavapai County, Ariz.*, 5 poles west of mile pole 400½, in the south end of the east abutment of culvert bridge A401 of the Atchison, Topeka & Santa Fe Railway. (Note 17,* unstamped.)

U. S. G. S. 5446.—½ mile west of *Holmes, Coconino County, Ariz.*, 1.45 meters west of mile pole 397 and 12.7 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a rock outcrop 2 meters below grade. (Note 17,* unstamped.)

Q_2.—½ mile east of *Holmes, Coconino County, Ariz.*, opposite a point 25.5 meters west of mile pole 396 and 3.72 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a rock outcrop. (Note 4.*)

U. S. G. S. 5713.—About 2.9 miles west of *Fairview, Coconino County, Ariz.*, 2.3 meters west of mile pole 394 and 12.9 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, 1 meter above grade in a large rock. (Note 17,* unstamped.)

U. S. G. S. 5964.—At *Fairview, Coconino County, Ariz.*, 7 poles west of mile pole 391, 3 rails west of the station sign, 10.1 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway and 55 centimeters from the south end of a stone wall. (Note 18,* unstamped.)

See pp. 162-166.

R_2.—About 0.6 mile east of *Fairview, Coconino County, Ariz.*, 4 poles west of mile pole 490½, in the north end of the west abutment of steel I-beam bridge A391 of the Atchison, Topeka & Santa Fe Railway, 22 centimeters from the face and 13 centimeters from the end of the coping. (Note 4.*)

S_2.—About 1.2 miles east of *Fairview, Coconino County, Ariz.*, 2 poles east of mile pole 390, in the north end of the west abutment of steel-trestle bridge A390 of the Atchison, Topeka & Santa Fe Railway, 22 centimeters from the face and 46 centimeters from the end of the coping stone. (Note 15.*)

T_2.—About 2.2 miles east of *Fairview, Coconino County, Ariz.*, 2 poles east of mile pole 389, near the west end of Johnson Canyon Tunnel, in the north end of the west abutment of steel-trestle bridge C389 of the Atchison, Topeka & Santa Fe Railway, 25 centimeters from the face and 52 centimeters from the end of the coping stone. (Note 4.*)

U_2.—About 1.6 miles west of *McLellan, Coconino County, Ariz.*, 11 rails east of mile pole 388, in the north end of the west abutment of steel-girder bridge D388 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face and 40 centimeters from the end of the coping stone. (Note 4.*)

V_2.—At *McLellan, Coconino County, Ariz.*, 1½ poles east of mile pole 386½, in the north end of the west abutment of steel-girder bridge A387 of the Atchison, Topeka & Santa Fe Railway, 31 centimeters from the face and 50 centimeters from the end of the coping stone. (Note 1.*)

U. S. G. S. 6568.—About 1.4 miles east of *McLellan, Coconino County, Ariz.*, 13.4 meters west of mile pole 385 and 11.8 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a rock outcrop ½ meter below grade. (Note 17,* unstamped.)

W_2.—About 0.6 mile west of *Supai, Coconino County, Ariz.*, 10 poles west of mile pole 382, in the north end of the west abutment of T-rail bridge B383 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 26 centimeters from the end of the abutment. (Note 4.*)

U. S. G. S. 6961.—At *Supai, Coconino County, Ariz.*, 1.0 meter from the fifth pole west of mile pole 581½ and 9.8 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 18,* unstamped.)

X_2.—About 0.7 mile west of *Williams, Coconino County, Ariz.*, 8 poles east of mile pole 379, in the north end of the east abutment of steel-girder bridge B379 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 60 centimeters from the end of the coping stone. (Note 4.*)

U. S. G. S. 6770.—At *Williams, Coconino County, Ariz.*, at the southeast corner of Second Street and Bill Williams Avenue, 2.7 meters from the northwest corner of the Grand Canyon Hotel. (Note 18.*)

Y_2.—At *Williams, Coconino County, Ariz.*, on the north side of the Atchison, Topeka & Santa Fe Railway, in the south side of the news stand of the Fray Marcos (Harvey) Hotel, 64 centimeters from the southeast corner and 1.48 meters from the ground. (Note 1.*)

Z_2.—2.4 miles east of *Williams, Coconino County, Ariz.*, 7 poles east of mile pole 376, in the north end of the west abutment of T-rail bridge A376 of the Atchison, Topeka & Santa Fe Railway, 20 centimeters from the face and 32 centimeters from the end of the abutment. (Note 4.*)

U. S. G. S. 6952.—About 3.2 miles east of *Williams, Coconino County, Ariz.*, 23.0 meters northwest of mile pole 375, 27.7 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway and 3.4 meters south of the right-of-way fence, in a natural rock, 1 meter below grade. (Note 17.*)

U. S. G. S. 6930.—About 4.2 miles east of *Williams, Coconino County, Ariz.*, 7 poles east of mile pole 374½, in the south end of the east abutment of steel-girder bridge A375 of the Atchison, Topeka & Santa Fe Railway, 53 centimeters from the face and 58 centimeters from the end of the coping stone. (Note 15.*)

U. S. G. S. 6953.—½ mile east of *Davern, Coconino County, Ariz.*, 6 poles east of mile pole 372, in the south end of the east abutment of steel-girder bridge B372 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 83 centimeters from the end of the coping stone. (Note 17.*)

U. S. G. S. 6869.—At *Chalender, Coconino County, Ariz.*, 3 poles north of mile pole 368, 42.6 meters northwest of the railroad station and 8.2 meters west of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a natural rock. (Note 17.*)

A_3.—About 0.8 mile south of *Chalender, Coconino County, Ariz.*, 12 poles north of mile pole 367, in the west end of the south abutment of steel-girder bridge A368 of the Atchison, Topeka & Santa Fe Railway, 38 centimeters from the face and 64 centimeters from the end of the abutment. (Note 15.*)

U. S. G. S. 6852.—2 miles east of *Chalender, Coconino County, Ariz.*, 3½ poles west of mile pole 366, in the north end of the east abutment of steel-girder bridge A367 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face, 65 centimeters from the end of the coping stone. (Note 17, stamped "6852–1907.") This mark has been moved from the north to the south end of the abutment.

B_3.—1 mile west of *Maine, Coconino County, Ariz.*, 7 poles west of mile pole 363½, in the north end of the west abutment of steel-girder bridge A364 of the Atchison, Topeka & Santa Fe Railway, 39 centimeters from the face and 80 centimeters from the end of the coping stone. (Note 4.*)

U. S. G. S. 7086.—At *Maine, Coconino County, Ariz.*, north of the railroad station, 34.0 meters west of mile pole 362½, 19.5 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a rock outcrop. (Note 17.*)

U. S. G. S. 7178.—2 miles east of *Maine, Coconino County, Ariz.*, 2 poles east of mile pole 360½, in the coping at the northeast corner of culvert bridge A361 of the Atchison, Topeka & Santa Fe Railway, 55 centimeters from the face and 25 centimeters from the end of the coping. (Note 17.*)

See pp. 162–166.

U. S. G. S. 7193.—About 0.6 mile east of *Arey, Coconino County, Ariz.*, 10.3 meters north of mile pole 358, 27.6 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, 1.5 meters south of the right-of-way fence, and 2 meters below grade, in a rock outcrop. (Note 17.*)

U. S. G. S. 7131.—About 0.3 mile east of *Bellemont, Coconino County, Ariz.*, 1 pole west of mile pole 356, in the north end of the east abutment of steel I-beam bridge A357 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 52 centimeters from the end of the coping stone. (Note 17.*)

C_3.—About 1.3 miles east of *Bellemont, Coconino County, Ariz.*, 1 pole east of mile pole 355, in the north end of the west abutment of steel I-beam bridge C355 of the Atchison, Topeka & Santa Fe Railway, 45 centimeters from the face and 93 centimeters from the end of the coping stone. (Note 1.*)

U. S. G. S. 7186.—About 3.3 miles south of *Bellemont, Coconino County, Ariz.*, 20 meters southwest of mile pole 353, 8.5 meters west of the center of the track of the Atchison, Topeka & Santa Fe Railway and 9.2 meters south of a telegraph pole. (Note 17.*)

U. S. G. S. 7273.—About 0.7 mile east of *Riordan, Coconino County, Ariz.*, 3 poles west of mile pole 350, in the south end of the west abutment of steel-girder bridge A351 of the Atchison, Topeka & Santa Fe Railway, 33 centimeters from the face and 35 centimeters from the end of the coping stone. (Note 17.*) This bench mark probably was moved in 1910.

U. S. G. S. 7091.—About 0.3 mile east of *Agassiz, Coconino County, Ariz.*, 6 meters west of the fifth pole west of mile pole 347, 10 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 1 meter above grade, in a rock outcrop. (Note 17.)*

D_3.—About 0.8 mile east of *Agassiz, Coconino County, Ariz.*, 7 poles west of mile pole 346½, in the north end of the east abutment of steel I-beam bridge D347 of the Atchison, Topeka & Santa Fe Railway, 42 centimeters from the face and 83 centimeters from the end of the coping stone. (Note 4.*)

U. S. G. S. 6907.—At *Flagstaff, Coconino County, Ariz.*, on La Roux Street, in the north end of the south stone window sill of the Citizens Bank Building, 4.75 meters south of the center of the main entrance, 16 centimeters from the edge of the sill and 12 centimeters above the sidewalk. (Note 17.*)

E_3.—At *Flagstaff, Coconino County, Ariz.*, in the south front of the Atchison, Topeka & Santa Fe Railway station, 38 centimeters from the east edge of the west door and 1.25 meters from the ground. (Note 1.*)

U. S. G. S. 6844.—About 2.1 miles east of *Flagstaff, Coconino County, Ariz.*, near mile pole 342, in the north end of the east abutment of steel I-beam bridge A343 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face and 60 centimeters from the end of the coping stone. The abutment is painted "U. S. B. M. 6844." (Note 15.*)

U. S. G. S. 6843.—About 3.1 miles east of *Flagstaff, Coconino County, Ariz.*, south of mile pole 341, 19.3 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 21.0 meters east of the pole painted "U. S. B. M. 6843." (Note 17.*)

F_3.—½ mile east of *Cosnino, Coconino County, Ariz.*, 42.5 meters southeast of mile pole 333, and 2.2 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a rock outcrop, 20 centimeters from its edge. (Note 1.*)

G_3.—At *Winona, Coconino County, Ariz.*, 2½ poles east of mile pole 329, 20.2 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 19.0 meters southeast of a telegraph pole, in a rock outcrop, ½ meter above grade. (Note 1.*)

H_3.—About 2.7 miles east of *Winona, Coconino County, Ariz.*, 9½ poles east of mile pole 326, in the north end of the west abutment of steel-girder bridge A326 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 70 centimeters from the end of the coping stone. (Note 4.*)

I_3.—About 0.7 mile east of *Angell, Coconino County, Ariz.*, 2½ poles west of mile pole 321, 3.04 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway and 13.7 meters from a telegraph pole, in a rock outcrop, 34 centimeters from its edge. (Note 1.*)

J_3.—About 0.5 mile west of *Hibbard, Coconino County, Ariz.*, 6 poles east of mile pole 318, in the north end of the west abutment of steel-trestle bridge A318 of the Atchison, Topeka & Santa Fe Railway over Canyon Padre, 26 centimeters from the face and 25 centimeters from the end of the coping stone. (Note 15.*)

K_3.—About 0.5 mile west of *Hibbard, Coconino County, Ariz.*, 10 poles west of mile pole 317½ in the north end of the east abutment of steel-trestle bridge A318 of the Atchison, Topeka & Santa Fe Railway over Canyon Padre, 51 centimeters from the end and 46 centimeters from the face of the abutment. (Note 1.*)

L_3.—About 1.3 miles east of *Hibbard, Coconino County, Ariz.*, 5 poles west of mile pole 316, in the south end of the west abutment of T-rail bridge A317 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 34 centimeters from the end of the abutment. (Note 4.*)

M_3.—About 3.4 miles west of *Canyon Diablo, Coconino County, Ariz.*, 2 poles west of mile pole 314, in the south end of the west abutment of steel I-beam bridge A315 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 40 centimeters from the end of the abutment. (Note 15.*)

N_3.—About 0.7 mile west of *Canyon Diablo, Coconino County, Ariz.*, 6 poles east of mile pole 312½, in the north end of the west abutment of steel-trestle bridge A313 of the Atchison, Topeka & Santa Fe Railway over Canyon Diablo, 24 centimeters from the face and 31 centimeters from the end of the coping stone. (Note 4.*)

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* See pp. 162-166.

O_3.—About 0.6 mile west of *Canyon Diablo, Coconino County, Ariz.*, 7 poles west of mile pole 312, in the north end of the the east abutment of steel-trestle bridge A313 of the Atchison, Topeka & Santa Fe Railway over Canyon Diablo, 30 centimeters from the face and 50 centimeters from the end of the coping stone. (Note 1.*)

P_3.—About 1.9 miles west of *Sunshine, (Meteor post office), Coconino County, Ariz.*, 13.8 meters west of mile pole 308 and 14.5 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, 2 meters below grade, in a rock outcrop. (Note 1.*)

Q_3.—About 1 mile west of *Sunshine, Coconino County, Ariz.*, 6 poles west of mile pole 307, in the north end of the west abutment of steel I-beam bridge A308 of the Atchison, Topeka & Santa Fe Railway, 43 centimeters from the face and 73 centimeters from the end of the coping stone. (Note 15.*)

R_3.—About 1.1 miles east of *Sunshine, Cononino County, Ariz.*, 2 poles west of mile pole 305, in the north end of the west abutment of steel I-beam bridge A306 of the Atchison, Topeka & Santa Fe Railway, 42 centimeters from the face and 62 centimeters from the end of the coping stone. (Note 4.*)

S_3.—About 3.1 miles east of *Sunshine, Coconino County, Ariz.*, 4 poles east of mile pole 303, in the north end of the west abutment of steel-girder bridge B303 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face and 45 centimeters from the end of the coping stone. (Note 15.*)

T_3.—About 1.6 miles west of *Dennison, Coconino County, Ariz.*, 29 meters southwest of mile pole 300, 13.0 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway and 14.6 meters east of a telegraph pole, in a rock outcrop. (Note 1.*)

U_3.—About 1.4 miles east of *Dennison, Coconino County, Ariz.*, 2½ poles west of mile pole 297, in the north end of the west abutment of steel I-beam bridge A298 of the Atchison, Topeka & Santa Fe Railway, 38 centimeters from the face and 75 centimeters from the end of the coping stone. (Note 4.*)

V_3.—About 4.7 miles west of *Winslow, Navajo County, Ariz.*, 1 pole east of mile pole 290½, in the south end of the west abutment of steel I-beam bridge A291 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 40 centimeters from the end of the coping stone. (Note 15.*)

W_3.—About 2.2 miles west of *Winslow, Navajo County, Ariz.*, 2 poles west of mile pole 288, in the north end of the west abutment of steel I-beam bridge A289 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 65 centimeters from the end of the coping stone. (Note 4.*)

X_3.—At *Winslow, Navajo County, Ariz.*, 7 poles east of mile pole 286, in the northeast corner of the yard of the railroad hospital, 6.8 meters south of the center of the south track of the Atchison, Topeka & Santa Fe Railway and 1.0 meter from the corner post of the fence. (Note 11.*) This mark was reported moved in 1910 to a location 11.79 meters south of that described above.

Y_3.—About 2.9 miles east of *Winslow, Navajo County, Ariz.*, 3½ poles east of mile pole 283, in the north end of the west abutment of steel-truss bridge A283 of the Atchison, Topeka & Santa Fe Railway over the Little Colorado River, 46 centimeters from the face and 1.22 meters from the end of the coping stone. (Note 1.*)

Z_3.—About 3.1 miles east of *Winslow, Navajo County, Ariz.*, 8½ poles west of mile pole 282½, in the north end of the east abutment of steel-truss bridge A283 of the Atchison, Topeka & Santa Fe Railway over the Little Colorado River, 53 centimeters from the face and 1.14 meters from the end of the coping stone. (Note 4.*)

A_4.—About 3 miles south of *Hobson, Navajo County, Ariz.*, 9½ poles north of mile pole 277, in the northwest pedestal of the foundation of a former water tank, 7.25 meters east of the center of the track of the Atchison, Topeka & Santa Fe Railway, 46 centimeters from the east face and 43 centimeters from the north face of the pedestal. (Note 4.*)

B_4.—About 2.9 miles east of *Hardy, Navajo County, Ariz.*, opposite mile pole 272, 31.1 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway and 0.9 meter south of the right-of-way fence. (Note 2.*)

C_4.—½ mile east of *Manila, Navajo County, Ariz.*, just east of mile pole 268½, in the north end of the west abutment of steel-girder bridge A269 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 50 centimeters from the end of the coping stone. (Note 1.*)

D_4.—About 0.9 mile west of *Joseph City, Navajo County, Ariz.* (*St. Joseph* post office), 6 poles east of mile pole 264½, in the north end of the west abutment of steel-girder bridge A265 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 55 centimeters from the end of the coping stone. (Note 4.*)

E_4.—About 1.4 miles east of *Joseph City, Navajo County, Ariz.*, 11.4 meters northwest of mile pole 262 and 22.1 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

F_4.—½ mile west of *Penzance, Navajo County, Ariz.*, 2 poles west of mile pole 259, in the north end of the west abutment of stone-arch bridge A260 of the Atchison, Topeka & Santa Fe Railway, in the first stone below the coping, 38 centimeters from the face and 25 centimeters from the end of the abutment. (Note 4.*)

G_4.—About 0.6 mile east of *Penzance, Navajo County, Ariz.*, 11.5 meters east of the second pole east of mile pole 258 and 14.7 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, 1½ meters below grade, in a rock outcrop. (Note 1.*)

H_4.—About 2.7 miles west of *Holbrook, Navajo County, Ariz.*, 8 poles east of mile pole 256, in the north end of the west abutment of steel-girder bridge A256 of the Atchison, Topeka & Santa Fe Railway, in the first stone below the coping, 32 centimeters from the face and 57 centimeters from the end of the abutment. (Note 4.*)

I_4.—At *Holbrook, Navajo County, Ariz.*, in the north face of the Atchison, Topeka & Santa Fe Railway station, 54 centimeters from the northwest corner of the building and 1.56 meters from the ground. (Note 1.*)

J_4.—3 miles east of *Holbrook, Navajo County, Ariz.*, 41.3 meters south of mile pole 250 and 8.0 meters southeast of the center of the track of the Atchison, Topeka & Santa Fe Railway, 1 meter below grade, in a rock outcrop. (Note 1.*)

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* See pp. 162-166.

K_4.—About 1.5 miles west of *Aztec, Navajo County, Ariz.*, 16.5 meters north of mile pole 247, 28.6 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway and 0.9 meter south of the right-of-way fence, 1½ meters below grade. (Note 2.*)

L_4.—About 3.2 miles east of *Aztec, Navajo County, Ariz.*, 4½ poles east of mile pole 242½, in the north end of the west abutment of steel-girder bridge A243 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 28 centimeters from the face and 70 centimeters from the end of the coping stone. (Note 4.*)

M_4.—About 4 miles east of *Aztec, Navajo County, Ariz.*, 5½ poles west of mile pole 241½, in the center of the south coping of culvert bridge B242 of the Atchison, Topeka & Santa Fe Railway, 20 centimeters from the face and 1.20 meters from the east end of the coping. (Note 15.*)

N_4.—1 mile west of *Carrizo, Navajo County, Ariz.*, 3 poles east of mile pole 239½, in the north end of the west abutment of steel-girder bridge A240 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 32 centimeters from the face and 58 centimeters from the end of the coping stone. (Note 1.*)

O_4.—About 1.7 miles west of *Adamana, Apache County, Ariz.*, 3 poles east of mile pole 234½, in the center of the south coping of culvert bridge A235 of the Atchison, Topeka & Santa Fe Railway, 31 centimeters from the face and 1.25 meters from the east end of the coping. (Note 4.*)

P_4.—At *Adamana, Apache County, Ariz.*, opposite the Atchison, Topeka & Santa Fe Railway station, 29.8 meters south of the center of the track and 0.9 meter north of the right-of-way fence. (Note 11.*)

Q_4.—2 miles east of *Adamana, Apache County, Ariz.*, 11 poles east of mile pole 231, in the north end of the west abutment of steel-girder bridge A231 of the Atchison, Topeka & Santa Fe Railway, 33 centimeters from the face and 50 centimeters from the end of the coping stone. (Note 4.*)

R_4.—3 miles west of *Pinta, Apache County, Ariz.*, 5.0 meters north of mile pole 222, 20.5 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway and 1½ meters below grade. (Note 2.*)

S_4.—About 1.7 miles west of *Pinta, Apache County, Ariz.*, 30 meters east of mile pole 221, in the center of the north coping of culvert bridge B221 of the Atchison, Topeka & Santa Fe Railway, 7 centimeters from the face and 1.60 meters from the east end of the coping. (Note 15.*)

T_4.—1 mile east of *Pinta, Apache County, Ariz.*, 12½ poles west of mile pole 218, in the coping at the northwest corner of stone-arch bridge A219 of the Atchison, Topeka & Santa Fe Railway, 19 centimeters from the face and 40 centimeters from the end of the coping. (Note 4.*)

U_4.—3 miles east of *Pinta, Apache County, Ariz.*, 10 poles east of mile pole 216½, in the north end of the west abutment of steel-girder bridge A217 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 20 centimeters from the face and 60 centimeters from the end of the abutment. (Note 1.*)

V_4.—About 3.3 miles west of *Navajo, Apache County, Ariz.*, ½ pole east of mile pole 216, in the coping at the southwest corner of stone-arch bridge A216 of the Atchison, Topeka & Santa Fe Railway, 15 centimeters from the face and 10 centimeters from the end of the coping. (Note 4.*)

W_4.—2 miles west of *Navajo, Apache County, Ariz.*, 9 poles east of mile pole 215, in the north end of the west abutment of steel-girder bridge A215 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 30 centimeters from the face and 35 centimeters from the end of the coping stone. (Note 15.*)

X_4.—About 2.8 miles east of *Navajo, Apache County, Ariz.*, 60 meters east of mile pole 210, in the north end of the west abutment of steel-girder bridge A210 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 30 centimeters from the face and 55 centimeters from the end of the coping stone. (Note 1.*)

Y_4.—About 1.2 miles west of *Chambers, Apache County, Ariz.*, 4 poles west of mile pole 207, in the north end of the west abutment of steel-girder bridge A208 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 40 centimeters from the end of the coping stone. (Note 4.*)

Z_4.—At *Chambers, Apache County, Ariz.*, 23.5 meters east of the Atchison, Topeka & Santa Fe Railway station, 14.6 meters south of the center of the track, and 1½ meters below grade. (Note 2.*)

A_5.—1 mile west of *Sanders, Apache County, Ariz.*, 30 meters west of mile pole 201, in the north end of the west abutment of steel I-beam bridge A202 of the Atchison, Topeka & Santa Fe Railway, 34 centimeters from the face and 80 centimeters from the end of the coping stone. (Note 4.*)

B_5.—At *Sanders, Apache County, Ariz.*, 2½ poles east of mile pole 200, in the center of the south coping of stone-arch bridge B200 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face and 3.03 meters from the west end of the coping. (Note 4.*)

C_5.—About 1.2 miles east of *Sanders, Apache County, Ariz.*, 6½ poles west of mile pole 198, in the center of the north coping of stone-arch bridge A199 of the Atchison, Topeka & Santa Fe Railway, 28 centimeters from the face and 5.0 meters from the east end of the coping. (Note 15.*)

D_5.—About 1.7 miles west of *Houck, Apache County, Ariz.*, 5½ poles east of mile pole 194, in the north end of the east abutment of steel-girder bridge B194 of the Atchison, Topeka & Santa Fe Railway, 45 centimeters from the face and 1.10 meters from the end of the coping stone. (Note 15.*)

E_5.—About 1 mile west of *Houck, Apache County, Ariz.*, 6 poles west of mile pole 193, in the north end of the west abutment of steel-truss bridge A194 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 30 centimeters from the face and 60 centimeters from the end of the coping stone. (Note 4.*)

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* See pp. 162–166.

F_5.—At *Houck, Apache County, Ariz.*, 12 poles west of mile pole 192, in the south end of the west abutment of steel-truss bridge A193 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 35 centimeters from the face and 45 centimeters from the end of the coping stone. (Note 1.*)

G_5.—About 2.1 miles east of *Allantown, Apache County, Ariz.*, 5 poles west of mile pole 185, in the north end of the west abutment of T-rail bridge A186 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 40 centimeters from the end of the abutment. (Note 4.*)

H_5.—About 1.4 miles west of *Lupton, Apache County, Ariz.*, 2 poles east of mile pole 182, in the north end of the west abutment of steel-girder bridge B182 of the Atchison, Topeka & Santa Fe Railway, 43 centimeters from the face and 84 centimeters from the end of the coping stone. (Note 1.*)

I_5.—About 0.3 mile west of *Lupton, Apache County, Ariz.*, 3 poles east of mile pole 181, in the north end of the west abutment of steel-girder bridge A181 of the Atchison, Topeka & Santa Fe Railway, 43 centimeters from the face and 52 centimeters from the end of the coping stone. (Note 15.*)

A.—About 2.3 miles west of *Manuelito, McKinley County, N. Mex.*, 11 poles east of mile pole 178, in the north end of the west abutment of steel-girder bridge A178 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 75 centimeters from the end of the coping stone. (Note 4.*)

B.—About 0.3 mile west of *Manuelito, McKinley County, N. Mex.*, 5 poles west of mile pole 174½ in the north end of the west abutment of steel-girder bridge A175 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face and 25 centimeters from the end of the coping stone. (Note 1.*)

C.—About 0.4 mile east of *Manuelito, McKinley Couty, N. Mex.*, 1 pole west of mile pole 173, in the north end of the west abutment of steel-girder bridge A174 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 55 centimeters from the end of the coping stone. (Note 4.*)

D.—About 4.2 miles east of *Manuelito, McKinley County, N. Mex.*, 6 poles west of mile pole 170, in the north end of the west abutment of steel-girder bridge A171 of the Atchison, Topeka & Sante Fa Railway over the Rio Puerco, 40 centimeters from the face and 43 centimeters from the end of the coping stone. (Note 15.*)

E.—About 0.8 mile west of *Defiance, McKinley County, N. Mex.*, 5 poles east of mile pole 167, in the north end of the west abutment of steel-girder bridge B167 of the Atchison, Topeka & Santa Fe Railway, 32 centimeters from the face and 41 centimeters from the end of the coping stone. (Note 1.*)

F.—About 0.8 mile east of *West Yard, McKinley County, N. Mex.*, 11 poles west of mile pole 161, in the coping at the northwest corner of stone-arch bridge A162 of the Atchison, Topeka & Santa Fe Railway, 10 centimeters from the face and 31 centimeters from the end of the coping. (Note 15.*)

G.—At *Gallup, McKinley County, N. Mex*, 10½ poles east of mile pole 158, at the southeast corner of the intersection of Railroad Avenue and Second Street, 19 meters south of the center of the south track of the Atchison, Topeka & Santa Fe Railway, 1.6 meters east of a telephone pole. (Note 11.*)

H.—About 1.9 miles east of *Gallup, McKinley County, N. Mex.*, 1 pole east of mile pole 156, in the north end of the west abutment of steel-girder bridge D156 of the Atchison, Topeka & Santa Fe Railway, 43 centimeters from the face and 44 centimeters from the end of the coping stone. (Note 1.*)

I.—About 2.8 miles east of *Gallup, McKinley County, N. Mex.*, 1 pole east of mile pole 154½, in the north end of the west abutment of steel-girder bridge A155 of the Atchison, Topeka & Santa Fe Railway, 37 centimeters from the face and 50 centimers from the end of the coping stone. (Note 15.*)

J.—About 1.8 mile west of *Zuni, McKinley County, N. Mex.*, 3½ poles east of mile pole 153½, in the north end of the west abutment of steel-girder bridge A154 of the Atchison, Topeka & Santa Fe Railway, 41 centimeters from the face and 67 centimeters from the end of the coping stone. (Note 4.*)

K.—About 1.2 miles east of *Zuni, McKinley County, N. Mex.*, 1½ poles east of mile pole 150½, in the north end of the west abutment of steel-girder bridge B151 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 38 centimeters from the face and 53 centimeters from the end of the coping stone. (Note 4.*)

L.—At *Wingate, McKinley County, N. Mex.*, opposite the Atchison, Topeka & Santa Fe Railway station, 27.5 meters south of the center of the track and 5.0 meters east of a telegraph pole. (Note 2.*)

M.—About 3.6 miles east of *Perea, McKinley County, N. Mex.*, 5½ poles west of mile pole 138, in the north end of the west abutment of steel-girder bridge A139 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 48 centimeters from the end of the coping stone. (Note 4.*)

N.—At *Guam, McKinley County, N. Mex.*, 5 poles west of mile pole 136, 31.8 meters east of the Atchison, Topeka & Santa Fe Railway station, opposite the station sign and 10.25 meters north of the center of the track. (Note 11.*)

O.—3 miles east of *Guam, McKinley County, N. Mex.*, opposite mile pole 133, 24.0 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 1 meter below grade. (Note 2.*)

P.—About 1.7 miles west of *Gonzales, McKinley County, N. Mex.*, 4 poles east of mile pole 132, in the coping at the southwest corner of stone-arch bridge B132 of the Atchison, Topeka & Santa Fe Railway, 21 centimeters from the face and 17 centimeters from the end of the coping. (Note 15.*)

Q.—At *Gonzales, McKinley County, N. Mex.*, 6 poles west of mile pole 130, 1.35 meters north of the south signboard reading: "Continental Divide Elevation 7248 Feet," and 14.0 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

R.—About 0.7 mile east of *Gonzales, McKinley County, N. Mex.*, 1 pole west of mile pole 129½, in the center of the north coping of stone-arch bridge B130 of the Atchison, Topeka & Santa Fe Railway, 20 centimeters from the face and 4.46 meters from the east end of the coping. (Note 4.*)

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* See pp. 162-166.

S.—At *Thoreau, McKinley County, N. Mex.*, 4 poles east of mile pole 125½, 7.6 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 1.6 meters from the southeast corner of the store building of the McGaffey Co. (Note 11.*)

T.—About 1.5 miles east of *Thoreau, McKinley County, N. Mex.*, 7½ poles east of mile pole 124, in the north end of the west abutment of steel-girder bridge A124 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 55 centimeters from the end of the coping stone. (Note 1.*)

U.—1 mile east of *Chaves, McKinley County, N. Mex.*, 6.5 meters north of mile pole 121, and 18.2 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, at grade. (Note 2.*)

V.—1 mile west of *Baca, McKinley County, N. Mex.*, 4.8 meters north of mile pole 116, and 15.7 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, 2 meters below grade. (Note 2.*)

W.—1 mile east of *Baca, McKinley County, N. Mex.*, 8.0 meters southwest of the fourth pole east of mile pole 114 and 4.70 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a limestone outcrop, 14 centimeters from the edge of the rock. (Note 4.*)

X.—2 miles east of *Baca, McKinley County, N. Mex.*, 7 poles east of mile pole 113, in the north end of the west abutment of steel I-beam bridge A113 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face and 39 centimeters from the end of the coping stone. (Note 15.*)

Y.—About 3.3 miles west of *Bluewater, Valencia County, N. Mex.*, 9 poles east of mile pole 111, in the north end of the west abutment of steel-girder bridge A111 of the Atchison, Topeka & Santa Fe Railway, 31 centimeters from the face and 36 centimeters from the end of the coping stone. (Note 1.*)

Z.—About 2.3 miles west of *Bluewater, Valencia County, N. Mex.*, opposite the tenth pole east of mile pole 110, and 15.3 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, ½ meter above grade. (Note 11.*)

A_1.—3 miles east of *Bluewater, Valencia County, N. Mex.*, 2 poles east of mile pole 104½, in the north end of the west abutment of steel-girder bridge A105 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 41 centimeters from the end of the coping stone. (Note 15.*)

B_1.—About 1.4 miles east of *Toltec, Valencia County, N. Mex.*, opposite mile pole 100, 29.2 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 1.6 meters north of the right-of-way fence, 1 meter below grade. (Note 2.*)

C_1.—About 1.8 miles west of *Grants, Valencia County, N. Mex.*, 7 poles east of mile pole 98, in the north end of the west abutment of T-rail bridge D98 of the Atchison, Topeka & Santa Fe Railway, 31 centimeters from the face and 35 centimeters from the end of the abutment. (Note 4.*)

D_1.—At *Grants, Valencia County, N. Mex.*, 9½ poles east of mile pole 96½, 34.6 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, 45 centimeters from the west wall of the store of the S. Bibo Mercantile Co., and 2.2 meters from the street corner. (Note 2.*)

E_1.—¼ mile east of *Grants, Valencia County, N. Mex.*, 24.3 meters northwest of the fourth pole east of mile pole 96, 30.3 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, on top of a rough stone post 6 inches square, projecting 15 inches above ground and marking the boundary of the railroad right of way. (Note 15.*)

F_1.—1 mile west of *Horace, Valencia County, N. Mex.*, 7 poles east of mile pole 91, in the center of the south coping of stone-arch bridge A91 of the Atchison, Topeka & Santa Fe Railway, 20 centimeters from the face and 4.80 meters from the east end of the coping. (Note 15.*)

G_1.—About 1.7 miles east of *Horace, Valencia County, N. Mex.*, 1½ poles west of mile pole 88, 2.85 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a sandstone outcrop, 20 centimeters from the edge of the rock. (Note 1.*)

H_1.—About 1.1 miles west of *McCartys, Valencia County, N. Mex.*, 5 poles east of mile pole 85, in the north end of the west abutment of steel-girder bridge D85 of the Atchison, Topeka & Santa Fe Railway, 33 centimeters from the face and 43 centimeters from the end of the coping stone. (Note 15.*)

I_1.—About 0.8 mile west of *McCartys, Valencia County, N. Mex.*, 1 pole west of mile pole 84½, in the coping at the northeast corner of culvert bridge B85 of the Atchison, Topeka & Santa Fe Railway, 11 centimeters from the face and 12 centimeters from the end of the coping. (Note 4.*)

J_1.— At *McCartys, Valencia County, N. Mex.*, 1 pole west of mile pole 83½, 5.33 meters east of a crossing warning sign, and 9.1 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

K_1.—About 0.9 mile west of *Alaska, Valencia County, N. Mex.*, 4 poles west of mile pole 79, in the north end of the west abutment of steel-girder bridge A80 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 48 centimeters from the end of the coping stone. (Note 1.*)

L_1.—About 3.5 miles east of *Alaska, Valencia County, N. Mex.*, 8 poles east of mile pole 75, in the north end of the west abutment of steel-girder bridge F75 of the Atchison, Topeka & Santa Fe Railway, 50 centimeters from the face and 1.53 meters from the end of the abutment. (Note 15.*)

M_1.—About 0.6 mile west of *Cubero, Valencia County, N. Mex.*, 14 poles east of mile pole 73, in the north end of the west abutment of steel-girder bridge C73 of the Atchison, Topeka & Santa Fe Railway over the Rio San Jose, 32 centimeters from the face and 48 centimeters from the end of the coping stone. (Note 4.*)

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* See pp. 162-166.

N_1.—2 miles east of *Cubero, Valencia County, N. Mex.*, 4 poles west of mile pole 70, in the north end of the west abutment of steel-girder bridge A71 of the Atchison, Topeka & Santa Fe Railway over the Rio San Jose, 28 centimeters from the end and 53 centimeters from the face of the coping stone. (Note 15.*)

O_1.—2½ miles west of *Laguna, Valencia County, N. Mex.*, 3 poles west of mile pole 68½, in the north end of the west abutment of steel-girder bridge A69 of the Atchison, Topeka & Santa Fe Railway over the Rio San Jose, 44 centimeters from the face and 70 centimeters from the end of the coping stone. (Note 4.*)

P_1.—About 0.9 mile west of *Laguna, Valencia County, N. Mex.*, at mile pole 67, in the north end of the west abutment of steel-truss bridge D67 of the Atchison, Topeka & Santa Fe Railway over the Rio San Jose, 31 centimeters from the face and 50 centimeters from the end of the coping stone. (Note 1.*)

Q_1.—At *Laguna, Valencia County, N. Mex.*, 12.1 meters south of the Atchison, Topeka & Santa Fe Railway station, 5.8 meters east of the center of the track and 1.08 meters east of the fence line. (Note 11.*)

Laguna Astro.—At *Laguna, Valencia County, N. Mex.*, on a bluff overlooking the Rio San Jose, 139.4 meters east of the center of the track of the Atchison, Topeka & Santa Fe Railway, 69.5 meters east of the Gunn Bros.' grist mill, and 11.8 meters from the edge of the bluff, on the south side of the top of a stone post about 12 inches square, with a 1-inch drill hole in the center. (Note 15.*) Reported to be the location of a former longitude station.

R_1.—2 miles north of *Laguna, Valencia County, N. Mex.*, 3 poles south of mile pole 64, in the west end of the south abutment of steel-girder bridge A65 of the Atchison, Topeka & Santa Fe Railway over the Rio San Jose, 35 centimeters from the face and 52 centimeters from the end of the coping stone. (Note 15.*)

S_1.—About 3.1 miles north of *Laguna, Valencia County, N. Mex.*, at mile pole 63, in the west end of the south abutment of steel-truss bridge B63 of the Atchison, Topeka & Santa Fe Railway over the Rio San Jose, 31 centimeters from the face and 30 centimeters from the end of the coping stone. (Note 4.*)

T_1.—At *El Rito, Valencia County, N. Mex.*, opposite mile pole 60, 19.1 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 3.7 meters north of the right-of-way fence, 1 meter below grade. (Note 2.*)

U_1.—3 miles east of *El Rito, Valencia County, N. Mex.*, 7 poles west of mile pole 56½, in the north end of the west abutment of steel-girder bridge B57 of the Atchison, Topeka & Santa Fe Railway, 31 centimeters from the face and 48 centimeters from the end of the coping stone. (Note 1.*)

V_1.—About 2.3 miles west of *Armijo, Valencia County, N. Mex.*, 9 poles east of mile pole 56, in the north end of the west abutment of steel-girder bridge B56 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face and 40 centimeters from the end of the coping stone. (Note 15.*)

W_1.—About 1.8 miles east of *Armijo, Valencia County, N. Mex.*, 7 poles west of mile pole 51½, in the north end of the west abutment of steel-truss bridge B52 of the Atchison, Topeka & Santa Fe Railway over the Rio San Jose, 32 centimeters from the face and 42 centimeters from the end of the coping stone. (Note 4.*)

X_1.—About 2.6 miles east of *Armijo, Valencia County, N. Mex.*, 2½ poles east of mile pole 51, in the north end of the west abutment of T-rail bridge B51 of the Atchison, Topeka & Santa Fe Railway, 33 centimeters from the face and 22 centimeters from the end of the abutment. (Note 15.*)

Y_1.—At *Suwanee, Valencia County, N. Mex.*, 6.9 meters south of mile pole 47, and 24.7 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

Z_1.—About 3.6 miles east of *Suwanee, Valencia County, N. Mex.*, 25.3 meters east of the fifth pole west of mile pole 43½, 4.0 meters northeast of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a limestone outcrop, at grade. (Note 1.*)

A_2.—1 mile west of *Garcia, Valencia County, N. Mex.*, 5 poles west of mile pole 42, in the north end of the west abutment of steel-girder bridge A43 of the Atchison, Topeka & Santa Fe Railway, 31 centimeters from the face and 42 centimeters from the end of the coping stone. (Note 4.*)

B_2.—1 mile south of *Garcia, Valencia County, N. Mex.*, 8.2 meters west of mile pole 40, 25.2 meters west of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 1 meter below grade. (Note 2.*)

C_2.—2 miles east of *Garcia, Valencia County, N. Mex.*, 7 poles east of mile pole 39, in the north end of the west abutment of steel I-beam bridge A39 of the Atchison, Topeka & Santa Fe Railway, 45 centimeters from the face and 60 centimeters from the end of the coping stone. (Note 15.*)

D_2.—2 miles west of *Rio Puerco, Valencia County, N. Mex.*, 3.2 meters south of mile pole 36, and 16.2 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, 1 meter below grade. (Note 2.*)

E_2.—½ mile east of *Rio Puerco, Valencia County, N. Mex.*, 8 poles east of mile pole 34, in the north end of the west abutment of steel-truss bridge C34 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 35 centimeters from the face and 37 centimeters from the end of the coping stone. (Note 1.*)

F_2.—1 mile east of *Pavo, Valencia County, N. Mex.*, at mile pole 32, in the north end of the west abutment of steel I-beam bridge C32 of the Atchison, Topeka & Santa Fe Railway, 38 centimeters from the face and 39 centimeters from the end of the coping stone. (Note 4.*)

G_2.—3 miles east of *Pavo, Valencia County, N. Mex.*, 4 poles west of mile pole 30, in the north end of the west abutment of steel I-beam bridge A31 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 26 centimeters from the end of the coping stone. (Note 15.*)

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* See pp. 162–166.

H_2.—3.5 miles east of *Pavo, Valencia County, N. Mex.*, 2½ poles west of mile pole 29½, in the north end of the west abutment of steel-girder bridge C30 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 80 centimeters from the end of the coping stone. (Note 1.*)

I_2.—About 1.5 miles west of *Sandia, Valencia County, N. Mex.*, 4.4 meters north of mile pole 25, and 9.2 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

J_2.—About 2.5 miles east of *Sandia, Valencia County, N. Mex.*, 3 poles east of mile pole 21, in the north end of the west abutment of steel I-beam bridge C21 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 30 centimeters from the end of the coping stone. (Note 15.*)

K_2.—About 1.2 miles west of *Manzana, Valencia County, N. Mex.*, 10½ poles west of mile pole 19, in the north end of the west abutment of steel-girder bridge B20 of the Atchison, Topeka & Santa Fe Railway, 33 centimeters from the face and 45 centimeters from the end of the coping stone. (Note 1.*)

L_2.—About 0.3 mile west of *Manzana, Valencia County, N. Mex.*, 3 poles east of mile pole 18½, in the north end of the west abutment of steel I-beam bridge A19 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 22 centimeters from the end of the coping stone. (Note 15.*)

M_2.—About 2.2 miles west of *Isleta, Bernalillo County, N. Mex.*, 2 poles east of mile pole 15, in the north end of the west abutment of steel-girder bridge A15 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 34 centimeters from the end of the coping stone. (Note 4.*)

U.S.G.S. 4891.—About 0.3 mile south of *Isleta, Bernalillo County, N. Mex.*, 2½ poles south of mile pole 13, 77 meters east of the center of the main line track of the Atchison, Topeka & Santa Fe Railway, 26.7 meters west of the center of the El Paso branch line track, 2 meters below grade of the latter, and 1.74 meters north of a stone post projecting 2 feet above ground. (Note 18,* unstamped.)

N_2.—At *Isleta, Bernalillo County, N. Mex.*, 13.1 meters east of the section foreman's house, 17.1 meters west of the center of the main line track of the Atchison, Topeka & Santa Fe Railway, and 28.7 meters north of the store of the Holmes Supply Co. (Note 11.*)

O_2.—2 miles north of *Isleta, Bernalillo County, N. Mex.*, 7 poles south of mile pole 913, in the west end of the south abutment of steel-girder bridge 818 of the Atchison, Topeka & Santa Fe Railway over the Rio Grande, 53 centimeters from the face and 38 centimeters from the end of the abutment. (Note 1.*)

U.S.G.S. 4902.—About 2.1 miles north of *Isleta, Bernalillo County, N. Mex.*, 2 poles south of mile pole 913, in the east end of the north abutment of steel-girder bridge 818 of the Atchison, Topeka & Santa Fe Railway over the Rio Grande, 50 centimeters from the face and 1.55 meters from the end of the abutment. (Note 5.*)

U. S. G. S. 4904.—About 3.2 miles north of *Isleta, Bernalillo County, N. Mex.*, 4 poles north of mile pole 912, 46 meters east of the center of the track of the Atchison, Topeka & Santa Fe Railway, 6.1 meters north of a Postal Telegraph pole, and 0.17 meters east of the railroad right-of-way fence, beside a highway. (Note 18,* stamped "11½.")

U. S. G. S. 4928.—7 miles south of *Albuquerque, Bernalillo County, N. Mex.*, 9 poles south of mile pole 909, 16.9 meters east of the center of the track of the Atchison, Topeka & Santa Fe Railway, 8 meters south of a road crossing, 1.17 meters east of the right-of-way fence, and 1.7 meters south of a Postal Telegraph pole. (Note 18,* stamped "8½.")

U. S. G. S. 4932.—About 3.2 miles south of *Albuquerque, Bernalillo County, N. Mex.*, 10½ poles south of mile pole 906, opposite a timber-treating plant of the railroad company, 15.5 meters west of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 32 centimeters west of the right-of-way fence. (Note 18,* stamped "5½.")

P_2.—At *Albuquerque, Bernalillo County, N. Mex.*, in the east front of the Alvarado Hotel, in the concrete wall at the south side of the entrance to the lunch room, 12 centimeters from the edge of the wall, and 68 centimeters above the sidewalk. (Note 1.*)

U. S. G. S. 4954.—At *Albuquerque, Bernalillo County, N. Mex.*, at the corner of Central Avenue and First Street, at the northwest corner of the grounds of the Alvarado Hotel; between the sidewalk and the street, 60 centimeters from the curbing of First Street, and 5.30 meters from the curbing of Central Avenue. (Note 18,* unstamped.)

Albuquerque Astro.—At *Albuquerque, Bernalillo County, N. Mex.*, in the southeast corner of the grounds of the Albuquerque Public Library, 1 meter from the stone wall surrounding the grounds, 3.5 meters from the curbing on West Central Avenue, and 4.0 meters from the curbing on North Edith Street. The mark is a bronze disk, stamped "Lat. 35° 05′ 01″, Long. 106° 38′ 30″," set in a stone post, 8 inches square, which is lettered "Azimuth Station."

U. S. G. S. 4951.—At *Albuquerque, Bernalillo County, N. Mex.*, at the southwest corner of the intersection of South Second Street and Coal Avenue, near the west end of the viaduct across the railroad tracks, 30 centimeters from the curbing on Coal Avenue, and 4.7 meters from the curbing on Second Street. (Note 18,* unstamped.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN EL RENO, OKLA., AND JERICHO, TEX., 1909.

T. B. M., 142.—At *El Reno, Canadian County, Okla.* (See Report for 1903, p. 779.)

B.—At *El Reno, Canadian County, Okla.* (See Report for 1903, p. 779.)

1357 El Reno.—At *El Reno, Canadian County, Okla.* (See Report for 1903, p. 779.)

City El Reno.—At *El Reno, Canadian County, Okla.* (See Report for 1903, p. 779.)

1327 Reno Junction.—At *Reno Junction, Canadian County, Okla.*, at the crossing of the Chicago, Rock Island & Pacific Railway and the (formerly so called) Choctaw, Oklahoma & Gulf Railway, 58.6 meters from the northeast intersection

* See pp. 162-166.

frog point measured southeasterly along the Chicago, Rock Island & Pacific Railway, 14.3 meters northeast of the center line of the tracks, and across a ditch from both railroads. (Note 18.*)

A_2.—At *Fort Reno, Canadian County, Okla.*, about ½ mile southwest of the Chicago, Rock Island & Pacific Railway station, at the northwest corner of the Fort Reno settlement, on the southwest corner of the southwest stone base supporting one of the steel columns of the high steel water tank. (Note 5.*)

B_2.—At *Calumet, Canadian County, Okla.*, about 100 meters west of the Chicago, Rock Island & Pacific Railway station and 19 meters north of the center line of the main track, on the top of the north retaining wall of concrete which supports the roadway leading into the elevator of the Farmer's Grain Co. (Note 4.*)

C_2.—About 7¼ miles west of *Calumet, Canadian County, Okla.*, 180 feet west of small timber bridge No. 5305 of the Chicago, Rock Island & Pacific Railway, 1¼ poles west of pole 530–15, on the west line of the highway at the crossing, 13.5 meters south of the center line of the main track. (Note 2.*)

D_2.—At *Geary, Blaine County, Okla.*, 70 meters west of the west end of the Chicago, Rock Island & Pacific Railway station, near west end of the triangular plot on which the railroad water tank stands, and 4.9 meters north of the center line of the main track. (Note 11.*)

E_2.—At *Geary, Blaine County, Okla.*, on the low stone window sill on the west side of the north, or main, face of the Geary Opera House. (Note 5.*)

F_2.—At *Geary, Blaine County, Okla.*, on a projecting foundation stone at the northwest corner of the north, or main entrance to the Geary public-school building. (Note 5.*)

G_2.—At *Geary, Blaine County, Okla.*, on the east corner of the northeast concrete foundation supporting one of the steel columns of the city water tank. (Note 4.*)

H_2.—About 3½ miles south of *Geary, Blaine County, Okla.*, 75 meters south of the south end of pile trestle No. 5385 of the Chicago, Rock Island & Pacific Railway, at the entrance to a cut, 15 meters west of the center line of the main track. (Note 2.*)

I_2.—About 7¼ miles southwest of *Geary, Blaine County, Okla.*, on the west end of the north concrete retaining wall supporting the embankment at the end of the steel bridge of the Chicago, Rock Island & Pacific Railway over South Canadian River. (Note 1.*)

J_2.—At *Bridgeport, Caddo County, Okla.*, about 240 meters east of the Chicago, Rock Island & Pacific Railway station, and 41.5 meters south of the center line of the main track, on the east property line of the extension of Main Street. (Note 2.*)

K_2.—About 2½ miles west of *Bridgeport, Caddo County, Okla.*, 400 feet west of the west end of pile trestle No. 5459 of the Chicago, Rock Island & Pacific Railway, 550 feet west of a highway crossing, directly opposite mile pole 546, and 18 meters south of the center line of the main track. (Note 2.*)

L_2.—At *McCool, Caddo County, Okla.*, 180 meters east of the temporary station of the Chicago, Rock Island & Pacific Railway, 15.9 meters south of the center line of the main track, just outside the right of way at the southwest property corner at the highway crossing. (Note 2.*)

M_2.—About 2 miles east of *Hydro, Caddo County, Okla.*, on the south end of the west concrete pier of plate-girder bridge No. 5526 of the Chicago, Rock Island & Pacific Railway over Deer Creek. (Note 4.*)

N_2.—At *Hydro, Caddo County, Okla.*, on the southwest corner of the red sandstone building at the northeast corner of Main and Caddo Streets, occupied in 1909 by the post office; set horizontally facing Main Street, 0.3 meter above the concrete sidewalk. (Note 1.*)

O_2.—At *Hydro, Caddo County, Okla.*, 55 meters west of the west end of the Chicago, Rock Island & Pacific Railway station and 4 meters north of the center line of the main track, near west end of gravel platform of station. (Note 11.*)

P_2.—About 2.2 miles west of *Hydro, Caddo County, Okla.*, on the north end of the west concrete abutment of plate-girder bridge No. 5568 of the Chicago, Rock Island & Pacific Railway over Deer Creek. (Note 4.*)

Q_2.—About 2.8 miles east of *Weatherford, Custer County, Okla.*, 400 feet west of the west end of pile-trestle bridge No. 5599 of the Chicago, Rock Island & Pacific Railway, 14.3 meters south of the center line of the main track, and directly opposite mile pole 560. (Note 2.*)

R_2.—At *Weatherford, Custer County, Okla.*, 44.9 meters west of the west end of the depot and 6.9 meters north of the center line of the main track of the Chicago, Rock Island & Pacific Railway, near the Broadway crossing. (Note 11.*)

S_2.—At *Weatherford, Custer County, Okla.*, at the southwest corner of Broadway and Main Streets, 0.4 meter above the sidewalk, in the stone foundation of the brick building occupied in 1909 by the First National Bank of Weatherford. (Note 1.*)

T_2.—About 2.6 miles west of *Weatherford, Custer County, Okla.*, near the middle of the fourth curve west of Weatherford station, on the Chicago, Rock Island & Pacific Railway, 3.5 meters below the top of the rail, in the center of the north spandrel wall of a reinforced concrete culvert. (Note 4.*)

U_2.—About 3.4 miles west of *Weatherford, Custer County, Okla.*, on the south end of the east concrete abutment of plate-girder bridge No. 5662 of the Chicago, Rock Island & Pacific Railway. (Note 4.*)

V_2.—About 4.8 miles west of *Weatherford, Custer County, Okla.*, on top of a cut on the divide between South Canadian and Washita Rivers, 10½ poles east of mile pole 568, 14 meters southwest of the center line of the main track, just inside the right of way of the Chicago, Rock Island & Pacific Railway. (Note 2.*)

W_2.—About 2 miles east of *Indianapolis, Custer County, Okla.*, 4 poles west of mile pole 571 on the Chicago, Rock Island & Pacific Railway, 13.4 meters south of the center line of the main track, on the west line of the north-and-south highway at the crossing on the curve. (Note 2.*)

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* See pp. 162–166.

X_2.—At *Indianapolis, Custer County, Okla.*, nearly opposite a large grain elevator, just inside the right of way of the Chicago, Rock Island & Pacific Railway, 44 meters southeast of a point on the center line of the main track which is 33 meters northeast of the center of the temporary railroad station. (Note 2.*)

Y_2.—About 3.8 miles west of *Indianapolis, Custer County, Okla.*, 650 feet southwest of the Chicago, Rock Island & Pacific Railway pile trestle No. 5768 over Turtle Creek, 32 meters northwest of the center line of the main track, on the north line of the east-and-west highway at the crossing near mile pole 577. (Note 2.*)

Z_2.—About 1.4 miles northeast of *Clinton, Custer County, Okla.*, 0.5 mile east of the crossing of the Chicago, Rock Island & Pacific Railway and the St. Louis & San Francisco Railroad, on the south end of the bridge seat of the east concrete abutment of the one-span steel bridge of the former railway over Washita River. (Note 1.*)

A_3.—At *Clinton, Custer County, Okla.*, directly opposite the north end of the St. Louis & San Francisco Railroad passenger station, 8.4 meters east of the center line of the main track. (Note 11.*)

B_3.—At *Clinton, Custer County, Okla.*, at the southwest corner of Frisco Avenue and Fifth Street, in the first stone above the Frisco Avenue sidewalk, on the west end of the brick and stone building of C. G. Welch. (Note 1.*)

C_3.—At *Clinton, Custer County, Okla.*, near the corner of Choctaw Avenue and Sixth Street, on the west corner of the southwest concrete pier supporting one of the four steel columns of the city water tower. (Note 4.*)

D_3.—About 1 mile north of *Clinton, Custer County, Okla.*, on the face of the north concrete abutment of the plate-girder bridge, on which the Kansas City, Mexico & Orient Railway crosses the Chicago, Rock Island & Pacific Railway, 1 meter above the tracks of the latter railway and 2 meters from the east face of the abutment. (Note 4.*)

E_3.—About 3 miles west of *Clinton, Custer County, Okla.*, just inside the right of way of the Chicago, Rock Island & Pacific Railway, 12 meters north of the center line of the main track, 110 meters west of private road crossing at top of the grade. (Note 2.*)

F_3.—About 2 miles northeast of *Parkersburg, Custer County, Okla.*, on the southeast one of the stone supports for the columns of the railroad water tank. (Note 5.*)

G_3.—At *Parkersburg, Custer County, Okla.*, 135 meters west of temporary railroad station, 17 meters south of the center line of the main track of the Chicago, Rock Island & Pacific Railway, at the west end of a cut, on the edge of a swamp. (Note 2.*)

H_3.—About 5.7 miles west of *Parkersburg, Custer County, Okla.*, 1 pole east of mile pole 591, at Alfalfa spur of the Chicago, Rock Island & Pacific Railway, just inside the road line near the railroad property corner, near the north-and-south road crossing, and 14 meters south of the center line of the main track at the east-and-west road crossing. (Note 2.*)

I_3.—At *Foss, Washita County, Okla.*, about 100 meters east of the Chicago, Rock Island & Pacific Railway station, 8 meters south of the center line of the main track, 45 meters east of the Adams Street crossing, in front of the Foss Mill & Elevator Co.'s buildings. (Note 11.*)

J_3.—At *Foss, Washita County, Okla.*, at the northwest corner of Adams and Main Streets, slightly above the sidewalk on a projecting basement stone at the southwest corner of the brick building of the Foss Mercantile Co. (Note 5.*)

K_3.—At *Foss, Washita County, Okla.*, near the west end of the Chicago, Rock Island & Pacific Railway passenger station, on the northeast corner of the east one of the two stone piers nearest the track, which support the columns of the railroad water tank. (Note 5.*)

L_3.—About 3.7 miles west of *Foss, Washita County, Okla.*, just inside the right of way of the Chicago, Rock Island & Pacific Railway, 2 poles west of mile pole 598, at the west end of a cut on the third curve west of Foss, and 14 meters south of the center line of the main track. (Note 2.*)

M_3.—At *Canute, Washita County, Okla.*, just inside the right of way of the Chicago, Rock Island & Pacific Railway, east of the section house, nearly opposite the east end of the railroad station, and 45 meters north of the center line of the main track. (Note 2.*)

N_3.—About 3.4 miles west of *Canute, Washita County, Okla.*, on the base of the southeast one of the four central stone piers supporting the wooden columns of the water tank belonging to the Chicago, Rock Island & Pacific Railway. (Note 5.*)

O_3.—About 1.6 miles east of *Elk City, Beckham County, Okla.*, near fence line on the east side of the road at a crossing 1 mile west of the Washita-Beckham County line road, 15 meters south of the center line of the main track of the Chicago, Rock Island & Pacific Railway. (Note 2.*)

P_3.—At *Elk City, Beckham County, Okla.*, on the right of way of the Chicago, Rock Island & Pacific Railway, 43.6 meters east of the east corner of the railroad station, and 17 meters southeast of the center line of the main track. (Note 11.*)

Q_3.—At *Elk City, Beckham County, Okla.*, at the southeast corner of Broadway and Main Streets, 0.7 meter above the sidewalk, in the water-table stone on the left side of the corner entrance to the Thurmond building, occupied by the First State Bank. (Note 1.*)

R_3.—At *Elk City, Beckham County, Okla.*, at the northwest corner of Jefferson and Broadway Streets, on the stone window sill near the sidewalk level on the south side of the building occupied by the German State Bank. (Note 5.*)

S_3.—About 5.0 miles southwest of *Elk City, Beckham County, Okla.*, just inside the right of way of the Chicago, Rock Island & Pacific Railway, at the northwest corner of the road crossing, at the highest point of the railroad between El Reno and Sayre, 14 meters north of the center line of the main track. (Note 2.*)

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* See pp. 162-166.

T_3.—At *Meritt, Beckham County, Okla.*, directly opposite the temporary station of the Chicago, Rock Island & Pacific Railway, 42 meters north of the center line of the main track, and just east of gate to private road. (Note 11.*)

U_3.—At *Doxey, Beckham County, Okla.*, on the south side of one of the stone piers supporting the columns of the Chicago, Rock Island & Pacific Railway water tank. This pier is the west one of the second row from the track. (Note 5.*)

V_3.—At *Doxey, Beckham County, Okla.*, 18.1 meters east of the east end of the Chicago, Rock Island & Pacific Railway station, and 10.7 meters north of the center line of the main track. (Note 2.*)

W_3.—About 1.2 miles east of the Chicago, Rock Island & Pacific Railway station at *Sayre, Beckham County, Okla.*, 10.5 meters south of the center line of the main track, and on the east line of the north-and-south road at crossing. (Note 2.*)

X_3.—About 0.7 mile east of the station at *Sayre, Beckham County, Okla.*, in the center of the top of the south spandrel wall of a small concrete culvert on the Chicago, Rock Island & Pacific Railway. (Note 4.*)

Y_3.—At *Sayre, Beckham County, Okla.*, at the southwest corner of Main and Fourth Streets, 1 decimeter above the Main Street sidewalk, on the base stone near center of the north face of the Thurmond Block, the corner room of which is occupied by the First State Bank. (Note 1.*)

Z_3.—At *Sayre, Beckham County, Okla.*, just west of the Chicago, Rock Island & Pacific Railway dining house, directly across from the coal chutes at the depot, 45 meters south of the center line of the main track, on the south fence line of an east-and-west road. (Note. 11.*)

A_4.—About 4.1 miles west of the Chicago, Rock Island & Pacific Railway station at *Sayre, Beckham County, Okla.*, 4 poles west of mile pole 631, near a private road crossing, at the west end of the first sizeable sandy cut west of Cane Mill Spur, 15 meters north of the center line of the track. (Note 2.*)

B_4.—At *Hext Ranch, Beckham County, Okla.*, 45 meters north of the center line of the main track of the Chicago, Rock Island & Pacific Railway, and 115 meters west of the northwest property corner at the road crossing near the cotton gin. (Note 2.*)

C_4.—About 2.0 miles east of *Erick, Beckham County, Okla.*, just inside the right of way at east end of a sandy cut on the Chicago, Rock Island & Pacific Railway, 1 pole west of mile pole 639, 14 meters north of the center line of the main track. (Note 2.*)

D_4.—At *Erick, Beckham County, Okla.*, at the corner of Main and Broadway Streets, on the east face of the First State Bank building, in a base stone to the left of the corner entrance, 1 decimeter above the sidewalk. (Note 1.*)

E_4.—At *Erick, Beckham County, Okla.*, 130 meters west of the ticket office in the Chicago, Rock Island & Pacific Railway station, 75 meters west of the Main Street crossing, 12.8 meters north of the center line of the main track in line with the telegraph poles. (Note 11.*)

F_4.—About 2.6 miles west of *Erick, Beckham County, Okla.*, 14 meters north of the center line of the main track of the Chicago, Rock Island & Pacific Railway, just inside the right of way, at the northwest intersection at the highway crossing. (Note 2.*)

G_4.—At *Texola, Beckham County, Okla.*, 650 feet east of the ticket office in the Chicago, Rock Island & Pacific Railway station, 315 feet east of the road crossing, 10.9 meters north of the center line of the main track, in line with the telegraph poles and just west of the section house. (Note 11.*)

H_4.—At *Texola, Beckham County, Okla.*, on the east end of the concrete foundation of the Chicago, Rock Island & Pacific Railway station, 1.15 meters from the southeast corner of the building, 0.25 meter above the ground, and 1.2 meters below the top of the window sill. (Note 1.*)

H_9.—At *Benonine, Wheeler County, Tex.*, on the right-of-way fence line of the Chicago, Rock Island & Pacific Railway, 12 meters north of the center line of the main track, just even with the signboard "Benonine," opposite the gates of the stock pens. (Note 2.*)

I_9.—At *Fuller, Wheeler County, Tex.*, on the right of way of the Chicago, Rock Island & Pacific Railway, 24 meters north of the center line of the main track, just even with the signboard "Fuller," just east of the section house, and about 0.7 meter above the track. (Note 11.*)

J_9.—About 3.8 miles east of *Shamrock, Wheeler County, Tex.*, just inside the right of way of the Chicago, Rock Island & Pacific Railway, 14.2 meters north of the center line of the main track, at the northwest property corner of the highway crossing near the signboard. (Note 2.*)

K_9.—At *Shamrock, Wheeler County, Tex.*, nearly opposite the west end of the Chicago, Rock Island & Pacific Railway station, 26 meters south of the center line of the main track, 0.3 meter above the rails. (Note 11.*)

L_9.—At *Shamrock, Wheeler County, Tex.*, at the northwest corner of Main and Second Streets, 1 decimeter above the sidewalk, in the base stone on the east side of the First National Bank Building. (Note 1.*)

M_9.—About 3.5 miles west of *Shamrock, Wheeler County, Tex.*, at the top of the grade between Shamrock and Lela, on the Chicago, Rock Island & Pacific Railway, 1½ poles west of mile pole 668, 14.3 meters south of the center line of the main track near the line fence between the railroad right of way and an east-and-west highway. (Note 2.*)

N_9.—At *Lela* (formerly *Story*), *Wheeler County, Tex.*, 72 meters west of the Chicago, Rock Island & Pacific Railway station, 12.2 meters north of the center line of the main track, and just west of the crossing signboard. (Note 11.*)

O_9.—About 3.1 miles northeast of *Ramsdell, Wheeler County, Tex.*, just inside the right of way of the Chicago, Rock Island & Pacific Railway, on a small ridge near an abandoned road crossing, 2 poles northeast of pole 673-20, and 14 meters northwest of the center line of the main track. (Note 2.*)

See pp. 162-166.

