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R. P. LAMONT, Secretary
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R. S. PATTON, Director

Special Publication No. 160

TRIANGULATION IN COLORADO

[1927 DATUM]

By

OSCAR S. ADAMS
Senior Mathematician

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CONTENTS

ILLUSTRATIONS

TRIANGULATION IN COLORADO (1927 DATUM)

By OSCAR S. ADAMS, *Senior Mathematician, United States Coast and Geodetic Survey*

READJUSTMENT OF TRIANGULATION, WESTERN UNITED STATES

This volume contains the results of the first-order triangulation executed by the United States Coast and Geodetic Survey in the State of Colorado. *The geographic positions contained herein are on a new datum and supersede the positions in Colorado which appeared in Special Publication No. 19 of this bureau.*

The triangulation of the United States has been built up by continually adding new arcs to those already measured, and for many years in adjusting this triangulation the plan had to be followed of fitting the new arcs of triangulation to the old ones which had been previously adjusted. This method was the only one that could have been followed up to the time that the western half of the triangulation net of the country had been extended to such a degree that the arcs formed many closed loops—a condition reached in the year 1926.

It then became necessary, in order to secure what may be called standard or final geographic positions to the westward of the ninety-eighth meridian, to make an adjustment of the net as a whole. This was done by a method devised at the office of the Coast and Geodetic Survey,[1] and the resulting geographic positions for all of the western triangulation are now available to surveyors and other engineers who may wish to have final geographic positions for their operations.

This volume is the first of a series of publications, each of which will give the geographic positions on the new datum for the triangulation stations of a State, or occasionally of two States, together with the descriptions of the same stations.

COMPUTATIONS

The adjustments of the arcs included in this publication form part of the general adjustment in the western part of the United States. The calculations of the adjustments were made by H. C. Mitchell, H. S. Rappleye, G. L. Fentress, H. P. Kaufmann, and others in the division of geodesy of this bureau. C. H. Swick and O. P. Sutherland assisted in the preparation of the manuscript for publication.

GENERAL DESCRIPTION OF TABLES AND SKETCHES

The tables of geographic positions, on pages 19 to 35, also contain the distances between contiguous triangulation stations in meters and feet, the logarithms of the distances in meters, and the azimuths of the lines joining these stations. The distances are corrected for elevation above mean sea level, and the azimuths are referred to the true south. Anyone who wishes to obtain the actual distances between the triangulation stations should use the formula given on page 17, by which the true distance at the mean elevation of the stations can be derived from the distance at sea level. The descriptions

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

of the stations, given on pages 41 to 55, are designed to enable the engineer to recover and identify the station mark after he has visited the general locality of the station. There will be times when the description, so far as witness and other marks are concerned, will have become out of date from changes by nature or by the work of man. Any engineer who may visit a station and find that the description does not truly represent the present conditions, or who finds the mark destroyed or mutilated, should report the facts to the Director of the Coast and Geodetic Survey at Washington, D. C., in order that the files of this office may be kept up to date. The engineer should realize that the triangulation extended over the country by the Coast and Geodetic Survey is a public survey made for the use of the people. The stations really belong to the States in which they are located, and the engineer who is so fortunate as to find one of these stations located near his work should help to perpetuate the monuments in order that they may be of continuous service and value to his locality. The Coast and Geodetic Survey officials will, from time to time, visit the stations established and will re-mark and redescribe them if necessary.

Near the back of this publication will be found sketches which show graphically the approximate locations of the stations and the lines over which observations were made. It is suggested that if one should wish to learn whether there are triangulation stations in the vicinity of his work he should first consult the sketches. He can obtain from them the names of the stations that may be of help to him; then he should turn to the index on page 69 of this volume, from which he can find the pages upon which the descriptions and geographic positions of the stations appear.

OTHER PUBLICATIONS OF VALUE TO THE ENGINEER

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

There are occasions, especially in cities, when the engineer wishes to use plane coordinates for his triangulation stations rather than spherical coordinates. In such cases he should procure from the Superintendent of Documents Special Publication No. 71, entitled "Relation between Plane Rectangular Coordinates and Geographic Positions," which costs 10 cents. This publication also describes the methods of transforming plane coordinates to spherical ones.

The Coast and Geodetic Survey has issued a number of manuals on the various classes of its work. The ones that would be of value to an engineer in connection with triangulation, including base measurements, are Special Publication No. 120, Manual of First-Order Triangulation, cost 40 cents; Special Publication No. 145, Manual of Second and Third Order Triangulation and Traverse, cost 60 cents; and Special Publication No. 137, Manual of First-Order Traverse, cost 30 cents. If he is interested in the determination of azimuth to a high

degree of accuracy, he should procure a copy of Special Publication No. 14, Determination of Time, Longitude, Latitude, and Azimuth, cost 35 cents. If he is interested only in the determination of approximate azimuths, he should secure a copy of Serial No. 166, Directions for Magnetic Measurements, cost 15 cents.

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

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

CLASSIFICATION OF TRIANGULATION

Triangulation is divided into different classes according to accuracy. The terms applied to these classes have recently been changed by agreement of representatives of the various Federal map-making bureaus. Four classes of triangulation are now prescribed and defined, viz, first, second, third, and fourth orders. The first three of these are, respectively, equal in accuracy to the classes primary, secondary, and tertiary as previously defined by the United States Coast and Geodetic Survey.

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

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

Under certain conditions the proportionate error in the length of a line as specified above may be found to be exceeded in any class of triangulation. Where two points are comparatively close together as compared with the size of the triangulation scheme, the distance between those points may be in error in excess of that indicated by the class of triangulation of the scheme. The accuracy of the computed length of any line can be estimated by computing the ΣR_1 in accordance with the formula for the strength of figures as given in

United States Coast and Geodetic Survey Special Publication No. 145. In any class of triangulation the subsidiary stations will be located with a less degree of accuracy than the main scheme stations.

GEODETIC SURVEYS OF BOUNDARIES

There is only one place on the earth having a given latitude and longitude. When by triangulation the latitude and longitude of a point have been determined, the point in question can be recovered with great accuracy in the future, even if the monument which had been established at that point has been destroyed. This is a matter of vast importance to the owner of land. If he can have the corners of his boundary tied into a triangulation system and have them defined by latitudes and longitudes, there will be no difficulty in the future in recovering the corners provided there is a record of these geographic positions.

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

ARCS INCLUDED IN THIS PUBLICATION

The triangulation included in this publication consists of a section of the transcontinental arc along the thirty-ninth parallel and two sections of the one hundred and fourth meridian arc, one to the northward and one to the southward of the thirty-ninth parallel arc. The section of the one hundred and fourth meridian arc to the northward is really along the one hundred and fifth meridian, and that to the southward lies between the one hundred and third and the one hundred and fourth meridians. The section of the thirty-ninth parallel arc was observed between the years 1879 and 1895; the one hundred fourth meridian northward was observed in 1912 and 1913; the one hundred and fourth meridian southward in 1922.

CHARACTERISTICS OF FIRST-ORDER TRIANGULATION

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

At certain intervals, depending upon the shape of the triangles, base lines are measured. A base is necessarily a side of one of the triangles. The ends of the base must be intervisible from the ground or from towers that may be erected over them. In the early years of the Coast and Geodetic Survey's existence the base lines were measured with metal bars, but beginning about 30 years ago steel tape lines were used in the measurements. Since 1907 all of the bases of the survey have been measured with invar tapes. The probable error of a measured base is about 1 part in 1,000,000 of its length. This accuracy meets all the requirements of engineering and science.

The azimuths of the triangulation depend upon what are called Laplace azimuths, or azimuths determined by observations on Polaris, which have been corrected for the deflection of the vertical at each Laplace station. These deflections are due to the attraction of mountain or plateau masses that are comparatively near the place at which the observations are made. The probable error of a Laplace azimuth is about $\pm 0.''3$.

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

SECONDARY STATIONS

In addition to the triangulation stations which form the triangles of the main scheme across Colorado, a number of objects, such as mountain peaks, church spires, school cupolas, and smokestacks, have been observed upon from the main scheme triangulation stations. These objects have had their geographic positions computed, and these positions are shown in the tables on pages 19 to 35. The names of these points are also included in the index, and the points are shown on the sketches. In most cases the name of the object is all the description that is available. It is believed that in practically every case the name is all that is necessary for its accurate identification by the engineer who may wish to use it.

In the readjustment each of the intersection stations has been computed by means of a single triangle, but on all of the sketches except Figure 6 the directions actually observed are shown. If the lengths and azimuths of any of these additional lines are needed at any time, these data can be obtained by writing to the Director of the United States Coast and Geodetic Survey, Washington, D. C.

Occasionally geographic positions of State boundary monuments are given. These data are especially valuable to anyone who wishes to make a State map. In some cases section corners have been connected with the triangulation. In such cases the geographic positions of the section corners are contained in the tables.

At most of the stations, especially those established in recent years, there are reference marks which will assist in the finding of the station marks. Should the latter be destroyed, but the reference marks be intact, one can compute the geographic positions of the reference marks and use them in place of the station marks.

On pages 56 to 63 is a table which gives the data for converting feet to meters, or the reverse. We believe that this table will fre-

quently be of considerable use to the engineer, not only in connection with his surveying but in other operations.

NORTH AMERICAN DATUM OF 1927

The original adjustment of the triangulation included in this publication was computed upon the Clarke spheroid of 1866, on what was called at that time the North American datum. In the readjustment of the triangulation in the western part of the United States the same spheroid was used as surface of reference, but only one station was held in position. The station Meades Ranch, in Kansas, was assigned the same position that it had in the original United States Standard datum, later called the North American datum. This position of Meades Ranch is as follows:

$$\phi = 39^\circ\ 13'\ 26''.686$$
$$\lambda = 98\ \ 32\ \ 30.506$$

This position was held in the new datum because it had been found to be best in accord with the country as a whole in the extensive investigation that was carried out at the time of the adoption of the original datum. If any are interested in the procedure followed in the establishment of this former datum, an account of it can be found in Special Publication No. 19, Primary Triangulation on the One Hundred and Fourth Meridian and on the Thirty-ninth Parallel in Colorado, Utah, and Nevada.

The orientation in the new adjustment is controlled by the various Laplace azimuths distributed throughout the network of arcs. The position of Meades Ranch, together with the Laplace azimuths included in the arcs, serve to define the North American datum of 1927. The date is appended to the name of the new datum to distinguish it from the old North American datum. A station is said to be on this North American datum of 1927 when it is rigidly adjusted to the scheme of the readjusted triangulation. These positions supersede all previously published positions in the State of Colorado. Only positions on the North American datum of 1927 should be used hereafter within this State.

USE OF HORIZONTAL CONTROL DATA

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

One other factor must be taken into consideration by the engineer of to-day. As the States develop industrially they will undoubtedly follow the lead of one of the Eastern States, Massachusetts, which with splendid foresight has extended its triangulation control over the entire State for the purpose of defining property boundaries in terms of latitude and longitude. The advantage of such a system is well

stated in the following extracts from the report on the Maryland oyster survey:

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

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

1. **Extensive mapping.**—The topographer needs as initial data for beginning a topographic survey the distance and direction between two points and the geographic position of one of them in latitude and longitude. His local triangulation or traverse, based on this control, will prevent the accumulation of excessive errors as he carries on his mapping operations. In the event that the available first-order triangulation in that region has lines of too great length to join to conveniently, he can measure a base and azimuth at some place visible from a first or second order triangulation station and connect his base to the station by triangulation, thus obtaining proper geographic positions for his local surveys.

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

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

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

it unnecessary, to establish the integrity of the recovered points by using at least three old stations as a basis for new work, the third station serving as a check for the two stations on which the new work may actually depend.

In local surveys where the area is of limited extent it is usually desirable to use a system of plane coordinates, the origin being connected to some point of the first or second order triangulation or traverse scheme. Tables for computing plane coordinates from geographic positions are found in United States Coast and Geodetic Survey Special Publication No. 71. The United States Coast and Geodetic Survey will be glad to give advice on any problem arising out of the use of its control points or on any proposed extension of triangulation or traverse from them.

EXPLANATION OF TABLE FOR POLYCONIC MAP PROJECTION

The engineer or surveyor who makes use of the data in this publication may find it desirable to construct a map covering the territory he is surveying. He may wish to show on this map the meridians and parallels so as to be able to plot the positions of the triangulation stations included in the area and show the details of his survey in the correct geographic positions. To enable him to do this with the least possible difficulty, the following table, reprinted in an abbreviated form from United States Coast and Geodetic Survey Special Publication No. 5, has been inserted. This table may also be used to interpret in terms of degrees, minutes, and seconds of arc any distance measured along a meridian or parallel. The method of using the table is described below:

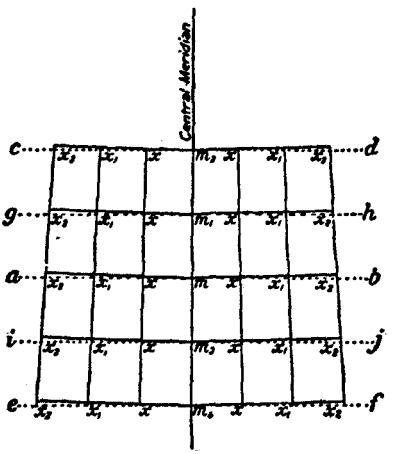

FIGURE 1.—Sketch for construction of polyconic projection

To make a projection for a large-scale map (1 to 20,000 and larger) first draw a straight line for a central meridian and a construction line *ab* perpendicular thereto, each to be as central to the sheet as the selected interval of latitude and longitude will permit. (See fig. 1, above.) On the central meridian lay off the distances mm_2 and mm_4, using the length of 1′ along the meridian, for the latitude in question, as given in the table under "Arcs of the meridian" and multiplying this length by the number of minutes for the interval between the central parallel and the extreme parallels. Through m_2 and m_4 draw straight lines, *cd* and *ef*, parallel to the line *ab*. On the lines *ef*, *ab*, and *cd* lay off the distances mx_2, m_2x_2, and m_4x_2 on both sides of the central meridian, taking the values from the table under "Arcs of the parallel," corresponding to the latitude of m, m_2, and m_4, respectively. The value of 1′ as taken from the table must be multiplied by the number of minutes out from the central meridian. Draw straight lines through the points thus determined for the extreme meridians—that is, through the x_2 points.

At the two points designated x_2 on the line *ab* lay off along the meridians the value of Y as given in the table under "Y coordinate of curvature," using as argument the interval in minutes between the central meridian and the extreme meridian. Draw straight lines from these points to the point *m* for the middle parallel, and from the points of intersection with the extreme meridians lay off distances along these meridians, above and below, equal to the distances mm_2 and mm_4 to locate points in the extreme parallels.

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

The method outlined above may be used for all large-scale maps regardless of the number of meridians and parallels shown. For small-scale maps the method is somewhat more complicated, and it becomes necessary to make use of Special Publication No. 5, which may be obtained for 20 cents from the Superintendent of Documents, Washington, D. C.

Polyconic map projection table

Latitude		Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian		Y coordinate of curvature, latitude 36°
		1″	1′	1″	1′			
°	′	*Meters*	*Meters*	*Meters*	*Meters*	°	′	*Meters*
36	00	25.046	1,502.8	30.821	1,849.27			
	1	.041	2.5	1	.28	0	1	0.1
	2	.035	2.2	1	.28		2	0.5
	3	.030	1.8	1	.29		3	1.2
	4	.025	1.5	2	.29		4	2.1
36	05	25.020	1,501.2	30.822	1,849.30	0	5	3.2
	6	.014	0.9	2	.30		6	4.6
	7	.009	0.6	2	.31		7	6.3
	8	.004	500.2	2	.31		8	8.2
	9	24.999	499.9	2	.32		9	10.4
36	10	24.993	1,499.6	30.822	1,849.32	0	10	12.8
	11	.988	9.3	2	.33		15	28.9
	12	.983	9.0	2	.33		20	51.4
	13	.977	8.6	2	.34		25	80.3
	14	.972	8.3	2	.34		30	115.6
36	15	24.967	1,498.0	30.822	1,849.35	0	35	157.4
	16	.961	7.7	3	.35		40	205.6
	17	.956	7.4	3	.36		45	260.2
	18	.951	7.0	3	.36		50	321.2
	19	.946	6.7	3	.37		55	388.7
36	20	24.940	1,496.4	30.823	1,849.37	1	00	462.5
	21	.935	6.1	3	.38		05	542.8
	22	.930	5.8	3	.38		10	629.5
	23	.924	5.4	3	.39		15	722.6
	24	.919	5.1	3	.40		20	822.2
36	25	24.914	1,494.8	30.823	1,849.40	1	25	928.2
	26	.908	4.5	3	.41		30	1,040.6
	27	.903	4.2	4	.41		35	1,159.4
	28	.898	3.8	4	.42		40	1,284.7
	29	.892	3.5	4	.42		45	1,416.4
36	30	24.887	1,493.2	30.824	1,849.43	1	50	1,554.5
	31	.882	2.9	4	.43		55	1,699.0
	32	.876	2.6	4	.44	2	00	1,850
	33	.871	2.2	4	.44	3	00	4,162
	34	.866	1.9	4	.45	4	00	7,399
36	35	24.860	1,491.6	30.824	1,849.45			
	36	.855	1.3	4	.46			
	37	.850	1.0	4	.46			
	38	.844	0.6	4	.47			
	39	.839	0.3	5	.47			
36	40	24.834	1,490.0	30.825	1,849.48			
	41	.828	89.7	5	.48			
	42	.823	9.4	5	.49			
	43	.817	9.0	5	.49			
	44	.812	8.7	5	.50			
36	45	24.807	1,488.4	30.825	1,849.51			
	46	.801	8.1	5	.51			
	47	.796	7.8	5	.52			
	48	.791	7.4	5	.52			
	49	.785	7.1	5	.53			
36	50	24.780	1,486.8	30.826	1,849.53			
	51	.775	6.5	6	.54			
	52	.769	6.2	6	.54			
	53	.764	5.8	6	.55			
	54	.758	5.5	6	.55			
36	55	24.753	1,485.2	30.826	1,849.56			
	56	.748	4.9	6	.56			
	57	.742	4.6	6	.57			
	58	.737	4.2	6	.57			
	59	.731	3.9	6	.58			
37	00	24.726	1,483.6	30.826	1,849.58			

Polyconic map projection table—Continued

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	*Y* coordinate of curvature, latitude 37°
	1″	1′	1″	1′		
° ′	*Meters*	*Meters*	*Meters*	*Meters*	° ′	*Meters*
37 00	24.726	1,483.6	30.826	1,849.58		
1	.721	3.3	6	.59	0 1	0.1
2	.715	2.9	7	.59	2	0.5
3	.710	2.6	7	.60	3	1.2
4	.704	2.3	7	.61	4	2.1
37 05	24.699	1,481.9	30.827	1,849.61	0 5	3.3
6	.694	1.6	7	.62	6	4.7
7	.688	1.3	7	.62	7	6.4
8	.683	1.0	7	.63	8	8.3
9	.677	0.6	7	.63	9	10.5
37 10	24.672	1,480.3	30.827	1,849.64	0 10	13.0
11	.667	80.0	7	.64	15	29.2
12	.661	79.7	7	.65	20	51.9
13	.656	9.3	8	.65	25	81.2
14	.650	9.0	8	.66	30	116.9
37 15	24.645	1,478.7	30.828	1,849.66	0 35	159.1
16	.639	8.4	8	.67	40	207.8
17	.634	8.1	8	.67	45	263.0
18	.629	7.7	8	.68	50	324.6
19	.623	7.4	8	.68	55	392.8
37 20	24.618	1,477.1	30.828	1,849.69	1 00	467.5
21	.612	6.8	8	.69	05	548.6
22	.607	6.4	8	.70	10	636.3
23	.601	6.1	8	.71	15	730.4
24	.596	5.8	9	.71	20	831.1
37 25	24.590	1,475.4	30.829	1,849.72	1 25	938.2
26	.585	5.1	9	.72	30	1,051.8
27	.580	4.8	9	.73	35	1,171.9
28	.574	4.4	9	.73	40	1,298.5
29	.569	4.1	9	.74	45	1,431.6
37 30	24.563	1,473.8	30.829	1,849.74	1 50	1,571.2
31	.558	3.5	9	.75	55	1,717.3
32	.552	3.1	9	.75	2 00	1,870
33	.547	2.8	9	.76	3 00	4,207
34	.541	2.5	9	.76	4 00	7,479
37 35	24.536	1,472.2	30.829	1,849.77		
36	.530	1.8	30	.77		
37	.525	1.5	0	.78		
38	.519	1.2	0	.78		
39	.514	0.8	0	.79		
37 40	24.509	1,470.5	30.830	1,849.80		
41	.503	70.2	0	.80		
42	.498	69.9	0	.81		
43	.492	9.5	0	.81		
44	.487	9.2	0	.82		
37 45	24.481	1,468.9	30.830	1,849.82		
46	.476	8.5	0	.83		
47	.470	8.2	1	.83		
48	.465	7.9	1	.84		
49	.459	7.5	1	.84		
37 50	24.454	1,467.2	30.831	1,849.85		
51	.448	6.9	1	.85		
52	.443	6.6	1	.86		
53	.437	6.2	1	.86		
54	.432	5.9	1	.87		
37 55	24.426	1,465.6	30.831	1,849.88		
56	.421	5.2	1	.88		
57	.415	4.9	1	.89		
58	.410	4.6	2	.89		
59	.404	4.2	2	.90		
38 00	24.399	1,463.9	30.832	1,849.90		

Polyconic map projection table—Continued

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y coordinate of curvature, latitude 38°
	1″	1′	1″	1′		
° ′	*Meters*	*Meters*	*Meters*	*Meters*	° ′	*Meters*
38 00	24.399	1,463.9	30.832	1,849.90		
1	.393	3.6	2	.91	0 1	0.1
2	.387	3.2	2	.91	2	0.5
3	.382	2.9	2	.92	3	1.2
4	.376	2.6	2	.92	4	2.1
38 05	24.371	1,462.3	30.832	1,849.93	0 5	3.3
6	.365	1.9	2	.93	6	4.7
7	.360	1.6	2	.94	7	6.4
8	.354	1.3	2	.94	8	8.4
9	.349	0.9	2	.95	9	10.6
38 10	24.343	1,460.6	30.833	1,849.95	0 10	13.1
11	.338	60.3	3	.96	15	29.5
12	.332	59.9	3	.97	20	52.4
13	.327	9.6	3	.97	25	81.9
14	.321	9.3	3	.98	30	118.0
38 15	24.315	1,458.9	30.833	1,849.98	0 35	160.6
16	.310	8.6	3	.99	40	209.8
17	.304	8.3	3	49.99	45	265.5
18	.299	7.9	3	50.00	50	327.7
19	.293	7.6	3	.00	55	396.5
38 20	24.288	1,457.3	30.833	1,850.01	1 00	471.9
21	.282	6.9	4	.01	05	553.8
22	.276	6.6	4	.02	10	642.3
23	.271	6.3	4	.02	15	737.3
24	.265	5.9	4	.03	20	838.9
38 25	24.260	1,455.6	30.834	1,850.03	1 25	947.1
26	.254	5.3	4	.04	30	1,061.8
27	.249	4.9	4	.05	35	1,183.0
28	.243	4.6	4	.05	40	1,310.8
29	.237	4.2	4	.06	45	1,445.2
38 30	24.232	1,453.9	30.834	1,850.06	1 50	1,586.1
31	.226	3.6	4	.07	55	1,733.5
32	.221	3.2	5	.07	2 00	1,888
33	.215	2.9	5	.08	3 00	4,247
34	.210	2.6	5	.08	4 00	7,549
38 35	24.204	1,452.2	30.835	1,850.09		
36	.198	1.9	5	.09		
37	.193	1.6	5	.10		
38	.187	1.2	5	.10		
39	.182	0.9	5	.11		
38 40	24.176	1,450.6	30.835	1,850.11		
41	.170	0.2	5	.12		
42	.165	49.9	5	.13		
43	.159	9.6	6	.13		
44	.154	9.2	6	.14		
38 45	24.148	1,448.9	30.836	1,850.14		
46	.142	8.5	6	.15		
47	.137	8.2	6	.15		
48	.131	7.9	6	.16		
49	.125	7.5	6	.16		
38 50	24.120	1,447.2	30.836	1,850.17		
51	.114	6.9	6	.17		
52	.109	6.5	6	.18		
53	.103	6.2	6	.18		
54	.097	5.8	6	.19		
38 55	24.092	1,445.5	30.837	1,850.20		
56	.086	5.2	7	.20		
57	.080	4.8	7	.21		
58	.075	4.5	7	.21		
59	.069	4.1	7	.22		
39 00	24.063	1,443.8	30.837	1,850.22		

Polyconic map projection table—Continued

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	*Y* coordinate of curvature, latitude 39°
	1″	1′	1″	1′		
° ′	*Meters*	*Meters*	*Meters*	*Meters*	° ′	*Meters*
39 00	24.063	1,443.8	30.837	1,850.22		
1	.058	3.5	7	.23	0 1	0.1
2	.052	3.1	7	.23	2	0.5
3	.047	2.8	7	.24	3	1.2
4	.041	2.5	7	.24	4	2.1
39 05	24.035	1,442.1	30.837	1,850.25	0 5	3.3
6	.030	1.8	8	.25	6	4.8
7	.024	1.4	8	.26	7	6.5
8	.018	1.1	8	.26	8	8.5
9	.013	0.8	8	.27	9	10.7
39 10	24.007	1,440.4	30.838	1,850.28	0 10	13.2
11	.001	40.1	8	.28	15	29.7
12	3.996	39.7	8	.29	20	52.9
13	.990	9.4	8	.29	25	82.6
14	.984	9.1	8	.30	30	118.9
39 15	23.979	1,438.7	30.838	1,850.30	0 35	161.9
16	.973	8.4	8	.31	40	211.5
17	.967	8.0	9	.31	45	267.6
18	.962	7.7	9	.32	50	330.4
19	.956	7.4	9	.32	55	399.8
39 20	23.950	1,437.0	30.839	1,850.33	1 00	475.8
21	.944	6.7	9	.33	05	558.4
22	.939	6.3	9	.34	10	647.6
23	.933	6.0	9	.35	15	743.4
24	.927	5.6	9	.35	20	845.8
39 25	23.922	1,435.3	30.839	1,850.36	1 25	954.8
26	.916	5.0	9	.36	30	1,070.4
27	.910	4.6	9	.37	35	1,192.6
28	.905	4.3	40	.37	40	1,321.4
29	.899	3.9	0	.38	45	1,456.8
39 30	23.893	1,433.6	30.840	1,850.38	1 50	1,598.8
31	.888	3.3	0	.39	55	1,747.5
32	.882	2.9	0	.39	2 00	1,903
33	.876	2.6	0	.40	3 00	4,281
34	.870	2.2	0	.40	4 00	7,611
39 35	23.865	1,431.9	30.840	1,850.41		
36	.859	1.6	0	.42		
37	.853	1.2	0	.42		
38	.847	0.9	0	.43		
39	.842	0.5	1	.43		
39 40	23.836	1,430.2	30.841	1,850.44		
41	.830	29.8	1	.44		
42	.825	9.5	1	.45		
43	.819	9.1	1	.45		
44	.813	8.8	1	.46		
39 45	23.807	1,428.4	30.841	1,850.46		
46	.802	8.1	1	.47		
47	.796	7.8	1	.47		
48	.790	7.4	1	.48		
49	.784	7.1	1	.49		
39 50	23.779	1,426.7	30.842	1,850.49		
51	.773	6.4	2	.50		
52	.767	6.0	2	.50		
53	.761	5.7	2	.51		
54	.756	5.3	2	.51		
39 55	23.750	1,425.0	30.842	1,850.52		
56	.744	4.7	2	.52		
57	.738	4.3	2	.53		
58	.733	4.0	2	.53		
59	.727	3.6	2	.54		
40 00	23.721	1,423.3	30.842	1,850.54		