P_9.—At *Ramsdell, Wheeler County, Tex.*, inside the right of way of the Chicago, Rock Island & Pacific Railway, in line with the east highway fence at the road crossing, 440 feet east of the ticket office in the railroad station, and 30 meters north of the center line of the main track. (Note 11.*)

Q_9.—At *Ramsdell, Wheeler County, Tex.*, on the west end of the concrete foundation of the Chicago, Rock Island & Pacific Railway station, 0.3 meter below the top and 0.6 meter from the northwest corner. (Note 1.*)

R_9.—About 6.0 miles west of *Ramsdell, Wheeler County, Tex.*, 2 poles east of pole 682–25, on the Chicago, Rock Island & Pacific Railway, 13.3 meters south of the center line of the main track, and about 0.25 meter east of the Wheeler-Gray County fence line. (Note 2.*)

S_9.—At *McLean, Gray County, Tex.*, on the east wall of the concrete foundation of the Chicago, Rock Island & Pacific Railway station, 0.3 meter below the top and 0.2 meter from the northeast corner. (Note 1.*)

T_9.—At *McLean, Gray County, Tex.*, at the northeast corner of Main and First Streets, on the building occupied by the Citizens State Bank of McLean. It is to the left of the entrance on the southwest corner, 1.4 meters above the sidewalk. (Note 1.*)

U_9.—About 3.9 miles southwest of *McLean, Gray County, Tex.*, inside the right of way at the southwest end of a cut on a curve on the Chicago, Rock Island & Pacific Railway, 2½ poles southwest of mile pole 691, 14.3 meters northwest of the center line of the main track. (Note 2.*)

V_9.—About 1.5 miles northeast of *Alanreed, Gray County, Tex.*, just outside the right of way at the south end of a cut on the Chicago, Rock Island & Pacific Railway, 2 poles north of pole 694–15, 16 meters east of the center line of the main track, and to the west of the highway. (Note 2.*)

W_9.—At *Alanreed, Gray County, Tex.*, 21.2 meters south of a point on the center line of the main track of the Chicago, Rock Island & Pacific Railway, which is 10.7 meters east of the railroad station, 1.2 meters above the main tracks, and just north of the highway. (Note 11.*)

X_9.—At *Alanreed, Gray County, Tex.*, at the northwest corner of Main Street and Second Avenue, on the brick building occupied by the Bank of Alanreed. It is on the southwest corner of the building, to the left of the entrance, and 0.3 meter above the sidewalk. (Note 1.*)

Y_9.—About 3.0 miles southwest of *Alanreed, Gray County, Tex.*, at the north end of the curve in the cut on the Chicago, Rock Island & Pacific Railway, ½ pole north of mile pole 699, 15 meters west of the center line of the main track, and just east of the public highway, which follows the divide. (Note 2.*)

Z_9.—At *Rockledge, Donley County, Tex.*, 60 meters south of the center line of the main track of the Chicago, Rock Island & Pacific Railway, even with and across the tracks from the signboard "Rockledge," at the north fence line of the highway which follows the divide. (Note 2.*)

A_{10}.—About 3.5 miles east of *Jericho, Donley County, Tex.*, just outside the right of way near the west end of the curve at the top of the grade on the Chicago, Rock Island & Pacific Railway, 1 pole east of pole 704–15, 15 meters south of the center line of the main track, and about 40 meters north of the highway which follows the divide. (Note 2.*)

B_{10}.—At *Jericho, Donley County, Tex.*, on the right-of-way property line of the Chicago, Rock Island & Pacific Railway, 60 meters west of the railroad station, 29.7 meters south of the center line of the main track. (Note 11.*)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN FORT WORTH AND EL PASO, TEX., 1910.

T.—At *Fort Worth, Tarrant County, Tex.* (See Report for 1903, p. 782.)

U.—At *Fort Worth, Tarrant County, Tex.* (See Report for 1903, p. 783.)

V.—At *Fort Worth, Tarrant County, Tex.* (See Report for 1903, p. 783.)

M_3.—At *Fort Worth, Tarrant County, Tex.* (See Report for 1903, p. 787.)

C_{10}.—At *Fort Worth, Tarrant County, Tex.*, on the Hill Street concrete viaduct, over the Texas & Pacific and the Frisco Line railway tracks, 1.1 miles west of the Union Passenger station, on the east face of the north side of the arch over the main-line track of the Texas & Pacific Railway, 1.45 meters above the ground and 0.36 meter from the south edge of the face of the arch. (Note 1.*)

D_{10}.—2.1 miles west of *Fort Worth, Tarrant County, Tex.*, on the highway bridge carrying the Fort Worth and Weatherford road over the Clear Fork of the Trinity River, on the top of the south wing wall of the east concrete abutment, about 0.20 meter from the footplate of the truss. This bridge is about 35 meters north of the Texas & Pacific Railway bridge 249–A over the same stream. (Note 1.*)

E_{10}.—About 4.5 miles west of *Fort Worth, Tarrant County, Tex.*, and midway between the Texas & Pacific Railway track and the center of the Fort Worth and Weatherford highway, 0.5 meter inside and south of the railroad's right-of-way fence and 1.5 meters inside and east of the fence of the first byroad that crosses the track west of the siding for the Fort Worth waterworks pumping station. (Note 2.*)

F_{10}.—About 1.4 miles east of *Benbrook, Tarrant County, Tex.*, on the middle pier of the Texas & Pacific Railway plate-girder bridge 254–C over Marys Creek, on the top of the coping of the north end of the pier, and approximately in the center of the stone. (Note 5.*)

G_{10}.—At *Benbrook, Tarrant County, Tex.*, on land belonging to Mr. C. W. Carpenter, at the turn of the Fort Worth and Weatherford highway, just across the road and south of the Texas & Pacific Railway stock pens, about 50 meters south of the main-line track, and 0.75 meter south and 0.75 meter west of the highway fence. (Note 11.*)

H_{10}.—About 2.8 miles west of *Benbrook, Tarrant County, Tex.*, on the Texas & Pacific Railway plate-girder bridge 258–B over Walnut Creek, on top of the north end of the east masonry abutment. (Note 1.*)

See pp. 162–166.

I_{10}.—At *Iona, Parker County, Tex.*, about 130 meters west of the section house, 15 meters south of the west end of the siding, and 1 meter north of the fence between the railroad right of way and the county road. (Note 2.*)

J_{10}.—At *Aledo, Parker County, Tex.*, on land belonging to Mr. J. J. Sears and in use as a public park, about midway of the south side of the park, and 1 meter north of the boundary fence. (Note 11.*)

K_{10}.—At *Aledo, Parker County, Tex.*, on the west side of the entrance of the stone building owned by Mr. J. J. Sears, and occupied by his general merchandise store, and 2 meters above the sidewalk. (Note 1.*)

L_{10}.—About 1.7 miles west of *Aledo, Parker County, Tex.*, on the Texas & Pacific Railway bridge 266C over Clear Creek, on top of the highest course of the east masonry abutment, and in line with the west girder. (Note 4.*)

M_{10}.—About 2.8 miles west of *Aledo, Parker County, Tex.*, on the Texas & Pacific Railway bridge 267C over the Clear Fork of the Trinity River, on the top of the eastern abutment, and in line with the south girder. (Note 16.*)

N_{10}.—About 0.4 mile west of *Anneta, Parker County, Tex.*, on the Texas & Pacific Railway bridge 270B over Burgess Creek, on the stone coping, at the northern end of the eastern abutment, and on a level with the bottom of the girder. (Note 16.*)

O_{10}.—About 0.5 mile east of *Earls, Parker County, Tex.*, on Texas & Pacific Railway bridge 273A over the Clear Fork of the Trinity River on top of the northern end of the western abutment. (Note 16.*)

P_{10}.—At *Earls, Parker County, Tex.*, on the Texas & Pacific Railway right of way, midway of a switch, and 1 meter north of the south fence. (Note 2.*)

Q_{10}.—About 2.5 miles east of *Weatherford, Parker County, Tex.*, on the Texas & Pacific Railway bridge 275B over the Clear Fork of the Trinity River, on the south end of the east abutment, 0.2 meter from the corner of the stone, and 6 meters from the center of the track. (Note 4.*)

R_{10}.—At *Weatherford, Parker County, Tex.*, 0.6 mile east of the Texas & Pacific Railway depot, on the Texas & Pacific Railway bridge 277–C over the Clear Fork of the Trinity River, 0.2 meter north of the south end of the east masonry pier, 1 meter below the rail, and 3 meters from the center of the track. (Note 4.*)

S_{10}.—At *Weatherford, Parker County, Tex.*, on Parker County courthouse, 1.1 meters south of the northeast cornerstone, 1 meter from the ground. (Note 1.*) Probably destroyed in rebuilding the courthouse.

T_{10}.—At *Weatherford, Parker County, Tex.*, in the northwest corner of the Texas & Pacific Railway park, 11 meters from the center of the main line of the railway, and 16 meters east of the northeast corner of the railway depot. (Note 11.*)

U_{10}.—About 1.4 miles west of *Weatherford, Parker County, Tex.*, on the Texas & Pacific Railway bridge 279A over the Clear Fork of the Trinity River, on top of the north end of the east masonry pier, 0.85 meter from the center of the north girder, and 1 meter below the rail. (Note 4.*)

V_{10}.—About 3 miles west of *Weatherford, Parker County, Tex.*, at the crossing of the Texas & Pacific Railway and the Weatherford-Mineral Wells county road, on the west side of the road, and on the north line of the railway right of way. (Note 2.*)

W_{10}.—At *Lambert, Parker County, Tex.*, in the southwest corner of the section-house yard, on the Texas & Pacific Railway property, on the north side of the track, and east of the main road crossing of the railway. (Note 2.*)

X_{10}.—About 4 miles east of *Millsap, Parker County, Tex.*, on the Texas & Pacific Railway right of way, 12 meters north of the track, and 2 meters west of the west fence of the road that crosses the track at this point. (Note 2.*)

Y_{10}.—At *Millsap, Parker County, Tex.*, on the Texas & Pacific Railway right of way, south of the track, west of the main road that crosses the track west of the depot, and 1 meter from the railway fence. (Note 11.*)

Z_{10}.—About 2.5 miles west of *Millsap, Parker County, Tex.*, on the Texas & Pacific Railway bridge 294B over Rock Creek, on the west concrete abutment, 0.3 meter below the rail, and 1.5 meter north of the center of the track (Note 4.*)

A_{11}.—At *Bennetts, Parker County, Tex.*, 13 meters south of the Texas & Pacific Railway main-line track at the station. (Note 11.*)

B_{11}.—About 1.5 miles east of *Brazos, Palo Pinto County, Tex.*, on the Texas & Pacific Railway right of way, 1 meter north of the south fence and 1 meter west of the fence on the west side of the road that crosses the track at this point and 19 meters west of bridge 300A. (Note 2.*)

C_{11}.—About 0.7 mile east of *Brazos, Palo Pinto County, Tex.*, on the Texas & Pacific Railway bridge 301A, on the south end of the east abutment wall, 0.2 meter below the rail. (Note 4.*)

D_{11}.—At *Brazos, Palo Pinto County, Tex.*, in front of the depot, 1 meter south of the north fence, on the Texas & Pacific Railway right of way. (Note 2.*)

E_{11}.—About 3.0 miles east of *Santo, Palo Pinto County, Tex.*, on the Texas & Pacific Railway bridge 305B over Palo Pinto Creek, on the north end of the west abutment, 0.2 meter north of the northwest corner of the footplate of the truss. (Note 4.*)

F_{11}.—About 0.7 mile east of *Santo, Palo Pinto County, Tex.*, on the Texas & Pacific Railway bridge 308A over Sunday Creek, on top of the north end of the east abutment, 1.6 meters below the rail at the end of the truss. (Note 4.*)

G_{11}.—At *Santo, Palo Pinto County, Tex.*, on the north side of the main-line track, 90 meters west of the depot and 1 meter from the corner of the right-of-way fence. (Note 11.*)

H_{11}.—About 3.9 miles east of *Santo, Palo Pinto County, Tex.*, on the Texas & Pacific Railway right of way, 465 feet west of a siding and 1 meter south of the fence between the railway and the county road. (Note 2.*)

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* See pp. 162–166.

I_{11}.—At *Judd, Palo Pinto County, Tex.*, on the Texas & Pacific Railway right of way, 1 meter south of the fence between the right of way and the county road and about 15 meters east of the station. (Note 2.*)

J_{11}.—About 1.9 miles east of *Gordon, Palo Pinto County, Tex.*, on the Texas & Pacific Railway bridge 317E over Bartons Creek, on top of the coping stone on the south end of the west abutment, 4.3 meters from the center of the track and 0.8 meter below the rail. (Note 4.*)

K_{11}.—At *Gordon, Palo Pinto County, Tex.*, 38 meters east of the center of the depot, on the east line of Locust Street. (Note 11.*)

L_{11}.—About 1 mile east of *Mingus, Palo Pinto County, Tex.*, north of the main-line track of the Texas & Pacific Railway and 1 meter south of the right-of-way fence. (Note 11.*)

M_{11}.—At *Mingus, Palo Pinto County, Tex.*, on the east face of the concrete water table of the center pillar supporting the porch roof of the Texas & Pacific Railway depot and 3 feet from the ground. (Note 1.*)

N_{11}.—About 1.4 miles west of *Mingus, Palo Pinto County, Tex.*, on the Texas & Pacific Railway bridge 324A over the South Fork of Palo Pinto Creek, on the north end of the east abutment 3.5 meters from the center of the track and 1 meter below the rail. (Note 4.*)

O_{11}.—At *Strawn, Palo Pinto County, Tex.*, on the north side of the Texas & Pacific Railway track in line with the telegraph poles, 530 meters east of the depot and 1 meter east of the fence to the cattle guard. (Note 2.*)

P_{11}.—At *Strawn, Palo Pinto County, Tex.*, on the north side of the Texas & Pacific Railway track, 394 meters west of the depot, 7 meters west of a pile culvert and 1 meter from the right-of-way fence. (Note 11.*)

Q_{11}.—About 2.3 miles west of *Strawn, Palo Pinto County, Tex.*, on the northeast corner of the southeast concrete footing of the Texas & Pacific Railway water tank. (Note 16.*)

R_{11}.—About 4.1 miles west of *Strawn, Palo Pinto County, Tex.*, on the Texas & Pacific Railway bridge 331A on top of the east abutment in the center of the track and 1 meter below the rail. (Note 4.*)

S_{11}.—About 0.9 mile east of *Wiles, Stevens County, Tex.*, on the Texas & Pacific Railway bridge 333D, on top of the south end of the east abutment. (Note 4.*)

T_{11}.—At *Wiles, Stevens County, Tex.*, north of the track at the Texas & Pacific Railway station, on the railway right of way, 1 meter from the north fence. (Note 2.*)

U_{11}.—About 0.7 mile west of *Wiles, Stevens County, Tex.*, on the Texas & Pacific Railway bridge 335A over the North Fork of Palo Pinto Creek, on the north end of the west abutment, 0.1 meter from the west end of the abutment, 0.65 meter from the north side of the abutment, and 1.6 meters below the rail. (Note 4.*)

V_{11}.—About 2.0 miles east of *Tiffin, Eastland County, Tex.*, on the Texas & Pacific Railway bridge 337D over the canyon of the North Fork of Palo Pinto Creek, on top of the coping of the fourth stone pier from the west end, 0.20 meter from the south end, and 0.57 meter from the west side of the pier, 2.0 meters from the center of the track, and 2.1 meters below the rail. (Note 16.*)

W_{11}.—At *Tiffin, Eastland County, Tex.*, on the west side of the main line of the Texas & Pacific Railway, 2 meters east of the right-of-way fence. (Note 2.*)

X_{11}.—At *Ranger, Eastland County, Tex.*, 5.58 meters northeast of the Texas & Pacific Railway depot, on the west side of the main-line track, 2 meters from the right-of-way fence. (Note 11.*)

Y_{11}.—At *Ranger, Eastland County, Tex.*, on the Texas & Pacific Railway depot, about 3 meters north of the southeast corner of the building and 1.3 meters above the ground. (Note 1.*)

Z_{11}.—About 1.0 mile west of *Ranger, Eastland County, Tex.*, on the west side of the track, 15 meters from the center of the main line of the Texas & Pacific Railway and 2.0 meters from the county-road fence. (Note 2.*)

A_{12}.—About 4.2 miles west of *Ranger, Eastland County, Tex.*, 90 meters west of the Texas & Pacific Railway culvert 346A, 12 meters west of the center of the main track and on line with the right-of-way fence. (Note 2.*)

B_{12}.—At *Olden, Eastland County, Tex.*, on the Texas & Pacific Railway right of way, west of the road crossing at the west end of the switch on the north side of the main line, 6 meters from the center of the track and 3 meters west of the cattle guard. (Note 2.*)

C_{12}.—About 2.0 miles east of *Eastland, Eastland County, Tex.*, on the west side of a public highway, 7 meters south of the main line of the Texas & Pacific Railway and 1 meter east of the western cattle guard. (Note 2.*)

D_{12}.—At *Eastland, Eastland County, Tex.*, at the west end of the old depot in the city park north of the Texas & Pacific Railway, 33 meters from the main road at the east side of the park, 46 meters from the main line of the railway, and 1 meter from the south fence of the park. (Note 11.*)

E_{12}.—About 2.6 miles west of *Eastland, Eastland County, Tex.*, on the north side of the main-line track of the Texas & Pacific Railway, on the railway right of way, 16 meters east of bridge 354D, and 1 meter from the fence. (Note 2.*)

F_{12}.—At *Lem, Eastland County, Tex.*, 16 meters north of the main line of the Texas & Pacific Railway at the station. (Note 2.*)

G_{12}.—At *Cisco, Eastland County, Tex.*, on the masonry between the doors of the Cisco Banking Co.'s bank building, 20 inches above the sidewalk, and 12 inches south of the north door. (Note 4.*)

H_{12}.—At *Cisco, Eastland County, Tex.*, at the north end of the park east of the station, west of the Texas Central Railroad, and south of the Texas & Pacific Railway. (Note 11.*)

I_{12}.—About 4.4 miles west of *Cisco, Eastland County, Tex.*, on the south side of the track, 10 meters west of bridge 366A over a byroad, 14 meters from the center of the track and in line with the right-of-way fence. (Note 2.*)

See pp. 162-166.

Lamb △.—About 2 miles east of *Dothan, Eastland County, Tex.*, 2 miles south and 5 miles west of Cisco, 1 mile south of the old Base Line public road, on one of the highest points of an extensive plateau. It is on the property of J. J. Livingston in a grove of low oak trees just to the east of a north-and-south road. The south gable of J. F. Lamb's house is distant about 120 meters in azimuth 158° 12′, and the east chimney of Livingston's house 78 meters in azimuth 356° 28′. The bench mark is the surface mark of a Coast and Geodetic Survey triangulation station and is marked by the point of a 40-penny nail projecting ¼ inch above the concrete that fills an iron pipe 1½ inches in diameter, which in turn is embedded in a cylinder of concrete 20 inches in diameter.

Lamb Ref. Mark.—About 2 miles east of *Dothan, Eastland County, Tex.*, 21.1 meters in azimuth 105° 24′ from Lamb △ described above, and 0.40 meter east of the fence line on the east side of the road. The mark is the point of a 40-penny nail projecting ¼ inch above the concrete that fills an iron pipe 1½ inches in diameter, which in turn is embedded in a cylinder of concrete 12 inches in diameter.

J_{12}.—At *Dothan, Eastland County, Tex.*, 180 meters west of the depot on the north side of the Texas & Pacific Railway track, and 1 meter from the fence between the railroad right of way and the county road. (Note 11.*)

K_{12}.—About 3.3 miles east of *Putnam, Callahan County, Tex.*, on the Texas & Pacific Railway right of way, 15 meters north of the center of the track on the east side of the county road that crosses the track at this point. (Note 2.*)

L_{12}.—At *Putnam, Callahan County, Tex.*, 3 meters from the southwest corner of the square containing the mineral wells of the Putnam Mineral Water Co., 46 meters from the main line of the Texas & Pacific Railway, and 26.95 meters from southeast corner of the Farmers' State Bank Building. (Note 11.*)

M_{12}.—At *Putnam, Callahan County, Tex.*, on the Farmers' State Bank, 1.70 meters west of the southeast corner, and 0.55 meter above the sidewalk. (Note 4.*)

N_{12}.—About 2.5 miles west of *Putnam, Callahan County, Tex.*, on the Texas & Pacific Railway right of way, 15 meters south from the center of the track, and west of the county road that crosses the track at this point. (Note 2.*)

O_{12}.—At *Chautauqua, Callahan County, Tex.*, on the Texas & Pacific Railway right of way, 19 meters south of the center of the main-line track at the station, and 1 meter from the fence. (Note 11.*)

P_{12}.—About 2.9 miles west of *Chautauqua, Callahan County, Tex.*, on the Texas & Pacific Railway bridge 384A, over Mexia Creek, 0.25 meter from the north end and 0.20 meter from the east side of the east abutment. (Note 16.*)

Q_{12}.—About 1.8 miles east of *Baird, Callahan County, Tex.*, on the Texas & Pacific Railway bridge 385A, over Mexia Creek, on top of the north end of the east abutment. (Note 4.*)

R_{12}.—At *Baird, Callahan County, Tex.*, near the southwest corner of the station park east of the depot. (Note 11.*)

S_{12}.—At *Baird, Callahan County, Tex.*, on the south face of the southeast corner stone of the Callahan County courthouse, 3 feet from the ground. (Note 1.*)

T_{12}.—About 3 miles west of *Baird, Callahan County, Tex.*, on the Texas & Pacific Railway right of way, 9 meters north of the track, 2 meters east of the line fence running north, and 18 meters from a double oak tree in the county road. (Note 2.*)

U_{12}.—At *Clyde, Callahan County, Tex.*, on the Texas & Pacific Railway right of way, 15 meters north of the center of the track and 97 meters east of the depot. (Note 11.*)

V_{12}.—About 3 miles west of *Clyde, Callahan County, Tex.*, 11 meters south of the center of the Texas & Pacific Railway track, and just west of the county road that crosses the track at this point. (Note 2.*)

W_{12}.—At *Elmdale, Taylor County, Tex.*, 15 meters north of the center of the Texas & Pacific Railway track, on the west line of the county road running north, and 1 meter from the right-of-way fence. (Note 11.*)

X_{12}.—At *Abilene, Taylor County, Tex.*, on the south end of the east abutment of the overhead crossing of the Texas & Pacific Railway over the Wichita Valley Railroad, 36 meters from the center of the track, and 1 meter below the rail. (Note 4.*)

Y_{12}.—At *Abilene, Taylor County, Tex.*, near the southwest corner of the south steps of the United States Weather Bureau Building. (Note 11.*)

Z_{12}.—At *Abilene, Taylor County, Tex.*, on the main building of Christian College, on the top course of stone of the masonry of the porch, east of the steps, and 0.87 meter above the ground. (Note 4.*)

A_{13}.—At *Abilene, Taylor County, Tex.*, 1.1 miles west of the Texas & Pacific Railway depot, 12 meters south of the track. (Note 2.*)

B_{13}.—About 5 miles west of *Abilene, Taylor County, Tex.*, on the north side of the Texas & Pacific Railway track and west of the county road that crosses the railroad at this point. (Note 2.*)

C_{13}.—At *Tye, Taylor County, Tex.*, in the northeast corner of the yard of the section foreman's house belonging to the Texas & Pacific Railway, 8 meters south of the center of the main-line track. (Note 11.*)

D_{13}.—At *Tye, Taylor County, Tex.*, 225 meters west of the Texas & Pacific Railway depot, 14 meters north of the track and just west of a road which crosses the track. (Note 2.*)

E_{13}.—About 4.2 miles east of *Merkel, Taylor County, Tex.*, in the county road, 2 meters from the railway right-of-way fence, on the north side of the Texas & Pacific Railway at milepost 419. (Note 2.*)

F_{13}.—At *Merkel, Taylor County, Tex.*, on top of the southwest side of the circular concrete foundation of the Texas & Pacific Railway water-filtering tower, and about 6 inches above the ground. (Note 4.*)

G_{13}.—At *Merkel, Taylor County, Tex.*, at the northeast corner of Front and Kent Streets, on the south face of the corner stone at the southwest corner of a stone building belonging to Dr. Adkissen, and 1.3 meters above the sidewalk. (Note 4.*)

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* See pp. 162-166.

H_{13}.—At *Merkel, Taylor County, Tex.*, in front of the section foreman's house, 10 meters north of the main line of the Texas & Pacific Railway and just west of a road that crosses the track. (Note 11.*)

I_{13}.—About 2.5 miles west of *Merkel, Taylor County, Tex.*, on the Texas & Pacific Railway right of way, 14 meters north of the center of the track, 85 meters east of milepost 426, just west of a byroad crossing, and 2 meters from the fence of a county road paralleling the railway. (Note 2.*)

J_{13}.—At *Trent, Taylor County, Tex.*, on the Texas & Pacific Railway right of way, 33 meters west of the center of the depot, 14 meters north of the main line of the railway, and on the west line of the main street of the town. (Note 11.*)

K_{13}.—At *Trent, Taylor County, Tex.*, 62.0 meters west of the Texas & Pacific Railway depot, beside the track of the county road, and 1 meter outside the railway right-of-way fence at milepost 430. (Note 2.*)

L_{13}.—About 4 miles east of *Eskota, Fisher County, Tex.*, on the Texas & Pacific Railway right of way, south of the track at milepost 434 and 1 meter from the county-road fence. (Note 2.*)

M_{13}.—At *Eskota, Fisher County, Tex.*, on the Texas & Pacific Railway right of way, 349 meters west of the depot, 12 meters north of the track, and just inside the county-road fence. (Note 11.*)

N_{13}.—About 4.9 miles east of *Sweetwater, Nolan County, Tex.*, on the Texas & Pacific Railway bridge 443–C over Sweetwater Creek, on the south end of the east abutment at the level of the bridge seat, 1.45 meters below the rail, and 3.3 meters from the center of the track. (Note 4.*)

O_{13}.—About 4 miles east of *Sweetwater, Nolan County, Tex.*, on the east face of the west abutment of the Santa Fe Railway bridge over Sweetwater Creek near the overhead crossing of the Texas & Pacific Railway, 1.3 meters above the ground and 0.5 meter from the south end of the abutment. (Note 1.*)

P_{13}.—At *Sweetwater, Nolan County, Tex.*, in the southwest corner of the yard of the Nolan County courthouse, 32.6 meters from the southwest corner of the courthouse, and 4 paces from each of two trees in the southwest corner of the yard. (Note 11.*)

Q_{13}.—At *Sweetwater, Nolan County, Tex.*, on the west abutment of the overhead crossing of the Texas & Pacific Railway over the Kansas City, Mexico & Orient Railway, 0.80 meter from the south end of the abutment, 3.4 meters from the center of the Texas & Pacific Railway track, and 1.04 meters below the rail. (Note 4.*)

R_{13}.—About 3.6 miles west of *Sweetwater, Nolan County, Tex.*, on the Texas & Pacific Railway right of way, at the top of the first long, steep grade west of Sweetwater, and 12 meters south of the center of the track. (Note 2.*)

S_{13}.—At *Roscoe, Nolan County, Tex.*, 125 meters northwest of the Texas & Pacific Railway depot, 1 block east of the Roscoe-Snyder road, 1 meter east of the east line of a street running north and south, and 0.4 meter from the north end of the street. (Note 11.*)

T_{13}.—At *Roscoe, Nolan County, Tex.*, at the northeast corner of First and Cypress Streets, 2 blocks west and 1 block south of the Texas & Pacific Railway depot, on the west side of Lipscomb & Davis's store, 1.78 meters from the southwest corner, and 0.40 meter above the sidewalk. (Note 4.*)

Patterson △.—About 4 miles north of *Roscoe, Nolan County, Tex.*, on the farm of A. A. Patterson, who lives ¾ mile north of the bench mark. It is 9.8 meters to the north edge of the main east-and-west road, 700 meters east of the southwest corner of Patterson's property and between two of his tenant houses. The station is the surface mark of a Coast and Geodetic Survey triangulation station and is marked by the point of a 40-penny nail projecting ¼ inch above the concrete that fills an iron pipe 1½ inches in diameter, which in turn is embedded in a cylinder of concrete 20 inches in diameter.

U_{13}.—About 3 miles west of *Roscoe, Nolan County, Tex.*, on the Texas & Pacific Railway right of way, 12 meters south of the track at milepost 459, and 1 meter from the fence of the county road paralleling the railroad. (Note 2.*)

V_{13}.—1 mile east of *Loraine, Mitchell County, Tex.*, on the Texas & Pacific Railway right of way, 75 meters west of the first culvert out of Loraine, 13 meters north of the center of the track, and 1 meter from the fence. (Note 2.*)

W_{13}.—At *Loraine, Mitchell County, Tex.*, on the Texas & Pacific Railway right of way, 144 meters west of the depot, 14 meters north of the center of the track, and 2 meters from the corner of the fence for the cattle guard. (Note 11.*)

X_{13}.—At *Loraine, Mitchell County, Tex.*, on the Texas & Pacific Railway right of way, at the third telegraph pole west of milepost 467, 0.8 kilometer west of the depot, 10 meters south of the track and just west of a road crossing. (Note 2.*)

Y_{13}.—About 3.5 miles east of *Colorado, Mitchell County, Tex.*, on the Texas & Pacific Railway right of way, 11 meters east of the sixth telegraph pole west of milepost 472, just east of a road crossing, and 10 meters north of the center of the track. (Note 2.*)

Z_{13}.—At *Colorado, Mitchell County, Tex.*, 135 meters east of the dwelling house of the Texas & Pacific Railway section foreman, on top of the south retaining wall of a reinforced concrete culvert over a dry ravine, 1 meter from the west end of the wall, 6 meters from the center of the track, and 0.4 meter below the rail. (Note 13.*)

A_{14}.—At *Colorado, Mitchell County, Tex.*, in the northeast corner of the yard of the Mitchell County courthouse; 5.2 meters from the northeast corner of the courthouse, 1.26 meters west and 1.80 meters south of the inside of a cement walk, and 1.7 meters from a poplar tree in the yard. (Note 11.*)

B_{14}.—At *Colorado, Mitchell County, Tex.*, on the Texas & Pacific Railway bridge, 476–D over the Colorado River, on top of the concrete pier at the east end of the truss, 0.4 meter from the west end of the pier, in the center of the track, and 0.43 meter below the rail. (Note 13.*)

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* See pp. 162–166.

C_{14}.—About 4.5 miles east of *Westbrook, Mitchell County, Tex.*, on the Texas & Pacific Railway right of way, near the fifth telegraph pole east of milepost 481, 14 meters north of the center of the track and 1 meter from the fence. (Note 2.*)

D_{14}.—At *Westbrook, Mitchell County, Tex.*, at the center of the east end of the Texas & Pacific Railway depot, 0.75 meter from the building. (Note 11.*)

E_{14}.—About 4.6 miles west of *Westbrook, Mitchell County, Tex.*, on the Texas & Pacific Railway right of way at milepost 490, 13 meters north of the center of the track and 1 meter from the fence between the right of way and the county road. (Note 2.*)

F_{14}.—At *Iatan, Mitchell County, Tex.*, 9 meters east of the depot, on the Texas & Pacific Railway right of way, 7 meters south of the center of the main-line track, and 4.3 meters N. 15° E. of a large cottonwood tree. (Note 11.*)

G_{14}.—About 4.4 kilometers west of *Iatan, Mitchell County, Tex.*, on the Texas & Pacific Railway right of way, and 7½ telegraph poles west of milepost 497, and 12 meters north of the center of the track. (Note 2.*)

H_{14}.—About 5.8 kilometers east of *Coahoma, Howard County, Tex.*, on the Texas & Pacific Railway right of way at milepost 500, 12 meters south of the center of the main-line track. (Note 2.*)

I_{14}.—At *Coahoma, Howard County, Tex.*, at the southeast corner of the section-house yard, 81 meters west of the Texas & Pacific Railway depot, and 31 meters south of the center of the main-line track. (Note 11.*)

J_{14}.—About 3.0 kilometers west of *Coahoma, Howard County, Tex.*, on the Texas & Pacific Railway right of way, 10 meters west of the fourteenth telegraph pole west of milepost 504, and 14 meters north of the center of the track. (Note 2.*)

K_{14}.—About 1.3 kilometers east of *Big Spring, Howard County, Tex.*, on the Texas & Pacific Railway right of way, at the tenth telegraph pole east of milepost 512, just east of a road crossing which is at the west end of a short cut, and 10 meters north of the center of the track. (Note 11.*)

L_{14}.—At *Big Spring, Howard County, Tex.*, at grade line on the north face of the new brick depot of the Texas & Pacific Railway, 16.35 meters from the northeast corner of the building, 4.15 meters west of the center of the main entrance and 13.35 meters from the center of the main-line track. (Note 1.*)

M_{14}.—At *Big Spring, Howard County, Tex.*, 22 meters from the center of the main-line track of the Texas & Pacific Railway, on the west sidewalk in the front yard of the railway Y. M. C. A. building, 10.95 meters from the northwest corner of the building, 8.15 meters north of the west column of the porch, and 13.90 meters from the northeast corner of the porch. (Note 11.*)

South End Meridian Line.—At *Big Spring, Howard County, Tex.*, in the southwest corner of the courthouse yard. The bench mark is the center of the "G" of the inscription "U. S. C. & G. S.", on top of the hard limestone monument 7 inches square, projecting 6 inches above the surface, which marks the south end of the meridian line established in 1901. The north end of the meridian line is probably destroyed by recent improvements.

N_{14}.—About 6.2 kilometers west of *Big Spring, Howard County, Tex.*, on the Texas & Pacific Railway right of way, at milepost 524 (old numbering), about 160 meters west of the fill over the arm of Hughes Lake, and 12 meters north of the main-line track. (Note 2.*)

O_{14}.—About 10.3 kilometers west of *Big Spring, Howard County, Tex.*, on the Texas & Pacific Railway right of way, 11 meters south of the center of the track, 4 meters west of the fence at a road crossing, and 2 meters from the right-of-way fence. (Note 2.*)

P_{14}.—At *Morita, Howard County, Tex.*, on the Texas & Pacific Railway right of way, 73 meters west of the section house, 14 meters north of the center of the track in line with the right-of-way fence just west of a byroad crossing. (Note 11.*)

Q_{14}.—About 5.2 kilometers west of *Morita, Howard County, Tex.*, 9 meters north of the center of the Texas & Pacific Railway track, 2.5 meters from the right-of-way fence, on the east side of a byroad or trail that crosses the track to a house on the south side of the railroad. (Note 2.*)

R_{14}.—About 5.8 kilometers east of *Stanton, Martin County, Tex.*, on the Texas & Pacific Railway right of way, 25 meters north of the center of the track, and 2 meters from the fence of the county road paralleling the railroad. (Note 2.*)

Stanton △.—1 mile southeast of *Stanton, Martin County, Tex.*, on the highest point of a narrow ridge running north and south, about ½ mile south of the Texas & Pacific Railway, and S. 54° E. from the Stanton city water tower. The bench mark is the surface mark of a Coast and Geodetic Survey triangulation station, a standard cap triangulation station mark, screwed to the top of a 3-inch iron pipe which is embedded in concrete.

S_{14}.—At *Stanton, Martin County, Tex.*, in the northeast corner of the Martin County courthouse yard, 45.05 meters from the corner stone of the courthouse, 0.4 meter from the north fence of the yard and 1.5 meters from the east fence. (Note 11.*)

T_{14}.—At *Stanton, Martin County, Tex.*, on the south side of the circular concrete foundation of the Texas & Pacific Railway water-purifying tower, 0.28 meter from the steel wall, and 3.93 meters from the center of the track. (Note 4.*)

U_{14}.—About 4.5 kilometers west of *Stanton, Martin County, Tex.*, in the west side of a road crossing, 12 meters north of the center of the track, and 2 meters south of the line of the north right-of-way fence. (Note 2.*)

Stanton south base.—About 7⅛ miles west-southwest of *Stanton, Martin County, Tex.*, ⅔ of a mile north of the Texas & Pacific Railway, on clear level prairie land. The bench mark is the surface mark of a Coast and Geodetic

* See pp. 162-166.

Survey triangulation station, a standard cap station mark, screwed to the top of a 3-inch iron pipe which is embedded in concrete.

V_{14}.—At *Germania, Midland County, Tex.*, on the Texas & Pacific Railway right of way, 44 meters west of the section foreman's house, 26.5 meters north of the center of the track, and 1 meter from the north right-of-way fence. (Note 11.*)

W_{14}.—About 1.3 kilometers west of *Germania, Midland County, Tex.*, on the Texas & Pacific Railway right of way, 13 meters north of the center of the track, and 1.5 meters from the fence between the right of way and the county road that parallels the railway. (Note 2.*)

X_{14}.—About 7.8 kilometers east of *Midland, Midland County, Tex.*, on the Texas & Pacific Railway right of way, 11 meters west of the tenth telegraph pole west of milepost 555, and 3 meters east of the fence of the road that crosses the track. (Note 2.*)

Y_{14}.—About 5.1 kilometers east of *Midland, Midland County, Tex.*, on the Texas & Pacific Railway right of way, about 60 meters from the rain gauge of the United States Weather Bureau, in range with the east side of a barn about 75 meters south of the track, 13 meters south of the center of the track and 1 meter from the fence between the right of way and the road paralleling it . (Note 2.*)

Z_{14}.—At *Midland, Midland County, Tex.*, 0.79 meter east of the southwest corner of the Texas & Pacific Railway depot, in the water table, 1.20 meters above the ground. (Note 4.*)

A_{15}.—At *Midland, Midland County, Tex.*, in the southeast corner of the Midland County courthouse yard, 47.5 meters from the southeast steps of the courthouse, 5.59 meters from a water plug in the street, and 4.87 meters west and 1.02 meters north of the inside of the walk. (Note 11.*)

B_{15}.—About 7.6 kilometers west of *Midland, Midland County, Tex.*, on the Texas & Pacific Railway right of way, at the west end of a spur track, 18 meters east of a by-road crossing, 13 meters south of the center of the main-line track and 0.5 meter from the fence between the right of way and the road paralleling the railroad. (Note 2.*)

Scar △.—7 miles west of *Midland, Midland County, Tex.*, and 3 miles east of Warfield, towns on the Texas & Pacific Railway, and ½ mile south of the railroad, on a round knoll in a cultivated field, the property of the Scarborough Cattle Co. of Midland. The station is marked by a standard brass cap station mark screwed to the top of a 3-inch pipe.

C_{15}.—At *Warfield, Midland County, Tex.*, 20 meters east of the section-foreman's house, and 18 meters north of the center of the main track of the Texas & Pacific Railway. (Note 11.*)

D_{15}.—About 2.3 kilometers west of *Warfield, Midland County, Tex.*, on the Texas & Pacific Railway right of way, 13 meters south of the center of the track. (Note 2.*)

E_{15}.—About 8.5 kilometers east of *Odessa, Ector County, Tex.*, on the Texas & Pacific Railway right of way, near the third telegraph pole east of milepost 575, and 12 meters south of the center of the track. (Note 2.*)

Odessa △.—About 2 miles east of *Odessa, Ector County, Tex.*, and 1 mile north of the Texas & Pacific Railway, on the highest point of a low bare knoll in the pasture of C. P. Turner and ½ mile north of his house. The bench mark is the surface mark of a Coast and Geodetic Survey triangulation station and is marked by a standard cap station mark screwed to the top of a 3-inch iron pipe which is embedded in concrete.

F_{15}.—At *Odessa, Ector County, Tex.*, on the southwest corner of the southwest stone footing of the Texas & Pacific Railway water tank. (Note 14.*)

G_{15}.—At *Odessa, Ector County, Tex.*, in the southwest corner of the Ector County courthouse yard, 42.1 meters from the southwest corner of the courthouse, and 0.72 meter from the concrete corner post of the yard. (Note 11.*)

H_{15}.—About 8.2 kilometers west of *Odessa, Ector County, Tex.*, on the Texas & Pacific Railway right of way, 58 meters east of milepost 585 (old numbering), 13 meters south of the center of the track, and 2 meters from the right-of-way fence. (Note 2.*)

I_{15}.—At *Douro, Ector County, Tex.*, on the range of the west side of the section-foreman's house, 21 meters south of the center of the main line of the Texas & Pacific Railway, and 28 meters S. 50° E. of a large cottonwood tree, north of the track. (Note 11.*)

J_{15}.—About 3.6 kilometers west of *Douro, Ector County, Tex.*, on the Texas & Pacific Railway right of way, at the highest point of the railway between Big Spring and Toyah, 180 meters east of the entrance to Dead Mans Cut, and 13 meters south of the center of the track at the point of curve of the first curve between Stanton and Metz. (Note 2.*)

K_{15}.—At *Metz, Ector County, Tex.*, in range with the west side of the section-foreman's house, 20 meters north of the center of the Texas & Pacific Railway track, and 1 meter from the right-of-way fence. The bench mark is the center of a 15-millimeter square cut in the top of a 5½-foot section of rail which is set to project about 1 foot above the ground.

L_{15}.—About 4.4 kilometers west of *Metz, Ector County, Tex.*, on the Texas & Pacific Railway right of way, 1683 feet east of the summit of the highest hill between Metz and Monahans, 12 meters south of the center of the track, and 2 meters from the right-of-way fence. (Note 2.*)

M_{15}.—About 8.8 kilometers west of *Metz, Ector County, Tex.*, on the Texas & Pacific Railway right of way, 264 feet east of milepost 606, 125 feet west of a fence running north from the railway, 12.5 meters south of the center of the track, and 2 meters from the right-of-way fence. (Note 2.*)

N_{15}.—About 3.1 kilometers east of *Sand Hills, Winkler County, Tex.*, on the Texas & Pacific Railway right of way, 1.8 meters east of milepost 609, 13.0 meters south of the center of the track, and 2.0 meters from the south right-of-way fence. (Note 2.*)

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* See pp. 162-166.

O_{15}.—At *Sand Hills, Winkler County, Tex.*, on the Texas & Pacific Railway right of way, 28.95 meters northeast from the northeast corner of the section-foreman's house (main upright), 26.75 meters from the northwest corner of the tool house, 36.1 meters north of the center of the track, and 30 meters south of the right-of-way fence. (Note 11.*)

P_{15}.—About 3.4 kilometers west of *Sand Hills, Winkler County, Tex.*, 11.80 meters west of milepost 613 of the Texas & Pacific Railway, 13.5 meters south of the center of the track, and 1.85 meters north of the right-of-way fence. (Note 2.*)

Q_{15}.—At *Monahans, Ector County, Tex.*, 20 meters east of the depot at the southwest corner of the yard of the Texas & Pacific Railway agent's dwelling house, in line with two China trees in the yard, the nearest of which is 4 meters west. (Note 11.*)

R_{15}.—About 0.9 kilometers west of *Monahans, Ector County, Tex.*, on the Texas & Pacific Railway right of way, 14 meters south of the center of the track at the whistling post. (Note 2.*)

S_{15}.—About 4.0 kilometers west of *Monahans, Ector County, Tex.*, on the Texas & Pacific Railway right of way, 14 meters north of the center of the track and 15 meters west of the section-line fence running north. (Note 2.*)

T_{15}.—At *Aroya, Ward County, Tex.*, on the Texas & Pacific Railway right of way, 87 paces west of the section-foreman's dwelling house, 7.50 meters west of the southwest corner of the red sandstone quarters for the section hands, and in line with the south side or front of same, 20.95 meters north of the center of the main-line track, and 5.5 meters north of the line of the right-of-way fence. (Note 11.*)

U_{15}.—About 4 kilometers west of *Aroya, Ward County, Tex.*, on the Texas & Pacific Railway right of way, at east end of a mound of earth and rock used as a rail rest, 13.02 meters south of the center of the track, and 2.21 meters from the right-of-way fence. (Note 2.*)

V_{15}.—At *Pyote, Ward County, Tex.*, on the Texas & Pacific Railway right of way, 53.0 meters west of the depot, 13.40 meters south of the center of the track, 1.95 meters north of the right-of-way fence, and 1.05 meters west of the cattle-guard fence. (Note 2.*)

W_{15}.—At *Pyote, Ward County, Tex.*, 11.21 meters west of the Texas & Pacific Railway depot, 18.4 meters west of the southwest corner of the stone house used as quarters for the section hands, and 17.7 meters north of the center of the main track. (Note 11.*)

X_{15}.—About 6.6 kilometers west of *Pyote, Ward County, Tex.*, on the Texas & Pacific Railway right of way, opposite a bungalow distant 175 meters to the south, 13.4 meters south of the center of the track, and 1.8 meters from the right-of-way fence. (Note 2.*)

Y_{15}.—A stone post at *Quito, Ward County, Tex.*, on the Texas & Pacific Railway right of way, 13.5 meters south of the track, and 0.25 mile west of the section foreman's dwelling house. (Note 11.*)

Z_{15}.—About 1.7 miles west of *Quito, Ward County, Tex.*, on the Texas & Pacific Railway bridge 635A, on the main line 50 meters east of the quarry spur, on top of the south end of the coping stone of the east abutment, 0.15 meter from the west side of the stone and 0.55 meter from the south end, 2.20 meters from the center of the track, and 1.0 meter below the rail. (Note 15.*)

A_{16}.—About 2 miles west of *Quito, Ward County, Tex.*, on the Texas & Pacific Railway bridge 635D, on top of the north end of the coping stone of the west abutment, 0.66 meter from the east side and 0.80 meter from the north end of the stone, 0.90 meter below the rail, and 2.10 meters north of the center of the track. (Note 4.*)

B_{16}.—About 2.3 miles west of *Quito, Ward County, Tex.*, on the Texas & Pacific Railway bridge 636A, just west of a rock quarry, on top of the north end of the west abutment, 1.15 meters from the north end and 0.14 meter from east edge of the coping stone, 1.5 meters from the center of the track and 0.9 meter below the rail. (Note 16.*)

C_{16}.—About 5 kilometers east of *Barstow, Ward County, Tex.*, on the south end of the east abutment of a Texas & Pacific Railway culvert, 0.30 meter from the west side and 0.55 meter from the south end of the coping stone, 2.23 meters south of the center of the track, and 0.9 meter below the rail. (Note 5.*)

Hays △.—About 4½ miles northeasterly from *Barstow, Ward County, Tex.*, on the northwest corner and highest point of the first very prominent hill northeast of Barstow, 1¾ miles N. 28° W. from Rogers' rock quarry, and in the pasture of N. L. Hays, whose ranch house is 1 mile S. 55° E. from the station. The bench mark is the surface mark of a Coast and Geodetic Survey triangulation station, a standard cap station mark screwed to the top of a 3-inch iron pipe which is embedded in concrete.

D_{16}.—About 1.0 kilometer east of *Barstow, Ward County, Tex.*, 3.35 feet east of the house near the track on the north side, 12.6 meters north of the center of the track, 2.7 meters south of the north right-of-way fence, and 25.4 meters north of section post 176-177. (Note 2.*)

E_{16}.—At *Barstow, Ward County, Tex.*, in the Ward County courthouse yard, 31.2 meters south and 4.7 meters west of the center of the main entrance to the building, 4.7 meters west of the front gateway, and 2.3 meters north of the south yard fence. (Note 11.*)

F_{16}.—About 1.6 miles west of *Barstow, Ward County, Tex.*, on the Texas & Pacific Railway right of way, 43.3 meters west of bridge 641A, which is an inverted siphon for an irrigation ditch, 12.50 meters south of the center of the track, and 1.88 meters from the right-of-way fence. (Note 2.*)

G_{16}.—About 4.9 kilometers east of *Pecos, Reeves County, Tex.*, on the Texas & Pacific Railway right of way, 20.9 meters west of bridge 643A over an irrigation ditch, 13.5 meters south of the center of the the track, and 1.75 meters from the fence. (Note 2.*)

* See pp. 162-166.

H_{16}.—About 2.1 miles east of *Pecos, Reeves County, Tex.*, on the Texas & Pacific Railway bridge 644B over the Pecos River, on top of the north end of the west abutment, 0.33 meter from the east side of the coping stone, 0.54 meter south of the center of the north truss, 1.75 meters from the north end of the abutment, 2 meters north of the center of the track, and 0.8 meter below the rail. (Note 4.*)

I_{16}.—At *Pecos, Reeves County, Tex.*, across the street from the Texas & Pacific Railway passenger station, on the north wall of the annex to the Orient Hotel, 0.8 meter from the northeast corner, 0.3 meter from the east side of a window, and 1.10 meters above the sidewalk. (Note 1.*)

J_{16}.—At *Pecos, Reeves County, Tex.*, in the northeast corner of the yard of the section foreman's dwelling house, 9 meters south of the center of the main line of the Texas & Pacific Railway. (Note 11.*)

K_{16}.—About 6.5 kilometers west of *Pecos, Reeves County, Tex.*, on the Texas & Pacific Railway right of way, 2.4 meters from the south fence, 13.1 meters south of the center of the track, and 10.4 meters south by west of section post 178-179. (Note 2.*)

L_{16}.—About 3.9 kilometers east of *Hermosa, Reeves County, Tex.*. on the Texas & Pacific Railway right of way, 2.3 meters from the south fence, and 13.3 meters south of the center of the track at the west end of a mound of earth used as a rail rest. (Note 2.*)

M_{16}.—At *Hermosa, Reeves County, Tex.*, in the line of the south side (front) of the section foreman's dwelling house, 3.19 meters from the southwest corner, and 13.4 meters north of the center of the track. (Note 11.*)

N_{16}.—About 5.9 kilometers west of *Hermosa, Reeves County, Tex.*, 5.5 meters southwest of milepost 666 of the Texas & Pacific Railway, 13.4 meters south of the center of the track, and 2.0 meters from the right-of-way fence. (Note 2.*)

O_{16}.—About 3.9 kilometers east of *Toyah, Reeves County, Tex.*, 14.7 meters north of the center of the Texas & Pacific Railway track, 1.5 meters from the north right-of-way fence, and 40 meters from point of curvature of the only curve between Hermosa and Toyah. (Note 2.*)

P_{16}.—At *Toyah, Reeves County, Tex.*, a stone post on the Texas & Pacific Railway right of way, 395 meters west of the depot, 7.10 meters east of the southeast corner of the section house in range with the front of the house, 2.05 meters east of a large cottonwood tree, and 10.3 meters north of the center of the main track. (Note 11.*)

Q_{16}.—At *Toyah, Reeves County, Tex.*, 559 meters west of the depot, on the southeast corner of the southeast stone footing of the more westerly one of two water tanks opposite the roundhouse of the Texas & Pacific Railway, and 3.0 meters from the center of the main track. (Note 16.*)

R_{16}.—At *Toyah, Reeves County, Tex.*, 759 meters west of the depot on the circular concrete foundation of the Texas & Pacific Railway water-softening tower, 0.48 meter east of the manhole near the bottom of the tank, and 7.6 meters south of the center of the main-line track. (Note 4.*)

S_{16}.—About 6.3 kilometers west of *Toyah, Reeves County, Tex.*, at the point of curve of the first curve of the Texas & Pacific Railway west of Toyah, 27.95 meters north of milepost 669, 14.4 meters north of the center of the track, and 1.0 meter from the north fence. (Note 2.*)

T_{16}.—About 11.2 kilometers west of *Toyah, Reeves County, Tex.*, on the Texas & Pacific Railway right of way, 3.8 meters southwest of milepost 672, 13.8 meters south of the center of the track, and 1.6 meters from the fence. (Note 2.*)

U_{16}.—At *Gomez, Reeves County, Tex.*, 1.95 meters west of the southwest corner of the section house, 13.55 meters north of the center of the track, and 26 meters north by west from milepost 676. (Note 11.*)

V_{16}.—About 4.1 kilometers west of *Gomez, Reeves County, Tex.*, 2.58 meters west of milepost 679, 12.90 meters south of the center of the track, and 2.5 meters from the fence. (Note 2.*)

W_{16}.—About 1.6 kilometers east of *San Martine, Reeves County, Tex.*, at the point of tangency of the first curve on the Texas & Pacific Railway, east of San Martine, 1920 feet east of milepost 686, 13.2 meters south of the center of the track, and 2.3 meters from the fence. (Note 2.*)

X_{16}.—At *San Martine, Reeves County, Tex.*, 0.74 meter west of the southwest corner of the section house, and 9.3 meters north of the center of the Texas & Pacific Railway track. (Note 11.*)

Y_{16}.—At *San Martine, Reeves County, Tex.*, on the southeast corner of the southeast masonry footing of the Texas & Pacific Railway water tank, 49 meters north of the center of the main track. (Note 16.*)

Z_{16}.—About 4.1 kilometers west of *San Martine, Reeves County, Tex.*, on the Texas & Pacific Railway bridge 688B, on top of the north wing wall of the west abutment, 3.6 meters from the west end of a bridge girder, and 2.4 meters north of the center of the track. (Note 4.*)

A_{17}.—About 9.0 kilometers east of *Kent, El Paso County, Tex.*, at the foot of the south point of the hill forming the west side wall of Levinson pond, at the thirteenth telegraph pole west of milepost 691, 14.2 meters north of the center of the track, 1.05 meters from the right-of-way fence, and 14 meters northeast of the small water tank alongside the track. (Note 2.*)

B_{17}.—About 5.5 kilometers east of *Kent, El Paso County, Tex.*, 84.0 meters west of milepost 694 of the Texas & Pacific Railway, at the east end of a cut, 1.93 meters north of the gauge of the north rail, 0.2 meter from the south edge of a flat stone in the cut, and 0.3 meter below the rail. (Note 4.*)

C_{17}.—At *Kent, El Paso County, Tex.*, 9.7 meters south of the main line of the Texas & Pacific Railway, in the northeast corner of the section-house yard, 6.6 meters from the northeast corner of the section house, and in range with two china trees, 3.80 meters east of the east tree. (Note 11.*)

D_{17}.—About 3.9 kilometers west of *Kent, El Paso County, Tex.*, 1.65 meters west of milepost 700 of the Texas & Pacific Railway, 12.80 meters south of the track, and 2.6 meters from the right-of-way fence. (Note 11.*)

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*See pp. 162-166

E_{17}.—About 4.6 kilometers west of *Kent, El Paso County, Tex.*, 700 meters west of milepost 700 of the Texas & Pacific Railway, 70 meters east of the section-line fence running north, on the highest round-topped smooth rock in a cut, 2.60 meters north of the north rail, and 0.75 meter above the rail. (Note 4.*)

F_{17}.—At *Boracho, El Paso County, Tex.*, on the Texas & Pacific Railway right of way, in front of the section-foreman's house, 5.0 meters from section post 190, 14.5 meters south of the center of the track, and 0.7 meter from the fence. (Note 11.*)

G_{17}.—About 2.3 kilometers west of *Boracho, El Paso County, Tex.*, on the Texas & Pacific Railway right of way, 125 feet east of bridge 356, 13.1 meters south of the center of the track, and 2.2 meters from the fence. (Note 2.*)

H_{17}.—About 5.6 kilometers east of *Plateau, El Paso County, Tex.*, on the Texas & Pacific Railway right of way, opposite the center of a small artificial pond 75 meters to the north, 14.10 meters north of the center of the track, and 1.0 meter from the fence. (Note 11.*)

I_{17}.—About 3.0 kilometers east of *Plateau, El Paso County, Tex.*, on top of a rock in the first cut of the Texas & Pacific Railway east of Plateau, about 1 meter north of the north rail and on a level with the top of the rail. (Note 4.*)

U.S.G.S. 3889 Vn Hn.—About 2.4 kilometers west of *Plateau, El Paso County, Tex.*, 100 feet south of the track of the Texas & Pacific Railway, and 10 feet north of a wagon road. (Note 18.*)

J_{17}.—At *Plateau, El Paso County, Tex.*, in front of and across the track from the section-foreman's house, 2 meters from the south right-of-way fence of the Texas & Pacific Railway. (Note 11.*)

K_{17}.—About 4.5 kilometers west of *Plateau, El Paso County, Tex.*, on the Texas & Pacific Railway right of way, 6.05 meters west of milepost 721, 13.70 meters south of the center of the track, and 1.45 meters from the fence. (Note 2.*)

U. S. G. S. 3840 Vn Hn.—About 6.4 kilometers east of *Wild Horse, El Paso County, Tex.*, 15 feet southeast of the thirteenth telegraph pole east of milepost 723 of the Texas & Pacific Railway, 16.45 meters south of the center of the track, 1.6 meters south of the right-of-way fence, and on the north side of a wagon road. (Note 18.*)

U. S. G. S. 3826 Vn Hn.—About 1.5 kilometers east of *Wild Horse, El Paso County, Tex.*, 1900 feet east of milepost 726 of the Texas & Pacific Railway, 23.6 meters south of the track, 8.6 meters south of the right-of-way fence, and on the north side of a wagon road. (Note 18.*)

L_{17}.—At *Wild Horse, El Paso County, Tex.*, in front of and across the track from the section-foreman's house, 21.8 meters south of the main line of the Texas & Pacific Railway, and 1.8 meters from the right-of-way fence. (Note 11.*)

U. S. G. S. 3867 Vn Hn.—About 3.5 kilometers west of *Wild Horse, El Paso County, Tex.*, 1000 feet east of the Texas & Pacific Railway bridge 329, 50 feet south of the railroad track, and 10 feet south of a wagon road. (Note 18.*)

M_{17}.—About 5.3 kilometers west of *Wild Horse, El Paso County, Tex.*, 13.1 meters south of the center of the Texas & Pacific Railway track, 7.3 meters from the right-of-way fence, and 38 meters east of milepost 730. (Note 2.*)

N_{17}.—About 4.4 kilometers east of *Van Horn, El Paso County, Tex.*, 12.85 meters south of the center of the Texas & Pacific Railway track, 2.0 meters from the fence, and 3.70 meters west of milepost 732. (Note 2.*)

O_{17}.—At *Van Horn, El Paso County, Tex.*, 60 meters west of the Texas & Pacific Railway depot, 10.8 meters south of the center of the track, and 0.47 meters east of the fence of the section-foreman's yard. (Note 11.*)

U. S. G. S. 4039 Vn Hn.—At *Van Horn, El Paso County, Tex.*, 240 feet west of the station of the Texas & Pacific Railway, 100 feet south of the main track, and 4 feet south of a telegraph pole. (Note 18.*)

U. S. G. S. 4239 Vn Hn.—About 5.1 kilometers west of *Van Horn, El Paso County, Tex.*, 378 meters west of milepost 737 of the Texas & Pacific Railway, and 25 meters north of the center of the track. (Note 18.*)

U. S. G. S. 4395 Vn Hn.—About 9.1 kilometers west of *Van Horn, El Paso County, Tex.*, 1200 feet northwest of trestle 375 of the Texas & Pacific Railway, and 10 feet south of a wagon road. (Note 18.*)

U. S. G. S. 4603 Vn Hn.—About 2 miles east of *Allamore, El Paso County, Tex.*, 7 meters east of the east row of Spanish dagger trees, and 8.55 meters north of the center of the track. The station and section house to which the earlier description referred have been moved 2 miles west. (Note 18.*)

P_{17}.—1 mile east of *Allamore, El Paso County, Tex.*, at milepost 744 of the Texas & Pacific Railway, 13.75 meters north of the center of the track, and 1.45 meters from the right-of-way fence. (Note 11.*)

Allamore △.—At *Allamore, El Paso County, Tex.*, about 9 meters N. 20° W. from the center of the water tank, 12.5 meters north of the north rail of the Texas & Pacific Railway, and 1.6 meters south of the railway fence line. The present water tank probably differs a foot or two in position from the one referred to above. The bench mark is the top of a cap of the usual type for marking a Coast and Geodetic Survey triangulation station, the cap being screwed to the top of a 3-inch iron pipe.

Q_{17}.—1 mile west of *Allamore, El Paso County, Tex.*, at milepost 746 of the Texas & Pacific Railway, 240 feet west of bridge 747–A, 14.2 meters north of the center of the track, 3.2 meters from the right-of-way fence. (Note 2.*)

R_{17}.—About 4.0 miles west of *Allamore, El Paso County, Tex.*, at milepost 749 of the Texas & Pacific Railway, 12.7 meters north of the center of the track, and 2 meters from the right-of-way fence. (Note 2.*)

S_{17}.—About 3.0 kilometers east of *Eagle Flat, El Paso County, Tex.*, 9.9 meters east of milepost 751 of the Texas & Pacific Railway, 11.60 meters south of the center of the track, and 3.4 meters from the right-of-way fence. (Note 2.*)

T_{17}.—At *Eagle Flat, El Paso County, Tex.*, in front of and across the tracks from the section-foreman's house, in the range of the west end of the house, 24.9 meters south of the main line of the Texas & Pacific Railway, and 1.65 meters from the right-of-way fence. (Note 11.*)

See pp. 162–166.

U_{17}.—About 3.6 kilometers west of *Eagle Flat, El Paso County, Tex.*, 1.60 meters east of milepost 755 of the Texas & Pacific Railway, 12.20 meters south of the center of the track, and 2.8 meters from the right-of-way fence. (Note 11.*)

V_{17}.—About 9.3 kilometers east of *Sierra Blanca, El Paso County, Tex.*, 4.1 meters west of milepost 759 of the Texas & Pacific Railway, 11.9 meters south of the center of the track, and 3.3 meters north of the fence between the right of way and wagon road. (Note 2.*)

W_{17}.—At *La Valley* 8.6 kilometers east of *Sierra Blanca, El Paso County, Tex.*, on the Texas & Pacific Railway right of way, 12.8 meters south of the center of the track, 3.7 meters from the fence, and in front of the west wing of the La Valley Hotel, about 40 meters distant. (Note 11.*)

X_{17}.—About 5.6 kilometers east of *Sierra Blanca, El Paso County, Tex.*, 11.5 meters south of the center of the Texas & Pacific Railway track, 3.9 meters from the right-of-way fence, and 2.0 meters west of milepost 764. (Note 2.*)

Y_{17}.—At *Sierra Blanca, El Paso County, Tex.*, in range with the north side of the Galveston, Harrisburg & San Antonio Railway and the Texas & Pacific Railway depot, 16.0 meters west of the northwest corner, 9.20 meters south of the center of the main line of the latter railway, and 15.55 meters north of the center of the main line of the former railway. (Note 11.*)

Z_{17}.—About 2.7 kilometers west of *Sierra Blanca, El Paso County, Tex.*, 28.9 meters north of the center of the Galveston, Harrisburg & San Antonio Railway track, 1.66 meters from the right-of-way fence, 1075 feet east of bridge 738–B, and 13½ telegraph poles east of milepost 739. (Note 11.*)

A_{18}.—At *Etholen, El Paso County, Tex.*, 13.20 meters north of the station sign, 13.0 meters west of the engine house (pump station), 24.5 meters north of the center of the track, and 5.8 meters from the right-of-way fence. (Note 11.*)

B_{18}.—About 2.8 kilometers west of *Etholen, El Paso County, Tex.*, 3.37 meters west of milepost 743 of the Galveston, Harrisburg & San Antonio Railway, on the right of way, 12.80 meters south of the center of the track, 2.4 meters from the fence and 35 meters west of bridge 742–B. (Note 2.*)

C_{18}.—At *Lasca, El Paso County, Tex.*, 7.6 meters north of the station sign, and 14.4 meters north of the center of the track, on the right of way, 0.9 meter from the fence. (Note 11.*)

D_{18}.—About 2.7 kilometers east of *Torcer, El Paso County, Tex.*, 13.15 meters south of the center of the track, on the right of way, 1.85 meters from the fence, and 1.64 meters north of milepost 748. (Note 2.*)

E_{18}.—At *Torcer, El Paso County, Tex.*, 15.9 meters south of the southeast corner of the Galveston, Harrisburg & San Antonio Railway depot, 29.0 meters south of the center of the track, and 1.5 meters from the right-of-way fence. (Note 11.*)

F_{18}.—About 0.9 kilometer west of *Torcer, El Paso County, Tex.*, just west of the Horseshoe Bend on the Galveston, Harrisburg & San Antonio Railway, at transit station 39679+39, 293 feet east of milepost 751, 12.0 meters west of the center of the track, and 2.2 meters from the fence. (Note 2.*)

G_{18}.—About 4.3 kilometers west of *Torcer, El Paso County, Tex.*, opposite transit station 39880+47.7, on the Galveston, Harrisburg & San Antonio Railway, at the sixth telegraph pole east of the point of the mountain, 13.5 meters east of the center of the track, and 1.8 meters from the fence. (Note 2.*)

H_{18}.—About 2.8 kilometers east of *Finlay, El Paso County, Tex.*, 4 meters east of the second telegraph pole east of milepost 757, 24 meters west of bridge 756–I, 13.8 meters south of the center of the track, and 1.8 meters from the fence. (Note 2.*)

I_{18}.—At *Finlay, El Paso County, Tex.*, 9.5 meters west of the center of the Galveston, Harrisburg & San Antonio Railway depot, and 8.4 meters north of the center of the track. (Note 11.*)

J_{18}.—At *Tinaja, El Paso County, Tex.*, at the east end of a passing track, 12.3 meters southeast of the center of the track, 2.1 meters from the fence, and 120 feet west of bridge 672C of the Galveston, Harrisburg & San Antonio Railway. (Note 11.*)

K_{18}.—At *Madden, El Paso County, Tex.*, 4.6 meters from the station sign, 14.8 meters south of the center of the Galveston, Harrisburg & San Antonio Railway track, and 15.8 meters from the fence. (Note 2.*)

L_{18}.—At *Nulo, El Paso County, Tex.*, 4.1 meters north of the station sign, 14.1 meters north of the center of the Galveston, Harrisburg & San Antonio Railway track, and 1.8 meters from the fence. (Note 2.*)

M_{18}.—At *Fort Hancock, El Paso County, Tex.*, 200 meters west of the depot, 27.4 meters north of bridge 776B of the Galveston, Harrisburg & San Antonio Railway, and 2.9 meters from the right-of-way fence. (Note 11.*)

N_{18}.—About 6.0 kilometers west of *Fort Hancock, El Paso County, Tex.*, 3.0 meters west of milepost 780 of the Galveston, Harrisburg & San Antonio Railway, 13.3 meters south of the center of the track, and 1.8 meters from the right-of-way fence. (Note 2.*)

O_{18}.—At *Iser, El Paso County, Tex.*, 400 feet west of the east end of a passing track of the Galveston, Harrisburg & San Antonio Railway, 1000 feet east of the station sign, 25 meters west of bridge 783A, 13.7 meters south of the center of the track, and 1.8 meters from the fence. (Note 11.*)

P_{18}.—About 4 miles east of *Polvo, El Paso County, Tex.*, 60 meters west of milepost 786 of the Galveston, Harrisburg & San Antonio Railway, 11.5 meters south of the center of the track, and 13.7 meters from the fence. (Note 2.*)

Q_{18}.—About 2 miles east of *Polvo, El Paso County, Tex.*, 3.1 meters west of milepost 788 of the Galveston, Harrisburg & San Antonio Railway, 11.8 meters south of the center of the track, and 3.9 meters from the fence. (Note 2.*)

R_{18}.—At *Polvo, El Paso County, Tex.*, in front of and across the track from the section house, 11 meters west of the west end of a passing track of the Galveston, Harrisburg & San Antonio Railway, 15.9 meters south of the center of the main track, and 1.4 meters from the fence. (Note 2.*)

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* See pp. 162–166.

S_{18}.—About 2 miles west of *Polvo, El Paso County, Tex.*, 0.9 meter northwest of milepost 792 of the Galveston, Harrisburg & San Antonio Railway, 14.3 meters south of the center of the track, and 1.2 meters from the fence. (Note 2.*)

U. S. G. S. 3560.—About 2.2 miles west of *Polvo, El Paso County, Tex.*, 8 poles west of milepost 792 of the Galveston, Harrisburg & San Antonio Railway, 13.9 meters south of the center of the track, and 1.3 meters from the fence. (Note 18.*)

T_{18}.—About 3 kilometers east of *Fabens, El Paso County, Tex.*, 2.2 meters east of milepost 798 of the Galveston, Harrisburg & San Antonio Railway, 14.3 meters south of the center of the track, and 0.4 meter from the fence. (Note 2.*)

U_{18}.—At *Fabens, El Paso County, Tex.*, 65 meters east of the Galveston, Harrisburg & San Antonio Railway depot, 20.6 meters north of the center of the track, and 1.8 meters northeast of the right-of-way post. (Note 11.*)

V_{18}.—At *Fabens, El Paso County, Tex.*, on the northwest corner of the northwest footing of the water tank of the Galveston, Harrisburg & San Antonio Railway, 9.5 meters south of the center of the track. (Note 4.*)

U. S. R. S. 3572.14.—About 3.0 kilometers west of *Fabens, El Paso County, Tex.*, 9 meters west of the Galveston, Harrisburg & San Antonio Railway bridge 801G, 14.05 meters south of the center of the track, and 2.0 meters from the fence. The bench mark is an iron pipe stamped "U. S. Reclamation Service."

U. S. R. S. (3616), later stamp 3586.94.—About 3.6 kilometers east of *Clint, El Paso County, Tex.*, at the tenth pole west of milepost 805 of the Galveston, Harrisburg & San Antonio Railway, 400 feet west of a road crossing, 12.9 meters south of the center of the track, and 2.0 meters from the fence. (Note 18.*)

U. S. R. S. 3592.95.—At *Clint, El Paso County, Tex.*, in the southwest corner of the section-house yard, 7.7 meters north of the center of the main-line track of the Galveston, Harrisburg & San Antonio Railway. The bench mark is an iron pipe stamped "U. S. Reclamation Service."

W_{18}.—At *Clint, El Paso County, Tex.*, 400 meters west of the Galveston, Harrisburg & San Antonio Railway depot, on the north side of a wagon road, 11.7 meters south of the main line of the railway, and 2.5 meters west of bridge 807B over an irrigation ditch. (Note 11.*)

X_{18}.—About 2.5 kilometers west of *Clint, El Paso County, Tex.*, 14.0 meters north of the center of the Galveston, Harrisburg & San Antonio Railway track at milepost 809, and 1.1 meter from the fence. (Note 2.*)

U. S. R. S. 3600.09.—About 4.1 kilometers west of *Clint, El Paso County, Tex.*, 2.8 meters west of milepost 800 of the Galveston, Harrisburg & San Antonio Railway, 14.4 meters south of the center of the track, and 0.6 meter from the fence. The bench mark is an iron pipe stamped "U. S. Reclamation Service."

Y_{18}.—At *Belen, El Paso County, Tex.*, 45 meters west of the Galveston, Harrisburg & San Antonio Railway depot at the east end of a passing track, 16.3 meters south of the center of the track, on the south concrete face of the siphon wall of an irrigation ditch under the tracks, 0.15 meter from the west edge, and 0.19 meter from the top of the concrete. (Note 1.*)

U. S. G. S. (3644), later stamp 3614.68.—At *Belen, El Paso County, Tex.*, 10 poles east of milepost 813 of the Galveston, Harrisburg & San Antonio Railway, 14.5 meters north of the center of the track, and 11.0 meters east of an adobe hut, in the line of the right-of-way fence and some cottonwood trees. (Note 18.*)

Z_{18}.—At *Belen, El Paso County, Tex.*, 130 meters west of the west end of a passing track of the Galveston, Harrisburg & San Antonio Railway at milepost 813, 14.1 meters south of the center of the track, and 0.8 meter from the fence. (Note 11.*)

A_{19}.—At *Ysleta, El Paso County, Tex.*, about 200 meters west of the Galveston, Harrisburg & San Antonio Railway depot, 1.85 meters from the southwest corner of the section-house yard, and 8.75 meters north of the center of the track. (Note 11.*)

B_{19}.—About 5.2 kilometers west of *Ysleta, El Paso County, Tex.*, 0.9 meter east of milepost 820 of the Galveston, Harrisburg & San Antonio Railway, 14.3 meters south of the center of the track, and 0.5 meter from the fence. (Note 2.*)

C_{19}.—At *Alfalfa, El Paso County, Tex.*, 8.0 meters south of the station sign, 13.9 meters south of the center of the Galveston, Harrisburg & San Antonio Railway track, and 1.2 meters from the fence. (Note 2.*)

D_{19}.—About 1.2 kilometers west of *Alfalfa, El Paso County, Tex.*, on the reinforced concrete highway bridge of the macadamized county road, on top of the north north wing wall, 32 meters from the center of the Galveston, Harrisburg & San Antonio Railway track. (Note 1.*)

E_{19}.—At *El Paso, El Paso County, Tex.*, on top of the masonry pier at the northwest corner of the El Paso brewery, 1.1 meters north of the corner of the main building, and 28 meters south of the center of the Galveston, Harrisburg & San Antonio Railway tracks. (Note 4.*)

F_{19}.—At *El Paso, El Paso County, Tex.*, at the crossing of the Galveston, Harrisburg & San Antonio Railway and the El Paso & Southwestern Railroad tracks, in the northeast corner of a grassy plot 5.6 meters south of the former railroad, 14.0 meters east of the latter railroad, and 5.7 meters east of tower No. 47. (Note 11.*)

G_{19}.—At *El Paso, El Paso County, Tex.*, on the west face of the south concrete pier of the viaduct over the Galveston, Harrisburg & San Antonio Railway and the El Paso & Southwestern Railroad tracks, on Austin Street, 8.5 meters south of the main line of the former railroad, and 1.4 meters above the ground. (Note 1.*)

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* See pp. 162–166.

H_{19}.—At *El Paso, El Paso County, Tex.*, at the corner of Texas and Ochoa Streets. The bench mark which is an El Paso city monument, is the cross on the top of a copper bolt which is stamped U.S.B.M. and which is set in a concrete post 10 inches below the level of the paving and covered by an iron plate set in the paving.

U. S. G. S., 3698.—At *El Paso, El Paso County, Tex.*, at the west end of the lower step of the north entrance to El Paso City Hall. The bench mark disk is broken and half gone but the part remaining contains the bench mark and appears stable. (Note 17.*)

U. S. G. S., 365.—At *El Paso, El Paso County, Tex.*, at the east end of the lower step of the south entrance to the El Paso City Hall, on the sidewalk between the curb and the cement steps. The bench-mark tablet is stamped 365–B–1905. (Note 17.*)

U. S. G. S., 366.—At *El Paso, El Paso County, Tex.*, on top of the west end of the lower stone step of the south entrance to the El Paso County courthouse. The bench-mark tablet is stamped 366–B–1905. (Note 17.*)

City Bench Mark.—At *El Paso, El Paso County, Tex.*, a cross on the top of the pyramid stone at the west side of the north entrance to the El Paso County courthouse.

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN JERICHO, TEX., AND ISLETA, N. MEX., 1911.

B_{10}.—At *Jericho, Donley County, Tex.* (See p. 245.)

I_{19}.—About 3.0 miles west of *Jericho, Donley County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, 2 meters from the north fence, in line with the telegraph poles, 14.0 meters north of the center of the track, and about midway between 2 concrete culverts just west of milepost 711. (Note 2.*)

J_{19}.—At *Boydston, Gray County, Tex.*, 7 meters northeast of a county-line post between Gray and Donley Counties, on the Chicago, Rock Island & Gulf Railway right of way, 15 meters north of the center of the track, and 10 meters east of the first pole east of the pole marked "713/30." (Note 2.*)

K_{19}.—At *Groom, Carson County, Tex.*, on the right of way, across the track from and in range with the east end of the Chicago, Rock Island & Gulf Railway depot, 1 meter from the fence, and 48 meters south of the center of the main-line track. (Note 11.*)

L_{19}.—About 1.9 miles west of *Groom, Carson County, Tex.*, on top of the south end wall of the ballasted concrete culvert of the Chicago, Rock Island & Gulf Railway, at a pole marked 721–05. (Note 4.*)

M_{19}.—About 4.1 miles west of *Groom, Carson County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, in line with the telegraph poles, 14 meters north of the center of the track, and just east of the second pole west of the pole marked "723." (Note 2.*)

N_{19}.—At *Lark, Carson County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, 30 meters north of the center of the track at the station sign, and 0.2 mile east of the section house. (Note 11.*)

O_{19}.—About 4.3 miles east of *Conway, Carson County, Tex.*, at a pole marked "730–20," on the Chicago, Rock Island & Gulf Railway opposite the east whistling post for a road crossing, 12 meters north of the center of the track, and 4 meters from the fence between the railroad and the wagon road paralleling the right of way. (Note 2.*)

P_{19}.—At *Conway, Carson County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, at the southwest corner of the crossing of two roads, 48 meters north of the center of the track, and 48 meters north 30° east of the northeast concrete foundation of the depot. (Note 2.*)

Q_{19}.—About 4.0 miles west of *Conway, Carson County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, 165 meters east of a point of curve, and 11 meters north of the center of the track at milepost 739. (Note 2.*)

R_{19}.—At *Yarnall, Carson County, Tex.*, across the track from the section house, near the corner of the fence, 50 meters south of the center of the track. (Note 11.*)

S_{19}.—About 4 miles west of *Yarnall, Carson County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, at the west end of a long fill and near the east end of a cut, just east of a wagon trail crossing, 29 meters north of the center of the track, and 1.5 meters from the fence. (Note 2.*)

T_{19}.—At *Royal, Potter County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, 27 meters south of the center of the track, in front of and across the track from the section house and in range with the west end, and 5 meters from the fence on the bank of a ditch bordered with locust bushes. (Note 2.*)

U_{19}.—About 6.5 kilometers east of *Amarillo, Potter County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, 28.7 meters north of the center of the track at the point of tangent of the first curve out of Amarillo. It is at the point where the Chicago, Rock Island & Gulf Railway, and the Atchison, Topeka & Santa Fe Railway tracks begin to diverge, 35.2 meters from the center of the latter track, on the curve 1½ poles east of pole 756/30, and 96 meters east of bridge 7569. (Note 2.*)

V_{19}.—About 2.0 kilometers east of the Atchison, Topeka & Santa Fe Railway depot, at *Amarillo, Potter County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, 3 meters west of the center of the track on top of the concrete foundation of the east semaphore for crossing the tracks of the other railway. (Note 1.*)

W_{19}.—About 1.3 kilometers east of the Atchison, Topeka & Santa Fe Railway depot at *Amarillo, Potter County, Tex.*, directly south of the west end of the signal tower at the crossing of this railway, the Chicago, Rock Island & Gulf Railway, and the Fort Worth & Denver City Railway, 18 paces from the tracks of the first, 63 paces from the tracks of the second, and 18 paces from the tracks of the last-mentioned railway. (Note 2.*)

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* See pp. 162–166.

X_{19}.—At *Amarillo, Potter County, Tex.*, on the front face of the north pillar supporting the center arch of the porch of the Atchison, Topeka & Santa Fe Railway depot, 20 meters west of the center of the main-line track, and 1.44 meters above the brick paving. (Note 1.*)

Y_{19}.—At *Amarillo, Potter County, Tex.*, on the south face of the foundation of Amarillo City Hall, near the southwest corner, at the elevation of the bottom of the corner stone, and 0.4 meter distant. (Note 1.*)

Z_{19}.—At *Zita, Potter County, Tex.*, just west of the south end of the Atchison, Topeka & Santa Fe Railway station, 29.8 meters west of the center of the main-line track, and near the right-of-way fence. (Note 2.*)

A_{20}.—South of *Zita, Potter County, Tex.*, opposite the iron rail marking mile 560, on the Atchison, Topeka & Santa Fe Railway in line with the telegraph poles, 15 meters south of pole 560, 21.8 meters west of the center of the track, and 9 meters from the fence. (Note 2.*)

B_{20}.—At *Haney, Potter County, Tex.*, on the right of way of the Atchison, Topeka & Santa Fe Railway, 34 meters west of the center of the main-line track at the station sign, 1.2 meters from the right-of-way fence. (Note 11.*)

C_{20}.—About 4.7 miles east of *Canyon, Randall County, Tex.*, at the east end of Haney Pit, on top of the west end of the south abutment of the Atchison, Topeka & Santa Fe Railway bridge 565A. (Note 1.*)

D_{20}.—At *Canyon, Randall County, Tex.*, in the northwest corner of Randall County courthouse yard, at the center of the arc of the curbstone. (Note 11.*)

E_{20}.—At *Canyon, Randall County, Tex.*, 91 meters west of the Atchison, Topeka & Santa Fe Railway depot, 18 meters north of the main-line track, on the south face of the reinforced concrete pump station, 0.65 meter from the east side, and 1.3 meters above the foundation. (Note 1.*)

F_{20}.—At *Canyon, Randall County, Tex.*, on the southeast corner of the southwest footing of the Canyon waterworks tank, ¼ mile west of the Atchison, Topeka & Santa Fe Railway depot, and 150 meters north of the main line track. (Note 4.*)

G_{20}.—About 1.8 miles west of *Canyon, Randall County, Tex.*, on the top of the east end of the north retaining wall of the Atchison, Topeka & Santa Fe Railway concrete-arch bridge 572A. (Note 4.*)

H_{20}.—At *Lester, Randall County, Tex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 25 meters north of the center of the track, at the station sign, 1.5 meters from the fence and 7 meters east of a road crossing. (Note 2.*)

I_{20}.—At *Umbarger, Randall County, Tex.*, on the right of way at the Atchison, Topeka & Santa Fe Railway station, 27 meters north of the center of the track, and 4 meters from the fence. (Note 2.*)

J_{20}.—About 1.7 miles west of *Umbarger, Randall County, Tex.*, on top of the west end of the north head wall of cast-iron culvert 582A of the Atchison, Topeka & Santa Fe Railway. (Note 1.*)

K_{20}.—At *Dawn, Deaf Smith County, Tex.*, 440 meters west of the Atchison, Topeka & Santa Fe Railway station, 33 meters north of the concrete foundation of the water crane, 31 meters north of the center of the track, and 1.2 meters from the right-of-way fence and wagon road. (Note 2.*)

L_{20}.—About 2.6 miles west of *Dawn, Deaf Smith County, Tex.*, on the Atchison, Topeka & Santa Fe Railway right of way, on the south side of a road crossing at the ninth pole west of milepost 589, in line with a fence running south, 33 meters south of the center of the track, and 1 meter from the right-of-way fence. (Note 2.*)

M_{20}.—At *Joel, Deaf Smith County, Tex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 30 meters north of the center of the track at the station sign and 1.5 meters from the fence. (Note 2.*)

N_{20}.—About 2.0 miles west of *Joel, Deaf Smith County, Tex.*, on the top of the west end of the north retaining wall of the Atchison, Topeka & Santa Fe Railway double-arch bridge 595A, 12 inches from the north side and 18 inches from the west end of the wall, and 2.5 meters below the rail. (Note 4.*)

O_{20}.—At *Hereford, Deaf Smith County, Tex.*, on the top of the southeast corner of the southeast footing of the Hereford waterworks tank, ⅛ mile east of the Atchison, Topeka & Santa Fe Railway depot, and 95 meters south of main-line track. (Note 4.*)

P_{20}.—At *Hereford, Deaf Smith County, Tex.*, on the south face of the concrete basement entrance to Deaf Smith County courthouse, 1.3 meters above sidewalk, and 0.3 meter from the east side of the door. (Note 1.*)

Q_{20}.—At *Hereford, Deaf Smith County, Tex.*, at the southwest corner of the Atchison, Topeka & Santa Fe Railway depot, in the south face of the limestone water table, in the brick corner pier, 1.3 meters above the brick flagging. (Note 4.*)

R_{20}.—About 3.8 miles west of *Hereford, Deaf Smith County, Tex.*, at the eighth pole west of milepost 603 of the Atchison, Topeka & Santa Fe Railway, 51 meters west of a road crossing, 1 meter from the fence betweeen the right of way and a parallel road, and 32 meters from the center of the track. (Note 2.*)

S_{20}.—At *Summerfield, Castro County, Tex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 1 meter from the north right-of-way fence, at the station sign. (Note 2.*)

T_{20}.—About 1.9 miles west of *Summerfield , Castro County, Tex.*, on the top of the east end of the south head wall of the Atchison, Topeka & Santa Fe Railway cast-iron culvert 609A. (Note 1.*)

U_{20}.—About 2.3 miles west of *Summerfield, Castro County, Tex.*, 14 meters north of the center of the Atchison, Topeka & Santa Fe Railway track, at milepost 610. (Note 11.*)

V_{20}.—At *Black, Parmer County, Tex.*, just outside the Atchison, Topeka & Santa Fe Railway right of way, on the north side of a wagon road, 19 meters south of the track, at a semaphore 200 meters west of the station sign. (Note 11.*)

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* See pp. 162–166.

W_{20}.—About 3.8 miles east of *Friona, Parmer County, Tex.*, just outside the Atchison, Topeka & Santa Fe Railway right of way, at milepost 618, on the north side of a wagon road paralleling the railroad. (Note 2.*)

X_{20}.—At *Friona, Parmer County, Tex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 50 meters north of the track at the station, 300 meters east of the east stone gatepost, and 0.4 meter from the fence. (Note 11.*)

Y_{20}.—About 2.9 miles west of *Friona, Parmer County, Tex.*, 9½ poles east of milepost 626 of the Atchison, Topeka & Santa Fe Railway, at the west end of a long fill, in the wagon road 25 meters south of the center of the track, and just west of the point where the right of way narrows. (Note 2.*)

Z_{20}.—At *Parmerton, Parmer County, Tex.*, at the station sign, at milepost 628, 18 meters south of the center of the Atchison, Topeka & Santa Fe Railway, on the north side of a wagon road just off the right of way. (Note 11.*)

A_{21}.—About 2.0 miles west of *Parmerton, Parmer County, Tex.*, 18 meters south of the center of the Atchison, Topeka & Santa Fe Railway at pole marked 630, just off the right of way on the north side of a wagon road. (Note 2.*)

B_{21}.—At *Bovina, Parmer County, Tex.*, in range with the east end of the Atchison, Topeka & Santa Fe Railway depot, just off the right of way, about 40 meters north of the main-line track, in the edge of a locust plantation belonging to XIT ranch. (Note 11.*)

C_{21}.—About 1.5 miles west of *Bovina, Parmer County, Tex.*, on the Atchison, Topeka & Santa Fe Railway bridge 635B, which is a 48-inch cast-iron pipe culvert, on top of the north concrete head wall 10 inches from the west end. (Note 1.*)

D_{21}.—About 4.0 miles west of *Bovina, Parmer County, Tex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 15 meters north of the center of the track, and 4 poles west of the pole marked 638. (Note 2.*)

E_{21}.—At *Wilsey, Parmer County, Tex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 14 meters south of the center of the main-line track, 20 meters east of the station sign, and 2 meters west of the pole marked 641. (Note 2.*)

F_{21}.—About 2.0 miles west of *Wilsey, Parmer County, Tex.*, 18 meters south of the center of the Atchison, Topeka & Santa Fe Railway track, at pole marked 743, 9 meters west of a rail marking the exact mile, 1 meter off the right of way, and 20 meters north of a wagon road. (Note 11.*)

Q_2.—At *Texico, Curry County, N. Mex.*, on the north face or front of the Atchison, Topeka & Santa Fe Railway reinforced-concrete pump station, 0.87 meter east of the northeast corner, 1.10 meters west of the west side of the door, and 1.15 meters above the ground. (Note 4.*)

R_2.—At *Texico, Curry County, N. Mex.*, on the reinforced-concrete pillar between the baggage room and the waiting room of the Atchison, Topeka & Santa Fe Railway station, 1.4 meters above the flagging. (Note 1.*)

S_2.—About 3.8 miles west of *Texico, Curry County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 33 meters south of the center of the track, and 16 meters southwest of the eighth pole west of milepost 651, on the west side of a road crossing, in the fence corner north of a lane paralleling the railroad on the south side. (Note 2.*)

T_2.—About 1.7 miles east of *Clovis, Curry County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 32 meters south of the center of the track, 19 meters west of milepost 655, and 7 meters west of the iron marking the exact mile, in the corner of the fence on the east side of a road crossing. (Note 2.*)

U_2.—At *Clovis, Curry County, N. Mex.*, on top of the southwest footing of Clovis city water tank, ¼ mile east of the Atchison, Topeka & Santa Fe Railway depot, 18 meters northeast of the northeast corner of the engine house. (Note 4.*)

V_2.—At *Clovis, Curry County, N. Mex.*, directly opposite and west of the west end of the Atchison, Topeka & Santa Fe Railway freight depot, in the lawn between the depot and the Gran Quivera Hotel, 2.7 meters west of the west side of the freight platform, at the elevation of the concrete curbing around the lawn, 0.75 meter west of the east curb, 17 meters north of the south curb, and 29 meters north of the center of the main-line track. (Note 11.*)

W_2.—At *Clovis, Curry County, N. Mex.*, on the south face of the central pillar of the porch on the east end of the Atchison, Topeka & Santa Fe Railway reinforced-concrete depot, 20 meters north of the center of the main-line track, and 1.4 meters above the brick flagging. (Note 1.*)

X_2.—About 2.0 miles west of *Clovis, Curry County, N. Mex.*, 38 meters north of the center of the Atchison, Topeka & Santa Fe Railway track, in the wagon road that crosses the track, in line with the right-of-way fence, and 1.5 meters from the west road fence. (Note 2.*)

Y_2.—About 0.7 kilometer east of *Blacktower, Curry County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 661A, in the center of the abutment 0.55 meter from the north end, and 0.15 meter south of an iron bolt (railway bench mark 4309.60) at approximately the same elevation. (Note 4.*)

Z_2.—At *Blacktower, Curry County, N. Mex.*, on the right of way at the Atchison, Topeka & Santa Fe Railway depot, 28 meters north of the center of the operator's window, and 22 meters north of the center of the main-line track. (Note 11.*)

A_3.—At *Blacktower, Curry County, N. Mex.*, on the north face just west of the entrance to the waiting room of the Atchison, Topeka & Santa Fe Railway reinforced-concrete depot, 0.3 meter west of the west side of the door, and 1.4 meters above the brick flagging. (Note 4.*)

B_3.—About 3.9 miles west of *Blacktower, Curry County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway, opposite the fifth telegraph pole west of milepost 666, in a wagon-road crossing, 33 meters south of the center of the track, in line with the right-of-way fence, and 2.0 meters east of the cattle-guard fence. (Note 2.*)

C_3.—About 5.9 miles west of *Blacktower, Curry County, N. Mex.*, on the top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 668A, in the center of the abutment, 0.3 meter from the north

* See pp. 162–166.

end, and 0.1 meter north of the round head of an iron bolt (railway bench mark 4367.67) at approximately the same elevation. (Note 1.*)

D_3.—1 mile west of *St. Vrain, Curry County, N. Mex.*, opposite the first telegraph pole west of the pole marked 674 on the Atchison, Topeka & Santa Fe Railway, 30 meters west of the section of rail marking the exact mile 674, in the line of the right-of-way fence, 34 meters north of the center of the track, and 1 meter west of the cattle-guard fence. (Note 11.*)

E_3.—About 0.8 mile east of *Melrose, Curry County, N. Mex.*, opposite the fourth pole west of milepost 780 on the Atchison, Topeka & Santa Fe Railway in a wagon-road crossing, 22 meters north of the center of the track, and 1.5 meters west of the fence to the cattle guard. (Note 2.*)

F_3.—At *Melrose, Curry County, N. Mex.*, on the south face of the center pillar of the porch at the east end of the Atchison, Topeka & Santa Fe Railway reinforced-concrete depot, 1.3 meters above the brick flagging. (Note 1.*)

G_3.—About 1.4 miles west of *Melrose, Curry County, N. Mex.*, on top of the north end of the east concrete abutment of the Atchison, Topeka & Santa Fe Railway bridge 682A over Fiddlers Draw, 0.1 meter south of the railway bench mark 4370.40, and at approximately the same elevation. (Note 4.*)

H_3.—At *Cantara, Curry County, N. Mex.*, 390 meters west of the station sign of the Atchison, Topeka & Santa Fe Railway, 20 meters east of the east side of the section house, just off the right of way, 30 meters south of the center of the track, and 1 meter south of the fence. (Note 11.*)

I_3.—About 2.0 miles east of *Krider, Roosevelt County, N. Mex.*, on top of the north end of the west concrete abutment of the Atchison, Topeka & Santa Fe Railway bridge 690A over Nixons Draw, 3 meters north of the center of the track, opposite the railway bench mark 4336.62 which is on the east abutment. (Note 1.*)

J_3.—At *Krider, Roosevelt County, N. Mex.*, 30 meters south of the Atchison, Topeka & Santa Fe Railway track at the station, just outside the right-of-way fence, and 50 meters west of the gate. (Note 2.*)

K_3.—About 2.0 miles west of *Krider, Roosevelt County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 694A, 2.75 meters north of the center of the track, and 0.1 meter north of the railway bench mark 4283.85 (iron bolt) at approximately the same elevation. (Note 4.*)

L_3.—*Tolar, Roosevelt County, N. Mex.*, just outside the south right-of-way fence at the station. (Note 2.*)

M_3.—About 1.5 miles west of *Tolar, Roosevelt County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 694A, 0.2 meter south of the railway bench mark 4181.87 (iron bolt), and 2.8 meters from the center of the track. (Note 1.*)

N_3.—At *Taiban, Roosevelt County, N. Mex.*, ¼ mile west of the Atchison, Topeka & Santa Fe Railway depot, 10 meters south of the center of the main-line track, on the south face of the reinforced-concrete pump house, 0.7 meter from the northeast corner, 1.23 meters from the east side of the doorway, and 1 meter above the ground. (Note 4.*)

O_3.—⅜ mile west of *Taiban, Roosevelt County, N. Mex.*, 440 meters west of the Atchison, Topeka & Santa Fe Railway reenforced-concrete pump house, 30 meters south of the center of the track at the east whistling post for a road crossing, and just outside the right-of-way fence. (Note 11.*)

P_3.—About 2.4 miles east of *La Lande, Roosevelt County, N. Mex.*, on the top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 707B, 0.2 meter south of the railway bench mark 4168.56 (iron bolt), at approximately the same elevation, and 2.7 meters north of the center of the track. (Note 1.*)

Q_3.—At *La Lande, Roosevelt County, N. Mex.*, in range with the west end of the Atchison, Topeka & Santa Fe Railway reinforced-concrete depot, 50 meters south of the southwest corner, 47 meters from the center of the main-line track, and 3 meters south of a ditch. (Note 2.*)

R_3.—About 3.4 miles east of *Fort Sumner, Guadalupe County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 713B, 2.7 meters from the center of the track, and 0.1 meter south of the railroad bench mark 4118.00 (iron bolt). (Note 4.*)

S_3.—About 0.7 mile east of *Fort Sumner, Guadalupe County, N. Mex.*, on the top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 716A, at the elevation of the railroad bench mark 4055.05, and 2.7 meters from the center of the track. (Note 1.*)

T_3.—At *Fort Sumner, Gaudalupe County, N. Mex.*, 600 meters east of the Atchison, Topeka & Santa Fe Railway depot, on the right of way, 25 meters east of the east end of a passing track, 36 meters east of point of tangency of curve 4280+10.2, and 33 meters north of the center of the track, 1 meter from the north fence, and 1 meter east of the fence to the cattle guard. (Note 11.*)

U_3.—At *Fort Sumner, Guadalupe County, N. Mex.*, on the south face of the Atchison, Topeka & Santa Fe Railway reinforced-concrete depot, near the southeast corner, 0.9 meter east of the east side of the waiting-room door, and 1.35 meters above the brick flagging. (Note 1.*)

V_3.—About 0.6 mile west of *Fort Sumner, Guadelupe County, N. Mex.*, on top of the north end of the west abutment of the Atchison, Topeka & Santa Fe Railway bridge 717A. (Note 4.*)

U. S. G. S. B. M. Fort Sumner.—At *Fort Sumner, Guadalupe County, N. Mex.*, 1.5 miles west of the Atchison, Topeka & Santa Fe Railway depot, at the west side of "Old Town," on the north side of the road, 18 meters north of a line of telephone poles, and 50 meters west of an adobe house. The east end of the Pecos River bridge bears S. 70° W., a concrete arch bears N. 55° W., distant about 475 meters, and the west abutment of the railway bridge 717A bears N. 70° E. The bench mark is a U. S. G. S. iron pipe, the center of the cap battered down about 5 millimeters, but otherwise in good condition.

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* See pp. 162–166.

W_3.—About 1.8 miles west of *Fort Sumner, Guadalupe County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 718B, over the Pecos River, 2.65 meters north of the center of the track, 0.40 meter from the north end, and 0.91 meter from the west side of the abutment. (Note 1.*)

X_3.—About 2.2 miles west of *Fort Sumner, Guadalupe County, N. Mex.*, on top of the north end of the west abutment of the Atchison, Topeka & Santa Fe Railway bridge 718B, over the Pecos River, 3.5 meters north of the center of the track. (Note 4.*)

Y_3.—About 4.2 miles west of *Fort Sumner, Guadalupe County, N. Mex.*, on the top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 721A, 2.7 meters from the center of the track. (Note 4.*)

Z_3.—At *Aguda, Guadalupe County, N. Mex.*, at the east end of a short cut on the Atchison, Topeka & Santa Fe Railway right of way, 43 meters west of the west line of the concrete foundation of the section house, 9 meters west of a road crossing, 32 meters south of the track at the mail crane, and 1.2 meters from the south right-of-way fence. (Note 2.*)

A_4.—At *Ricardo, Guadalupe County, N. Mex.*, on the east face of the pillar in the center of the east end of the porch of the Atchison, Topeka & Santa Fe Railway reinforced-concrete depot, 1.3 meters above the ground. (Note 1.*)

B_4.—About 2.7 miles west of *Ricardo, Guadalupe County, N. Mex.*, just off the Atchison, Topeka & Santa Fe Railway right of way, at the telegraph pole marked "733," 18 meters east of the rail section marking the exact mile, and 35 meters south of the center of the track. (Note 11.*)

C_4.—At *Evanola (Gillespie), Guadalupe County, N. Mex.*, just off the Atchison, Topeka & Santa Fe Railway right of way, 36 meters south of the center of the track at the station sign, and 36 meters east of the rail section marking mile 737. (Note 2.*)

D_4.—About 2.9 miles east of *Yeso, Guadalupe County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 741A, at the elevation of the railway bench mark 4696.07 (iron spike), and 2.85 meters from the center of the track. (Note 1.*)

E_4.—At *Yeso, Guadalupe County, N. Mex.*, 100 meters west of the Atchison, Topeka & Santa Fe Railway depot, on the right of way, just east of a road crossing, about 40 meters north of the center of the main-line track, and 0.8 meter from the fence. (Note 11.*)

F_4.—At *Yeso, Guadalupe County, N. Mex.*, ¼ mile west of the Atchison, Topeka & Santa Fe Railway depot, on top of the northeast corner of the southeast footing of the coal chute, 7.6 meters south of the center of the main-line track, and 2.4 meters south of the center of a passing track. (Note 16.*)

G_4.—At *Largo, Guadalupe County, N. Mex.*, on the right of way of the Atchison, Topeka & Santa Fe Railway, 31 meters south of the center of the track, in range with the west end of the section house, and 0.8 meter from the south fence. (Note 2.*)

H_4.—About 0.9 mile west of *Largo, Guadalupe County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 751A, 0.15 meter north of the railway bench mark 4991.27 (iron bolt). (Note 1.*)

I_4.—At *Buchanan, Guadalupe County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 285 meters east of the depot, 43 meters south of the center of the track in range with the west end of the section house, and 20 meters east of a gate in the south fence. (Note 11.*)

J_4.—About 0.7 mile west of *Buchanan, Guadalupe County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 756A, over Gillespie Draw, 2.6 meters from the center of the track and 0.15 meter south of the railway bench mark 5142.88 (iron bolt). (Note 4.*)

K_4.—About 2.7 miles west of *Buchanan, Guadalupe County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 758C, 2.55 meters from the center of the track and 0.25 meter south of the railway bench mark 5206.57 (iron bolt). (Note 16.*)

L_4.—At *Cardenas, Guadalupe County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 240 meters east of the station sign, 78 meters east of the east side of the section house, 33 meters south of the center of the main-line track, and 6 meters west of a gate in the south fence. (Note 2.*)

M_4.—About 1.2 miles west of *Cardenas, Guadalupe County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 762B, over Bonita Draw, 2.93 meters from the center of the track, and 0.13 meter north of the railway bench mark 5325.13 (iron bolt). (Note 4.*)

N_4.—At *Duoro, Guadalupe County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 224 meters east of the depot, 46 meters north of the center of the main-line track, and 1 meter from the fence. (Note 11.*)

O_4.—About 1.7 miles west of *Duoro, Guadalupe County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 770B, 2.8 meters from the center of the track. (Note 1.*)

P_4.—About 4.6 miles west of *Duoro, Guadalupe County, N. Mex.*, on top of the north end of the west abutment of the Atchison, Topeka & Santa Fe Railway bridge 773A, 2.85 meters from the center of the track. (Note 16.*)

Q_4.—At *Casaus, Guadalupe County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 473 meters east of the station sign, 30 meters south of the center of the track in range with the west side of the section house, and 52 meters southwest of bridge 775B. (Note 11.*)

R_4.—About 1.5 miles west of *Casaus, Guadalupe County, N. Mex.*, on top of the east end of the south retaining wall of the double concrete arch 777A of the Atchison, Topeka & Santa Fe Railway, 2.9 meters south of the center of the track. (Note 1.*)

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* See pp. 162-166.

S_4.—At *Iden, Guadalupe County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, across the track from and in range with the west end of the section house, 31 meters south of the center of the main-line track, and 1 meter from the fence. (Note 2.*)

T_4.—About 2.7 miles east of *Vaughn, Guadalupe County, N. Mex.*, on top of the west end of the north retaining wall of the concrete arch 784B on the Atchison, Topeka & Santa Fe Railway, 3.75 meters north of the center of the track. (Note 4.*)

U_4.—At *Vaughn, Guadalupe County, N. Mex.*, on north face of the center pillar of the porch of the Atchison, Topeka & Santa Fe Railway depot, 1.4 meters above the flagging. (Note 1.*)

V_4.—At *Vaughn, Guadalupe County, N. Mex.*, on top of the west pillar of the main entrance to the Atchison, Topeka & Santa Fe Railway reading room. (Note 1.*)

W_4.—About 1.4 miles west of *Vaughn, Guadalupe County, N. Mex.*, just off the Atchison, Topeka & Santa Fe Railway right of way about 75 meters east of milepost 789, on the east slope of a knoll opposite a rock quarry, and 34 meters south of the center of the track. (Note 2.*)

X_4.—About 2.9 miles west of *Vaughn, Guadalupe County, N. Mex.*, on top of the east end of the south retaining wall of the Atchison, Topeka & Santa Fe Railway concrete arch, 789A, over the El Paso & Southwestern Railroad tracks, about 4.0 meters below the rail. (Note 1.*)

Y_4.—At *Tejon, Torrance County, N. Mex.*, 30 meters west of the west end of a passing track, on top of the east end of the north retaining wall of the Atchison, Topeka & Santa Fe Railway concrete arch 792A. (Note 16.*)

Z_4.—About 2.2 miles east of *Carnero, Torrance County, N. Mex.*, on top of the south retaining wall of the double concrete arch, 795A, on the the Atchison, Topeka & Santa Fe Railway, 4.6 meters from the center of the track. (Note 1.*)

A_5.—At *Carnero, Torrance County, N. Mex.*, 247 meters west of the station sign, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 798A, 2.68 meters from the center of the track. (Note 1.*)

B_5.—About 3.4 miles east of *Encino, Torrance County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 800A, 2.62 meters from the center of the track. (Note 16.*)

C_5.—At *Encino, Torrance County, N. Mex.*, on the south face or front of the Atchison, Topeka & Santa Fe Railway reinforced-concrete depot, 0.7 meter west of the west side of the arch on the east end of the depot, 0.9 meter east of the east side of the door to the waiting room, and 1.3 meters above the flagging. (Note 1.*)

D_5.—About 2.2 miles west of *Encino, Torrance County, N. Mex.*, just off the Atchison, Topeka & Santa Fe Railway right of way, 33 meters south of the center of the track at milepost 806, and on the north side of a wagon road. (Note 2.*)

E_5.—About 1.8 miles east of *Negra, Torrance County, N. Mex.*, on top of the north end of east abutment of the Atchison, Topeka & Santa Fe Railway bridge 806A, 2.9 meters north of the center of the track. (Note 1.*)

F_5.—At *Negra, Torrance County, N. Mex.*, on top of the north head wall of the Atchison, Topeka & Santa Fe Railway cast-iron culvert 808B, 3.4 meters from the center of the track. (Note 1.*)

G_5.—About 2.9 miles east of *Pedernal, Torrance County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 812A, 2.8 meters from the center of the track. (Note 1.*)

H_5.—At *Pedernal, Torrance County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 32 meters south of the center of the track, in range with the east end of the depot. (Note 2.*)

I_5.—At *Dunmoor, Torrance County, N. Mex.*, at the east end of a passing track, 500 meters east of the station sign, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 818A, 2.8 meters from the center of the track. (Note 1.*)

J_5.—About 2.8 miles west of *Dunmoor, Torrance County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 30 meters south of the center of the track, at milepost 822, about 110 meters east of a point of curve. (Note 2.*)

K_5.—About 3.1 miles east of *Lucy, Torrance County, N. Mex.*, on top of the east end of the north retaining wall of the double concrete arch 825A on the Atchison, Topeka & Santa Fe Railway. (Note 16.*)

L_5.—About 0.9 mile east of *Lucy, Torrance County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 827A. (Note 16.*)

M_5.—At *Lucy, Torrance County, N. Mex.*, 33 meters south of the center of the track at the Atchison, Topeka & Santa Fe Railway depot. (Note 2.*)

N_5.—About 4.2 miles west of *Lucy, Torrance County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 32 meters south of the center of the track at milepost 833. (Note 2.*)

O_5.—At *Silio, Torrance County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, ⅛ mile east of the station sign, and 28 meters south of the center of the track at milepost 836. (Note 2.*)

P_5.—At *Willard, Torrance County, N. Mex.*, on the south face of the Atchison, Topeka & Santa Fe Railway pump house, 0.20 meter from the southwest corner, and 1.50 meters above the ground. (Note 4.*)

Q_5.—At *Willard, Torrance County, N. Mex.*, about ¼ mile east of the Atchison, Topeka & Santa Fe Railway depot, on the right of way, 33 meters south of the center of the track, and 85 meters east of the crossing of the New Mexico Central Railroad tracks. (Note 2.*)

R_5.—At *Willard, Torrance County, N. Mex.*, on the south face of the Atchison, Topeka & Santa Fe Railway reinforced-concrete depot, 0.60 meter east of the east side of the waiting-room door, 0.67 meter west of the west side of the porch arch, and 1.27 meters above the flagging. (Note 1.*)

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* See pp. 162-166.

S_5.—About 3.8 miles west of *Willard, Torrance County, N. Mex.*, on top of the east end of the north retaining wall of the Atchison, Topeka & Santa Fe Railway concrete arch 845A. (Note 1.*)

T_5.—At *Broncho, Torrance County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 31 meters south of the center of the track, in range with the west side of the section house, 0.8 meter from the south fence, and 5 meters east of the east end of a passing track. (Note 2.*)

U_5.—At *Broncho, Torrance County, N. Mex.*, about 70 meters west of the west end of a passing track, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fè Railway bridge 849C. (Note 4.*)

V_5.—About 3.6 miles east of *Mountainair, Torrance County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 852A. (Note 1.*)

W_5.—At *Mountainair, Torrance County, N. Mex.*, 0.4 mile east of the Atchison, Topeka & Santa Fe Railway depot, on top of the south end of the east abutment of bridge 855A. (Note 4.*)

X_5.—At *Mountainair, Torrance County, N. Mex.*, on the south face of the Atchison, Topeka & Santa Fe Railway reenforced concrete depot, 0.95 meter east of the east side of the waiting-room door, 0.70 meter west of the west side of the porch arch, and 1.34 meters above the flagging. (Note 1.*)

Y_5.—About 1.7 miles west of *Mountainair, Torrance County, N. Mex.*, on top of the north retaining wall of the Atchison, Topeka & Santa Fe Railway concrete arch 857A. (Note 4.*)

Z_5.—About 3.8 miles west of *Mountainair, Torrance County, N. Mex.*, on top of the north end of the west abutment of the Atchison, Topeka & Santa Fe Railway bridge 859A. (Note 4.*)

A_6.—At *Abo, Torrance County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 35 meters south of the center of the track, and 0.5 meter from the south fence, in range with the west side of section house, and 30 meters east of bridge 861D. (Note 2.*)

B_6.—About 0.6 mile west of *Abo, Torrance County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 862A. (Note 1.*)

C_6.—About 2.8 miles west of *Abo, Torrance County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 865D. (Note 4.*)

D_6.—About 0.4 mile west of *Scholle, Valencia County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 869A. (Note 1.*)

E_6.—About 0.9 mile west of *Scholle, Valencia County, N. Mex.*, on top of the east end of the north retaining wall of the Atchison, Topeka & Santa Fe Railway concrete arch 869B. (Note 4.*)

F_6.—About 2.5 miles west of *Scholle, Valencia County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 871B, the first bridge over the Rio Abo going down the canyon. (Note 1.*)

G_6.—About 1.2 miles east of *Sais* (siding), *Valencia County, N. Mex.*, on top of the north end of the west abutment of the Atchison, Topeka & Santa Fe Railway bridge 874A, the last bridge over the Rio Abo going down the canyon. (Note 4.*)

H_6.—At *Sais* (siding), *Valencia County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 54 meters south of the center of the track, 0.8 meter from fence, and 17 meters east of the range of the east side of the section house. (Note 2.*)

I_6.—At *Becker, Valencia County, N. Mex.*, on the west face of the Atchison, Topeka & Santa Fe Railway reenforced concrete pump house, 0.27 meter from the northwest corner, 1.17 meters above the ground, 0.38 meter north of the north side of the window, and 0.18 meter below the window sill. (Note 4.*)

J_6.—At *Becker, Valencia County, N. Mex.*, on the south face of the Atchison, Topeka & Santa Fe Railway reenforced concrete depot, 0.80 meter east of the east side of the waiting-room door, and 1.3 meters above the flagging. (Note 1.*)

K_6.—1 mile west of *Bodega, Valencia County, N. Mex.*, 23 meters south of the Atchison, Topeka & Santa Fe Railway track at the rail section marking mile 887, and 3 meters east of the telegraph pole marked "887." (Note 2.*)

L_6.—About 2.1 miles east of *Madrone, Valencia County, N. Mex.*, 23 meters south of the center of the Atchison, Topeka & Santa Fe Railway track, 7 meters west of the telegraph pole marked 890, ¼ mile west of a long cut, on the west slope of a small sandy knoll. (Note 2.*)

M_6.—At *Madrone, Valencia County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, in front of and across the track from the section house, 23 meters east of the center of the track, 4 meters east of a ditch, and 1 meter above the grade of the railroad. (Note 2.*)

N_6.—About 2.8 miles east of *Belen, Valencia County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 893A over the Rio Grande. (Note 1.*)

O_6.—About 2.7 miles east of *Belen, Valencia County, N. Mex.*, on the south end of the west abutment of the Atchison, Topeka & Santa Fe Railway bridge 893A over the Rio Grande. (Note 4.*)

U. S. G. S. 4793.—About 1.7 miles south of *Belen, Valencia County, N. Mex.*, 50 feet west of the junction of the Atchison, Topeka & Santa Fe Railway main line with the Belen cut-off, 260 feet south of milepost 934. (Note 18.*) The top of the cap was found apparently battered down about 1.5 centimeters; the cross in the center was, however, taken as the bench mark.

P_6.—At *Belen, Valencia County, N. Mex.*, on the east face of the Atchison, Topeka & Santa Fe Railway pebble-dashed brick depot, 0.64 meters from the northeast corner, 1.3 meters above the flagging. (Note 1.*)

Q_6.—At *Belen, Valencia County, N. Mex.*, in the sidewalk in the center of the north arch on the east side of the porch of the Atchison, Topeka & Santa Fe Railway eating house, a pebble-dashed brick structure, 100 meters east of the depot. (Note 4.*)

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* See pp. 162–166.

U. S. G. S. 4808.—About 1.2 miles north of *Belen, Valencia County, N. Mex.*, 50 feet east of the Atchison, Topeka & Santa Fe Railway tracks at a road crossing. (Note 18.*)

U. S. G. S. 4821.—About 5.7 miles south of *Los Lunas, Valencia County, N. Mex.*, at the south end of the Mexican town of Los Chaves, 12 meters west of the Atchison, Topeka & Santa Fe Railway track, opposite the first pole south of milepost 928, on the west side of a wagon road paralleling the railroad, and 3 meters north of a large cottonwood tree. (Note 18.*)

U. S. G. S. 4833.—About 3.0 miles south of *Los Lunas, Valencia County, N. Mex.*, 50 feet east of the Atchison, Topeka & Santa Fe Railway track, 10 feet north of a gate. (Note 18.*)

R_6.—About 1.7 miles south of *Los Lunas, Valencia County, N. Mex.*, 17 meters west of the Atchison, Topeka & Santa Fe Railway tracks, 160 meters south of milepost 924, 0.5 meter south of the right-of-way fence, 7 meters east of a cottonwood tree on the bank of an irrigation ditch, and 1.5 meters north of a gate and of a road crossing. (Note 2.*)

S_6.—At *Los Lunas, Valencia County, N. Mex.*, 200 meters south of the Atchison, Topeka & Santa Fe Railway station, on the east face of the stone pump house, 0.34 meter north of the southeast corner, 0.34 meter south of the window at the level of the sill, and 1.34 meters above the ground. (Note 4.*)

U. S. G. S. 4851.—At *Los Lunas, Valencia County, N. Mex.*, 700 feet north of the Atchison, Topeka & Santa Fe Railway station, 60 feet west of the track at a road crossing, at the northeast corner of Solomon Lunas's yard fence. (Note 18.*)

T_6.—About 2.7 miles north of *Los Lunas, Valencia County, N. Mex.*, 15 meters east of the Atchison, Topeka & Santa Fe Railway tracks, 15 meters south of a gate, and 23 meters south of an old irrigation ditch. (Note 2.*)

U. S. G. S. 4891.—At *Isleta, Bernalillo County, N. Mex.* (See p. 241.)

N_2.—At *Isleta, Bernalillo County, N. Mex.* (See p. 241.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN LOUISVILLE, KY., AND CAIRO, ILL., ESTABLISHED BY THE CORPS OF ENGINEERS, UNITED STATES ARMY, IN 1903, 1905, AND 1906.

(These descriptions are from information furnished by the Chief of Engineers. Changes have been made chiefly for the purpose of condensing under general notes and indexing according to locality.)

U. S. E. B. M. No. 10 (=602B).—At *Louisville, Jefferson County, Ky.*, the north quadrant of a cross in a circle on an old abutment on the south side of the Louisville & Portland Canal, near the west end of the gate recess near Tenth Street.

U. S. E. B. M. 603.—At *Louisville, Jefferson County, Ky.*, on the south side of the Louisville & Portland Canal, about a mile east of the locks at Twenty-seventh Street. The mark is the top of an iron post, 3 feet underground, 3.75 meters from the eastern one of two cross marks in the canal wall, and 3.35 meters from the western one.

U. S. E. B. M. 604M.—At *Louisville, Jefferson County, Ky.*, on the west side of the approach to the Twenty-seventh Street Bridge. The mark is the top of an iron bar 4.3 meters south of the engine house.

P. B. M. 604.—At *Louisville, Jefferson County, Ky.*, near the foot of the stone steps and revetment in the rear of the power house at the upper lock chamber of the Louisville & Portland Canal. (Note 61.*)

Guard Pier.—At *Louisville, Jefferson County, Ky.*, a cross cut on the north abutment of the guard gates of the 80-foot lock of the Portland & Louisville Canal, 3.14 meters north of the south face of the abutment and 17.77 meters east of a bridge.

P. B. M. 604A.—At *Louisville, Jefferson County, Ky.*, a square, lettered U. S. B. M., cut in the west face of the downstream side of the mouth of the Thirty-fourth Street sewer, 1.5 meters from the northwest corner, and 1.8 meters below the top of the sewer.

P. B. M. 605.—At *Louisville, Jefferson County, Ky.*, opposite the plant of the Barth Leather Co., at New Albany, Ind., about 250 meters upstream from an old brick residence on the Kentucky shore, and 380 meters below the North Thirty-fifth Street sewer. (Note 61.*)

P. B. M. 606.—At *Louisville, Jefferson County, Ky.*, opposite the lower old frame house between the pumping station and the sawmill at New Albany, Ind., and directly opposite the rock ledge above Falling Run. The mark is the center of a cast-iron cap under a box lid, 3 feet below the surface of the ground.

P. B. M. 607.—At *Louisville, Jefferson County, Ky.*, at the top of the bank in Fontaine Ferry Park, 110 meters above the steps to the bathing beach, 76 meters above the bath houses, and opposite a point midway between the brick house and the upstream end of a rock ledge. (Note 61.*)

P. B. M. 607A.—At *Louisville, Jefferson County, Ky.*, below Fontaine Ferry Park, at the mouth of the Broadway sewer. The mark is a cross cut on an anchor bolt, the seventh in the land-side row counting from the upstream end of the mouth of the sewer. The capstone of the sewer is marked with a cross lettered U. S. B. M.

P. B. M. 608.—At *Louisville, Jefferson County, Ky.*, about 40 meters below the steps at the entrance to Riverview Park, and 5 meters down from the dancing pavilion, at the top of a bank. (Note 61.*)

P. B. M. 609.—At *Louisville, Jefferson County, Ky.*, opposite a one-story yellow house under a large silver poplar tree on the Indiana shore, 5 meters back from the top of the first bank above the river. (Note 61.*)

P. B. M. 610.—6 miles below *Louisville, Jefferson County, Ky.*, at the top of the first bank above the river, and about 250 meters below a new frame house with a metal roof, on the Indiana shore. (Note 61.*)

P. B. M. 611.—7 miles below *Louisville, Jefferson County, Ky.*, 5 meters back from the top of the first bank above the river, about 300 meters above the white brick house at the head of Hughes Bar, and opposite a point midway between a whitewashed barn and frame house on the Indiana shore. (Note 61.*)

*See pp. 162-166.

P. B. M. 612.—8 miles below *Louisville, Jefferson County, Ky.*, halfway between the top of the first bank and the foot of the second bank above the river, about 400 meters above the Government light at Hughes Bar, and opposite a barn about 250 meters back from the top of the bank on the Indiana shore. (Note 61.*)

P. B. M. 613.—9 miles below *Louisville, Jefferson County, Ky.*, midway between the top of the first bank and the foot of the second bank above the river, about 295 meters above a gully 45 meters wide, and about 400 meters below a one-and-one-half story frame house on the Indiana shore. (Note 61.*)

P. B. M. 614.—In *Jefferson County, Ky.*, near *Bridgeport* (*Locust Point* post office, *Ind.*), at the top of the first bank above the river, and about 300 meters below a two-story frame house on the Indiana shore. (Note 61.*)

P. B. M. 614A.—In *Jefferson County, Ky.*, opposite *Bridgeport* (*Locust Point* post office, *Ind.*) on the second terrace above the river. The mark is a railroad spike in the root of a 38-inch maple tree, which has been blazed by fire on the side away from the river, and on which the high-water marks of 1883 and 1884 are cut.

P. B. M. 615.—Near *Greenwood Landing, Jefferson County, Ky.*, 8 meters back from the top of the first bank above the river, and about 200 meters above a whitewashed barn on the Indiana shore. (Note 61.*)

P. B. M. 616.—At *Greenwood Landing, Jefferson County, Ky.*, at the foot of the second bank above the river, and about 250 meters above the Government light at Beelers Landing, Ind. (Note 61.*)

P. B. M. 617.—In *Jefferson County, Ky.*, near *Stewarts Landing, Ind.*, at the foot of the second bank above the river, opposite a point about 200 meters above the upstream side of the second ravine below Frank McHarry's tomb on the Indiana shore, and 0.6 meter down hill from the line of two 3-inch elm stumps, 2.1 meters apart. (Note 61.*)

P. B. M. 618.—Near *Valley Station, Jefferson County, Ky.*, about 900 meters above the highway leading to the station, and opposite a point about 500 meters above the steps on the Indiana shore, leading to Maple Grove. (Note 61.*)

P. B. M. 619.—Near *Johnsontown, Jefferson County, Ky.*, at the foot of the second bank above the river, ½ mile below Johnsontown Road Landing, ⅔ mile above Twelve-Mile Light, and opposite a two-story frame dwelling, surrounded by 3 red outbuildings, on the Indiana shore. (Note 61.*)

P. B. M. 620.—Near *Bethany, Jefferson County, Ky.*, at the line of cultivation 560 meters below Twelve-Mile Light, and opposite a point about 550 meters below an old barn on the Indiana shore. (Note 61.*)

P. B. M. 621.—Near *Kosmosdale, Jefferson County, Ky.*, and nearly opposite *Rees Landing, Ind.*, under the top of the second bank above the river, opposite the point of a cliff, and about 300 meters below a dwelling house on the Indiana shore. (Note 61.*)

P. B. M. 622.—Near *Kosmosdale, Jefferson County, Ky.*, 6 meters from the top of the river bank, near the line of cultivation, and about 150 meters below the whitewashed barn at Rees Landing on the Indiana shore. (Note 61.*)

P. B. M. 623.—Near *Kosmosdale, Jefferson County, Ky.*, at the top of the river bank, 10 meters from the line of cultivation, and about 900 meters above the Government light at Rosewood Landing, Ind. (Note 61.*) It was searched for without success in 1910.

P. B. M. 623A.—At *Kosmosdale, Jefferson County, Ky.*, a cross cut on the anchor bolt, 0.78 meter north of the south end of the pedestal at the south foot of the stiff-leg derrick of the Kosmos Cement Works.

P. B. M. 624.—At *Kosmosdale, Jefferson County, Ky.*, near the top of the river bank, about 120 meters below the Kosmos Cement Works, and 5 meters above a large cottonwood tree with an electric light suspended from the side facing the river. (Note 61.*) It was searched for without success in 1910.

P. B. M. 625.—Near *Kosmosdale, Jefferson County, Ky.*, 9 meters back from the top of the first bank above the river, at the edge of a line of willows and opposite a two-story frame house on the Indiana shore. (Note 61.*)

P. B. M. 626.—In *Jefferson County, Ky.*, near *West Point, Hardin County, Ky.*, about 35 meters directly up the river bank from a large rock at the waters edge, about 7 by 5 by 3.5 feet. (Note 61.*)

U. S. G. S. 441.—At *West Point, Hardin County, Ky.*, at the southeast corner of Highland and Carter Streets, on the stone window sill of the Kentucky and Indiana Bank Building. (Note 17.*)

P. B. M. 627.—At *West Point, Hardin County, Ky.*, 9 meters back from the top of the river bank, 240 meters below the Government light, and 3.7 meters from a fence line. (Note 61.*)

P. B. M. 628.—Near *West Point, Hardin County, Ky.*, at the edge of the willow line near the foot of the second bank above the river, and opposite a point about 240 meters above a white frame house under a cliff on the Indiana shore. (Note 61.*)

P. B. M. 629.—In *Hardin County, Ky.*, opposite *Evans Landing, Ind.*, 9 meters back from the top of the first bank above the river, and opposite the Government light on the Indiana shore. (Note 61.*)

P. B. M. 630.—In *Meade County, Ky.*, near *Browns Landing, Ind.*, at the top of the first bank above the river, at the edge of cultivation, and opposite a point about 240 meters below the white frame house at Browns Landing. (Note 61.*)

P. B. M. 631.—In *Meade County, Ky.*, near *Browns Landing, Ind.*, at the top of the first bank above the river, and opposite a point midway between the Government light on the Indiana shore and the mouth of Mosquito Creek. (Note 61.*)

P. B. M. 632.—Near *Rock Haven, Meade County, Ky.*, at the foot of the second bank above the river, 15 meters below a one-story frame house on the Kentucky shore, and opposite a point about 120 meters below the mouth of Mosquito Creek on the Indiana shore. (Note 61.*)

P. B. M. 633.—Near *Rock Haven, Meade County, Ky.*, at the top of the river bank, about 375 meters above the mouth of Otter Creek, Ky., and opposite Hughes Landing, Ind. (Note 61.*)

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* See pp. 162-166.

P. B. M. 634.— ¾ mile above *Rock Haven* landing, *Meade County, Ky.*, on the second terrace of the river bank, and 15 meters below the Government light. (Note 61.*)

P. B. M. 635.—At *Rock Haven, Meade County, Ky.*, in dense willows at the foot of the river bank, and about 30 meters below the mouth of the creek. (Note 61.*)

P. B. M. 635 A.—At *Rock Haven, Meade County, Ky.*, a cross cut in the top of a ring bolt, about 30 meters below the mouth of the creek.

P. B. M. 636.—Near *Rock Haven, Meade County, Ky.*, opposite *Cedar Farm Landing, Ind.*, and about 200 meters above a large hay barn in a cedar grove on the Indiana shore. (Note 61.*)

P. B. M. 637.—Near *Dittoes Landing, Meade County, Ky.*, near the top of the river bank, opposite a point about 60 meters below a large barn on the Indiana shore, and about 725 meters above the Government light at the landing. (Note 61.*)

P. B. M. 638.—Near *Dittoes Landing, Meade County, Ky.*, at the top of the first terrace of the river bank, and about 725 meters above Tobacco Landing, Ind. (Note 61.*)

P. B. M. 639.—In *Meade County, Ky.*, about ½ mile below *Tobacco Landing, Ind.*, at the top of the river bank, near the line of cultivation, about 350 meters above the mouth of a small branch on the Kentucky shore and opposite a red-rock cliff on the Indiana shore. (Note 61.*)

P. B. M. 640.—Near *Brandenburg, Meade County, Ky.*, at the top of the river bank near the line of cultivation, ¾ mile above Millers Landing, and about 300 meters above the one-story white frame house at the mouth of a creek on the Indiana shore. (Note 61.*)

P. B. M. 641.—Near *Brandenburg, Meade County, Ky.*, at the highest point of the river bank, between a frame house and a clump of large trees at the head of Brandenburg Bar, and about 200 meters above the Government light on the Indiana shore. (Note 61.*)

P. B. M. 642.—About 1 mile above *Brandenburg, Meade County, Ky.*, on the top of the river bank in cultivated ground, and about 300 meters below a one-story white frame house at the top of the bank on the Indiana shore. (Note 61.*) In 1910 it was found to be broken and unreliable.

P. B. M. 643.—At *Brandenburg, Meade County, Ky.*, in the courthouse yard, 9 meters north of the northwest corner of the courthouse. (Note 61.*)

P. B. M. 643 A.—At *Brandenburg, Meade County, Ky.*, a square, cut and lettered U. S. B. M., on the stone water table, 1.5 meters south of the northwest corner of the courthouse.