Polyconic map projection table—Continued

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	*Y* coordinate of curvature, latitude 40°
	1″	1′	1″	1′		
° ′	*Meters*	*Meters*	*Meters*	*Meters*	° ′	*Meters*
40 00	23.721	1,423.3	30.842	1,850.54		
1	.715	2.9	2	.55	0 1	0.1
2	.710	2.6	3	.56	2	0.5
3	.704	2.2	3	.56	3	1.2
4	.698	1.9	3	.57	4	2.1
40 05	23.692	1,421.5	30.843	1,850.57	0 5	3.3
6	.686	1.2	3	.58	6	4.8
7	.681	0.8	3	.58	7	6.5
8	.675	0.5	3	.59	8	8.5
9	.669	20.1	3	.59	9	10.8
40 10	23.663	1,419.8	30.843	1,850.60	0 10	13.3
11	.658	9.5	3	.60	15	29.9
12	.652	9.1	3	.61	20	53.2
13	.646	8.8	4	.61	25	83.2
14	.640	8.4	4	.62	30	119.8
40 15	23.634	1,418.1	30.844	1,850.63	0 35	163.0
16	.629	7.7	4	.63	40	212.9
17	.623	7.4	4	.64	45	269.4
18	.617	7.0	4	.64	50	332.6
19	.611	6.7	4	.65	55	402.5
40 20	23.605	1,416.3	30.844	1,850.65	1 00	479.0
21	.600	6.0	4	.66	05	562.2
22	.594	5.6	4	.66	10	652.0
23	.588	5.3	4	.67	15	748.5
24	.582	4.9	5	.67	20	851.6
40 25	23.576	1,414.6	30.845	1,850.68	1 25	961.4
26	.570	4.2	5	.68	30	1,077.8
27	.565	3.9	5	.69	35	1,200.8
28	.559	3.5	5	.70	40	1,330.5
29	.553	3.2	5	.70	45	1,466.9
40 30	23.547	1,412.8	30.845	1,850.71	1 50	1,609.9
31	.541	2.5	5	.71	55	1,759.6
32	.536	2.1	5	.72	2 00	1,916
33	.530	1.8	5	.72	3 00	4,311
34	.524	1.4	5	.73	4 00	7,663
40 35	23.518	1,411.1	30.846	1,850.73		
36	.512	0.7	6	.74		
37	.506	0.4	6	.74		
38	.501	10.0	6	.75		
39	.495	09.7	6	.76		
40 40	23.489	1,409.3	30.846	1,850.76		
41	.483	9.0	6	.77		
42	.477	8.6	6	.77		
43	.471	8.3	6	.78		
44	.465	7.9	6	.78		
40 45	23.460	1,407.6	30.846	1,850.79		
46	.454	7.2	7	.79		
47	.448	6.9	7	.80		
48	.442	6.5	7	.80		
49	.436	6.2	7	.81		
40 50	23.430	1,405.8	30.847	1,850.81		
51	.424	5.5	7	.82		
52	.419	5.1	7	.83		
53	.413	4.8	7	.83		
54	.407	4.4	7	.84		
40 55	23.401	1,404.1	30.847	1,850.84		
56	.395	3.7	7	.85		
57	.389	3.3	8	.85		
58	.383	3.0	8	.86		
59	.377	2.6	8	.86		
41 00	23.372	1,402.3	30.848	1,850.87		

Polyconic map projection table—Continued

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y coordinate of curvature, latitude 41°
	1″	1′	1″	1′		
° ′	*Meters*	*Meters*	*Meters*	*Meters*	° ′	*Meters*
41 00	23.372	1,402.3	30.848	1,850.87		
1	.366	1.9	8	.87	0 1	0.1
2	.360	1.6	8	.88	2	0.5
3	.354	1.2	8	.89	3	1.2
4	.348	0.9	8	.89	4	2.1
41 05	23.342	1,400.5	30.848	1,850.90	0 5	3.3
6	.336	1,400.2	8	.90	6	4.8
7	.330	1,399.8	8	.91	7	6.6
8	.324	9.5	9	.91	8	8.6
9	.318	9.1	9	.92	9	10.8
41 10	23.313	1,398.8	30.849	1,850.92	0 10	13.4
11	.307	8.4	9	.93	15	30.1
12	.301	8.0	9	.93	20	53.5
13	.295	7.7	9	.94	25	83.6
14	.289	7.3	9	.95	30	120.4
41 15	23.283	1,397.0	30,849	1,850.95	0 35	163.9
16	.277	6.6	9	.96	40	214.1
17	.271	6.3	9	.96	45	270.9
18	.265	5.9	30.849	.97	50	334.5
19	.259	5.6	30.850	.97	55	404.7
41 20	23.253	1,395.2	30.850	1,850.98	1 00	481.7
21	.247	4.8	0	.98	05	565.3
22	.241	4.5	0	.99	10	655.6
23	.236	4.1	0	1,850.99	15	752.6
24	.230	3.8	0	1,851.00	20	856.3
41 25	23.224	1,393.4	30.850	1,851.01	1 25	966.7
26	.218	3.1	0	.01	30	1,083.8
27	.212	2.7	0	.02	35	1,207.6
28	.206	2.4	0	.02	40	1,338.0
29	.200	2.0	0	.03	45	1,475.1
41 30	23.194	1,391.6	30.851	1,851.03	1 50	1,619.0
31	.188	1.3	1	.04	55	1,769.5
32	.182	0.9	1	.04	2 00	1,927
33	.176	0.6	1	.05	3 00	4,335
34	.170	1,390.2	1	.05	4 00	7,706
41 35	23.164	1,389.9	30.851	1,851.06		
36	.158	9.5	1	.07		
37	.152	9.1	1	.07		
38	.146	8.8	1	.08		
39	.140	8.4	1	.08		
41 40	23.134	1,388.1	30.851	1,851.09		
41	.128	7.7	2	.09		
42	.122	7.3	2	.10		
43	.117	7.0	2	.10		
44	.111	6.6	2	.11		
41 45	23.105	1,386.3	30.852	1,851.11		
46	.099	5.9	2	.12		
47	.093	5.6	2	.12		
48	.087	5.2	2	.13		
49	.081	4.8	2	.14		
41 50	23.075	1,384.5	30.852	1,851.14		
51	.069	4.1	2	.15		
52	.063	3.8	3	.15		
53	.057	3.4	3	.16		
54	.051	3.0	3	.16		
41 55	23.045	1,382.7	30.853	1,851.17		
56	.039	2.3	3	.17		
57	.033	2.0	3	.18		
58	.027	1.6	3	.18		
59	.021	1.2	3	.19		
42 00	23.015	1,380.9	30.853	1,851.20		

Polyconic map projection table—Continued

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	*Y* coordinate of curvature	
	1″	1′	1″	1′		Lat. 42°	Lat. 43°
° ′	*Meters*	*Meters*	*Meters*	*Meters*	° ′	*Meters*	*Meters*
42 00	23.015	1,380.9	30.853	1,851.20			
1	.009	0.5	3	.20	0 1	0.1	0.1
2	23.003	1,380.2	3	.21	2	0.5	0.5
3	22.997	1,379.8	4	.21	3	1.2	1.2
4	.991	9.4	4	.22	4	2.2	2.2
42 05	22.985	1,379.1	30.854	1,851.22	0 5	3.4	3.4
6	.979	8.7	4	.23	6	4.8	4.9
7	.973	8.4	4	.23	7	6.6	6.6
8	.967	8.0	4	.24	8	8.6	8.6
9	.961	7.6	4	.24	9	10.9	10.9
42 10	22.955	1,377.3	30.854	1,851.25	0 10	13.4	13.5
11	.949	6.9	4	.26	15	30.2	30.3
12	.942	6.5	4	.26	20	53.8	53.9
13	.936	6.2	4	.27	25	84.0	84.3
14	.930	5.8	5	.27	30	120.9	121.3
42 15	22.924	1,375.5	30.855	1,851.28	0 35	164.6	165.1
16	.918	5.1	5	.28	40	215.0	215.7
17	.912	4.7	5	.29	45	272.1	273.0
18	.906	4.4	5	.29	50	336.0	337.0
19	.900	4.0	5	.30	55	406.5	407.8
42 20	22.894	1,373.7	30.855	1,851.30	1 00	483.8	485.3
21	.888	3.3	5	.31	05	567.8	569.6
22	.882	2.9	5	.32	10	658.5	660.5
23	.876	2.6	5	.32	15	755.9	758.3
24	.870	2.2	5	.33	20	860.1	862.8
42 25	22.864	1,371.8	30.856	1,851.33	1 25	971.0	974.0
26	.858	1.5	6	.34	30	1,088.5	1,091.9
27	.852	1.1	6	.34	35	1,212.8	1,216.6
28	.846	0.7	6	.35	40	1,343.8	1,348.0
29	.840	0.4	6	.35	45	1,481.6	1,486.2
42 30	22.834	1,370.0	30.856	1,851.36	1 50	1,626.1	1,631.1
31	.828	1,369.7	6	.37	55	1,777.2	1,782.8
32	.822	9.3	6	.37	2 00	1,935	1,941
33	.815	8.9	6	.38	3 00	4,354	4,367
34	.809	8.6	6	.38	4 00	7,739	7,763
42 35	22.803	1,368.2	30.856	1,851.39			
36	.797	7.8	7	.39			
37	.791	7.5	7	.40			
38	.785	7.1	7	.40			
39	.779	6.7	7	.41			
42 40	22.773	1,366.4	30.857	1,851.41			
41	.767	6.0	7	.42			
42	.761	5.6	7	.43			
43	.755	5.3	7	.43			
44	.749	4.9	7	.44			
42 45	22.742	1,364.5	30.857	1,851.44			
46	.736	4.2	7	.45			
47	.730	3.8	8	.45			
48	.724	3.5	8	.46			
49	.718	3.1	8	.46			
42 50	22.712	1,362.7	30.858	1,851.47			
51	.706	2.4	8	.47			
52	.700	2.0	8	.48			
53	.694	1.6	8	.49			
54	.688	1.3	8	.49			
42 55	22.681	1,360.9	30.858	1,851.50			
56	.675	0.5	8	.50			
57	.669	1,360.2	8	.51			
58	.663	1,359.8	9	.51			
59	.657	9.4	9	.52			
43 00	22.651	1,359.1	30.859	1,851.52			

EXPLANATION OF TABLES OF POSITIONS

In the tables of positions the latitude and longitude of each point are given on the North American datum of 1927, and there are also given for all except the intersection points the length and azimuth of each line observed over, whether in one or both directions. Along with the latitude and longitude of each point the lengths and azimuths are given of lines from that point to other points of the scheme. No lengths and azimuths are repeated, and for a given line the length and azimuth will be found opposite the position of the one or the other of the two stations involved.

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

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

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

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

EXPLANATION OF LENGTHS

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

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

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

AZIMUTH AND BACK AZIMUTH

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

Because of the convergence of the meridians, the azimuth and the back azimuth of a line do not differ by exactly 180°, the amount of the divergence varying with the latitude and the difference of longitude of the two ends of the line. To illustrate from the tables, on page 21 the azimuth from Pikes Peak to Divide is 240° 47′ 50″.73, while the back azimuth, or the azimuth from Divide to Pikes Peak, is 61° 07′ 53″.22.

The azimuths of the triangulation lines offer a very convenient and accurate means of testing the deflection of the magnetic needle on a surveyor's transit, and even the azimuth over such short distances as those between a station mark and its reference mark may be used for this purpose with fair accuracy provided the distance is greater than 100 feet.

GEOGRAPHIC POSITIONS

Thirty-ninth parallel

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Principal points	° ′ ″	° ′ ″	° ′ ″				
Curlew (Kans.), 1891	38 50 25.881 101 46 56.672						
McLane (Kans.), 1891	39 01 54.168 101 57 49.351	323 25 03.28	143 31 53.46	Curlew	4.4218005	26,411.95	86,653.2
Arapahoe, 1891	38 46 01.280 102 05 43.859	201 13 18.64 253 12 12.61	21 18 16.61 73 23 58.97	McLane Curlew	4.4987257 4.4532615	31,530.12 28,396.28	103,445.1 93,163.5
Monotony, 1891	39 01 44.503 102 14 58.628	269 13 13.12 297 10 20.23 335 15 59.01	89 24 01.29 117 27 57.24 155 21 47.37	McLane Curlew Arapahoe	4.3937367 4.6589314 4.5052986	24,759.21 45,596.49 32,010.96	81,230.8 149,594.5 105,022.6
Cheyenne Wells, 1892	38 57 03.302 102 24 01.676	236 23 20.46 307 32 41.50	56 29 02.14 127 44 10.28	Monotony Arapahoe	4.1954716 4.5241016	15,684.53 33,427.32	51,458.3 109,669.5
First View, 1892	38 47 42.549 102 32 55.339	216 36 08.14 224 52 56.77 274 23 31.04	36 41 43.06 45 04 13.08 94 40 32.91	Cheyenne Wells Monotony Arapahoe	4.3334928 4.5646892 4.5966343	21,552.26 36,701.96 39,503.38	70,709.4 120,413.0 129,604.0
Landsman, 1892	38 56 52.179 102 35 15.076	252 46 48.15 268 43 46.05 348 44 47.48	72 59 33.50 88 50 49.37 168 46 15.18	Monotony Cheyenne Wells First View	4.4861909 4.2100375 4.2375467	30,633.10 16,219.50 17,280.12	100,502.1 53,213.5 56,693.2
Kit Carson, 1881	38 42 07.350 102 51 35.052	220 49 14.30 248 58 57.89	40 59 28.69 69 10 38.73	Landsman First View	4.5575196 4.4616106	36,101.03 28,947.47	118,441.5 94,971.8
Eureka, 1881	38 58 39.832 102 51 46.045	277 50 04.72 306 32 26.31 359 30 09.71	98 00 27.86 126 44 16.15 179 30 16.61	Landsman First View Kit Carson	4.3818099 4.5310051 4.4857996	24,088.51 33,962.93 30,605.51	79,030.4 111,426.7 100,411.6
Aroya, 1881	38 48 09.721 103 10 55.580	234 51 22.31 291 38 16.84	55 03 24.02 111 50 23.28	Eureka Kit Carson	4.5294178 4.4795613	33,839.02 30,169.03	111,020.2 98,979.6
Overland, 1881	39 02 20.055 103 10 15.628	284 10 28.83 324 03 29.63 2 06 20.17	104 22 07.23 144 15 12.86 182 05 55.07	Eureka Kit Carson Aroya	4.4400821 4.6640030 4.4189486	27,547.49 46,132.07 26,239.08	90,378.7 151,351.6 86,086.0

GEOGRAPHIC POSITIONS—Continued

Thirty-ninth parallel—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Principal points—Continued	° ′ ″	° ′ ″	° ′ ″				
Adobe, 1881	38 40 40.553	219 35 54.90	39 50 21.15	Overland	4.7168040	52,095.95	170,918.0
	103 33 16.320	246 43 31.04	66 57 30.07	Aroya	4.5467681	35,218.28	115,545.3
Hugo, 1880	39 04 32.812	4 36 37.64	184 35 05.16	Adobe	4.6464844	44,308.23	145,367.9
	103 30 48.981	277 45 07.41	97 58 04.54	Overland	4.4761948	29,936.07	98,215.3
		316 25 18.31	136 37 48.36	Aroya	4.6209115	41,774.52	137,055.2
Square Bluffs, 1880	38 51 08.039	227 38 48.69	47 50 42.18	Hugo	4.5671018	36,906.41	121,083.8
	103 49 43.612	308 58 55.73	129 09 13.90	Adobe	4.4871502	30,700.84	100,724.3
Cramer Gulch, 1880	38 35 35.824	197 16 15.44	17 20 07.33	Square Bluffs	4.4786804	30,107.90	98,779.0
	103 55 54.307	253 55 02.63	74 09 10.51	Adobe	4.5335494	34,162.48	112,081.4
Big Springs, 1880	38 45 06.142	253 00 28.78	73 16 25.05	Square Bluffs	4.5852109	38,477.86	126,239.4
	104 15 09.657	302 05 47.02	122 17 48.96	Cramer Gulch	4.5185774	33,004.82	108,283.3
Holcolm Hills, 1880	39 00 07.864	291 19 34.79	111 37 58.26	Square Bluffs	4.6576343	45,460.51	149,148.4
	104 18 59.797	348 41 49.04	168 44 13.48	Big Springs	4.4526115	28,353.82	93,024.2
Holt, 1880	39 02 20.674	82 18 22.85	262 05 20.61	Holcolm Hills	4.4795480	30,168.10	98,976.5
	103 58 17.354	263 59 08.75	84 16 27.39	Hugo	4.6003460	39,842.45	130,716.4
		329 08 25.24	149 13 48.17	Square Bluffs	4.3829419	24,151.38	79,236.7
Divide, 1879	39 04 14.962	294 08 33.94	114 15 57.84	Holcolm Hills	4.2691668	18,585.18	60,974.9
	104 30 44.601	327 28 02.25	147 37 49.50	Big Springs	4.6230518	41,980.90	137,732.3
El Paso east base, 1879	38 57 21.989	160 58 29.08	340 56 34.08	Divide	4.1294326	13,472.02	44,199.5
	104 27 41.915	247 48 28.68	67 53 57.12	Holcolm Hills	4.1325393	13,568.73	44,516.7
		321 17 43.17	141 25 35.09	Big Springs	4.4631447	29,049.91	95,307.9
El Paso west base, 1879	38 58 42.840	212 48 05.96	32 50 58.90	Divide	4.0859253	12,187.80	39,986.1
	104 35 19.255	263 34 03.55	83 44 19.82	Holcolm Hills	4.3750729	23,717.72	77,813.9
		282 43 08.67	102 47 56.28	El Paso east base	4.0526549	11,288.984	37,037.27
Corral Bluffs, 1879	38 52 11.332	181 42 50.44	1 42 59.87	El Paso west base	4.0820015	12,078.18	39,626.5
	104 35 34.263	197 19 42.73	17 22 44.91	Divide	4.3688191	23,378.63	76,701.4
		229 52 08.53	49 57 05.23	El Paso east base	4.1724694	14,875.42	48,803.8
		238 23 01.74	58 33 26.72	Holcolm Hills	4.4487101	28,100.25	92,192.2
		293 49 20.39	114 02 07.91	Big Springs	4.5095383	32,324.99	106,052.9
Pikes Peak, 1879	38 50 25.926	240 47 50.73	61 07 53.22	Divide	4.7215815	52,672.20	172,808.7
	105 02 37.191	277 55 06.22	98 24 49.36	Big Springs	4.8414942	69,421.53	227,760.5
Plateau, 1894	38 23 32.079	139 35 58.54	319 17 40.07	Pikes Peak	4.8162005	65,493.85	214,874.4
	104 33 17.136	176 25 54.42	356 24 28.81	Corral Bluffs	4.7252331	53,116.95	174,267.9
		213 19 14.91	33 30 32.95	Big Springs	4.6794623	47,803.79	156,836.3
Bison, 1894	39 14 18.100	282 00 47.01	102 38 05.73	Divide	4.9402136	87,139.20	285,889.2
	105 29 50.118	318 12 45.17	138 29 53.68	Pikes Peak	4.7715845	59,099.59	193,895.9
Mount Ouray, 1894	38 25 21.777	214 39 15.39	35 06 36.29	Bison	5.0428680	110,374.31	362,119.7
	106 13 27.018	245 20 50.77	66 05 04.05	Pikes Peak	5.0521999	112,771.64	369,985.0
		270 48 36.44	91 50 50.24	Plateau	5.1639197	145,854.46	478,524.2
Mount Elbert, 1894	39 07 03.926	260 24 49.27	81 00 44.18	Bison	4.9188871	82,963.51	272,189.4
	106 26 41.198	283 46 56.05	104 39 49.01	Pikes Peak	5.0977788	125,250.32	410,925.4
		345 58 33.82	166 06 51.14	Mount Ouray	4.9003784	79,502.06	260,833.0
Treasury Mountain, 1893	39 00 51.430	258 19 00.84	78 43 43.89	Mount Elbert	4.7613915	57,728.67	189,398.1
	107 05 54.435	310 32 28.43	131 05 17.16	Mount Ouray	5.0020284	100,468.15	329,619.3
Uncompahgre, 1895	38 04 17.953	196 42 57.81	16 56 32.15	Treasury Mountain	5.0386911	109,317.86	358,653.7
	107 27 41.309	217 01 09.36	37 39 12.69	Mount Elbert	5.1644901	146,046.14	479,153.0
		249 49 49.96	70 35 47.48	Mount Ouray	5.0611036	115,107.49	377,648.5
Mount Waas (Utah), 1893	38 32 20.856	253 25 12.13	74 45 11.93	Treasury Mountain	5.2840969	192,352.08	631,075.1
	109 13 37.750	288 01 21.49	109 07 01.77	Uncompahgre	5.2119820	162,922.85	534,522.7
Tavaputs, 1891	39 32 23.278	288 55 07.42	110 07 33.27	Treasury Mountain	5.2419586	174,565.58	572,720.6
	109 00 18.715	320 04 00.66	141 02 03.79	Uncompahgre	5.3243760	211,045.44	692,404.9
		9 53 03.60	189 44 40.30	Mount Waas	5.0520720	112,738.44	369,876.0
Patmos Head (Utah), 1890	39 30 07.840	267 27 38.50	88 17 41.33	Tavaputs	5.0522550	112,785.95	370,031.9
	110 18 57.354	318 14 42.17	138 55 50.08	Mount Waas	5.1539658	142,549.54	467,681.3
Mount Ellen (Utah), 1891	38 07 16.462	195 35 58.78	15 54 42.38	Patmos Head	5.2021633	159,280.77	522,573.7
	110 48 49.923	251 01 21.57	72 00 24.37	Mount Waas	5.1652075	146,287.60	479,945.2
		270 02 15.20	92 06 22.69	Uncompahgre	5.4685033	294,105.61	964,911.5
Supplementary points							
Weskan schoolhouse cupola (Kans.), 1891	38 51 56.430	226 02 49.0	46 10 38.6	Turtle	4.397361	24,966.7	81,912
	101 57 52.921	279 56 58.8	100 03 50.4	Curlew	4.205981	16,068.7	52,719
Kansas and Colorado boundary mark 73½, 1891.	38 55 30.789	292 18 38.2	112 28 32.5	Curlew	4.392352	24,680.4	80,972
	102 02 43.409	13 55 58.9	193 54 05.7	Arapahoe	4.257502	18,092.6	59,359
Kansas and Colorado boundary mark 78, 1891.	38 52 53.773	23 22 51.2	203 20 28.4	Arapahoe	4.141621	13,855.5	45,458
	102 01 56.108	131 02 44.2	310 54 32.2	Monotony	4.397198	24,957.3	81,881

GEOGRAPHIC POSITIONS—Continued

Thirty-ninth parallel—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
Kansas and Colorado boundary mark 68, 1891	39 00 22.404	248 16 59.8	68 20 06.9	McLane	3.884016	7,656.2	25,119
	102 02 45.067	308 45 23.2	128 55 19.1	Curlew	4.467330	29,331.2	96,231
Kansas and Colorado boundary mark 83, 1891	38 47 09.050	179 51 14.7	359 51 13.7	Kansas and Colorado boundary mark 73½	4.189541	15,471.8	50,760
	102 02 41.773	255 00 44.4	75 10 36.8	Curlew	4.372840	23,596.1	77,415
Chemung schoolhouse cupola, 1880 [1]	38 51 22.73	7 34 48	187 34 14	Arapahoe	3.999984	9,999.6	32,807
	102 04 49.22	142 37 14	322 30 52	Monotony	4.382838	24,145.6	79,218
Subsidiary, 1880	39 05 51.427	281 22 01.4	101 36 02.5	Overland	4.515069	32,739.3	107,412
	103 32 30.211	314 53 20.2	134 54 24.0	Hugo	3.535878	3,434.6	11,268
First View, section house chimney, 1881	38 49 02.102	65 19 32.2	245 07 33.7	Kit Carson	4.484582	30,519.8	100,130
	102 32 27.346	122 38 23.0	302 26 15.5	Eureka	4.520113	33,121.7	108,667
Aroya, section house chimney, 1881 [1]	38 51 20.36	35 08 06	215 06 19	Aroya	3.856540	7,186.9	23,579
	103 08 04.17	171 09 59	351 08 37	Overland	4.313609	20,587.8	67,545
Hugo, schoolhouse chimney, 1880 [1]	39 08 03.26	27 24 29	207 23 01	Hugo	3.863886	7,309.5	23,981
	103 28 29.00	54 58 09	234 55 36	Subsidiary	3.849950	7,078.6	23,224
Hugo, section house chimney, 1880 [1]	39 07 57.83	33 12 27	213 10 38	Hugo	3.878228	7,554.9	24,786
	103 27 56.85	59 20 00	239 17 08	Subsidiary	3.882919	7,636.9	25,055
Coulson's house, main chimney, 1880 [1]	39 08 00.25	29 20 59	209 19 24	Hugo	3.865581	7,338.1	24,075
	103 28 19.36	56 37 46	236 35 08	Subsidiary	3.858429	7,218.2	23,682
Dry Camp, 1895	38 33 45.720	58 01 49.0	237 48 54.0	Plateau	4.551800	35,628.7	116,892
	104 12 31.675	169 41 42.9	349 40 04.2	Big Springs	4.328906	21,325.8	69,966
Munson and Hamlin's barn, west gable, 1879	38 57 33.810	14 35 17.8	194 35 15.3	El Paso east base	2.575962	376.7	1,236
	104 27 37.975	100 53 29.3	280 48 39.2	El Paso west base	4.053348	11,307.0	37,096
Eastonville, church spire, 1895 [1]	39 03 33.81	254 46 48	74 48 50	Divide	3.684716	4,838.6	15,875
	104 33 58.82	321 21 44	141 33 33	Big Springs	4.640168	43,668.5	143,269
Eastonville, creamery tower, 1895 [1]	39 03 43.42	256 11 12	76 12 56	Divide	3.610486	4,078.4	13,381
	104 33 29.35	322 20 27	142 31 58	Big Springs	4.638126	43,463.6	142,597
Glen Eyrie, 1880	38 53 58.976	252 20 28.4	72 32 30.3	El Paso west base	4.462631	29,015.6	95,195
	104 54 27.885	276 49 40.0	97 01 31.6	Corral Bluffs	4.439711	27,524.0	90,302
Bear Creek, 1880	38 48 56.813	170 10 39.6	350 09 57.6	Glen Eyrie	3.975722	9,456.3	31,025
	104 53 20.941	235 10 25.8	55 21 45.0	El Paso west base	4.501306	31,718.0	104,061
Colorado Springs latitude and longitude, 1873	38 50 02.870	69 31 21.4	249 28 59.8	Bear Creek	3.764707	5,817.1	19,085
	104 49 35.061	135 54 31.4	315 51 27.6	Glen Eyrie	4.006091	10,141.2	33,272
Colorado Springs, astronomic (U. S. E.), 1873	38 49 43.540	74 31 53.4	254 29 38.3	Bear Creek	3.732066	5,395.9	17,703
	104 49 45.384	139 10 29.4	319 07 32.1	Glen Eyrie	4.017577	10,413.0	34,163
Pennington's large white house, center chimney, 1879	38 58 47.480	320 50 41.0	140 55 00.1	Corral Bluffs	4.197156	15,745.5	51,658
	104 42 26.669	62 56 31.4	242 48 58.1	Glen Eyrie	4.290379	19,515.5	64,027
Colorado Springs, college cupola, 1879	38 50 52.775	9 29 16.7	189 29 07.4	Colorado Springs astronomic (U. S. E.)	3.335371	2,164.6	7,102
	104 49 30.592	57 15 19.4	237 12 55.0	Bear Creek	3.820025	6,607.3	21,677
Colorado Springs, public schoolhouse, flagstaff on clock tower, 1879	38 50 11.063	26 52 21.3	206 52 10.1	Colorado Springs astronomic (U. S. E.)	2.978387	951.5	3,122
	104 49 27.555	67 53 21.9	247 50 55.6	Bear Creek	3.783729	6,077.6	19,940
Monte Rosa, 1879	38 45 14.860	138 57 04.7	318 53 27.6	Pikes Peak	4.104650	12,724.8	41,748
	104 56 50.704	226 53 14.0	47 09 37.7	Divide	4.712418	51,572.5	169,201
Vertical circle No. 2, 1879 [1]	38 50 24.10	319 12 52	139 16 25	Monte Rosa	4.099974	12,588.5	41,301
	105 02 31.26	111 28 02	291 27 58	Pikes Peak	2.186845	153.8	505
Colorado Springs, north telegraph pole, 1879	38 50 01.605	49 31 48.6	229 27 19.9	Monte Rosa	4.133945	13,612.7	44,661
	104 49 41.830	92 12 28.1	272 04 25.6	Vertical circle No. 2	4.268824	18,570.5	60,927
Colorado Springs, south telegraph pole, 1879	38 50 00.113	49 40 22.5	229 35 53.8	Monte Rosa	4.132949	13,581.5	44,559
	104 49 41.904	92 20 59.5	272 12 57.0	Vertical Circle No. 2	4.268825	18,570.6	60,927
Telegraph pole, 1879 [1]	38 50 24.30	66 37 29	246 37 29	Vertical Circle No. 2	1.196270	15.7	52
	105 02 30.66	107 37 23	287 37 19	Pikes Peak	2.218204	165.3	542
Chimney, 1879	38 50 24.642	36 03 04	216 03 04	Vertical Circle No. 2	1.314735	20.6	68
	105 02 30.754	104 18 16	284 18 12	Pikes Peak	2.204685	160.2	526
Table, 1895	39 14 02.344	343 07 15.2	163 09 39.5	Divide	4.277084	18,927.1	62,097
	104 34 33.206	42 59 10.1	222 41 29.4	Pikes Peak	4.775000	59,566.2	195,427
Mount Harvard, cairn, 1894	38 55 27.911	351 26 06.6	171 29 42.7	Mount Ouray	4.750634	56,316.3	184,764
	106 19 12.761	46 48 06.6	226 05 29.0	Uncompahgre	5.137911	137,376.0	450,708
Leadville, Ninth Street, schoolhouse cupola, 1894 [1]	39 15 04.79	4 10 46	184 09 37	Mount Harvard	4.560961	36,388.2	119,384
	106 17 22.67	42 09 43	222 03 51	Mount Elbert	4.300807	19,989.7	65,583
Gunnison, azimuth, 1894	38 32 46.141	282 25 45.9	102 51 53.7	Mount Ouray	4.796435	62,579.9	205,314
	106 55 26.360	41 55 05.1	221 35 05.6	Uncompahgre	4.848792	70,597.9	231,620

[1] No check on this position.