P. B. M. 644.—About 1 mile below *Brandenburg, Meade County, Ky.*, on the steep rocky river bank, and opposite a point about 475 meters above the mouth of Buck Creek on the Indiana shore. In 1910 the top of the bench mark was found to be cracked. (Note 61.*)

P. B. M. 645.—In *Meade County, Ky.*, about 300 meters above the landing at *Mauckport, Ind.*, on the top of the river bank at the edge of cultivation, about 125 meters below a small branch, and about 215 meters below an old frame house with a row of cedars in front of it. (Note 61.*)

P. B. M. 646.—In *Meade County, Ky.*, ¾ mile below *Mauckport, Ind.*, midway between the top of the first bank and the foot of the second bank above the river, and about 150 meters above the mouth of a small creek 5 feet wide. (Note 61.*)

P. B. M. 647.—In *Meade County, Ky.*, near *Mauckport, Ind.*, about 120 meters below the road at Haynes Landing, under a large elm tree at the foot of the second bank above the river. (Note 61.*)

P. B. M. 648.—In *Meade County, Ky.*, near *Mauckport, Ind.*, at the top of the river bank near the line of cultivation, about the center of Haynes Bar, about 550 meters above the mouth of a small creek, and opposite a point midway between Haunted Hollow and two frame houses at the mouth of the next hollow below on the Indiana shore. (Note 61.*)

P. B. M. 651.—In *Meade County, Ky.*, near *Mauckport, Ind.*, ⅔ mile below the Kosmos cement quarry, at the top of the river bank, 18 meters north of an old frame house belonging to the Kosmos Cement Co., about 30 meters above the mouth of a small branch. (Note 61.*)

P. B. M. 654.—Near *Crecelius, Meade County, Ky.*, near the top of the river bank in a gully made by a small field drain, about 6 meters below the line of cultivation, about 360 meters below a landing, about 240 meters above the mouth of a small branch, and opposite a point about 300 meters above the mouth of Big Indian Creek on the Indiana shore. (Note 61.*)

P. B. M. 655.—Near *Crecelius, Meade County, Ky.*, at the top of the river bank in the meadow at Shaws Landing, about 600 meters above Swans Landing on the Indiana shore, and about 25 meters below a hay barn. (Note 61.*)

P. B. M. 656.—Near *Crecelius, Meade County, Ky.*, about 6 meters below the foot of the second bank above the river, opposite a point about 490 meters above a white log house at the upstream side of a ravine on the Indiana shore. (Note 61.*)

P. B. M. 657.—Near *Crecelius, Meade County, Ky.*, at the top of the river bank, at the edge of a cultivated field about 30 meters above Crecelius Landing, and opposite Kendles Landing above Upper Blue River Island. (Note 61.*)

P. B. M. 658.—Near *Peckenpaugh, Meade County, Ky.*, 6 meters back from the top of the first bank above the river, about 60 meters below Peckenpaugh landing, and opposite the center of Upper Blue River Island. (Note 61.*)

P. B. M. 660.—In *Meade County, Ky.*, near *Leavenworth, Ind.*, 12 meters back from the top of the river bank, and opposite a point about 90 meters below the mouth of Big Blue River. (Note 61.*)

See pp. 162-166.

P. B. M. 661.—In *Meade County, Ky.*, near *Leavenworth, Ind.*, at the top of the river bank in a pear orchard, 8 meters above a yellow cottage belonging to Mrs. Higgins of New York, and nearly opposite Leavenworth Wharf on the Indiana shore. (Note 61.*)

P. B. M. 661A.—At *Leavenworth, Crawford County, Ind.*, at the northeast corner of Frank and Nelson Streets, on the foundation capstone, 3.7 meters east of the southwest corner of the Merchants Hotel. The mark is a chiseled square lettered "B. M."

High Water 1883.—At *Leavenworth, Crawford County, Ind.*, on the inside of the rear wall of Shaw's old warehouse on the east side of Nelson Street, and about 15 meters north of Second Street.

High Water 1884.—At *Leavenworth, Crawford County, Ind.*, in the same location as high water 1883.

P. B. M. 662.—In *Meade County, Ky.*, below *Leavenworth, Ind.*, in a dense willow growth at the top of the river bank about 300 meters below Indian Hollow. (Note 61.*)

P. B. M. 663.—In *Meade County, Ky.*, near *Leavenworth, Ind.*, at the top of the river bank near the line of cultivation and opposite a point about 360 meters below a log house on the Indiana shore. (Note 61.*)

P. B. M. 664.—Near *Crecelius, Meade County, Ky.*, at the top of the first terrace above the river in a growth of willows near the line of cultivation and opposite a point about 490 meters below a frame house on the Indiana shore. (Note 61.*)

P. B. M. 665.—Near *Crecelius, Meade County, Ky.*, at the top of the first terrace above the river, at the line of cultivation, and about 30 meters below a large beach tree below Allens Landing. (Note 61.*)

P. B. M. 666.—At *Crecelius, Meade County, Ky.*, at the top of the river bank about 60 meters below Crecelius Landing, about 50 meters below a small branch, and opposite Schooners Point on the Indiana shore. (Note 61.*)

P. B. M. 667.—Near *Crecelius, Meade County, Ky.*, on a rock about 4 by 5 feet about 400 meters below the light at Schooners Point. The mark is a square cut on the rock and lettered "U. S. B. M."

P. B. M. 668.—Near *Crecelius, Meade County, Ky.*, at the line of vegetation on the river bank, about 250 meters above a white house and about 300 meters above Lyons Landing on the Indiana shore. The mark is a square cut on a stone and lettered "USBM668."

P. B. M. 669.—Near *Cedar Branch, Meade County, Ky.*, at the top of the first terrace above the river, and about 300 meters below the Government light at Cedar Branch. (Note 61.*)

P. B. M. 670.—Near *Cedar Branch, Meade County, Ky.*, about 240 meters below Holcrofts Landing, Ind., 2.1 meters above a large stone 6 by 15 by 25 feet on the river bank. (Note 61.*)

P. B. M. 671.—Near *Wolf Creek, Meade County, Ky.*, opposite Cape Sandy Landing on the Indiana shore, and about 200 meters below the mouth of a small creek. (Note 61.*)

P. B. M. 672.—Near *Wolf Creek, Meade County, Ky.*, at the top of the first terrace above the river near the line of cultivation, and opposite a point about 490 meters below the Government light at Peepenpaughs Bar on the Indiana shore. (Note 61.*)

P. B. M. 673.—Near *Wolf Creek, Meade County, Ky.*, at the top of the river bank at the edge of cultivation about 725 meters above Wolf Creek Landing. (Note 61.*)

P. B. M. 674.—Near *Wolf Creek, Meade County, Ky.*, about ½ mile below Wolf Creek Landing, at the top of the river bank at the edge of cultivation and about 100 meters below the Government light in a tree. (Note 61.*)

P. B. M. 678.—In *Meade County, Ky.*, near *Alton, Ind.*, on the Hardin farm on the top of the river bank at the edge of cultivation, about 290 meters above the landing and 75 meters below a steamboat wreck near the Kentucky shore, and opposite a point 240 meters above a one-and-one-half story frame house above Gaileys Landing on the Indiana shore. (Note 61.*)

P. B. M. 679.—Near *Concordia, Meade County, Ky.*, at the highest point of the first bank above the river, about 120 meters above Willards Landing, and about 430 meters above Rona Landing. (Note 61.*)

P. B. M. 680.—Near *Concordia, Meade County, Ky.*, at the highest point of the river bank at the edge of a cultivated field, about 490 meters above a large barn on the Indiana shore, about 275 meters above a frame house in Kentucky, and opposite a deserted log house in Indiana. (Note 61.*)

P. B. M. 681.—Near *Concordia, Meade County, Ky.*, near the top of the river bank in a cottonwood grove about ¼ mile above Boone Hollow Light, and 18 meters back from the willow line. (Note 61.*)

P. B. M. 682.—Near *Concordia, Meade County, Ky.*, on a ledge in the stone quarry 1 mile above Concordia Landing and about 240 meters below a large barn on the Indiana shore. The mark is a square cut on the rock and lettered U. S. B. M. 682.

P. B. M. 683.—At *Concordia, Meade County, Ky.*, at the top of the bank on the south side of the first street below the landing, 1.8 meters east and 4.6 meters north of the northeast corner of an old frame hotel. (Note 61.*)

P. B. M. 684.—1 mile below *Concordia, Meade County, Ky.*, in a cornfield at the top of the river bank, about 200 meters below an old house and about ¼ mile above the Government light. (Note 61.*)

P. B. M. 685.—Near *Concordia, Meade County, Ky.*, at the top of the river bank at the edge of a cultivated field on S. F. Burch's farm at the head of Flint Island, about 450 meters below Burch Landing and about 240 meters above the line of vegetation on the island. (Note 61.*)

P. B. M. 686.—On *Flint Island, Meade County, Ky.*, at the foot of a steep bank on the island, about 125 meters above the Government light on a sycamore tree, about 280 meters above the dike at the foot of the island, and opposite a large barn on the Indiana shore. (Note 61.*)

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* See pp. 162-166.

P. B. M. 687.—On *Flint Island, Meade County, Ky.*, at the top of the river bank in a cultivated field, 60 meters below the Government light near the foot of the island, and about 275 meters above Blue Grass Landing. (Note 61.*)

P. B. M. 687A.—On *Flint Island, Meade County, Ky.*, about 240 meters below Blue Grass Landing and about ¼ mile below the Government light, on a large sandstone rock at the edge of vegetation. The mark is a square cut in the rock, and lettered U. S. B. M.

P. B. M. 688.—At *Burchs Landing, Breckinridje County, Ky.*, on the first terrace above the river at the edge of a cultivated field, opposite a point about 90 meters above a large barn in a meadow on the Indiana shore, which is about 275 meters above the mouth of Oil Creek. (Note 61.*)

P. B. M. 689.—Near *Chenault, Breckinridge County, Ky.*, on the first terrace above the river at the edge of a cultivated field, near three large cottonwood trees, and about 90 meters below the mouth of a creek on the Indiana shore, which is about 275 meters below Derby Landing, opposite the upper end of a detached hill below Derby Landing. (Note 61.*)

P. B. M. 690.—At *Chenault, Breckinridge County, Ky.*, on the second terrace above the river in a pasture field, about 450 meters below Chenault Landing, about 125 meters above a one-story cottage, 15 meters above a large walnut tree, 3.5 meters from a smaller walnut tree, and 1.8 meters back from the fence. (Note 61.*)

P. B. M. 691.—Near *Chenault, Breckinridge County, Ky.*, on the first terrace above the river at the edge of a cultivated field, about 200 meters above Upper Chenault Light, and about 200 meters below a two-story frame house. (Note 61.*)

P. B. M. 692.—Near *Lahant, Breckinridge County, Ky.*, on the first terrace above the river at the edge of a cultivated field, 18 meters above Yellow Bank Creek. (Note 61.*)

P. B. M. 693.—Near *Lahant, Breckinridge County, Ky.*, on the first terrace above the river in a cottonwood grove opposite a point about 30 meters below the lower mouth of Poison Creek. (Note 61.*)

P. B. M. 694.—Near *Ammons, Breckinridge County, Ky.*, on the first terrace above the river in a cottonwood grove about 60 meters below Lower Chenault Light, and opposite a large frame house on the top of a hill on the Indiana shore. (Note 61.*)

P. B. M. 695.—Near *Ammons, Breckinridge County, Ky.*, on the first terrace above the river, 5 meters back from the edge of a cultivated field, about 210 meters above the mouth of Lick Run and 275 meters below a one-story frame cottage on the Indiana shore. (Note 61.*)

P. B. M. 696.—Near *Stephensport, Breckinridge County, Ky.*, at the top of the river bank, about 10 meters from the public road, 10 meters from a big rock, and about 250 meters below the Government light at the head of Stephensport Bend. (Note 61.*)

P. B. M. 697.—Near *Stephensport, Breckinridge County, Ky.*, half way between the edge of the river bank and the river road, about 500 meters above Upper Stephensport Landing, and about 560 meters above Sinking Creek. (Note 61.*)

P. B. M. 697 A.—At *Stephensport, Breckinridge County, Ky.*, on the northeast corner of the capstone of the north pedestal on the east side of the bridge over Sinking Creek. The mark is a chiseled square lettered U.S.B.M.

P. B. M. 698.—Below *Stephensport, Breckinridge County, Ky.*, near the foot of the second bank above the river at the end of a rock ledge about 40 meters above a small creek known as Barlows Branch. (Note 61.*)

P. B. M. 699.—Near *Addison, Breckinridge County, Ky.*, on the steep, wooded bank ⅔ mile above Addison Landing and opposite a point about 250 meters below a white cottage surrounded by maple trees on the Indiana shore. (Note 61.*)

P. B. M. 700.—Near *Addison, Breckinridge County, Ky.*, at the top of the river bank at the edge of a meadow about 490 meters below Addison Landing, in front of a large frame house on the Kentucky side and opposite a large frame house on the Indiana shore. (Note 61.*)

P. B. M. 701.—At *Holt, Breckinridge County, Ky.*, in the edge of the meadow 6 meters back from the edge of the river bank, about 250 meters below a shanty boat on props on the Indiana shore, and nearly north of the store building on the Kentucky shore. (Note 61.*)

P. B. M. 702.—Near *Holt, Breckinridge County, Ky.*, 6 meters back from the top of the river bank in a cultivated field, near an isolated locust tree and opposite a point about 450 meters below a one-story log house on the upper side of a ravine on the Indiana shore. (Note 61.*)

P. B. M. 703.—Near *Holt, Breckinridge County, Ky.*, at the top of the river bank near the edge of a cultivated field, 15 meters above an isolated beech tree, and about 165 meters above Captain Smith's landing. (Note 61.*)

P. B. M. 704.—Near *Cloverport, Breckinridge County, Ky.*, at the edge of a cultivated field, about 250 meters below the mouth of Bull Creek. (Note 61.*)

P. B. M. 705.—Near *Cloverport, Breckinridge County, Ky.*, at the top of the river bank, near the roadside, about 875 meters below the Government light at Carters Landing. (Note 61.*)

P. B. M. 706.—Near *Cloverport, Breckinridge County, Ky.*, at the foot of a hillside about 90 meters above a rock ledge which is above the mouth of a creek. (Note 61.*)

P. B. M. 707.—At *Cloverport, Breckinridge County, Ky.*, at the foot of the middle bank above the river, about 100 meters above the mouth of Upper Creek, 7.8 meters from a 30-inch sycamore tree. (Note 61.*)

P. B. M. 707 A.—At *Cloverport, Breckinridge County, Ky.*, at the northwest corner of Second and Main Streets on the basement doorsill of the Masonic Temple. The mark is a chiseled square, lettered U. S.

High Water 1884.—At *Cloverport, Breckinridge County, Ky.*, at the corner of Second and Main Streets. The mark is a nail in the west wall of Fisher's drug store.

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* See pp. 162–166.

P. B. M. 708.—At *Cloverport, Breckinridge County, Ky.*, at the top of the river bank, 4.9 meters back from the fence line, 27 meters from the house owned by Jesse Keys, about 55 meters below an abandoned tipple, and 115 meters below the Government light. (Note 61.*)

P. B. M. 709.—Near *Cloverport, Breckinridge County, Ky.*, near the top of the river bank about 110 meters below the mouth of Fawcettes Creek, 2.7 meters from a 15-inch sycamore tree and 6.2 meters from a 20-inch cottonwood. (Note 61.*)

P. B. M. 710.—Near *Cloverport, Breckinridge County, Ky.*, 8 meters back from the top of the river bank near the foot of the railroad embankment, about 180 meters below a log and tie landing, and 60 meters above a stone culvert on the Louisville, Henderson & St. Louis Railway. (Note 61.*)

P. B. M. 711.—Near *Skillman, Hancock County, Ky.*, at the top of the river bank in a cultivated field about 275 meters below Groves Landing on the Indiana shore, 3.5 meters from a 3-inch elm tree, and 4.7 meters from a 5-inch locust. (Note 61.*)

P. B. M. 712.—Near *Skillman, Hancock County, Ky.*, at the top of the river bank in a cultivated field, about 450 meters below a large tobacco barn and 550 meters above the Government light on the Indiana shore. (Note 61.*)

P. B. M. 713.—Near *Skillman, Hancock County, Ky.*, about 10 meters from the foot of the second bank above the river, about 25 meters above a large hay barn, 60 meters below a ravine, 950 meters above Skillman Landing, and opposite a frame house with a lone cedar in front of it on the Indiana shore. (Note 61.*)

P. B. M. 714.—Near *Skillman, Hancock County, Ky.*, at the foot of the second bank above the river, about 300 meters below the Government light at Millstone Landing and about 335 meters above a two-story frame house with a row of cedars in front of it. (Note 61.*)

P. B. M. 715.—In *Hancock County, Ky.*, opposite *Deer Creek, Ind.*, on the second terrace above the river in the yard surrounding the residence belonging to the Hogamon brothers and occupied by J. Matingly, and opposite a point about 60 meters below the mouth of Deer Creek. (Note 61.*)

P. B. M. 715 A.—In *Hancock County, Ky.*, opposite *Deer Creek, Ind.*, at the top of the river bank about 50 meters below the house occupied by J. Matingly, on the corner of a line stone between the farms of Hogamon Bros. and Mrs. Eliza Webb. The mark is a chiseled square lettered "U. S."

P. B. M. 716.—Near *Landis Landing, Hancock Counry, Ky.*, on the second terrace above the river about 8 meters back from the edge of the bank, about 250 meters below a barn on the Eliza Webb farm and 425 meters above a house on the same farm occupied by a Mrs. Robbins. (Note 61.*)

P. B. M. 717.—Near *Hawesville, Hancock County, Ky.*, at the top of the river bank, 4.1 meters toward the river from the center line of the road opposite a point about 250 meters below Pauline Landing on the Indiana shore. (Note 61.*)

P. B. M. 717 A.—Near *Hawesville, Hancock County, Ky.*, on the capstone at the northwest corner of the east abutment of the bridge over Indian Creek about 90 meters from its mouth. The mark is a chiseled square lettered "U. S."

P. B. M. 718.—Near *Hawesville, Hancock County, Ky.*, on the first terrace above the river about 25 meters from the top of the first bank and 20 meters from the foot of the second, about 90 meters below a storeroom owned by a Mr. Price and 180 meters above a house occupied by him. The mark is a cut on a cast-iron cap. (Note 61.*)

P. B. M. 719.—Near *Hawesville, Hancock County, Ky.*, at the foot of the bank about 13 meters from the railroad, about 95 meters below trestle 82¾, and about 35 meters above a tool house of the Louisville, Henderson & St. Louis Railway. (Note 61.*)

P. B. M. 720.—At *Hawesville, Hancock County, Ky.*, about 50 meters from the railroad, 43.8 meters from a nail in a post projecting 2 feet above the ground at the corner of the Hawesville Plain Dealer newspaper office, about 35 meters from the concrete wall of the ice plant, and about the same distance from the northwest corner of the electric light plant. (Note 61.*)

P. B. M. 720 A.—At *Hawesville, Hancock County, Ky.*, at the intersection of the Louisville, Henderson & St. Louis Railway and Cool Spring Branch, about 10 meters below the railway, 25 meters below the creek, and 50 meters above the station. The mark is an arrow pointing north on a United States Geological Survey meridian monument.

U. S. G. S. 422.—At *Hawesville, Hancock County, Ky.*, on the southeast corner of the courthouse. The mark is a cross on a metallic template.

P. B. M. 721.—Near *Hawesville, Hancock County, Ky.*, at the foot of the second bank above the river, about 8 meters from the road, 150 meters below a two-story yellow frame house, and opposite the chair factory. at Cannelton, Ind. (Note 61.*)

P. B. M. 722.—Near *Hawesville, Hancock County, Ky.*, 1 mile above Tell City, Ind., 8 meters from the foot of the second bank above the river and about 15 meters from the road, 40 meters above a brick house owned and occupied by C. T. Duncan, and 150 meters below a frame house owned and occupied by W. Zuelly. (Note 61.*)

P. B. M. 723.—Near *Hawesville, Hancock County, Ky.*, 3.7 meters from the foot of the river bank, opposite a point about 95 meters below a brick house owned and occupied by Henry Mason, and about 50 meters above the lower factory of the United States Hame Co., at Tell City, Ind. (Note 61.*)

P. B. M. 724.—At *Beachams Landing, Hancock County, Ky.*, about 3 meters from the foot of the river bank, about 60 meters below the landing, and about 20 meters above a two-story frame house occupied by a Mr. Longuest, and opposite the smokestack of the brickyard in Tell City, Ind. (Note 61.*)

P. B. M. 725.—In *Hancock County, Ky.*, above *Troy, Ind.*, about 2.5 meters from the foot of the river bank, and about 12 meters from the top, and about 20 meters above a vacant two-story frame house owned by J. Q. Adams. (Note 61.*)

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* See pp. 162-166.

P. B. M. 726.—In *Hancock County, Ky.*, above *Troy, Ind.*, about 210 meters above the mouth of Henderson Creek in the yard surrounding the residence of H. Gardener, about 12 meters from the top of the river bank, 28.1 meters from the northeast corner of the house and 25.1 meters from the southeast corner. (Note 61.*)

P. B. M. 727.—In *Hancock County, Ky.*, above *Troy, Ind.*, about 12 meters from the top of the second terrace above the river, on the farm of Harvey Meyers, about 45 meters above the one-story frame residence of Mr. Bolington, and opposite a two-story stone house owned by John Fitch, of Troy, Ind. (Note 61.*)

P. B. M. 728.—In *Hancock County, Ky.*, below *Troy, Ind.*, 15 meters from the top of the second bank above the river on the farm of Mr. Hodges, about 15 meters above the line of Mr. Ligh's farm, and opposite a point about 275 meters below the Government light on the Indiana shore. The mark is the center of a cast-iron pin.

P. B. M. 728 A.—In *Hancock County, Ky.*, below *Troy, Ind.*, about 5 meters east of P. B. M. 728. The mark is a seat cut on a 30-inch cottonwood tree.

P. B. M. 729.—Near *Lewisport, Hancock County, Ky.*, at the top of the river bank on the farm of S. P. Emick, about 10 meters south of a warehouse, about ¼ mile above the residence of Mr. Emick, and nearly opposite the mouth of Crooked Creek on the Indiana shore. (Note 61.*)

P. B. M. 730.—Near *Lewisport, Hancock County, Ky.*, about ¾ mile below the mouth of the slough that forms the upper end of Corn Island, on the first terrace above the river, about 18 meters from the top and 35 meters above the mouth of a field drain. (Note 61.*)

P. B. M. 731.—Near *Lewisport, Hancock County, Ky.*, on the first terrace above the river, about 25 meters from the foot of the second bank and 35 meters from the top of the first, near the head of Andersons Bar, opposite a point about 240 meters below a barn on the Indiana shore and 300 meters above another barn on that shore. (Note 61.*)

P. B. M. 732.—Near *Lewisport, Hancock County, Ky.*, on the second terrace above the river, about 12 meters from the edge of the bank, and opposite the house owned and occupied by Mrs. Henderson, near Anderson Bar. (Note 61.*)

P. B. M. 733.—Near *Lewisport, Hancock County, Ky.*, on the first terrace above the river, about 15 meters from the top, on the farm of Mrs. Sallie E. Parker, and opposite a point about 10 meters above the house occupied by Mr. Lambert, and opposite another point 120 meters above a barn on the Indiana shore. (Note 61.*)

P. B. M. 733 A.—At *Lewisport, Hancock County, Ky.*, near the river bank on the south side of Main Street, in the fifth course of brick above the water table on the east face of the northeast corner of the brick residence of I. B. Hayden. The mark is a horizontal cut lettered "U. S. B. M."

P. B. M. 734.—At *Lewisport, Hancock County, Ky.*, about 120 meters below the Government light, 6 meters from the foot of the river bank, and opposite a point 4 meters above the one-story frame house owned and occupied by a Mrs. Miller and 9 meters below the vacant one-story frame house owned by Mrs. Harper. (Note 61.*)

P. B. M. 735.—Near *Lewisport, Hancock County, Ky.*, about 30 meters from the top of the river bank on the farm of Lee Holland, about 50 meters above the line fence between that farm and the one belonging to Malinda Holland, and opposite a point about 30 meters above the residence of Lee Holland. (Note 61.*)

P. B. M. 736.—Near *Lewisport, Hancock County, Ky.*, 27 meters from the top of the river bank on the farm of H. Burch, opposite a point about 120 meters above the residence of Mr. Grubel and 90 meters above the barn. (Note 61.*)

P. B. M. 737.—Near *Lewisport, Hancock County, Ky.*, about 1 mile above the mouth of Blackford Creek, on the farm of Capt. Grammond, about 18 meters from the top of the river bank, and 110 meters below the house occupied by F. Poll. (Note 61.*)

P. B. M. 738.—In *Hancock County, Ky.*, opposite *Grand View, Ind.*, on the farm of Samuel Sheridan, about 9 meters from the top of the river bank, 30 meters above the mouth of Blackford Creek, about 120 meters above the residence owned and occupied by Robt. Blunt, and opposite a point about 30 meters below the mouth of Little Sandy Creek on the Indiana shore. (Note 61.*)

P. B. M. 739.—In *Daviess County, Ky.*, near *Grand View, Ind.*, about 1 mile below the mouth of Blackford Creek, on the farm of James Haywood, about 450 meters from the house occupied by Mr. Hall, and opposite a point about 60 meters above a two-story white house on the Indiana shore. (Note 61.*)

P. B. M. 740.—In *Daviess County, Ky.*, near *Rockport, Ind.*, about 2 miles below the mouth of Blackford Creek on the farm of J. Mathews, 81 meters from the line between this farm and that of Mary Dixon, and opposite a point about 150 meters above the mouth of Honey Creek on the Indiana shore. (Note 61.*)

P. B. M. 741.—In *Daviess County, Ky.*, 1⅓ miles above *Rockport, Ind.*, on the farm of W. Johnson, in the yard surrounding the residence of R. P. Pool, about 5 meters beyond the county road, 5 meters from the northeast corner of the house, and 16.1 meters from the northwest corner. (Note 61.*)

P. B. M. 742.—In *Daviess County, Ky.*, near *Rockport, Ind.*, on the farm of Lawson Green, 6 meters beyond the county road, about 15 meters from an old well near the road, and 90 meters from the house occupied by Elijah Beard. (Note 61.*)

P. B. M. 743.—In *Daviess County, Ky.*, near *Rockport, Ind.*, on the farm of Oscar Muckols, about 215 meters from the house occupied by L. Pool, and 40.2 meters from the line fence between the farms of O. Muckols and S. E. Muckols. (Note 61.*)

P. B. M. 744.—At *Iceland Landing, Daviess County, Ky.*, at the top of the river bank at the edge of a field on the farm of George Taylor, about 60 meters above Muddy Gut Creek. (Note 61.*)

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* See pp. 162–166.

P. B. M. 745.—In *Daviess County, Ky.*, below *Rockport, Ind.*, about ⅔ mile above the root of the dike at the mouth of Puppy Creek, on the farm of George Taylor, 3 meters from the top of the river bank, and 60 meters above the line fence between the farms of Mr. Taylor and Mr. Galvin. (Note 61.*)

P. B. M. 746.—In *Daviess County, Ky.*, below *Rockport, Ind.*, 120 meters above Puppy Creek on the Galvin farm, 486 meters below the head of the dike, about 25 meters in front of Puppy Creek, and 7.9 meters from a double sycamore tree. (Note 61.*)

P. B. M. 747.—Near *Owensboro, Daviess County, Ky.*, on the farm of W. S. Hawes, about 220 meters above the line fence between the farms of W. S. Hawes and Mrs. M. Young, 9.0 meters from a 5-inch cottonwood, 3.7 meters from a 4-inch cottonwood, and 2.9 meters from a 5-inch one. (Note 61.*)

P. B. M. 749.—Near *Owensboro, Daviess County, Ky.*, opposite a point 200 meters below the head of Yellow Bank Island and directly opposite a barn facing northeast and southwest on the Indiana shore. (Note 61.*)

P. B. M. 750.—Near *Owensboro, Daviess County, Ky.*, in the sandy slope about 185 meters below the Government light on the Kentucky shore. (Note 61.*)

P. B. M. 751.—Near *Owensboro, Daviess County, Ky.*, about 380 meters below the upper incline of the Glenmore Distillery, at the top of the river bank, and 70.6 meters to northwest corner of a house. (Note 61.*)

P. B. M. 752.—At *Owensboro, Daviess County, Ky.*, on the first slope above the river in the willows about 135 meters above the Owensboro wharf and 120 meters below the brick sewer. (Note 61.*)

U. S. G. S. 396.—At *Owensboro, Daviess County, Ky.*, in the northeast corner of the courthouse yard. The mark is a copper plate set in stone and lettered "U. S. Geog. Survey."

H. W. 1884.—At *Owensboro, Daviess County, Ky.*, at the southwest corner of St. Ann and Water Streets. The mark is a stone 18 inches square, lettered "In memory of High Water, Feb. 18th, 1883."

Water Gauge.—At *Owensboro, Daviess County, Ky.* The mark is the zero of the gauge.

P. B. M. 753.—Near *Owensboro, Daviess County, Ky.*, on the slope above the river about 8 meters back from the willow line, and 30 meters above the Henning Distillery incline. (Note 61.*)

P. B. M. 754.—Near *Owensboro, Daviess County, Ky.*, on the first slope above the river, 5 meters back from the edge of the willows, about 45 meters below the incline and directly opposite the point where the willows end on the right bank. (Note 61.*)

P. B. M 755.—Near *Owensboro, Daviess County, Ky.*, 6 meters back from the top of the river bank in a cultivated field, and about 150 meters below a large barn. (Note 61.*)

P. B. M. 756.—Near *Little Hurricane Island, Daviess County, Ky.*, on top of the river bank at the tree line and about 60 meters above the vegetation at the upper end of the island. (Note 61.*)

P. B. M. 757.—Near *Little Hurricane Island, Daviess County, Ky.*, back of the island about 1 mile below the bend, on the slope about 5 meters from the top of the bank and the road, and 120 meters above a small frame house. (Note 61.*)

P. B. M. 758.—Near *Little Hurricane Island, Daviess County, Ky.*, about 18 meters from the top of the river bank in a cultivated field back of the island, about 300 meters above a farm house with cedar trees in the yard. (Note 61.*)

P. B. M. 759.—Near *Little Hurricane Island, Daviess County, Ky.*, 5 meters from the top of the river bank in a cultivated field about 300 meters above the Government light on the other shore. (Note 61.*)

P. B. M. 760.—Near *French Island, Daviess County, Ky.*, on the wooded slope 6 meters from the edge of cultivation, about 450 meters above the upper end of the island and about 400 meters above Government Light No. 350. (Note 61.*)

P. B. M. 761.—Near *French Island, Daviess County, Ky.*, about 11 meters back from the top of the river bank in a cultivated field, about ⅓ mile below the Eagle Distillery and Griscoms Landing, and 14 meters below a fence line. (Note 61.*)

P. B. M. 762.—Near *French Island, Daviess County, Ky.*, in a cultivated field 15 meters back from the top of the river bank, about 90 meters above a large tree in the field, and 600 meters above the foot of Upper French Island. (Note 61.*)

P. B. M. 763.—Near *French Island, Daviess County, Ky.*, in a cultivated field about ½ mile above the Government light on the Kentucky shore, 12.2 meters south of the northwest corner of a fisherman's shack at the top of the river bank, and 9.9 meters from the southwest corner. (Note 61.*)

P. B. M. 764.—Near *French Island, Daviess County, Ky.*, in a cultivated field about 30 meters from the edge of cultivation, about 150 meters below the foot of the island, and 30 meters above a lone sycamore tree at the edge of the bank. (Note 61.*)

P. B. M. 765.—Near *French Island, Daviess County, Ky.*, on the first terrace above the river among large trees about 12 meters below the edge of cultivation, and about 250 meters below the Government light on the other shore. (Note 61.*)

P. B. M. 766.—Near *French Island, Daviess County, Ky.*, on the first terrace above the river among willow trees, about 9 meters from the edge of cultivation and 250 meters above a large two-story frame house on the other shore. (Note 61.*)

P. B. M. 767.—Near *Carlinburg, Henderson County, Ky.*, 1½ miles above Jones Landing, at the edge of cultivation at the top of the bank and opposite a point half way between two frame houses on the other shore. (Note 61.*)

P. B. M. 768.—Near *Scuffletown, Henderson County, Ky.*, about 715 meters above Jones Landing, on the slope above the river, about 15 meters from the edge of cultivation, 75 meters above a one-story log cabin, and 60 meters below a floating light. (Note 61.*)

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* See pp. 162–166.

P. B. M. 769.—Near *Scuffletown, Henderson County, Ky.*, ½ mile below Jones Landing, on the slope below the river bank, and ½ mile above a floating light. (Note 61.*)

P. B. M. 771.—Near *Scuffletown, Henderson County, Ky.*, about 1⅔ miles above Newburg, Ind., at the top of the slope above the river, 15 meters below a road, in front of an old tobacco barn, 30 meters above a one-story log house, and 120 meters above the Government light on the other bank. (Note 61.*)

P. B. M. 773.—Near *Scuffletown, Henderson County, Ky.*, on the terrace above the river among the trees and opposite a point about 60 meters below the four-story brick power house at Newburg, Ind. (Note 61.*)

P. B. M. 777.—Near the mouth of *Green River, Henderson County, Ky.*, about 135 meters below the foot of the dike, at the top of the slope, 5 meters from the edge of cultivation, about 60 meters below a large corncrib, and opposite a point about 120 meters below the Government light on the other shore. (Note 61.*)

P. B. M. 778.—About ⅔ mile above the mouth of *Green River, Henderson County, Ky.*, on the top of the slope at the edge of cultivation, and opposite a frame house on the other shore. (Note 61.*)

P. B. M. 779.—About 300 meters below the mouth of *Green River, Henderson County, Ky.*, opposite a point about 150 meters above Atkins Landing on the Indiana shore, and at the top of the slope above the river among willow trees. (Note 61.*)

P. B. M. 780.—In *Henderson County, Ky.*, near *Evansville, Ind.*, among trees at the top of the river bank, 8 meters from the edge of cultivation and 30 meters above an old log cabin on the bank. (Note 61.*)

P. B. M. 781.—In *Henderson County, Ky.*, near *Evansville, Ind.*, at the top of the river bank among the trees, 9 meters from the edge of cultivation, and 500 meters below the Government light on the Kentucky shore. (Note 61.*)

P. B. M. 782.—In *Henderson County, Ky.*, near *Evansville, Ind.*, on the first terrace above the river among the small willows about 1.5 meters above the lower end of the incline of the Illinois Central Railroad. (Note 61.*)

P. B. M. 783.—In *Henderson County, Ky.*, near *Evansville, Ind.*, in a cultivated field about 75 meters back from the river bank, and 150 meters above a one-and-one-half-story frame house. (Note 61.*)

P. B. M. 784.—In *Henderson County, Ky.*, near *Evansville, Ind.*, about 180 meters back from the top of the river bank in the yard surrounding a one-and-one-half-story frame house, 14.8 meters from the southeast corner of the house, and 8.7 meters from the northeast corner. (Note 61.*)

P. B. M. 785.—In *Henderson County, Ky.*, near *Evansville, Ind.*, in cultivated ground about 40 meters back from the top of the river bank, and about 15 meters below a clump of trees, formerly Halls Bayou. (Note 61.*)

P. B. M. 786.—In *Henderson County, Ky.*, near *Evansville, Ind.*, in a cultivated field about 18 meters back from the top of the river bank, about 15 meters below the root of the center dike, 500 meters below the Government light on the Kentucky shore, and 600 meters above the Evansville water works. (Note 61.*)

P. B. M. 787.—In *Henderson County, Ky.*, near *Evansville, Ind.*, among the trees on the first terrace above the river, 15 meters above the dike, and directly opposite the wharf at Evansville. (Note 61.*)

P. B. M. 788.—In *Henderson County, Ky.*, near *Evansville, Ind.*, on the crest of a knoll among willow trees directly opposite the road to the river below the lower sawmill on the Indiana shore. (Note 61.*)

P. B. M. 789.—In *Henderson County, Ky.*, near *Evansville, Ind.*, at the top of the river bank at the edge of a cultivated field, on the east side of a road, and 3.4 meters directly behind Government Light No. 366. (Note 61.*)

P. B. M. 790.—In *Henderson County, Ky.*, near *Evansville, Ind.*, at the foot of the river bank, about 360 meters from a barn. (Note 61.*)

High Water Marks.—At *Evansville, Vanderburg County, Ind.*, at the corner of Sycamore and Water Streets. The marks are cuts in the curbstone showing height of water on February 19, 1883, and February 19, 1884.

U. S. G. S. 394.—At *Evansville, Vanderburg County, Ind.*, in the stone sill on the east side of the customhouse. The mark is a copper plate marked "394 feet Vin. Datum."

P. B. M. 791.—At *Dutch Bend, Henderson County, Ky.*, about 180 meters back from the top of the river bank, and directly in front of a one-story frame house to the right of the road running back from the top of the bank, 12.0 meters from one corner of the house, 5.8 meters from another corner, and 13.4 meters from another. (Note 61.*)

P. B. M. 792.—At *Dutch Bend, Henderson County, Ky.*, among the willows on the terrace above the river, 15 meters from the edge of cultivation, opposite a point about ½ mile below the Government light and 250 meters above a large barn on the Indiana shore. (Note 61.*)

P. B. M. 793.—Near *Henderson, Henderson County, Ky.*, about 2 miles above Henderson Towhead at the top of the slope of the river bank among the willows, about 8 meters from the edge of cultivation, and opposite a point about 60 meters below a two-story frame house and barn on the Indiana shore. (Note 61.*)

P. B. M. 794.—Near *Henderson, Henderson County, Ky.*, about 1 mile above Henderson Towhead, among the trees at the top of the slope opposite the upper end of a row of tall trees on the Indiana shore. (Note 61.*)

P. B. M. 795.—Near *Henderson, Henderson County, Ky.*, opposite Henderson Towhead, about 18 meters back from the top of the river bank on the lower bank of a small branch and hog wallow. (Note 61.*)

P. B. M. 796.—Near *Henderson, Henderson County, Ky.*, about ¾ mile above the Henderson waterworks, beneath the top of the river bank, about 60 meters below an old incline, and 30 meters below a small ravine. (Note 61.*)

P. B. M. 797.—Near *Henderson, Henderson County, Ky.*, near the creek below the Henderson waterworks. (Note 61.*)

Reference Point.—At *Henderson, Henderson County, Ky.*, on the stone flagging at the upper end of the wharf at the foot of Second Street. The mark is an old survey point and is a triangle lettered "U. S."

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* See pp. 162–166.

Old B. M.—At *Henderson, Henderson County, Ky.*, on the stone flagging at the lower end of the wharf at the foot of Second Street. The mark is a chiseled square lettered "U. S. B. M."

High Water 1884.—At *Henderson, Henderson County, Ky.*, at the southwest corner of Second and Water Streets. The mark is a spike in the wall of an old brick building.

P. B. M. 797 A.—At *Henderson, Henderson County, Ky.*, on the foundation stone at the south side of the first pier of the Henderson railroad bridge. The mark is a seat cut on the top of the stone and lettered "U. S. B. M."

P. B. M. 798.—At *Henderson, Henderson County, Ky.*, at the top of the slope of the paved wharf about 30 meters north of Second Street and directly opposite the mouth of the alley. (Note 61.*)

P. B. M. 799.—Near *Henderson, Henderson County, Ky.*, 1 mile below the Henderson wharf, in cultivated ground about 18 meters back from the top of the first bank above the river, about 40 meters below a small ravine and 150 meters below a large brick warehouse. (Note 61.*)

P. B. M. 800.—Near *Henderson, Henderson County, Ky.*, on cultivated ground on the top of the river bank, about 15 meters from the edge of cultivation and about 180 meters below the upper end of Henderson Island. (Note 61.*)

P. B. M. 801.—Near *Henderson, Henderson County, Ky.*, behind Henderson Island at the top of the river bank in cultivated ground, about 8 meters back from the edge of cultivation and 55 meters above the bank of Canoe Creek. (Note 61.*)

P. B. M. 802.—Near *Henderson, Henderson County, Ky.*, below Henderson Island, at the top of the river bank, about 12 meters back from the edge in a clump of small trees between two cultivated fields and about 250 meters below the Government light on the Kentucky shore. (Note 61.*)

P. B. M. 803.—Near *McDonalds Landing, Henderson County, Ky.*, 1 mile above Lock and Dam No. 48, in an orchard about 12 meters back from the top of the river bank and cultivated field, about 90 meters below the Government light and 75 meters above a hedge fence. (Note 61.*)

P. B. M. 805.—Near *McDonalds Landing, Henderson County, Ky.*, 1 mile below Lock and Dam No. 48, in a cultivated field about 60 meters back from the top of the river bank, about 300 meters below the Government light on the Kentucky shore and halfway between two small frame houses. (Note 61.*)

P. B. M. 806.—About ⅓ mile above *McDonalds Landing, Henderson County, Ky.*, in a thick jungle, about 40 meters back from the top of the river bank and opposite a point about 90 meters below a large barn on the Indiana shore. (Note 61.*)

P. B. M. 807.—Near *Cypress Bend, Henderson County, Ky.*, about 60 meters back from the top of the river bank among some large trees, about 15 meters below a large barn and the ruins of an old house. (Note 61.*)

P. B. M. 808.—Near *Cypress Bend, Henderson County, Ky.*, at the head of the bend about 45 meters back from the willow line on the bank of the river and about 120 meters above a house and barn on the other shore. (Note 61.*)

P. B. M. 809.—In *Cypress Bend, Henderson County, Ky.*, among the small trees about 30 meters back from the willow line at the river bank, directly opposite a large house and barn and the Government light on the Indiana shore. (Note 61.*)

P. B. M. 810.—In *Henderson County, Ky.*, about 1 mile above *West Franklin, Ind.*, at the top of the river bank in a cultivated field, about 8 meters back from the edge of cultivation and about 450 meters above a stone crusher on the Indiana shore. (Note 61.*)

P. B. M. 811.—In *Henderson County, Ky.*, about 150 meters below the landing at *West Franklin, Ind.*, at the top of the slope from the river in a cultivated field, 8 meters back from the edge of cultivation. (Note 61.*)

P. B. M. 812.—Near *Diamond Island, Henderson County, Ky.*, about ½ mile below the head of the island, at the top of the slope from the river in a cultivated field, 6 meters back from the edge of cultivation. (Note 61.*)

P. B. M. 813.—Near *Diamond Island, Henderson County, Ky.*, 12 meters back from the top of the river bank in a cultivated field at a turn in the road, 90 meters above a large barn, and about 300 meters above the Government light on the Kentucky shore. (Note 61.*)

P. B. M. 815.—Near *Diamond Island, Henderson County, Ky.*, at the top of the slope from the river among trees about 9 meters from the edge of cultivation and about 300 meters above the Government light which is on a tree at the foot of the island. (Note 61.*)

P. B. M. 816.—Near *Diamond Island, Henderson County, Ky.*, at the top of the slope of the river bank among the trees about 30 meters from the edge of cultivation and about 180 meters below the foot of Diamond Island Towhead. (Note 61.*)

P. B. M. 817.—Near *Alzey, Henderson County, Ky.*, ¾ mile above Smiths Landing, at the top of the first slope of the river bank among the trees and about 150 meters above a store and a group of houses. (Note 61.*)

P. B. M. 818.—Near *Alzey, Henderson County, Ky.*, below Smiths Landing, at the edge of the road 12 meters back from the top of the river bank, 145 meters below Government light No. 378, on the Kentucky shore. (Note 61.*)

P. B. M. 819.—In *Henderson County, Ky.*, near *Mount Vernon, Ind.*, at the top of the river bank among the trees 180 meters above New York Landing. (Note 61.*)

P. B. M. 820.—In *Henderson County, Ky.*, near *Mount Vernon, Ind.*, about 0.9 mile below New York Landing, among the trees at the top of the slope from the river, about 180 meters below a scale house at a turn in the road. (Note 61.*)

P. B. M. 821.—In *Henderson County, Ky.*, near *Mount Vernon, Ind.*, ¼ mile below Whitmans Landing and opposite the head of Towhead Bar, at the top of the river bank among the trees. (Note 61.*)

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* See pp. 162-166.

P. B. M. 822.—In *Henderson County, Ky.*, near *Mount Vernon, Ind.*, opposite the foot of Mount Vernon Towhead among the trees on the long slope from the river. (Note 61.*)

P. B. M. 823.—In *Henderson County, Ky.*, near *Mount Vernon, Ind.*, opposite the wharf at Mount Vernon and directly back of a ferry landing on the Kentucky shore among the willows at the top of the slope from the river. (Note 61.*)

P. B. M. 824.—In *Henderson County, Ky.*, near *Mount Vernon, Ind.*, about 250 meters above Hegermans Landing and opposite a point 300 meters below a one-story red frame house on the Indiana shore, at the top of the slope from the river among the trees and 8 meters from the head of cultivation. (Note 61.*)

P. B. M. 825.—In *Henderson County*, near *Slim Island, Union County, Ky.*, on the slope above the river among the trees, 15 meters from the line of cultivation and about 880 meters above the line between Henderson and Union Counties. (Note 61.*)

P. B. M. 826.—Near *Slim Island, Union County, Ky.*, at the top of the river bank in a cultivated field, 8 meters from the edge of the road, 30 meters above a turn in the road and about 250 meters above a large barn and windmill on Slim Island. (Note 61.*)

P. B. M. 827.—Near *Slim Island, Union County, Ky.*, in cultivated land, 12 meters back from the top of the river bank and opposite the center of the island. (Note 61*)

P. B. M. 828.—Near *Slim Island, Union County, Ky.*, at the top of the slope from the river among the weeds and willows 8 meters from the edge of cultivation and about ½ mile above the Government light at the foot of the island. (Note 61.*)

P. B. M. 829.—Near *Slim Island, Union County, Ky.*, opposite the head of Slim Island Towhead and about $^2/_5$ mile below the Government light at the foot of the island, at the top of the river bank in cultivated ground. (Note 61.*)

P. B. M. 830.—Near *Slim Island, Union County, Ky.*, 250 meters below the foot of Slim Island Towhead, at the top of the slope from the river, among the trees 3 meters from the edge of cultivation. (Note 61.*)

P. B. M. 831.—Near *Uniontown, Union County, Ky.*, at the upper end of Mississippi Bend, at the top of the slope from the river among the willows, 6 meters from the edge of cultivation and opposite a point 90 meters above a barn and clump of trees on the Indiana shore. (Note 61.*)

P. B. M. 833.—Near *Uniontown, Union County, Ky.*, above Poker Point, in cultivated ground, 30 meters back from the edge of the river bank and about 45 meters above a frame shack. (Note 61.*)

P. B. M. 834.—Near *Uniontown, Union County, Ky.*, in cultivated ground, 30 meters back from the edge of the river bank and opposite a point about 300 meters above a two-story frame house on the Indiana shore. (Note 61.*)

P. B. M. 835.—Near *Uniontown, Union County, Ky.*, about 600 meters above the landing, among thick willows on a slight slope about 90 meters above a small creek. (Note 61.*)

P. B. M. 836.—Near *Uniontown, Union County, Ky.*, on the wooded slope above the river, about 15 meters in front of the boiler shed of the Union County Distillery. (Note 61.*)

P. B. M. 837.—Near *Uniontown, Union County, Ky.*, about ½ mile above the central point of Lower Highland Rocks, in a cultivated field on the slope above the river, and about 20 meters below an old burned snag. (Note 61.*)

P. B. M. 838.—Near *Wabash Island, Union County, Ky.*, among the trees on the slope above the river, about 20 meters from the edge of cultivation, and ⅔ mile above the Government light at the head of Wabash Island. (Note 61.*)

P. B. M. 839.—Near *Wabash Island, Union County, Ky.*, about 250 meters above the head of the island, among the trees on the slope above the river, and 15 meters from the edge of cultivation. (Note 61.*) The mark was recovered in 1911, and was then 2½ feet underground.

P. B. M. 840.—Near *Wabash Island, Union County, Ky.*, at the top of the slope from the river among willows, 10 meters from the edge of cultivation, 150 meters above a two-story frame house on the shore of Wabash Island, and 300 meters below Lost Creek. (Note 61.*)

P. B. M. 841.—Near *Wabash Island, Union County, Ky.*, on the first terrace above the river among the trees directly opposite a two-story frame house on the island. (Note 61.*)

P. B. M. 842.—Near *Wabash Island, Union County, Ky.*, about ¼ mile below the Government light at the foot of the island, at the top of the slope from the river, among the trees, 15 meters from the edge of a cultivated field. (Note 61.*)

P. B. M. 843.—About 1¼ miles below the foot of *Wabash Island, Union County, Ky.*, and about 600 meters above the first bare bank on the Kentucky shore, among the trees on the first terrace above the river. (Note 61.*)

P. B. M. 844.—Near *Raleigh, Union County, Ky.*, in a cultivated field, 30 meters back from the top of the river bank, and 11 meters above a row of dead trees that probably form a property line. (Note 61.*)

P. B. M. 845.—At *Raleigh, Union County, Ky.*, about 40 meters back from the top of the river bank, half way between the frame store building with the Government light on it, and the barn 30 meters distant. (Note 61.*)

P. B. M. 846.—Near *Browns Island, Union County, Ky.*, opposite the head of the island, at the top of the river bank, at the edge of the road, at the upper end of a clump of large trees, and about 300 meters below a frame house at a turn of the road. (Note 61.*)

P. B. M. 847.—Near *Browns Island, Union County, Ky.*, below the foot of the island, in a cultivated field at the top of the river bank, 5 meters back from the edge of a road, and about 90 meters below the Government light. (Note 61.*)

P. B. M. 848.—In *Union County, Ky.*, opposite *Shawneetown, Ill.*, at the top of the slope of the river bank, at the lower edge of the road, and about 90 meters above a frame house. (Note 61.*)

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* See pp. 162-166.

P. B. M. 849.—In *Union County, Ky.*, opposite *Shawneetown, Ill.*, among thick willows on the first terrace above the river, 365 meters below the ferry landing, and directly opposite the Riverside Hotel at Shawneetown. (Note 61.*)

P. B. M. 850.—In *Union County, Ky.*, 1 mile below *Shawneetown, Ill.*, among trees at the top of the river bank, 15 meters from the edge of a cultivated field, and opposite a small frame house on the Illinois shore. (Note 61.*)

P. B. M. 851.—In *Union County, Ky.*, 2 miles below *Shawneetown, Ill.*, about 675 meters above the Government light on the other shore, among trees about 12 meters back from the edge of the bank. (Note 61.*)

P. B. M. 852.—In *Union County, Ky.*, near *Shawneetown, Ill.*, about 120 meters above the upper end of the towhead at Shawneetown Bend, among the willows on the first terrace above the river. (Note 61.*)

P. B. M. 853.—Near *Cincinnati Towhead, Union County, Ky.*, at the top of the river bank at the edge of a cultivated field, about 365 meters below the foot of the towhead. (Note 61.*)

P. B. M. 854.—Near *Cincinnati Towhead, Union County, Ky.*, about 180 meters below the Government light on the Illinois shore, on a sand bar among small willows, opposite a point about the center of the towhead. (Note 61.*)

P. B. M. 855.—Near *Cincinnati Towhead, Union County, Ky.*, in a cultivated field, 12 meters back from the top of the river bank, and about 450 meters below a small frame house on the Illinois shore. (Note 61.*)

P. B. M. 856.—Near *Dekoven, Union County, Ky.*, opposite the center of Saline Bar, in a cultivated field, 10 meters back from the edge of cultivation, and 600 meters below the Government light on the Kentucky shore. (Note 61.*)

P. B. M. 857.—Near *Dekoven, Union County, Ky.*, about 600 meters above the Government light at the foot of Saline Bar, at the top of the river bank, among willow trees, and 6 meters from the edge of cultivation. (Note 61.*)

P. B. M. 858.—Near *Dekoven, Union County, Ky.*, among the willow trees on the first terrace above the river, about 150 meters above a frame house and opposite a point about 400 meters below the mouth of the Saline River. (Note 61.*)

P. B. M. 859.—Near *Dekoven, Union County, Ky.*, about 1¼ miles below the mouth of the Saline River, at the top of the slope of the river bank in a clump of large cottonwood trees, about 450 meters above the Government light on the Illinois shore. (Note 61.*)

P. B. M. 860.—Near *Dekoven, Union County, Ky.*, about ½ mile above the landing at Dekoven, opposite a point about 150 meters below a frame house on the Illinois shore, at the top of the river bank, 15 meters below the edge of the road. (Note 61.*)

P. B. M. 860 A.—Near *Dekoven, Union County, Ky.*, about 600 meters below the coal elevator, at the top of the river bank in a cultivated field, and 12 meters from the edge of the road. (Note 61.*)

P. B. M. 862.—1 mile below *Caseyville, Union County, Ky.*, 8 meters back from the edge of the river bank. (Note 61.*)

P. B. M. 863.—Near *Caseyville, Union County, Ky.*, ½ mile below the Western Kentucky Coal Tipple and $^1/_5$ mile above the mouth of the Tradewater River, at the top of the river bank, 3 meters west of an elm tree. (Note 61.*)

P. B. M. 864.—In *Crittenden County*, near *Caseyville, Union County, Ky.*, opposite a point about 110 meters below the foot of Tradewater Island, on the ridge west of a pecan grove, 60 meters back from the top of the river bank, and 120 meters below a ravine. (Note 61.*)

P. B. M. 865.—Near *Weston, Crittenden County, Ky.*, about 700 meters above the landing and 11 meters back from the top of the river bank. (Note 61.*)

P. B. M. 866.—About 880 meters below *Weston, Crittenden County, Ky.*, about 150 meters below a ravine and 12 meters back from the top of the river bank. (Note 61.*)

P. B. M. 867.—About $^4/_5$ mile above *Fords Ferry, Crittenden County, Ky.*, about 110 meters below a ravine, and opposite a point about 60 meters above a one-and-one-half-story frame house on the Illinois shore, in a cultivated field 12 meters back from the top of the river bank. (Note 61.*)

P. B. M. 868.—At *Fords Ferry, Crittenden County, Ky.*, 550 meters below the mouth of Crooked Creek and opposite a point about 150 meters below a frame house on the Illinois shore, at the top of the river bank, on land belonging to H. McConnell. (Note 61.*)

P. B. M. 869.—In *Crittenden County, Ky.*, near *Cave-in-Rock, Ill.*, opposite a point 600 meters above the vegetation on Cave-in-Rock Island, at the top of the river bank. (Note 61.*)

P. B. M. 870.—In *Crittenden County, Ky.*, near *Cave-in-Rock, Ill.*, about 730 meters above the lower end of Cave-in-Rock Island, in a cultivated field, 30 meters back from the edge of the river bank. (Note 61.*)

P. B. M. 871.—In *Crittenden County, Ky.*, near *Cave-in-Rock, Ill.*, on land belonging to J. B. Easley, 201 meters below the Government light, and 12 meters back from the top of the river bank. (Note 61.*)

P. B. M. 872.—Near *Tolu, Crittenden County, Ky.*, opposite the upper end of the rock ledge on the Illinois shore just above Walker Bar Towhead, in a cultivated field, 9 meters back from the top of the river bank. (Note 61.*)

P. B. M. 873.—Near *Tolu, Crittenden County, Ky.*, about 60 meters below the mouth of a creek on the Illinois shore, and opposite the center of Walker Bar Towhead, in a cultivated field, 18 meters back from the top of the river bank. (Note 61.*)

P. B. M. 874.—Near *Tolu, Crittenden County, Ky.*, ¾ mile above Big Hurricane Island, opposite a point about 120 meters below Walkers Bar Towhead and 150 meters below the Government light, in a cultivated field, at the top of the river bank. (Note 61.*)

P. B. M. 875.—Near *Tolu, Crittenden County, Ky.*, about 520 meters below the head of Hurricane Island Towhead and opposite a point about 365 meters above a slough on Big Hurricane Island, on the lower terrace of a willow thicket. (Note 61.*)

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* See pp. 162–166.

P. B. M. 876.—At *Tolu, Crittenden County, Ky.*, about 30 meters below Hurricane Creek, in the back yard of J. O. Brown, 9.3 meters from the northwest corner of his house, and 7.8 meters from the corner of the ell on the house. (Note 61.*)

P. B. M. 880.—In *Crittenden County*, near *Carrsville, Livingston County, Ky.*, opposite a point about 300 meters below Orrs Landing, in a willow thicket, about 15 meters back from the lower terrace of the river bank. (Note 61.*)

P. B. M. 881.—Near *Carrsville, Livingston County, Ky.*, about ¼ mile above the landing of the Rose Clar Lead Mine and opposite an old frame house on the hillside in Illinois, at the edge of a cultivated field at the top of the river bank. (Note 61.*)

P. B. M. 882.—Near *Carrsville, Livingston County, Ky.*, about ½ mile above the point of Irish Jimmies Bar, and opposite the center of the Rose Clar Mine incline, at the edge of cultivation at the top of the river bank. (Note 61.*)

P. B. M. 883.—Near *Carrsville, Livingston County, Ky.*, ⅔ mile above the landing, about halfway between Buck and Deer Creeks, at the edge of cultivation at the top of the river bank. (Note 61.*)

P. B. M. 884.—Near *Carrsville, Livingston County, Ky.*, about 360 meters below the mill on a sandstone rock on the hillside. The mark is a chiseled square, lettered "U. S. B. M."

P. B. M. 885.—Near *Carrsville, Livingston County, Ky.*, about ⅓ mile above McElroys Landing, near the upper end of a rocky cliff and opposite a point about 90 meters below a barn on the Illinois shore, at the edge of cultivation at the top of the river bank. (Note 61.*)

P. B. M. 886.—Near *Carrsville, Livingston County, Ky.*, near the head of Grand Pierre Bar, opposite a point halfway between the Government light and a house on the Illinos shore, in a field belonging to J. T. Cox, near a barb-wire fence and underneath one of a row of cherry trees. (Note 61.*)

P. B. M. 887.—Near *Carrsville, Livingston County, Ky.*, opposite a point about ½ mile above Grand Pierre Creek and midway between the Government light and the lower end of a cliff on the Illinois shore, at the edge of cultivation at the top of the lower terrace above the river. (Note 61.*)

P. B. M. 888.—Near *Berry Ferry, Livingston County, Ky.*, opposite Buena Vista, Ill., about ⅔ mile below Grand Pierre Creek, at the top of the river bank at the edge of cultivation about 275 meters above a portable sawmill on J. N. Walter's property. (Note 61.*)

P. B. M. 889.—Near *Berry Ferry, Livingston County, Ky.*, near the head of Golconda Island, and opposite a point midway between two barns on the top of the cliff on the Illinois shore, in a willow thicket at the top of the river bank. (Note 61.*)

P. B. M. 890.—Near *Berry Ferry, Livingston County, Ky.*, behind Golconda Island, about 60 meters above a log house, and 75 meters below a barb-wire fence along a row of walnut and elm trees, on the top of the lower terrace above the river and just below a cultivated field. (Note 61.*)

P. B. M. 891.—Near *Berry Ferry, Livingston County, Ky.*, opposite the lower end of Golconda Island and about 120 meters below a creek, at the top of the river bank at the edge of cultivation. (Note 61.*)

P. B. M. 892.—Near *Berry Ferry, Livingston County, Ky.*, opposite a point about midway between the lower landing at Golconda, Ill., and a small unpainted house on the cliff, and 210 meters below the ferry landing on the Kentucky shore, at the foot of the upper terrace above the river. (Note 61.*)

High water 1883.—At *Golconda, Pope County, Ill.*, at the lower end of the warehouse at the downstream side of the wharf. The mark is on a stone tablet.

High water 1884.—At *Golconda, Pope County, Ill.*, in the same location as high water 1883.

P. B. M. 893.—Near *Berry Ferry, Livingston County, Ky.*, near the head of Pryors Island, 700 meters below Gilligans Creek and about 60 meters below a large sycamore tree, at the top of the river bank at the edge of cultivation. (Note 61.*)

P. B. M. 894.—Near *Berry Ferry, Livingston County, Ky.*, about $^5/_6$ mile below the head of Pryor's Island, about ½ mile below a house and barn on the Illinois shore, in a cultivated field, 9 meters from the top of the river bank and about 100 meters above a house. (Note 61.*)

P. B. M. 895.—Near *Pryors Island, Livingston County, Ky.*, about $^2/_5$ mile above the lower end of the island, at the edge of cultivation at the top of the river bank, opposite a bunch of large sycamore trees. (Note 61.*)

P. B. M. 896.—Near *Bayou, Livingston County, Ky.*, opposite a point about 90 meters below Lovers Leap on the Illinois shore, at the top of the river bank at the edge of cultivation under a bunch of three cottonwood trees. (Note 61.*)

P. B. M. 897.—Near *Bayou, Livingston County, Ky.*, near the head of Sisters Island, opposite a point about 365 meters below a small white house on the bottom on the Illinois shore, 15 meters back from the river bank behind a bunch of large cottonwood trees and in a cultivated field. (Note 61.*)

P. B. M. 898.—Near *Bayou, Livingston County, Ky.*, opposite a point about midway between the lower ends of the Two Sisters Islands, at the top of the lower terrace of the river bank, in a willow thicket.(Note 61.*)

P. B. M. 899.—Near *Bayou, Livingston County, Ky.*, opposite the Government light near Bay City, Ill., opposite a point about 150 meters below Big Bay Creek, and about 275 meters above a white frame house, at the edge of cultivation at the top of the river bank. (Note 61.*)

P. B. M. 900.—Near *Bayou, Livingston County, Ky.*, about ½ mile above Bayou Creek, and opposite the summit of the first hill below Bay City, Ill., in a cultivated field 6 meters back from the top of the river bank. (Note 61.*)

P. B. M. 901.—At *Bayou, Livingston County, Ky.*, 200 meters below the landing, 12 meters back from the top of the river bank in a cultivated field. (Note 61.*)

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* See pp. 162-165.

P. B. M. 902.—Near *Birdsville, Livingston County, Ky.*, about 60 meters above the Government light on the Kentucky shore and 26.6 meters from the northeast corner of an old stone chimney, at the top of the river bank. (Note 61.*)

P. B. M. 903.—At *Birdsville, Livingston County, Ky.*, about 120 meters above the landing, 12 meters back from the top of the river bank, and 9 meters above an old sawmill. (Note 61.*)

P. B. M. 903A.—At *Birdsville, Livingston County, Ky.*, on the stone curbing in front of the first building southwest from the post office. The mark is a cut on the stone, lettered "U. S."

P. B. M. 904.—About 1 mile below *Birdsville, Livingston County, Ky.*, opposite a point about 1030 meters below the lower end of Stewarts Island, in a cultivated field about 9 meters back from the edge of the river bank. (Note 61.*)

P. B. M. 905.—Near *Birdsville, Livingston County, Ky.*, about 470 meters below Stewarts Island Towhead, opposite a point about ½ mile above a barn on the Illinois shore, on the lower terrace of the river bank at the edge of a cultivated field and a willow thicket. (Note 61.*)

P. B. M. 906.—Near *Smithland, Livingston County, Ky.*, about 1 mile above Dog Island, and about 150 meters below a ravine, in a cultivated field, 18 meters back from the top of the steep bank, and 15 meters above a double log house back of a row of thorn trees. (Note 61.*)

P. B. M. 907.—Near *Smithland, Livingston County, Ky.*, about 300 meters below a Government light on a tree, and opposite a point about the center of Dog Island, 8 meters back from the top of the river bank, in a cultivated field near a large pecan tree. (Note 61.*)

P. B. M. 908.—Near *Smithland, Livingston County, Ky.*, about 1 mile above the mouth of the Cumberland River, about 600 meters below Dog Island Government light, and opposite the upper end of Cumberland Island, in a cultivated field about 11 meters back from the top of the river bank. (Note 61.*)

P. B. M. 909.—At *Smithland, Livingston County, Ky.*, at the foot of the riprap bank, about 180 meters below the wharf, about 9 meters west of the center of Front Street in line with the center of the alley just above Chas. H. Webb's law office. (Note 61.*)

P. B. M. 909A.—At *Smithland, Livingston County, Ky.*, in front of the one-story frame building belonging to C. B. Davis on Front Street. The mark is a cross cut on a stone about 8 by 10 inches and lettered "U. S."