GEOGRAPHIC POSITIONS—Continued

Thirty-ninth parallel—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
Gunnison, longitude pier, 1894	38 32 46.60 106 55 26.36	359 50	179 50	Gunnison, azimuth	1.148664	14.082	46.2
Mesa, 1893	38 54 00.921 108 10 43.712	66 35 38.1 135 06 47.7	245 56 17.4 314 35 26.5	Mount Waas Tavaputs	4.998246 5.002892	99,596.9 100,668.1	326,761 330,275
Chiquita, 1895	38 54 37.674 108 39 06.175	156 30 41.1 271 26 02.5	336 17 16.3 91 43 51.8	Tavaputs Mesa	4.882205 4.613179	76,243.9 41,037.3	250,144 134,637
Grand Junction, standpipe, 1895	39 04 17.967 108 33 35.908	299 49 40.8 23 58 43.5	120 04 04.1 203 55 15.7	Mesa Chiquita	4.581102 4.291820	38,115.5 19,580.3	125,051 64,240
Grand Junction, electric power house smokestack, 1895.	39 03 46.979 108 33 46.958	298 22 20.1 24 25 31.1	118 36 50.3 204 22 10.3	Mesa Chiquita	4.578443 4.269509	37,882.9 18,599.8	124,287 61,023
Grand Junction, telegraph longitude station, 1895.	39 03 54.613 108 33 52.920	328 39 39.2 23 43 41.7	148 39 42.9 203 40 24.6	Grand Junction, electric power house smokestack. Chiquita	2.440289 4.273146	275.6 18,756.2	904 61,536
Divide, 1891	39 34 19.203 108 58 38.521	33 47 40.2 44 36 54.7	213 46 36.4 224 35 46.6	Tavaputs Summit	3.633626 3.560346	4,301.6 3,633.7	14,113 11,922
East Peak, 1891	39 31 44.772 109 01 09.967	88 52 36.2 225 51 41.3	268 03 06.3 45 52 13.9	Patmos Head Tavaputs	5.047403 3.231819	111,532.9 1,705.4	365,921 5,595
Spur, 1891	39 32 45.611 109 00 44.770	317 54 19.7 17 46 58.4	137 54 36.3 197 46 42.4	Tavaputs East Peak	2.967617 3.294551	928.1 1,970.4	3,045 6,465
Summit, 1891	39 32 55.318 109 00 25.407	350 48 47.4 57 04 39.1	170 48 51.7 237 04 26.8	Tavaputs Spur	3.000416 2.740990	1,001.0 550.8	3,284 1,807
Tavaputs south base, 1891	39 32 25.313 109 00 30.504	151 26 45.3 282 34 07.3	331 26 36.2 102 34 14.8	Spur Tavaputs	2.852889 2.460028	712.7 288.4	2,338 946
Tavaputs north base, 1891	39 32 32.316 109 00 22.747	340 56 38.9 40 37 14.3	160 56 41.5 220 37 09.4	Tavaputs Tavaputs south base	2.469654 2.454102	294.9 284.51	968 933.4

Flat Top, 1891	39 32 34.093 108 50 23.237	88 42 32.4 105 22 29.2	268 36 13.3 285 17 13.9	Tavaputs Divide	4.153003 4.088508	14,223.4 12,260.5	46,665 40,225
Mount Peale (Utah), 1893	38 26 18.493 109 13 42.657	180 36 33.8 240 22 31.4	0 36 36.9 61 01 52.6	Mount Waas Mesa	4.048203 5.020172	11,173.9 104,754.3	36,660 343,681
La Salle, northwest peak, cairn (Utah), 1893	38 32 47.422 109 13 58.101	328 57 53.2 358 12 39.9	148 58 05.9 178 12 49.5	Mount Waas Mount Peale	2.980453 4.079117	956.0 11,998.2	3,136 39,364
La Salle, north peak, cairn (Utah), 1893	38 33 01.600 109 13 40.891	356 32 04.0 43 37 51.8	176 32 06.0 223 37 41.1	Mount Waas La Salle, northwest peak cairn	3.099896 2.781019	1,258.6 604.0	4,129 1,982
C. V. South, cairn (Utah), 1893	38 31 38.021 109 13 58.902	201 11 56.0 357 42 36.1	21 12 09.2 177 42 46.2	Mount Waas Mount Peale	3.151272 3.993890	1,416.7 9,860.3	4,648 32,350
C. V. North, cairn (Utah), 1893	38 32 04.111 109 14 04.320	231 15 25.8 357 10 39.3	51 15 42.4 177 10 52.8	Mount Waas Mount Peale	2.916474 4.028158	825.0 10,669.8	2,707 35,006
Colorado-Utah, north boundary flag, 1893	38 33 57.395 109 03 33.658	78 32 58.6 81 55 57.8	258 26 42.1 261 49 28.6	Mount Waas La Salle, northwest peak cairn	4.173987 4.183920	14,927.5 15,272.8	48,925 50,108
Colorado-Utah, north boundary stone, 1893 [1]	38 33 56.41 109 03 33.66	180	0	Colorado-Utah, north boundary flag	1.484015	30.48	100.0
Colorado-Utah, middle boundary monument, 1893.[1]	38 30 43.62 109 03 33.76	101 38 00 106 11 18	281 31 43 286 05 00	Mount Waas La Salle, north peak cairn	4.174195 4.184936	14,934.6 15,308.6	48,998 50,225
Colorado-Utah, south boundary, 1893	38 27 46.155 109 03 33.522	120 06 07.5 123 30 52.3	299 59 51.4 303 24 34.2	Mount Waas La Salle, north peak cairn	4.228271 4.246504	16,915.0 17,640.2	55,495 57,875
Middle La Salle Peak (Utah), 1893	38 27 47.674 109 13 59.783	75 08 21.1 183 37 29.2	254 09 35.0 3 37 42.9	Mount Ellen Mount Waas	5.156526 3.926358	143,392.3 8,440.3	470,446 27,691
Mount Waas azimuth mark cairn (Utah), 1893.	38 26 22.184 109 15 32.972	119 33 21.3 194 09 39.1	299 23 02.4 14 10 50.8	Moab Mount Waas	4.441992 4.057152	27,668.9 11,406.5	90,777 37,423
Thompsons Springs, west tank (Utah), 1893	38 58 17.832 109 42 54.532	318 23 05.6 323 15 00.8	138 41 25.4 143 33 05.9	Mount Waas Middle La Salle Peak	4.806624 4.846915	64,065.5 70,293.5	210,188 230,621
Thompsons Springs, east tank (Utah), 1893 [1]	38 58 16.69 109 42 48.61	103 55 27	283 55 24	Thompsons Springs, west tank	2.166957	146.878	481.88
Moab (Warner's ranch) (Utah), 1893	38 33 43.647 109 ′2 07.082	275 19 57.6 297 03 26.0	95 31 29.0 117 14 53.5	Mount Waas Mount Peale	4.431098 4.478233	26,983.5 30,076.9	88,528 98,677
Moab ditch mark (Utah), 1893[1]	38 33 44.66 109 32 06.96	5 21 00	185 21 00	Moab (Warner's ranch)	1.496750	31.387	102.98
Valley Knob (Utah), 1890	38 59 05.057 110 04 17.941	159 55 05.4 303 42 42.0	339 45 49.1 124 14 25.4	Patmos Head Mount Waas	4.786707 4.947012	61,193.7 88,514.0	200,766 290,400

[1] No check on this position.

GEOGRAPHIC POSITIONS—Continued

Thirty-ninth parallel—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
Hartman (Utah), 1898	39 01 49.230 110 09 54.340	301 59 43.3	122 03 15.0	Valley Knob	3.979864	9,546.9	31,322
Mica (Utah), 1898	38 59 05.372 110 10 04.183	182 40 57.3 270 02 11.0	2 41 03.5 90 05 48.8	Hartman Valley Knob	3.704018 3.920831	5,058.5 8,333.6	16,596 27,341
Reservoir (Utah), 1898	38 59 29.362 110 09 58.651	181 22 38.5 275 11 33.0	1 22 41.2 95 15 07.3	Hartman Valley Knob	3.634918 3.915623	4,314.4 8,234.2	14,155 27,015
Wash (Utah), 1898	39 00 10.099 110 11 27.006	216 05 38.9 315 01 58.9	36 06 37.2 135 02 51.0	Hartman Mica	3.577892 3.450366	3,783.5 2,820.8	12,413 9,255
Green River east base (Utah), 1898	38 59 36.921 110 10 14.739	120 28 31.6 186 51 26.4	300 27 46.1 6 51 39.2	Wash Hartman	3.304849 3.613783	2,017.7 4,109.4	6,620 13,482
Green River west base (Utah), 1898	38 59 35.596 110 11 02.839	151 20 28.0 267 58 25.6	331 20 12.8 87 58 55.9	Wash Green River east base	3.083697 3.063808	1,212.5 1,158.3	3,978 3,800
Green River, north meridian (Utah), 1898	38 59 49.971 110 09 55.059	105 40 43.1 180 16 09.6	285 39 45.2 0 16 10.0	Wash Hartman	3.361345 3.565572	2,298.0 3,677.7	7,539 12,066
Green River, south meridian (Utah), 1898 [1]	38 59 30.02 110 09 55.06	76 46 03 180 00 00	256 46 01 0 00 00	Reservoir Green River, north meridian	1.948533 2.788994	88.8 615.2	291 2,018
Green River, longitude (Utah), 1898 [1]	38 59 29.62 110 29 55.06	180 00 00	0 00 00	Green River, south meridian	1.093422	12.40	40.7
Green River, latitude (Utah), 1898 [1]	38 59 29.62 110 29 55.11	270 00 00	90 00 00	Green River, longitude	0.11394	1.30	4.3
Green River, schoolhouse (Utah), 1898 [1]	38 59 38.44 110 09 40.31	29 24 02 110 49 38	209 23 47 290 48 31	Mica Wash	3.06836 3.43884	1,170.5 2,746.9	3,840 9,012
Green River, hotel (Utah), 1898 [1]	38 59 28.22 110 09 51.97	22 39 31 119 27 40	202 39 23 299 26 40	Mica Wash	2.88274 3.41939	763.4 2,626.6	2,505 8,617
Cliff (Utah), 1898	39 03 50.932 110 12 21.523	316 39 53 349 05 46	136 41 26 169 06 21	Hartman Wash	3.712538 3.841045	5,158.7 6,935.0	16,925 22,753

[1] No check on this position.

Mountain peaks

Station	Latitude and longitude			Station	Latitude and longitude		
	°	′	″		°	′	″
Arapahoe Peak, summit, 1895	40	01	19.42	Mount Princeton, cairn, 1894	38	44	57.14
	105	38	36.96		106	14	30.77
Longs Peak, 1895	40	15	22.18	Mount Yale, 1894	38	50	39.15
	105	36	57.07		106	18	47.56
Camerons Cone, 1895 [1]	38	50	33.93	Mount Massive, cairn, 1894	39	11	14.89
	104	59	01.56		106	28	30.37
Greenhorn Mountain, cairn, 1895	37	52	52.92	Mount of the Holy Cross, cairn, 1893.[1]	39	28	00.68
	105	00	46.25		106	28	51.90
East Spanish Peak, 1879	37	23	36.07	La Garita, king summit, 1893	37	55	20.10
	104	55	10.50		106	32	24.51
West Spanish Peak, 1879	37	22	40.97	La Garita, range peak, 1893	38	01	23.28
	104	59	32.84		106	55	22.11
Platte Peak, 1895	39	15	37.35	West Elk Peak, cairn, 1894	38	43	04.61
	105	06	02.65		107	11	55.67
Sierra Blanca Peak, 1894 [1]	37	34	38.81	Gunnison Peak, cairn, 1893	38	48	43.57
	105	29	06.42		107	22	56.36
Crestone Peak, 1894	37	57	58.57	Leon Peak, low cairn, 1893	39	04	45.95
	105	35	02.72		107	50	35.70
Hunts Peak, 1894	38	22	59.56	North Mann, cairn, 1891 [1]	39	23	11.62
	105	56	45.91		107	51	55.84
Rito Alto, cairn, 1894	38	13	09.80	South Mann, cairn, 1891 [1]	39	21	07.96
	105	45	21.43		107	53	46.61
Grays Peak, summit, 1894	39	38	01.21	Mount Sneffels, cairn, 1895	38	00	13.66
	105	48	59.95		107	47	30.04
Mount Evans, 1894	39	35	18.33	Wetterhorn, cigar peak, 1895	38	03	38.40
	105	38	35.37		107	30	36.64
Buffalo Peak, 1894	38	59	30.33	Lone Cone, 1893	37	53	16.53
	106	07	27.81		108	15	17.37
Antero, cairn, 1894	38	19	29.78	Mount Wilson, 1893	37	50	20.81
	106	13	04.13		107	59	27.63
Mount Shavano, 1893	38	37	08.70				
	106	14	19.34				

[1] No check on this position.

One hundred and fourth meridian north

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Principal points	° ′ ″	° ′ ″	° ′ ″				
Elbert, 1912	39 14 02.580	343 07 52.08	163 10 16.38	Divide	4.2772344	18,933.65	62,118.1
	104 34 33.150	42 58 56.28	222 41 15.61	Pikes Peak	4.7750458	59,572.49	195,447.4
Hilltop, 1912	39 27 18.731	344 49 52.54	164 54 57.04	Divide	4.6454708	44,204.94	145,029.0
	104 38 45.754	346 08 14.96	166 10 55.10	Elbert	4.4028895	25,286.55	82,961.0
		26 51 41.43	206 36 37.70	Pikes Peak	4.8831299	76,406.43	250,676.8
Morrison (U. S. G. S.), 1895	39 40 09.273	295 34 19.79	115 56 13.98	Hilltop	4.7378977	54,688.71	179,424.5
	105 13 09.104	310 54 04.27	131 18 35.90	Elbert	4.8662229	73,489.10	241,105.5
		350 35 33.10	170 42 12.95	Pikes Peak	4.9696059	93,240.78	305,907.5
Douglas, 1912	39 31 17.127	346 31 04.84	166 31 51.72	Hilltop	3.8785316	7,560.17	24,803.7
	104 39 59.475	109 14 45.88	288 53 37.76	Morrison (U. S. G. S.)	4.7009651	50,230.22	164,797.0
Indian (U. S. G. S.), 1912	39 39 18.452	13 19 44.61	193 17 24.54	Hilltop	4.3581031	22,808.84	74,832.0
	104 35 05.815	25 17 49.11	205 14 41.97	Douglas	4.2152436	16,415.10	53,855.2
		91 51 06.61	271 26 49.27	Morrison (U. S. G. S.)	4.7360027	54,450.60	178,643.3
Watkins astronomic, 1912	39 44 43.434	350 08 03.59	170 08 50.29	Indian (U. S. G. S.)	4.0074462	10,172.93	33,375.7
	104 36 18.928	81 04 22.14	260 40 50.13	Morrison (U. S. G. S.)	4.7269352	53,325.53	174,952.2
Boulder (U. S. G. S.), 1912	39 57 36.957	291 47 47.53	112 14 17.86	Watkins astronomic	4.8037019	63,635.86	208,778.6
	105 17 40.631	298 54 39.99	119 21 55.63	Indian (U. S. G. S.)	4.8424720	69,578.02	228,273.9
		348 40 22.54	168 43 16.40	Morrison (U. S. G. S.)	4.5178706	32,951.15	108,107.2
Brighton (U. S. G. S.), 1912	40 01 37.486	340 19 52.57	160 26 29.12	Indian (U. S. G. S.)	4.6418866	43,841.62	143,837.0
	104 45 24.782	45 01 48.38	224 44 01.95	Morrison (U. S. G. S.)	4.7487439	56,071.73	183,962.0
		80 59 48.62	260 39 04.44	Boulder (U. S. G. S.)	4.6676400	46,520.03	152,624.5
Horsetooth (U. S. G. S.), 1912	40 32 22.460	326 34 15.00	146 51 17.62	Brighton (U. S. G. S.)	4.8329872	68,074.92	223,342.5
	105 11 46.382	7 26 51.85	187 23 02.96	Boulder (U. S. G. S.)	4.8120259	64,867.31	212,818.8
Dewey (U. S. G. S.), 1912	40 30 25.498	17 57 59.95	197 50 09.00	Brighton (U. S. G. S.)	4.7482658	56,010.03	183,759.6
	104 33 16.163	46 17 29.01	225 48 47.98	Boulder (U. S. G. S.)	4.9419431	87,486.92	287,030.0
		94 00 14.52	273 35 13.43	Horsetooth (U. S. G. S.)	4.7363952	54,499.84	178,804.9
Twin (Wyo.), 1912	41 02 53.670	314 43 27.82	135 11 24.08	Dewey (U. S. G. S.)	4.9296674	85,048.65	279,030.4
	105 16 02.630	353 54 21.57	173 57 08.99	Horsetooth (U. S. G. S.)	4.7543889	56,805.30	186,368.7
Warren (Wyo.), 1912	41 01 11.369	334 54 04.44	155 06 23.44	Dewey (U. S. G. S.)	4.7981169	62,822.74	206,110.9
	104 52 07.959	27 29 51.48	207 17 01.78	Horsetooth (U. S. G. S.)	4.7786190	60,064.65	197,062.1
		95 30 36.72	275 14 54.84	Twin	4.5271324	33,661.42	110,437.5
Wadill (Wyo.), 1912	41 15 12.228	344 22 06.34	164 25 30.66	Warren	4.4302654	26,931.80	88,358.7
	104 57 18.548	49 06 18.24	228 53 58.53	Twin	4.5406971	34,729.38	113,941.3
Russell (Wyo.), 1912	41 14 11.781	266 22 16.57	86 36 37.54	Wadill	4.4838065	30,465.37	99,951.8
	105 19 04.478	302 24 31.73	122 42 14.99	Warren	4.6506680	44,737.11	146,775.0
		348 31 22.88	168 33 22.51	Twin	4.3292830	21,344.35	70,027.3
Greentop (Wyo.), 1912	41 21 00.802	288 46 12.30	109 01 03.66	Wadill	4.5212416	33,207.92	108,949.6
	105 19 49.042	351 02 21.90	171 04 51.02	Twin	4.5308303	33,949.26	111,381.9
		355 17 53.25	175 18 22.66	Russell	4.1024536	12,660.58	41,537.3
Whitaker (Wyo.), 1912	41 23 55.980	348 33 51.13	168 35 23.83	Wadill	4.2170639	16,484.05	54,081.4
	104 59 38.928	79 13 58.77	259 00 38.91	Greentop	4.4569133	28,636.06	93,950.1
Ragged (Wyo.), 1912	41 26 20.438	278 32 28.91	98 46 22.73	Whitaker	4.4713987	29,607.29	97,136.6
	105 20 39.320	302 12 17.03	122 27 42.39	Wadill	4.5859361	38,542.17	126,450.4
		353 14 24.18	173 14 57.42	Greentop	3.9969369	9,929.72	32,577.8
Cheyenne west base (Wyo.), 1913	41 17 56.075	198 18 14.99	18 19 59.45	Whitaker	4.0680252	11,695.67	38,371.5
	105 02 17.049	306 00 39.77	126 03 56.69	Wadill	3.9340644	8,591.41	28,187.0
Cheyenne east base (Wyo.), 1913	41 16 48.697	108 14 16.07	288 11 16.93	Cheyenne west base	3.8228501	6,650.435	21,818.97
	104 57 45.560	168 42 07.29	348 40 52.41	Whitaker	4.1284811	13,442.53	44,102.7
		348 04 04.10	168 04 21.92	Wadill	3.4831118	3,041.67	9,979.2
Supplementary points							
Denver University Observatory dome, 1895	39 40 33.800	88 11 32.8	268 01 19.7	Morrison (U. S. G. S.)	4.359883	22,902.5	75,139
	104 57 08.709	137 13 56.1	317 00 47.2	Boulder (U. S. G. S.)	4.634082	43,060.8	141,275
Denver, Loretta Heights, school belfry, 1912	39 39 41.520	93 02 02.8	272 54 41.4	Morrison (U. S. G. S.)	4.217594	16,504.2	54,148
	105 01 37.644	145 27 23.0	325 17 06.4	Boulder (U. S. G. S.)	4.605400	40,308.8	132,246
Denver, County courthouse dome, 1895	39 44 32.590	67 41 41.4	247 32 52.5	Morrison (U. S. G. S.)	4.328992	21,330.1	69,981
	104 59 21.164	132 53 00.9	312 41 16.3	Boulder (U. S. G. S.)	4.551620	35,613.9	116,843
Denver, State Capitol, dome, 1895	39 44 21.275	68 58 33.5	248 49 33.4	Morrison (U. S. G. S.)	4.334251	21,589.9	70,833
	104 59 03.601	132 50 27.2	312 38 31.4	Boulder (U. S. G. S.)	4.558202	36,157.8	118,628
Denver, Grant smelter chimney, 1912	39 46 35.546	60 38 47.6	240 29 21.0	Morrison (U. S. G. S.)	4.384593	24,243.4	79,539
	104 58 22.563	126 38 49.9	306 26 27.5	Boulder (U. S. G. S.)	4.534769	34,258.6	112,397
Denver, Daniels and Fisher's Tower, 1912	39 44 53.196	65 34 18.7	245 25 43.4	Morrison (U. S. G. S.)	4.324604	21,115.6	69,277
	104 59 42.506	132 40 56.8	312 29 25.9	Boulder (U. S. G. S.)	4.541696	34,809.4	114,204
Westminster schoolhouse belfry, 1912	39 50 49.821	39 13 23.9	219 06 11.6	Morrison (U. S. G. S.)	4.406184	25,479.1	83,593
	105 01 53.146	119 14 31.1	299 04 23.3	Boulder (U. S. G. S.)	4.411161	25,772.8	84,556
Brighton, bench mark, eccentric, 1912	40 00 01.244	239 35 19.1	59 37 36.3	Brighton (U. S. G. S.)	3.768434	5,867.2	19,249
	104 48 58.178	43 18 41.0	223 03 11.6	Morrison (U. S. G. S.)	4.702564	50,415.5	165,405

One hundred and fourth meridian north—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points—Continued	° ′ ″	° ′ ″	° ′ ″				
Brighton, bench mark R 2 (U. S. G. S.), 1912[1]	40 00 01.26 104 48 56.50	89 21 47	269 21 46	Brighton, bench mark, eccentric	1.600232	39.832	130.68
Greely, tall tank, 1912[1]	40 25 07.55 104 40 35.91	107 06 11 226 31 55	286 45 57 46 36 41	Horsetooth (U. S. G. S.) Dewey (U. S. G. S.)	4.663277 4.154304	46,055.0 14,266.1	151,099 46,805
Greely, sugar factory chimney, 1912[1]	40 25 05.87 104 40 34.20	107 09 01 226 16 12	286 48 46 46 20 56	Horsetooth (U. S. G. S.) Dewey (U. S. G. S.)	4.663784 4.154505	46,108.8 14,272.7	151,275 46,826
La Salle, tank near coal chute, 1912[1]	40 20 46.48 104 42 19.28	117 25 45 215 35 11	297 06 38 35 41 03	Horsetooth (U. S. G. S.) Dewey (U. S. G. S.)	4.670736 4.341918	46,852.9 21,974.4	153,717 72,094
Loveland, tall red brick chimney, 1912[1]	40 24 10.22 105 03 37.76	22 09 44 142 52 40	202 00 40 322 47 23	Boulder (U. S. G. S.) Horsetooth (U. S. G. S.)	4.724548 4.279969	53,033.2 19,053.2	173,993 62,510
Loveland, tall white chimney, 1912[1]	40 24 10.40 105 03 35.91	22 12 14 142 45 48	202 03 09 322 40 30	Boulder (U. S. G. S.) Horsetooth (U. S. G. S.)	4.724725 4.280469	53,054.8 19,075.2	174,064 62,583
Dover, bench mark, eccentric, 1912	40 46 45.494 104 48 42.175	50 49 07.5 128 01 49.5	230 34 05.6 307 43 55.1	Horsetooth (U. S. G. S.) Twin	4.623499 4.686982	42,024.2 48,638.7	137,874 159,575
Dover, bench mark E 3, 1912[1]	40 46 45.33 104 48 42.56	240 38 01	60 38 01	Dover, bench mark, eccentric	1.018700	10.440	34.25
Eaton, sugar factory chimney, 1912	40 31 34.692 104 42 24.783	92 11 39.6 162 31 08.5	271 52 34.7 342 27 02.6	Horsetooth (U. S. G. S.) Dover, bench mark, eccentric	4.617908 4.469239	41,486.6 29,460.4	136,111 96,655
Nunn schoolhouse belfry, 1912	40 42 22.917 104 47 04.916	318 33 45.0 62 07 29.9	138 42 44.4 241 51 25.4	Dewey (U. S. G. S.) Horsetooth (U. S. G. S.)	4.469591 4.595938	29,484.3 39,440.1	96,733 129,396
Dover, bench mark, reference mark, 1912	40 46 46.969 104 48 43.264	330 42 32.5 342 01 12.9	150 42 33.2 162 01 13.3	Dover, bench mark, eccentric Dover, bench mark, E 3	1.717504 1.726027	52.180 53.21	171.19 174.6
Section 36, T. 4 S., R. 65 W., southeast cornerstone, 1912.[1]	39 39 22.05 104 35 02.56	34 58 04	214 58 02	Indian (U. S. G. S.)	2.131140	135.251	443.74
Bench mark G 2, 1912[1]	39 44 47.18 104 36 08.86	64 15 44	244 15 37	Watkins, astronomic	2.424909	266.017	872.76

Terry (U. S. G. S.) (Wyo.), 1912	41 01 33.093 104 52 21.366	334 56 44.9 94 24 41.1	154 56 53.7 274 09 08.0	Warren Twin	2.869084 4.522332	739.7 33,291.4	2,427 109,224
Colorado-Wyoming boundary monument, milepost 44, 1912.	40 59 53.777 104 53 33.673	208 52 11.7 219 54 57.8	28 52 59.2 39 55 54.0	Terry Warren	3.543908 3.494302	3,498.7 3,121.1	11,479 10,240
Otto, Union Pacific Ry. water tank, black (Wyo.), 1912.	41 05 27.291 105 04 29.785	292 56 47.5 73 44 04.5	113 04 45.9 253 36 29.3	Terry Twin	4.266700 4.226746	18,479.9 16,855.7	60,629 55,301
Fort D. A. Russell (Warren) water tank (Wyo.), 1912.	41 09 23.246 104 52 12.934	359 33 39.4 103 28 55.6	179 33 42.7 283 11 14.2	Warren Russell	4.181100 4.586503	15,174.0 38,592.5	49,783 126,616
Cheyenne, State capitol dome (Wyo.), 1912	41 08 24.966 104 49 10.892	17 11 16.7 104 31 15.8	197 09 20.4 284 11 34.7	Warren Russell	4.146121 4.634947	13,999.8 43,146.6	45,931 141,557
Kipp's house, chimney (Wyo.), 1912	41 16 40.246 104 56 42.031	17 23 10.5 163 00 10.3	197 22 46.4 342 58 13.5	Wadill Whitaker	3.454117 4.147906	2,845.2 14,057.4	9,335 46,120
Tall, new house, west gable (Wyo.), 1912	41 15 45.801 105 02 34.997	195 08 01.9 277 58 24.6	15 09 58.2 98 01 53.3	Whitaker Wadill	4.194967 3.871538	15,666.3 7,439.4	51,399 24,407
Hollingswood's barn (Wyo.), 1912	41 17 03.204 104 58 58.150	175 44 44.4 325 53 08.2	355 44 17.5 145 54 13.9	Whitaker Wadill	4.106165 3.616439	12,769.2 4,134.7	41,894 13,565
Ritzke's windmill (Wyo.), 1912	41 15 23.491 104 56 39.667	69 00 14.0 165 14 42.2	248 59 48.3 345 12 43.8	Wadill Whitaker	2.986583 4.213530	969.6 16,350.5	3,181 53,643
Section 33, T. 17 N., R. 68 W., stone post (Wyo.), 1912.[1]	41 23 37.84 105 00 03.54	225 37 03	45 37 19	Whitaker	2.903155	800.1	2,625
Bench mark 6702 Denver (U. S. G. S.) (Wyo.), 1912.[1]	41 23 37.93 105 00 20.30	239 54 59	59 55 26	Whitaker	3.045644	1,110.82	3,644.4
East Twin (U. S. G. S.) (Wyo.), 1912[1]	41 02 53.68 105 16 02.75	276 08 37	96 08 37	Twin	0.441538	2.764	9.07

[1] No check on this position.

One hundred and fourth meridian south

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Principal points	° ′ ″	° ′ ″	° ′ ″				
Haswell, 1922	38 33 00.413	116 17 22.29	296 04 58.05	Adobe	4.5072087	32,152.05	105,485.5
	103 13 23.772	187 16 03.88	7 17 36.49	Aroya	4.4512747	28,266.67	92,738.2
Metz, 1922	38 35 24.362	161 22 10.03	341 20 45.13	Adobe	4.0123998	10,289.63	33,758.6
	103 31 00.330	230 52 00.67	51 04 33.88	Aroya	4.5737743	37,477.82	122,958.5
		279 45 11.96	99 56 10.70	Haswell	4.4143027	25,959.88	85,170.0
Todd, 1922	38 16 52.522	179 50 45.66	359 50 43.29	Metz	4.5350741	34,282.63	112,475.6
	103 30 56.523	220 27 56.25	40 38 50.39	Haswell	4.5941744	39,280.26	128,872.0
Clark, 1922	38 14 43.354	97 19 08.60	277 05 46.40	Todd	4.5016470	31,742.93	104,143.3
	103 09 21.139	140 38 05.58	320 24 38.27	Metz	4.6952536	49,573.95	162,643.9
		170 08 49.37	350 06 18.67	Haswell	4.5357384	34,335.10	112,647.7
Mopa, 1922	38 27 53.835	119 16 28.15	299 05 48.58	Metz	4.4546567	28,487.65	93,463.2
	103 13 53.567	184 21 52.25	4 22 10.80	Haswell	3.9768393	9,480.68	31,104.5
		344 47 34.06	164 50 23.10	Clark	4.4023473	25,254.99	82,857.4
		50 41 48.59	230 31 13.55	Todd	4.5069220	32,130.84	105,415.9
Hadley, 1922	37 58 10.624	161 14 15.84	341 09 17.29	Todd	4.5627803	36,540.99	119,884.9
	103 22 52.958	212 48 00.24	32 56 21.24	Clark	4.5616042	36,442.17	119,560.7
Animas, 1922	37 56 31.437	100 36 24.37	280 29 30.67	Hadley	4.2228037	16,703.35	54,800.9
	103 11 40.327	143 17 50.37	323 05 56.77	Todd	4.6722735	47,019.01	154,261.5
		185 44 27.08	5 45 52.95	Clark	4.5293866	33,836.59	111,012.2
Huey, 1922	38 02 20.583	336 08 40.94	156 10 40.92	Animas	4.0707300	11,768.74	38,611.3
	103 14 55.251	56 33 58.21	236 29 04.08	Hadley	4.1452654	13,972.22	45,840.5
		139 02 34.75	318 52 40.82	Todd	4.5519754	35,643.09	116,939.0
England, 1922	37 43 22.419	172 41 57.65	352 40 29.46	Hadley	4.4410460	27,608.70	90,579.5
	103 20 29.222	207 57 12.37	28 02 36.77	Animas	4.4401302	27,550.54	90,388.7
Cameron, 1922	37 47 58.208	70 07 01.25	249 57 15.68	England	4.3962473	24,902.75	81,701.8
	103 04 32.984	125 10 46.30	304 59 30.84	Hadley	4.5165163	32,848.56	107,770.6
		146 36 29.22	326 32 06.88	Animas	4.2778328	18,959.76	62,203.8
Alexander, 1922	37 32 07.763	139 24 13.99	319 16 49.20	England	4.4380312	27,417.71	89,952.9
	103 08 20.709	190 45 52.42	10 48 11.58	Cameron	4.4746377	29,828.93	97,863.7
Long, 1922	37 31 06.427	177 21 47.45	357 21 21.41	England	4.3563034	22,714.51	74,522.5
	103 19 46.553	215 35 45.33	35 45 03.49	Cameron	4.5843122	38,398.32	125,978.5
		263 32 07.32	83 39 05.09	Alexander	4.2290749	16,946.30	55,598.0
Martin, 1922	37 21 30.352	131 58 09.64	311 50 00.20	Long	4.4247550	26,592.25	87,244.7
	103 06 21.436	171 31 27.59	351 30 15.07	Alexander	4.2981563	19,868.10	65,183.9
Reville, 1922	37 22 39.587	197 27 43.22	17 29 44.93	Long	4.2143569	16,381.62	53,745.4
	103 23 06.725	231 06 45.89	51 15 44.73	Alexander	4.4463284	27,946.56	91,688.0
		274 50 48.70	95 00 58.84	Martin	4.3949496	24,828.45	81,458.0
Willow, 1922	37 19 22.019	123 58 05.01	303 54 21.90	Reville	4.0378118	10,909.67	35,792.8
	103 16 58.972	255 47 48.62	75 54 15.32	Martin	4.2090906	16,184.18	53,097.6
Seven L, 1922	37 06 11.530	198 37 51.39	18 42 04.03	Reville	4.5071890	32,150.59	105,480.7
	103 30 04.196	218 24 05.54	38 32 00.43	Willow	4.4930936	31,123.87	102,112.2
		230 57 21.06	51 11 41.87	Martin	4.6540040	45,082.08	147,906.8
Potato, 1922	37 10 24.656	77 32 57.77	257 18 41.70	Seven L	4.5545601	35,855.86	117,637.1
	103 06 26.254	136 47 04.14	316 40 41.18	Willow	4.3569899	22,750.45	74,640.4
		180 19 51.95	0 19 54.87	Martin	4.3122258	20,522.29	67,330.2
Clayton east base (N. Mex.), 1922	36 47 44.160	141 38 10.10	321 27 11.48	Seven L	4.6393974	43,591.06	143,015.0
	103 11 48.530	190 44 00.41	10 47 14.29	Potato	4.6303231	42,689.70	140,057.8
New Mexico-Colorado boundary, milepost 328 eccentric, 1922.	36 59 57.333	15 30 01.34	195 27 29.57	Clayton east base	4.3701675	23,451.33	76,939.9
	103 07 35.739	109 12 31.09	288 58 58.60	Seven L	4.5472811	35,259.90	115,681.9
		185 03 55.73	5 04 37.63	Potato	4.2881240	19,414.40	63,695.4
Grande (N. Mex.), 1922	36 42 19.805	217 01 41.19	37 15 11.98	Seven L	4.7432305	55,364.38	181,641.3
	103 52 34.423	260 26 21.98	80 50 45.45	Clayton east base	4.7888215	61,492.41	201,746.3
Dora (N. Mex.), 1922	36 32 35.571	115 49 52.68	295 34 54.52	Grande	4.6182288	41,517.27	136,211.2
	103 27 28.890	176 28 07.30	356 26 34.21	Seven L	4.7942230	62,261.99	204,271.2
		219 44 34.11	39 53 55.69	Clayton east base	4.5618748	36,464.88	119,635.2
Des Moines (N. Mex.), 1922	36 45 22.455	305 23 19.44	125 36 35.88	Dora	4.6096779	40,707.82	133,555.6
	103 49 43.127	37 03 51.46	217 02 09.01	Grande	3.8484582	7,054.37	23,144.2
		217 03 19.57	37 15 07.91	Seven L	4.6840373	48,310.03	158,497.2
Clayton west base (N. Mex.), 1922	36 46 02.869	254 07 43.46	74 12 09.29	Clayton, east base	4.0585424	11,443.067	37,542.80
	103 19 12.496	26 23 50.10	206 18 53.75	Dora	4.4435975	27,771.38	91,113.3
Seneca (N. Mex.), 1922	36 38 46.512	67 03 27.28	246 52 42.24	Dora	4.4657466	29,224.47	95,880.6
	103 09 26.891	132 49 46.32	312 43 56.29	Clayton west base	4.2967475	19,803.75	64,972.8
		168 02 14.93	348 00 50.24	Clayton east base	4.2289548	16,941.61	55,582.6
Rabbit (N. Mex.), 1922	36 31 56.083	93 42 16.78	273 34 38.98	Dora	4.2825420	19,166.46	62,882.0
	103 14 39.932	165 28 54.63	345 26 11.93	Clayton west base	4.4308090	26,965.53	88,469.4
		188 16 22.88	8 18 05.23	Clayton east base	4.4703004	29,532.51	96,891.2
		211 34 10.92	31 37 17.52	Seneca	4.1718093	14,852.83	48,729.7

One hundred and fourth meridian south—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
Supplementary points	° ′ ″	° ′ ″	° ′ ″				
Hoover (N. Mex.), 1922	36 35 40.961	66 43 44.55	246 37 19.42	Rabbit	4.2432098	17,506.9	57,437
	103 03 53.436	80 53 41.32	260 39 38.00	Dora	4.5521330	35,656.0	116,981
		152 09 29.34	332 04 45.44	Clayton east base	4.4017459	25,220.0	82,743
Clay (N. Mex.), 1922	36 27 26.000	139 02 52.25	318 59 59.46	Rabbit	4.0424456	11,026.7	36,177
	103 09 49.411	210 06 17.85	30 09 49.72	Hoover	4.2465174	17,640.8	57,877
Eccentric No. 4 (N. Mex.-Tex.), 1922	36 26 38.580	97 36 33.86	277 32 11.57	Clay	4.0449660	11,090.9	36,387
	103 02 27.929	118 18 07.48	298 10 52.19	Rabbit	4.3155960	20,682.2	67,855
		172 45 17.37	352 44 26.49	Hoover	4.2266797	16,853.1	55,292
Northwest corner of Texas, Clark's Monument (N. Mex.-Tex.), 1922.	36 30 01.603	66 26 34.08	246 22 11.82	Clay	4.0785725	11,983.2	39,315
	103 02 28.277	101 01 49.07	280 54 33.70	Rabbit	4.2681968	18,543.7	60,839
Milepost No. 1 (N. Mex.-Tex.), 1922	36 30 01.610	69 45 51.33	249 40 41.30	Clay	4.1411083	13,839.1	45,404
	103 01 07.942	99 58 24.98	279 50 21.80	Rabbit	4.3119569	20,509.6	67,289
Milepost No. 313 (Colorado-New Mexico boundary), 1922.	36 59 57.457	6 10 39.3	186 08 27.4	Dora	4.706763	50,905.3	167,012
	103 23 48.658	52 48 57.0	232 31 42.0	Grande	4.730509	53,766.2	176,398
De Maya (N. Mex.), 1922	36 58 12.414	128 26 36.9	308 24 57.7	Milepost No. 328, eccentric	3.7162971	5,203.52	17,071.9
	103 04 50.914	174 03 05.4	354 02 07.9	Potato	4.3559342	22,695.21	74,459.2
Collins, 1922	37 01 01.412	39 44 22.7	219 42 37.4	De Maya	3.8308106	6,773.46	22,222.6
	103 01 55.853	158 59 11.7	338 56 28.6	Potato	4.2695798	18,602.86	61,032.9
Boundary monument 1900 (Colorado-New Mexico-Oklahoma), 1922.	37 00 00.473	64 40 20.1	244 37 29.1	De Maya	3.8909653	7,779.74	25,524.0
	103 00 06.631	124 50 05.8	304 49 00.1	Collins	3.5171284	3,289.49	10,792.3
Station A, 1922 [1]	38 15 26.73	328 22 32	148 22 53	Clark	3.196094	1,570.70	5,153.21
	103 09 55.01						
Section, T. 20 S., R. 51 W., SW. corner, 1922 [1]	38 15 58.14	336 51 34	156 51 44	Station A	3.022411	1,052.96	3,454.58
	103 10 12.03						
Section 25, T. 20 S., R. 55 W., SW. corner, 1922 [1]	38 16 46.45	241 13 34	61 13 42	Todd	2.589611	388.70	1,275.25
	103 31 10.54						
Section and tract corner, T. 17 S., R. 55 W., 1922. [1]	38 35 23.80	210 22 04	30 22 04	Metz	1.301464	20.02	65.7
	103 31 00.75						
Tract corner, T. 16 S., R. 55 W., 1922 [1]	38 40 48.34	312 59 15	132 59 21	Adobe	2.546744	352.16	1,155.39
	103 33 26.98						
Section 23, SE. corner, 1922 [1]	38 48 21.59	6 52 45	186 52 44	Aroya	2.566510	368.562	1,209.19
	103 10 53.75						
Section corner, 1922 [1]	37 19 21.44	104 54 25	284 54 23	Willow	1.838124	68.8	226.0
	103 16 56.27						
Section 12, T. 31 S., R. 51 W., ¼ corner, 1922 [1]	37 21 33.61	87 14 27	267 13 35	Martin	3.318373	2,081.5	6,829.0
	103 04 56.95						
Section 5, T. 31 S., R. 53 W., ¼ corner, 1922 [1]	37 22 52.82	34 31 32	214 31 25	Reville	2.694741	495.15	1,624.52
	103 22 55.32						
Section 3, T. 29 S., R. 51 W., SW. corner, 1922 [1]	37 32 31.00	48 45 02	228 44 42	Alexander	3.036010	1,086.45	3,564.46
	103 07 47.44						
Section 3, T. 27 S., R. 53 W., SW corner, 1922 [1]	37 42 59.78	226 31 44	46 32 03	England	3.006214	1,014.41	3,328.11
	103 20 59.28						
Section 7, T. 26 S., R. 50 W., west ¼ corner, 1922 [1].	37 47 47.57	174 14 30	354 14 29	Cameron	2.517926	329.55	1,081.21
	103 04 31.63						
Section 19, T. 24 S., R. 51 W., west ¼ corner 1922 [1].	37 56 49.20	67 46 28	247 45 54	Animas	3.160772	1,448.01	4,750.68
	103 10 45.43						
Section corner, 1922 [1]	38 02 28.29	307 18 44	127 18 52	Huey	2.593304	392.02	1,286.14
	103 15 08.04						
Section 23, T. 28 N., R. 35 E., SE. corner, 1922 [1]	36 38 29.76	222 51 14	42 51 26	Seneca	2.847714	704.23	2,310.46
	103 09 46.17						
Section 10, T. 29 N., R. 29 E., SE. corner, 1922 [1]	36 45 23.65	74 42 40	254 42 37	Des Moines	2.143666	139.21	456.72
	103 49 37.71						
Section 3, T. 29 N., R. 34 E., SW. corner, 1922 [1]	36 46 15.45	72 42 58	252 42 28	Clayton, west base	3.115551	1,304.8	4,280.9
	103 18 22.26						
Section 33, T. 30 N., R. 35 E., east ¼ corner, 1922 [1].	36 47 09.76	221 56 26	41 56 49	Clayton, east base	3.154053	1,425.78	4,677.75
	103 12 26.97						
New Mexico-Colorado boundary milepost No. 328, 1922 [1].	37 00 00.63	0 02 41	180 02 41	Milepost No. 328, eccentric	2.006594	101.53	333.1
	103 07 35.74						
New Mexico-Colorado boundary (old) M. C. 1881, 1922 [1].	37 00 09.66	359 56 06	179 56 06	Boundary monument, 1900	2.452155	283.24	929.3
	103 00 06.64						
New Mexico-Texas boundary, M. C. 306, 1922 [1].	36 26 21.61	180 07 43	0 07 43	Eccentric No. 4	2.718672	523.205	1,716.55
	103 02 27.98						
New Mexico-Texas boundary, milepost No. 4, 1922 [1].	36 26 32.79	180 04 56	0 04 56	Eccentric No. 4	2.251480	178.435	585.42
	103 02 27.94						
Section 1, T. 26 N., R. 34 E., NE. corner (N. Mex.), 1922 [1].	36 31 29.90	221 55 57	41 56 14	Rabbit	3.035457	1,085.069	3,559.93
	103 15 09.08						
Section 17, T. 27 N., R. 33 E. SW. corner (N. Mex.), 1922 [1].	36 34 08.51	13 36 38	193 36 21	Dora	3.469441	2,947.411	9,669.96
	103 27 01.00						

[1] No check on this position.

ELEVATIONS

The elevations given in the tables are referred to mean sea level. The stations are divided into three classes: First, those fixed by direct connection with sea level, the elevations of which are subject to a probable error of ±0.04 meter; secondly, the stations in the main scheme fixed by reciprocal measures of vertical angles and subject to probable errors varying from ±0.1 to ±1.2 meters; and, thirdly, the intersection stations the elevations of which are fixed by measurement of vertical angles which are not reciprocal (the stations not being occupied) and are subject to probable errors which may be as great as ±3 meters.

Elevations, thirty-ninth parallel arc

Station	Point to which elevation refers	Elevation	
		Meters	Feet
Class 1			
First view	Top of surface mark	1,400.48	4,594.7
Kit Carson	do	1,345.67	4,414.9
Hugo	do	1,625.54	5,333.1
Divide	do	2,259.46	7,412.9
El Paso west base	Top of monument	2,167.03	7,109.7
Do	Top of surface mark	2,165.98	7,106.2
El Paso east base	do	1,993.94	6,541.8
Pikes Peak	do	4,300.63	14,109.6
Class 2			
Landsman	Top of surface mark	1,418.1	4,652
Eureka	do	1,442.5	4,733
Overland	do	1,609.4	5,280
Aroya	do	1,495.9	4,908
Adobe	do	1,575.6	5,169
Holt	do	1,868.4	6,130
Square Bluffs	do	1,711.9	5,616
Cramer Gulch	do	1,605.4	5,267
Dry Camp	do	1,705.0	5,594
Corral Bluffs	do	2,070.4	6,793
Plateau	do	1,644.4	5,395
Big Springs	do	1,903.6	6,245
Holcolm Hills	do	2,138.9	7,017
Bison	do	3,787.8	12,427
Mount Ouray	do	4,253.5	13,955
Mount Elbert	do	4,395.1	14,420
Treasury Mountain	do	4,097.1	13,442
Uncompahgre	do	4,354.5	14,286
Mount Waas	do	3,752.3	12,311
Tavaputs	do	2,677.8	8,785
Patmos Head	do	2,999.5	9,841
Mount Ellen	do	3,496.9	11,473
Gunnison azimuth	do	2,342.2	7,684
Mesa	do	3,046.0	9,993
Chiquita	do	2,603.7	8,542
Grand Junction standpipe	Top of pipe	1,403.3	4,604
Class 3			
Monte Rosa	Top of peak	3,506.4	11,504
East Spanish Peak	Highest point	3,865.8	12,683
Sierra Blanca Peak	Top of peak	4,377.7	14,363
Crestone Peak	do	4,355.9	14,291
Rito Alto	do	4,137.2	13,573
Antero	do	4,037.0	13,245
Mount Shavano	do	4,321.9	14,179
Mount Harvard	do	4,388.9	14,399
Mount Yale	do	4,319.7	14,172
Mount Princeton	do	4,321.3	14,177
Mount Massive	do	4,390.2	14,404

Elevations, one hundred and fourth meridian north

Station	Point to which elevation refers	Elevation	
		Meters	Feet
Class 1			
Watkins astronomic	Top of surface mark	1,683.47	5,523.2
Brighton bench mark, eccentric	do	1,514.35	4,968.3
Dover bench mark, eccentric	do	1,648.01	5,406.8
Bench mark 6702 Denver	do	2,042.14	6,699.9
Whitaker	do	2,041.98	6,699.4
Class 2			
Elbert	Top of surface mark	2,146.9	7,044
Hilltop	do	2,007.0	6,585
Douglas	do	1,955.4	6,415
Indian	do	1,848.1	6,063
Morrison	do	2,401.2	7,878
Boulder	do	2,575.9	8,451
Brighton	do	1,692.7	5,225
Dewey	do	1,498.0	4,915
Horsetooth	do	2,211.3	7,255
Warren	do	1,970.8	6,466
Twin	do	2,482.8	8,146
Terry	do	1,970.7	6,466
Wadill	do	2,007.4	6,586
Greentop	do	2,472.2	8,111
Russell	do	2,507.7	8,227
Ragged	do	2,508.7	8,231
Cheyenne east base	do	2,011.2	6,598
Cheyenne west base	do	2,074.2	6,805
Class 3			
Daniels & Fisher's tower	Top of dome	1,687.0	5,535
Denver University observatory	do	1,656.9	5,436
Denver State Capitol	Top of gilded dome	1,672.9	5,489
Denver County courthouse	do	1,645.9	5,400
Loretto Heights school	Top of belfry tower	1,718.1	5,637
Denver, Grant smelter	Top of chimney	1,680.2	5,512
Westminster schoolhouse	Top of belfry	1,726.6	5,665
Greeley tall tank	Top of tank	1,466.3	4,811
Greeley sugar factory	Top of chimney	1,464.5	4,805
La Salle, tank near coal chute	Top of tank	1,450.0	4,757
Eaton sugar factory	Top of chimney	1,513.6	4,966
Loveland red-brick chimney	do	1,554.1	5,099
Loveland tall white chimney	do	1,563.0	5,128
Cheyenne State Capitol	Top of small dome	1,900.0	6,234
Fort D. A. Russell (Warren) water tank	Eaves	1,908.0	6,260
Otto, U. P. Ry., black water tank	Top of tank	2,131.9	6,994
Ritzke's windmill	Center of wheel	2,001.9	6,568
Kipp's, square house	Top of chimney	1,999.9	6,561
Hollingswood's barn	West gable	2,029.4	6,658
Tall new house	do	2,083.9	6,837

Elevations, one hundred and fourth meridian south

Station	Point to which elevation refers	Elevation	
		Meters	Feet
Class 2			
Haswell	Top of surface mark	1,415.4	4,644
Metz	do	1,529.2	5,017
Mopa	do	1,401.0	4,596
Clark	do	1,325.8	4,350
Todd	do	1,387.5	4,552
Huey	do	1,215.2	3,987
Hadley	do	1,343.3	4,407
Animas	do	1,298.6	4,260
Cameron	do	1,342.1	4,403
England	do	1,418.2	4,653
Alexander	do	1,552.6	5,094
Long	do	1,588.1	5,210
Martin	do	1,617.5	5,307
Reville	do	1,692.8	5,554
Willow	do	1,690.1	5,545
Potato	do	1,669.8	5,478
Seven L	do	2,011.4	6,599
Milepost No. 328 eccentric, New Mexico-Colorado boundary.	do	1,589.6	5,215
Clayton east base	do	1,600.9	5,252
Des Moines	do	2,025.4	6,645
Grande	do	2,658.0	8,720
Dora	do	1,917.2	6,290
Seneca	do	1,554.9	5,101
Clayton west base	do	1,658.3	5,441
Rabbit	do	1,847.6	6,062
Hoover	do	1,500.1	4,922
Clay	do	1,539.7	5,051
Northwest corner of Texas, Clark's boundary monument.	Top of monument	1,440.7	4,727
De Maya	Top of surface mark	1,545.8	5,072
Collins	do	1,495.8	4,907
Boundary monument 1900, Colorado-New Mexico-Oklahoma.	Top of monument	1,354.7	4,445
Eccentric No. 4	Top of surface mark	1,458.8	4,786

DESCRIPTIONS OF TRIANGULATION STATIONS

The following descriptions of stations may be conveniently consulted by reference to the illustrations at the end of this publication or to the index. All azimuths given in the descriptions are reckoned continuously from true south around by west to 360°, south being 0°, west 90°, north 180°, and east 270°. Where magnetic azimuths are given they are indicated as such.