P. B. M. 910.—1 mile below *Smithland, Livingston County, Ky.*, about 485 meters below the first creek below the town, in a cultivated field about 9 meters back from the top of the river bank. (Note 61.*)

P. B. M. 911.—Near *Smithland, Livingston County, Ky.*, about ⅔ mile below the head of the dike and about 90 meters above the lower light on Cumberland Island, in a cultivated field about 15 meters back from the top of the river bank. (Note 61.*)

P. B. M. 913.—Near *Smithland, Livingston County, Ky.*, near the head of Cottonwood Bar, about 900 meters above the Government light, at the edge of cultivation, opposite the lower end of a row of thorn trees, along the top of the river bank. (Note 61.*)

P. B. M. 914.—Near *Ledbetter, Livingston County, Ky.*, about $^2/_5$ mile above Brick House Landing, and 180 meters below Caney Creek, on the lower terrace above the river about 25 meters from the foot of the bank. (Note 61.*)

P. B. M. 915.—Near *Ledbetter, Livingston County, Ky.*, about 700 meters below a creek, on the first terrace above the river, 81 meters back from the top of the bank, about on the line between a cultivated field and a woods. (Note 61.*)

P. B. M. 916.—Near *Ledbetter, Livingston County, Ky.*, above Ledbetter Landing, nearly opposite the lower end of Cottonwood Bar, and opposite a point about 450 meters below a shed on the Illinois shore, on the lower terrace above the river, 9 meters back of a cultivated field, and near the edge of the timber at the foot of the upper bank. (Note 61.*)

P. B. M. 917.—Near *Ledbetter, Livingston County, Ky.*, about 180 meters above Crowells Landing, opposite a point about 550 meters above a house behind the trees, 5 meters back in a cultivated field at the top of the river bank. (Note 61.*)

P. B. M. 918.—In *Livingston County*, near *Paducah, McCracken County, Ky.*, at the head of Indiana Bar and opposite a point about ½ mile above the Government light on the Illinois shore, at the top of the first terrace above the river, about 4 meters back from the edge of the bank. (Note 61.*)

P. B. M. 919.—In *Livingston County*, near *Paducah, McCracken County, Ky.*, near the foot of Indiana Bar, and opposite a point about $^2/_5$ mile above a landing on the Illinois shore, in a cultivated field at the top of the river bank, 12 meters back from the line of cultivation. (Note 61.*)

P. B. M. 920.—In *Livinsgton County*, near *Paducah, McCracken County, Ky.*, 1 mile above the mouth of the Tennessee River and ¼ mile below the Government light on a pecan tree, opposite a point about ½ mile below a landing among the trees, 9 meters back from the top of the river bank. (Note 61.*)

P. B. M. 921.—In *Livingston County*, near *Paducah, McCracken County, Ky.*, near the mouth of the Tennessee River and about ¼ mile above Livingston Point, among the trees about half way up the river bank. (Note 61.*)

P. B. M. 922.—Near *Paducah, McCracken County, Ky.*, at the lower edge of the timber on the upper end of Tennessee Island, and opposite a point about 210 meters above a house on the island, at the top of the river bank. (Note 61.*)

P. B. M. 923.—At *Paducah, McCracken County, Ky.*, near the top of the levee, 5.9 meters behind the building of Armour & Co., 20.7 meters from the northeast corner and about 8 meters from the northwest corner. (Note 61.*)

P. B. M. 923A.—At *Paducah, McCracken County, Ky.* The bench mark is the 14-foot mark of the permanent tide gauge.

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* See pp. 162-166.

P. B. M. 924.—At *Paducah, McCracken County, Ky.*, about 180 meters below a pole incline, and 45 meters below the third group of piling, counting from the top, on the Illinois Central Railroad incline, and about 9 meters above a brickyard stack. (Note 61.*)

P. B. M. 925.—Near *Paducah, McCracken County, Ky.*, about 300 meters below the lower end of Paducah Towhead and 12 meters back from the water's edge. (Note 61.*)

P. B. M. 926.—Near *Paducah, McCracken County, Ky.*, directly opposite the landing of the Illinois Central Railroad ferry at Brookport, about 18 meters below a stranded barge and 12 meters back from the water's edge. (Note 61.*)

P. B. M. 927.—Near *Paducah, McCracken County, Ill.*, opposite a point about 300 meters below the second creek on the Illinois shore below Brookport, among the willow trees. (Note 61.*)

P. B. M. 929.—In *McCracken County, Ky.*, near *Metropolis, Ill.*, opposite the mouth of Massac Creek and among the willows, 45 meters toward the river from two tall, ivy-covered trees, one a hackberry and the other an ash, 6 meters apart. The mark is 15 inches underground. (Note 61.*)

P. B. M. 930.—In *McCracken County, Ky.*, near *Metropolis, Ill.*, near the foot of Fort Massac Bar, and about 450 meters below the Government light on the Illinois shore, at the top of the river bank, 16 meters above a cottonwood stump 2 feet in diameter. (Note 61.*)

P. B. M. 931.—In *McCracken County, Ky.*, near *Metropolis, Ill.*, opposite a point about ¼ mile above Harrison Bros. Co. lumberyard, and about 30 meters above Massac Creek in Kentucky, among willow trees. (Note 61.*)

P. B. M. 932.—In *McCracken County, Ky.*, near *Metropolis, Ill.*, about opposite the Riverside Mills, near twin cottonwood trees, and about 18 inches under the surface at the top of the river bank. (Note 61.*)

P. B. M. 933.—In *McCracken County, Ky.*, near *Metropolis, Ill.*, opposite the lower end of the town and a small white farm house, at the top of the river bank in front of a sycamore tree. (Note 61.*)

P. B. M. 934.—In *McCracken County, Ky.*, 1½ miles below *Metropolis, Ill.*, at the top of the river bank in a clump of large maple trees. (Note 61.*)

P. B. M. 935.—In *McCracken County, Ky.*, near *Metropolis, Ill.*, about 120 meters above Little Run Creek, at the top of the river bank at the edge of a cultivated field. (Note 61.*)

P. B. M. 936.—Near *Ragland, McCracken County, Ky.*, near Walnut Creek, at the top of the river bank, among the trees 5 meters toward the river from the edge of a cultivated field. (Note 61.*)

P. B. M. 937.—Near *Ragland, McCracken County, Ky.*, about 2⅓ miles below Joppa, Ill., ½ mile above the Government light on the Illinois shore and 1 mile below Willow Creek, at the top of the river bank among the willow trees. (Note 61.*)

P. B. M. 938.—Near *Ragland, McCracken County, Ky.*, about 1⅓ miles above Joppa, Ill., at the top of the river bank about 6 meters above a fallen elm tree. (Note 61.*)

P. B. M 939.—Near *Ragland, McCracken County, Ky.*, opposite a point about ⅓ mile above the landing at Joppa, Ill., among the trees at the top of a ridge. (Note 61.*)

P. B. M. 940.—Near *Ragland, McCracken County, Ky.*, opposite a point about 180 meters below the lowest railroad transfer incline at Joppa, Ill., at the top of the river bank among the trees. (Note 61.*)

P. B. M. 941.—Near *Ragland, McCracken County, Ky.*, above Hunting Creek and opposite a point about ½ mile above a barn on the Illinois shore with its ridgepole at right angles to the river, halfway up the slope of the river bank at the edge of a young cottonwood grove. (Note 61.*)

P. B. M. 942.—In *McCracken County*, near *Ogden, Ballard County, Ky.*, opposite a point about 300 meters below Hillermans Landing on the Illinois shore, at the top of the river bank at the edge of an oak grove. (Note 61.*)

P. B. M. 943.—In *McCracken County*, near *Ogden, Ballard County, Ky.*, 1 mile above the landing at the top of the river bank at the foot of a large oak tree. (Note 61.*)

P. B. M. 944.—Near *Ogden, Ballard County, Ky.*, about 135 meters above the mouth of a creek, near a county line stone between McCracken and Ballard Counties, at the top of the river bank, and near a large, lone sycamore at the edge of a sycamore grove. (Note 61.*)

P. B. M. 945.—Near *Ogden, Ballard County, Ky.*, opposite the head of Grand Chain about 1 mile below a creek, in a slight gully at the top of the river bank. (Note 61.*)

P. B. M. 947.—In *Ballard County, Ky.*, 1 mile above the landing at *Grand Chain, Ill.*, at the top of the river bank just back of a large sycamore tree and a dead tree lying parallel to the shore line. (Note 61.*)

P. B. M. 948.—In *Ballard County, Ky.*, opposite the landing at *Grand Chain, Ill.*, at the top of the bank at the edge of a mixed grove, and opposite two buildings and an outhouse on a farm at the top of a bluff clay bank. (Note 61.*)

P. B. M. 949.—In *Ballard County, Ky.*, 1 mile below the landing at *Grand Chain, Ill.*, about 900 meters above the wreck of the steamer *Pittsburg*, at the top of the river bank near three large maple trees. (Note 61.*)

P. B. M. 950.—In *Ballard County, Ky.*, 2 miles below *Grand Chain, Ill.*, about 700 meters below the wreck of the steamer *Pittsburg*, at the top of the river bank, 12 meters back from the edge of a young cottonwood grove. (Note 61.*)

P. B. M. 951.—In *Ballard County, Ky.*, near *Caledonia, Ill.*, 1½ miles above the landing and about ¼ mile below a small creek, at the top of the river bank near two tall trees, one a sycamore and the other a pignut. (Note 61.*)

P. B. M. 952.—In *Ballard County, Ky.*, about $^3/_5$ mile above the landing at *Caledonia, Ill.*, at the top of the river bank in a bunch of willow and young cottonwood trees, and near a large hackberry tree. (Note 61.*)

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* See pp. 162-166.

P. B. M. 953.—In *Ballard County, Ky.*, 700 meters below the landing at *Caledonia, Ill.*, at the top of the bank at the turn of the river, near two large maple trees and just back of a fallen sycamore lying parallel to the river. (Note 61.*)

P. B. M. 954.—In *Ballard County, Ky.*, near *Caledonia, Ill.*, at Mayballs Landing, on the top of the river bank at the lower end of a grove of large willows and about 180 meters below a farmhouse. (Note 61.*)

P. B. M. 955.—About 150 meters below *Humphries Creek, Ballard County, Ky.*, at the top of the river bank in a grove of young willow trees. (Note 61.*)

P. B. M. 956.—1 mile below *Humphries Creek, Ballard County, Ky.*, on the bank of the river in a young willow grove. (Note 61.*)

P. B. M. 957.—Near *Holloway, Ballard County, Ky.*, 1½ miles above Cache Island, and 215 meters below the Government light, beside a large uprooted stump halfway up the river bank. (Note 61.*)

P. B. M. 958.—Near *Holloway, Ballard County, Ky.*, about ½ mile above Cache Island, at the top of the river bank near the fence in front of the house on the McDonnell estate, 3.6 meters from the southwest corner and 7.4 meters from the northwest corner of the house. (Note 61.*)

P. B. M. 959.—Near *Holloway, Ballard County, Ky.*, 700 meters below the head of Cache Island, in a clump of young cottonwood trees at the top of the river bank. (Note 61.*)

P. B. M. 960.—Near *Holloway, Ballard County, Ky.*, about $^4/_5$ mile above the lower end of Cache Island, at the top of the river bank behind a clump of large cottonwood trees, and between the pike and the fence. (Note 61.*)

P. B. M. 961.—At *Holloway, Ballard County, Ky.*, opposite Mound City, Ill., at the top of the river bank in the public road, 8 meters above the store and near a large stump about 5 feet high. (Note 61.*)

P. B. M. 962.—Near *Holloway, Ballard County, Ky.*, below Mound City, Ill., about 180 meters below a house, at the top of the river bank among the trees and near a very large elm. (Note 61.*)

P. B. M. 963.—Near *Holloway, Ballard County, Ky.*, below Mound City, Ill., at the top of the river bank about 90 meters above a house, near three very large cottonwood trees, and between a maple and a cottonwood tree. (Note 61.*)

P. B. M. 964.—Near *East Cairo, Ballard County, Ky.*, about ⅔ mile above the railroad bridge, at the top of the river bank, near a fence around a barn with its ridgepole parallel to the river. (Note 61.*)

P. B. M. 965.—Near *East Cairo, Ballard County, Ky.*, about 885 meters below the railroad bridge, at the top of the river bank, about halfway between a walnut tree and a locust tree. (Note 61.*)

P. B. M. 2.—At *Cairo, Ill.* (See Report for 1899, p. 599.)

P. B. M. 966.—Near *East Cairo, Ballard County, Ky.*, opposite the upper end of the landing at Cairo, Ill., at the top of the river bank, and about 180 meters below the remains of an old railroad transfer slip. (Note 61.*)

P. B. M. 967.—Near *East Cairo, Ballard County, Ky.*, ⅓ mile below the lower of the abandoned railroad transfer slips, at the top of the river bank, 12 meters back from the edge of a young willow grove. (Note 61.*)

P. B. M. 968.—Near *East Cairo, Ballard County, Ky.*, at the mouth of the Ohio River, about 180 meters below a point opposite the end of the Illinois shore, at the top of the river bank, about 12 meters back from the edge of a young cottonwood grove. (Note 61.*)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN TERRE HAUTE, IND., AND SHAWNEETOWN, ILL., ESTABLISHED BY CORPS OF ENGINEERS, UNITED STATES ARMY, 1903 AND 1911.

(These descriptions are from information furnished by the Chief of Engineers and are here reproduced essentially as furnished except for changes made for the purposes of condensing and indexing according to locality.)

U. S. G. S. 513.—At *Terre Haute, Vigo County, Ind.* (See p. 288.)

U. S. G. S. 495.—At *Terre Haute, Vigo County, Ind.* (See p. 288.)

P. B. M. Traverse.—At *Terre Haute, Vigo County, Ind.*, north of the Fort Harrison pike crossing of the Chicago & Eastern Illinois Railroad, 8.1 meters east of the east rail of the track, and 13.1 meters to the northwest from a blazed elm tree. The mark is an iron post stamped "Prim. Trav. Sta. No. 22."

U. S. E. 482.—At *Terre Haute, Vigo County, Ind.* (See p. 289.)

P. B. M. Vandalia No. 2.—At *Terre Haute, Vigo County, Ind.*, on the southwest corner of the bridge seat of the west pier of the Vandalia Railroad bridge over the Wabash River. The mark is a square cut within a square and lettered "U. S. B. M."

P. B. M. 1.—At *Terre Haute, Vigo County, Ind.*, on the right bank of the Wabash River, about 120 meters north of the west end of the Wabash Avenue highway bridge and 5 meters west of the top of the high made bank, in the northeast corner of the property of Louis Heyden. (Note 60.*)

P. B. M. Wabash.—At *Terre Haute, Vigo County, Ind.*, in the east end of the concrete approach to the abutment at the north side of the Wabash Avenue highway bridge over the Wabash River, 1.8 meters from the end post, and 4 inches outside the guard wall. The mark is a cross in the center of a 2-inch chiseled square lettered "B. M."

P. B. M. Brewery.—At *Terre Haute, Vigo County, Ind.*, at the corner of First and Wilson Streets, on the north end of the lower step of the entrance to the building of the Peoples Brewing Co. The mark is a chiseled square lettered "U.S.B.M."

P. B. M. 2.—At *Terre Haute, Vigo County, Ind.*, in the front yard of the cottage at 613 Prairieton Avenue, the first house south of the Commercial Distilling Co., 1 meter from the north yard fence, 3 meters from the east fence and 2 meters west of a blazed oak tree. (Note 60.*)

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* See pp. 162-166.

P. B. M. 3.—Near *Prairieton, Vigo County, Ind.*, about 7 miles below Terre Haute, on the farm of Theodore Hullman, about 100 meters east of the river bank, in the fence corner 1 meter east of the road fence, 1.5 meters south of the barnyard fence, and about 75 meters west from the dwelling house. (Note 60.*)

P. B. M. 4.—About 1¼ miles below *Prairieton, Vigo County, Ind.*, about 1 mile back from the river, on the north side of the road leading west from Prairieton, and on the west side of the road turning off to the river, at the southeast corner of a cultivated field owned by John Rotz, about 30 meters north of a small dwelling occupied by George McCoy, 1 meter inside of the east fence and 1.2 meters inside of the south fence. (Note 60.*)

P. B. M. 5.—Near *Prairieton, Vigo County, Ind.*, about ¼ mile below the lower end of Strains Ripple, about 12 meters south of the levee running east and west along the top of the river bank, about 30 meters north of the dwelling house on the farm of S. A. Paddock and 100 meters east of the "White" schoolhouse, 5 meters south of the center line of the road, 1 meter south of the yard and road fence and just at the junction of the yard and garden fences. (Note 60.*)

P. B. M. 6.—In *Vigo County, Ind.*, near *Darwin, Ill.*, about 180 meters above the upper end of Aurora Bend and 15 meters east of the road leading to Darwin, in the front yard of the house of Fred Maurer, 3.7 meters west of the northwest corner of the house. (Note 60.*)

P. B. M. 7.—In *Vigo County, Ind.*, opposite *Darwin, Ill.*, about 8 meters east of the center of the road at the point where it turns down the steep bank to the ferry, near the center of a square formed by 4 blazed cottonwood trees, each about 10 or 11 meters distant from the mark. (Note 60.*)

P. B. M. 8.—Near *York, Clark County, Ill.*, about 100 meters west of the river at the upper end of Chenoweths Reach, 20 meters southeast of the southeast corner of the two-story green brick house belonging to M. C. Chenoweth, 5 meters west of the road, in the corner formed by the yard and poultry-yard fences. (Note 60.*)

P. B. M. 9.—Near *York, Clark County, Ill.*, 50 meters from the top of the river bank in the southeast corner of the barnyard of G. H. Whitlock, 30 meters east of the southeast corner of his dwelling and 18 meters west of a 24-inch blazed maple tree. (Note 60.*)

P. B. M. 10.—At *York, Clark County, Ill.*, 50 meters north of the top of the river bank on a vacant lot, the property of Mrs. J. H. Rook, 15 meters southwest of the intersection of the ferry road and the first street parallel to the river. (Note 60.*)

P. B. M. 11.—In *Crawford County*, near *York, Clark County, Ill.*, about ¼ mile southwest of the mouth of Racoon Creek, on the property of Oliver Meeker, about 60 meters north of the center of a lane, in a group of trees surrounding an old cabin, 12 meters southeast of the southeast corner of the cabin and 12 meters north of the northeast corner of a small 1-room building. A blazed sycamore and a blazed split-bodied maple, each distant 3.7 meters, bear northeast and west, respectively. (Note 60.*)

P. B. M. Hutsonville.—At *Hutsonville, Crawford County, Ill.*, in the north end of the lowest stone step at the main entrance to the public-school building. The mark is a chiseled square lettered "U. S. B. M."

P.B.M. 12.—At *Hutsonville, Crawford County, Ill.*, in the southwest corner of the public-school grounds, about 1 meter east of the east edge of the sidewalk and $\frac{6}{10}$ meter north of the east-and-west property fence. (Note 60.*)

P. B. M. 13.—Near *Hutsonville, Crawford County, Ill.*, just south of the point where the road turns east to Harneys Ferry, 75 meters west of the river bank on the property of John Colliflower, 40 meters east of the southeast corner of his dwelling, 1 meter south of his south garden fence, $\frac{7}{10}$ meter west of the road fence and 3 meters north of a small apple tree. (Note 60.*)

P. B. M. Plunkett.—In *Crawford-County, Ill.*, opposite *Merom, Ind.*, 15 meters north of the road leading down to the ferry on the south end of the lowest of the 8 steps leading to the porch on the residence of J. E. Plunkett. The mark is a cross in the center of a chiseled square lettered "U .S. B. M."

P. B. M. 14.—In *Crawford County, Ill.*, opposite *Merom, Ind.*, about 60 meters from the top of the river bank and about 30 meters west of the dwelling of J. E. Plunkett, in the southeast corner of the garden, 8 meters north of the road leading down to the ferry. (Note 60.*)

P. B. M. Riverton.—At *Riverton, Sullivan County, Ind.*, on the south end of the bridge seat surface of the concrete abutment at the east end of the Illinois Central Railroad bridge over the Wabash River, $\frac{7}{10}$ meter from the face of the retaining wall and 1 meter below the center line of the downstream chord of the bridge. The mark is the center of a chiseled square, lettered "U. S. B. M."

P. B. M. 15.—Near *Riverton, Sullivan County, Ind.*, 1¼ miles below Greers Ripple and about 120 meters back from the river bank, in the northwest corner of the yard and 11 meters in front of the cabin occupied by Judd Smith and owned by W. H. Jones. There is a small iron pipe about 68 meters to the northwest. (Note 60.*)

P. B. M. 16.—Near *Riverton, Sullivan County, Ind.*, about 1¼ miles above the point formerly known as Hites Ferry, at the inside base of the levee opposite a fisherman's shack on the other side of the levee, about 8 meters above where the east and west section line road turns up the river and about 120 meters above the upper one of two pile hurdles in the river about 90 meters apart. (Note 60.*)

P. B. M. 17.—Near *Riverton, Sullivan County, Ind.*, about ¾ mile above Shaws Landing and 60 meters back from the caving river bank, on the west side of the river road at the upper end of a growth of timber along the bank, in the southwest corner of the garden owned by Ross Lynch, 55 meters south of his house and 6 meters north of his barn. (Note 60.*)

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* See pp. 162–166.

P. B. M. 18.—In *Knox County Ind.*, near *Russellville, Ill.*, opposite Longtown landing, in the southeast corner of the apple orchard, 1 meter from the fence, and 150 meters south of the barn on the farm owned by A. Black and occupied by Exin Higgins. (Note 60.*)

P. B. M. 19.—In *Knox County, Ind.*, near *Russellville, Ill.*, about ½ mile back from the river across from a willow bar, on the north fence line of an east and west gravel road, about 200 meters east of a high wooden bridge, the second out from the river. It is ½ mile west of a north-and-south road at the point where a farm road turns south and runs down to a house occupied by E. E. Brown; a 24-inch blazed elm tree, distant about 3 meters, bears west. (Note 60.*)

P. B. M. 20.—At *Russellville, Lawrence County, Ill.*, about 100 meters back from the river bank, on the east side of the public road leading north to Palestine, Ill., and south to Vincennes, Ind., in the southwest corner of a lot owned by James Broyle, just across the road from the town house, and about 30 meters above where the road turns east to the ferry; about 10 meters northwest of a frame house on the corner, about 10 meters south of a 30-inch cottonwood tree, and about 10 meters north of a 40-inch maple tree. (Note 60.*)

P. B. M. 21.—About 5 miles below *Russellville, Lawrence County, Ill.*, about ¼ mile below the point formerly known as Belgrade Landing on the east side of the public road, 38 meters southwest of W. H. Wetham's house, ⅔ meter inside the property line, in line with the fence separating the barnyard and lawn. (Note 60.*)

P. B. M. 22.—In *Lawrence County, Ill.*, 3 miles above *Vincennes, Ind.*, 5 meters north of the center of the main public road where it crosses the levee, 1.2 meters from the top of the levee on the inside face, 1.2 meters west of E. W. Hedden's R. F. D. mail box, and about 60 meters south of his barn. (Note 60.*)

B. & O. No. 1.—In *Lawrence County, Ill.*, near *Vincennes, Ind.*, near the center of the top stone on the upstream end of the Illinois abutment of the Baltimore & Ohio Railroad bridge over the Wabash River. The mark is a cross chiseled on the stone and marked "U. S. P. B. M."

B. & O. No. 2.—At *Vincennes, Knox County, Ind.*, on the top of the downstream end of the south abutment of the Baltimore & Ohio Railroad bridge over the Wabash River. The mark is the center of a chiseled square lettered "U. S. E. B. M."

No. 1.—At *Vincennes, Knox County, Ind.* (See Appendix 8, Report for 1899, p. 566.)

A_3.—At *Vincennes, Knox County, Ind.* (See Appendix 8, Report for 1899, p. 566.)

P. B. M. 2-1903.—Near *Vincennes, Knox County, Ind.*, about 3¼ miles below the Baltimore & Ohio Railroad bridge, in front of the house af Earl Meskemon, near the top of the river side of the levee and 6.4 meters southwest of a 48-inch blazed sycamore tree. (Note 61.*)

P. B. M. 23.—About 4 miles below *Vincennes, Knox County, Ind.*, 30 meters back from the top of the river bank and 80 meters north of the northeast corner of Homer Henderson's house, in the northwest corner of his orchard, 1 meter east of the hedge fence and 1 meter north of the wire fence. (Note 60.*)

P. B. M. 3-1903.—About 6 miles below *Vincennes, Knox County, Ind.*, and ¾ mile above the mouth of the Embarras River, near the top of the river side of the levee, at the lower end of a small field and about 250 paces above a small cabin outside the levee, and 300 paces above a barn inside the levee. (Note 61.*)

P. B. M. 24.—In *Knox County, Ind.*, near *St. Francisville, Ill.*, on the W. H. Brevoort estate, 3.7 meters from the center line of the road along near the base of the levee, 18 meters south of the two-story red house, in the northwest corner of the barn lot just inside the road fence. (Note 60.*)

P. B. M. Big Four.—In *Knox County, Ind.*, 3½ miles above *St. Francisville, Ill.*, on the top of the lower end of the second pier on the Indiana end of the Big Four Railroad bridge over the Wabash River. The mark is the center of a 1-inch chiseled square, lettered "U. S. B. M."

P. B. M. 25.—In *Knox County, Ind.*, 1½ miles above *St. Francisville, Ill.*, on top of a prominent narrow sand ridge, 75 meters southeast of a road at the point where it crosses the ridge and 6 meters west of a triple-bodied blazed elm tree in the swale. (Note 60.*)

P. B. M. 26.—In *Knox County, Ind.*, 3 miles below *St. Francisville, Ill.*, in the northeast corner of the yard of the two-story white frame residence of John Rainey, 11 meters northeast of the northeast corner of the house and just inside of the yard fence. (Note 60.*)

P. B. M. 27.—About 2¾ miles above *Little Rock, Knox County, Ind.*, 12 meters back from the top of the river bank in the northwest corner of the garden plot of the caretaker's house on the property of the Wabash Fishing Club, ⅔ meter east of the east end of the heavy wrought-iron fence and 9 meters east of an 18-inch blazed hickory tree. (Note 60.*)

P. B. M. 10-1903.—At *Little Rock, Knox County, Ind.*, in the lane where the road leaves the river, at the west end of a corn crib, 20 paces east of the public scales and 12 meters east of the mail box of Edwin Self (Note 61.*)

P. B. M. 28.—About 2½ miles below *Little Rock, Knox County, Ind.*, in the northeast corner of the yard of the one-and-one-half story white dwelling of Perry Cunningham, on the southwest corner of a south and an east-and-west road, about 14 meters northeast of the northeast corner of the house, about 8 meters west of the center line of the south road at the junction, and 8 meters back from the top of the river bank, just inside the yard fence. (Note 60.*)

P. B. M. 29.—In *Knox County, Ind.*, about 4 miles above *Mount Carmel, Ill.*, about 1¾ miles above Grand Rapids locks, on land belonging to James Carson, about ¼ mile below the bridge over a main drainage ditch and 200 meters below a smaller ditch, about 5 meters west of the southwest corner of a small tenant house on a high mound, 5 meters east of the center of the road along the top of the river bank, and 2 meters northeast of a blazed walnut tree. (Note 60.*)

P. B. M. 12-1903.—In *Knox County, Ind.*, near *Mount Carmel, Ill.*, about ½ mile below a point opposite Hanging Rock, about 1½ miles above the Grand Rapids lock and dam and nearly opposite the lower end of a small island,

* See pp. 162-166.

exactly on the fence line, halfway between two drainage ditches, 5 meters northeast of the center line of the road and 9 meters northeast of a 24-inch blazed black-oak tree. (Note 61.*)

P. B. M. 13-1903.—In *Knox County, Ind.*, 2 miles above *Mount Carmel, Ill.*, where the coping stones meet near the upper heelpost on the land wall of the Grand Rapids lock. (Note 61.*)

P. B. M. Grand Rapids.—In *Knox County, Ind.*, 2 miles above *Mount Carmel, Ill.*, near where three coping stones meet near the upper heelpost on the land wall of the Grand Rapids lock. The mark is the center of a 1-inch square sunk in the masonry, and lettered "U. S. P. B. M."

P. B. M. 30.—In *Gibson County, Ind.*, opposite *Mount Carmel, Ill.*, 150 meters back from the river bank and 160 meters below the Southern Railway bridge across the Wabash River, 8 meters from the upper corner of the house owned by George Coombs and occupied by C. G. Patry, and on the outside of the river road. (Note 60.*)

P. B. M. 15, 1903.—In *Gibson County, Ind.*, near *Mount Carmel, Ill.*, about ½ mile below the foot of Patoka Island, ¼ mile above a cable ferry, and 30 paces below the front gate of Anton Beuligman's yard, close to the river side of the fence. (Note 61.*)

P. B. M. 31.—In *Gibson County, Ind.*, 4¼ miles below *Mount Carmel, Ill.*, 45 meters back from the top of the river bank, in front of the small house owned by Charles Kenton and occupied by Andrew Walden, 1 foot inside of the fence line. (Note 60.*)

P. B. M. 17, 1903.—In *Gibson County, Ind.*, opposite *Rochester, Ill.*, at the anchor of the ferry cable and on the river side of the fence. (Note 61.*)

P. B. M. 32.—About 1 mile above *Crowleyville, Gibson County, Ind.*, about 3 miles below the cable ferry at Rochester, Ill., in the northwest corner of the yard of the house occupied by Jordan Garrett, 1 meter inside of each of the fences, and 10 meters from a hickory tree, with its top broken out, standing at the top of the river bank. (Note 60.*)

P. B. M. 18, 1903.—About 1 mile above *Crowleyville, Gibson County, Ind.*, about ¼ mile above the church house, 10 meters below the residence of Jordan Garrett, on the river side of the intersection of the road fence and the fence at the lower side of the garden, and about 45 meters below P. B. M. 32. (Note 61.*)

P. B. M. 33.—In *Gibson County, Ind.*, near *Grayville, Ill.*, about 1 mile below Jimtown, Ind., about ½ mile below the ruins of an old sorghum mill, 35 meters back from the top of the river bank, in the southeast corner of the garden plot in front of the white house occupied by Allan Collins, 1 meter inside of each of the fences, and 12 meters from the house. (Note 60.*)

P. B. M. 20, 1903.—In *Gibson County, Ind.*, near *Grayville, Ill.*, about 1 mile below McCrearys Bluff, on the river side of the road, ¼ mile above a large white house and 50 paces below a small house. (Note 61.*)

P. B. M. 34.—In *Gibson County, Ind.*, near *Grayville, Ill.*, about 1¾ miles below McCrearys Bluff, at the southwest corner of the yard of the small red dwelling of Millard Hagler, 1 meter inside of the fences and 6 meters from the northwest corner of the house, about 120 meters back from the top of the river bank, and 180 meters west of a schoolhouse on the other side of the road. (Note 60.*)

P. B. M. 35.—In *Gibson County, Ind.*, near *Grayville, Ill.*, about 2 miles above Seagars Island, about 250 meters from the river, at the corner of the yard of a small house, 1 meter from the fences, and 6 meters from the southeast corner of the house, 30 meters west of the prominent red barn, and 30 meters south of the farm road at the top of the high bank. (Note 60.*) A small iron pipe established by the base-line party is 6 meters east of the mark.

P. B. M. 22, 1903.—In *Gibson County, Ind.*, near *Gravyille, Ill.*, about ¼ mile below the foot of Seagars Island, at the top of the river bank between a house and a corn crib, 62.5 meters from the house, and 26.2 meters from the crib. (Note 61.*)

P. B. M. 36.—In *Gibson County, Ind.*, about 4½ miles above *Grayville, Ill.*, about 200 meters below a prominent gravel and sand bar, 18 meters from the top of the river bank, in the corner of the yard of an abandoned cabin, 15 meters southwest of the cabin, 30 meters above a log corn crib, and 12 meters east of a blazed 40-inch swell-butted oak. Twin sycamores and two maples near the blazed tree show prominently from the river. (Note 60.*)

P. B. M. 23, 1903.—In *Gibson County, Ind.*, near *Grayville, Ill.*, about 3 miles below Seagars Island and just above a clump of timber, in the northeast corner of a garden, 54 meters northeast of a house and at the top of the caving river bank. (Note 61.*)

P. B. M. 37.—In *Gibson County, Ind.*, opposite *Grayville, Ill.*, about 18 meters back from the levee in a cultivated field, at the point where the road outside the levee, and the one along the river from Griffin, Ind., intersect and lead to the Grayville ferry. A 12-inch blazed coffee-bean tree, distant 12 meters, bears west. (Note 60.*)

P. B. M. 25, 1903.—In *Posey County, Ind.*, about 1¾ miles below *Grayville, Ill.*, on the downstream end of the west pier on the Indiana end of the Illinois Central Railroad bridge over the Wabash River. The mark is the center of a chiseled square, lettered "U. S. E. B. M."

P. B. M. 38.—In *Posey County, Ind.*, near *Grayville, Ill.*, about 3½ miles above New Baltimore, Ind., and ¼ mile back from the river, in the northwest corner of the garden plot on the land of R. Brooks, 35 meters east of the road to New Harmony, and 8 meters northeast of a small house. (Note 60.*) A small iron pipe established by a base-line party is 5 meters south of the mark.

P. B. M. 39.—About 4 miles above *New Harmony, Posey County, Ind.*, 1 meter inside the fences, in the northeast corner of the back yard of the small house owned and occupied by D. M. Ades, about 100 meters back from the river bank, 12 meters above the bank of the Black River, and 100 meters south of the highway bridge across Black River. (Note 60.*)

* See pp. 162-166.

P. B. M. 28, 1903.—About 3 miles above *New Harmony, Posey County, Ind.*, about 25 meters from the south end of the large white house of Link Ford, on the north side of a fence, about 10 meters from the top of the river bank and 15 meters from the fence corner. (Note 61.*)

U. S. G. S. 392.—At *New Harmony, Posey County, Ind.*, in the north window sill of the building of the New Harmony Banking Co. (Note 17.*)

U. S. G. S. 387.—At *New Harmony, Posey County, Ind.*, at the west end of the top step of the north entrance to the Murphy Library. (Note 17.*)

P. B. M. New Harmony.—At *New Harmony, Posey County, Ind.*, at the lower edge of town, 24 meters south of the west end of Steam Mill Street, close to the wire fence on the west side of the alley, just back of the house of Le Roy Cox, and 2 meters north of Capt. Ribeyre's red barn. (Note 61.*)

P. B. M. 40.—At *New Harmony, Posey County, Ind.*, at the lower edge of town, 21 meters south of the west end of Steam Mill Street, 45 meters north of the road leading to the ferry, at the southwest corner of the yard surrounding the house of Le Roy Cox, and 6 meters east of Capt. Ribeyre's red barn. It is about 15 meters below P. B. M. New Harmony, and on the opposite side of the alley. (Note 60.*)

P. B. M. △ 4, 1903.—Near *New Harmony, Posey County, Ind.*, about ½ mile below the head of Turkey Island, and 50 meters back from the top of the river bank, 33 meters northeast of the house occupied by John Fisher, 4 meters west of the north corner of the barn, $\frac{7}{10}$ meter north of the fence running down to the river, 6 meters south of the fence corner, and 15 meters east of the corn crib. (Note 61.*)

P. B. M. 41.—About 4¼ miles below *New Harmony, Posey County, Ind.*, on the right bank of Ribeyres Island, about ¼ mile below large corn cribs on the river bank, about 120 meters back from the river, on the outside of the road leading around the island, in the southwest corner of the yard surrounding the two-story white house of William Hobbs, and about 8 meters southwest of the house. (Note 60.*)

P. B. M. △ 10, 1903.—About 5¾ miles below *New Harmony, Posey County, Ind.*, on the right bank of Ribeyres Island, 120 meters from the river, about 30 meters from the house occupied by a Mr. Stewart, 5 meters south of the barn, 2.5 meters west of the pump house, and 1.2 meters from the fence. (Note 61.*)

P. B. M. 42.—About 7¼ miles below *New Harmony, Posey County, Ind.*, on the right bank of Ribeyres Island, about 200 meters from the river, on the outside of the road leading around the island, in the southeast corner of the garden plot of the small white dwelling of George Mitchell, 1 meter inside of the fences and 14 meters southeast of the house. (Note 60.*)

P. B. M. △ 9, 1903.—About 7½ miles below *New Harmony, Posey County, Ind.*, on the right bank of Ribeyres Island, 12 meters from the top of the high river bank, in a cultivated field just inside of the road, 30 meters below a vacant house, and about 180 meters below P. B. M. 42 (see above). (Note 61.*)

P. B. M. 43.—In *Posey County, Ind.*, near *Maunie, Ill.*, ½ mile above Mink Island and just above Winklers Ferry, at the top of the river bank just inside the ferry road, 2.4 meters north of a blazed 12-inch box-elder tree, and 3.6 meters east of a blazed 24-inch sycamore. (Note 60.*)

P. B. M. 44.—In *Posey County, Ind.*, about 3 miles above *Maunie, Ill.*, about 60 meters above the foot of Twin Sister Island No. 1, 30 meters back from the top of the river bank and 2 meters west of the wire fence between 2 cultivated fields. Blazed 16-inch walnut tree, distant 6 meters, bears south; two blazed thorn trees, distant 3 and 6 meters, respectively, bear northwest. (Note 60.*)

P. B. M. Aldrich.—In *Posey County, Ind.*, about ½ mile above *Maunie., Ill.*, about 200 meters from the river, 2.4 meters north of the northeast corner of the big red barn on a high mound on the land of John Aldrich. (Note 61.*) A small iron pipe established by a base line party is about 1 meter east of the mark.

P. B. M. 31, 1903.—In *Posey County, Ind.*, near *Maunie, Ill.*, ¾ mile above the head of Grand Chain, 12 meters from the upper corner of a large tenement house on the river side of the road, near two pecan trees, and 8 meters from the iron pump in the back yard. (Note 61.*)

P. B. M. L. & N.—In *Posey County, Ind.*, about 3 miles below *Maunie, Ill.*, on the top of the upper end of the land pier of the Louisville & Nashville Railroad bridge over the Wabash River, ½ meter above the iron base-plate, about $\frac{9}{10}$ meter from the upper end of the top course of masonry, and 1.7 meters from the sides. The mark is the center of a chiseled square, lettered "U. S. B. M."

P. B. M. 45.—In *Posey County, Ind.*, about 3 miles below *Maunie, Ill.*, about 55 meters back of the land pier of the Louisville & Nashville Railroad bridge over the Wabash River and 5 meters below the center line of the trestle. (Note 60.*)

U. S. G. S. 375.—At *Maunie, White County, Ill.*, in the middle of the northwest face of the foundation wall of the Methodist Church, 2 feet above the ground. (Note 17.*) The mark is stamped "375–Illinois–1903."

P. B. M. 33, 1903.—In *Posey County, Ind.*, near *Maunie, Ill.*, about 1¾ miles below the Louisville & Nashville Railroad bridge, in line with the upper side of the steel tower for supporting telephone wires across the river, and 9 meters toward the river from its base. (Note 61.*)

P. B. M. 46.—In *Posey County, Ind.*, 7½ miles below *Maunie, Ill.*, about ¼ mile above Little Chain, 30 meters back from the river bank, and 9 meters southwest of the southwest corner of the small red house occupied part of the year by Herman Jeffries. (Note 60.*)

P. B. M. 47.—In *Posey County, Ind.*, near the *Mouth of the Little Wabash River*, about 60 meters above Fretageot's ferry landing, about 120 meters below the angle where the road turns away from the river, and 75 meters back from

* See pp. 162-166.

the river, 10 meters outward from the center of the road leading to Mount Vernon, Ind., and 1 meter inside of the fence line of a wooded pasture. A blazed oak, distant 26 meters, bears west. (Note 60.*) About 120 meters below the mark is a small iron pipe established by the base-line party.

P. B. M. 48.—In *Posey County, Ind.*, about 3¼ miles above the *Mouth of the Little Wabash River*, about 75 meters from the river at the top of the high bank, in the northeast corner of the yard of the small white dwelling of R. D. Walling, 5.5 meters northeast of the northeast corner of the house, and 1 meter inside of the fences. (Note 60.*) About 60 meters below the mark is a small iron pipe established by the base-line party.

P. B. M. 49.—In *Posey County, Ind.*, about 1 mile below the *Mouth of the Little Wabash River*, on the top of the high bank about 250 meters from the river, 1 meter inside of a wire fence, and 18 meters southwest of the southwest corner of a rail corn crib on a high mound and in plain view from the river, 3 meters north of a blazed 15-inch red-oak tree and 3.5 meters south of a blazed 8-inch pig hickory. (Note 60.*) A small iron pipe established by a base-line party is about 27 meters north of the mark.

P. B. M. 50.—In *Posey County, Ind.*, about 10 miles above the *Mouth of the Wabash River* and 1 mile above Levi's slough, about 250 meters from the river, 6 meters from the center line on the south side of the section line road, in the corner of the yard, 11 meters west of the northwest corner of the house owned and occupied by Ferdinand Vollmer. A barn and two sheds across the road are plainly visible from the river. (Note 60.*)

P. B. M. 39, 1903.—In *Posey County, Ind.*, near the *Mouth of the Wabash River*, about 1¼ miles below Bone Bank and opposite the upper end of Mackeys Bar, near a small shack, about 12 meters from the river on the river side of the wagon road, between a large white locust tree and a large hackberry tree at the lower edge of a small strip of large trees. (Note 61.*)

P. B. M. 51.—In *Posey County, Ind.*, about 6½ miles above the *Mouth of the Wabash River*, ½ mile below Mackeys Island, on the land of the Mackey heirs, 45 meters from the top of the caving river bank, in the northwest corner of the barn lot of a small tenant house, 1 meter inside of the fences, and 12 meters south of the southwest corner of the house. A 60-inch elm, distant 12 meters, bears north, and a 40-inch cottonwood, distant 12 meters, bears northwest. (Note 60.*)

P. B. M. 52.—In *Posey County, Ind.*, about ¾ mile above the *Mouth of the Wabash River*, about 275 meters from the river in cultivated land, the property of a Mr. Crumback, at the intersection of the road leading across the neck and the one leading down the river, about ¾ mile above a prominent corn crib on a high concrete-faced mound, about $^1/_5$ mile north of a shack at the top of the river bank and ¼ mile east of a shack at a turn in the road, about 3 meters northeast of a blazed 24-inch pecan tree, and about 40 meters east of another. (Note 60.*)

P. B. M. 53.—On the right-hand side of *Wabash Island, Union County, Ky.*, opposite the mouth of the Wabash River, at an open place used as a fisherman's landing, about 40 meters from the low-water bank and 135 meters above the road leading across the island. (Note 60.*)

P. B. M. 54.—In *Union County, Ky.*, about ¾ mile below the head of *Wabash Island*, about ⅓ mile below the wagon bridge across Lost Creek and 100 meters above its mouth, on high ground in the southeast corner of H. R. Slack's garden, 1 meter inside of the fences, 15 meters south of the southeast corner of the barn, and 60 meters northeast of the house. (Note 60.*)

P. B. M. 839.—Near *Wabash Island, Union County, Ky.* (See p. 274.)

P. B. M. 842.—Near *Wabash Island, Union County, Ky.* (See p. 274.)

P. B. M. Kentucky.—At *Blackburn, Union County, Ky.*, opposite *Shawneetown, Ill.*, at the southwest corner of an abandoned store building in the northeast corner of the crossroads. The mark is stamped "1906." (Note 18.*)

P. B. M. Hotel.—At *Shawneetown, Gallatin County, Ill.* (See p. 291.)

P. B. M. Station.—At *Shawneetown, Gallatin County, Ill.* (See p. 291.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN BELEN, N. MEX., AND EL PASO, TEX., ESTABLISHED BY THE UNITED STATES GEOLOGICAL SURVEY, 1905.

[From information furnished by the United States Geological Survey. Slight changes have been made for the purposes of indexing and of condensing under general notes.]

Descriptions of Geological Survey bench marks between Belen and Albuquerque, N. Mex., are given in connection with the descriptions of nearby Coast and Geodetic Survey bench marks on pages 241, 263, and 264.

U. S. G. S. 4795.—About 4.8 miles south of *Belen, Valencia County, N. Mex.*, 220 feet south of milepost 937, 50 feet west of the Atchison, Topeka & Santa Fe track, 8 feet north of a gate. (Note 18.*)

U. S. G. S. 4770.—About 1.5 miles north of *Sabinal* (*Bernardo* post office), *Socorro County, N. Mex.*, 300 feet north of the Valencia-Socorro County line, 50 feet west of the Atchison, Topeka & Santa Fe track, 12 feet north of a gate. (Note 18.*)

U. S. G. S. 4762.—About 0.5 mile south of *Sabinal* (*Bernardo* post office), *Socorro County, N. Mex.*, 400 feet south of mile post 943, 45 feet west of the Atchison, Topeka & Santa Fe track, 6 feet north of a gate. (Note 18.*)

U. S. G. S. 4743.—About 3.5 miles south of *Sabinal* (*Bernardo* post office), *Socorro County, N. Mex.*, 500 feet south of milepost 946, 50 feet west of the Atchison, Topeka & Santa Fe track, 7 feet south of a gate. (Note 18.*)

U. S. G. S. 4740.—About 6.5 miles south of *Sabinal* (*Bernardo* post office), *Socorro County, N. Mex.*, 300 feet south of mile post 949, 50 feet east of the road crossing, at a fence corner. (Note 18.*)

* See pp. 162-166.

U. S. G. S. 4720.—About 1.5 miles north of *Lajoya, Socorro County, N. Mex.*, 3 feet west of milepost 952, 50 feet east of the Atchison, Topeka & Santa Fe track. (Note 18.*)

U. S. G. S. 4691.—About 4.7 miles south of *Lajoya, Socorro County, N. Mex.*, 50 feet west of the Atchison, Topeka & Santa Fe track, at the fence line. (Note 18.*)

U. S. G. S. 4698.—About 4.2 miles north of *Alamillo, Socorro County, N. Mex.*, 180 feet west of bridge 886, 50 feet north of the Atchison, Topeka & Santa Fe track. (Note 18.*)

U. S. G. S. 4696.—About 3.5 miles north of *Alamillo, Socorro County, N. Mex.*, on the north end of steel bridge 889, 8 feet east of the Atchison, Topeka & Santa Fe track, at the corner of the retaining wall. (Note 18.*)

U. S. G. S. 4653.—At *Alamillo, Socorro County, N. Mex.*, 60 feet south of the Atchison, Topeka & Santa Fe milepost 965, at the northeast corner of the fence at the section house. (Note 18.*)

U. S. G. S. 4635.—About 3.7 miles south of *Alamillo, Socorro County, N. Mex.*, 50 feet east of the Atchison, Topeka & Santa Fe track, at a dike. (Note 18.*)

U. S. G. S. 4597.—About 1.5 miles north of *Socorro, Socorro County, N. Mex.*, 800 feet north of milepost 976, 50 feet west of the Atchison, Topeka & Santa Fe track. (Note 18.*)

U. S. G. S. 4593—At *Socorro, Socorro County, N. Mex.*, in front of the Windsor Hotel, in line with the curb. (Note 18.*)

U. S. G. S. SOCR 4568.—About 2.5 miles south of *Socorro, Socorro County, N. Mex.*, 100 feet north of milepost 980, 50 feet west of the Atchison, Topeka & Santa Fe track, in a fence corner. (Note 18.*)

U. S. G. S. 4566.—About 5.5 miles south of *Socorro, Socorro, County, N. Mex.*, 1,000 feet west of milepost 983, 60 feet west of the Atchison, Topeka & Santa Fe track, 125 feet east of an adobe house, 3 feet north of a gate. (Note 18.*)

U. S. G. S. 4548.—About 8.7 miles south of *Socorro, Socorro County, N. Mex.*, 1,300 feet south of milepost 986, 50 feet west of the Atchison, Topeka & Santa Fe track, 2 feet north of a gate. (Note 18.*)

U. S. G. S. 4539.—At *San Antonio, Socorro County, N. Mex.*, 150 feet west of the Atchison, Topeka & Santa Fe track, 6 feet south of the southeast corner of Solomon B. Chavez's house. (Note 18.*)

U. S. G. S. 4533.—About 2.5 miles south of *San Antonio, Socorro County, N. Mex.*, 27 feet west of the Atchison, Topeka & Santa Fe track, at the north end of the base line, 15 feet north of the signal. (Note 18.*)

U. S. G. S. 4509.—About 6 miles south of *San Antonio, Socorro County, N. Mex.*, 60 feet west of the Atchison, Topeka & Santa Fe track, 4 feet south of milepost 994. (Note 18.*)

U. S. G. S. 4498.—About 1.4 miles south of *Elmendorf, Socorro County, N. Mex.*, in the cement under the signal at the south end of the base line. (Note 18.*)

U. S. G. S. 4489.—About 5 miles north of *San Marcial, Socorro County, N. Mex.*, 300 feet south of milepost 1000, 50 feet west of the Atchison, Topeka & Santa Fe track, at a wire fence. (Note 18.*)

U. S. G. S. 4472.—About 2.2 miles north of *San Marcial, Socorro County, N. Mex.*, 1,300 feet north of milepost 1003 50 feet west of the Atchison, Topeka & Santa Fe track, 2 feet north of a gate. (Note 18.*)

U. S. G. S. 106.—At *San Marcial, Socorro County, N. Mex.*, at the northwest corner of the railroad park, 3 feet west of the northwest gate. (Note 18.*)

U. S. G. S. 4458.—At *San Marcial, Socorro County, N. Mex.*, at the northwest corner of the railroad park, 3 feet west of the northwest gate. (Note 17.*)

U. S. G. S. 107.—About 0.75 mile south of *San Marcial, Socorro County, N. Mex.*, on the north end of the Atchison, Topeka & Santa Fe Railway bridge over the Rio Grande, 4 feet east of the rail, in the coping stone. (Note 17.*)

U. S. G. S. 110.—About 4 miles south of *San Marcial, Socorro County, N. Mex.*, east of the Atchison, Topeka & Santa Fe track, 60 feet east of a road crossing, 10 feet north of the wagon road. (Note 18.*)

U. S. G. S. 113.—At *Pope, Socorro County, N. Mex.*, 36 feet east of the main line of the Atchison, Topeka & Santa Fe Railway, in line with the telegraph poles. (Note 18.*)

U. S. G. S. 116.—About 2.5 miles south of *Pope, Socorro County, N. Mex.*, south of a telegraph pole; north of milepost 1015, 40 feet west of the Atchison, Topeka & Sante Fe track, in line with telegraph poles. (Note 18.*)

U. S. G. S. 119.—About 5.75 miles south of *Pope, Socorro County, N. Mex.*, 1 telegraph pole south of milepost 1018, 50 feet west of the Atchison, Topeka & Santa Fe track, in line with telegraph poles. (Note 18.*)

U. S. G. S. 122.—At *Lava, Socorro County., N. Mex.*, 0.25 mile north of the station, 700 feet south of milepost 1021, 50 feet east of the Atchison, Topeka & Santa Fe track, in line with telegraph poles. (Note 18.*)

U. S. G. S. 123.—About 0.5 mile south of *Lava, Socorro County, N. Mex.*, on a small flat surrounded by volcanic rock and lava, 14 rails south of milepost 1022, 8 rails north of the point of a curve, and 106 feet west of the Atchison, Topeka & Santa Fe track, under a mound of volcanic rock, flush with the ground, in cement. (Note 18.*)

U. S. G. S. 126.—About 3.5 miles south of *Lava, Socorro County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, 5 feet south of milepost 1025. (Note 18.*)

U. S. G. S. 129.—About 6.5 miles south of *Lava, Socorro County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 6 feet south of milepost 1028. (Note 18.*)

U. S. G. S. 132.—About 9.5 miles south of *Lava, Socorro County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, 6 feet south of milepost 1031. (Note 18.*)

U. S. G. S. 135.—About 2 miles south of *Crocker, Sierra County, N. Mex.*, 40 feet west of the Atchison, Topeka & Santa Fe track, south of mile post 1034. (Note 18.*)

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* See pp. 162-166.

U. S. G. S. 138.—About 5 miles south of *Crocker, Sierra County, N. Mex.*, 40 feet west of the Atchison, Topeka & Santa Fe track, 6 feet south of milepost 1037. (Note 18.*)

U. S. G. S. 141.—About 8 miles south of *Crocker, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, 5 feet south of milepost 1040. (Note 18.*)

U. S. G. S. 4727.—At *Engle, Sierra County, N. Mex.*, 150 feet north of the station, between the main line and the side track of the Atchison, Topeka & Santa Fe Railway. (Note 18.*)

U. S. G. S. 147.—About 3 miles south of *Engle, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 5 feet south of milepost 1046. (Note 18.*)

U. S. G. S. 150.—About 6.25 miles south of *Engle, Sierra County, N. Mex.*, 0.25 mile south of milepost 1049, 700 feet south of the lake, 135 feet south of the cattle guard, 55 feet east of the track, and 5 feet south of a telegraph pole. (Note 18.*)

U. S. G. S. 150½.—4 inches west of U. S. G. S. 150 (see above). (Note 17.*)

U. S. G. S. 153.—About 0.75 mile south of *Cutter, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 6 feet south of milepost 1052. (Note 18.*)

U. S. G. S. 156.—About 3.75 miles south of *Cutter, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 5 feet south of milepost 1055. (Note 18*.)

U. S. G. S. 159.—About 1.75 miles south of *Aleman, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 6 feet north of milepost 1058. (Note 18.*)

U. S. G. S. 162.—About 4.75 miles south of *Aleman, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 6 feet north of milepost 1061. (Note 18.*)

U. S. G. S. 165.—About 0.75 mile south of *Upham, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 6 feet north of milepost 1064. (Note 18.*)

U. S. G. S. 168.—About 3.75 miles south of *Upham, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 5 feet south of milepost 1067. (Note 18.*)

U. S. G. S. 171.—About 6.75 miles south of *Upham, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 5 feet north of milepost 1070. (Note 18.*)

U. S. G. S. 174.—In *Dona Ana County*, 9.25 miles south of *Upham, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 5 feet south of milepost 1073. (Note 18.*)

U. S. G. S. 177.—About 2.25 miles south of *Grama, Dona Ana County, N. Mex.*, 175 feet south of a road crossing, 70 feet west of the Atchison, Topeka & Santa Fe track, and 25 feet west of milepost 1076. (Note 18.*)

U. S. G. S. 180.—About 0.75 mile north of *Rincon, Dona Ana County, N. Mex.*, at the north end of the Atchison, Topeka & Santa Fe bridge 1035, 5 feet east of the rail, in the concrete abutment. (Note 17.*)

U. S. G. S. 283-B.—At *Rincon, Dona Ana County, N. Mex.*, at the northwest corner of Kingman Street and Railroad Avenue, 10 feet south of L. F. Elliott's storehouse and the postoffice. (Note 18.*)

U. S. G. S. 283½-B.—At *Rincon, Dona Ana County, N. Mex.*, in the east side of the town. (Note 17.*)

U. S. G. S. 286-B.—About 3 miles southeast of *Rincon, Dona Ana County, N. Mex.*, midway between mileposts 1082 and 1083, 40 feet southwest of the Atchison, Topeka & Santa Fe track, and 5 feet west of a gate, on the fence line. (Note 18.*)

U. S. G. S. 290-B.—About 0.5 mile south of *Detroit, Dona Ana County, N. Mex.*, 45 feet southwest of the public road crossing, by a wire fence, about 300 feet south of the Atchison, Topeka & Santa Fe milepost 1086. (Note 18.*)

U. S. G. S. 293-B.—About 1.5 miles south of *Tonuco, Dona Ana County, N. Mex.*, 100 feet east of the Atchison, Topeka & Santa Fe track, at the foot of a bluff, 45 feet east of milepost 1089. (Note 18.*)

U. S. G. S. 296B.—About 4.5 miles south of *Tonuco, Dona Ana County, N. Mex.*, on the north side of the canyon, 45 feet east of the Atchison, Topeka & Santa Fe track, 100 feet east of the river, and 80 feet northeast of bridge 55. (Note 18.*)

U. S. G. S. 299.—About 0.75 mile north of *Selden, Dona Ana County, N. Mex.*, 100 feet east of the Atchison, Topeka & Santa Fe track, 45 feet east of milepost 1905, by a wire fence. (Note 18.*)

U. S. G. S. 3932.—About 1 mile south of *Selden, Dona Ana County, N. Mex.*, and about 1 mile north of old Fort Selden, in a rock which projects about 40 feet out into the river. (Note 17.*)

U. S. G. S. 303B.—About 3.75 miles south of *Selden, Dona Ana County, N. Mex.*, on the fence line midway between the old and the new grade of the Atchison, Topeka & Santa Fe Railway, about 200 feet north of the intersection of the two grades. (Note 18.*)

U. S. G. S. 306B.—At *Stewarts Ranch, Dona Ana County, N. Mex.*, 900 feet south of the house, 95 feet northeast of a public road crossing, 5 feet west of the fence corner, on the west side of the wagon road. (Note 18.*)

U. S. G. S. 309B.—About 2.5 miles south of *Stewarts Ranch, Dona Ana County, N. Mex.*, 400 feet south of milepost 1105, 40 feet west of the road crossing, 7 feet south of a gate, on the fence line. (Note 18.*)

U. S. G. S. 312B.—About 1 mile south of *Dona Ana, Dona Ana County, N. Mex.*, about 500 feet south of milepost 1108, 700 feet northeast of a two-story brick house on the north side of the lane, 45 feet east of a road crossing, and 6 feet west of the fence corner. (Note 18.*)

U. S. G. S. 315B.—About 4 miles south of *Dona Ana, Dona Ana County, N. Mex.*, 300 feet north of milepost 1111, 45 feet east of a road crossing, 6 feet north of the fence corner. (Note 18.*)

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* See pp. 162-166.

U. S. G. S. 3855.—At *Las Cruces, Dona Ana County, N. Mex.*, 180 feet south of the Atchison, Topeka & Santa Fe station, 15 feet west of the main track, 12 feet north of the water tank, in the center of the driveway. (Note 18.*)

U. S. G. S. 3855A.—At *Las Cruces, Dona Ana County, N. Mex.*, 130 feet southwest of the Dona Ana County courthouse, 30 feet east of the fence corner. (Note 18.*)

U. S. G. S. 318B.—At *Las Cruces, Dona Ana County, N. Mex.*, in the city park, 5 feet west of the southeast corner of the entrance. (Note 18.*)

U. S. G. S. 3837.—At *Mesilla Park, Dona Ana County, M. Mex.*, 450 feet south of the station, and midway between the main track and the side track, of the Atchison, Topeka & Santa Fe Railway. (Note 18.*)

U. S. G. S. 323B.—About 2.75 miles south of *Mesilla Park, Dona Ana County, N. Mex.*, 200 feet southeast of milepost 1118, 45 feet west of a road crossing, 4 feet east of the fence corner. (Note 18.*)

U. S. G. S. 3813.—About 4.75 miles south of *Mesilla Park, Dona Ana County, N. Mex.*, 40 feet east of the Atchison, Topeka & Santa Fe track, 10 feet northwest of milepost 1120. (Note 18.*)

U. S. G. S. 328B.—About 7.75 miles south of *Mesilla Park, Dona Ana County, N. Mex.*, 60 feet east of the Atchison, Topeka & Santa Fe track, 15 feet east of milepost 1123. (Note 18.*)

U. S. G. S. 3794.—At *Mesquite, Dona Ana County, N. Mex.*, 38 feet east of the Atchison, Topeka & Santa Fe track 7 feet north of milepost 1124. (Note 18.*)

U. S. G. S. 332B.—About 3 miles south of *Mesquite, Dona Ana County, N. Mex.*, 100 feet northeast of milepost 1127, 90 feet east of a road crossing, 6 feet south of a gate. (Note 18.*)

U. S. G. S. 3782.—At *Vado, Dona Ana County, N. Mex.*, 100 feet south of the Atchison, Topeka & Santa Fe station, in the southeast corner of the foundation stone under the water tank. (Note 17.*)

U. S. G. S. 336B.—At *Berino, Dona Ana County, N. Mex.*, 0.25 mile south of milepost 1131, 100 feet east of the main line of the Atchison, Topeka & Santa Fe, at the west end of the lane, 6 feet south of a fence corner. (Note 18.*)

U. S. G. S. 3760.—About 0.75 mile south of *Berino, Dona Ana County, N. Mex.*, 45 feet east of the Atchison, Topeka & Santa Fe track, 10 feet north of milepost 1132. (Note 18.*)

U. S. G. S. 340B.—About 3.25 miles south of *Berino, Dona Ana County, N. Mex.*, 100 feet west of a road crossing, 6 feet east of the fence corner. (Note 18.*)

U. S. G. S. 3780.—Near *La Tuna, El Paso County, Tex.*, 33 feet west of the main line of the Atchison, Topeka & Santa Fe Railway, about 4 feet north of the line between New Mexico and Texas. (Note 18.*)

U. S. G. S. 3774.—At *Vinton, El Paso County, Tex.*, 21 feet east of the main line of the Atchison, Topeka & Santa Fe Railway, under the Vinton signboard. (Note 18.*)

U. S. G. S. 350B.—At *Çanutillo, El Paso County, Tex.*, 80 feet east of the main track of the Atchison, Topeka & Santa Fe Railway at the southwest corner of J. J. Cumflid's house. (Note 18.*)

U. S. G. S. 354B.—About 1.5 miles south of *Montoya, El Paso County, Tex.*, 40 feet west of a road crossing, 5 feet east of a fence corner. (Note 18.*)

U. S. G. S. 357B.—About 2.8 miles south of *Whites Spur, El Paso County, Tex.*, 0.25 mile north of milepost 1150, 50 feet east of the Atchison, Topeka & Santa Fe track, and 16 feet east of a public road. (Note 18.*)

U. S. G. S. 359B.—About 5.25 miles south of *Whites Spur, El Paso County, Tex.*, 240 feet north of a public road crossing, 100 feet east of the river, 45 feet east of the Atchison, Topeka & Santa Fe track, and 12 feet east of a wagon road. (Note 18.*)

Boundary 1.—Near *El Paso, El Paso County Tex.* The top of the masonry at the northeast corner of Monument No. 1, marking the international boundary line.

U. G. S. S. 3698.—At *El Paso, El Paso County, Tex.* (See p. 257.)

U. S. G. S. 365.—At *El Paso, El Paso County, Tex.* (See p. 257.)

U. S. G. S. 366.—At *El Paso, El Paso County, Tex.* (See p. 257.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN MITCHELL, IND., AND OAKLAND, ILL., ESTABLISHED BY THE UNITED STATES GEOLOGICAL SURVEY, 1906–7.

[These descriptions were furnished by the United States Geological Survey. Slight changes have been made, chiefly for the purposes of indexing and of condensing by means of general notes.]

X.—At *Mitchell, Lawrence County, Ind.* (See App. 8, Report for 1899, p. 566.)

U. S. G. S. 688.—At *Mitchell, Lawrence County, Ind.* (See p. 289.)

U. S. G. S. 590.—At *Yockey, Lawrence County, Ind.*, at the highway crossing at the station, 80 feet east of the track of the Chicago, Indianapolis & Louisville Railway, 15 feet north of the highway, in bedrock. (Note 17.*)

U. S. G. S. 508.—About 1.68 miles north of *Yockey, Lawrence County, Ind.*, on the Chicago, Indianapolis & Louisville Railway bridge over White River, on the bridge seat at the west side of the north abutment. (Note 17.*)

U. S. G. S. 700.—At *Bedford, Lawrence County, Ind.*, on the face of the city hall, at the front entrance. (Note 17.*)

U. S. G. S. 503.—About 0.29 mile west of *Dark Hollow, Lawrence County, Ind.*, on the Chicago, Indianapolis & Louisville Railway bridge over Salt Creek, on the east side of the south abutment. (Note 17.*)

U. S. G. S. 557.—At *Avoca, Lawrence County, Ind.*, near A. H. Bridwell's residence, on the stone wall in front of the yard, 2 feet south of the gate entrance. (Note 17.*)

U. S. G. S. 644.—At *Springville, Lawrence County, Ind.*, on the schoolhouse, at the northwest corner of the foundation. (Note 17.*)

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* See pp. 162–166.

U. S. G. S. 575.—About 1.58 miles west of *Springville, Lawrence County, Ind.*, about 400 feet southeast of a small stone house 15 feet east of a private road crossing, and 4 feet south of the track of the Chicago, Indianapolis & Louisville Railway, on a large rock. (Note 17.*)

U. S. G. S. 551.—At *Armstrong, Lawrence County, Ind.*, on the Chicago, Indianapolis & Louisville Railway water tank, on the front face of the stone foundation.—(Note 17.*)

U. S. G. S. 565.—In *Greene County*, 2.13 miles west of *Armstrong, Lawrence County, Ind.*, 100 feet east of the railroad bridge over Indian Creek, 10 feet north of the track of the Chicago, Indianapolis & Louisville Railway, in the top of a limestone bowlder. (Note 17.*)

U. S. G. S. 641.—At *Owensburg, Greene County, Ind.*, 343 feet west of the station of the Chicago, Indianapolis & Louisville Railway, on an overhead railroad bridge, on top of the coping stone, at the south side of the track. (Note 17.*)

U. S. G. S. 543.—At *Robison, Greene County, Ind.*, on a highway bridge on the south side of the Chicago, Indianapolis & Louisville Railway track, at the top of the north wing wall of the east abutment, stamped "543." (Note 17.*)

U. S. G. S. 755.—About 2.86 miles north of *Robison, Greene County, Ind.*, on the southwest corner of the church of the Latter Day Saints, on its front face. (Note 17.*)

U. S. G. S. 880.—At *Cincinnati, Greene County, Ind.*, in the front yard of J. H. Neals, stamped "Prim. Trav. Sta. No. 7-880." (Note 18.*)

U. S. G. S. 519.—At *Koleen, Greene County, Ind.*, 378 feet north of the station, 45 feet north of the track of the Chicago, Indianapolis & Louisville Railway, and 45 feet northwest of milepost "C 26." (Note 18.*)

U. S. G. S. 509a.—At *Mineral City, Greene County, Ind.*, 0.38 mile east of the station, 125 feet west of a road crossing, 20 feet south of the track of the Chicago, Indianapolis & Louisville Railway, in the northwest corner of the lot owned by Charles Hayward. (Note 18.*)

U. S. G. S. 509.—About 2.55 miles northwest of *Mineral City, Greene County, Ind.*, 15 feet north of the track of the Chicago, Indianapolis & Louisville Railway, and 15 feet east of a private road at the foot of a hill. (Note 18.*)

U. S. G. S. 534.—At *Bloomfield, Greene County, Ind.*, 120 feet north of the Chicago, Indianapolis & Louisville Railway station, 50 feet west of wagon road, south of the southeast corner of Jones's planing mill. (Note 18.*)

U. S. G. S. 541.—At *Bloomfield, Greene County, Ind.*, in the southwest corner of the engine room of the Fawcett Manufacturing Co., on the south side. (Note 17.*)

U. S. G. S. 503.—About 1.75 miles north of *Elliston, Greene County, Ind.*, on top of the south abutment, at the west side of the county bridge, 75 feet west of the Chicago & Eastern Illinois Railroad. (Note 17.*)

U. S. G. S. 507.—About 4.73 miles north of *Elliston, Greene County, Ind.*, at a road crossing 780 feet north of milepost "T H 43," 30 feet east of the Chicago & Eastern Illinois Railroad, on the north end of a road culvert; stamped "507." (Note 17.*)

U. S. G. S. 526.—At *Worthington, Greene County, Ind.*, at the southeast corner of the Taylor Building, 338 feet south of the Chicago & Eastern Illinois station. (Note 17.*)

U. S. G. S. 521.—About 3.3 miles north of *Worthington, Greene County, Ind.*, 0.10 mile south of milepost "T H 36," 12 feet west of the Chicago & Eastern Illinois track in a bowlder. (Note 17.*)

U. S. G. S. 562.—In *Owen County*, 6 miles north of *Worthington, Greene County, Ind.*, 1478 feet north of a road crossing; 1866 feet south of milepost "T H 33," and 20 feet east of the Chicago & Eastern Illinois Railroad track, on a large rock in the side of the cut. (Note 17.*)

U. S. G. S. 659.—At *Coal City, Owen County, Ind.*, on the southwest face of Red Men's Hall. (Note 17.*)

U. S. G. S. 596.—In *Clay County*, 2.4 miles northwest of *Coal City, Owen County, Ind.*, 803 feet northeast of the Chicago & Eastern Illinois Railroad, at the south corner of the cross roads near Barricks schoolhouse. (Note 17.*)

U. S. G. S. 588.—At *Clay City, Clay County, Ind.*, on the northeast corner of the Clay City roller mill, 50 feet west of the Chicago & Eastern Illinois Railroad track. (Note 17.*)

U. S. G. S. 558.—About 3.4 miles north of *Clay City, Clay County, Ind.*, on the south abutment of the Chicago & Eastern Illinois Railroad bridge over the Eel River, in the bridge seat at the west side of the track. (Note 17.*)

U. S. G. S. 569.—At *Saline City, Clay County, Ind.*, 60 feet south of the southwest corner of the Brown Hotel, at the south end of a culvert at a road crossing. (Note 17.*)

U. S. G. S. 634.—At *Cory, Clay County, Ind.*, southwest of the front face of the I. O. O. F. Building. (Note 17.*)

U. S. G. S. 608.—In *Vigo County*, 1.94 miles west of *Cory, Clay County, Ind.*, in a brick chimney at the rear of W. N. Brill's house on the Clay-Vigo county line road 300 feet south of the Chicago & Eastern Illinois Railroad. (Note 17.*)

U. S. G. S. 669.—At *Riley, Vigo County, Ind.*, in the south wall at the southeast corner of the I. O. O. F. Building. (Note 17.*)

U. S. G. S. 524.—About 4.6 miles northeast of *Riley, Vigo County, Ind.*, on top of the stone of a Chicago Terre Haute & Southeastern Railway culvert, 60 feet northeast of the highway. (Note 17.*)

U. S. G. S. 493.—About 1 mile north of *Spring Hill, Vigo County, Ind.*, on top of the bridge seat of a Chicago & Eastern Illinois Railroad culvert, 100 feet north of the crossing of the Chicago, Terre Haute & Southeastern belt line. (Note 17.*)

U. S. G. S. 495.—At *Terre Haute, Vigo County, Ind.*, on the front face of the southwest corner of the Union Station. (Note 17.*)

U. S. G. S. 513.—At *Terre Haute, Vigo County, Ind.*, on the northeast corner of the post office. (Note 17.*)

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*See pp. 162-166.

U. S. E. 482.— About 0.9 mile west of *Terre Haute, Vigo County, Ind.*, on the east side of the south abutment of the Vandalia Railroad bridge over the Wabash River, on top of the bridge seat. The mark is a chiseled square.

U. S. G. S. 477.—At *West Terre Haute, Vigo County, Ind.*, on the Berry block, at the northwest corner of George L. Berry's drug store, in a stone window sill. (Note 17.*)

U. S. G. S. 508.—About 1.3 miles west of *Liggett, Vigo County, Ind.*, on top of the bridge seat of the west abutment of the Vandalia Railroad bridge. (Note 17.*)

U. S. G. S. 580.—In *Edgar County*, 1.83 miles west of *Farrington, Clark County, Ill.*, 0.24 mile southwest of milepost "T H 10," east of the track of the Vandalia Railroad in the top of a culvert. (Note 17.*)

U. S. G. S. 644.—At *Marley, Edgar County, Ill.*, in the northeast corner of the front wall of the Methodist Episcopal Church. (Note 17.*)

U. S. G. S. 673.—About 2.1 miles northwest of *Marley, Edgar County, Ill.*, 750 feet southeast of milepost "T H 15." just west of the Vandalia Railroad track, in the top of a culvert. (Note 17.*)

U. S. G. S. 728.—About 4.3 miles northwest of *Marley, Edgar County, Ill.*, 300 feet east of the Vandalia Railroad track, and 100 feet east of a road, in the southwest corner of the front wall of the McCall schoolhouse. (Note 17.*)

U. S. G. S. 739.—At *Paris, Edgar County, Ill.*, in the wall at the east end of the Vandalia freight station. (Note 17.*)

U. S. G. S. 691.—At *May, Edgar County, Ill.*, 150 feet southeast of milepost "T H 26," just north of the Vandalia Railroad track, in the top of a culvert. (Note 17.*)

U. S. G. S. 681.—About 1.3 miles west of *May, Edgar County, Ill.*, 1050 feet west of a road crossing, in the top of the south end of the Vandalia Railroad culvert. (Note 17.*)

U. S. G. S. 691.—At *Redmon, Edgar County, Ill.*, in the front wall of the Redmon Bank. (Note 17.*)

U. S. G. S. 664.—About 0.5 mile east of *Borton, Edgar County, Ill.*, in the top of a railroad culvert north of the Vandalia Railroad track, at a road crossing. (Note 17.*)

U. S. G. S. 645.—In *Coles County*, 2.02 miles west of *Isabel, Edgar County, Ill.*, 276 feet west of a road crossing, and 100 feet north of the Vandalia Railroad track, in the house of Ed. Gobert. (Note 17.*)

U. S. G. S. 659.—At *Oakland, Coles County, Ill.*, 250 feet west of where the Toledo, St. Louis & Western Railroad crosses the Vandalia Railroad, in the front wall of J. T. Simms's grain elevator. (Note 17.*)

C_4.—At *Oakland, Coles County, Ill.* (See Precise Leveling in the United States 1903–1907, p. 210.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN MITCHELL, IND., AND LOUISVILLE, KY., ESTABLISHED BY THE UNITED STATES GEOLOGICAL SURVEY, 1911.

[These descriptions were furnished by the U. S. Geological Survey. Such changes as have been made were chiefly for the purposes of indexing and of condensing under general notes.]

X.—At *Mitchell, Lawrence County, Ind.* (See App. 8, Report for 1899, p. 566.)

U. S. G. S. 688.—At *Mitchell, Lawrence County, Ind.*, on the east face of the Bank of Mitchell, at the north corner. (Note 17.*)

U. S. G. S. 707.—At *Mitchell, Lawrence County, Ind.*, 1.1 miles south of the railroad crossing, 480 feet south of milepost 257 of the Chicago, Indianapolis & Louisville Railway, 30 feet east of the track, and 30 feet south of a road crossing. (Note 18.*)

U. S. G. S. 636.—At *Orleans, Orange County, Ind.*, 1,730 feet north of the station, 27 feet west of the track of the Chicago, Indianapolis & Louisville Railway, 30 feet north of a road, at the corner of Mr. Baker's yard fence. (Note 18.*)

U. S. G. S. 709.—Near *Leipsic, Orange County, Ind.*, about 1 mile west of the station, in the west end of concrete culvert No. 264.6, on the north side of the track of the Chicago, Indianapolis & Louisville Railway. (Note 17.*)

U. S. G. S. 735.—Near *Leipsic, Orange County, Ind.*, about ½ mile east of the station, 30 feet north of the track of the Chicago, Indianapolis & Louisville Railway, on line with an orchard fence. (Note 18.*)

U. S. G. S. 774.—About 1.4 miles west of *Saltillo, Washington County, Ind.*, near the Orange-Washington County line, 10 feet north of the track of the Chicago, Indianapolis & Louisville Railway, in rock culvert 268.8. (Note 17.*)

U. S. G. S. 839.—About 1300 feet east of *Campbellsburg, Washington County, Ind.*, 30 feet south of the track of the Chicago, Indianapolis & Louisville Railway, beside a fence. (Note 18.*)

U. S. G. S. 886.—About 1.7 miles west of *Hitchcock (Oxonia post office), Washington County, Ind.*, on the north side of the track of the Chicago, Indianapolis & Louisville Railway, 5 feet back from the end of stone culvert 275.4, and 10 feet below the track. (Note 17.*)

U. S. G. S. 880.—About 550 feet west of *Hitchcock (Oxonia post office), Washington County, Ind.*, 30 feet south of the track of the Chicago, Indianapolis & Louisville Railway, on line with an orchard fence. (Note 18.*)

U. S. G. S. 721.—About 2.1 miles west of *Salem, Washington County, Ind.*, 15 feet north of the track of the Chicago, Indianapolis & Louisville Railway, on the west end of a stone culvert. (Note 17.*)

U. S. G. S. 728.—At *Salem, Washington County, Ind.*, 480 feet west of the station, on the south side of the track of the Chicago, Indianapolis & Louisville Railway, 6 feet from east end and 6 inches from south face of stone arch bridge No. 282.2. (Note 17.*)

U. S. G. S. 728a.—About 0.8 mile southeast of *Salem, Washington County, Ind.*, 130 feet east of a switch stand, 25 feet south of the track of the Chicago, Indianapolis & Louisville Railway. (Note 18.*)

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*See pp. 162–166.

U. S. G. S. 760.—About 2.6 miles east of *Salem, Washington County, Ind.*, 6 feet south of the track of the Chicago, Indianapolis & Louisville Railway, in the west abutment of bridge No. 284.9, 260 feet west of milepost 285. (Note 17.*)

U. S. G. S. 835.—About 4300 feet south of *Norris* (*Harristown post office*), *Washington County, Ind.*, 16 feet west of the track of the Chicago, Indianapolis & Louisville Railway, in the top of the south wall of stone culvert No. 287.7. (Note 17.*)

U. S. G. S. 814.—About 4100 feet south of *Farabee, Washington County, Ind.*, 150 feet north of milepost 291, and 28 feet eastward from the track of the Chicago, Indianapolis & Louisville Railway. (Note 18.*)

U. S. G. S. 704.—About 1100 feet south of *Pekin, Washington County, Ind.*, 26 feet west of the track of the Chicago, Indianapolis & Louisville Railway. (Note 18.*)

U. S. G. S. 577.—About 0.6 mile northwest of *Borden, Clark County, Ind.*, 6 feet southwest of the track of the Chicago, Indianapolis & Louisville Railway, in the northwest stone abutment of bridge No. 298.4. (Note 17.*)

U. S. G. S. 520.—About 3 miles southeast of *Borden, Clark County, Ind.*, 120 feet northwest of milepost 302, and 10 feet northeast of the track of the Chicago, Indianapolis & Louisville Railway, in the southeast side of stone culvert No. 301.9. (Note 17.*)

U. S. G. S. 504.—About 400 feet northeast of *Bridgeport, Clark County, Ind.*, 9 feet southwest of the track of the Chicago, Indianapolis & Louisville Railway, in the southwest abutment of steel bridge No. 303.7. (Note 17.*)

U. S. G. S. 545.—About 0.9 mile south of *Wilson, Clark County, Ind.*, 9 feet west of the track of the Chicago, Indianapolis & Louisville Railway, in the top of rock culvert No. 306.5. (Note 17.*)

U. S. G. S. 547.—About 800 feet south of *St. Joseph, Clark County, Ind.*, 10 feet east of the track of the Chicago, Indianapolis & Louisville Railway, in the top of stone arch culvert No. 309.6. (Note 17.*)

U. S. G. S. 536.—About 4.8 miles north of *New Albany, Floyd County, Ind.*, 11 feet west of the track of the Chicago, Indianapolis & Louisville Railway, in stone culvert No. 312.8. (Note 17.*)

U. S. G. S. 456.—At *New Albany, Floyd County, Ind.*, 1 mile north of the Chicago, Indianapolis & Louisville Railway station, 12 feet south of the track, in the north side of the wye, in the east stone abutment of a steel bridge. (Note 17.*)

464 Ind.—At *New Albany, Floyd County, Ind.*, 125 feet south of the Chicago, Indianapolis & Louisville Railway station, at the southeast corner of Main and Vincennes Streets. (Note 18.*)

R. R. Bridge.—At *Louisville, Jefferson County, Ky.*, in the west concrete abutment of the Twenty-seventh Street railroad bridge, on the north side of the track. The mark is the center of a chiseled square.

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN DUQUOIN AND SHAWNEETOWN, ILL., ESTABLISHED BY THE UNITED STATES GEOLOGICAL SURVEY, 1906.

[These descriptions were furnished by the U. S. Geological Survey. Slight changes have been made, chiefly for the purposes of indexing and of condensing under general notes.]

R_3.—At *Duquoin, Perry County, Ill.* (See App. 8, Report for 1899, p. 600.)

U. S. G. S. 468.—At *Duquoin, Perry County, Ill.*, 600 feet east of the Illinois Central Railroad station, in the east brick wall of the Exchange Bank. (Note 17.*)

U. S. G. S. 396.—About 3.2 miles east of *Duquoin, Perry County, Ill.*, 60 feet west of a creek, 40 feet north of the Illinois Central Railroad, just south of a fence corner. (Note 18.*)

U. S. G. S. 402.—1 mile southeast of *McDonald, Perry County, Ill.*, 60 feet directly north of the Illinois Central Railroad milepost "East St. Louis 77—Eldorado 44." (Note 18.*)

U. S. G. S. 449.—At *Mulkeytown, Franklin County, Ill.*, 324 feet south of the Illinois Central Railroad station, in the east side of the corner stone of the hall of the Modern Woodmen of America. (Note 17.*)

U. S. G. S. 443.—At *Christopher, Franklin County, Ill.*, in the southwest corner of the Christopher National Bank. (Note 17.*)

U. S. G. S. 392.—About 2.8 miles east of *Christopher, Franklin County, Ill.*, 348 feet west of a small bridge of the Illinois Central Railroad, 150 feet southeast of a house occupied by Isaac Denton. (Note 18.*)

U. S. G. S. 438.—About 5.7 miles east of *Christopher, Franklin County, Ill.*, 150 feet southeast of a road crossing on the Illinois Central Railroad, at the northwest corner of the house occupied by W. M. Wolf. (Note 18.*)

U. S. G. S. 474.—At *Benton, Franklin County, Ill.*, 1,507 feet north of the Illinois Central Railroad station, in the stone step just south of the west entrance to the Franklin County courthouse. (Note 17.*)

U. S. G. S. 405.—About 2.3 miles southeast of *Benton, Franklin County, Ill.*, 90 feet directly north of the Illinois Central milepost marked "E. St. Louis 92—Eldorado 29," (Note 18.*)

U. S. G. S. 479.—At *Smothers, Franklin County, Ill.*, 260 feet southeast of where a road crosses the Illinois Central Railroad, at the northwest corner of a store kept by M. M. Moore. (Note 18.*)

U. S. G. S. 438.—At *Parrish, Franklin County, Ill.*, 200 feet northeast of where a road crosses the Illinois Central Railroad, at the southwest corner of a store kept by Moore & Brown. (Note 18.*)

U. S. G. S. 494.—At *Thompsonville, Franklin County, Ill.*, 600 feet south of where a road crosses the Illinois Central Railroad, 100 feet east of a brick schoolhouse. The bench mark is stamped "Prim. Trav. Sta. No. 4—494—1906." (Note 18.*)

* See pp. 162-166.

U. S. G. S. 429.—At *West End, Saline County, Ill.*, 75 feet north of the Illinois Central Railroad station, in the south wall of the West End Rolling Mill. (Note 17.*)

U. S. G. S. 392.—About 0.7 mile southeast of *Rileyville, Saline County, Ill.*, 20 feet northwest of a cattle guard, in the corner of fence at the point where the county road turns north from the Illinois Central Railroad. (Note 18.*)

U. S. G. S. 397.—At *Galatia, Saline County, Ill.*, 0.3 mile west of the Illinois Central Railroad station at the Galatia Rolling Mill, in the southwest foundation of an old elevator. (Note 17.*)

U. S. G. S. Milepost.—About 3.2 miles southeast of *Galatia, Saline County, Ill.*, inside the fence, 20 feet directly south of the Illinois Central Railroad milepost marked "E. St. Louis 114—Eldorado 7." (Note 18.*)

U. S. G. S. 390.—About 1.6 miles east of *Raleigh, Saline County, Ill.*, 70 feet west of the Illinois Central Railroad milepost marked "E. St. Louis 117—Eldorado 4," 62 feet south of the center of the track. (Note 18.*)

U. S. G. S. 388.—At *Eldorado, Saline County, Ill.*, 30 feet south of the southwest corner of the Grand Hotel, at the edge of the pavement. (Note 18.*)

U. S. G. S. Grayson.—About 0.5 mile southeast of *Grayson, Saline County, Ill.*, inside the wire fence, 40 feet north of the center of the Louisville & Nashville Railroad track. (Note 18.*)

U. S. G. S. Crossroads.—About 3.1 miles southeast of *Grayson, Saline County, Ill.*, 40 feet northwest of a road crossing on the Louisville & Nashville Railroad, on the west side of the road. (Note 18.*)

U. S. G. S. Station.—At *Equality, Gallatin County, Ill.*, at the northwest corner of the Louisville & Nashville Railroad station. (Note 18.*)

U. S. G. S. Fowler.—About 2.7 miles southeast of *Equality, Gallatin County, Ill.*, 100 feet southeast of E. P. Fowler's residence, in a fence corner, 40 feet north of the Louisville & Nashville Railroad track. (Note 18.*)

U. S. G. S. Six Mile.—About 5.7 miles southeast of *Equality, Gallatin County, Ill.*, 60 feet north of the Louisville & Nashville Railroad milepost marked "St. Louis 138—Shawneetown 6." (Note 18.*)

U. S. G. S. Five Mile.—About 2.5 miles east of *Cypress Junction, Gallatin County, Ill.*, 330 feet west of where a road crosses the Louisville & Nashville Railroad, and 50 feet north of milepost marked "St. Louis 141—Shawneetown 5," (Note 18.*)

P. B. M. Station.—At *Shawneetown, Gallatin County, Ill.*, at the southwest corner of the Louisville & Nashville Railroad station. (Note 18.*)

P. B. M. Hotel.—At *Shawneetown, Gallatin County, Ill.*, 100 feet east of the southeast corner of the Riverside Hotel, in the northeast corner of the concrete gun rack. (Note 17.*)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN GEORGETOWN AND LOUISVILLE, KY., ESTABLISHED BY THE UNITED STATES GEOLOGICAL SURVEY, 1906.

[These descriptions were furnished by the U. S. Geological Survey. Slight changes have been made for the purposes of indexing and condensing under general notes.]

W.—At *Georgetown, Scott County, Ky.* (See App. 3, Report for 1913, p. 624.)

U. S. G. S. 866.—At *Georgetown, Scott County, Ky.*, at the southeast corner of Sinclair's store in Mrs. T. B. Sinclair's lot. The bench mark is an iron post stamped "866" and is primary station No. 17 of the United States Geological Survey.

U. S. G. S. 798.—About 3 miles west of *Georgetown, Scott County, Ky.*, on top of the east end of a culvert abutment, north of the track of the Frankfort & Cincinnati Railway. (Note 17.*)

U. S. G. S. 840.—At *Duvall, Scott County, Ky.*, near the Frankfort & Cincinnati Railway station, on top of the west wall of a culvert east of the road, 5 feet north of the track. (Note 17.*)

U. S. G. S. 802.—At *Stamping Ground, Scott County, Ky.*, in Dr. Reilly's front yard, south of the Frankfort & & Cincinnati Railway track, 230 feet west of the railway station. (Note 18.*) This bench mark is primary traverse station No. 26 of the United States Geological Survey.

U. S. G. S. 714.—About 2.1 miles west of *Stamping Ground, Scott County, Ky.*, on top of the west abutment of a bridge, south of the Frankfort & Cincinnati Railway track. (Note 17.*)

U. S. G. S. 732.—At *Switzer, Franklin County, Ky.*, 40 feet west of the Frankfort & Cincinnati Railway station, on top of a culvert 9 feet south of the track; stamped "732." (Note 17.*)

U. S. B. M. 744.—About 0.5 mile west of *Switzer, Franklin County, Ky.*, at the west end of the second long trestle, north of the Frankfort & Cincinnati Railway track. The bench mark is the top of a bolt in the bent, marked "U. S. B. M. 744."

U. S. G. S. 673.—At *Elkhorn* station (*Forks of Elkhorn* post office), *Franklin County, Ky.*, 75 feet west of the Frankfort & Cincinnati Railway station, at the northeast corner of a warehouse. (Note 18.*)

U. S. G. S. 714.—At *Stedmantown, Franklin County, Ky.*, 360 feet west of the Frankfort & Cincinnati Railway station, on top of the east end of a culvert, 6 feet north of the track. (Note 17.*)

U. S. B. M. 675.—About 1.9 miles west of *Stedmantown, Franklin County, Ky.*, on top of a small abutment at the west end of a steel trestle, north of the track of the Frankfort & Cincinnati Railway. It is marked with a square and the letters "U. S. B. M. 675."

U. S. G. S. 511.—At *Frankfort, Franklin County, Ky.*, at the southwest corner of the Capitol grounds. (Note 18.*)

U. S. G. S. 512.—At *Frankfort, Franklin County, Ky.*, on the post office, at the northeast corner of the front face. (Note 17.*)

* See pp. 162-166.

U. S. G. S. 537.—About 1.3 miles west of *Kennebec, Franklin County, Ky.*, on top of the retaining wall of a steel bridge, north of the Louisville & Nashville Railroad track. (Note 17.*)

U. S. B. M. 562.—About 2.3 miles west of *Kennebec, Franklin County, Ky.*, on top of a culvert south of the Louisville & Nashville Railroad track. It is marked with a square and the letters "U. S. B. M. 562."

Bridge.—About 0.3 mile west of *Benson, Franklin County, Ky.*, on the abutment of a Louisville & Nashville Railroad bridge. It is marked with a chiseled square.

U. S. G. S. 600.—About 0.3 mile west of *Benson, Franklin County, Ky.*, on top of the retaining wall of the east abutment of a steel bridge, north of the Louisville & Nashville Railroad track. (Note 17.*)

U. S. G. S. 714.—At *Hatton, Shelby County, Ky.*, in the front yard of C. W. Stockton's tenement house, opposite Roberts & Wright's general store, north of the Louisville & Nashville Railroad track, and 10 feet north of the fence. (Note 18.*)

U. S. G. S. 829.—About 2.8 miles west of *Hatton, Shelby County, Ky.*, on the east end of a culvert north of the Louisville & Nashville Railroad track. (Note 17.*)

U. S. G. S. 881.—About 3.7 miles west of *Hatton, Shelby County, Ky.*, on top of a rock cut, north of the Louisville & Nashville Railroad track. It is marked with a pointed square.

U. S. G. S. 912.—At *Bagdad, Shelby County, Ky.*, 40 feet west of the Louisville & Nashville Railroad station, 45 feet south of the track. (Note 18.*)

U. S. G. S. 903.—At *Christiansburg, Shelby County, Ky.*, 135 feet east of the Louisville & Nashville Railroad station, in the northeast corner of Mrs. Miriam Hall's front yard. (Note 18.*)

U. S. B. M. 882.—About 1 mile west of *Christiansburg, Shelby County, Ky.*, on top of a rock, south of the Louisville & Nashville Railroad track. It is marked with a square and the letters "U. S. B. M. 882."

U. S. G. S. 849.—About 2.2 miles west of *Christiansburg, Shelby County, Ky.*, east of the road and 43 feet south of the Louisville & Nashville Railroad track at "Mulberry Crossing." (Note 18.*)

U. S. G. S. 724.—About 6.4 miles west of *Christiansburg, Shelby County, Ky.*, on top of the west end of a culvert south of the Louisville & Nashville Railroad track. (Note 17.*)

U. S. G. S. 760.—At *Shelbyville, Shelby County, Ky.*, in the courthouse yard, 10 feet east of the southeast corner. It is primary traverse station No. 2, 1905, of the United States Geological Survey. (Note 18.*)

U. S. G. S. 750.—At *Scotts* (*Scotts Station* post office), *Shelby County, Ky.*, opposite the Louisville & Nashville Railroad station, and 45 feet north of the track at the fence line. (Note 18.*)

U. S. G. S. 725.—About 0.2 mile west of *Field Station, Shelby County, Ky.*, on top of the west abutment of a Louisville & Nashville Railroad trestle. (Note 17.*)

U. S. G. S. 825.—At *Simpsonville, Shelby County, Ky.*, in the southeast corner of the Masonic lodge grounds. The bench mark is an iron post stamped "825," and is primary traverse station No. 1, 1905, of the United States Geological Survey.

U. S. G. S. 701.—At *Connor, Shelby County, Ky.*, 50 feet south of the Louisville & Nashville Railroad station, east of a road, in the angle with the right of way. (Note 18.*)

U. S. G. S. 629.—At *Long Run, Jefferson County, Ky.*, 100 feet east of the Louisville & Nashville Railroad station, north of the track at the intersection of a road with the right of way. (Note 18.*)

U. S. G. S. 640.—About 0.2 mile west of *Eastwood, Jefferson County, Ky.*, on the west end of a culvert north of the Louisville & Nashville Railroad track. It is marked with a square.

U. S. G. S. 595.—About 0.1 mile east of *Beckley, Jefferson County, Ky.*, on top of the retaining wall of the west abutment of a bridge, south of the Louisville & Nashville Railroad track. (Note 17.*)

U. S. G. S. 634.—About 1.1 miles west of *Beckley, Jefferson County, Ky.*, on top of a culvert, north of the Louisville & Nashville Railroad track. It is marked with a square.

U. S. G. S. 652.—About 0.2 mile west of *Avoca, Jefferson County, Ky.*, on top of the east end of a culvert, south of the Louisville & Nashville Railroad track. It is marked with a square.

U. S. G. S. 724.—At *Anchorage, Jefferson County, Ky.*, in the circular park, 300 feet northwest of the clubhouse. The bench mark is an iron post and is primary traverse station No. 38 of the United States Geological Survey.

U. S. G. S. 561.—At *Lyndon, Jefferson County, Ky.*, 260 feet west of the Louisville & Nashville Railroad station, south of the track, 40 feet east of a road. It is an iron post stamped "561."

U. S. G. S. 539.—About 0.3 mile west of *Warwick Villa, Jefferson County, Ky.*, south of the Louisville & Nashville Railroad track, on the west wall of a culvert. It is marked with a square.

U. S. G. S. 550.—About 440 feet west of *St. Matthews, Jefferson County, Ky.*, 25 feet east of the forks of the road to the south. (Note 18.*) The bench mark is primary traverse station No. 118 of the United States Geological Survey.

U. S. G. S. 548.—About 0.7 mile west of *St. Matthews, Jefferson County, Ky.*, at the southwest corner of the intersection of the Finley and Shelby Pikes. (Note 18.*) The bench mark is primary traverse station No. 117 of the United States Geological Survey.

U. S. G. S. 553.—About 1.4 miles west of *St. Matthews, Jefferson County, Ky.*, at the northwest corner of Clearwater Reservoir. (Note 18.*) This bench mark is primary traverse station No. 50 of the United States Geological Survey.

No. 49.—At *Louisville, Jefferson County, Ky.*, at the southeast corner of Park Avenue and Shelbyville Road. (Note 18.*) This bench mark is primary traverse station No. 49 of the United States Geological Survey.

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* See pp. 162–166.

B. M. 86, or No. 16.—At *Louisville, Jefferson County, Ky.*, on the northeast corner of Main and Eleventh Streets, 50.1 feet from the southeast corner of Doyle's saloon, and 101.6 feet from the northeast corner of J. V. Reed & Co.'s store. The bench mark is a bronze tablet set in stone and is primary traverse station No. 16 of the United States Geological Survey.

B. M. 13.—At *Louisville, Jefferson County, Ky.*, at the southeast corner of Twenty-sixth and Portland Streets, 46.6 feet from a grocery store, and 7.9 feet from Struby's pump. The bench mark is a bronze tablet set in stone and is primary traverse station No. 13 of the United States Geological Survey.

ADDITIONS AND CORRECTIONS TO PREVIOUSLY PUBLISHED DESCRIPTIONS OF BENCH MARKS.

DESCRIPTIONS OF MISCELLANEOUS ADDITIONAL BENCH MARKS.

111A.—At *Goldsboro, Wayne County, N. C.*, on the southwest corner of the Goldsboro City Hall, on the granite water table 4 feet above the ground. (Note 1.*)

CORRECTIONS TO DESCRIPTIONS OF BENCH MARKS PUBLISHED IN APPENDIX 8, REPORT FOR 1899.

Pages 472 and 555. It was reported on September 21, 1904, that "Tidal," at *Locust Grove, Bath Beach*, Long Island, *N. Y.*, was lost.

Pages 472 and 556. It was reported on December 16, 1903, by Mr. John H. Frazee, that No. 6, at *Astoria, Long Island, N. Y.*, had probably been destroyed by repairs.

Pages 557 and 558. It was reported in November, 1900, by Mr. Edmund P. Ramsey that the following bench marks could not be found: No. 10 at *Flushing, N. Y.*, and No. 12 at *College Point, N. Y.*

Page 562. Mr. O. E. Carr, levelman for the Baltimore and Ohio R. R., reported in 1904 that the following bench marks were not found: J, at *Keyser, W. Va.;* XX, at *Bloomington, Md.;* XXI, near *Oakland, Md.;* and XXVIII, at *Rowlesburg, W. Va.*

Page 610. It was reported that bench mark No. 215 at *Delta, La.*, was destroyed.

Page 632. Leveling in 1905 by Mr. C. P. Burgwyn indicates that City B. M., at *Richmond, Va.*, has probably been disturbed in elevation since 1892, when the leveling was done which gave the published elevation.

Page 654. Mr. C. H Judson, assistant engineer, New York Central Lines, stated in a letter dated August 11, 1908, that B. M. U., at Alexis, Ohio, was about to be destroyed by improvements, and that the resident engineer had established a new B. M. which is 2.77 feet higher than the B. M. U., and is described as follows: On the top of a concrete box culvert under the Ann Arbor R. R., just W. of the crossing of the Ann Arbor R. R. over the Lake Shore and Michigan Southern Ry.; the top of the SW. corner, marked with a chiseled B. M.

Page 655. A letter from Mr. H. A. Twining, at Haskins, Ohio, on April 26, 1906, stated that B. M. A_1, at *Hull Prairie, Ohio*, was about to be destroyed by repairs.

Page 670. For a later description of P. B. M. 45, at *Shreveport, La.*, see page 134 of Precise Leveling in the United States, 1903–1907.

Page 673. It was reported that P. B. M. 79, at *Egg Bend Landing, La.*, was destroyed.

Page 676. It was reported that the pipe was missing from P. B. M. 12 on *Bayou Macon, La.*

Page 677. Bench mark No. 7 (Melvin 1879), at *Natchez, Miss.*, is in the northeast corner of lower step of west entrance to courthouse instead of the northwest corner.

Page 690. It was reported that P. B. M. Mound at *Mound Landing, La.*, was disturbed.

The bench marks in the following list should be referred to note 8, page 550, Report for 1899, which is the same as note 39, page 164, of this publication.

P. B. M. 76 at Grand Bend, La.
P. B. M. 89 at Simmesport, La.
M. R. C. Stone $\frac{132}{3}$ at Vidalia, La.
M. R. C. Stone $\frac{132}{4}$ at Vidalia, La.
P. B. M. 1 at Natchez, Miss.

The bench marks in the following list should be referred to note 40, page 164 of this publication instead of to note 8, page 550, Report for 1899.

P. R. P. Frenchport II, at Frenchport, Ark.
P. R. P. Frenchport I, at Frenchport, Ark.
P. B. M. Elliot, at Elliot, Ark.
P. R. P. Camden I, at Camden, Ark.
P. B. M. Lester, at Lester, Ark.
P. B. M. Chidester, at Chidester, Ark.
P. B. M. Whelen, at Whelen, Ark.
P. B. M. Gurdon II, at Gurdon, Ark.
P. B. M. Gurdon I, at Gurdon, Ark.
P. B. M. Smithton, at Smithton, Ark.
P. B. M. Curtis, at Curtis, Ark.
P. B. M. Gum Springs, at Gum Springs, Ark.
P. B. M. Arkadelphia II, at Arkadelphia, Ark.
P. B. M. Wilmot, at Wilmot, Ark.
P. B. M. Noble, on Bayou Bartholomew, Ark.
P. B. M. Parkdale, at Parkdale, Ark.
P. B. M. Sunshine, at Sunshine, Ark.
P. B. M. Portland, at Portland, Ark.
P. B. M. Kidd, at Kidds Spur, Ark.
P. B. M. Morrell, at Morrell, Ark.
P. B. M. Hudspeth, at Hudspeth, Ark.
P. B. M. Dermott, at Dermott, Ark.
P. B. M. Baxter, at Baxter, Ark.
P. B. M. McGehee, at McGehee, Ark.

* See pp. 162-166.

P. B. M. Trippe, at Trippe Junction, Ark.
P. R. P. Gibson, at Gibsons Landing, La.
P. B. M. 5a, at Jones Bayou, La.
P. B. M. 6a, at McClures Landing, La.
P. B. M. 7a, at Eva, La.
P. B. M. 8a, at Hardscramble Landing, La.
P. B. M. 9a, at Lums, La.
P. B. M. 10a, at New Era, La.
P. B. M. 11a, at Acme, La.
P. B. M. 12a, at Mouth of Black River, La.
P. B. M. Sandidge, on Bayou Bartholomew, La.
P. B. M. Myers, on Bayou Bartholomew, La.
P. B. M. Williams, on Bayou Bartholomew, La.
P. B. M. Anderson, on Bayou Bartholomew, La.
P. B. M. Bonner, on Bayou Bartholomew, La.
P. B. M. Davis 2, on Bayou Bartholomew, La.
P. B. M. Ward, on Bayou Bartholomew, La.
P. B. M. Wells, on Bayou Bartholomew, La.
P. B. M. Mound, at Mound Landing, La.
P. B. M. Lindgrove, at Lindgrove Landing, La.
P. B. M. Bonita, at Bonita, La.
P. B. M. Jones, at Jones, La.
P. B. M. La.-Ark., near Jones, La.
P. B. M. Port Union, at Port Union Landing, La.
P. B. M. Hay, near Port Union Landing, La.
P. B. M. White, near Farmerville, La.
P. B. M. Rodgers, near Farmerville, La.
P. B. M. Farmerville, at Farmerville, La.
P. B. M. Scott, at Scotts Bluff, La.
P. B. M. Stein, at Steins Bluff, La.
P. B. M. Cox Ferry, near Bayou D'Arbonne La.
P. B. M. 16, at Rayville, La.
P. B. M. Burke, at Burke, La.
P. B. M. Archibald, at Archibald, La.
P. B. M. Mangham, at Mangham, La.
P. B. M. Big Creek, at Big Creek, La.
P. B. M. Baskin, at Baskin, La.
P. B. M. Steele, at Steeles Switch, La.
P. B. M. Winnsboro, at Winnsboro, La.
P. B. M. Eden, at Eden, La.
P. B. M. Gilbert, at Gilbert, La.
P. B. M. Wisner, at Wisner, La.
P. B. M. Elam, at Elam, La.
P. B. M. Peck, at Peck, La.
P. B. M. Newman, near Peck, La.
P. B. M. Chisum, near Florence, La.
P. B. M. Florence, at Florence, La.
P. B. M. Copeland, at Copeland, La.
P. B. M. Kirk, at Kirks Ferry, La.
P. B. M. Tensas, at Greenville, La.
P. B. M. Lee Bayou, at Lee Bayou, La.
P. B. M. Clayton, at Clayton, La.
P. B. M. Cypress, at Cypress City, La.
P. B. M. Helena, at Helena, La.
P. B. M. Concordia, at Corcordia, La.
D, at Vicksburg, Miss.
E, near Vicksburg, Miss.
F, near Vicksburg, Miss.
P. B. M. Friar Point III, at Friar Point, Miss.
P. B. M. Coahoma, at Coahoma, Miss.
P. B. M. Clover Hill, near Clover Hill, Miss.
P. B. M. Lyon, at Lyon, Miss.
P. B. M. Clarksdale I, at Clarksdale, Miss.
P. B. M. Clarksdale II, at Clarksdale, Miss.

CORRECTIONS TO DESCRIPTIONS OF BENCH MARKS PUBLISHED IN APPENDIX 3, REPORT FOR 1903.

Page 622. In line 2, P. B. M. XLIX should be changed to P. B. M. Fort Adams.

Page 627. Mr. G. B. Nicholson, chief engineer of the Chicago, New Orleans & Texas Pacific Railroad, on June 20, 1904, stated that B. M. Y_1, near *Kings Mountain, Ky.*, would probably be destroyed soon by improvements.

Pages 722 and 723. The following additional notes and corrections to bench marks along the Hudson River were furnished by J. B. Miller, Assistant, Coast and Geodetic Survey:

V. O. 9.—*Cold Spring, N. Y.*, just at the north end of a rock cut and 6 feet east of east main track and 0.4 foot above the rails.

Ik′.—Near *Fishkill, Dutchess County, N. Y.*, 37½ rods south of milepost 59, at the south end of a rock cut, 20 feet west of the west main track, 55 feet north of a block signal, 4 feet above the rails; a step cut in a broad sloping rock.

R. R. 118.—*Fishkill, N. Y.*, 6 feet east of east main track.

Ii′.—*New Hamburgh, Dutchess County, N. Y.*, 37 meters north of the station, 64 meters north of Main Street, 2 meters west of the center of the west track, on an irregular rock 12 meters south of the entrance to a rock cut leading to a tunnel, 0.2 meter above the rails; the east edge of a shallow drill hole surrounded by a rude triangle.

Ig′.—*Poughkeepsie, N. Y.*, on the north face instead of the east face and 4 meters west of the west main track.

Vose.—*Poughkeepsie, N. Y.*, the northern and higher one of the similar crosses near together.

R. R. 162.—Near *Hyde Park, N. Y.* Not found in 1905.

Pages 722, 723. Mr. R. E. Dougherty, engineer of the New York Central & Hudson River Railroad, on September 25, 1906, stated that Ih′, Ig′, Vose, and I_1, at *Poughkeepsie, N. Y.*, would soon be destroyed on account of rail road improvements.

Page 751. It was reported in 1907 that 17 MC, at *Morehead City, N. C.*, was destroyed.

Page 752. It was reported by Mr. W. E. Gehres, in 1913, that bench mark 111MC, at *Goldsboro, N. C.*, was destroyed.

Page 763. B. M. 25C, at *Monaca, Pa.*, was not found in 1906.

Page 774. Mr. R. B. Burchfield, on July 13, 1905, reported that F_5, at *Anthony, Kans.*, would probably soon be exposed to injury, as the Poorman Co. were building a new office and would remove the old one.

CORRECTIONS TO DESCRIPTIONS OF BENCH MARKS PUBLISHED IN PRECISE LEVELING IN THE UNITED STATES, 1903–1907.

Page 159. Bench mark E_1 is 3 kilometers east instead of 3 kilometers west of *Vienna, Clark County, S. Dak.*

INDEX TO ELEVATIONS AND DESCRIPTIONS OF BENCH MARKS.

[Alphabetical under each State and the States arranged in alphabetical order.]

ALABAMA.

Place.	Elevation, this publication.[1]	Description.			
		This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
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Bainbridge	96				703
Barton	96				701
Baylor	92				710
Belle Mina	96			639	
Bessemer	92				710
Bibbville	92				710
Birmingham	92			809	709
Birmingham to Decatur	96			639–641	
Birmingham to York	92–93				709–713
Blount Springs	96			640	
Boligee	92				712
Bolivar	96			636	
Boyles	96			641	
Bridgeport	96			635, 636	
Brownsboro	96			638, 639	
Browns Ferry	96				706
Carpenter	96			636	
Cedar Grove	96			636	
Cherokee	96, 97			643	701
Citronelle	91				593
Coaling Station	92				710
Coatopa	93				714
Cottondale	92				711
Courtland	97			642	
Cuba	93				714
Cullman	96			640	
Cunningham	96			641	
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Decatur to Chattanooga, Tenn	95, 96			634–639	
Decatur to Tuscumbia	96, 97			641, 642	702–707
Deer Park	91				593
Demopolis	93				714
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Elyton	92				709
Englewood	92				711
Epes	92				712, 713
Escatawpa	91				593
Eutaw	92				712
Fackler	96			636	
Falkville	96			640	
Fearns	96			639	
Finleys Landing	96				706
Flint	96			639	
Florence	96				702
Garden City	96			640	
Grand Bay	91				592
Greenbrier	96			639	
Gurley	96			638	
Hairston	92				712
Hanceville	96			640	
Hartsells	96			639, 640	
Hillman	92				709
Hillsboro	97			642	
Hollywood	96			636	
Hull	92				711
Huntsville	96			639	
Johnson, Cullman County	96			640	
Johnson, Tuscaloosa County	92				710
Jonesboro	92				710
Kimbrel	92				710
Lambs Ferry	96				705
Larkinsville	96			637	
Leesdale	96			640	
Leighton	97			642	
Lim Rock	96			637	
Livingston	93				713
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McDowell	93				714
Madison	96			639	
Margerum	96, 97			643	701
Miller	92				712
Miltons Bluff	96				706
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Mobile to Meridian, Miss	91				593, 594
Morris	96			641	
Moundville	92				711, 712
Newcastle	96			641	
Olmstead	92			808	
Paint Rock	96			638	
Parker	93				713
Paynes Landing	97				708
Pegram	96				700
Powderly	92				709
Powers	92				712
Prides	96, 97			643	701
Reids	96			640	
Riverton	97				707
Riverton Junction	96, 97			643	701
Riverton to Pittsburg Landing, Tenn	97				707–709
St. Elmo	91				592
Scottsboro	96			637	
Standiford	92				710
Stevenson	96			636	
Swearengin	96			637	
Sycamore Landing	96				705
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Trinity	97			642	
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Woodstock	92				710
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Bellemont	150, 161	235			

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

ARIZONA—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
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Chalender	150, 161	234			
Chambers	150, 161	237			
Cherokee	149, 161	232			
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Cliffs	161				
Cosnino	150, 161	235			
Crookton	150, 161	233			
Crozier	149, 161	232			
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McLellan	150, 161	234			
Maguire	161				
Maine	150, 161	234			
Manila	150, 161	236			
Moqui	161				
Navajo	150, 161	237			
Nelson	150, 161	232			
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Powell	149, 161	230			
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Riordan	150, 161	235			
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ARKANSAS.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
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Arkansas City	110, 113				612, 691
Arkansas City to Little Rock	110				612–614
Atkins	110				615
Avoca	110				621
Baxter	113	293			691
Bayou Bartholomew	113	293			690
Bayou Lapile	112				684
Beech Hill	112				686
Belle Point Landing	112				684
Benton	113				688
Berlin	110				616
Blackville	110				615
Bradley	113		134		
Brentwood	110				620
Brightwater	110				621
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Buena Vista	113		133		
Camden	112, 113	293			686
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Chester to Van Buren	110				618, 619
Chidester	113	293			687
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Coal Hill	110				617
Conway	110				615
Curtis	113	293			687
Daleville	113				688
Dermott	113	293			691
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Dyer	110				618
El Dorado Landing	112				685
Elliott	113	293			686
Ensign	113				688
Eutaw Shoals	112				684
Fayetteville	110				620
Fletchers Landing	112				685
Fort Smith	110				618
Fort Smith to Van Buren	110				618
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Frenchport	113	293			686
Galla Creek	110				615
Garfield	110				621
Garland	113		133		
Germantown	110				615
Greenland	110				620
Gum Springs	113	293			687
Gurdon	113	293			687
Hartman	110				617
Helena	114				699
Hudspeth	113	293			691
Jacks Island	112				684
Johnson	110				620
Jordan Ferry	113		133		
Jordan Landing	113		133		
Kidds Spur	113	293			690
Knoxville	110				616
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Lamar	110				616
Lancaster	110				619
Leppards Camp	112				685
Lester	113	293			686
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Lillie	110				619
Little Bay	112				685
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Little Rock to Camden	113				686–689
Little Rock to Van Buren	110				614–618
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Malvern	113				688
Marche	110				614
Mayflower	110				614
Menifee	110				615
Mill Creek	110				616
Morrell	113	293			690

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

ARKANSAS—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
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Ogamaw	113		133		
Onita	110				615
Ouachita Belle Landing	112				684
Ozark	110				617
Palarm	110				614
Parkdale	113	293			690
Pigeon Hill Landing	112				685
Pine Bluff	110				613
Plumerville	110				615
Poepping	110				617
Porter	110				619
Portland	113	293			690
Preston	110				615
Redfield	110				613
Rogers	110				621
Rudy	110				619
Russellville	110				615
Saline River	113				688
Smackover Creek	112				685
Smithton	113	293			687
Spadra	110				617
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Walnut Hill	112				686
Walnut Lake	110				613
West Fork	110				620
Whelen	113	293			687
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CALIFORNIA.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
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Crary	145, 159	190			
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Riverside	145	191			
Roseville	145	188			
Salt Lake	159				
San Bernardino	145, 159	191			
San Diego	144, 145	188			
San Diego to Barstow	144–145	188–193			
San Juan Capistrano	145, 159	190			
San Onofre	145, 159	189			
Santa Ana	145, 159	190			
Selwyn	145, 159	189			
Serra	145, 159	189			
Siam	146, 159	202			
Siberia	146, 159	201			
Sorrento	145, 159	189			
Summit	145, 159	192			
Todd	145, 159	192			
Troy	146, 159	200			
Vanderbilt	146, 159	203			
Verdemont	145, 159	191			
Victorville	145, 159	192			
Vontrigger	146, 159	202, 203			
Yorba	145, 159	190			

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

COLORADO.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Acequia	110				589
Agate	110				591
Arapahoe	109				585
Aroya	109				585
Bennett	110				591
Boyero	109				585
Brighton	131				644
Byers	110				591
Calhan	109				586
Carr	131				645
Castle Rock	110				589
Cheyenne Wells	109				585
Colorado Springs	109				587, 588
Colorado Springs to Denver	109, 110				588–590
Colorado Springs to Limon	109				586–588
Deer Trail	110				591
Denver	110, 131				590, 591 643
Denver to Cheyenne, Wyo	131				643–645
Denver to Colorado Springs	109–110				588–590
Denver to Limon	110				590, 591
Douglas	110				589
Dover	131				645
Eaton	131				645
Edgerton	110				588
Elsmere	109				587
Falcon	109				586
First View	109				585
Godfrey	110				590
Greeley	131				645
Greenland	110				589
Hazeltine	131				643
Henderson	131				644
Hugo	109				585
Hugo to Ellis, Kans	109				583–585
Hugo to Limon	109				585, 586
Husted	110				588
Kit Carson	109				585
Lake	109				585, 586
Larkspur	110				589
La Salle	131				644
Limon	109				586
Limon to Colorado Springs	109				586–588
Limon to Denver	110				590, 591
Limon to Hugo	109				585, 586
Littleton	110				589
Lowland	110				591
Lucerne	131				645
Lupton	131				644
Magnolia	110				591
Mattison	109				586
Mirage	109				585
Monument	110				588
Nantes	131				644
Palmer Lake	110				588, 589
Petersburg	110				589
Peyton	109				586
Pierce	131				645
Pike View	110				588
Plateau	110				589
Platteville	131				644
Ramah	109				586
Resolis	109				586
River Bend	110				590
Roswell	109				587
Sedalia	110				589
Toluca	110				589
Watkins	110				591
Wild Horse	109				585
Wolhurst	110				589

DISTRICT OF COLUMBIA.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Brookland	127, 128			728	
Eckington	127			728	
Georgetown	111			809	627
Georgetown to Hagerstown, Md	111				627–628
Georgetown to Richmond, Va	92				628–630
Georgetown to Washington	91				627
Langdon	140		215		
Stotts	128			729	
Takoma Park	128			729	
Washington	92, 111, 127, 140		215, 243	728, 805, 806, 807, 809	627, 643
Washington to Annapolis, Md	92				642, 643
Washington to Georgetown	91				627
Washington to Relay, Md	140		215, 216		
Washington to Washington Junction, Md	127, 128			728–730	
Winthrop Heights	140		215		

FLORIDA.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Albion	92				635
Archer	92			808	635
Arredonda	92				634
Bronson	92				635
Buena Vista	92				633
Cedar Keys	92				635, 636
Cedar Keys to St. Augustine	92				632–636
East Palatka	92				633
Ellzey	92				635
Francis	92				633
Gainesville	92				634
Grove Park	92				634
Hastings	92				633
Hawthorn	92				634
Hollister	92				633
Interlachen	92				634
McMeekin	92				634
Middleton	92				633
Otter Creek	92				635
Palatka	92				633
Palmer	92				635
Rochelle	92				634
Rosewood	92				635
St. Augustine	92				632, 633
St. Augustine to Cedar Keys	92				632–636
Tocoi Junction	92				633

GEORGIA.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Achord	107			759	
Adams Park	107			758	
Atlanta	107			758	
Austell	107			757	
Baxley	107			759	
Braswell	107			757	
Brunswick	107			760, 761	
Brunswick to Cleveland, Tenn	107			756–761	
Brentwood	107			760	
Bullard	107			758	
Chambers	107			757	
Chauncey	107			759	
Cochran	107			759	
Cohutta	107			757	
Constitution	107			758	
Cork	107			758	
Dallas	107			757	
Dalton	107			757	
Dames Ferry	107			758	
Dock Junction	107			760	
Eastman	107			759	

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

GEORGIA—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.	Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*		*Pages.*	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Ellenwood	107			758		Miller	107			757	
Empire	107			759		Mount Pleasant	107			760	
Everett	107			760		Odum	107			760	
Gardi	107			760		Oostanaula	107			757	
Godwinsville	107			759		Pendarvis	107			760	
Graham	107			759		Peyton	107			758	
Gresston	107			759		Phelps	107			757	
Hazlehurst	107			759		Pine Grove	107			759	
Holton	107			758		Pinson	107			757	
Hooker	96			635		Powder Springs	107			757	
Jackson	107			758		Reid	107			758	
Jenkinsburg	107			758		Rockmart	107			757	
Jesup	107			760		Rome	107			757	
Juliette	107			758		Sapps Still	107			760	
Lenox	107			758		Scotland	107			759	
Locust Grove	107			758		Seney	107			757	
Lumber City	107			759		Stockbridge	107			758	
McDonough	107			758		Surrency	107			760	
McGriff	107			759		Towns	107			759	
Macon	107			758		Waring	107			757	
McPherson	107			757		Westlake	107			758	
McRae	107			759		Wheaton	107			760	

IDAHO.

American Falls	132	170				Monroe	145, 159	193			
Bannock	132	170				Mora	132	175			
Bassett	145, 159	194				Mountain Home	132	171			
Blackfoot	145, 159	193				Nampa	132	175, 176			
Bliss	132	170				Napati	132	170			
Caldwell	132	176				Notus	132	176			
Camas	145, 159	194				Olds Ferry	132	177, 178			
Chalk Spur	132	171				Onyx	132	169			
Cleft	132	171				Orchard	132	171			
Colburne	132	170				Owinza	132	170			
Crystal	132	177				Owyhee	132	171, 175			
Dayton	132	169				Owyhee to Pocatello	132	169–171			
Dietrich	132	170				Owyhee to Seattle, Wash.	132–134	175–188			
Downey	132	169				Oxford	132	169			
Dubois	145, 159	194				Parma	132	176			
Eaton	132	177				Payette	132	177			
Firth	145, 159	193				Payne	145, 159	194			
Fuller	132	170				Pocatello	132, 145, 159	169, 193			
Garner	132	169				Pocatello to Butte, Mont.	145–146	193–198			
Gibson	145, 159	193				Pocatello to Owyhee	132	169–171			
Glenns Ferry	132	171				Pocatello to Red Desert, Wyo.	131, 132	166–169			
Gooding	132	170				Portneuf	132	169			
Hamer	145, 159	194				Ross Fork	145, 159	193			
Hawgood	145, 159	194				Senter	132	170			
High Bridge	145, 159	194, 195				Shelley	145, 159	193			
Humphrey	145, 159	195				Shoshone	132	170			
Idaho Falls	145, 159	194				Spencer	145, 159	195			
Inkom	132	169				Swan Lake	132	169			
Jones	145, 159	194				Ticeska	132	170			
Kimama	132	170				Tunupa	132	170			
King Hill	132	171				Tyhee	159				
Kuna	132	175				Wapello	145, 159	193			
Market Lake	145, 159	194				Wapi	132	170			
Marsh Valley	132	169				Weiser	132	177			
McCammon	132	169				Weston	132	169			
Medbury	132	171				Yale	132	170			
Michaud	132	170									
Minidoka	132	170									

ILLINOIS.