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

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

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

MARKING OF STATIONS

The standard disk station and reference marks referred to in the following descriptions and notes consist of a disk and shank of brass cast in one piece, as shown in Figure 2. The disk of the station mark is 90 millimeters in diameter, with a hole at the center surrounded by a 20-millimeter equilateral triangle, and has the following inscribed legend: "U. S. Coast and Geodetic Survey Triangulation Station. For information write to the Superintendent, Washington, D. C. $250 fine or imprisonment for disturbing this mark." On the new marks made since March, 1921, the word "Director" replaces the word "Superintendent" in the inscription. The shank is 25 millimeters in diameter and 80 millimeters long, with a slit at the lower end into which a wedge is inserted, so that when it is driven into a drill hole in the rock it will bulge at the bottom and hold the mark firmly in place. The marks used since about 1915 have grooves cut around the shank instead of the slit.

The standard disk reference mark, shown in Figure 2, is the same size and shape as the station mark, but has an arrow on the top in place of the triangle, which, when properly set, points to the station. The legend is the same, except the words "reference mark" take the place of the words "triangulation station."

The following notes on the marking of stations are made as general as possible in order that it may not be necessary in the field to describe small and unimportant variations:

STANDARD NOTES ON THE MARKING OF STATIONS

Surface marks

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

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

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

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

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

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

Underground marks

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

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

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

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

Reference marks

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

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

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

Witness marks

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

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

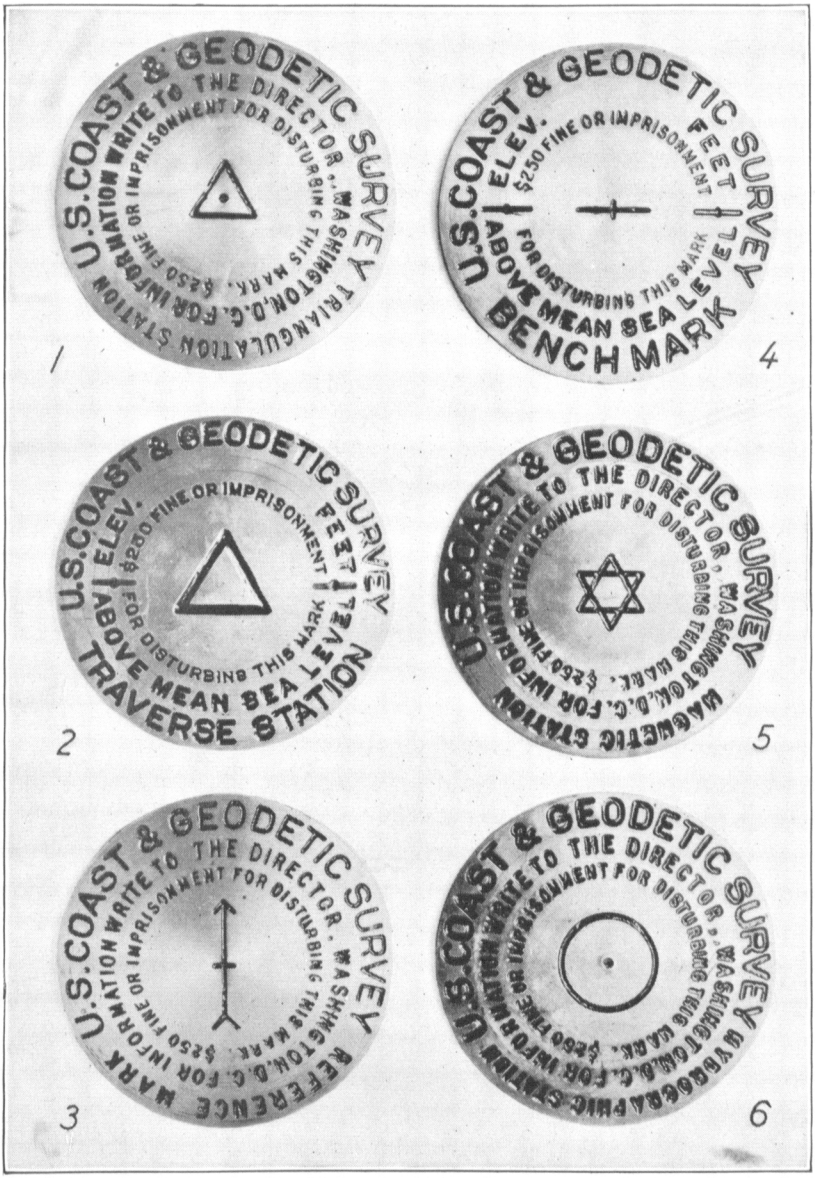

FIGURE 2.—STANDARD MARKS OF THE UNITED STATES COAST AND GEODETIC SURVEY

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

THIRTY-NINTH PARALLEL

Principal points

Curlew (Wallace County, Kans., F. W. P., 1891; 1922).—In the northeast corner of SW. ¼ of SW. ¼ of NE. ¼ of NE. ¼ sec. 17, T. 14 S., R. 40 W., 4 miles south and 1½ miles west of Sharon Springs, near the northern edge of the plateau which, commencing about 6 or 7 miles south of the Smoky Hill River, extends south to the Arkansas. The station is on land owned (1922) by John Haarberg and is southwest of his house, in the north part of his garden. The underground marks are as follows: Lowest mark is a stone jug 3½ feet below the surface; above the jug is a stone jar, bottom up, with a drill hole in the bottom; it is 30 inches below the surface; above the jug is a standard disk station mark set in a concrete block 24 inches below the surface. The station mark, a disk set as described in note 1 (*a*), is 10 inches below the surface. Reference mark, a disk set according to note 11 (*a*) and projecting 4 inches above the surface, is on the east side of the east garden fence, distant 12.59 meters (41.3 feet) bearing S. 86° E. (magnetic) from the station. The center of a drilled well iron casing is distant 12.8 meters (42 feet) bearing N. 52° E. (magnetic). The southwest corner of Mr. Haarberg's house is 32.83 meters (107.7 feet) bearing N. 38° E. (magnetic).

McLane (Wallace County, Kans., F. W. P., 1891; 1922).—About 14 miles northwest of Sharon Springs and 11 miles north of Weskan, on the Goose Creek bluffs, about 1 mile south of the creek and 2½ miles southeast of McLane's ranch. The road from McLane's ranch to Sharon Springs passes about 200 meters south of the station. Lister post office is about ¾ mile northwest of the station. The station is on the section line between sections 3 and 10, T. 12 S., R. 42 W., 254.05 meters (833.5 feet) west of the section corner at the northeast corner of section 10 and southeast corner of section 3. C. H. Rich owns the land in section 10 (1922). The underground marks are as follows: Lowest mark is a hole in the bottom of an earthenware jar placed bottom up 4 feet below the surface. Above the jar is a drain tile filled with concrete and incased in concrete, with a standard disk station mark at the top. It is 23 inches below the surface. The surface mark is a bronze disk, 2 inches above the surface, set as described in note 1 (*a*).

Arapahoe (Cheyenne County, F. W. P., 1892; 1922).—About 7 miles southeast of Arapahoe and 11 miles southwest of Weskan, towns on the Union Pacific Railroad, and 3 miles west of the Kansas-Colorado boundary line in the NW. ¼ NE. ¼ sec. 10, T. 15 S., R. 42 W., on the highest and most prominent hill in the vicinity. Station and underground marks are similar to those at station *Curlew*. (See above.) Pieces of broken crockery and tile were mixed with the dirt over the mark. A reference mark, a disk set as described in note 11 (*a*) and 4 inches above the surface, is on the south fence line of the roadway along the north line of section 10 and 30 feet south of the section line, distant 238.81 meters (783.5 feet), bearing N. 13° W. (magnetic) from the station mark. Additional references are: To drainpipe with cap at NE. corner of section 10 (U. S. Land Office mark), 516.0 meters (1,693 feet), bearing N. 45° E. (magnetic); to east line of section 10, 449.0 meters (1,473 feet) east.

Monotony (Cheyenne County; F. W. P., 1892; 1922).—Near the north boundary of the county, in the NW. ¼ NE. ¼ sec. 8, T. 12 S., R. 43 W., 12 miles north and 4 miles west of Arapahoe Railroad station, on the highest point of the divide between the north fork of the Smoky Hill River to the north and Sand Creek to the south, and about 3 miles distant from each. The nearest house (1892) is on the Cheyenne Wells-Burlington road about 4½ miles northwest of the station and belongs to A. Eichels. Surface and underground marks are similar to those at station *Curlew*. (See above) Pieces of broken crockery and tile were mixed with the dirt over the station mark. A reference mark, a disk set according to note 11 (*a*) and 4 inches above the surface, is in the fence line on the north line of the roadway along the north line of the section, 2.59 meters (8.50 feet) east of the half-section corner, 30 feet north of the center of the roadway, and 290.38 meters (952.7 feet), bearing N. 14° W. (magnetic) from the station. Additional references are: To north and south half-section line, section 8, 153.0 meters (502 feet) west; to half-section corner between sections 8 and 5, marked with iron pipe and cap, 319.4 meters (1,048 feet), bearing N. 43° W. (magnetic); to north line section 8, 281.0 meters (922 feet) north.

Cheyenne Wells (Cheyenne County; F. W. P., 1892; 1922).—About 9 miles northwest of Cheyenne Wells, a town on the Union Pacific Railroad, on the highest point of a ridge about ½ mile west of the Cheyenne Wells-Beloit road, about 2½ miles toward Beloit from where the road crosses the Smoky Hill River.

For notes in regard to marking of stations, see p. 40.

The station is in NW. ¼ sec. 1, T. 13 S., R. 45 W., on cultivated land owned (1922) by John Tryon. Surface and underground marks are similar to those at station *Curlew*, except that lowest mark is 4½ feet below the surface. (See p. 41.) Broken crockery is mixed with the dirt over the mark. The reference mark, a disk set according to note 11 (*a*), is in the fence line on the west side of the roadway on the west line of section 1, 222.8 meters (731 feet) north of the United States Land Office mark at ¼ corner, and 637.49 meters (2,091.5 feet) S. 75° W. (magnetic) from the station. Additional references are: To north line of section 1, 584.3 meters (1,917 feet) north; to east and west half section line, section 1, 226.2 meters (742 feet) south.

First View (Cheyenne County; F. W. P., 1892; 1922).—About 1½ miles south by west of First View, a town on the Union Pacific Railroad, on the western extremity of the plateau east of the Big Sandy Creek, in the NW. ¼ sec. 34, T. 14 S., R. 46 W., on land owned (1922) by N. C. Peterson. The surface mark is a disk set as described in note 1 (*a*); underground mark is disk set according to note 11 (*a*), 30 inches below the surface. Below the underground mark is an additional mark, a cross in an irregular-shaped block rock, 3 feet below the surface. Pieces of crockery and tile are mixed with the dirt over the station mark, which is 12 inches below the surface. Reference mark, a disk set according to note 11 (*a*), is in the north fence line of roadway on the north line of section 34, 218.8 meters (718 feet) west of the mark at the half section corner between sections 27 and 34, and distant 33.86 meters (111.1 feet) N. 5° W. (magnetic) from the station. The General Land Office mark, a block of limestone surrounded by four pits, at the half-section corner between sections 27 and 34 is 221.22 meters (725.8 feet) N. 68° E. (magnetic) from the station.

Landsman (Cheyenne County; F. W. P., 1892).—Reported in 1922 as lost.

Kit Carson (Cheyenne County; O. H. T., 1882; 1922).—About 5 miles southwest of Kit Carson, a town on the Union Pacific Railroad, in SE. ¼ NW. ¼ sec. 35, T. 15 S., R. 49 W., on top of the highest sand dune in the vicinity, west of the Pueblo trail at a point about 1 mile southwest of where the trail crosses the old abandoned roadbed of the Arkansas Valley Railroad. The underground mark is a cross on a lead bolt in a rock 28 inches below the surface. Surface mark, a copper disk set according to note 1 (*a*), is 4 inches below the surface. The reference mark, a General Land Office mark, an iron pipe with a standard bronze cap marking the northwest corner of section 35, is distant 777.61 meters (2,551.2 feet) N. 74° W. (magnetic) from the station.

Eureka (Cheyenne County; O. H. T., 1881; 1922).—About 14 miles north and 3 miles west of Kit Carson, a town on the Union Pacific Railroad, and 2 miles north-northwest of Big Springs ranch house, on a hill just west of a side road that branches from the main road a short distance north of the ranch house. The station is near the center of NW. ¼ sec. 26 T. 12 S., R. 49 W., on pasture land owned (1922) by John F. Grabner, who lives in the NE. ¼ of the same section. Underground and station marks are similar to those at station Kit Carson (see above), the station mark being 9 inches below the surface. The reference mark, a disk 4 inches above the surface set as described in note 11 (*a*), is in the south fence line of the roadway on the north line of section 26, 324 meters (1,063 feet) east of the northwest corner of section 26, and distant 389.78 meters (1,278.8 feet) bearing N. 15° W. (magnetic) from the station. Additional references are: To west line of section 26, 323 meters (1,060 feet) west; to north line of section 26, 398.9 meters (1,309 feet) north.

Aroya (Lincoln County; O. H. T., 1881; 1922).—About 3½ miles south and 2½ miles west of Aroya, a town on the Union Pacific Railroad, on the eastern slope of a high ridge of sand hills which forms the watershed between Rush Creek and Big Sandy Creek. Station is in NE. ¼ NE. ¼ sec. 26, T. 14 S., R. 52 W., on land owned by J. A. Dougherty, who lives in the NW. ¼ of the same section. The lower underground mark is a cross on a lead bolt set in a rock, 34 inches below the surface. The upper underground mark, a disk set as described in note 7 (*a*), is 28 inches below the surface. Surface mark, a disk set according to note 1 (*a*), is 9 inches below the surface. Reference mark, a disk set according to note 11 (*a*), is in the west fence line of roadway on section line between sections 25 and 26, distant 43.21 meters (141.8 feet) in azimuth 298° 39′ from the station. Additional references are: To north line of section 26, 365.5 meters (1,199 feet) north; to General Land Office mark at NE. corner of section 26, 368.63 meters (1,209.4 feet) bearing N. 7° W. (magnetic); to east line of section 26, 41.5 meters (136 feet) east.

For notes in regard to marking of stations, see p. 40.

Overland (Lincoln County; O. H. T., 1881; 1922).—About 13 miles northwest of Aroya, a town on the Union Pacific Railroad, north of the old stage road, on one of the highest southern spurs of the ridge which forms the divide between Big Sandy Creek and Republican Creek. There is higher land north and northwest of the station. Underground mark is a disk set as described in note 7 (*a*); surface mark is disk level with surface set according to note 1 (*a*). The reference mark, a standard mark of the General Land Office, an iron post with bronze cap incased in concrete, marking the SE. corner of section 36 and the corner of townships 11 and 12, ranges 51 and 52 west, is distant 733.74 meters (2,407.3 feet) S. 83° W. (magnetic) from the station. From the station to south line of section 36 is 85 meters (280 feet).

Adobe (Lincoln County; O. H. T., 1880; 1922).—About 35 miles south of Hugo, 4 miles south and 1 mile west of Karval, in the NW. ¼ sec. 10, T. 17 S., R. 55 W., on land owned by T. B. Hersberger, who lives ½ mile north of the station. The station is on the highest point of land in the vicinity. The underground mark is a disk set as described in note 7 (*a*); surface mark is a disk set according to note 1 (*a*) and is even with surface. Reference mark is a disk 3 inches above the surface set as described in note 11 (*a*). It is directly on the section line 272 meters (894 feet) east from the northwest corner of section 10, and 244.09 meters (800.8 feet) from the station in azimuth 180° 04′ 56″.

Hugo (Lincoln County; O. H. T., 1880).—Reported in 1922 as lost.

Square Bluffs (Lincoln County; O. H. T., 1880).—Reported in 1922 as lost.

Cramer Gulch (Lincoln County; O. H. T., 1880).—Reported in 1922 as lost.

Big Springs (El Paso County; O. H. T., 1880; 1922).—About 30 miles east of Colorado Springs and 6 miles south of Mr. Pebble's home ranch, which is known as Big Springs, on uncultivated land, the highest point within a radius of 6 miles. The station is in the NW. ¼ NW. ¼ sec. 17, T. 15 S., R. 61 W. The underground mark is a disk 30 inches below the surface set as described in note 7 (*a*); surface mark is a disk 3 inches above the surface set according to note 1 (*a*). Reference mark, a disk set according to note 11 (*a*) and 2 inches above the surface, is in the fence line on the north side of the roadway along the north line of section 17, 108.5 meters (356 feet) N. 35° W. (magnetic) from the station. To west line of section 17 is 318.2 meters (1,044 feet) west; to north line of section 17, 94.5 meters (310 feet) north.

Holcolm Hills (El Paso County; O. H. T., 1880).—Reported in 1922 as lost.

Holt (Elbert County; O. H. T., 1880).—Reported in 1922 as lost.

Divide (El Paso County; O. H. T., 1880; 1922).—About 3 miles east of Eastonville, a town on the Colorado and Southern Railway, and about ¼ mile south of the bluffs forming the southern edge of a large plateau or mesa, near the western end of the middle and largest one of three small hills or buttes. Surface mark is a disk set as described in note 4; underground mark is a lead bolt set in a bowlder 1½ feet below surface. Four reference marks, each a cross in a lead bolt set in a stone, are, respectively, 1.83 meters (6.0 feet) north, east, south, and west of the station. An additional reference mark, a disk set according to note 12 (*a*), is distant 7.74 meters (25.4 feet) bearing 181° from the station. A large cairn, visible from the Eastonville road, is on the edge of the bluff 14 meters (46 feet) from the station in azimuth 30° 10′. Two pine trees, one marked with a square blaze and the other with a triangular blaze, are, respectively, 22.93 meters (75.2 feet) in azimuth 212° 12′, and 21.43 meters (70.3 feet) in azimuth 232° 15′ from station.

El Paso east base (El Paso County; O. H. T., 1878; 1922).—About 5 miles south and 1 mile east of Peyton, on Munson and Hamlin's ranch, commonly known as the Townsend ranch, in SE. ¼ SE. ¼ sec. 32, T. 12 S., R. 63 W., 215 meters (707 feet) north of the center of the road along the south side of section 32, and 168 meters (552 feet) west of the east line of section 32, on land owned (1922) by M. P. Ingerham, who lives 1 mile south of the station. The west gable of Munson and Hamlin's barn is 376.6 meters (1,236 feet) N. 14° 35′ E. (magnetic) from the station. Underground mark, 3½ feet below the surface, is a copper tack in a lead plug in a granite post, inscribed with the letters "U. S. E. B." Surface mark is a standard disk in a granite post set in concrete. It is also inscribed with letters "U. S. E. B." Reference mark, a disk 3 inches above the surface, set according to note 11 (*a*), is in the fence line on the north side of the public road along the south side of section 32 and is 225.6 meters (740.2 feet) S. 40° E. (magnetic) from the station. From station to east line section 32 is 168 meters (552 feet); to south line section 32, 215 meters (707 feet).

For notes in regard to marking of stations, see p. 40.

El Paso west base (El Paso County; O. H. T., 1878; 1922).—About 15 miles northeast of Colorado Springs and about 1 mile north of the sheep corral and main spring of water of the so-called Pugsley ranch, in the SW. ¼ NW. ¼ sec. 29, T. 12 S., R. 64 W., in a large pasture owned by the Newman Brothers. Underground and station marks are similar to those at *El Paso east base* (p. 43) except that the letters "W. B." are substituted for the letters "E. B." A standard disk reference mark, set in a dressed stone, bedded on a concrete base, is on the highest point of a knoll, somewhat higher than the one on which the station is located, distant 78.39 meters (257.2 feet) bearing N. 48° W. (magnetic) from the station. Top of stone is level with surface. The east and west half section line of section 29 is 184.7 meters (606 feet) south.

Corral Bluffs (El Paso County; O. H. T., 1879; 1922).—About 4 miles south and 1 mile east of Falcon, on the edge of the bluff forming the northern boundary of what is known as the Big Corral, a natural formation used to pen up cattle during the round-up. The station is in the SE. ¼ SE. ¼ sec. 31, T. 13 S., R. 64 W., on the highest land in the vicinity and commands a view of the plains as far south as the Arkansas River. Underground mark is a cross on a lead bolt in a bowlder, 25 inches below the surface; surface mark is a disk set as described in note 1 (*a*); it is 3 inches above the surface. Points of reference are: Center of road on east line of section 31, east 168 meters (552 feet); east to edge of deep drain, 20 feet; west to edge of deep drain, 200 feet; south to edge of bluff, 30 feet.

Plateau (Pueblo County; F. D. G., 1894; 1922).—About 9 miles northeast of Pueblo and 3½ miles northeast of Overton, on the highest ground at the north end of the plateau near the east line fence of M. Steele's property, whose home ranch is on the county road 1½ miles north of Overton. The station is near the trail which branches from the main road ¼ mile from Burke's ranch and is 77.1 meters (253 feet) northwest of the north gatepost in the fence described above and 51.2 meters (168 feet) west of the second post from the north gatepost where the fence bends a little to the north. Station is in the east part of sec. 16, T. 19 S., R. 64 W., in pasture land owned (1922) by Drunkard and Emmet. The underground mark is a disk set as described in note 7 (*a*). Surface mark is a disk even with surface set according to note 1 (*a*). Two standard disk reference marks were set in stone posts, one 3.3 meters (11 feet) north and the other 3.00 meters (9.8 feet) south of the station.

Pikes Peak (El Paso County; O. H. T., 1879; 1912).—On the summit of Pikes Peak, just north of the apex of the first northward bend in the burro trail leading west from the Summit Hotel and the terminus of the cogwheel railway. The nearest point of the precipice is about 25 meters north 25° west from the station and the northwest corner of the hotel is 160 meters distant in azimuth 273° 29′. The station is marked by a wire nail leaded in a drill hole in the concrete foundation of an old masonry pier. The pier, only a part of which remains, was built on four pillars in order to leave access to this nail. The station is also marked by a nail in a 4 by 4 inch scantling at the top of the remnants of the pier about 1 meter above the foundation. A United States Geological Survey triangulation station mark is on the southwest corner of the pier 0.467 meter (1.53 feet) distant in azimuth 50° 46′. A United States Geological Survey bench-mark tablet is embedded in the top of a large bowlder 13.594 meters (44.60 feet) from the station in azimuth 99° 52′. In the south face of this same bowlder is an aluminum tablet inscribed with the latitude and longitude, but it is badly defaced by bullet marks.

Bison (Park County; F. W. P., 1894).—On the highest point of rocks on Bison Peak, the king peak of the Tarryall Range, which is between Tarryall Creek and Goose Creek. The station is near the ninth meridian west, in township 9 south, and is marked by a nail leaded in a drill hole in the granite rock. A rough masonry pier used in mounting the instrument is above the station mark. Four drill holes in the rock near the station bear, respectively, 0°, 180°, 240°, and 300°.

Mount Ouray (Saguache County; W. E., 1894).—On the Great Continental Divide on the summit of Mount Ouray, about 4 kilometers in a northeasterly direction from Marshall Pass, a station on the Denver & Rio Grande Railroad. The station is marked by a cross in a copper bolt set in the solid surface rock. It is also marked by a drill hole filled with charcoal and plaster of Paris in a brick embedded in the top of a brick and concrete pier built above the lower mark. The station is surrounded by a ring wall of loose stones 4 feet high with an inner diameter of 11 feet. Four reference marks, each consisting of a brick set on end and marked with a drill hole filled with plaster of Paris, are just outside the

For notes in regard to marking of stations, see p. 40.

wall at the following distances and azimuths from the station: 2.75 meters (9.0 feet), 5° 31′; 2.80 meters (9.2 feet) 96° 46′; 2.74 meters (9.0 feet), 186° 11′; and 2.73 meters (9.0 feet), 275° 54′. *Mount Ouray latitude station*, marked by a brick and concrete pier, is 20.514 meters (67.30 feet) distant in azimuth 188° 23′.

Mount Elbert (Lake County; P. A. W., 1894).—On the summit of Mount Elbert, about 7 miles by trail from the town of Twin Lakes (also called Dayton). The station is marked by a copper bolt leaded into a drill hole in a large surface rock. It is also marked, 5 inches above the bolt, by a drill hole in a rock embedded in a 5-inch layer of masonry built between the bases of the three small brick piers used in mounting the instrument. At a distance of 5 feet in each of the directions north, east, south, and west is a reference stone marked with a drill hole. The station is nearly surrounded by a square rock wall.

Treasury Mountain (Gunnison County; W. E., 1893).—On the summit of Treasury Mountain, a prominent peak in the Elk Mountain Range, about 2 miles southeast of the mining town of Crystal. The station is marked by a copper bolt set in a drill hole in the solid surface rock. It is also marked, 6 inches above the bolt, by a drill hole filled with plaster of Paris in a brick embedded in a layer of masonry built between the bases of the three small brick piers used in mounting the instrument. The station is nearly surrounded by a ring wall of rocks 4 feet high with an inner diameter of 10 feet. Four reference marks, each consisting of a drill hole in a surface rock, are just outside the wall at the following distances and azimuths from the station: 2.31 meters (7.6 feet), 267° 10′; 2.25 meters (7.4 feet), 351° 25′; 2.39 meters (7.8 feet), 81° 45′; and 2.39 meters (7.8 feet), 177° 20′. *Treasury Mountain latitude station*, marked by a brick pier, is 31.13 meters (102.1 feet) from the station in azimuth 327° 43′.

Uncompahgre (Hinsdale County; W. E. 1895).—On the summit of Uncompahgre Peak, one of the most prominent and best known peaks in southwestern Colorado, about 8 miles northwest of Lake City. The station is within about 10 feet of the perpendicular cliff on the north side of the summit. It is marked by a cross in a copper bolt which is leaded in a drill hole in the solid surface rock. The station is also marked, 4 inches above the copper bolt, by a drill hole in a brick embedded in a layer of concrete which connects the bases of three small brick piers used for mounting the instrument. The station is nearly surrounded by a ring wall of rocks 4 feet high with an inner diameter of 11 feet. Four reference marks, each consisting of a drill hole in a rock filled with lead, are at the following distances and azimuths from the station: 2.48 meters (8.1 feet), 3° 36′; 2.85 meters (9.4 feet), 89° 58′; 2.65 meters (8.7 feet), 179° 49′; and 2.87 meters (9.4 feet), 269° 56′. *Uncompahgre latitude station*, marked by a brick pier with a concrete foundation, is 15.275 meters (50.11 feet) from the station in azimuth 305° 55′.

Mount Waas (Grand County, Utah; W. E., 1893).—On the highest point of Mount Waas, which is the third prominent peak from the north end of the La Sal Mountains. The station is marked by a cross in a copper bolt which is set in a drill hole in the rock between the bases of three small brick piers used for mounting the instrument. The station is surrounded by a ring wall of rocks 4 feet high with an inner diameter of 10 feet. Four reference marks, each probably consisting of a drill hole in the rock, are just outside the wall at the following distances and azimuths from the station: 2.24 meters (7.3 feet), 3° 58′; 2.29 meters (7.5 feet), 104° 19′; 2.18 meters (7.2 feet), 186° 37′; and 2.21 meters (7.3 feet), 275° 45′. *Mount Waas astronomic station*, marked by a concrete pier, is 28.213 meters (92.56 feet) from the station in azimuth about 329°.