Adeline	117				734	Bloomfield	137		179		
Albany	117				733	Bloomington	139		208, 209		
Albany to Fulton	117				732–733	Bluffs	137		179		
Albany to Grafton	116, 117				724–732	Boos	139		210		
Alton	93				719	Borton	157	289			
Anna	110				600	Bradbury	139		210		
Arnold Landing	119				773	Bridgewater	137		178		
Arsenal Island	117				731	Brockton	139		211		
Ashley	110				600	Bureau	138		186, 187		
Averyville	138		184			Bushton	139		210		
Aviston	109			807	567	Byron	117				734
Bartlett	117				736	Cairo	91, 93, 110, 116				598, 599, 718, 724
Bath	137		181			Cairo to Corinth, Miss.	91				596–599
Beardstown	137		180			Cairo to Louisville, Ky.	153–155	264–279			
Bensenville	117				736	Cairo to Memphis, Tenn.	116				715–718
Benton	157	290									

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

ILLINOIS—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Cairo to Odin	110				599–601
Cairo to St. Louis, Mo	93				720–724
Caledonia	155	278, 279			
Carbondale	110				600
Carlyle	109			807	567
Caseyville	109			807	567
Catlin	139		211		
Cave-in-Rock	155	275			
Centralia	110				601
Champaign	139		209		
Champaign to Olney	139, 140		209–211		
Champaign to Pekin	139		208–209		
Chandlerville	137		180		
Channahon	138		193, 194		
Charleston	139		210		
Chester	93				721
Chicago	117, 139		204–208	808	726, 736, 737
Chicago to Pekin	137–139		183–208		
Chicago to Savanna	117				733–737
Chillicothe	138		185		
Christopher	157	290			
Clay City	109			807	566
Cordova	117				732
Cragin	117				736
Cypress Junction	157	291			
Danvers	139		208		
Darwin	156	280			
Davis Junction	117				735
Deers	140		211		
Depue	138		187		
De Soto	110				600
Dixons Landing	116				728
Downs	139		209		
Dumser	117				735
Dundas	139		209		
Duquoin	110, 157	290			600
Duquoin to Shawneetown	157	290, 291			
East Dubuque	119				768
East Elgin	117				736
East St. Louis	109				567
Eldorado	157	291			
Eldred	137		178		
Elgin	117				736
Empire	139		209		
Equality	157	291			
Fairgrange	139		210		
Fairmount	139		211		
Fairmount Junction	139		211		
Falmouth	139		210		
Farmer City	139		209		
Farrington	157	289			
Fielding	117				735
Flora	109				566
Ford Woods	139		209		
Forreston Junction	117				734
Fulton	117				733
Fulton to Albany	117				732–733
Fulton to Savanna	117				733
Galatia	157	291			
Gales Landing	137		182		
Genoa	117				735
Gillum	139		209		
Glasgow	137		179		
Golconda	155	276			
Grafton	93, 137		177		719
Grafton to Albany	116, 117				724–732
Grafton to Pekin	137		177–183		
Grafton to 12 miles above St. Louis, Mo	93				719
Grand Chain	155	278			
Grayson	157	291			
Grayville	156	282			
Greenup	139		210		
Hamburg	116				727
Hampshire	117				735
Hampton	117				732
Harris	139		209		
Harris Landing	119				773
Hastings Landing	116				728
Havana	137		181, 182		
Henry	138		186		
Hickory Grove	117				734
Hidalgo	139		210		
Hildreth	139		211		
Hillview	137		179		
Hogville Landing	116				727
Homer	140		211		
Huey	109			807	567
Hume	139		211		
Hutsonville	156	280			
Isabel	157	289			
Island 256, opposite foot of	119				773
Itasca	117				736
Iuka	109			807	566
Jamaica	139		211		
Janesville	139		210		
Jersey Landing	93				719
Joliet	138		195, 196		
Keithsburg	116				730
Kingston	117				735
Kirkland	117				735
Lake Michigan, in	117				737
Lanark	117				734
Lanark Junction	117				734
Lasalle	138		189		
Leaf River	117				734
Lebanon	109				567
Lemont	139		198, 200		
Lerna	139		210		
Le Roy	139		209		
Leslie	139		208		
Lilly	139		208		
Liverpool	137		182		
Lockport	138		196, 197		
Lydda	137		180		
McDonald	157	290			
Mackinaw	139		208		
Mahomet	139		209		
Makanda	110				600
Manheim	117				736
Manito	137		182		
Mansfield	139		209		
Marcus	119				774
Marley	157	289			
Marquette	138		187		
Marseilles	138		191		
Marshalls Landing	137		182		
Martins Landing	116				728
Matanzas	137		181		
Maunie	156	283			
May	157	289			
Menert	139		208		
Meredosia	137		180		
Metropolis	155	278			
Millers Landing	116				728
Millsdale	138		194		
Mira	140		211		
Moline	117				732
Monroe	117				735
Morris	138		192, 193		
Mossville	138		185		
Mound City Junction	110				599
Mount Carmel	156	281, 282			
Mount Carroll	117				734
Mount Forest	139		202		
Mulkeytown	157	290			
New Boston	116				730
Newton	139		210		
Nutwood	137		178		
Oakland	139, 157	289	210, 211		
Oakland to Mitchell, Ind	157	287–289			
Odin	109, 110				566, 601
Odin to Cairo	110				599–601
Odin to Olney	109				566
Odin to St. Louis, Mo	109				566–570
Olney	109, 139		209		566
Olney to Champaign	139, 140		209–211		
Olney to Lawrenceburg, Ind	108–109				565, 566
Olney to Odin	109				566
Oquawka	116				729, 730
Ottawa	138		190, 191		
Oxville	137		179		
Paris	157	289			
Parrish	157	290			
Pegram	137		179		
Pekin	137, 139		183, 208		
Pekin to Champaign	139		208, 209		
Pekin to Chicago	137–139		183–208		
Pekin to Grafton	137		177–183		
Peoria	137, 138		183, 184		

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

ILLINOIS—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Peru	138		188, 189		
Piasa Creek	93				719
Pingree Grove	117				735
Point Landing	116				728
Port Byron	117				732
Putnam	138		186		
Radom	110				600
Raleigh	157	291			
Rapids City	117				732
Rardin	139		210		
Redmon	157	289			
Reds Landing	116				727
Richview	110				600
Rileyville	157	291			
Rising	139		209		
Rochester	156	282			
Rockdale	138		195		
Rock Island	117				731
Rome	138		185		
Romeo	138, 139		198		
Rosedale	137		177, 178		
Rosehill	139		210		
Roselle	117				736
Russellville	156	281			
Sag Bridge Station	139		200		
Saidora	137		181		
St. Francisville	156	281			
Salem	109				566
Sandoval	109				567
Savanna	117, 119				733, 774
Savanna to Chicago	117				733–737
Savanna to Fulton	117				733
Savanna to St. Paul, Minn.	117–119				737–774
Seneca	138		192		
Shawneetown	155, 156, 157	274, 275, 284, 291			
Shawneetown to Duquoin	157	290–291			
Shawneetown to Terre Haute, Ind	155–156	279–284			
Sidell	139		211		
Sidney	140		211		
Smothers	157	290			
Spankey	137		178		
Sparland	138		185, 186		
Spring Valley	138		188		
Sterling Island	116				727
Stillman Valley	117				735
Stoehrs	137		182		
Summit	139		202, 203, 204		
Thomas Landing	116				728
Thompsonville	157	290			
Thomson	117				733
Toledo	139		210		
Topeka	137		182		
Tremont	139		208		
Turners Landing	116				727
Twin Grove	139		208		
Ullin	110				600
Urbana	140		211		
Utica	138		189, 190		
Villa Ridge	110				599
Watertown	117				732
Wesley	137		183		
Wesley Junction	137		183		
West Elgin	117				735
West End	157	291			
West Liberty	139		210		
West Point	116				728
Willow Springs	139		200, 201		
Wilsons Island No. 5	93				719
Woodruff	139		208		
York	156	280			

INDIANA.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Alton	154	267			
Armstrong	157	288			
Avoca	157	287			
Bedford	157	287			
Bloomfield	157	288			
Borden	157	290			
Bridgeport, Clark Co	157	290			
Bridgeport, Harrison Co	153	265			
Browns Landing	154	265			
Campbellsburg	157	289			
Cincinnati	157	288			
Clay City	157	288			
Coal City	157	288			
Cochran	109			807	565
Cory	157	288			
Crowleyville	156	282			
Dark Hollow	157	287			
Deer Creek	154	269			
Delaware	109			807	565
Elliston	157	288			
Evans Landing	154	265			
Evansville	154	272			
Farabee	157	290			
Fort Ritner	109			807	565
Grand View	154	270			
Hitchcock	157	289			
Koleen	157	288			
Lawrenceburg	98, 108			807	667
Lawrenceburg to Olney, Ill.	108–109				565, 566
Leavenworth	154	266, 267			
Leipsic	157	289			
Liggett	157	289			
Little Rock	156	281			
Mauckport	154	266			
Medora	109			807	565
Merom	156	280			
Mineral City	157	288			
Mitchell	109, 157	287, 289			566
Mitchell to Louisville, Ky.	157	289–290			
Mitchell to Oakland, Ill.	157	287–289			
Mosquito Creek	154	265			
Mount Vernon	155	273, 274			
Mouth of Little Wabash	156	283, 284			
Mouth of Wabash	156	284			
New Albany	157	290			
New Harmony	156	282, 283			
Norris	157	290			
North Vernon	109			807	565
Orleans	157	289			
Owensburg	157	288			
Pekin	157	290			
Prairieton	155, 156	280			
Riley	157	288			
Riverton	156	280			
Robison	157	288			
Rockport	154	270, 271			
St. Joseph	157	290			
Salem	157	289, 290			
Saline City	157	288			
Saltillo	157	289			
Scottville	109			807	566
Spring Hill	157	288			
Springville	157	287, 288			
Stewarts Landing	153	265			
Terre Haute	155, 157	279, 288, 289			
Terre Haute to Shawneetown, Ill	155–156	279–284			
Tobacco Landing	154	266			
Troy	154	269, 270			
Vincennes	109, 156	281			566
Washington	109				566
West Franklin	155	273			
West Shoals	109				566
West Terre Haute	157	289			
Wilson	157	290			
Worthington	157	288			
Yockey	157	287			

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

IOWA.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Akron	135		166		
Austin	135		165		
Bartlett	125				836
Bellevue	119			809	771, 772
Beloit	135		164		
Blencoe	125				839, 840
Buenavista	119				764
Buffalo	117				731
Burlington	116				729
California Junction	125				830
Calliope	135		165		
Cattese	119				769
Chatsworth	135		165, 166		
Clayton	119				762
Council Bluffs	125				837, 838
Crescent	125				838
Dubuque	119				767, 768, 769
Eagle Point	119				767
Eckard	119				762, 763
Edmore	119				766
Elm Springs	135		164		
Fairport	116				731
Finley Landing	119				765
Fort Madison	116				729
Frenchtown Landing	119				765
Gordons Ferry	119				770, 771
Guttenberg	119				763
Hamburg	125				835, 836
Hawarden	135		165		
Haynies	125				836
Hentons	125				837
Honey Creek	125				838
Island 176	119				762
Island 207	119				765
Island Park	125				837
Keokuk	116				724, 728
Little Maquoketa River	119				766
Loveland	125				838
McPaul	125				836
Massey	119				770
Missouri Valley	125				838, 839
Modale	125				839
Mondamin	125				839
Montpelier	117				731
Montrose	116				728
Muscatine	116				730, 731
Nashville	116				728
Nebraska City Junction	125				836
Nine Mile Island	119				770
North Bellevue	119				771
North McGregor	118				761
Onawa	125				840
Pacific Junction	125				837
Percival	125				836
Port Louisa	116				730
River Sioux	125				839
Salix	126				841
Sargents Bluff	126				841
Shawondasee Club Grounds	119				769
Sioux City	126, 130, 135		167		841, 842
Sioux City to Norfolk, Nebr.	130			792, 793	
Sioux City to St. Joseph, Mo.	125, 126				833–842
Sioux City to Watertown, S. Dak	135		158–167		
Sloan	126				840
Smiths Station	119				771
Snyders	119				770
Sny McGill	119				762
South McGregor	118, 119				761
Spechts Ferry	119				766
Turkey River Junction	119				764
Viele Station	116				728, 729
Waupeton	119				765
West Davenport	117				731
Westfield	135		166		
Whiting	125, 126				840

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Place.	Elevation, this publication.[1]	This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Abilene	130				579
Abilene to Norfolk, Nebr.	130				647–653
Abilene to Holliday	109				576–579
Anthony	129	294	244	774	
Anthony to Bowie, Tex.	129			774–781	
Anthony to Salina	129			771–774	
Argentine	109				576
Ascot	129			774	
Assaria	129			771	
Atchison	124				829, 830
Aurora	130				648
Basil	129			773	
Bavaria	109				580
Belvue	109				578
Bridgeport	129			771	
Brookville	109				581
Buffalo Park	109				583
Bunker Hill	109				582
Carvel	129			773	
Castleton	129			773	
Catlin	130				648
Cedar Junction	109				576
Chapman	109				579
Club House	109				577
Collyer	109				583
Concordia	130				648
Connors	124				826, 827
Courtland	130				649
Darlow	129			772	
De Soto	109				576
Dorrance	109				581
Duquoin	129			774	
Ellis	109				582
Ellis to Hugo, Colo	109				582–585
Ellis to Salina	109				580–582
Ellsworth	109				581
Eudora	109				576
Fernie	129			772	
Fort Leavenworth	124				828
Fort Riley	109				579
Gorham	109				582
Grainfield	109				853
Grinnell	109				583
Groveland	129			772	
Grover	109				577
Hannum	130				648
Harper	129			774	
Hays	109				582
Hilton	129			771	
Holliday	109, 111				576, 627
Holliday to Abilene	109				576–579
Holliday to Harrisonville, Mo	110, 111				625–627
Holliday to Kansas City, Mo	109				575, 576
Homer	109				582
Huscher	130				648
Hutchinson	129			772	
Inman	129			772	
Johnstown	129			771	
Junction City	109				579
Kackley	130				649
Kanopolis	109				581
Kansas City	109, 124				825, 826
Kickapoo	124				828, 829
Kingman	129			773	
Lashmet	129			773	
Lawrence	109				577
Leavenworth	124				827, 828
Leavenworth Junction	124				827
Lecompton	109				577
Lindsborg	129			771	
Longford	130				648
Lovewell	130				649
McAllaster	109				584
McPherson	129			771, 772	
Manchester	130				647
Manhattan	109				579
Medora	129			772	
Mentor	129			771	
Miltonvale	130				648
Monotony	109				584
Monument	109				584
Morse	111				626
Nearman	124				826
New Cambria	129				579, 580

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

KANSAS—Continued.

Place.	Elevation, this publication.[1]	Description.			
		This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Newington	111				626
Oak Hill	130				648
Oakley	109				583
Oak Mills	124				829
Ogallah	109				583
Ogden	109				579
Olathe	111				626, 627
Oneonta	130				648
Page City	109				584
Pomeroy	124				826
Popes	124				827
Pretty Prairie	129			773	
Quindaro	124				826
Quinter	109				583
Rago	129			773	
Rossville	109				578
Russell	109		243		582
St. George	109				578
St. Marys	109				578
Salina	129				580
Salina to Anthony	129			771–774	
Salina to Ellis	109				580–582
Salina to Solomon	129				579–580
Sharon Springs	109				584
Silver Lake	109				578
Solomon	129, 130				579, 647
Solomon to Salina	129				579–580
Spring	129			781	
Sulphur Springs	130				648
Talmage	130				647
Tecumseh	109				577
Terra Cotta	109				581
Topeka	109				577, 578
Turkey Creek	109				584
Varner	129			773	
Victoria	109				582
Wade	124				828
Wakeeney	109				583
Walker	109				582
Wallace	109				584
Wamego	109				578
Weaver	109				576
Webber	130				649
Weskan	109				584
Wilson	109				581
Winona	109				584

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Place.	Elevation, this publication.[1]	Description.			
		This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Addison	154	268			
Alexander	91				598
Alpine	95			629	
Alzey	155	273			
Ammons	154	268			
Anchorage	157	292			
Arlington	91				598
Avoca	157	292			
Bagdad	157	292			
Bardwell	91				598
Bayou	155	276			
Beachams Landing	154	269			
Beckley	157	292			
Benson	157	292			
Berry Ferry	155	276			
Bethany	153	265			
Birdsville	155	277			
Blackburn	156	284			
Blanchett	95			623	
Brandenburg	154	266			
Brannon	95			625	
Browns Island	155	274			
Burchs Landing	154	268			
Burgin	95			626	
Burnside	95			628	
Carlinburg	154	271			
Carrsville	155	276			
Caseyville	155	275			
Cedar Branch	154	267			
Chenault	154	268			
Christiansburg	157	292			
Cincinnati Towhead	155	275			
Clinton	91				598
Cloverport	154	268, 269			
Columbus	116				715, 718
Concordia	154	267			
Connor	157	292			
Corinth	95			623	
Covington	95			622	
Crecelius	154	266, 267			
Crescent Springs	95			622	
Crittenden	95			623	
Cypress Bend	155	273			
Danville	95			626	
Dekoven	155	275			
Diamond Island	155	273			
Dittoes Landing	154	266			
Dixon	95			622	
Donerail	95			624	
Dry Ridge	95			623	
Dutch Bend	154	272			
Duvall	157	291			
East Cairo	91, 155	279			598
Eastwood	157	292			
Elkhorn	157	291			
Erlanger	95			622	
Eubank	95			627	
Faulconer	95			626	
Field Station	157	292			
Flat Rock	95			629	
Flint Island	154	267, 268			
Floyd	95			627	
Fords Ferry	155	275			
Fort Jefferson	91, 116				598, 718
Frankfort	157	291			
French Island	154	271			
Fulton	91				598
Georgetown	95, 157	291		624	
Georgetown to Louisville	157	291–293			
Greendale	95			624	
Green River, mouth of	154	272			
Greenwood	95			629	
Greenwood Landing	153	265			
Hatton	157	292			
Hawesville	154	269			
Henderson	154, 155	272, 273			
Hickman	116				715
Highbridge	95			625, 626	
Hillenmeyer	95			624	
Hinton	95			623	
Holloway	155	279			
Holt	154	268			
Humphries Creek	155	279			
Iceland Landing	154	270			
Jessamine	95			625	
Johnsontown	153	265			
Junction City	95			626	
Kennebec	157	292			
Kings Mountain	95	294	244	627	
Kinkaid	95			624	
Kosmosdale	153	265			
Lahant	154	268			
Landis Landing	154	269			
Ledbetter	155	277			
Lewisport	154	270			
Lexington	95			624	
Little Hurricane Island	154	271			
Long Run	157	292			
Louisville	153, 157	264, 265, 290, 292, 293			
Louisville to Cairo, Ill	153–155	264–279			
Louisville to Georgetown	157	291–293			
Louisville to Mitchell, Ind	157	289, 290			
Ludlow	95, 98				665
Lyndon	157	292			
McDonalds Landing	155	273			
McKinney	95			627	
Mason	95			623	
Moreland	95			626, 627	
Newport	95			622	
Nicholasville	95			625	
Norwood	95			628	
Ogden	155	278			
Owensboro	154	271			
Paducah	155	277, 278			
Peckenpaugh	154	266			
Pine Knot	95			629	

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

KENTUCKY—Continued.

Place.	Elevation, this publication.[1]	Description.			
		This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Pryors Island	155	276			
Pulaski	95			627	
Puppy Creek, mouth of	154	271			
Ragland	155	278			
Raleigh	155	274			
Richwood	95			622	
Rock Haven	154	265, 266			
Rodgers Gap	95			624	
Sadieville	95			624	
St. Matthews	157	292			
Science Hill	95			627	
Scotts Station	157	292			
Scuffletown	154	271, 272			
Shelbyville	157	292			
Sherman	95			623	
Simpsonville	157	292			
Skillman	154	269			
Slim Island	155	274			
Sloans Valley	95			628	
Smithland	155	277			
Somerset	95			628	
Stamping Ground	157	291			
Stedmantown	157	291			
Stephensport	154	268			
Strunk	95			629	
Switzer	157	291			
Tolu	155	275, 276			
Uniontown	155	274			
Valley Station	153	265			
Wabash Island	155, 156	274, 284			
Walton	95			623	
Warwick Villa	157	292			
Waynesburg	95			627	
Weston	155	275			
West Point	153, 154	265			
Whitley	95			629	
Wickliffe	91				598
Williamstown	95			623	
Wilmore	95			625	
Wolf Creek	154	267			
Worshams Landing	116				715

LOUISIANA.

Place.	Elevation, this publication.[1]	This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Acme	112	294			681
Acme to Barbin Landing	112		131		
Acme to Jonesville	112				681
Alabama Landing	112				684
Albany Point	112				681
Alden Bridge	113		134		
Alexandria	112		130		672
Allen Green	111				669
Alto	112		132		
Anchor	115			616	
Arbroth	115			615	
Arcadia	111				669
Archibald	112	294			679
Archibald to Columbia	112		132		
Archibald to Concordia	112				679–681
Archibald to Rayville	112				679
Ashwood	116		144		
Bank Smith Place	112				682
Barbin Landing	112		131		
Barbin Landing to Acme	112		131		
Barbin Landing to Shreveport	111–112				670–673
Barbin Landing to Smithland	112				673–675
Barbre Landing	112				674
Barnes	111				675
Baskin	112	294			679
Baton Rouge	114			611, 612, 613	
Baton Rouge to New Orleans	114		134–136	607–612	
Baton Rouge to Smithland	114–115			612–619	
Bayou Bartholomew	113	294			689, 690
Bayou D'Arbonne	113	294			683
Bayou Dorcheat	111				670
Bayou Macon	111	293			676
Bayou Sara	115			616, 617	
Bayou Siord	112				682
Belle Helene	114			610	
Benton	113		134		
Big Creek	112	294			679
Black Hawk	115		136		608
Black River	112	294			679
Blankston	112				677
Bodcau	111				670
Bodcau to Monroe	111				668–670
Bœuf River	112		132		
Bonita	113	294			690
Bonners Plantation	111				670
Bougere	115		137		608
Boyce	112				672
Brooks	115			618	
Bullitt Bayou	115		140, 141		
Burke	112	294			679
Burnside	114			610	
Burtville	114			611	
Buxtons Landing	112				672
Cabin Teele Plantation	111				610
Calhoun	111				669
California	111				675
Campo Bello Plantation	111				670
Campti	112				671
Carpenter	111				676
Carrollton	114		134	607, 608	603, 667
Cash Plantation	111				670
Caspiana Landing	111				670
Catahoula Shoals	112				678
Celestine Plantation	114		136		
Charlieville	112		132		
Chef Menteur	114			606	
Cheniere	111				669
Choudrant	111				669
Clayton	112	294			680
Coles Landing	112				678
Colfax	112				672
College Landing	114		135		
Colomb	114			610	
Columbia	112		132		678
Columbia to Archibald	112		132		
Columbia to Jonesville	112				678–679
Columbia to Monroe	112				677, 678
Concordia	112	294			676, 679, 680, 681
Concordia to Archibald	112				679–681
Concordia to Jonesville	112				679
Concordia to Vidalia	112				676, 677
Convent	114			610	
Copeland	112	294			680
Cottingham Landing	112				678
Coushatta	111				671
Crew Lake	111				675
Crichtons Plantation	111				671
Crowville	112		131		
Curtis	111		131		
Cypress City	112	294			680
Dallas	111				676
Danville	112				678
David Ferry	112				673
Delhi	111, 112		131		676
Delhi to Tensas River	112		131		
Delta	111, 116	293	145, 146		610, 636
Devall	114, 115			614, 615	
Doyle	111				670
Dubberly	111		131		669
Duck Port Plantation	111				610
Dunns Landing	112				671
East Point	111				671
Eden	112	294			679
Egg Bend Landing	112	293	130		673
Elam	112	294			680
Elcho Plantation	111				610
Ennis	115			619	
Eva	112	294			681
Fairchilds Island	115		141		
Fairmount	112				672
Fairview	115		137		
Farmerville	113	294			683
Farmerville to Glendora	113				683
Fish Pond	115		137, 138		
Fishtrap Shoals	112				683
Florence	112	294			680

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

LOUISIANA—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Fort Macomb	114			606	
Frank Pierre Creek	112				684
Frogmore	112				679
Garyville	114		135		
Geismar	114			610	
Gibsland	111				669
Gibsons Landing	112	294			609, 678
Gilbert	112	294			680
Gilbert to New Light	112		131		
Girard	111				675
Glendora	112, 113			809	682
Glendora to Farmerville	113				683
Goldman	115		142		
Gordon	111				675
Grand Bend	112	293			672
Greenville	112	294			680
Greenwood	130			786	
Griffin	116		145		
Hahnville	114			608	
Hamburg	112				674
Hardscramble Landing	112	294			681
Hard Times Landing	116		143, 144		
Harrisonburg	112				678, 679
Haughton	111				670
Helena	112	294			680
Hendersons Landing	111				611
Hendersons Mill	112				681
Hermitage	115			615, 616	
Hester	114		135	609	604, 605
Holly Grove	112		132		
Holly Grove Landing	112		132		
Holly Ridge	111				676
Howard	111				670
Hurricane Bluff	113		134		
Jeters Landing	112				682
Jeters Landing to Shreveport	112				681, 682
Jewella	130			786	
Jones	113	294			690
Jones Bayou	112	294			681
Jones Quarter Landing	112				672
Jonesville	112				679
Jonesville to Acme	112				681
Jonesville to Columbia	112				678, 679
Jonesville to Concordia	112				679
Kenner	114		135		
King	116		144, 145		
Kirks Ferry	112	294			680
Lacour	115			619	
Lake One	111				676
Landerneau	112		132		
La Place	114		135		
L'Argent	115		141		
Lee Bayou	112	294			680
Lindgrove Landing	113	294			690
Lobdell	114			614	
Loggy Bayou	111				671
Logtown	112				677
Lotus Landing	111				670
Lums	112	294			681
Lutcher	114		135	609	
McClures Landing	112	294			681
Mabel	115		141		
Mangham	112	294			679
Mansura	112				673
Marksville	112		131		673
Merrick	112				674
Miles	114		136		
Mill Bayou	112				683
Millers Bluff	113		134		
Millikens Bend	111				610
Monroe	111, 112				668, 669; 677
Monroe to Bodcau	111				668–670
Monroe to Columbia	112				677–678
Monroe to Parkeville	112				682
Monroe to Rayville	111				675
Montgomery	112				672
Mooringsport	112				682
Moreauville	112				674
Morganza	115			618	
Morville	115		138		
Mound	111				675
Mound Landing	113	293, 294			690
Mount Airy	114			609	
Murrays Landing	112		131		
New Era	112	294			681
New Light	112		131		
New Light to Gilbert	112		131		
New Orleans	114		134	606, 607	603, 668
New Orleans to Baton Rouge	114		134–136	607–612	
New Orleans to Biloxi, Miss	114			604–607	
New River	114			610	
Nichols	130			786	
Nocks	115		136		
Normands Landing	112				673
Old River	112				671
Omega	111				611
Osbornes Ferry	112		131		
Parkeville	112, 113				682
Parkeville to Camden, Ark.	112–113				683–686
Parkeville to Monroe	112				682
Parkeville to Wilkersons Landing, Miss	113				689–691
Patterson Plantation	114		135		
Pecan Grove Plantation	114		135		
Peck	112	294			680
Plain Dealing	113		134		
Point Breeze	115			620, 621	
Pointe Coupee	115			617	
Point Pleasant	116		144		683
Poland	112				673
Port Union Landing	113	294			683
Pullaway Landing	112		131		
Quebec	111				676
Raccourci	115			619	
Rapides	112				672
Rayville	111	294			675, 679
Rayville to Archibald	112				679
Rayville to Monroe	111				675
Rayville to Vicksburg, Miss	111				675, 676
Red River Landing	115			620	675
Riverside Plantation					610
Riverton	112				678
River View Plantation	111				610
Rock Row Shoals	112				682
Ruston	111		131		669
St. Gabriel	114			610	
St. Joseph	115, 116		142, 143		
St. Maurice	112				671
St. Peters	114		135		
St. Rose	114			608	
Sarpy	114		135		
Scotts Bluff	113	294			683
Sellers	114			609	604
Shiloh Shoals	112				684
Shreveport	111, 113; 130	293	131, 134	787	670
Shreveport to Barbin Landing	111–112				670–673
Shreveport to Camden, Ark	113		133, 134		
Shreveport to Fort Worth, Tex	129, 130			782–787	
Shreveport to Jeters Landing	112				681, 682
Sibley	111				669
Simmesport	112	293			674
Simsboro	111				669
Smithland	112, 115		131	619, 620	607
Smithland to Barbin Landing	112				673–675
Smithland to Baton Rouge	114–115			612–619	
Smithland to Fort Adams, Miss	115			619–622	
Stafford	112				678
Steeles Switch	112	294			679
Steins Bluff	113	294			683
Sunrise Landing	112		131		
Sunshine	114			611	605
Tallulah	111				676
Tarbert (Miss.), opposite	115			620	
Taylor	111				669
Tensas River to Delhi	112		131		
Tiger Island	112				671
Torras Landing	112				675
Trinity	112				679
Upper Brownsville Plantation	111				671
Vanceville	113		134		
Vick	112		131		

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

LOUISIANA—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Vidalia	112, 115	293	138–140		608, 609, 677
Vidalia to Concordia	112				676, 677
Vidalia to Fort Adams, Miss.	115		136–140		
Vidalia to Vicksburg, Miss.	115–116		140–146		
Walls	115			615	
Wards Ferry	113				690
Waterproof	115		141, 142		609
Water Valley Landing	112				674
Waverly	111				676
West Baton Rouge	114			613, 614	
West Monroe	111				669
Whitehall	114		136		
Williamsport	115			619	
Willow	112				671
Winnsboro	112	294			679
Wisner	112	294			680

MARYLAND.

Place.	Elevation, this publication.[1]	This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Adamstown	141		220		
Alberton	140		218		
Alexandria Junction	140		215		
Altamont	143		237		
Ammendale	140		216		
Annapolis	92				642, 643
Annapolis Junction	140		216		
Annapolis to Washington, D. C	92				642, 643
Baltimore	140		216, 217		
Baltimore to Relay	140		216, 217		
Barnesville	128			730	
Bartholows	141		219		
Beltsville	140		216		
Berwyn	140		215		
Black Bear	143		237		
Black Oak	143		236		
Bloomington	108, 143	293	237		
Bond Station	143		237		
Bowie	92				643
Boyd	128			730	
Brady	143		236		
Branchville	140		215		
Bridewell	140		216		
Brunswick	128			731	
Buckeystown	141		219		
Buckeystown Station	141		219		
Buck Lodge	128			730	
Capitol View	128			729	
Catoctin	128			731	
Cedar Cliff	143		236		
Cherry Run	108				561
Clopper	128			729	
College Park	140		215		
Contee	140		216		
Crabtree	143		237		
Cresap	143		236		
Cumberland	108, 128, 143		236	736, 737	561
Cumberland to Amblersburg, W. Va	108, 143, 144		236–238		561, 562
Cumberland to Foley, Pa	128			737, 738	
Cumberland to Hancock	108, 128			734–737	561
Darby	128			730	
Davis	140		218		
Dawson	143		236		
Deer Park	108, 143		237		562
Derwood	128			729	
Dickerson	128			730	
Dorsey	140		216		
Doubs	141		220		
Elk Ridge	140		216		
Ellerslie	128			737	
Ellicott City	140		218		
Evitts Creek	128			736	
Frankville	143		237		
Frederick	141		219		
Frederick Junction	141		219		
Gaither	140		218		
Gaithersburg	128			729	
Garrett Park	128			729	
Germantown	128			729, 730	
Gorsuch	140		218		
Gray	140		218		
Great Falls	111				627
Hagerstown	108				560
Hagerstown to Georgetown, D. C	111				627, 628
Hagerstown to Hancock	108				560, 561
Hagerstown to Harrisburg, Pa	108				560
Halethorpe	140		216		
Halpine	128			729	
Hancock	108				561
Hancock to Cumberland	108, 128			734–737	561
Hancock to Hagerstown	108				560, 561
Hancock to Washington Junction	128			730–734	
Hanover	140		216		
Harwood	140		216		
Henryton	140		218		
Hollofield	140		218		
Hoods Mills	141		218		
Hutton	108, 144		238		562
Hyattsville	140		215		
Ijamsville	141		219		
Ilchester	140		217		
Jessups	140		216		
Keedysville	111				628
Kensington	128			729	
Knoxville	128			731	
Lansdowne	140		216		
Laurel	140		216		
Lime Kiln	141		219		
Linden	128			729	
Little Orleans	108				561
Lowndes	143		236		
McKenzie Station	143		236		
Marriottsville	140		216		
Monrovia	141		219		
Montevideo	140		216		
Morgan	141		218		
Mountain Lake Park	144		237, 238		
Mount Airy Junction	141		219		
Mount Savage Junction	128			737	
Mount Winans	140		217		
Muirkirk	140		216		
North Branch	128			736	
Oak Crest	140		216		
Oakland	108, 144	293	238		562
Oella	140		218		
Oldtown	108				561
Orange Grove	140		217		
Pinto	143		236		
Plane No. 4	141		219		
Point of Rocks	111			730	627
Potomac Station	143		236		
Rawlings	143		236		
Reels Mill	141		219		
Relay	140		216, 217		
Relay to Baltimore	140		216, 217		
Relay to Washington, D. C	140		215, 216		
Relay to Washington Junction	140, 141		217–220		
Riverdale	140		215		
Rives	140		215		
Robert Station	143		236		
Rockville	128			729	
St. Denis	140		216		
Savage Station	140		216		
Seneca	111				627
Silver Spring	128			729	
Skipnish	144		238		
Sunnyside	140		215		
Swanton	143		237		
Sykesville	140		218		
Tuscarora	128			730	
Vineyard	140		217		
Ward	128			729	
Waring	128			729	
Washington Grove	128			729	
Washington Junction	128, 141		220	730	
Washington Junction to Hancock	128			730–734	
Washington Junction to Relay	140, 141		217–220		

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

MARYLAND—Continued.

Place.	Elevation, this publication.[1]	Description.			
		This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Washington Junction to Washington, D. C.	127, 128			728–730	
Watersville	141		218, 219		
West Baltimore	140		216		
Westmore	128			729	
Weverton	111, 128			731	628
Whites Ferry	111				627
Williamsport	108				560, 561
Wilson	92				643
Windham	128			729	
Woodbine	141		218		
Woodside	128			729	
Woodstock	140		218		

MICHIGAN.

Place.	Elevation, this publication.[1]	This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Algonac	98				845, 846
Back River	98				847
Barbeau	98			648	
Bay Mills	98			650	
Brimley	98			650	
Delray	98				843
Detour	98			645, 646	
Detour to Iroquois	98			645–651	
Detroit	98			644	842–844
Detroit Junction	99				842
East China	98				846
Ecorse	98			644	843
Escanaba	98				791
Escanaba to Marquette	98			651	791
Fair Haven	98				845
Fort Gratiot	98				842
Gatesville	98			647	
Gibraltar	98				653
Gibraltar to Deshler, Ohio	97				653–656
Gibraltar to Trenton	98			644	842, 843
Grossepoint	98				844
Grossepoint Farms	98				845
Iroquois Point	98			651	
Iroquois to Detour	98			645–651	
Kelden	98			647	
Lakeport	98			644	842
La Salle	97				654
Lexington	98			644, 645	
Lexington to Trenton	98			644	842–847
McCarron	98			648	
Mackinaw	98			652	
Maple Ridge	98				791
Marine City	98				846
Marquette	98			651	791
Marquette to Escanaba	98			651	791
Marysville	98				847
Monroe	97				654
Mount Clemens	98				844
New Baltimore	98				845
New Haven	99				842
Newport	97				653
Pine River	99				842
Port Huron	98				847
Raber	98			646, 647	
Roberts Landing	98				846
Rosedale	98			648	
Roseville	98				844
St. Clair	98				846
Sand Beach	98			651, 652	
Sands	98				791
Sault Sainte Marie	98			648–650	
Schlesser	98			646	
Sibleys	98				843
South Rockwood	97				653
Stalwart	98			647	
Sterlingville	98			647	
Trenton	98				842, 843
Trenton to Gibraltar	98			644	842, 843
Trenton to Lexington	98			644	842–847
Vienna	97				654
Windmill Point	98				844
Wyandotte	98				842, 843

MINNESOTA.

Place.	Elevation, this publication.[1]	This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Ada	136		170		
Aitkin	120, 122		146		785
Aitkin to Brainerd	120				783–785
Aitkin to Grand Rapids	122		146–148		
Albany	134		149		
Alexandria	134		151, 152		
Angus	136		171		
Anoka	120				776, 777
Argyle	136		171		
Ashby	135		167		
Averill	136		169		
Avon	134		149		
Backus	121			587	
Bald Eagle Junction	122				789
Ball Club	121			595	
Barnesville	136		169		
Barnum	122				786
Bear Island	120				779
Belle Prairie	120				782
Beltrami	136		170		
Bemidji	121			592	
Bena	121			594	
Blackberry	122		148	597	
Borup	136		169, 170		
Brainerd	120			585	783
Brainerd to Aitkin	120				783–785
Brainerd to Cass Lake	120, 121			586–590	
Brainerd to St. Cloud	120				779–783
Brandon	134		152		
Brock Creek	122				788
Browns Hill	122				788
Carlisle	136		168		
Carlton	122				786
Cass Lake	121			590, 593	
Cass Lake to Brainerd	120–121			586–590	
Cass Lake to Grand Rapids	121–122			593–598	
Cass Lake to Lake Itasca	121			590–593	
Cedar Brook, mouth of	120				785
Centerville	122				789
Central Point	117				745
Childs	134		153, 154		
Clearwater	120				779
Clinton	134		156		
Cohasset	121			596	
Collegeville	134		149		
Collis	134		155		
Crawford	136		169		
Crookston	136		170, 171		
Cuba	121			593	
Dakota	118				753
Dalton	135		167, 168		
Daytons Bluff	117				738
Dean Brook	120				784
Deer River	121			595, 596	
Downer	136		169		
Dresbach	118				753, 754
Duluth	122				785
Duluth to St. Paul	122				785–790
Dumont	134		155		
Dutchmans Coulee	118				747
East St. Cloud	120, 134		148		779
Elbow Lake	134		152, 153		
Elk River	120				778
Erdahl	134		152		
Euclid	136		171		
Evansville	134, 135		152, 167		
Evansville to St. Cloud	134		148–152		
Evansville to Stephen	135–136		167–172		
Evansville to Watertown, S. Dak	134–135		152–158		
Farris	121			590	
Felton	136		169		
Fergus Falls	136		168		
Florence	117				745

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

MINNESOTA—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Forest Lake	122				789
Fort Ripley	120				782
Freeport	134		149		
Fridley	120				776
Garfield	134		152		
Gladstone	122				790
Glyndon	136		169		
Graceville	134		155, 156		
Grand Rapids	121			597	
Grand Rapids to Aitkin	122		146–148		
Grand Rapids to Cass Lake	121–122			593–598	
Hackensack	121			587, 588	
Hadler	136		170		
Harris	122				788
Hastings	117				740
Hay Creek, mouth of	120				784
Hennepin River, mouth of	121			592	
Hereford	134		153		
Highwood	117				739
Hinckley	122				787
Homer	118				752
Hubert	120			585	
Hull	121			596	
Hunters	121			588	
Island Lake	120, 121			587	784
Island No. 1	120				784
Island No. 18	117				740
Island No. 22	120				782
Itasca	120				777
Jenkins	120			586	
Keplers Coulee	117				746
Kettle River	122				787
Kings Coulee	117, 118				746, 747
Kittson	136		170		
La Crescent	118				754
Lake City	117				746
Lake Itasca	121			592, 593	
Lake Itasca to Cass Lake	121			590–593	
Lake Side	117				744, 745
Lamoille	118				752
La Prairie	122			597	
La Salle River, mouth of	121			592	
Lawndale	136		168, 169		
Leaks	120			585	
Leech Lake	121			589	
Libby	122		147		
Little Falls	120				781
Little Rock	120				780
Lockhart	136		170		
Lomond	121			593	
Lothrop	121			588	
Maltby	121			592	
Melby	135		167		
Melrose	134		149, 150		
Merrifield	120			585	
Mildred	121			587	
Miller	122				787
Minneapolis	119, 120				775, 776
Minneopa	118				752
Mission Creek	122				788
Mississippi	122		147, 148		
Monticello	120				778, 779
Moose Lake	122				787
Nelson	134		151		
Newport	117				739
Newport Landing	117				739
Nininger Slough	117				740
North Branch	122				789
North Prairie	120				781
Nushka	121			594, 595	
Old Crow Wing Ferry	120				782
Old Fort Ripley	120				782
Old Indian Mission	120				784
Ortonville	134		156, 157		
Osakis	134		150, 151		
Otsego	120				778
Parkdale	136		168		
Pequot	120			586	
Pine City	122				788
Pine River	120, 121			586	784
Point Douglas	117				741
Pokegama Lake	121			596, 597	
Portage	122		147		
Prospect Hill	121			592	
Pullman	117				739, 740
Rabbit River, mouth of	120				784
Red Rock	117				739
Red Wing	117				743, 744
Reeds Landing	118				747
Rice	120				780, 781
Richmond	118				753
River Junction	118				754
Rosby	121			590, 591	
Roscoes Coulee	118				747
Rothsay	136		168		
Royalton	120				781
Rush City	122				788
Russia	136		170		
St. Augusta	120				779
St. Cloud	120, 134		148, 149		779, 780
St. Cloud to Brainerd	120				779–783
St. Cloud to Evansville	134		148–152		
St. Cloud to St. Paul	119, 120				774–779
St. Joseph	134		149		
St. Paul	117, 119, 122				737, 738, 775, 790
St. Paul to Duluth	122				785–790
St. Paul to St. Cloud	119, 120				774–779
St. Paul to Savanna, Ill	117–119				737–774
St. Paul Park	117				739, 740
Sandstone Junction	122				787
Sauk Center	134		150		
Sauk Rapids	120				780
Schley	121			593, 594	
Shirley	136		171		
Short Line Park	122				786
Smithville	122				786
South Bemidji	121			591	
Stacy	122				789
Starke	121			595	
Stephen	136		171, 172		
Stephen to Evansville	135, 136		167–172		
Sturgeon Lake	122				787
Teepeeota Point	118				748
Tenney	134		153		
"The Rapids"	121			592	
Thomson	122				786
Thorsborg	134		152		
Tintah	134		153		
Towhead Rapids	120				784
Verna	122		148		
Wabasha	118				747, 748
Wacouta	117				744
Waldeck	122		146, 147		
Walker	121			588, 589	
Warren	136		171		
West Duluth	122				785
West Union	134		150		
Wheaton	134		155		
Wheatville	136		170		
White Bear	122				790
Wilkinson	121			589, 590	
Willow River	122				787
Winona	118				751, 752
Wyoming	122				789
Yarmouth	134		153		

MISSISSIPPI.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Argyle	113				697
Arnot	115		137		
Artesia	91				595
Auburn Plantation	111				612
Austin	114				700
Australia	114				694
Baird	113				693
Baldwyn	91				595
Bay St. Louis	114			605	
Beauvoir	114			605	
Bee Lake	113				692
Belle Isle Plantation	113				692
Ben Lomond Plantation	111				611
Beulah	114				695
Biloxi	91, 114			604, 605	591, 592
Biloxi to Mobile, Ala	91				591, 592

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

MISSISSIPPI—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Biloxi to New Orleans, La.	114			604–607	
Blakely Plantation	113				692
Bolivar	114				696
Bolton	111				638
Booneville	91				596
Bovina	111				638
Brandon	111				639
Bucatunna	91				593
Buck Ridge	114				696
Buggs Landing	97				708
Burnsville	96, 97			643	700
Calmar	113				692
Carsons	114				695
Childers	113				696
Chinchuba	114			606	
Chunky	111				640
Claiborne	114			606	
Clarksburg	111				639
Clarksdale	114	294			698
Clarksdale to Friar Point	114				697, 698
Clarks Landing	114				695
Clinton	111				638
Clover Hill	114	294			697
Coahoma	114	294			697
Commerce	114				699
Concordia	114				695
Content	114				696
Corinth	91, 97			643, 644	596, 700
Corinth to Cairo, Ill	91				596–599
Corinth to Memphis, Tenn.	111				641, 642
Corinth to Meridian	91				594–596
Corinth to Tuscumbia, Ala.	96, 97			642–644	700–702
De Soto	91				594
Edwards	111				638
Enola	113				692
Enterprise	91				594
Forest	111				639
Fort Adams	115	294		621	
Fort Adams to Smithland, La	115			619–622	
Fort Adams to Vidalia, La.	115		136–140		
Fort Loring	113				693
Friar Point	114	294			694, 697, 698
Friar Point to Clarksdale	114				697, 698
Friar Point to Memphis, Tenn	114				698–700
Friar Point to Wilkersons Landing	113, 114				694–696
Glendale	114				698
Glenora Plantation	111				612
Graham	111				640
Greenfield	111				639
Greenville	111, 113				612, 691, 697
Greenville to Vicksburg	111				610–612
Greenville to Vicksburg via Greenwood	113				692–694
Greenville to Wilkersons Landing	113				691–697
Greenwood	113				693
Guntown	91				595
Hays	111				611
Heathman	113				694
Hickory	111				640
Horn Lake Creek	114				699
Hughes Landing	114				694
Indian Creek	97				708
Indianola	113				693
Ingomar	111				611
Itta Bena	113				693
Iuka	96				700
Jackson	111				639
Kleinston	111, 116		146		637
Lake	111				640
Lake Charles Landing	114				694
Lake See	111				612
Lake Washington Landing	111				612
L'Argent	113				692
Leota	111				611, 612
Longwood Plantation	111				612
Lyon	114	294			698
Macon	91				594, 595
Mayersville	111				611
Meridian	91, 93, 111				594, 640, 714
Meridian to Corinth	91				594–596
Meridian to Mobile, Ala	91				593, 594
Meridian to Vicksburg	111				636–640
Meridian to York, Ala	93				713, 714
Mhoons Landing	114				699
Millers Bend	113				691, 697
Mississippi City	114			605	601, 668
Morton	111				639
Mound Place	113				696
Natchez	112, 115	293	139, 140		677
Nebletts Landing	114				695
Newmans	111				638
Newton	111				640
Ocean Springs	91, 114			604	592
Offutts Landing	113				691, 697
Okolona	91				595
Palmetto Plantation	111				611
Pass Christian	114			605	601
Pearson	111				639
Pelahatchee	111				639
Port Anderson	113				691, 697
Prentiss	114				695
Quitman	91				594
Rankin	111				639
Refuge	111				612
Refuge Plantation	111				612
Reserve Plantation	111				611
Rienzi	91				596
Riverdale Plantation	111				611
Riverton	114				695
Robinsonville	114				694
Rodney	115		142, 143		
Rosedale	114				695
Russell	93				714
Saltillo	91				595
Satartia	113				692
Scooba	91				594
Scranton	91			807	592
Shannon	91				595
Shiloh Plantation	111				611
Shubuta	91				594
Sidon	113				693
Smiths	111				638
Star Landing	114				699
Stoneville	113				694
Stormville	114				696
Sunflower Landing	114				694
Tallulah Landing	111				611
Tarbert (opposite, in La.)	115			620	
Tchula	113				693
Terrene	114				695
The Bogue	113				694
Toomsuba	93				714
Tupelo	91				595
Verona	91				595
Vicksburg	111, 113, 116	294	130, 146		636, 637, 692
Vicksburg (Delta)	111, 116				610
Vicksburg to Greenville	111				610–612
Vicksburg to Greenville via Greenwood	113				692–694
Vicksburg to Meridian	111				636–640
Vicksburg to Rayville, La.	111				610, 636, 675, 676
Vicksburg to Vidalia, La	115–116		140, 146		
Warfield Point	111				612
Waveland	114			606	602
Waynesboro	91				593
West Point	91				595
White Harbor	114			605	601
Wilkersons Landing	113				696
Wilkersons Landing to Friar Point	113, 114				694–696
Wilkersons Landing to Greenville	113				691–697
Wilkersons Landing to Parkeville, La	113				689–691
Winchester	91				593
Yazoo City	113				692
Yazoo River	113				692

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

MISSOURI.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Adrian	110				624
Alexandria	116				724
Allenton	91				567
Amazonia	125				833
Archie	110				625
Arthur	110				624
Ashburn	116				725
Atherton	124				823
Bainbridge Creek	93				722
Becker	94				795
Belton	110				626
Berger	91, 94				568, 800
Berlin	123				820
Big Blue River	109, 124				575, 824
Bigelow	125				834
Birmingham Point	93				722
Blue Mills Landing	124				823
Bluffport	123				815
Bois Brulé	93				721
Boles	94				795, 796
Bon Homme	93				794
Bonnots Mill	91, 95				570, 805, 806
Boonville	123				812, 813, 814
Boston	110				622, 623
Boston to Chester, Ark	110				619–623
Boston to Harrisonville	110				623–625
Buckhorn Point	123				816
Bull Rock	122				809
Butler	110				624
California	109				571
Cambridge	123				816
Canton	116				724, 725
Cape Girardeau	93				723
Cape Girardeau County	93				722
Cape Rock	93				722
Carondelet	93				720
Carthage	110				622
Centaur	93				794
Centertown	109				571
Center View	109				574
Chamois	91, 94				569, 803, 804
Charbonnier Point	93				792
Clarksburg	109				572
Clarksville	116				726
Claysville	122				809
Cliff	93				720, 721
Cliff Cave	93				720
Cold Water Creek, mouth of	93				791
Cole	109				571
Coleman	110				626
Columbia Bottom	93				791
Commerce	93				723
Corning	125				834, 835
Courtney	124				823, 824
Craig	125				834
Creve Cœur Lake	93				793, 794
Cromwell Point	123				816
Curzons	125				833
Deer Creek	94				804
Dewitt	123				817
Dover	123				819, 820
Drew	93				794
Dundee	94				798, 799
East Atchison	124				830
Edwards	123				819
Elliotts Landing	123				812
Elston	109				571
Etlah	91, 94				568, 799, 800
Ewings Landing	95				806
Exeter	110				621
Fabius River	116				725
Forbes	125				833
Forest City	125				833, 834
Fort Bellefontaine	93				791
Fortuna	109				572
Franklin	123				813
Franklin Island	123				812
Gasconade	91, 94				568, 569, 801, 802
Geigers Landing	123				810, 811
Glasgow	123				815, 816
Grand Eddy	93				722
Grand River	123				817
Grays Creek	122				808
Grays Point	93				723
Greenwood	109				574
Gregory Landing	116				724
Gumbo	93				794
Halls	124				831
Hannibal	116			808	725
Harrisonville	110				625
Harrisonville to Boston	110				623–625
Harrisonville to Holliday, Kans	110, 111				625–627
Harrisonville to Pleasant Hill	110				625
Hermann	91, 94				568, 800, 801
Hilton	116				725
Holden	109				574
Horton	110				624
Illinois	93				720
Independence	109, 124				575, 824
Irwin	110				623
Isbell	91, 95				570, 805
Jamestown Landing	93				792
Jasper	110				622
Jefferson Barracks	93				720
Jefferson City	91, 95, 122				570, 571, 806–808
Jefferson City to Kansas City	122–124				807–825
Jefferson City to Plesaant Hill	109				570–574
Jefferson City to 12 miles above St. Louis	93–95				791–807
Jefferson City to St. Louis	91				567–570
Jefferson Station	93				720
Kansas City	109, 124				575, 824, 825
Kansas City to Holliday, Kans	109				575, 576
Kansas City to Jefferson City	122–124				807–825
Kansas City to Pleasant Hill	109				574, 575
Kansas City to St. Joseph	124, 125				825–832
Kenmoor	124				831
Kent	94				798
Kimmswick	93				720
Kimpton	110				625
Kingsville	109				574
Knobnoster	109				573
Labaddie	94				795
La Grange	116				725
Lamar	110				623
Lamonte	109				573
Langdon	125				835
Laynesville	123				818
Lees Summit	109				574
Lexington	123, 124				820, 821
Lisbon	123				814, 815
Little Blue	109				575
Little Blue River	124				823
Lone Tree	110				625
Loose Creek	95				805
Louisiana	116				726
Malta Bend Landing	123				818
Marion	122, 123				809, 810
Matthews Landing	124				822
Miami	123				817
Milo	110				623
Missouri City	124				823
Mona	93				794
Monett	110				621
Moniteau Creek	123				810
Montserrat	109				573
Morrison	91, 94				569, 803
Mount Vernon Landing	123				811
Musics Ferry	93				792
Napier	125				834
Napoleon	124				822
Nevada	110				623
New Frankfort	123				816
New Haven	91, 94				568, 799
New Sibley	124				823
Nishnabotna	125				835
Nodaway	125				833
Northrup	123				820
Osage City	91, 95				570, 806

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

MISSOURI—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Otterville	109				572
Overton	123				811
Passaic	110				624
Phelps	125				835
Pierce City	110				621
Platin Rock Creek	93				720
Pleasant Hill	109, 110				574
Pleasant Hill to Harrisonville	110				625
Pleasant Hill to Jefferson City	109				570–574
Pleasant Hill to Kansas City	109				574, 575
Port Royal	93, 94				795
Purdy	110				621
Quarrytown	93				721
Raymore	110				626
Reeds	110				622
Rich Hill	110				624
Richland Creek	123				815
Rocheport	123				811
Rush Tower	93				720
Rushville	124				830
St. Albans	94				795
St. Aubert	91, 94				569, 804
St. Charles	93				792, 793
St. George	124				831
Ste. Genevieve	93				721
St. Joseph	124, 125				831, 832
St. Joseph to Kansas City	124, 125				825–832
St. Joseph to Sioux City, Iowa	125, 126				833–842
St. Louis	91, 93; 109				567, 719, 720, 791
St. Louis to Cairo, Ill	93				720–724
St. Louis to Jefferson City	91				567–570
St. Louis to Odin, Ill	109				566, 567
St. Louis to 12 miles above St. Louis	93				719, 720
St. Louis (12 miles above) to Grafton, Ill	93				719
St. Louis (12 miles above) to Jefferson City	93–95				791–807
St. Marys	93				721
St. Paul	91				567
Salt Creek	123				816
Sandy Hook Landing	123				810
Sarcoxie	110				622
Saverton	116				725
Scott	109				571
Sedalia	109				573
Seligman	110				621
Sheldon	110				623
Shipley Landing	94				804, 805
Sibley	124				822
Sibley Bridge	124				822
Smithton	109				572
South Point	91, 94				568, 796, 797
Stanleys Landing	122				809
Stevens	93				794
Strasburg	109				574
Sugar Loaf Rock	122				809
Sulphur Springs	93				720
Syracuse	109				572
Terrapin Island	123				811
Teteseau Bend	123				818
Tipton	109				572
Tower Rock	93				722
Versailles	109				572
Warrensburg	109				573
Washburn	110				621
Washington	91, 94				568, 797, 798
Waterloo	124				822
Watson	125				835
Waverly	123				818, 819
Wayne	124				824
Wellington	124				821, 822
Wentworth	110				622
West Quincy	116				725
White Sand Depot Landing	93				721
Wittenburg	93				722
Wolf Point	123				811

MONTANA.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Aberdeen	149, 160	227, 228			
Africa	147, 160	207			
Anita	149, 160	226			
Apex	146, 159	196, 197			
Armstead	146, 159	196			
Ballantine	149, 160	225, 226			
Barratts	146, 159	196			
Beaudines Spur	146, 159	197			
Belgrade	147, 159	206			
Big Hole	146, 159	197			
Bigtimber	147, 160	208			
Billings	147, 160	210			
Bond	146, 159	196			
Bozeman	147, 159	207			
Browne	146, 159	197			
Butte	146, 147, 159	198, 204			
Butte to Huntley	147	204–210			
Butte to Pocatello, Idaho	145, 146	193–198			
Buxton	146, 159	197			
Carney	147, 160	208			
Central Park	147, 159	206			
Chestnut	147, 159	207			
Coal Spur	147, 160	207			
Columbus	147, 160	209			
Corinth	149, 160	226			
Crab Tree	146, 159	196			
Crow Agency	149, 160	227			
Dalys	159				
Dehart	147, 160	208			
Dell	146, 159	195, 196			
Dillon	146, 159	196			
Divide	146, 159	197			
Dunmore	149, 160	227			
Dyers	159				
Elton	147, 160	207, 208			
Feely	146, 159	197			
Foster	147, 160	209			
Gallatin	159				
Garryowen	149, 160	227			
Glen	146, 159	197			
Gordon	147, 159	207			
Grayling	146, 159	196			
Greycliff	147, 160	208			
Hardin	149, 160	226, 227			
Highview	147, 159	205			
Homestake	147, 159	205			
Hoppers	147, 160	207			
Huntley	147, 149, 160	210, 225			
Huntley to Butte	147	204–210			
Huntley to Cadiz, Wyo	149	225–229			
Ionia	149, 160	227			
Jefferson Island	147, 159	205			
Keith	159				
Laurel	147, 160	209			
Lavon	146, 159	197			
Lewis Spur	147, 159	205			
Lima	145, 146, 159	195			
Lime Spur	147, 159	205			
Little Horn	149, 160	227			
Livingston	147, 160	207			
Lockwood	147, 160	210			
Lodgegrass	149, 160	227			
Logan	147, 159	206			
Malden Rock	146, 159	197			
Manhattan	147, 159	206			
Melrose	146, 159	197			
Merrill	147, 160	209			
Misko	147, 160	209			
Mission	147, 160	207			
Monida	145, 159	195			
Muir	147, 160	207			
Old Gallatin City	147	206			
Oneida	147, 160	208			

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

MONTANA—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Park City	147, 160	209			
Patcum	147, 160	208			
Peritsa	160				
Pipestone	147, 159	205			
Quebec	147, 160	208			
Rapids	147, 160	209			
Red Rock	146, 159	196			
Reedpoint	147, 160	208			
Reynolds	147, 160	208			
Sappington	147, 159	205			
Silver Bow	146, 159	197, 198			
Skones	147, 159	204			
Spire Rock	147, 159	205			
Springdale	147, 160	208			
Storey	147, 159	207			
Three Forks	147, 159	206			
Toluca	149, 160	226			
Wataga	147, 160	209			
Welch	147, 159	205			
West End	147, 160	207			
Whitehall	147, 159	205			
Williams	145, 159	195			
Willow Creek	147, 159	205, 206			
Woodin	146, 159	197			
Wyola	149, 160	227			
Yegen	147, 160	210			
Youngs Point	147, 160	209			

NEBRASKA.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Ainsworth	130			796	
Alda	130				651
Amboy	130				649
Andrews	131			799	
Apex	130			792	
Arabia	130			796	
Atkinson	130			795	
Ayr	130				650
Bassett	130				
Blue Hill	130			796	649, 650
Bordeaux	130				
Bostwick	130			798	649
Brickton	130				650
Brunswick	130			794	
Central City	130				651
Chadron	130			798, 799	
Chadron to Orin Junction, Wyo	130, 131			799, 800	
Chadron to Page	130			795–799	
Chapman	130				651
Clarks	130				651
Clinton	130			798	
Coburn	130			793	
Cody	130			797	
Columbus	130				652
Cowles	130				649
Crawford	131, 148, 160	220		799	
Crawford to Cadiz, Wyo	148, 149	220–225			
Crookston	130			796, 797	
Dakota City	130			793	
Doniphan	130				650
Duncan	130				652
Eli	130			797	
Emerson	130			792	
Emmet	130			795	
Fort Robinson	131	220		799	
Foster	130			794	
Georgia	130			797	
Gordon	130			797, 798	
Grand Island	130				650, 651
Glen	131			799	
Guide Rock	130				649
Hadar	130			793	
Hansen	130				650
Harrison	131			799, 800	
Hastings	130				650
Havens	130				651
Hay Springs	130			798	
Hope	130			792	
Horn	148, 160	220			
Hoskins	130			792	
Hubbard	130			793	
Humphrey	130				652
Irwin	130			797	
Joder	148, 160	220, 221			
Johnstown	130			796	
Lockwood	130				651
Long Pine	130			796	
Madison	130				652, 653
Mansfield	148, 160	221			
Merriman	130			797	
Nacora	130			793	
Nenzil	130			797	
Newport	130			795	
Norfolk	130				653
Norfolk to Abilene, Kans	130				647–653
Norfolk to Page	130			793, 794	
Norfolk to Sioux City, Iowa	130			792, 793	
Oconee	130				652
Omaha	125				837, 838
O'Neill	130			795	
Orchard	130			794	
Orella	148, 160	221			
Paddock	130				651
Page	130			794	
Page to Chadron	130			795–799	
Page to Norfolk	130			793, 794	
Pierce	130			794	
Plainview	130			794	
Platte Center	130				652
Ridge	130			792	
Rivers	130				650
Rushville	130			798	
Savage	130			794	
Shelton	130				651
Silver Creek	130				651
South Sioux City	130			793	
Stuart	130			795	
Superior	130				649
Tarnov	130				652
Thacher	130			796	
Thummel	130				651
Valentine	130			796	
Wakefield	130			792	
Wayne	130			792	
Whitney	130			799	
Winside	130			792	
Woodlake	130			796	
Wood River	130				651

NEVADA.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Acoma	147, 160	214			
Acton	147, 160	211			
Apex	147, 160	211			
Arden	146, 159	204			
Barclay	147, 160	213			
Bard	146, 159	204			
Big Springs	147, 160	213			
Borax	146, 159	203			
Boyd	147, 160	213			
Bracken	146, 159	204			
Brown	147, 160	214			
Byron	147, 160	211			
Caliente	147, 160	213			
Cana	147	213			
Carp	147, 160	212			
Crestline	147, 160	214			
Crystal	147, 160	211			
Dike	147, 160	211			
Dry Lake	147, 160	211			
Eccles	147, 160	213			
Elgin	147, 160	213			
Erie	146, 159	204			
Etna	147	213			
Galt	147, 160	212			
Garnet	147, 160	211			
Guelph	147, 160	212			
Hoya	147, 160	212			
Islen	147, 160	213			

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

NEVADA—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Jean	146, 159	204			
Kyle	147, 160	212			
Las Vegas	147, 159, 160	204, 210			
Las Vegas to Barstow, Cal.	145–147	200–204			
Las Vegas to Zenda, Utah	147, 148	210–215			
Leith	147, 160	212			
Lien	147, 160	214			
Minto	147, 160	213			
Moapa	147, 160	211			
Roach	146, 159	203			
Rox	147, 160	212			
St. George	147, 160	212			
Sloan	146, 159	204			
Stewart	147, 160	210			
Stine	147, 160	213			
Sutor	146, 159	204			
Ute	147, 160	211			
Valley	147, 160	210, 211			
Vigo	147, 160	212			

NEW JERSEY.

Place.	Elevation, this publication.[1]	This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Annandale	108				559
Bergen	91				554
Bloomsbury	108				559
Bound Brook	108				558, 559
Branchport	91				552
Conaskonk Point	91				553
Constables Hook	91				554
Elizabeth	91				554
Highlands	91				552
Keyport	91				553
Matawan	91				553
Metuchen	108				558
Morgan	91				558
Navesink Highlands	91				558
New Market	108				559
North Branch	108				559
Perth Amboy	91				554
Perth Amboy to Harrisburg, Pa	108				558–560
Phillipsburg	108				559
Port Monmouth	91				553
Red Bank	91				552
Sandy Hook	91				552, 553, 558
Seabright	91				558
Somerville	108				559
South Amboy	91				553
South Plainfield	108				558

NEW MEXICO.