Tavaputs (Garfield County; W. E., 1891).—On the southern edge of the Book Mountains, which in this vicinity consist of low flat ridges sparsely covered with pine and aspen trees. The station is between West Salt Wash, 3 miles to the southeast, and Bitter Creek, ¾ mile to the west. Bitter Creek has its source in a fresh-water spring 1¼ miles distant to the north. The marking of the station is similar to that of *Uncompahgre* (see above), except that there are only three reference marks which are at the following distances and azimuths from the station: 2.43 meters (8.0 feet), 74° 41′; 2.40 meters (7.9 feet), 196° 31′; and 2.43 meters (8.0 feet), 322° 12′.

Patmos Head (Carbon County, Utah; W. E., 1890).—On Patmos Head, one of the peaks of the range of mountains known as West Tavaputs Plateau, and the highest point within several miles. It is about 12½ miles southeast from Sunnyside and 3 miles southeast of the upper end of Dry Canyon. The station is marked by a copper bolt in a rock bedded in the ground and about 8 inches above the bolt by a drill hole in another rock which is cemented to the lower one.

For notes in regard to marking of stations, see p. 40.

Three small brick piers, used for mounting the instrument, are about the station, and the whole is surrounded by a ring wall of rocks 3½ feet high with an inner diameter of 11 feet. Four reference marks are outside the ring wall at the following distances and azimuths from the station: Drill hole in a rock, 2.59 meters (8.5 feet), 233° 16′; drill hole in a rock, 2.62 meters (8.6 feet), 327° 07′; copper bolt in a rock, 3.45 meters (11.3 feet), 343° 16′; and a stump, 3.35 meters (11.0 feet), 90° 06′. *Patmos Head astronomic station* is 56.76 meters (186.2 feet) from the station in azimuth 190° 12′.

Mount Ellen (Garfield County, Utah; W. E., 1891).—On the summit of Mount Ellen, the northern peak of the Henry Mountains, a conical barren peak the upper part of which is covered with rough broken pieces of granite rock. The station is marked by a copper bolt in a rock embedded in concrete and a few inches above the bolt by a drill hole in another rock set between the bases of three small brick piers used for supporting the instrument. The station is nearly surrounded by a ring wall of rocks 4½ feet high with an inner diameter of 11 feet. Three reference marks, each consisting of a drill hole filled with plaster of Paris in the solid surface rock, are just outside of the wall at the following distances and azimuths from the station: 2.41 meters (7.9 feet), 23° 35′; 2.44 meters (8.0 feet), 144° 45′; and 2.39 meters (7.8 feet), 263° 34′. *Mount Ellen astronomic station*, marked by a brick pier, is 15.02 meters (49.3 feet) from the station in azimuth 5° 20′.

Supplementary points

Glen Eyrie (El Paso County; O. H. T., 1880).—About 7 miles northwest of Colorado Springs and 2 miles northwest of General Palmer's dwelling house, on the foothills north of the Garden of the Gods and about 3 miles from the Gateway. The station is on the first ridge west of Glen Eyrie, and about 500 meters northwest of the point where a high bald hill beside the glen joins the main ridge. The station is marked by a cross on a lead bolt in a flat stone about 1 foot below the surface of the ground.

Bear Creek (El Paso County; O. H. T., 1879).—About 4 miles west-southwest of Colorado Springs and just south of Bear Creek on one of the front foothills of Pikes Peak. The station is marked by a cross in the lead which fills a hole 3 inches in diameter and 1½ inches deep in a flat stone about 1 foot below the surface of the ground.

Colorado Springs latitude and longitude (El Paso County; E. S., 1873; 1879).—Just east of the Denver & Rio Grande Railroad passenger depot at Colorado Springs, in the experimental garden just north of the main walk, about 60 meters west of the east gate. The station is marked by the foundation of an old masonry pier.

Colorado Springs astronomic (*U. S. E.*) (El Paso County; O. H. T., 1879).—On a rise of ground southeast of the freight depot of the Denver & Rio Grande Railroad at Colorado Springs. The station is marked by a drill hole in the top of a solid stone pier.

Table (Elbert County; F. D. G., 1895).—About 2½ miles northwest of the town of Elbert, on the highest hill in this vicinity, called Table Mountain by the owner, W. E. Foote, who lives just north of the hill. The station is marked at the surface by a nail in a small pine stub and underground by a drill hole in a flat stone about 15 inches below the ground. A United States Geological Survey station is 1.12 meters (3.7 feet), east of the station, and a fence post, to which is nailed a piece of wood 8 feet high with two cross pieces attached, is 1.55 meters (5.1 feet), north. Station *Elbert* is on the same hill.

Mesa (Delta County; W. E., 1893).—A short distance north of the most western point of that part of the Grand Mesa which is southeast of Connah Creek within about 40 feet of the edge of the rim rock which limits the mesa. The station is marked by a copper bolt set in the solid lava rock. It is also marked about 10 inches above the ground by a drill hole in a brick embedded in the masonry which fills the space between the bases of the three small brick piers used to support the instrument.

Chiquita (Mesa County; W. E., 1895).—About 12 miles south-southwest from Grand Junction, on the northern rim or brow of Piñon Mesa. The station is marked by a low brick pier used in mounting the instrument.

Grand Junction standpipe (Mesa County; W. E., 1895).—The center of the standpipe at Grand Junction, which is 10 feet in diameter and about 100 feet high. The station was occupied eccentrically at a point 12.03 meters (39.5 feet) distant in azimuth 166°. The eccentric point is marked by a brick pier.

For notes in regard to marking of stations, see p. 40.

Valley Knob (Grand County, Utah; W. E., 1890; 1898).—About 5 miles east of Green River, on a bare knoll 50 feet above the valley, ¼ mile north of the railroad track. The station is marked by a drill driven into the ground. The signal pole and the heliotrope stand weighted down with stones were left in position.

Hartman (Emery County, Utah; C. H. S., 1898).—About 2 miles north of the town of Green River and ½ mile west of the Green River, on the southeast end of a mesa which rises about 40 feet above the general level, the first prominent bank north of a deep wash. The station is marked by a drill hole in a rock over which is a pile of rocks used to secure the base of the signal pole.

Mica (Emery County, Utah; C. H. S., 1898).—About 800 meters south of the depot at Green River, on the east end and highest point of a conspicuous hill sloping toward the westward. The station is marked by a drill hole in a piece of sandstone above which is a pile of bricks used for securing the base of the signal pole.

Reservoir (Emery County, Utah; C. H. S., 1898).—On the high hill just south of the railroad at Green River, near an old abandoned reservoir. The station is marked by a drill hole in a piece of sandstone, 6 feet from the north edge of the reservoir.

Wash (Emery County, Utah; C. H. S., 1898).—About 1½ miles northwest of the town of Green River on the high bluff that forms the rim of the plain just north of the railroad track. The station is about 10 feet north of the edge of the bluff and 75 feet above the plain. It is marked by a drill hole in a shale rock, over which is a pile of rocks used for securing the base of the signal pole.

Green River east base (Emery County, Utah; C. H. S., 1898).—Just west of the first curve of the railroad west of the depot at Green River, about 200 meters from the west water tank and 9 paces north of the track. A low ridge extending north and south is about 20 or 30 meters east of the station. The station is on the top of a low dirt pier and is marked by a drill hole in a piece of sandstone.

Green River west base (Emery County, Utah; C. H. S., 1898).—About ½ mile west of the first curve west of the depot at Green River, 194 meters west of wooden culvert No. 221A and 9 paces north of the north rail of the track. The station is between the line of telegraph poles and the track and is about 15 or 20 meters southeast of an old railroad grade extending northeast and southwest. The station is marked by a drill hole in a shale rock set flush with the surface of the ground.

Green River north meridian (Emery County, Utah; C. H. S., 1898).—About 625 meters directly north of *Green River longitude* station, about 30 meters north of a large wash and just west of a wagon road. The station is marked by a drill hole in a sandstone block 10 inches square and 18 inches long having a pile of bricks around the top.

Green River south meridian (Emery County, Utah; C. H. S., 1898).—Fifty paces south of the railroad and 12.40 meters north of *Green River longitude* station. The station is marked by a drill hole in a piece of sandstone with four reference bricks placed around it just below the surface of the ground.

Green River longitude (Emery County, Utah; C. H. S., 1898).—On the railroad right of way, 65 paces west of the depot at Green River, 64 paces southwest of the railroad water tank, and 50 paces from the railroad. The station is marked by a brick pier 17 by 25 inches, 3 feet high above the ground. *Green River latitude* station, marked by a brick pier 17 inches square, is 51 inches due west of the station.

Cliff (Emery County, Utah; C. H. S., 1898).—This station was neither occupied or marked, as its location is nearly inaccessible. It is north-northwest of the town of Green River on a lofty butte about 3 miles long east and west which rises about 2,000 feet above the plain. The upper part of the cliff is composed of stratified rock with the dip vertical and has the general appearance of a huge battleship. The station is the highest point of the cliff which is near the middle of its length.

Green River schoolhouse (Emery County, Utah; C. H. S., 1898).—The flagstaff on the cupola of the small wooden schoolhouse about ⅛ mile northeast of the depot at Green River.

Green River hotel (Emery County, Utah; C. H. S., 1898).—The flagstaff on the railroad hotel just south of the depot at Green River.

For notes in regard to marking of stations, see p. 40.

ONE HUNDRED AND FOURTH MERIDIAN NORTH

Principal points

Elbert (Elbert County; C. V. H., 1912).—Two and one-half miles west and ½ mile north of Elbert in a cultivated field ¼ mile north of a large square house. The station is on the highest knoll in the vicinity and is marked according to notes 1 (*b*) and 7 (*b*). A reference mark, described in note 11 (*b*), is about 0.4 meter west of a fence line, 0.9 meter south of the fence corner where there is a flag left by the United States Geological Survey, and 92.053 meters from the station. Latitude observations were made in 1913 at a point, not marked, 0.025 meter (0.08 foot) east and 0.045 meter (0.15 foot) south of the station. Station *Table* is on this same hill.

Hilltop (Ebert County; C. V. H., 1912).—One and one-half miles east and ½ mile north of the railroad station at Hilltop, on the highest point of a low hill in the pasture of Daniel Mayer, near the northeast corner of the SE. ¼, sec. 10, T. 7 S., R. 65 W. The station is marked according to notes 1 (*b*) and 7 (*b*). A reference mark, described in note 11 (*b*), is in the fence line at the northeast corner of the quarter section mentioned above, 321.810 meters (1,055.80 feet) from the station in azimuth 231° 02′.

Morrison (Jefferson County; F. D. G., 1895; 1912).—This station is identical with the United States Geological Survey station of the same name. It is about 3 miles northwest of the town of Morrison, on the highest point of Mount Morrison, 40 meters northwest of the upper landing of the cable railway. The station is marked according to note 4, in a drill hole in a large bowlder. The copper bolt marking the eccentric station occupied by the United States Geological Survey is 3.130 meters (10.27 feet) distant in azimuth 311° 45′. Latitude observations were made in 1913 at a point, not marked, 3.71 meters (12.2 feet) from the station in azimuth 322° 13′.

Douglas (Douglas County; C. V. H., 1912).—About 7 miles east of Parker on the south side of the section road running east from that town, about 5 feet south of the south road fence at the highest point of the road in that vicinity. The station is on land belonging to Andrew Johnson, near the middle of the north side of sec. 21, T. 6 S., R. 65 W., and is marked according to notes 1 (*b*) and 7 (*b*). A reference mark, described in note 11 (*b*) is in the fence line on the opposite side of the road, 20.06 meters (65.8 feet) from the station in azimuth 170° 33′.

Indian (Arapahoe County; C. V. H., 1912).—This station is identical with the United States Geological Survey station "Indian Mound." It is on the center one of a group of mounds known as the Indian Mounds, about 6 miles south and 1 mile east of Watkins, near the southeast corner of sec. 36, T. 4 S., R. 65 W. The station is marked by a United States Geological Survey iron-pipe station mark projecting 20 inches above the ground. A reference mark, described in note 11 (*b*), is 188.922 meters (619.82 feet) from the station in azimuth 199° 21′. The southeast corner stone of section 36 is 135.251 meters (443.73 feet) distant in azimuth 214° 58′. A cairn is 3.0 meters (10 feet) from the reference mark and 192.0 meters (630 feet) from the station in azimuth 199° 31′.

Watkins astronomic (Adams County; C. V. H., 1912).—On the Union Pacific Railroad right of way at Watkins, 35.2 meters south of the main-line track on the north side of the Watkins–Denver wagon road. The station is marked according to notes 1 (*b*) and 7 (*b*), with the addition of 6 inches of concrete outside the iron pipe of the surface mark. A reference mark, described in note 11 (*b*), except that there is a nail in place of the brass disk, is on the south side of the wagon road running southeast from Watkins and nearly on line with the north-and-south section fence and is 289.603 meters (950.14 feet) from the station in azimuth 308° 51′. A United States Geological Survey iron-pipe bench mark (U. S. Coast and Geodetic Survey bench mark G_2) is 266.017 meters (872.76 feet), distant in azimuth 244° 16′. The southeast corner of the depot is 27.85 meters (91.4 feet) from the station in azimuth 142° 54′, and a railroad water tank is about 175 meters distant in azimuth 103° 09′. Azimuth observations were made at this station, and longitude observations were made at a point, not marked, 48.64 meters (159.6 feet) south and 4.60 meters (15.1 feet) east of the station.

Brighton (Weld County; C. V. H., 1912).—This station is identical with the United States Geological Survey station of the same name. It is about 4½ miles northeast of the town of Brighton on the highest hill in the NE. ¼, sec. 27, T. 1 N., R. 66 W. The station is marked by a United States Geological Survey iron pipe triangulation mark projecting 1 foot above the ground. A

For notes in regard to marking of stations, see p. 40.

reference mark, described in note 11 (*b*), is 0.27 meter below the station and 93.563 meters (306.96 feet) distant in azimuth 124° 24′.

Boulder (Boulder County; C. V. H., 1912).—This station is identical with the United States Geological Survey station of the same name. It is about 4 miles direct and 9 miles by road and trail from the town of Boulder, on the northeastern one of the two peaks locally known as South Boulder Peak, between South Boulder and Bear Canyons. The station is marked by a United States Geological Survey bronze tablet set in solid rock. A reference mark, described in note 12 (*b*), is 0.43 meter above the station and 4.454 meters (14.61 feet) distant in azimuth 8° 59′. A cross cut in the solid rock 1 meter above the station and 0.08 meter below the top of the highest rock on the peak is 1.88 meters (6.2 feet), from the station in azimuth 90° 51′. Azimuth observations were made at this station.

Horsetooth (Larimer County; C. V. H., 1912).—This station is identical with the United States Geological Survey station of the same name. It is 8 miles southeast of Fort Collins on a high bare rocky point of the divide, immediately east of Redstone Creek, and 1¼ miles north of the point where the Fort Collins–Estes Park road crosses the divide. Deep vertical clefts divide the peak into three nearly equal parts, which have the appearance of gigantic teeth when viewed from the eastward. The station is on the highest and most southern one of the three divisions of the peak and is marked by a United States Geological Survey triangulation tablet set in solid rock. A reference mark, described in note 12 (*b*) is 0.04 meters below the station and 4.74 meters (15.6 feet), distant in azimuth 171° 24′.

Dewey (Weld County; C. V. H., 1912).—This station is identical with the United States Geological Survey station of the same name. It is 8 miles east and 1 mile south of Eaton, a town on the Union Pacific Railroad, and 1½ miles east and 1 mile south of Galeton, a new town on a branch of the Union Pacific Railroad. The station is on a round-topped knoll on the open prairie near the center of the north side of sec. 9, T. 6 N., R. 64 W., and is marked by a United States Geological Survey iron-pipe bench mark projecting about 20 inches above the surface of the ground. A reference mark, described in note 11 (*b*), is 136.190 meters (446.82 feet), from the station in azimuth 309° 56′. Azimuth and latitude observations were made at this station.

Warren (Laramie County, Wyo.; C. V. H., 1912).—At the extreme western end of a high ridge about 10½ miles south 17° west from Cheyenne, 2 miles north 57° east from the old Terry ranch, now the headquarters of the Warren Live Stock Co., and ½ mile northeast of the section house at Gleason, a station on the Union Pacific Railroad. The station is marked according to notes 1 (*b*) and 7 (*b*). A reference mark, described in note 11 (*b*) is 0.18 meter below the station and 10.728 meters (35.20 feet), distant in azimuth 127° 54′. The conspicuous conical hill on which *Terry* is located is about ⅜ mile north-northwest from the station.

Twin (Laramie County, Wyo.; C. V. H., 1912).—On the highest point of the more eastern one of the two peaks known as Twin Mountain, about 20 miles a little south of west from Cheyenne and 7 miles by road southwest of Granite Canyon, a station on the Union Pacific Railroad. The station is marked according to note 3. A reference mark, described in note 12 (*b*), is 0.15 meter above the station and 3.494 meters (11.46 feet) distant in azimuth 159° 58′. The bronze tablet marking the United States Geological Survey triangulation station "East Twin" is 0.16 meter above the station and 2.674 meters (8.77 feet) distant in azimuth 96° 08′. Azimuth observations were made at this station.

Wadill (Laramie County, Wyo.; C. V. H., 1912).—Thirteen miles by road northwest of Cheyenne, 2 miles west of the Cheyenne-Chugwater road, and 1¼ miles west of the Cheyenne-Whitaker ranch road along which there is a telephone line. The station is on a ridge on the open prairie at the highest point of the divide between Lodge Pole Creek and Crow Creek, and about 300 meters south 31° west from the center of sec. 24, T. 15 N., R. 68 W., on homestead land belonging to James Wadill, who lives about ⅝ mile south of the station. The station is marked according to notes 1 (*b*) and 7 (*b*). A reference mark, described in note 11 (*b*) is on the quarter section line, 1.74 meters below the station and 88.778 meters (291.27 feet) distant in azimuth 274° 38′. The chimney of William Kipp's house is in azimuth 197° 23′ from the station and Mr. Ritzke's windmill in azimuth 249° 00′.

Russell (Laramie County, Wyo.; C. V. H., 1912).—Near the eastern edge of Fort D. A. Russell target and maneuver reserve on top of a bare rocky peak

For notes in regard to marking of stations, see p. 40.

about 3½ miles east of Pole Mountain. The peak is the highest in that immediate vicinity and has a rocky, partially wooded ridge making off from it toward the west. The station is on the south side of the peak slightly below a high bowlder to the north, with Greentop Mountain showing through a small notch in the summit. It is marked according to note 3. A reference mark, described in note 12 (*b*), is 1.03 meters above the station and 10.27 meters (33.7 feet) distant in azimuth 168° 41′.

Greentop (Albany County, Wyo.; C. V. H., 1912).—On the timbered, rocky summit of Greentop Mountain, 8 miles west and 4 miles south of station Horse Creek on the Colorado & Southern Railway, and about ⅛ mile south of the south fork of Horse Creek. The station is marked according to note 3. A reference mark, described in note 12 (*b*), is 0.5 meter above the station and 3.13 meters (10.3 feet) distant in azimuth 59° 03′. A cairn is 6.0 meters (20 feet) from the station in azimuth 90°.

Whitaker (Laramie County, Wyo.; C. V. H., 1912).—About 18 miles north and 8½ miles west of Cheyenne and 3 miles south and ¾ mile east of the D. R. Whitaker ranch buildings on Horse Creek. The station is on rolling prairie land at the highest point of the divide between Pole Creek and Horse Creek, about ¾ mile northeast of the Cheyenne-Whitaker ranch road at the point where the road passes the quarter section corner and bench mark referred to below. The station is marked according to notes 1 (*b*) and 7 (*b*). A reference mark, described in note 11 (*b*), is 1.17 meters below the station and 91.038 meters (298.68 feet) distant in azimuth 270° 57′. The southwest corner post of sec. 33, T. 17 N., R. 68 W., is 800.12 meters (2,625.1 feet) distant in azimuth 45° 37′. The United States Geological Survey iron-pipe bench mark "6702 Denver" is 1,110.82 meters (3,644.4 feet) distant in azimuth 59° 55′ 30″. A cairn is 8 meters from the station on the line toward Ragged Top Mountain. Latitude observations were made at this station in 1913.

Ragged (Albany County, Wyo.; C. V. H., 1912).—About 10 miles west of Horse Creek, a post office on the Colorado & Southern Railway, 8 miles west of McLaughlin's ranch, and ½ mile south of the North Fork of Horse Creek, on the highest rock of a group of pinnacles known as Ragged Top Mountain. The rock referred to is the middle one of three prominent peaks on the most western ridge and is about 300 meters west of an old wood road in a canyon opening to the south. The station is marked by a United States Geological Survey bench mark tablet set in solid rock. The tablet has a triangle cut in the top and is stamped "Elevation above sea level, 8,230 feet." A reference mark, described in note 12 (*b*), is 0.20 meter below the station and 3.12 meters (10.2 feet) distant in azimuth 185° 04′. Azimuth observations were made at this station.

Cheyenne west base (Laramie County, Wyo.; C. V. H., 1913).—About 17 miles by road northwest of Cheyenne and ½ mile south of the house of William Pellis, on the highest part of an east and west ridge and about 15 meters south of the quarter section corner on the line between secs. 5 and 6, T. 15 N., R. 68 W. The station is marked by a standard disk station mark, described on page 39, set in a cylinder of concrete 16 inches in diameter and 24 inches long, the top of which is flush with the surface of the ground. The underground mark is similar to the surface mark except that the cylinder of concrete is only 10 inches in diameter and 10 inches long. It is 30 inches below the ground and 6 inches below the bottom of the surface mark. A standard disk reference mark, described on page 39, set in a cylinder of concrete 12 inches in diameter and 24 inches long, is on the section line 18.80 meters (61.7 feet) from the station in azimuth 7° 28′.

Cheyenne east base (Laramie County, Wyo.; C. V. H., 1913).—About 14 miles by road northwest of Cheyenne, on the highest point of a ridge extending east and west, and about 25 meters south of the quarter section corner on the line between secs. 11 and 12, T. 15 N., R. 68 W. Section 11 is owned by Clarence Sorenson, who lives ⅝ mile north of the station. The station is marked by a standard disk station mark, described on page 39, set in a cylinder of concrete 16 inches in diameter and 24 inches long, the top of which is flush with the surface of the ground. The underground mark is a twenty-penny nail set in a cylinder of concrete 10 inches in diameter and 10 inches long, about 30 inches below the surface of the ground. A standard disk reference mark, described on page 39, set in a cylinder of concrete 12 inches in diameter and 24 inches long, is 16.47 meters (54.04 feet) from the station in azimuth 180° 51′.

For notes in regard to marking of stations, see p. 40.

Supplementary points

Brighton bench mark R 2 (Adams County; C. V. H., 1912).—This station is identical with the United States Geological Survey bench mark "R 2." It is about 1 mile north of Brighton, near the north county line, on the south side of the base line road 1 meter north of the fence line and 7.25 meters (23.8 feet) west of the west rail of the Union Pacific Railroad. The station is marked by an iron pipe and a cap on which are the figures 4966. *Brighton bench mark eccentric*, the point occupied, is 39.832 meters (130.68 feet) distant in azimuth 89° 22′. A reference mark, described in note 11 (*b*), with the arrow pointing toward the eccentric point, is in the fence line on the north side of the base line road and 1 meter west of the west fence line of the county road and is 54.30 meters (178.1 feet) from the bench mark in azimuth 110° 00′. Latitude observations were made in 1913 at a point, not marked, 14.256 meters (46.77 feet) south and 0.285 meter (0.94 foot) west of the eccentric station.

Loveland tall white chimney (Larimer County; C. V. H., 1912).—The center of a tall white chimney in the town of Loveland. Latitude observations were made in 1913 at a point, not marked, 196.20 meters (643.7 feet) from the station in azimuth 193° 55′.

Dover bench mark E 3 (Weld County; C. V. H., 1912).—This station is identical with first-order leveling bench mark E 3 established by this survey. It is in the southeast corner of the Union Pacific Railroad section-house yard, 17 meters from the southeast corner of the section house and 25 meters west of the center of the track. It is marked by a granite post 6 inches square on top and 4½ feet long, projecting 6 inches above the ground, and inscribed on the top with a square and the letters "U. S. B. M." The station was occupied eccentrically. *Dover bench mark eccentric*, which is not marked, is 10.44 meters (34.25 feet) from the station in azimuth 240° 38′. *Dover bench mark reference mark*, described in note 11 (*b*), with the arrow pointing toward the eccentric point, is on the railroad right of way 16 meters west of the center of the track, 36 meters north of the east gable of the section house, and 53.23 meters (174.64 feet) from the station in azimuth 162° 00′. The reference mark is on the east side of the Denver-Cheyenne wagon road and is south of the wagon road which crosses the track at this point.

Terry (Laramie County, Wyo.; C. V. H., 1912).—This station is identical with the United States Geological Survey station of the same name. It is about 10 miles south 17° west from Cheyenne and about 2 miles northeast of the house on the old Terry ranch, now the headquarters of the Warren Live Stock Co. The station is on a bare conical hill and is marked by a United States Geological Survey iron bench-mark post set 3 feet in the ground. A reference mark, described in note 11 (*b*), is 0.94 meter below the station and 10.87 meters (35.66 feet) distant in azimuth 202° 55′.

Colorado-Wyoming boundary monument, milepost 44 (Weld County, Colo., and Laramie County, Wyo.; C. V. H., 1912).—About 11 miles west of south of Cheyenne, on the ranch of the Warren Live Stock Co., about ½ mile southeast of their ranch house. The monument is a dressed red sandstone post standing about 4 feet above the surface of the ground and is surrounded by a mound of loose rock. It is marked as follows: "44M" on the east side, "Colorado" on the south, "41 N. L. 1873" on the west, and "Wyoming" on the north side. It is the only permanent boundary monument for several miles in either direction. The station is marked by a standard disk station mark, described on page 39, set in the top of the monument. A reference mark, described in note 11 (*b*), is in a fence line near an angle in the fence, 3.92 meters below the station and 110.184 meters (361.50 feet) distant in azimuth 75° 18′. Latitude observations were made in 1913 at a point, not marked, 14.838 meters (48.68 feet) directly north of the monument.

ONE HUNDRED AND FOURTH MERIDIAN SOUTH

Principal points

Haswell (Lincoln County; C. M. D., 1922).—About 8 miles northwest of Haswell, 3 miles west southwest of Webster's place, ¼ mile south of a section line road, on land owned by a resident of Kansas, the highest land in the vicinity. W. F. Overturf, of Haswell, knows the exact location of the station. Surface mark is disk set as described in note 1 (*a*), with underground mark a disk set according to note 7 (*a*). Reference marks are disks, set according to note 11 (*a*),

For notes in regard to marking of stations, see p. 40.

at the following distances and azimuths from the station: No. 1, 30.97 meters (101.6 feet), 259° 48′; No. 2, 29.01 meters (95.2 feet), 347° 18′.

Metz (Lincoln County; C. M. D., 1922).—On Wild Horse Point, 2½ miles west of Green Knoll, 6 miles south of Herpsberger's horse ranch, 3 miles southeast of Wilson's homestead and Metz Springs, 400 meters west of the bluff, and 30 meters northeast of the wagon road. Surface mark is disk set as described in note 1 (*a*), with underground mark a disk set according to note 7 (*a*). A reference mark, a disk set as described in note 11 (*a*), is 9.95 meters (32.6 feet) from the station in azimuth 87° 34′. A tract corner in T. 17 S., R. 55 W., Metes and Bounds Survey of 1919, being an angle point 6 of tract 39 and 3 of tract 41 on boundary tract 65, is under the cattle guard in the fence line which runs 10 meters west of the station. This tract corner is 20.02 meters (65.7 feet) from the station in azimuth 30° 29′.

Todd (Bent County; C. M. D., 1922).—Near the west end of the mesa, near the southern end of Todd Point, a prominent point 10 miles east of Sugar City. The station is about 2 miles northwest of Heath signboard on the Missouri Pacific Railroad, about 300 meters south of a homestead, and 5 meters west of a plowed field. The station was established by the United States Geological Survey. No details of the marking of the station are given.

Clark (Bent County; C. M. D., 1922).—About 4 miles east and 10 miles north of Las Animas, 15 miles south of Haswell, 3 miles east of Blue Lake Reservoir, ½ mile south of the Kiowa-Bent county line, ¾ mile east of the Clark homestead, 300 meters south of an old mud lake, and 150 meters west of the Las Animas-Haswell road, on the highest point of a grassy knoll. Surface mark is disk set as described in note 1 (*a*); underground mark is disk set according to note 7 (*a*). Reference marks are disks, set as described in note 11 (*a*), at the following distances and azimuths from the station: No. 1, 11.095 meters (36.40 feet), 204° 44′; No. 2, 13.330 meters (43.73 feet), 293° 32′.

Mopa (Kiowa County; C. M. D., 1922).—About 3¼ miles west and 1 mile north of Haswell, on land owned by Mrs. Carman. Surface mark is disk set as described in note 1 (*a*); underground mark is disk set according to note 11 (*a*). The reference mark, an iron rod 12 inches long set in concrete, is in the fence line west of the station. From the station the following distances and magnetic bearings are given: Windmill, 500 feet, N. 62° 00′ E.; Mrs. Carman's house, 525 feet, N. 72° 15′ E.; Haswell church spire, 3½ miles east; windmill ¼ mile, S. 74° 45′ E.; reference mark 18.415 meters (60.42 feet) S. 73° 55′ W.

Hadley (Bent County; C. M. D., 1922).—About 12 miles southwest of Las Animas, 8 miles southeast of La Junta, 4 miles south of Hadley, 3 miles east of J. J. Dwyer's place, and ⅝ mile south of a lone hill standing in valley just north of the mesa. The station is 60 meters east of the head of a gully with a fence on its western side and is on the highest part of a gravel knob. Surface mark is disk set as described in note 1 (*a*); underground mark is disk set according to note 7 (*a*). Reference mark, a disk set as described in note 11 (*a*), is 16.96 meters (55.6 feet) from the station in azimuth 296° 56′.

Animas (Bent County; C. M. D., 1922).—About 10 miles south and ½ mile east of Las Animas, on the highest point of a grassy hill 250 meters east of the road leading south from Las Animas to Rule post office, Kim, Ninaview, etc. Station mark is disk set as described in note 1 (*a*); underground mark is disk set according to note 7 (*a*). Reference marks are disks, set as described in note 11 (*a*), at the following distances and azimuths from the station: No. 1, 14.50 meters (47.6 feet), 178° 47′; No. 2, 15.12 meters (49.6 feet), 258° 58′.

Huey (Bent County; C. M. D., 1922).—About 2 miles south and 2 miles west of Las Animas on land owned by Huey Brothers, on the highest point in the vicinity. Surface mark is disk set as described in note 1 (*a*). Underground mark is a standard reference disk set stem up in a block of concrete 3 feet below surface of ground. Reference marks are disks, set as described in note 11 (*a*), at the following distances and azimuths from the station: No. 1, 15.595 meters (51.16 feet), 176° 46′; No. 2, 18.810 meters (61.71 feet), 266° 57′.

England (Bent County; C. M. D., 1922).—About 25 miles southeast of La Junta, 4 miles northwest of Opal, 7 miles southeast of the J. J. ranch, 75 meters west of the old homestead of M. H. England, and 400 meters southeast of Mr. England's new house. Surface mark is disk set as described in note 1 (*a*); underground mark is disk set according to note 7 (*a*). Reference marks are disks, set as described in note 11 (*a*), at the following distances and azimuths from the station: No. 1, 16.175 meters (53.07 feet), 58° 11′; No. 2, 18.920 meters (62.07 feet), 161° 29′.

For notes in regard to marking of stations, see, p. 40.

Cameron (Bent County; C. M. D., 1922).—About 25 miles southeast of Las Animas, 8 miles north of Rule post office, 1¾ miles east of the Cameron windmill, on the highest point of the round knoll on the divide between Caddo Creek and Primrose Creek. Station mark is disk set as described in note 1 (*a*); underground mark is disk set according to note 7 (*a*). Reference marks are disks, set according to note 11 (*a*), at the following distances and azimuths from the station: No. 1, 14.31 meters (46.9 feet), 91° 37′; No. 2, 13.33 meters (43.7 feet), 174° 06.′

Alexander (Las Animas County; C. M. D., 1922).—About 40 miles southeast of Las Animas, 15 miles west of south of Rule post office, 4 miles northeast of James Murray's sheep ranch, 3 miles southeast of Flues post office, and 30 meters south of the intersection of the road leading south from Alexander Hill and the mesa road leading east and west along the ridge. Station mark is disk set as described in note 1 (*a*); underground mark is disk set according to note 7 (*a*). Reference marks are disks, set as described in note 11 (*a*), at the following distances and azimuths from the station: No. 1, 19.78 meters (64.9 feet), 172° 08′; No. 2, 26.86 meters (88.1 feet), 276° 19′.

Long (Las Animas County; C. M. D., 1922).—About 20 miles north of Kim, 8 miles south of Opal post office, 5 miles south of J. T. Lindsay's place, and 1½ miles south of the top of the point where the La Junta-Kim road comes out of Long Canyon. The station is at the highest point of the mesa, 3 meters west of where the La Junta-Kim road passes over the top of the hill. Surface mark is disk set as described in note 1 (*a*); underground mark is disk set according to note 7 (*a*). Reference marks are disks, set as described in note 11 (*a*), at the following distances and azimuths from the station: No. 1, 17.97 meters (59.0 feet), 22° 25′; No. 2, 14.20 meters (46.6 feet), 110° 20′.

Martin (Las Animas County; C. M. D., 1922).—On the highest point of a grassy knoll near the head of Freezeout Canyon, 10 miles northeast of Kim, and 1 mile southwest of the homestead of F. A. Martin. The tip of Potato Butte, 11 miles south, is just visible late in the afternoon through a saddle. A mail route passes about 1 mile east of the station. Surface mark is disk set as described in note 1 (*a*); underground mark is disk set according to note 7 (*a*). Reference marks are disks, set according to note 11 (*a*), at the following distances and azimuths from the station: No. 1, 54.08 meters (177.4 feet), 156° 16′; No. 2, 64.43 meters (211.4 feet), 222° 01′.

Reville (Las Animas County; C. M. D., 1922).—About 6 miles northwest of Willow Springs, 10 miles north and 1½ miles west of Kim, 1 mile east of Smith Canyon, and ¾ mile west of Reville's (Mexican) house, on the highest ground in the vicinity. Surface mark is disk set as described in note 1 (*a*); underground mark is disk set according to note 7 (*a*). Reference marks, disks set as described in note 11 (*a*), are at the following distances and azimuths from the station: No. 1, 20.05 meters (65.8 feet), 304° 44′; No. 2, 71.30 meters (233.9 feet), 25° 59′.

Willow (Las Animas County; C. M. D., 1922).—About 7 miles northeast of Kim, 1½ miles south of Willow Springs, and one-half mile east of a clump of cottonwood trees. Surface mark is disk set as described in note 1 (*a*); underground mark is disk set according to note 7 (*a*). Reference mark is disk set according to note 11 (*a*), 30.76 meters (100.9 feet) from the station in azimuth 191° 09′. A section corner is distant 68.9 meters (226 feet) in azimuth 284° 54′.

Seven L (Las Animas County; C. M. D., 1922).—On Mesa de Maya, about 6 miles north of the State line, 7 miles southwest of the old Seven L ranch, 2 miles south of the Montoya place, on the higher of the two rocky hills known as Seven L or Black Buttes, midway between two piles of rocks. The station mark is disk set as described in note 2. Reference marks are disks, set according to note 12, at the following distances and azimuths from the station: No. 1, 6.62 meters (21.7 feet), 177° 10′; No. 2, 7.66 meters (25.1 feet), 284° 36′.

Potato (Las Animas County; C. M. D., 1922).—About 15 miles southeast of Kim, Colo., 25 miles northwest of Kenton, Okla., on the highest point of Potato Butte, a lone knob on the top of a lone mesa, Mesa Bagnite. Station is about 1½ miles southeast of McArthur's sheep ranch. Station mark is disk set as described in note 2. Reference marks are disks, set according to note 12, at the following distances and azimuths from the station: No. 1, 10.20 meters (33.5 feet), 198° 38′; No. 2, 2.88 meters (9.4 feet), 275° 39′.

Clayton east base (Union County, N. Mex.; C. M. D., 1922).—About 20 miles north of Clayton, 6 miles east and 2 miles north of Cuates post office, near the western end of the level-topped knoll at the western side of section 27, T. 30 N., R. 35 E., on land owned by Orville Moulder, ¼ mile north-northeast from a

For notes in regard to marking of stations, see p. 40.

stone house, 50 meters back from the brow of the hill, on line with Mount Dora and the stone house. Surface mark is a disk 5 inches above the surface set as described in note 1 (*a*). The underground mark is a disk 26 inches below the surface set as described in note 8 (*a*). The reference mark, a disk 3 inches above the surface, set as described in note 11 (*a*), is on the north and south fence line, on the west line of the section, directly on line with *Clayton west base*, and is distant 150.425 meters (493.52 feet) from the station.

New Mexico–Colorado boundary, milepost No. 328, eccentric (Union County, N. Mex.; C. M. D., 1922).—On Mesa de Maya, about 3 miles east of Sheep Pen Canyon, 1 mile north of Cimarron Valley, and 3 miles east of the Steele ranch and the stone schoolhouse in Cimarron Valley. The station is on the grassy prairie, ¼ mile southeast from a small lake, and is on the highland south of milepost 328. Surface mark is disk set as described in note 1 (*a*); underground mark is disk set according to note 7 (*a*). Reference mark is disk, set according to note 11 (*a*), 16.20 meters (53.1 feet) from the station in azimuth 287° 20′; milepost 328 is distant 101.53 meters (333.1 feet) in azimuth 180° 03′.

Grande (Union County, N. Mex.; C. M. D., 1922).—On the highest point of Sierra Grande, a prominent grassy and rock covered mountain 5 miles southwest of Des Moines. The station is 3 meters south of two piles of stones on the western peak and is marked by disk set as described in note 2. Reference marks, disks set according to note 12, are at the following distances and azimuths from the station: No. 1, 33.48 meters (109.8 feet), 84° 41′; No. 2, 14.64 meters (48.0 feet), 324° 12′.

Dora (Union County, N. Mex.; C. M. D., 1922).—About 3 miles northeast of the town of Mount Dora, near the western end of the rocky ridge, on the highest point of Mount Dora, a grassy hill covered with lava rock. Station mark is disk set as described in note 2. Reference marks, disks set according to note 12, are at the following distances and azimuths from the station: No. 1, 14.83 meters (48.7 feet), 63° 47′; No. 2, 8.645 meters (28.4 feet), 274° 20′.

Des Moines (Union County, N. Mex.; C. M. D., 1922).—On high ground, about 300 meters south of the Colorado & Southern Depot at Des Moines, 200 meters west of the track, and about 300 meters southeast of the brick high school. Station mark is disk set as described in note 2. Reference marks, disks set according to note 12, are at the following distances and azimuths from the station: No. 1, 41.29 meters (135.5 feet), 249° 16′; No. 2, 7.89 meters (25.9 feet), 345° 24′. The SE. corner of section 10, T. 29 N., R. 29 E., is 139.21 meters (456.72 feet) from the station in azimuth 254° 43′.

Clayton west base (Union County, N. Mex.; C. M. D., 1922).—About 23 miles northwest of Clayton, ¼ mile south of Cuates post office, on the highest point and western end of a ridge at the western half of section 9, T. 29 N., R. 34 E., on land belonging to the First National Bank of Clayton. Surface mark is a disk, level with surface, set as described in note 1 (*a*). The underground mark is a disk set as described in note 7 (*a*); it is 36 inches below the surface. The reference mark, a disk set according to note 11 (*a*), is in the east-and-west fence line, on south side of roadway along the section line north of the station, 398.92 meters (1,308.8 feet) from the station in azimuth 181° 48′ 30″. From station to west section line is 357.8 meters (1,174 feet); to north section line, 406.3 meters (1,333 feet).

Seneca (Union County, N. Mex.; C. M. D., 1922).—About 18 miles north of Clayton, 2½ miles north of Seneca post office, on the highest point of the ridge and about 900 meters west of the road. Station is about 700 meters northeast of the SE. corner of section 23, T. 28 N., R. 53 E. The station mark is a disk set as described in note 1 (*a*), and the underground mark is a disk set according to note 7 (*a*). Reference marks are disks set as described in note 11 (*a*). No. 1 is distant 8.21 meters (26.9 feet), S. 67° 00′ E. (magnetic); No. 2 is distant 11.82 meters (38.78 feet), S. 53° 30′ W. (magnetic).

Rabbit (Union County, N. Mex.; C. M. D., 1922).—About 6 miles northwest from Clayton, on the highest point of Rabbit Ear Butte, in a rocky outcrop, 12 meters northwest from the southeast edge of the top. Station mark is disk set as described in note 2. Two reference marks, disks set according to note 12, are at the following distances and azimuths from the station: No. 1, 11.30 meters (37.1 feet), 214° 57′; No. 2, 8.42 meters (27.6 feet), 76° 42′

For notes in regard to marking of stations, see p. 40.

Supplementary points

Hoover (Union County, N. Mex.; C. M. D., 1922).—About 16 miles northeast from Clayton, 3½ miles east and 2 miles south from Seneca post office, on the highest point of the hill in the western half of section 11, T. 27 N., R. 36 E., on land belonging to W. F. Hoover, and 1.20 meters west of the fence. Surface mark is a disk set as described in note 1 (*a*), and underground mark is disk set according to note 7 (*a*). Reference marks, disks set as described in note 11 (*a*), are at the following distances and azimuths from the station: No. 1, 10.99 meters (36.1 feet), 159° 11′; No. 2, 9.38 meters (30.8 feet), 256° 44′.

Clay (Union County, N. Mex.; C. M. D., 1922).—On high land about ½ mile east of Clayton, 0.2 mile south of Stimson's dairy, and 0.3 mile north of Clayton–Texline highway. Station mark is disk set as described in note 2. Reference marks, disks set according to note 12, are at the following distances and azimuths from the station: No. 1, 22.94 meters (75.3 feet), 238° 29′; No. 2, 27.65 meters (90.7 feet), 356° 16′.

Eccentric No. 4 (Union County, N. Mex., and Dallam County, Tex.; C. M. D., 1922).—Four miles south of the northwest corner of Texas, on the east side of the section line road, at the summit of the first rise south of the corner of Texas, and on the boundary between Texas and New Mexico. Surface mark is disk set as described in note 1 (*a*). Underground mark is disk set according to note 7 (*a*). The reference mark, a disk set according to note 11 (*a*), is distant 21.45 meters (70.4 feet) from station in azimuth 96° 12′. Stone monument (*boundary milepost No. 4*) is distant 178.44 meters (585.4 feet) in azimuth 0° 05′ and *boundary mile corner No. 306* is distant 523.20 meters (1,716.5 feet) in azimuth 0° 07′ 43″.

Northwest corner of Texas, Clark's monument (Union County, N. Mex., and Dallam County, Tex.; C. M. D., 1922).—About 8 miles north of Texline, and about 6 miles east and 6 miles north of Clayton. The station is the concrete monument (Clark's monument) at the northwest corner of Texas.

Milepost No. 1, New Mexico-Texas boundary (Union County, N. Mex., and Dallam County, Tex.; C. M. D., 1922).—About 7 miles east and 6 miles north of Clayton. Station is the stone monument on the New Mexico-Texas boundary, 1 mile east of the northwest corner of Texas.

Milepost No. 313, Colorado-New Mexico boundary (Union County, N. Mex., and Las Animas County, Colo.; C. M. D., 1922).—On the top of Mesa de Maya, ¾ mile west of the old William McCash place in Cimarron Valley, 2 miles northeast of A. J. Jones's ranch, 1 mile east of Baker's lower ranch, 125 meters west of a pile of white stones on the State line, and 48 meters east of the bluff. Station is at the southeast edge of a clump of bushes and is marked by a pipe, 3 feet high, surrounded by a pile of stones.

De Maya (Union County, N. Mex.; C. M. D., 1922).—About 15 miles northwest of Kenton, Okla., on a prominent point of Mesa de Maya, opposite a cone-shaped butte 2½ miles west of Jack Gillworth's house. Station mark is disk set as described in note 2. Reference marks are disks, set according to note 12, at the following distances and azimuths from the station: No. 1, 29.80 meters (97.8 feet), 264° 43′; No. 2, 65.30 meters (214.2 feet), 316° 48′.

Collins (Baca County; C. M. D., 1922).—About 16 miles northwest of Kenton, Okla., on the highest point of a point of Mesa de Maya, which extends eastward, about 6 miles west by north of Pard Collins's house and 3 miles west by north of the northeast corner of New Mexico. Station mark is disk set as described in note 2. Reference marks are disks, set according to note 12, at the following distances and azimuths from the station: No. 1, 33.34 meters (109.4 feet), 187° 01′; No. 2, 29.37 meters (96.4 feet), 283° 39′.

Boundary monument 1900, Colorado-New Mexico-Oklahoma (Union County, N. Mex., Cimarron County, Okla., and Baca County, Colo.; C. M. D., 1922).—About 13 miles northwest of Kenton, Okla., 3 miles west by north of Pard Collins's house, and 125 meters north of a wire gate. Station is a large stone monument surrounded by a pile of rocks. The old boundary mile corner established in 1881 (see position of station *New Mexico-Colorado boundary [old] M. C. 1881)* is 283.24 meters (929.3 feet) from the station in azimuth 179° 56′ 06″.

For notes in regard to marking of stations, see p. 40.

V.—CONVERSION TABLES

Lengths—Feet to meters (from 1 to 1,000 units)

[Reduction factor: 1 foot = 0.3048006096 meter]

Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
0	0.0	50	15.24003	100	30.48006	150	45.72009	200	60.96012
1	0.30480	1	15.54483	1	30.78486	1	46.02489	1	61.26492
2	0.60960	2	15.84963	2	31.08966	2	46.32969	2	61.56972
3	0.91440	3	16.15443	3	31.39446	3	46.63449	3	61.87452
4	1.21920	4	16.45923	4	31.69926	4	46.93929	4	62.17932
5	1.52400	5	16.76403	5	32.00406	5	47.24409	5	62.48412
6	1.82880	6	17.06883	6	32.30886	6	47.54890	6	62.78893
7	2.13360	7	17.37363	7	32.61367	7	47.85370	7	63.09373
8	2.43840	8	17.67844	8	32.91847	8	48.15850	8	63.39853
9	2.74321	9	17.98324	9	33.22327	9	48.46330	9	63.70333
10	3.04801	60	18.28804	110	33.52807	160	48.76810	210	64.00813
1	3.35281	1	18.59284	1	33.83287	1	49.07290	1	64.31293
2	3.65761	2	18.89764	2	34.13767	2	49.37770	2	64.61773
3	3.96241	3	19.20244	3	34.44247	3	49.68250	3	64.92253
4	4.26721	4	19.50724	4	34.74727	4	49.98730	4	65.22733
5	4.57201	5	19.81204	5	35.05207	5	50.29210	5	65.53213
6	4.87681	6	20.11684	6	35.35687	6	50.59690	6	65.83693
7	5.18161	7	20.42164	7	35.66167	7	50.90170	7	66.14173
8	5.48641	8	20.72644	8	35.96647	8	51.20650	8	66.44653
9	5.79121	9	21.03124	9	36.27127	9	51.51130	9	66.75133
20	6.09601	70	21.33604	120	36.57607	170	51.81610	220	67.05613
1	6.40081	1	21.64084	1	36.88087	1	52.12090	1	67.36093
2	6.70561	2	21.94564	2	37.18567	2	52.42570	2	67.66574
3	7.01041	3	22.25044	3	37.49047	3	52.73051	3	67.97054
4	7.31521	4	22.55525	4	37.79528	4	53.03531	4	68.27534
5	7.62002	5	22.86005	5	38.10008	5	53.34011	5	68.58014
6	7.92482	6	23.16485	6	38.40488	6	53.64491	6	68.88494
7	8.22962	7	23.46965	7	38.70968	7	53.94971	7	69.18974
8	8.53442	8	23.77445	8	39.01448	8	54.25451	8	69.49454
9	8.83922	9	24.07925	9	39.31928	9	54.55931	9	69.79934
30	9.14402	80	24.38405	130	39.62408	180	54.86411	230	70.10414
1	9.44882	1	24.68885	1	39.92888	1	55.16891	1	70.40894
2	9.75362	2	24.99365	2	40.23368	2	55.47371	2	70.71374
3	10.05842	3	25.29845	3	40.53848	3	55.77851	3	71.01854
4	10.36322	4	25.60325	4	40.84328	4	56.08331	4	71.32334
5	10.66802	5	25.90805	5	41.14808	5	56.38811	5	71.62814
6	10.97282	6	26.21285	6	41.45288	6	56.69291	6	71.93294
7	11.27762	7	26.51765	7	41.75768	7	56.99771	7	72.23774
8	11.58242	8	26.82245	8	42.06248	8	57.30251	8	72.54255
9	11.88722	9	27.12725	9	42.36728	9	57.60732	9	72.84735
40	12.19202	90	27.43205	140	42.67209	190	57.91212	240	73.15215
1	12.49682	1	27.73686	1	42.97689	1	58.21692	1	73.45695
2	12.80163	2	28.04166	2	43.28169	2	58.52172	2	73.76175
3	13.10643	3	28.34646	3	43.58649	3	58.82652	3	74.06655
4	13.41123	4	28.65126	4	43.89129	4	59.13132	4	74.37135
5	13.71603	5	28.95606	5	44.19609	5	59.43612	5	74.67615
6	14.02083	6	29.26086	6	44.50089	6	59.74092	6	74.98095
7	14.32563	7	29.56566	7	44.80569	7	60.04572	7	75.28575
8	14.63043	8	29.87046	8	45.11049	8	60.35052	8	75.59055
9	14.93523	9	30.17526	9	45.41529	9	60.65532	9	75.89535

Lengths—Feet to meters (from 1 to 1,000 units)—Continued

Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
250	76.20015	300	91.44018	350	106.68021	400	121.92024	450	137.16027
1	76.50495	1	91.74498	1	106.98501	1	122.22504	1	137.46507
2	76.80975	2	92.04978	2	107.28981	2	122.52985	2	137.76988
3	77.11455	3	92.35458	3	107.59462	3	122.83465	3	138.07468
4	77.41935	4	92.65939	4	107.89942	4	123.13945	4	138.37948
5	77.72416	5	92.96419	5	108.20422	5	123.44425	5	138.68428
6	78.02896	6	93.26899	6	108.50902	6	123.74905	6	138.98908
7	78.33376	7	93.57379	7	108.81382	7	124.05385	7	139.29388
8	78.63856	8	93.87859	8	109.11862	8	124.35865	8	139.59868
9	78.94336	9	94.18339	9	109.42342	9	124.66345	9	139.90348
260	79.24816	310	94.48819	360	109.72822	410	124.96825	460	140.20828
1	79.55296	1	94.79299	1	110.03302	1	125.27305	1	140.51308
2	79.85776	2	95.09779	2	110.33782	2	125.57785	2	140.81788
3	80.16256	3	95.40259	3	110.64262	3	125.88265	3	141.12268
4	80.46736	4	95.70739	4	110.94742	4	126.18745	4	141.42748
5	80.77216	5	96.01219	5	111.25222	5	126.49225	5	141.73228
6	81.07696	6	96.31699	6	111.55702	6	126.79705	6	142.03708
7	81.38176	7	96.62179	7	111.86182	7	127.10185	7	142.34188
8	81.68656	8	96.92659	8	112.16662	8	127.40665	8	142.64669
9	81.99136	9	97.23139	9	112.47142	9	127.71146	9	142.95149
270	82.29616	320	97.53620	370	112.77623	420	128.01626	470	143.25629
1	82.60097	1	97.84100	1	113.08103	1	128.32106	1	143.56109
2	82.90577	2	98.14580	2	113.38583	2	128.62586	2	143.86589
3	83.21057	3	98.45060	3	113.69063	3	128.93066	3	144.17069
4	83.51537	4	98.75540	4	113.99543	4	129.23546	4	144.47549
5	83.82017	5	99.06020	5	114.30023	5	129.54026	5	144.78029
6	84.12497	6	99.36500	6	114.60503	6	129.84506	6	145.08509
7	84.42977	7	99.66980	7	114.90983	7	130.14986	7	145.38989
8	84.73457	8	99.97460	8	115.21463	8	130.45466	8	145.69469
9	85.03937	9	100.27940	9	115.51943	9	130.75946	9	145.99949
280	85.34417	330	100.58420	380	115.82423	430	131.06426	480	146.30429
1	85.64897	1	100.88900	1	116.12903	1	131.36906	1	146.60909
2	85.95377	2	101.19380	2	116.43383	2	131.67386	2	146.91389
3	86.25857	3	101.49860	3	116.73863	3	131.97866	3	147.21869
4	86.56337	4	101.80340	4	117.04343	4	132.28346	4	147.52350
5	86.86817	5	102.10820	5	117.34823	5	132.58827	5	147.82830
6	87.17297	6	102.41300	6	117.65304	6	132.89307	6	148.13310
7	87.47777	7	102.71781	7	117.95784	7	133.19787	7	148.43790
8	87.78258	8	103.02261	8	118.26264	8	133.50267	8	148.74270
9	88.08738	9	103.32741	9	118.56744	9	133.80747	9	149.04750
290	88.39218	340	103.63221	390	118.87224	440	134.11227	490	149.35230
1	88.69698	1	103.93701	1	119.17704	1	134.41707	1	149.65710
2	89.00178	2	104.24181	2	119.48184	2	134.72187	2	149.96190
3	89.30658	3	104.54661	3	119.78664	3	135.02667	3	150.26670
4	89.61138	4	104.85141	4	120.09144	4	135.33147	4	150.57150
5	89.91618	5	105.15621	5	120.39624	5	135.63627	5	150.87630
6	90.22098	6	105.46101	6	120.70104	6	135.94107	6	151.18110
7	90.52578	7	105.76581	7	121.00584	7	136.24587	7	151.48590
8	90.83058	8	106.07061	8	121.31064	8	136.55067	8	151.79070
9	91.13538	9	106.37541	9	121.61544	9	136.85547	9	152.09550