Place.	Elevation, this publication.[1]	This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Abajo	161				
Abo	153, 162	263			
Agudo	153, 162	261			
Alamillo	156	285			
Alaska	150, 161	239			
Albuquerque	151, 161	241			
Albuquerque to Goffs, Cal.	149–151	229–241			
Aleman	156	286			
Armijo	150, 161	240			
Baca	150, 161	239			
Barr	161				
Becker	153, 162	263			
Belen	153, 156, 162	263, 264, 284			
Belen to El Paso, Tex.	156, 157	284–287			
Berino	157	287			
Blacktower	153, 162	259			
Bluewater	150, 161	239			
Bodega	153, 162	263			
Broncho	153, 162	263			
Buchanan	153, 162	261			
Cantara	153, 162	260			
Cardenas	153, 162	261			
Casaus	153, 162	261			
Carnero	153, 162	262			
Chaves	150, 161	239			
Clovis	153, 162	259			
Cortez	161				
Crocker	156	285, 286			
Cubero	150, 161	239, 240			
Cutter	156	286			
Defiance	150, 161	238			
Detroit	157	286			
Dona Ana	157	286			
Dunmoor	153, 162	262			
Duoro	153, 162	261			
Elmendorf	156	285			
El Rito	150, 161	240			
Encino	153, 162	262			
Engle	156	286			
Evanola	153, 162	261			
Fort Sumner	153, 162	260, 261			
Gallup	150, 161	238			
Garcia	150, 161	240			
Gonzales	150, 161	238			
Grama	157	286			
Grants	150, 161	239			
Guam	150, 161	238			
Horace	150, 161	239			
Iden	153, 162	262			
Isleta	150, 151, 161	241			
Isleta to Jericho, Tex.	152–153	257–264			
Krider	153, 162	260			
Laguna	150, 161	240			
Lajoya	156	285			
La Lande	153, 162	260			
Largo	153, 162	261			
Las Cruces	157	287			
Lava	156	285			
Los Lunas	153, 162	264			
Lucy	153, 162	262			
McCartys	150, 161	239			
Madrone	153, 162	263			
Manuelito	150, 161	238			
Manzana	150, 161	241			
Melrose	153, 162	260			
Mesquite	157	287			
Messilla Park	157	287			
Mountainair	153, 162	263			
Negra	153, 162	262			
Pavo	150, 161	240, 241			
Pedernal	153, 162	262			
Perea	150, 161	238			
Pope	156	285			
Ricardo	153, 162	261			
Rincon	157	286			
Rio Puerco	150, 161	240			
Sabinal	156	284			
St. Vrain	153, 162	260			
Sais	153, 162	263			
Sais Crusher	162				
San Antonio	156	285			
Sandia	150, 161	241			
San Marcial	156	285			
Scholle	153, 162	263			
Selden	157	286			
Silio	153, 162	262			
Socorro	156	285			
Stewarts Ranch	157	286			
Suwanee	150, 161	240			
Taiban	153, 162	260			
Tejon	153, 162	262			
Texico	153, 162	259			
Thoreau	150, 161	239			
Tolar	153, 162	260			
Toltec	150, 161	239			
Tonuco	157	286			
Upham	156	286			
Vado	157	287			
Vaughn	153, 162	262			
West Yard	150, 161	238			
Willard	153, 162	262, 263			
Wingate	150, 161	238			
Yeso	153, 162	261			
Zuni	150, 161	238			

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

NEW YORK.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Addison	105				861
Addison Junction	103			717	
Adrian	105				861
Afton	105				862
Albany	99, 100			661, 677	848
Albany to Buffalo	100–102			677–703	
Albion	102			700	
Alexandria Bay	103				857, 858
Alfred	105				860
Allegany	105				860
Almond	105				860
Amboy	101			692	
Amsterdam	99, 100			663, 672, 682	
Andover	105				860
Angola	106			748	
Aqueduct Station	100			671, 672	
Ardsley	104			720	
Arkport	106			747	
Astoria	91	293			556
Astoria Dock	91				556, 557
Athol Springs	106			748	
Auriesville	100			673, 682	
Avon	106			746	
Bainbridge	105				862
Bainbridge to Binghamton	105				862
Bainbridge to Cohoes	105				862, 863
Baldwinsville	102			703, 704	
Barnerville Crossing	105				863
Barrytown	104			723, 724	
Barton	105				861
Bath	100			671	
Bath Beach	91	293			555
Bay Ridge	91				555
Belgium	102, 103			703, 706	
Belle Isle	101			692	
Belmont	105				860
Belvidere	105				860
Bemis Heights	103, 104			708, 714	
Bernhardts Bay	99			668	
Big Flats	105				861
Binghamton	105				862
Binghamton to Bainbridge	105				862
Binghamton to Elmira	105				861, 862
Binghamton to Hancock	105–106			741	
Blasdell	106			748	
Bradfords Hill	103				853
Brewerton	100			676	
Brighton	102			698	
Brockport	102			699	
Brooklyn	91				555, 556
Buffalo	99, 102, 106			657, 658, 702, 703, 747, 748	
Buffalo to Albany	100–102			677–703	
Buffalo to Dunkirk	106			747–749	
Buffalo to Olcott	98, 99			653–659	
Burns	106			747	
Bushnell Basin	102			697	
Cadosia	106			743	
Callicoon	106			742	
Camelot	104			722	
Cameron	105				861
Camillus	101			692	
Campbell Hall	106			742	
Canajoharie	99, 100			664, 684	850
Canaseraga	101, 106			690, 747	
Canastota	101			689, 690	
Canisteo	105				861
Cape Vincent	103				859
Carrollton	105				860
Castleton	104, 105			725, 728	
Castleton to Hudson	105			727, 728	
Catskill Station	104			724	
Cattaraugus	105				860
Caughdenoy	100			669, 676	
Central Square	100			669	
Champlain	103			717, 718	
Charlotte	106			745	
Charlotte to Hornellsville	106			745–747	
Chelsea	104			722	
Chemung	105				861
Chippewa Village	103				856, 857
Chittenango	101			690	
Chubbs Dock	103			716	
Clayton	103				858, 859
Cleveland	99			668	
Clyde	101, 102			694, 695, 705	
Clyde to Phoenix	102			703–705	
Cobleskill	105				863
Cochecton	106			742	
Cohoes	99, 100, 105			661, 671, 677, 678	848, 849, 863
Cohoes to Bainbridge	105				862, 863
Cold Spring	104	294		722	849, 863
College Point	91	293			557, 558
Colliers	105				862
Comstock	103, 104			712, 715, 716	
Constantia	100			668	
Coomer	98			654	
Coopersville	103			717	
Coopersville to Hogansburg	103			717–719	
Corlears Hook	91				556
Corning	105				861
Coveville	103, 104			708, 709, 714	
Coxsackie Station	104, 105			725, 727	
Crescent	99, 100			661, 671	
Croton	104			679, 721	
Crown Point	103			717	
Crown Point Lighthouse	103			717	
Crown Point to Whitehall	103			716, 717	
Cuba	105				860
Cuylerville	106			746	
Dayton	105				860
Deposit	106			741	
Derby	106			748	
Dewitt	101			691	
Dobbs Ferry	91, 104			719, 720	557
Dobbs Ferry to Poughkeepsie	104			719–722	
Dodges Bay	103				859
Downing	99, 100			664, 673, 683	
Dresden	103			716	
Duanesburg	105				863
Dunhams Basin	103, 104			711, 715	
Dunkirk	105, 106			749	859
Dunkirk to Buffalo	106			747–749	
Dunkirk to Salamanca	105				859, 860
Dunsbach Ferry	100			671	
Durhamville	101			689	
Eagle Harbor	102			700	
East Albany	99				848
East Worcester	105				863
Egg Island	103				853
Elmira	105			738	861
Elmira to Binghamton	105				861, 862
Elmira to Hornellsville	105				861
Elmira to Williamsport, Pa.	105			738, 739	
Elm Park	91				554
Esperance	105				863
Fairport	102			697	
Farnham	106			748	
Fishkill	104	294		722	
Flushing	91	293			557
Fondas Basin	99, 100			662, 679	
Forestville	105				859
Fort Ann	103, 104			712, 715	
Fort Covington	103			719	
Fort Edward	103, 104			710, 711, 715	
Fort Frederick	103			717	
Fort Hamilton	91				555
Fort Hunter	99, 100			663, 673, 682	
Fort Miller	103, 104			709, 710, 715	
Fort Montgomery	103			717	
Fort Plain	99, 100			664, 673, 684	
Fort Ticonderoga	103			716	
Fort Wadsworth	91				554
Fowlerville	106			746	
Fox Ridge	102			705	
Frankfort	99, 100, 101			666, 675, 687	851
Friendship	105				860
Fulton	100			669, 676	
Fultonville	99, 100			663, 664, 673, 682, 683	850

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

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Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Garrison	104			722	
Gasport	102			701	
Genesee Junction	106			745	
Genesee Valley Junction	106			746	
Germantown	104			724	
Giffords	91				554
Glens Falls	104			711	
Governors Island	91				555, 556
Grass River	103				853
Great Kills	91				554
Greenbush (Rensselaer)	105			726	848
Greenbush (Rensselaer) to Oswego	100			670–676	
Greenbush (Rensselaer) to Poughkeepsie	104, 105			722–726	
Greenbush (Rensselaer) to Troy	105			726, 727	
Greenbush (Rensselaer) to Vischers Ferry	99			661	
Green Island	100			677	
Guymard	106			742	
Hancock	106			741, 743	
Hancock to Binghamton	105–106			741	
Hancock to Poughkeepsie	106			741–743	
Hancock to Sidney	106			743	
Hankins	106			741	
Harpersville	105				862
Herkimer	99, 100, 101			665, 674, 686	
Higginsville	99, 101			667, 689	852
Highland	104, 106			721, 742	
Hinmanville	100			676	
Hinsdale	105				860
Hogansburg	103				852
Hogansburg to Coopersville	103			717–719	
Hogansburg to Tibbetts Point	103				852–859
Holley	102			699	
Holmesville	106			744	
Honeoye Junction	106			746	
Hornellsville	105, 106			747	861
Hornellsville to Charlotte	106			745–747	
Hornellsville to Elmira	105				861
Hornellsville to Salamanca	105				860, 861
Horseheads	105				861
Howes Cave	105				863
Hudson	104, 105			724, 725, 727	
Hudson to Castleton	105			727, 728	
Hulberton	102			699, 700	
Hunters Point	91, 108		243		556
Hyde Park	104	294		723	
Ilion	99, 100, 101			666, 675, 686, 687	
Indian Castle	99, 100			665, 674, 685	
Ingalls Crossing	100			676	
Irving	106			748	
Irvington	104			720	
Jordan	101			692, 693	
Kelleys	105				863
Kirkville	101			690	
Kirkwood	105			740	
Knowlesville	102			700	
Lake View	106			748	
Langdon	105			740	
La Salle	98, 99			656, 659	
Lewiston	98, 99			655, 659, 660	
Lewiston Heights	98			655	
Leonardsville	106			744	
Linlithgo	104			724	
Lisbon	103				854
Little Falls	99, 100			665, 674, 685, 686, 808	
Little Valley	105				860
Liverpool	103			706	
Livingston Creek	104			724	
Lock Berlin	101			695	
Lockport	99, 102			659, 701, 702	
Long Eddy	106			741	
Long Island City	91				557
Lordville	106			741	
Louisville Landing	103				853
Loyd	106			742	

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Lyons	101			695, 696	
Macedon	102			697	
Manlius	101			690	
Maryland	105				862
Maywood	106			743	
Meadville	101			694	
Mechanicsville	103, 104			707, 713, 714	
Medina	102			700, 701	
Memphis	101			692	
Middleport	102			713	
Middletown	106			701, 742	
Mindenville	99, 100			665, 674, 685, 808	
Minetto	100			669, 676	
Model City	98			654	
Mohawk	99, 101			665, 666, 686	
Montezuma	101			694	
Montrose	104			721	
Morristown	103				855, 856
Moses Kill	103			715	
Mount Morris	106			746	
Mount Upton	106			744	
Murphys Island	103				853
Narrowsburg	106			742	
Newark	101, 102			696	
New Berlin	106			744	
Newfane	98, 99			653, 659	
New Hamburg	104	294		722	
New London	99, 100, 101			667, 675, 689	
New York	91				556, 557
Niagara Falls	98, 99			655	
Niskayuna	100			671	
North Bay	99, 100			668, 676	
Northfield	106			743	
North Tonawanda	99			656	
Northumberland	103, 104			709, 715	
Nunda	106			747	
Nunda Junction	106			746	
Oak Point Village	103				856
Ogdensburg	103				854, 855
Olcott	98			653	
Olcott to Buffalo	98, 99			653–659	
Olean	105				860
Oneonta	105				862
Oriskany	99, 100, 101			666, 667, 675, 688	
Oscawana	104			721	
Ossining	104			721	
Oswego	100, 105			669, 670	852
Oswego to Greenbush (Rensselaer)	100			670–676	
Oswego to Utica	99, 100			666–670	
Otego	105				862
Otisville	106			742	
Owego	105				861, 862
Painted Post	105				861
Palmyra	102			696, 697	
Pattersonville	99, 100			662, 663, 672, 681	849
Peekskill	104			721	
Pendleton	102			702	
Pendleton Center	99			658, 659	
Pennellville	100			669	
Phœnix	100, 102			676, 703, 706	
Phœnix to Clyde	102			703–705	
Phœnix to Syracuse	102, 103			705, 706	
Piffard	106			746	
Pittsford	102			697, 698	
Plainville	102			704	
Polhemus Dock	91				557
Port Byron	101, 102			693, 694, 704, 705	
Port Crane	105				862
Port Gibson	102			696	
Port Jervis	106			742	
Pot Cove	91				557
Poughkeepsie	104, 106	294		722, 723, 742	
Poughkeepsie to Dobbs Ferry	104			719–722	
Poughkeepsie to Greenbush (Rensselaer)	104, 105			722–726	
Poughkeepsie to Hancock	106			741–743	

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

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Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Pullman	99			657	
Putnam	103			716	
Quaker Bridge	105			739	
Quarantine Dock	91				554
Racket River	103				853
Ransomville	98			654	
Rathbone	105				861
Ravenswood	91				556
Red House	105			739	
Rensselaer	99, 104, 105			661, 671, 726, 728,	
Rexford Flats	99, 100, 105			662, 679, 680	849, 863
Rhinecliff	104			723	
Richards Landing	103				853
Richfield Junction	106			744	
Richmondville	105				863
River Road	103				853
Rochester	102, 106			698, 745	
Rock Rift	106			743	
Rome	99, 100, 101			667, 675, 688, 689	852
Ross Crossing	106			747	
Rotterdam Junction	100			672, 680	
Rouses Point	103			717	
St. Johnsville	99, 100			664, 665, 684, 685	
Salamanca	105				860
Salamanca to Dunkirk	105				859, 860
Salamanca to Hornellsville	105				860, 861
Salamanca to Irvineton, Pa.	105			739, 740	
Sand Ridge	100			676	
Sanitaria Springs	105				862
Savannah	102			705	
Scarboro	104			720	
Schaghticoke	103			714	
Schenectady	99, 100, 105			662, 672, 680, 681	849, 863
Schenevus	105				862
Schodack Landing	104			725	
Schuylerville	103, 104			709, 714, 715	
Scottsville	106			745	
Severance	106			745	
Sidney	106			744	
Sidney to Hancock	106			743	
Sidney to Utica	106			743, 744	
Silver Creek	106			749	
Smith Mills	105				860
Smiths Basin	103, 104			711, 712, 715	
Snody Dock	103			716	
Sonyea	106			746	
South Edmeston	106			744	
South Greece	102			698, 699	
South New Berlin	106			744	
Spencerport	102			699	
Sprakers	99, 100			664, 673, 683, 684,	
Staatsburg	104			723	
Stacys Basin	99, 101			667, 689	
Stanwix	99			667, 688,	
Stillwater	103, 104			707, 714	
Stockport (Delaware County)	106			741	
Stockport Station (Columbia County)	104, 105			725, 727	
Stuyvesant	104, 105			725, 727, 728	
Swains	106			747	
Sylvan Beach	100			675	
Sylvan Junction	99			667	
Syracuse	101, 102, 103			691, 692, 705, 706	
Syracuse to Phœnix	102, 103			705, 706	
Tarrytown	104			720	
Three River Point	102			703	
Tibbetts Point	103				859
Tibbetts Point to Hoganburg	103				852–859
Ticonderoga	103			716	
Tilden	103				854
Tivoli	104			724	
Tonawanda	99, 102			656, 657, 658, 702, 726, 727	
Troy	100, 105			671, 677, 706	
Troy to Greenbush (Rensselaer)	105			726, 727	
Troy to Whitehall	103–104			706–713	
Tunnell	105				862
Tuscarora	106			746	
Unadilla	105				862
Union	105				862
Utica	99, 100, 101, 106			666, 675, 687, 688, 743	851
Utica to Oswego	99, 100			666–670	
Utica to Sidney	106			743, 744	
Utica to Vischers Ferry	99			662–666	
Verplanck	104			721	
Vischers Ferry	99, 100			661, 662, 671, 679	849
Vischers Ferry to Greenbush (Rensselaer)	99			661	
Vischers Ferry to Utica	99			662–666	
Waddells Point	103				854
Waddington	103				854
Waites Crossing	103			749	
Walden	103			742	
Walton	103			743	
Warners	101			692	
Washington Mills	106			743	
Waterford	103, 104			706, 707, 713	
Watervliet	99, 100			661, 677	
Waverly	105				861
Wayneport	102			697	
Weedsport	101, 102			693, 704	
Wells Bridge	105				862
Wellsburg	105				861
Wellsville	105				860
West Downing	100			683	
West Edmeston	103			744	
West Monroe	100			669	
West Seneca	106			748	
West Troy	100			671, 713	
Whitehall	103, 104			712, 713, 716	
Whitehall to Crown Point	103			716, 717	
Whitehall to Troy	103, 104			706–713	
Whitehall to Waterford	103			713–716	
Whites	103			745	
Whitesboro	99, 101			666, 688	
Wilburs Basin	103			714	
Willets Point	91				558
Wilson	98			654	
Wolf Run	105			739	
Worcester	105				8 2
Wrights	103			716	
Wrights Corners	99			659	
York	106			746	

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Alexander	107			755	
Asheville	107			755	
Atlantic	106			751	
Azalea	107			755	
Bailey	107			755	
Barnard	107			755	
Bests	107			752	
Biltmore	107			755	
Blackwood	107			752	
Bridgewater	107			754	
Cary	107			752	
Catawba	107			754	
Chapel Hill	107			753	
Claremont	107			754	
Clark	103			751	
Clayton	107			75	
Cleveland	107			753	
Conrad	107			753	
Connelly Springs	107			754	
Cove Creek	103			751	

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

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Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Dover	106			751	
Drexel	107			754	
Durham	107			752	
Efland	107			753	
Elmwood	107			753	
Falling Creek	107			752	
Garner	107			752	
Gibsonville	107			753	
Glen Alpine	107			754	
Goldsboro	107	293, 294		752	
Graham	107			753	
Greenlees	107			754	
Greensboro	107			753	
Havelock	106			751	
Hickory	107			754	
High Point	107			753	
Hildebran	107			754	
Hillsboro	107			753	
Hot Springs	107			755	
Jamestown	107			753	
Kinston	106			752	
Lagrange	107			752	
Lexington	107			753	
Linwood	107			753	
McLeansville	107			753	
Majolica	107			753	
Marion	107			754	
Marshall	107			755	
Mebane	107			753	
Morehead City	106	294		751	
Morehead City to Caswell, Tenn	106, 107			751–756	
Morganton	107			754	
Morrisville	107			752	
Mud Cut	107			754	
Nebo	107			754	
Nelson	107			752	
Newbern	106			751	
Newport	106			751	
Newton	107			754	
Old Fort	107			754	
Olivette	107			755	
Paint Rock	107			755	
Plott	107			753	
Pomona	107			753	
Princeton	107			752	
Raleigh	107			752	
Riverdale	106			751	
Rose	107			752	
Round Knob	107			754	
Salisbury	107			753	
Selma	107			752	
Statesville	107			753	
Swannanoa	107			754	
Thomasville	107			753	
Tuscarora	106			751	
University Station	107			752	
Wilsons Mills	107			752	

NORTH DAKOTA.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Blackmer	134		154		
Fairmount	134		153, 154		

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Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Akron	142		229		
Alexandria	97				660
Alexis	97	293			654
Alliance	142		228		
Alliance to Struthers	142		228, 229		
Anna	97				658
Athens	108				564
Bairdstown	143		233		
Bannon	140		213		
Barberton	142		229		
Bascom	143		233		
Basil	140		213		
Beach City	143		235		
Bedford	107			762	
Belmore	97				656
Belpre	108				563
Belpre to Chillicothe	108				563, 564
Belpre to Grafton, W. Va	108				562, 563
Berlin Center	142		228		
Birds Run	140		214		
Bloomdale	143		233		
Boenna Crossing	142		228		
Botkins	97				658
Boughtonville	143		231, 232		
Brice	140		213		
Cambridge	140		214		
Canaanville	108				563, 564
Canal Dover	143		235		
Canal Fulton	143		234		
Canton to E. Akron Jct	107			762, 763	
Carlisle	97				661
Carrollton	97				661
Carthage	97				664
Cassels	140		214		
Chicago Junction	143		232		
Chicago Jct. to Deshler	143		232–234		
Chicago Jct. to Greenwich	143		231–232		
Chillicothe	108, 140		212		564
Chillicothe to Belpre	108				563, 564
Chillicothe to Cincinnati	108				564, 565
Chillicothe to Portsmouth	140		211, 212		
Chillicothe to Valley Crossing	140		212, 213		
Cincinnati	98, 108				565, 664; 665, 666
Cincinnati to Chillicothe	108				564, 565
Cincinnati to Harriman Jct., Tenn	95			622–630	
Circleville	140		212, 213		
Cleveland	107			761, 762	
Cleveland to E. Akron Jct	107			761, 762	
Clifford	140		212		
Clinton	142		229		
Clinton Valley	108				564
Columbus	140		213		
Columbus to Valley Crossing	140		213		
Columbus Grove	97				656
Coolville	108				563
Crescentville	97				663
Creston	142		230		
Crestvue	97				663
Cridersville	97				657
Cromley	140		213		
Crystal Spring	143		234		
Cumminsville	108				565
Custar	97				655
Davis	140		212		
Dayton	97				660
Delano	140		212		
Delhi	98			807	565, 666
Dennison	140		215		
Deshler	97, 143				656
Deshler to Chicago Junction	143		232–234		
Duvalls	140		213		
East Akron	107			762	
East Akron Junction	107			762	
East Akron Jct. to Canton	107			762, 763	
East Akron Junction to Cleveland	107			761, 762	
East Akron Jct. to Warwick	142		229, 230		
Easton	142		230		
Ellsworth	142		228		
Excello Mills	97				662
Farrington	97				659
Flockton	97				663
Fostoria	143		233		
Franklin	97				661, 662
Fultonham	140		214		
Galatea	143		234		
Girard	142		229		
Glassrock	140		214		

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

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Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Glendale	97				663
Glenford	140		213, 214		
Glen Jean	140		212		
Gnadenhutten	140		215		
Godsend	143		233		
Goshen	143		236		
Greenwich	143		231		
Greenwich to Chicago Jct	143		231, 232		
Greenwich to Sullivan	142–143		231		
Gregg	140		213		
Guernsey	140		214, 215		
Guysville	108				563
Hamden	108				564
Hamilton	97				662, 663
Harley	140		213		
Haskins	97				655
Haysville	140		212		
Hazelton	142		229		
Heno	97				662
Hereford	143		231		
Higby	140		212		
Highland Springs	107			762	
Homer	142		230		
Hoytville	143		234		
Hull Prairie	97	293			655
Ivorydale	98				664
Jones	97				663
Justus	143		235		
Kimbolton	140		214		
Kingston	140		212		
Kirkwood	97				658
Leipsic	97				656
Le Sourdsville	97				662
Lima	97				657
Little Hocking	108				563
Little York	107			762	
Lockbourne	140		213		
Lockland	97				664
Locks	140		212		
Lodi	142		230		
Londonderry	108				564
Lordstown	142		228		
Loveland	108				564
Lowellville	142		227		
Lucasville	140		212		
Lyndon	108				564
Macedonia	107			762	
Marietta	144		243		
Martinsville	108				564
Massillon	143		234, 235		
Messenger	142		229		
Miamisburg	97				661
Middletown	97				662
Midvale	143		236		
Milton Center	97				655
Monroe	97				657
Moonville	108				564
Mount Perry	140		214		
Musselmans Junction	108				564
Myersville	107			762	
Navarre	143		235		
New Berlin	107			762, 763	
Newcomerstown	140		215		
New Concord	140		214		
New Philadelphia	143		235		
New Salem	140		213		
Newtons	142		230		
Niles	142		228		
North Baltimore	143		234		
North Bend	98				666
North Jackson	142		228		
Nova	142, 143		231		
Omega	140		212		
Ottawa	97				656
Overpeck	97				662
Pauls	143		234		
Perrysburg	97				655
Piketon	140		212		
Piqua	97				658, 659
Poasttown	97				662
Portsmouth	140		212		
Portsmouth to Chillicothe	140		211, 212		
Port Union	97				663
Port Washington	140		215		
Ramey	143		231		
Rees	140		213		
Remington	108				565
Renick	140		211		
Rensselaer	97				664
Republic	143		232		
Rittman	142		230		
Roachton	97				655
Rockdale	97				662
Rosemont	142		228		
St. Bernard	97				664
St. Joseph	98				666
Sargents	140		212		
Schooley	108				564
Scipio	143		232		
Seasons	107			762	
Sebring	142		228		
Sedamsville	98				666
Seneca	143		232		
Seventeen	140		215		
Siam	143		232		
Sidney	97				658
Silver Lake Junction	107			762	
Snodes	142		228		
Sonora	140		214		
South Zanesville	140		214		
Station 15 P. O	140		215		
Sterling	142		230		
Stewart	108				563
Strasburg	143		235		
Struthers	142		229		
Struthers to Alliance	142		228, 229		
Struthers to Ellwood City, Pa	142		226, 227		
Sullivan	142		231		
Sullivan to Greenwich	142, 143		231		
Sullivan to Warwick	142		230		
Sundale	140		214		
Swanders	97				658
Tadmor	97				660
Thornport	140		213		
Thurston	140		213		
Tiffin	143		233		
Tippecanoe City	97				659
Toledo	97				654, 655
Tontogany	97				655
Trenton	97				662
Troy	97				659
Truro	140		213		
Turkeyfoot Junction	142		229		
Tuscarawas	140		215		
Uhrichsville	140		236		
Uhrichsville to Warwick	143		234–236		
Uhrichsville to Zanesville	140		214, 215		
Valley Crossing	140		213		
Valley Crossing to Chillicothe	140		212, 213		
Valley Crossing to Columbus	140		213		
Valley Crossing to Zanesville	140		213, 214		
Vera	140		212		
Wakefield	140		212		
Wapakoneta	97				657
Warwick	142, 143		230, 234		
Warwick to East Akron Junction	142		229, 230		
Warwick to Sullivan	142		230		
Warwick to Uhrichsville	143		234–236		
Waverly	140		212		
West Cairo	97				657
Weston	97				655
White Cottage	140		214		
Whitfield	97				660
Winston Springs	98				664
Woodsdale	97				662
Youngstown	142		229		
Zaleski	108				564
Zanesville	140		214		
Zanesville to Uhrichsville	140		214, 215		
Zanesville to Valley Crossing	140		213, 214		

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

OKLAHOMA.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Addington	129			776	
Bison	129			780	
Bridgeport	151, 161	242			
Caddo	129			780	
Calumet	151, 161	242			
Canute	151, 161	243			
Chickasha	129			778	
Choctaw Crossing	161				
Clinton	151, 161	243			
Clyde	129			781	
Comanche	129			776, 777	
Darlington	129			779	
Dover	129			780	
Doxey	151, 161	244			
Duncan	129			777	
Elk City	151, 161	243			
El Reno	129, 161	241		779	
El Reno to Jericho, Tex	151	241–245			
Enid	129			780	
Erick	151, 161	244			
Fort Reno	151, 161	242			
Foss	151, 161	243			
Frisco Junction	161				
Geary	151, 161	242			
Gibbon	129			781	
Hennessey	129			780	
Hext Ranch	151, 161	244			
Hydro	151, 161	242			
Indianapolis	151, 161	242, 243			
Jefferson	129			781	
Kingfisher	129			780	
Kremlin	129			781	
McCool	151, 161	242			
Manchester	129			781	
Marlow	129			777	
Medford	129			781	
Meritt	151, 161	244			
Minco	129			778, 779	
Ninnekah	129			778	
North Enid	129			781	
Okarche	129			780	
Parkersburg	151, 161	243			
Pond Creek	129			781	
Reno Junction	129, 161	241		779	
Rush Springs	129			777, 778	
Ryan	129			776	
Sayre	151, 161	244			
Sugden	129			776	
Terral	129			775, 776	
Texola	151	244			
Union	129			779	
Wakita	129			781	
Washita	161				
Waukomis	129			780	
Weatherford	151, 161	242			

ONTARIO, CANADA.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Amherstburg	98			644	
Fort Erie	99			660	
International Bridge	99			660	
Lake Erie	99			660	
Port Colbourne	99				847
Port Colbourne to Port Dalhousie	99				847, 848
Port Dalhousie	99				847, 848

OREGON.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Baker City	132	179			
Bingham Springs	133	181			
Cayuse	133	181			
Durkee	132	178, 179			
Encina	132	179			
Fulton	133	181			
Haines	132	179			
Helix	133	182			
Hilgard	133	180			
Huntington	132	178			
Hutchinson	132	179			
Kamela	133	180			
Lagrande	133	180			
McCormack	133	182			
Mcacham	133	180, 181			
Mission	133	181			
North Fork	133	181			
North Powder	132, 133	179			
Norton	132	179			
Nyssa	132	176			
Ontario	132	176, 177			
Pendleton	133	181			
Perry	133	180			
Pleasant Valley	132	179			
Ring	133	182			
Smeltz	133	182			
Stanton	133	182			
Telocaset	133	179			
Union	133	180			
Union Station	133	180			
Unity	132	179			
Warren	133	182			
Weatherby	132	178			
Wingville	132	179			

PENNSYLVANIA.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Allegheny	142		224		
Allegheny Tunnel	126				872
Allegrippus	126				872
Allentown	108				559
Allison Park	142		225		
Alters Run Bridge	126				868
Altoona	126				872
Anderson	126				870
Annville	108				560
Aqueduct	126				868
Ardara	127				874
Ardenheim	126				871
Bagdad	127			598	
Bailey	126				868
Baird	129				867
Bakerstown	142		225		
Banning	141		222		
Barree	126				871
Bear Run	141		221, 222		
Beatty	127				874
Beaver	108				560
Beaver Falls	142		227		
Belle Valley	105				864
Bellwood	126				872
Bennington	126				872
Benvenue	129				868
Benvenue to Ellwood City	141–142		224–226		
Benvenue to Foley	141		220–224		
Bessemer	129, 141		224		867
Bidwell	141		221		
Big Spring Run	126				873
Birmingham	126				871
Bixler Water Station	126				869
Blacks Run	105				865
Blair Furnace	126				872
Blairsville	127			599	
Blairsville Intersection	127				873
Blairsville Intersection to Braddock	127				873, 874
Blairsville Intersection to Harrisburg	126–127				868–873
Blairsville Intersection to West Penn Junction	127			598, 599	
Bolivar	127				873
Bolivar Junction	126, 127			599	
Bow	127			599	

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

PENNSYLVANIA—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Braddock	129, 141		224		868
Braddock to Bentons Ferry, W. Va	129				866–868
Braddock to Blairsville Intersection	127				873, 874
Bradenville	127				873
Brandon	105				865
Bridgeport	126				870
Brilliant	105				866
Brinton	127				874
Broad Ford	141		222		
Broad Ford Junction	141		222		
Bryant	142		225		
Callery Junction	142		225		
Canton	105			738	
Carlisle	108				560
Carney	127				874
Casselman	141		221		
Celia	142		226		
Chambersburg	108				560
Charleroi	129				867
Chewton	142		226		
Christy Park	141		223		
Clarks Ferry	127			600	
Coal Valley	129				867
Cochranton	105				864
Columbia Crossroads	105			738	
Colza	106			750	
Conemaugh	126				873
Conemaugh Viaduct	126				873
Confluence	141		221		
Connellsville	141		222		
Cooks Mills	128			737	
Corry	103			750	
Corydon	105			739	
Coulter	141		223		
Cove	126				868
Cove Creek	126				868
Cowley	105			738	
Cresson	126				872
Dauphin	127			599, 600	
Dawson	141		222		
Demmler	141		223		
Denholm	126				869
Derry	127				873
Dewart	127			603	
Dotter	105				865
Dougal	127			602	
Downieville	142		225		
Duncannon	126				868
Durward	126				869
East Brady	105				865
Easton	108				559
East Sandy	105				864
Edenburg	142		227		
Edgecliff	105				865
Edri	127			598, 599	
Ehrenfeld	126				872
Elfinwild	142		225		
Elgin	106			749, 750	
Elizabeth Furnace	126				872
Ellwood City	142		226		
Ellwood City to Benvenue	141, 142		224–226		
Ellwood City to Monaca	142		227		
Ellwood City to Struthers, Ohio	142		226, 227		
Emlenton	105				865
Erie	105				863, 864
Erie to Leboeuf	105				863, 864
Eureka	141		223		
Evans City	142		225		
Fairchance	129				867
Fairhope	128			738	
Fields	105			738	
Fishers Ferry	127			601	
Foley	128			738	
Foley to Benvenue	141		220–224		
Foley to Cumberland, Md	128			737, 738	
Fombell	142		226		
Fort Hill	141		221		
Fostoria	126				872
Franklin	105			740	864
Franklin to Irvineton	105			740, 741	
Franklin to Leboeuf	105				864
Franklin to West Penn Junction	105				864, 865
Gallitzin	126				872
Garland	106			750	
Garrett	141		220, 221		
Geiger Point	127			600	
Geneva	142		227		
George	127				874
Georgetown	127			601	
Gibsonia	142		225		
Glencoe	141		220		
Glenshaw	142		225		
Glenwood	141		224		
Goehring	142		226		
Granville	126				870
Grapeville	127				874
Gratztown	141		223		
Grazierville	126				872
Great Bend (Susquehanna Co.)	105			741	
Great Bend (Warren Co.)	105			739	
Greencastle	108				560
Greensburg	127				874
Griffin	141		223		
Guffey	141		223		
Haggerty Run	126				872
Halifax	127			600	
Harmony	142		226		
Harmony Junction	142		226		
Harrisburg	108, 126				560, 868
Harrisburg to Blairsville Intersection	126, 127				868–873
Harrisburg to Hagerstown, Md	108				560
Harrisburg to Perth Amboy, N. J	108				558–560
Harrisburg to Williamsport	127			599–604	
Hazen	142		226		
Hecks	127			599	
Hemlock	105			739	
Herndon	127			601	
Hickory	105			740	
Hickory Grove	105			741	
Highland	141		224		
Hoblitzell	128			737	
Homewood	129, 142		227		868
Horingford Station	126				870
Horn	106			750	
Huntingdon	126				871
Hyde Park	127			598	
Hyndman	128			737	
Indian Creek	141		222		
Inglenook	127			600	
Irvineton	105, 106			740, 751	
Irvineton to Franklin	105			740, 741	
Irvineton to Leboeuf	106			749–751	
Irvineton to Salamanaca, N. Y	105			739–740	
Irwin	127				874
Jacksons Crossing	105			740	
Jackstown	126				870
Jacobs Creek	141		223		
Johnstown	126				873
Juniata Bridge	126				868
Kapps	127			602	
Kennerdell	105				865
Kenwood	142		227		
Keystone	141		220		
Kinzua	105			739	
Kittanning	105				865
Kittanning Point	126				872
Larimer	127				874
Latrobe	127				874
Laughlin Junction	141		224		
Lavenia	141		222		
Lawrenceville	141		224		
Layton	141		222		
Lebanon	108				560
Leboeuf	105, 106			749	864
Leboeuf to Erie	105				863–864
Leboeuf to Franklin	105				864
Leboeuf to Irvineton	106			749–751	
Leechburg	127			598	
Lewistown Junction	126				869
Lilly	126				872
Livermore	127			599	
Liverpool	127			600, 601	
Lock No. 4	129				867
Lockport	126				873
Longfellow Station	126				870
Loshs Run	126				868
Lovell	106			750	
Lower Hillville	105				865
Loyalhanna	127				873
Loyalsock	127			603	
McKeesport	141		223		

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

PENNSYLVANIA—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
McKimms	142		226		
McSpadden	141		221		
McVeytown	126				870
Macungie	108				559
Mahantongo	127			601	
Mahoningtown	142		226		
Manayunk Bridge	126				870
Mance	141		220		
Manor	127				874
Mapleton	126				870
Marion Junction	141		224		
Markleton	141		221		
Mars	142		225		
Mayfield	142		227		
Mayes Bridge	126				870
Meadville	105				864
Mexico	126				869
Mifflin	126				869
Mill Creek	126				870, 871
Millers	105				864
Millersburg	127			600	
Millerstown	126				869
Mill Rift	106			742	
Millwood	127				873
Milton	127			602	
Mineral Point	126				873
Monaca	142	294	227	763	
Monaca to Ellwood City	142		227		
Montandon	127			602	
Monterey	105				865
Montgomery	127			603	
Mosgrove	105				865
Moss Side	127				874
Mount Royal	142		225		
Mount Union	126				870
Muncy	127			603	
Myersdale	141		220		
Narrows Station	126				869
New Brighton	142		227		
New Castle Junction	142		226		
New Florence	126				873
Newport	126				869
Newton Hamilton	126				870
North Sewickley	142		226		
Northumberland	127			602	
Ohiopyle	141		221		
Old Ferry Station	126				869
Old Furnace	142		226		
Oleopolis	105			740	
Outcrop	129				866
Pack Saddle	127				873
Parker	105				865
Paulton	127			598	
Penn	127				874
Perdix	126				868
Petersburg	126				871
Peters Creek	129				867
Philson	141		220		
Piney Run	126				873
Pinkerton	141		221		
Pittsburgh	105, 141		224		866
Pittsfield	106			750	
Point Marion	129				866
Pondeddy	106			742	
Portage	126				872
Port Royal	126, 141		223		869
Powys	105			738	
President	105			740	
Radebaugh	127				874
Raiston	105			738	
Rankin	141		224		
Reading	108				560
Red Bank	105				865
Reduction	141		223		
Rimerton	105				865
River View	129				867
Roach	106			750	
Roaring Branch	105			738	
Roaring Run	127			598	
Robesonia	108				560
Rockland	105				865
Rock Point	142		226		
Rockville	126			809	868
Rockwood	141		221		
Rosston	105				865
Ryde	126				870
Saegerstown	105				864
St. George	105				865
Salina	127			598	
Salisbury Junction	141		220		
Saltsburg	127			599	
Samson	105				864
Sand Patch	141		220		
Sang Hollow	126				873
Scott Haven	141		223		
Selinsgrove Junction	127			601	
Shamrock	108				560
Shaner	141		223		
Sharpsburg	142		224, 225		
Shermans Creek	126				868
Shippensburg	108				560
Shoenberger	126				871
Shohola	106			742	
Sipes	141		221		
Smithton	141		223		
Snedekerville	105			738	
Social Hall	127			599	
South Connellsville	141		222		
South Oil City	105			740	
Spring Creek	106			750	
Stewarton	141		222		
Sugar Creek	105				864
Sugar Run	105			739	
Summit	142		227	763	
Sunbury	127			602	
Susquehanna	105			741	
Suter	141		223		
Thompson	105			740	
Thompsontown	126				869
Thomson	129				867
Tidioute	105			740	
Tionesta	105			740	
Tippecanoe	129				867
Tipton	126				872
Trimmers Rock	126				869
Troy	105			738	
Trunkeyville	105			740	
Tunnelton	127			599	
Turtle Creek	127				874
Tuscarora	126				869
Tuttletown	105			739	
Tyrone	126				871
Union City	106			749	
Union Furnace	126				871
Uniontown	129				867
Upper Middletown	129				867
Ursina	141		221		
Utica	105				864
Valencia	142		225		
Vandergrift	127			598	
Vandevanders Bridge	126				870
Vandyke	126				869
Venango	105				864
Versailles	141		223		
Vineyard Station	126				870
Vista	141		223		
Wall	127				874
Warren	105			739	
Warrior Ridge	126				871
Watsontown	127			602, 603	
West Brownsville Junction	129				867
Westcoolang Park	106			742	
West Ellwood Junction	142		227		
West Penn Junction	105, 127			598	865
West Penn Junction to Blairsville Intersection	127			598, 599	
West Penn Jct. to Franklin	105				864, 865
West Ellwood Junction	142		227		
West Pittsburgh	142		226		
West Newton	141		223		
Wheeling Junction	141		224		
White Rock	127			599	
Wildwood	105, 142		225		866
Williams	128			737	
Williamsport	105, 127			603, 604, 739	
Williamsport to Elmira, N. Y	105			738, 739	
Williamsport to Harrisburg	127			599–604	
Wilmore	126				872
Witmer	142		225		
Womelsdorf	108				560
Woods Run	129				867
Woodvale	126				873
Youngsville	106			751	
Zelienople	142		226		

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

QUEBEC, CANADA.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Aubrey	103			718	
Barrington	103			718	
Carrs Crossing	103			719	
Huntingdon	103			719	
Ormstown	103			718	
Ste. Agnes	103			719	
Ste. Clothilde	103			718	
St. Regis	103				852
St. Stanislas	103			718, 719	
Valleyfield	103			719	
Whites Station	103			719	

SOUTH DAKOTA.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Ardmore	148, 160	221			
Argentine	148, 160	222			
Baltic	135		163		
Bigstone City	134		157		
Bryant	135		159, 160		
Canton	135		164		
Colman	135		162		
Dell Rapids	135		163		
Dennis	148, 160	221			
Dewey	148, 160	222			
Edgemont	148, 160	221, 222			
Egan	135		162		
Elk Point	135		166		
Erwin	135		160		
Fairview	135		164, 165		
Forestville	135		158		
Grover	135		159		
Harrisburg	135		164		
Hazel	135		159		
Hudson	135		165		
Jefferson	135		166, 167		
Lake Preston	135		160, 161		
Madison	135		161, 162		
Marietta	148, 160	222			
McCook	135		167		
Milbank	134		157		
Oldham	135		161		
Paine	160				
Provo	148, 160	221			
Ramona	135		161		
Renner	135		163		
Rumford	148, 160	221			
Sioux Falls	135		163, 164		
South Shore	135		158		
Stockholm	134		158		
Trent	135		162, 163		
Twinbrooks	134		157		
Vienna	135	294	159		
Watertown	135		158		
Watertown to Evansville, Minn	134–135		152–158		
Watertown to Sioux City, Iowa	135		158–167		
Wentworth	135		162		
White Rock	134		154, 155		

TENNESSEE.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Annadel	95			630	
Ashport	116				717
Athens	107			756	
Bailey	111				642
Bethel Springs	91				596
Black Fox	107			761	
Black Oak	95			631	
Blue Springs	107			757	
Booths Point	116				716
Booths Point Landing	116				716
Boyce	107, 95			634, 761	
Boyds Landing	97				708
Bradford	91				597
Bridgeport	107			755	
Brinkleys Landing	116				718
Buntyn	111				642
Cardiff	95			632	
Caswell	107			756	
Caswell to Morehead City, N. C	106, 107			751–756	
Cave Springs	95			634	
Charleston	107			756	
Chattanooga	107, 95, 96			634, 761	
Chattanooga to Cleveland	107			761	
Chattanooga to Decatur, Ala	96			634–639	
Chattanooga to Harriman	95			631–634	
Chewalla	111				641
Cleveland	107			756	
Cleveland to Brunswick, Ga.	107			756–761	
Cleveland to Chattanooga	107			761	
Cleveland to Wright	107			756	
Clinton	95			631	
Collierville	111				642
Concord	107			756	
Cypress Creek	111				641
Daisy	95			633	
Dayton	95			633	
Delrio	107			755	
Dossett	95			631, 637	
Elverton	95			631	
Emory Gap	95			632	
Evensville	95			633	
Falcon	91				596
Forked Deer Island	116				717
Fort Pillow Landing	116				717
Fulton	116				717
Germantown	111				642
Glen Alice	95			632	
Glen Mary	95			629	
Grand Junction	111				641
Graysville	95			633	
Greenfield	91				597
Hales Point	116				716
Hamburg Landing	97				708
Harriman	95			630, 631	
Harriman Junction to Chattanooga	95			631–634	
Harriman Junction to Cincinnati, Ohio	95			622–630	
Harriman Junction to Knoxville	95			630, 631	
Heiskell	95			631	
Helenwood	95			629	
Henderson	91				596
Hinches Switch	107			761	
Hixson	95			634	
Hodges	107			756	
Isham	95			629	
Island No. 40	116				718
Jackson	91				597
Knoxville	107			756	
Knoxville to Harriman Junction	95			630, 631	
La Grange	111				641
Lancing	95			630	
Lenoir City	107			756	
Lesters Landing	116				716
Lorraine	95			632	
Loudon	107			756	
McCarty	107			761	
McConnell	91				598
McNairy	91				596
Martin	91				597
Mascot	107			756	
Medina	91				597
Memphis	111, 116				642, 718
Memphis to Cairo, Ill	116				715–718
Memphis to Corinth, Miss	111				641, 642
Memphis to Friar Point, Miss	114				698–700
Middleton	111				641
Milan	91				597

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

TENNESSEE—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Morristown	107			755	
Moscow	111				641
Mossy Creek	107			756	
Mott Landing	116				716
Mouse Creek	107			756	
Nemo	95			630	
Newport	107			755	
New River	95			629	
Oakdale	95			630	
Oakfield	91				597
Oliver Springs	95			631	
Oneida	95			629	
Ooltewah Junction	107			761	
Paynes Landing	116				717
Philadelphia	107			756	
Pinson	91				596
Pittsburg Landing	97				708, 709
Pittsburg Landing to Riverton Junction, Ala	97				707–709
Plum Point	116				717
Pocahontas	111				641
Powell	95			631	
Ramer	91				596
Randolph	116				717
Rankin	107			755	
Rathburn	95			633	
Reelfoot Landing	116				716
Retro	95			633	
Riceville	107			756	
Richardsons Landing	116				717
Robbins	95			629	
Rockwood	95			632	
Roddy	95			632	
Rossville	111				642
Sale Creek	95			633	
Saulsbury	111				641
Sharon	91				597
Sheffield	95			632	
Shellmound	96			635	
Spring City	95			632	
Sunbright	95			630	
Sweetwater	107			756	
Talbot	107			756	
Tasso	107			756	
Thomas Landing	116				718
Tiptonville	116				716
Tyners	107			761	
Wauhatchie	96			635	
Wheat	95			631	
White	111				642
White Pine	107			755	
Whiteside	96			635	
Williams Ferry	95			631	
Winfield	95			629	
Wolf Creek	107			755	
Wolf River	111				641
Wright	107			756	
Wright to Cleveland	107			756	
Yellow Creek	97				708

TEXAS.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Abbott	108			789	
Abilene	151, 161	248			
Alanreed	151, 161	245			
Aledo	151	246			
Alfalfa	152, 162	256			
Allamore	152, 162	254			
Alvarado	108			788	
Alvord	108			782	
Amarillo	152, 153	257, 258			
Anneta	151	246			
Arlington	129			783	
Aroya	152, 162	252			
Austin	136	172			
Avinger	130			786	
Avondale	108			782	
Baird	151, 161	248			
Barker	137		174		
Barstow	152, 162	252			
Bartlett	136	171			
Bastrop	136	173			
Bateman	136	174			
Belen	152, 162	256			
Bellevue	129			775	
Belt Junction	108			787	
Belton	108			790	
Benbrook	151, 161	245			
Bennetts	151, 161	246			
Benonine	151, 161	244			
Bethel	108			788	
Big Spring	152, 162	250			
Black	153, 162	258			
Blocker	130			786	
Boggy Tank	136		172		
Boracho	152, 162	254			
Bovina	153, 162	259			
Bowie	129			774, 775	
Bowie to Anthony, Kans	129			774–781	
Bowie to Fort Worth	108			782	
Boydston	152	257			
Brashear	130			785	
Brazos	151	246			
Brookshire	137		173		
Burleson	108			788	
Burnap	137		173		
Caddo Mills	129			784	
Campbell	130			784	
Canutillo	157	287			
Canyon	153, 162	258			
Cason	130			785	
Cat Spring	136		173		
Chatauqua	151, 161	248			
Circleville	136	171			
Cisco	151, 161	247			
Clear Fork	136	174			
Clint	152	256			
Clyde	151, 161	248			
Coahoma	152, 162	250			
Colorado	152, 162	249			
Comanche to Fort Worth	108			787, 788	
Como	130			785	
Conley	108			789	
Conway	152, 162	257			
Copperas Cove	108			790, 791	
Coupland	136	172			
Cowen	108			782	
Cresson	108			788	
Cumby	130			785	
Daffan	136	172			
Daingerfield	130			785	
Dale	136	174			
Dallas	129			783	
Dawn	153, 162	258			
Decatur	108			782	
Dickinson	137		175		
Dothan	151, 161	248			
Douro	152, 162	251			
Eagle Flat	152, 162	254, 255			
Eagle Ford	129			783	
Earls	151, 161	246			
Eastland	151, 161	247			
Eddy	108			790	
Egan	108			788	
Elgin	136	172			
Elmdale	151	248			
Elm Mott	108			789	
El Paso	152, 157	256, 257, 287			
El Paso to Belen, N. Mex	156, 157	284–287			
El Paso to Fort Worth	151–152	245–257			
Eskota	151, 161	249			
Etholen	152, 162	255			
Eureka	137		174		
Fabens	152, 162	256			
Fate	129			784	
Fayetteville	136		172		
Finlay	152, 162	255			
Fisher	129			783	
Fort Hancock	152, 162	255			
Fort Worth	108, 129, 151	245		782, 783, 787	
Fort Worth to Bowie	108			782	
Fort Worth to Comanche	108			787, 788	

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

TEXAS—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Fort Worth to El Paso	151–152	245–257			
Fort Worth to Shreveport, La	129, 130			782–787	
Fort Worth to Temple	108			788–790	
Friona	153, 162	259			
Fruitland	108			782	
Fuller	151, 161	244			
Galveston	137		176		
Galveston to Smithville	136, 137		172–177		
Garland	129			784	
Genoa	137		175		
Germania	152, 162	251			
Gomez	152, 162	253			
Goodwin	136	174, 175			
Gordon	151	247			
Granbury	108			788	
Grand Prairie	129			783	
Grand View	108			789	
Granger	136	171			
Greenville	129, 130			784	
Groom	152, 162	257			
Halsted	136		172		
Handley	129			783	
Haney	153, 162	258			
Harrisburg	137		174		
Hemkens	136	173, 174			
Hereford	153, 162	258			
Herman	108			782	
Hermosa	152, 162	253			
Hewitt	108			790	
Hillendahl	137		174		
Hillsboro	108			789	
Hills Prairie	136	173			
Holland	108, 136	171		791, 792	
Holland to Smithville	136	171–173			
Holland to Temple	108			791, 792	
Houston	137		174		
Houston Heights	137		174		
Hughes	130			785	
Hunter	136	174			
Iatan	152, 162	250			
Iona	151, 161	246			
Iser	152, 162	255			
Itasca	108			789	
Jefferson	130			786	
Jericho	151, 152, 161	245, 257			
Jericho to El Reno, Okla	151	241–245			
Jericho to Isleta, N. Mex	152–153	257–264			
Joel	153, 162	258			
Judd	151, 161	247			
Judkins	162				
Karnack	130			786	
Katy	137		173		
Kelleyville	130			786	
Kempner	108			791	
Kent	152, 162	253, 254			
Killeen	108			790	
Kirtley	136		172		
La Grange	136		172		
Lamarque	137		175		
Lambert	151, 161	246			
Lampasas	108			791	
Lampasas to Temple	108			790, 791	
Lark	152, 162	257			
Lasater	130			786	
Lasca	152, 162	255			
La Tuna	157	287			
La Valley	152	255			
League City	137		175		
Leesburg	130			785	
Lela	151, 161	244			
Lem	151, 161	247			
Lester	153, 162	258			
Letitia	137		174		
Littig	136	172			
Little River	108			791	
Lockhart	136	174			
Loraine	152, 162	249			
Lorena	108			790	
McDowell	137		173		
McLean	151, 161	245			
Madden	152, 162	255			
Manor	136	172			
Maxwell	136	174			
Merkel	151, 161	248, 249			
Metz	152, 162	251			
Midland	152, 162	251			
Millsap	151	246			
Mingus	151, 161	247			
Monahans	152, 162	252			
Montoya	157	287			
Morita	152, 162	250			
New Braunfels	136	175			
New Braunfels to Smithville	136	173–175			
New Ulm	136		173		
Nolanville	108			790	
Norwood	130			786	
Nulo	152, 162	255			
Odessa	152, 162	251			
Olden	151	247			
Parmerton	153, 162	259			
Pecos	152, 162	252, 253			
Pickton	130			785	
Pittsburg	130			785	
Plateau	152, 162	254			
Plum	136		172		
Polvo	152, 162	255, 256			
Primms Spur	136		172		
Primrose	108			787	
Putnam	151, 161	248			
Pyote	152, 162	252			
Quito	152, 162	252			
Ramsdell	151, 161	244, 245			
Ranger	151, 161	247			
Red Rock	136	174			
Reedville	136	174			
Rhome	108			782	
Ringgold	129			775	
Rockledge	151, 161	245			
Rockwall	129			784	
Rosanky	136	173			
Roscoe	151, 152, 162	249			
Rowlett	129			784	
Royal	152, 162	257			
Royse	129			784	
Saginaw	108			782	
Sand Hills	152, 162	251, 252			
San Felipe	137		173		
San Marcos	136	174			
San Martine	152, 162	253			
Santo	151, 161	246			
Sayers	136	172			
Schofield	108			789	
Scroggins	130			785	
Sealy	137		173		
Seguin	136	175			
Shamrock	151, 161	244			
Sierra Blanca	152, 162	255			
Smithville	136	173			
Smithville to Galveston	136, 137		172–176		
Smithville to Holland	136	171–173			
Smithville to New Braunfels	136	173–175			
Stanton	152, 162	250			
Stoneburg	129			775	
Strawn	151, 161	247			
Sulphur Springs	130			785	
Summerfield	153, 162	258			
Sunset	108			782	
Sweetwater	151, 161	249			
Taylor	136	171, 172			
Temple	108			790	
Temple to Fort Worth	108			788–790	
Temple to Holland	108			791, 792	
Temple to Lampassas	108			790, 791	
Texas City Junction	137		175		
Texola	161				
Tiffin	151	247			
Tinaja	152, 162	255			
Torcer	152, 162	255			
Tornillo	162				
Toyah	152, 162	253			
Trent	151, 161	249			
Troy	108			790	
Tye	151, 161	248			
Umbarger	153, 162	258			
Upton	136	173			
Van Horn	152, 162	254			
Vinton	157	287			
Virgile	108			787	
Virginia Point	137		176		

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

TEXAS—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Waco	108			789	
Waples	108			788	
Warfield	152, 162	251			
Waskom	130			786	
Weatherford	151	246			
Webster	137		175		
West	108			789	
Westbrook	152, 162	250			
West Point	136		172		
Whites Spur	157	287			
Wild Horse	152, 162	254			
Wiles	151, 161	247			
Wilsey	153, 162	259			
Winnsboro	130			785	
Yarnall	152	257			
Ysleta	152, 162	256			
Zita	153	258			

UTAH.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Adams	160				
Ajax	148, 160	217			
Akin	148, 160	219			
Bear River	132	168			
Becks	159				
Beryl	148, 160	214			
Black Rock	148, 160	220			
Borden	148, 160	219			
Boulter	148, 160	218			
Brigham	132	168			
Buehl	160				
Buena Vista	148, 160	216			
Cache Junction	132	169			
Castle Rock	131	168			
Centerville	146, 159	199			
Champlin	148, 160	219			
Clear Lake	148	219			
Cline	148, 160	219			
Cornish	132	169			
Croydon	131	167			
Cruz	148, 160	220			
Devils Gate	131	167			
Dewey	132	168			
Dunbar	148	218			
Dyer	148	219			
Echo	131	167			
Emory	131	167			
Erda	148	217			
Escalante	148, 160	214			
Eureka	148	218			
Evona	146, 159	199			
Farmington	146, 159	199			
Faust	148, 160	218			
Ford	148, 160	215			
Garfield	148, 160	216, 217			
Goss	148, 160	220			
Hatch	159				
Honeyville	132	168			
Hot Springs	132	168			
Jericho	148, 160	218, 219			
Jerome	148	219			
Kaysville	146, 159	199			
Kerr	148, 160	215			
Laho	148, 160	215			
Lake Point	148	217			
Latimer	148, 160	215			
Layton	146, 159	199			
Lofgreen	148, 160	218			
Lund	148, 160	215			
Lynndyl	160				
Lynn Junction	148	219			
McIntyre	148	218			
Malone	148, 160	220			
Mammoth	160				
Milford	148, 160	215			
Modena	148, 160	214			
Morgan	131	167			
Morris	148, 160	217			
Morton	148, 160	214			
Nada	148, 160	215			
Neels	148, 160	219			
Oasis	148, 160	219			
Ogden	131	167, 168, 199			
Ogden to Salt Lake City	146	199, 200			
Opal	148, 160	215			
Pumice	148, 160	220			
Ransom	132	169			
Read	148	220			
Riter	148, 160	216			
Roy	146, 159	199			
Sahara	148, 160	214			
St. John	148, 160	217			
Salt Lake City	146, 148, 159	199, 200, 216			
Salt Lake City to Ogden	146	199–200			
Salt Lake City to Zenda	148	216–220			
Shields	148, 160	217			
Simkins	146, 159	199			
Stockton	148, 160	217			
Stockyard Junction	146, 159	199			
Strawberry	131	167			
Syracuse	146	199			
Syracuse Grove	146	199			
Syracuse Junction	146, 159	199			
Thermo	148, 160	215			
Tintic	148, 160	218			
Tomas	147, 160	214			
Tooele	148, 160	217			
Uinta	131	167			
Upton	148, 160	215			
Utah-Nevada line	160				
Uvada	147, 160	214			
Van	148, 160	219			
Vernon	148, 160	218			
Wasatch	131	168			
Willard	132	168			
Woods Cross	146, 159	199			
Wyuta	131	168			
Zenda	148, 160	215, 220			
Zenda to Las Vegas, Nev	147, 148	210–215			
Zenda to Salt Lake City	148	216–220			

VIRGINIA.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Accotink	92				629
Alexandria	92				629, 630
Ashland	92				628
Brooke	92				629
Cameron Run	92				629
Diascond	92				631
Doswell	92				628
Fort Monroe	92				630
Fredericksburg	92				629
Guinea	92				628
Lanexa	92				631
Laurel	92				628
Lee Hall	92				630
Milford	92				628
Morrison	92				630
Newport News	92				630
Old Point Comfort	92				630
Old Point Comfort to Richmond	92				630–632
Penola	92				628
Pohick Creek	92				629
Potomac Run	92				629
Providence Forge	92				631
Quantico	92				629
Richmond	92	293			628, 631
Richmond to Old Point Comfort	92				630–632
Richmond to Georgetown, D. C	92				628–630
Roxbury	92				631

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

VIRGINIA—Continued.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Rutherglen	92				628
Summit	92				629
Toano	92				630
Widewater	92				629
Williamsburg	92				630
Woodbridge	92				629

WASHINGTON.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Alfalfa	133	186			
Argo	133	182			
Auburn	133	183			
Badger	134	187			
Black River	133	182			
Borup	133	184			
Bristol	133	184			
Byron	133	186			
Canton	133	183			
Canyon	133	185			
Chandler	134	186			
Cle Elum	133	184			
Covington	133	183			
Eagle Gorge	133	183			
Easton	133	184	245		
Ellensburg	133	185			
Gibbon	133	186			
Hot Springs	133	183, 184	245		
Hunts Junction	133, 134	182, 187, 188			
Kennewick	134	187			
Kent	133	182, 183			
Kiona	134	186			
Lester	133	184			
Mabton	133	186			
Martin	133	184			
Maywood	133	183			
Nelson	133	184			
North Yakima	133	185			
Palmer Junction	133	183			
Pasco	134	187			
Prosser	133	186			
Ravensdale	133	183			
Relief	134	187			
Roza	133	185			
Satus	133	186			
Seattle	133	182			
Seattle to Owyhee, Idaho	132–134	175–188			
Selah	133	185			
South Seattle	133	182			
Stampede	133	184			
Teanaway	133	184			
Thomas	133	183			
Thorp	133	185			
Thrall	133	185			
Toppenish	133	186			
Umtanum	133	185			
Wapato	133	185, 186			
Wenas	133	185			
Weston	133	184			
Yakima City	133	185			

WEST VIRGINIA.

Place.	Elevation, this publication.[1]	Description. This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Amblersburg	108, 144		238		562
Amblersburg to Cumberland, Md	108, 143, 144		236–238		561, 562
Amblersburg to Grafton	108, 144		238, 239 245		562
Anderson	144		245		
Austen	144		239, 245		
Back Creek	128			733	
Baird	128			735	
Barnesville	144		240		
Barrackville	144		240		
Barrackville Station	144		240		
Bellton	144		242		
Bentons Ferry	129, 144		240		866
Bentons Ferry to Benwood	144		240–243		
Bentons Ferry to Braddock, Pa	129				866–868
Bentons Ferry to Grafton	144		239, 240		866
Benwood	144		243		
Benwood Junction	144		243		
Benwood to Bentons Ferry	144		240–243		
Board Tree	144		242		
Bridgeport	108				562
Broomfield P. O	144		240		
Buckhorn	144		245		
Burton	144		241		
Bush	144		239		
Cairo	108				563
Cameron	144		242		
Catawba	129				866
Cherry Run	128			733	
Cogley	144		242		
Colfax	144		239, 240		
Corinth	144		238		
Cornwall	108				563
Cottonwood	144		241		
Cranberry Summit	108				562
Dans Run	128			736	
Denver Station	144		242		
Doe Gully	128			735	
Downs	144		240, 241		
Duffields	128			732	
Engle	128			731	
Fairmont	129, 144		240		866
Farmington	144		240		
Fetterman	144		239		
French	128			736	
Gaston Junction	144		240		
Glen Easton	144		242		
Glover Gap	144		241		
Grafton	108, 144		239		562
Grafton to Amblersburg	108, 144		238, 239		562
Grafton to Belpre, Ohio	108		245		562, 563
Grafton to Bentons Ferry	144		239–240		866
Great Cacapon	128			734	
Green Spring	128			736	
Hammond	144		239		
Hancock	128			733, 734	
Hansrotte	128			735	
Hardman	144		239		
Harpers Ferry	128			731	
Hobbs	128			732	
Hundred	144		241		
Independence	144		239		
Ironton	144		239		
Katy	144		240		
Kerneysville	128			732	
Keyser	108, 143	293	236, 237		562
Kingmont	144		240		
Lineburg	128			734	
Little Cacapon	128			735	
Little Falls	129				866
Littleton	144		241, 242		
Loudenville	144		242		
Magnolia	128			735	
Mannington	144		241		
Martinsburg	128			732	
Metz	144		241		
Miller	128			733	
Morgantown	129				866
Moundsville	144		243		
Newburg	144		239		
North Mountain	128			733	
Okonoko	128			735	
Opequon	128			732	
Orleans Road	128			734	
Parkersburg	108				563
Patterson Creek	128			736	
Patterson Creek Cut-off	128			736	
Paw Paw	128			735	
Petroleum	108				563
Piedmont	143		237		
Powells	129, 144		239		866
Riggs	144		238		

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

WEST VIRGINIA—Continued.

Place.	Elevation this publication.[1]	Description.			
		This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Rinard	144		238		
Rockwells Run	128			734	
Rodamers	144		238		
Rosbys Rock	144		242, 243		
Round Top	128			734	
Rowlesburg	108, 144	293	238, 245		562
Shenandoah Junction	128			732	
Sir Johns Run	128			734	
Sleepy Creek	128			733	
Tabb	128		238	732, 733	
Terra Alta	144		239		
Thornton	144		239		
Tunnelton	144		245		
Uffington	129				866
Underwood Station	144		240		
Valley Falls	129, 144		239		866
Van Clevesville	128			732	
Van Vorhis	129				866
West End	144		245		
West Union	108				563
West Virginia Central Junction	143		237		
Woodmont	128			734	
Woodruff	144		242		

WISCONSIN.

Place.	Elevation this publication.[1]	This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Alma	118				748, 749
Britts Landing	118				756
Charme	118				759, 760
Cochrane	118				749
De Soto	118				757, 758
Diamond Bluff	117				742, 743
Ferryville	118				758
Fountain City	118				749, 750
Genoa	118				756
Island No. 24	117				743
Island No. 65	118				750
Island No. 69	118				750
La Crosse	118				754, 755
Lynxville	118				759
Milwaukee	98			653	
Morgans Coulee	117				742
North La Crosse	118				754, 755
Prairie Du Chien	118				760, 761
Prescott	117				741
Pucketville	117				743
Rush Creek	118				758
Smiths Bar	117				741
Smiths Landing	117				741, 742
Stoddard	118				755, 756
Tippets Landing	118				757
Trenton	117				743
Trenton Landing	117				743
Victory	118				757
Viola	118				759
Warners Landing	118				756
Winona, Minn., opposite	118				750

WYOMING.

Place.	Elevation this publication.[1]	This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
Ah Say	131	167			
Alger	149, 160	228			
Alki	161				
Allen	131			803	
Altamont	131	168			
Arno	149, 161	229			
Arvada	149, 160	225			
Athol	131				645
Aurora	131			803	
Azusa	131	167, 168			
Baxter	131	166			
Big Corral	149	229			
Bitter Creek	131	166			
Black Buttes	131	166			
Bona	131			802	
Bordeaux	131			801	
Borie	131				645
Bridger	131	168			
Bryan	131	167			
Buckhorn	131			802	
Cadiz	149, 160	225, 229			
Cadiz to Crawford, Nebr	148–149	220–225			
Cadiz to Huntley, Mont	149	225–229			
Carter	131	168			
Cassa	131			802	
Cheyenne	131			808	645
Cheyenne to Denver, Colo	131				643–645
Cheyenne to Orin Junction	131			800–802	
Cheyenne to Rock Creek	131				645–647
Chugwater	131			801	
Church Buttes	131	168			
Clearmont	149, 161	229			
Clifton	148, 160	222			
Como	131			803	
Coopers Lake	131				646
Creston	131			805	
Croton	149, 160	225			
Dakoming	148, 160	222			
Dale Creek	131				646
Daleys Ranch	131			804	
Dana	131			804	
Diamond	131			801	
Dietz	149, 160	228			
Echeta	149, 160	225			
Edson	131			804	
Elkhurst	131	168			
Evanston	131	168			
Felix	149, 160	224, 225			
Fillmore	131			805	
Fisher	131			800	
Fort Steele	131			804	
Garrett	131	168			
Gillette	149, 160	224			
Glendo	131			802	
Granger	131	167, 168			
Granite Canyon	131				646
Green River	131	167			
Greenville	131			804	
Hallville	131	166			
Hampton	131	168			
Hanna	131			803	
Harper	131				647
Hartville Junction	131			802	
Horse Creek	131			801	
Howell	131				646
Iron Mountain	131			801	
Islay	131			801	
Jerome	148, 160	223			
Johnson Siding	148, 160	222			
Kara	148, 149, 160	223			
Keeline	131			800	
Kendrick	149, 160	225			
Kier	149, 160	224			
Knight	131	168			
Kool	160				
Laramie	131				646
Lariat	149, 160	225			
Latham	131			805	
Leroy	131	168			
Lookout	131				646
Lost Spring	131			800	
Lusk	131			800	
Manville	131			800	
Marston	131	167			
Medicine Bow	131			803	
Minturn	149, 160	224			
Monarch	149, 160	228			
Monell	131	166			
Moorcroft	149, 160	223, 224			
Newcastle	148, 160	222, 223			
Node Ranch	131			800	
Ohlman	149, 160	228			
Orin Junction			802		

[1] See discussion on page 158 in regard to elevations of rail in front of railroad stations.

WYOMING—Continued.

Place.	Elevation, this publication.[1]	Description.			
		This publication.	Precise leveling in the U. S. 1903–1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Orin Junction to Chadron	130, 131			799–800	
Orin Junction to Cheyenne	131			800–802	
Oriva	149, 160	224			
Osage	148, 160	223			
Otto	131				646
Owens	160				
Parkman	149, 160	228			
Pedro	148, 160	223			
Peru	131	167			
Point of Rocks	131	166			
Ranchester	149, 160	228			
Rawlins	131			804	
Red Buttes	131				646
Red Desert	131	166		805	
Red Desert to Pocatello, Idaho	131–132	166–169			
Red Desert to Rock Creek	131			803–805	
Regis	161				
Riner	131			804	
Riverdale	160				
Rock Creek	131			803	647
Rock Creek to Cheyenne	131				645–647
Rock Creek to Red Desert	131			803–805	
Rock Springs	131	166, 167			
Rozet	149, 160	224			
Salt Wells	131	166			
Shawnee	131			800	
Sheridan	149, 160	228			
Sherman	131				646
Silver Crown	131			800, 801	
Solon	131			804	
Sparta	149, 160	224			
Spencer	148, 160	222			
Springvalley	131	168			
Table Rock	131	166			
Thornton	148, 160	223			
Tipton	131	166			
Tongue River	160				
Ulm	149	229			
Upton	148, 160	223			
Uva	131			802	
Van Tassel	131			800	
Verona	149, 161	229			
Volente	131			801	
Wakely	149, 160	228			
Walcott	131			804	
Wamsutter	131			805	
Wendover	131			802	
Wessex	149, 160	224			
Wheatland	131			801, 802	
Wilcox	131			803	
Wilkins	131	167			
Wyoming	131				646

[1] See discussion on page 158 in regard to elevation of rail in front of railroad stations.