Lengths—Feet to meters (from 1 to 1,000 units)—Continued

Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
500	152.40030	550	167.64034	600	182.88037	650	198.12040	700	213.36043
1	152.70511	1	167.94514	1	183.18517	1	198.42520	1	213.66523
2	153.00991	2	168.24994	2	183.48997	2	198.73000	2	213.97003
3	153.31471	3	168.55474	3	183.79477	3	199.03480	3	214.27483
4	153.61951	4	168.85954	4	184.09957	4	199.33960	4	214.57963
5	153.92431	5	169.16434	5	184.40437	5	199.64440	5	214.88443
6	154.22911	6	169.46914	6	184.70917	6	199.94920	6	215.18923
7	154.53391	7	169.77394	7	185.01397	7	200.25400	7	215.49403
8	154.83871	8	170.07874	8	185.31877	8	200.55880	8	215.79883
9	155.14351	9	170.38354	9	185.62357	9	200.86360	9	216.10363
510	155.44831	560	170.68834	610	185.92837	660	201.16840	710	216.40843
1	155.75311	1	170.99314	1	186.23317	1	201.47320	1	216.71323
2	156.05791	2	171.29794	2	186.53797	2	201.77800	2	217.01803
3	156.36271	3	171.60274	3	186.84277	3	202.08280	3	217.32283
4	156.66751	4	171.90754	4	187.14757	4	202.38760	4	217.62764
5	156.97231	5	172.21234	5	187.45237	5	202.69241	5	217.93244
6	157.27711	6	172.51715	6	187.75718	6	202.99721	6	218.23724
7	157.58192	7	172.82195	7	188.06198	7	203.30201	7	218.54204
8	157.88672	8	173.12675	8	188.36678	8	203.60681	8	218.84684
9	158.19152	9	173.43155	9	188.67158	9	203.91161	9	219.15164
520	158.49632	570	173.73635	620	188.97638	670	204.21641	720	219.45644
1	158.80112	1	174.04115	1	189.28118	1	204.52121	1	219.76124
2	159.10592	2	174.34595	2	189.58598	2	204.82601	2	220.06604
3	159.41072	3	174.65075	3	189.89078	3	205.13081	3	220.37084
4	159.71552	4	174.95555	4	190.19558	4	205.43561	4	220.67564
5	160.02032	5	175.26035	5	190.50038	5	205.74041	5	220.98044
6	160.32512	6	175.56515	6	190.80518	6	206.04521	6	221.28524
7	160.62992	7	175.86995	7	191.10998	7	206.35001	7	221.59004
8	160.93472	8	176.17475	8	191.41478	8	206.65481	8	221.89484
9	161.23952	9	176.47955	9	191.71958	9	206.95961	9	222.19964
530	161.54432	580	176.78435	630	192.02438	680	207.26441	730	222.50445
1	161.84912	1	177.08915	1	192.32918	1	207.56922	1	222.80925
2	162.15392	2	177.39395	2	192.63399	2	207.87402	2	223.11405
3	162.45872	3	177.69876	3	192.93879	3	208.17882	3	223.41885
4	162.76353	4	178.00356	4	193.24359	4	208.48362	4	223.72365
5	163.06833	5	178.30836	5	193.54839	5	208.78842	5	224.02845
6	163.37313	6	178.61316	6	193.85319	6	209.09322	6	224.33325
7	163.67793	7	178.91796	7	194.15799	7	209.39802	7	224.63805
8	163.98273	8	179.22276	8	194.46279	8	209.70282	8	224.94285
9	164.28753	9	179.52756	9	194.76759	9	210.00762	9	225.24765
540	164.59233	590	179.83236	640	195.07239	690	210.31242	740	225.55245
1	164.89713	1	180.13716	1	195.37719	1	210.61722	1	225.85725
2	165.20193	2	180.44196	2	195.68199	2	210.92202	2	226.16205
3	165.50673	3	180.74676	3	195.98679	3	211.22682	3	226.46685
4	165.81153	4	181.05156	4	196.29159	4	211.53162	4	226.77165
5	166.11633	5	181.35636	5	196.59639	5	211.83642	5	227.07645
6	166.42113	6	181.66116	6	196.90119	6	212.14122	6	227.38125
7	166.72593	7	181.96596	7	197.20590	7	212.44602	7	227.68606
8	167.03073	8	182.27076	8	197.51080	8	212.75083	8	227.99086
9	167.33553	9	182.57557	9	197.81560	9	213.05563	9	228.29566

Lengths—Feet to meters (from 1 to 1,000 units)—Continued

Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
750	228.60046	**800**	243.84049	**850**	259.08052	**900**	274.32055	**950**	289.56058
1	228.90526	**1**	244.14529	**1**	259.38532	**1**	274.62535	**1**	289.86538
2	229.21006	**2**	244.45009	**2**	259.69012	**2**	274.93015	**2**	290.17018
3	229.51486	**3**	244.75489	**3**	259.99492	**3**	275.23495	**3**	290.47498
4	229.81966	**4**	245.05969	**4**	260.29972	**4**	275.53975	**4**	290.77978
5	230.12446	**5**	245.36449	**5**	260.60452	**5**	275.84455	**5**	291.08458
6	230.42926	**6**	245.66929	**6**	260.90932	**6**	276.14935	**6**	291.38938
7	230.73406	**7**	245.97409	**7**	261.21412	**7**	276.45415	**7**	291.69418
8	231.03886	**8**	246.27889	**8**	261.51892	**8**	276.75895	**8**	291.99898
9	231.34366	**9**	246.58369	**9**	261.82372	**9**	277.06375	**9**	292.30378
760	231.64846	**810**	246.88849	**860**	262.12852	**910**	277.36855	**960**	292.60859
1	231.95326	**1**	247.19329	**1**	262.43332	**1**	277.67336	**1**	292.91339
2	232.25806	**2**	247.49809	**2**	262.73813	**2**	277.97816	**2**	293.21819
3	232.56287	**3**	247.80290	**3**	263.04293	**3**	278.28296	**3**	293.52299
4	232.86767	**4**	248.10770	**4**	263.34773	**4**	278.58776	**4**	293.82779
5	233.17247	**5**	248.41250	**5**	263.65253	**5**	278.89256	**5**	294.13259
6	233.47727	**6**	248.71730	**6**	263.95733	**6**	279.19736	**6**	294.43739
7	233.78207	**7**	249.02210	**7**	264.26213	**7**	279.50216	**7**	294.74219
8	234.08687	**8**	249.32690	**8**	264.56693	**8**	279.80696	**8**	295.04699
9	234.39167	**9**	249.63170	**9**	264.87173	**9**	280.11176	**9**	295.35179
770	234.69647	**820**	249.93650	**870**	265.17653	**920**	280.41656	**970**	295.65659
1	235.00127	**1**	250.24130	**1**	265.48133	**1**	280.72136	**1**	295.96139
2	235.30607	**2**	250.54610	**2**	265.78613	**2**	281.02616	**2**	296.26619
3	235.61087	**3**	250.85090	**3**	266.09093	**3**	281.33096	**3**	296.57099
4	235.91567	**4**	251.15570	**4**	266.39573	**4**	281.63576	**4**	296.87579
5	236.22047	**5**	251.46050	**5**	266.70053	**5**	281.94056	**5**	297.18059
6	236.52527	**6**	251.76530	**6**	267.00533	**6**	282.24536	**6**	297.48539
7	236.83007	**7**	252.07010	**7**	267.31013	**7**	282.55017	**7**	297.79020
8	237.13487	**8**	252.37490	**8**	267.61494	**8**	282.85497	**8**	298.09500
9	237.43967	**9**	252.67971	**9**	267.91974	**9**	283.15977	**9**	298.39980
780	237.74448	**830**	252.98451	**880**	268.22454	**930**	283.46457	**980**	298.70460
1	238.04928	**1**	253.28931	**1**	268.52934	**1**	283.76937	**1**	299.00940
2	238.35408	**2**	253.59411	**2**	268.83414	**2**	284.07417	**2**	299.31420
3	238.65888	**3**	253.89891	**3**	269.13894	**3**	284.37897	**3**	299.61900
4	238.96368	**4**	254.20371	**4**	269.44374	**4**	284.68377	**4**	299.92380
5	239.26848	**5**	254.50851	**5**	269.74854	**5**	284.98857	**5**	300.22860
6	239.57328	**6**	254.81331	**6**	270.05334	**6**	285.29337	**6**	300.53340
7	239.87808	**7**	255.11811	**7**	270.35814	**7**	285.59817	**7**	300.83820
8	240.18288	**8**	255.42291	**8**	270.66294	**8**	285.90297	**8**	301.14300
9	240.48768	**9**	255.72771	**9**	270.96774	**9**	286.20777	**9**	301.44780
790	240.79248	**840**	256.03251	**890**	271.27254	**940**	286.51257	**990**	301.75260
1	241.09728	**1**	256.33731	**1**	271.57734	**1**	286.81737	**1**	302.05740
2	241.40208	**2**	256.64211	**2**	271.88214	**2**	287.12217	**2**	302.36220
3	241.70688	**3**	256.94691	**3**	272.18694	**3**	287.42697	**3**	302.66701
4	242.01168	**4**	257.25171	**4**	272.49174	**4**	287.73178	**4**	302.97181
5	242.31648	**5**	257.55652	**5**	272.79655	**5**	288.03658	**5**	303.27661
6	242.62129	**6**	257.86132	**6**	273.10135	**6**	288.34138	**6**	303.58141
7	242.92609	**7**	258.16612	**7**	273.40615	**7**	288.64618	**7**	303.88621
8	243.23089	**8**	258.47092	**8**	273.71095	**8**	288.95098	**8**	304.19101
9	243.53569	**9**	258.77572	**9**	274.01575	**9**	289.25578	**9**	304.49581

Lengths—Meters to feet (from 1 to 1,000 units)

[Reduction factor: 1 meter=3.280833333 feet]

Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet
0		**50**	164.04167	**100**	328.08333	**150**	492.12500	**200**	656.16667
1	3.28083	1	167.32250	1	331.36417	1	495.40583	1	659.44750
2	6.56167	2	170.60333	2	334.64500	2	498.68667	2	662.72833
3	9.84250	3	173.88417	3	337.92583	3	501.96750	3	666.00917
4	13.12333	4	177.16500	4	341.20667	4	505.24833	4	669.29000
5	16.40417	5	180.44583	5	344.48750	5	508.52917	5	672.57083
6	19.68500	6	183.72667	6	347.76833	6	511.81000	6	675.85167
7	22.96583	7	187.00750	7	351.04917	7	515.09083	7	679.13250
8	26.24667	8	190.28833	8	354.33000	8	518.37167	8	682.41333
9	29.52750	9	193.56917	9	357.61083	9	521.65250	9	685.69417
10	32.80833	**60**	196.85000	**110**	360.89167	**160**	524.93333	**210**	688.97500
1	36.08917	1	200.13083	1	364.17250	1	528.21417	1	692.25583
2	39.37000	2	203.41167	2	367.45333	2	531.49500	2	695.53667
3	42.65083	3	206.69250	3	370.73417	3	534.77583	3	698.81750
4	45.93167	4	209.97333	4	374.01500	4	538.05667	4	702.09833
5	49.21250	5	213.25417	5	377.29583	5	541.33750	5	705.37917
6	52.49333	6	216.53500	6	380.57667	6	544.61833	6	708.66000
7	55.77417	7	219.81583	7	383.85750	7	547.89917	7	711.94083
8	59.05500	8	223.09667	8	387.13833	8	551.18000	8	715.22167
9	62.33583	9	226.37750	9	390.41917	9	554.46083	9	718.50250
20	65.61667	**70**	229.65833	**120**	393.70000	**170**	557.74167	**220**	721.78333
1	68.89750	1	232.93917	1	396.98083	1	561.02250	1	725.06417
2	72.17833	2	236.22000	2	400.26167	2	564.30333	2	728.34500
3	75.45917	3	239.50083	3	403.54250	3	567.58417	3	731.62583
4	78.74000	4	242.78167	4	406.82333	4	570.86500	4	734.90667
5	82.02083	5	246.06250	5	410.10417	5	574.14583	5	738.18750
6	85.30167	6	249.34333	6	413.38500	6	577.42667	6	741.46833
7	88.58250	7	252.62417	7	416.66583	7	580.70750	7	744.74917
8	91.86333	8	255.90500	8	419.94667	8	583.98833	8	748.03000
9	95.14417	9	259.18583	9	423.22750	9	587.26917	9	751.31083
30	98.42500	**80**	262.46667	**130**	426.50833	**180**	590.55000	**230**	754.59167
1	101.70583	1	265.74750	1	429.78917	1	593.83083	1	757.87250
2	104.98667	2	269.02833	2	433.07000	2	597.11167	2	761.15333
3	108.26750	3	272.30917	3	436.35083	3	600.39250	3	764.43417
4	111.54833	4	275.59000	4	439.63167	4	603.67333	4	767.71500
5	114.82917	5	278.87083	5	442.91250	5	606.95417	5	770.99583
6	118.11000	6	282.15167	6	446.19333	6	610.23500	6	774.27667
7	121.39083	7	285.43250	7	449.47417	7	613.51583	7	777.55750
8	124.67167	8	288.71333	8	452.75500	8	616.79667	8	780.83833
9	127.95250	9	291.99417	9	456.03583	9	620.07750	9	784.11917
40	131.23333	**90**	295.27500	**140**	459.31667	**190**	623.35833	**240**	787.40000
1	134.51417	1	298.55583	1	462.59750	1	626.63917	1	790.68083
2	137.79500	2	301.83667	2	465.87833	2	629.92000	2	793.96167
3	141.07583	3	305.11750	3	469.15917	3	633.20083	3	797.24250
4	144.35667	4	308.39833	4	472.44000	4	636.48167	4	800.52333
5	147.63750	5	311.67917	5	475.72083	5	639.76250	5	803.80417
6	150.91833	6	314.96000	6	479.00167	6	643.04333	6	807.08500
7	154.19917	7	318.24083	7	482.28250	7	646.32417	7	810.36583
8	157.48000	8	321.52167	8	485.56333	8	649.60500	8	813.64667
9	160.76083	9	324.80250	9	488.84417	9	652.88583	9	816.92750

Lengths—Meters to feet (from 1 to 1,000 units)—Continued

Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet
250	820.20833	**300**	984.25000	**350**	1,148.29167	**400**	1,312.33333	**450**	1,476.37500
1	823.48917	**1**	987.53083	**1**	1,151.57250	**1**	1,315.61417	**1**	1,479.65583
2	826.77000	**2**	990.81167	**2**	1,154.85333	**2**	1,318.89500	**2**	1,482.93667
3	830.05083	**3**	994.09250	**3**	1,158.13417	**3**	1,322.17583	**3**	1,486.21750
4	833.33167	**4**	997.37333	**4**	1,161.41500	**4**	1,325.45667	**4**	1,489.49833
5	836.61250	**5**	1,000.65417	**5**	1,164.69583	**5**	1,328.73750	**5**	1,492.77917
6	839.89333	**6**	1,003.93500	**6**	1,167.97667	**6**	1,332.01833	**6**	1,496.06000
7	843.17417	**7**	1,007.21583	**7**	1,171.25750	**7**	1,335.29917	**7**	1,499.34083
8	846.45500	**8**	1,010.49667	**8**	1,174.53833	**8**	1,338.58000	**8**	1,502.62167
9	849.73583	**9**	1,013.77750	**9**	1,177.81917	**9**	1,341.86083	**9**	1,505.90250
260	853.01667	**310**	1,017.05833	**360**	1,181.10000	**410**	1,345.14167	**460**	1,509.18333
1	856.29750	**1**	1,020.33917	**1**	1,184.38083	**1**	1,348.42250	**1**	1,512.46417
2	859.57833	**2**	1,023.62000	**2**	1,187.66167	**2**	1,351.70333	**2**	1,515.74500
3	862.85917	**3**	1,026.90083	**3**	1,190.94250	**3**	1,354.98417	**3**	1,519.02583
4	866.14000	**4**	1,030.18167	**4**	1,194.22333	**4**	1,358.26500	**4**	1,522.30667
5	869.42083	**5**	1,033.46250	**5**	1,197.50417	**5**	1,361.54583	**5**	1,525.58750
6	872.70167	**6**	1,036.74333	**6**	1,200.78500	**6**	1,364.82667	**6**	1,528.86833
7	875.98250	**7**	1,040.02417	**7**	1,204.06583	**7**	1,368.10750	**7**	1,532.14917
8	879.26333	**8**	1,043.30500	**8**	1,207.34667	**8**	1,371.38833	**8**	1,535.43000
9	882.54417	**9**	1,046.58583	**9**	1,210.62750	**9**	1,374.66917	**9**	1,538.71083
270	885.82500	**320**	1,049.86667	**370**	1,213.90833	**420**	1,377.95000	**470**	1,541.99167
1	889.10583	**1**	1,053.14750	**1**	1,217.18917	**1**	1,381.23083	**1**	1,545.27250
2	892.38667	**2**	1,056.42833	**2**	1,220.47000	**2**	1,384.51167	**2**	1,548.55333
3	895.66750	**3**	1,059.70917	**3**	1,223.75083	**3**	1,387.79250	**3**	1,551.83417
4	898.94833	**4**	1,062.99000	**4**	1,227.03167	**4**	1,391.07333	**4**	1,555.11500
5	902.22917	**5**	1,066.27083	**5**	1,230.31250	**5**	1,394.35417	**5**	1,558.39583
6	905.51000	**6**	1,069.55167	**6**	1,233.59333	**6**	1,397.63500	**6**	1,561.67667
7	908.79083	**7**	1,072.83250	**7**	1,236.87417	**7**	1,400.91583	**7**	1,564.95750
8	912.07167	**8**	1,076.11333	**8**	1,240.15500	**8**	1,404.19667	**8**	1,568.23833
9	915.35250	**9**	1,079.39417	**9**	1,243.43583	**9**	1,407.47750	**9**	1,571.51917
280	918.63333	**330**	1,082.67500	**380**	1,246.71667	**430**	1,410.75833	**480**	1,574.80000
1	921.91417	**1**	1,085.95583	**1**	1,249.99750	**1**	1,414.03917	**1**	1,578.08083
2	925.19500	**2**	1,089.23667	**2**	1,253.27833	**2**	1,417.32000	**2**	1,581.36167
3	928.47583	**3**	1,092.51750	**3**	1,256.55917	**3**	1,420.60083	**3**	1,584.64250
4	931.75667	**4**	1,095.79833	**4**	1,259.84000	**4**	1,423.88167	**4**	1,587.92333
5	935.03750	**5**	1,099.07917	**5**	1,263.12083	**5**	1,427.16250	**5**	1,591.20417
6	938.31833	**6**	1,102.36000	**6**	1,266.40167	**6**	1,430.44333	**6**	1,594.48500
7	941.59917	**7**	1,105.64083	**7**	1,269.68250	**7**	1,433.72417	**7**	1,597.76583
8	944.88000	**8**	1,108.92167	**8**	1,272.96333	**8**	1,437.00500	**8**	1,601.04667
9	948.16083	**9**	1,112.20250	**9**	1,276.24417	**9**	1,440.28583	**9**	1,604.32750
290	951.44167	**340**	1,115.48333	**390**	1,279.52500	**440**	1,443.56667	**490**	1,607.60833
1	954.72250	**1**	1,118.76417	**1**	1,282.80583	**1**	1,446.84750	**1**	1,610.88917
2	958.00333	**2**	1,122.04500	**2**	1,286.08667	**2**	1,450.12833	**2**	1,614.17000
3	961.28417	**3**	1,125.32583	**3**	1,289.36750	**3**	1,453.40917	**3**	1,617.45083
4	964.56500	**4**	1,128.60667	**4**	1,292.64833	**4**	1,456.69000	**4**	1,620.73167
5	967.84583	**5**	1,131.88750	**5**	1,295.92917	**5**	1,459.97083	**5**	1,624.01250
6	971.12667	**6**	1,135.16833	**6**	1,299.21000	**6**	1,463.25167	**6**	1,627.29333
7	974.40750	**7**	1,138.44917	**7**	1,302.49083	**7**	1,466.53250	**7**	1,630.57417
8	977.68833	**8**	1,141.73000	**8**	1,305.77167	**8**	1,469.81333	**8**	1,633.85500
9	980.96917	**9**	1,145.01083	**9**	1,309.05250	**9**	1,473.09417	**9**	1,637.13583

Lengths—Meters to feet (from 1 to 1,000 units)—Continued

Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet
500	1,640.41667	**550**	1,804.45833	**600**	1,968.50000	**650**	2,132.54167	**700**	2,296.58333
1	1,643.69750	**1**	1,807.73917	**1**	1,971.78083	**1**	2,135.82250	**1**	2,299.86417
2	1,646.97833	**2**	1,811.02000	**2**	1,975.06167	**2**	2,139.10333	**2**	2,303.14500
3	1,650.25917	**3**	1,814.30083	**3**	1,978.34250	**3**	2,142.38417	**3**	2,306.42583
4	1,653.54000	**4**	1,817.58167	**4**	1,981.62333	**4**	2,145.66500	**4**	2,309.70667
5	1,656.82083	**5**	1,820.86250	**5**	1,984.90417	**5**	2,148.94583	**5**	2,312.98750
6	1,660.10167	**6**	1,824.14333	**6**	1,988.18500	**6**	2,152.22667	**6**	2,316.26833
7	1,663.38250	**7**	1,827.42417	**7**	1,991.46583	**7**	2,155.50750	**7**	2,319.54917
8	1,666.66333	**8**	1,830.70500	**8**	1,994.74667	**8**	2,158.78833	**8**	2,322.83000
9	1,669.94417	**9**	1,833.98583	**9**	1,998.02750	**9**	2,162.06917	**9**	2,326.11083
510	1,673.22500	**560**	1,837.26667	**610**	2,001.30833	**660**	2,165.35000	**710**	2,329.39167
1	1,676.50583	**1**	1,840.54750	**1**	2,004.58917	**1**	2,168.63083	**1**	2,332.67250
2	1,679.78667	**2**	1,843.82833	**2**	2,007.87000	**2**	2,171.91167	**2**	2,335.95333
3	1,683.06750	**3**	1,847.10917	**3**	2,011.15083	**3**	2,175.19250	**3**	2,339.23417
4	1,686.34833	**4**	1,850.39000	**4**	2,014.43167	**4**	2,178.47333	**4**	2,342.51500
5	1,689.62917	**5**	1,853.67083	**5**	2,017.71250	**5**	2,181.75417	**5**	2,345.79583
6	1,692.91000	**6**	1,856.95167	**6**	2,020.99333	**6**	2,185.03500	**6**	2,349.07667
7	1,696.19083	**7**	1,860.23250	**7**	2,024.27417	**7**	2,188.31583	**7**	2,352.35750
8	1,699.47167	**8**	1,863.51333	**8**	2,027.55500	**8**	2,191.59667	**8**	2,355.63833
9	1,702.75250	**9**	1,866.79417	**9**	2,030.83583	**9**	2,194.87750	**9**	2,358.91917
520	1,706.03333	**570**	1,870.07500	**620**	2,034.11667	**670**	2,198.15833	**720**	2,362.20000
1	1,709.31417	**1**	1,873.35583	**1**	2,037.39750	**1**	2,201.43917	**1**	2,365.48083
2	1,712.59500	**2**	1,876.63667	**2**	2,040.67833	**2**	2,204.72000	**2**	2,368.76167
3	1,715.87583	**3**	1,879.91750	**3**	2,043.95917	**3**	2,208.00083	**3**	2,372.04250
4	1,719.15667	**4**	1,883.19833	**4**	2,047.24000	**4**	2,211.28167	**4**	2,375.32333
5	1,722.43750	**5**	1,886.47917	**5**	2,050.52083	**5**	2,214.56250	**5**	2,378.60417
6	1,725.71833	**6**	1,889.76000	**6**	2,053.80167	**6**	2,217.84333	**6**	2,381.88500
7	1,728.99917	**7**	1,893.04083	**7**	2,057.08250	**7**	2,221.12417	**7**	2,385.16583
8	1,732.28000	**8**	1,896.32167	**8**	2,060.36333	**8**	2,224.40500	**8**	2,388.44667
9	1,735.56083	**9**	1,899.60250	**9**	2,063.64417	**9**	2,227.68583	**9**	2,391.72750
530	1,738.84167	**580**	1,902.88333	**630**	2,066.92500	**680**	2,230.96667	**730**	2,395.00833
1	1,742.12250	**1**	1,906.16417	**1**	2,070.20583	**1**	2,234.24750	**1**	2,398.28917
2	1,745.40333	**2**	1,909.44500	**2**	2,073.48667	**2**	2,237.52833	**2**	2,401.57000
3	1,748.68417	**3**	1,912.72583	**3**	2,076.76750	**3**	2,240.80917	**3**	2,404.85083
4	1,751.96500	**4**	1,916.00667	**4**	2,080.04833	**4**	2,244.09000	**4**	2,408.13167
5	1,755.24583	**5**	1,919.28750	**5**	2,083.32917	**5**	2,247.37083	**5**	2,411.41250
6	1,758.52667	**6**	1,922.56833	**6**	2,086.61000	**6**	2,250.65167	**6**	2,414.69333
7	1,761.80750	**7**	1,925.84917	**7**	2,089.89083	**7**	2,253.93250	**7**	2,417.97417
8	1,765.08833	**8**	1,929.13000	**8**	2,093.17167	**8**	2,257.21333	**8**	2,421.25500
9	1,768.36917	**9**	1,932.41083	**9**	2,096.45250	**9**	2,260.49417	**9**	2,424.53583
540	1,771.65000	**590**	1,935.69167	**640**	2,099.73333	**690**	2,263.77500	**740**	2,427.81667
1	1,174.93083	**1**	1,938.97250	**1**	2,103.01417	**1**	2,267.05583	**1**	2,431.09750
2	1,778.21167	**2**	1,942.25333	**2**	2,106.29500	**2**	2,270.33667	**2**	2,434.37833
3	1,781.49250	**3**	1,945.53417	**3**	2,109.57583	**3**	2,273.61750	**3**	2,437.65917
4	1,784.77333	**4**	1,948.81500	**4**	2,112.85667	**4**	2,276.89833	**4**	2,440.94000
5	1,788.05417	**5**	1,952.09583	**5**	2,116.13750	**5**	2,280.17917	**5**	2,444.22083
6	1,791.33500	**6**	1,955.37667	**6**	2,119.41833	**6**	2,283.46000	**6**	2,447.50167
7	1,794.61583	**7**	1,958.65750	**7**	2,122.69917	**7**	2,286.74083	**7**	2,450.78250
8	1,797.89667	**8**	1,961.93833	**8**	2,125.98000	**8**	2,290.02167	**8**	2,454.06333
9	1,801.17750	**9**	1,965.21917	**9**	2,129.26083	**9**	2,293.30250	**9**	2,457.34417

Lengths—Meters to feet (from 1 to 1,000 units)—Continued

Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet
750	2,460.62500	800	2,624.66667	850	2,788.70833	900	2,952.75000	950	3,116.79167
1	2,463.90583	1	2,627.94750	1	2,791.98917	1	2,956.03083	1	3,120.07250
2	2,467.18667	2	2,631.22833	2	2,795.27000	2	2,959.31167	2	3,123.35333
3	2,470.46750	3	2,634.50917	3	2,798.55083	3	2,962.59250	3	3,126.63417
4	2,473.74833	4	2,637.79000	4	2,801.83167	4	2,965.87333	4	3,129.91500
5	2,477.02917	5	2,641.07083	5	2,805.11250	5	2,969.15417	5	3,133.19583
6	2,480.31000	6	2,644.35167	6	2,808.39333	6	2,972.43500	6	3,136.47667
7	2,483.59083	7	2,647.63250	7	2,811.67417	7	2,975.71583	7	3,139.75750
8	2,486.87167	8	2,650.91333	8	2,814.95500	8	2,978.99667	8	3,143.03833
9	2,490.15250	9	2,654.19417	9	2,818.23583	9	2,982.27750	9	3,146.31917
760	2,493.43333	810	2,657.47500	860	2,821.51667	910	2,985.55833	960	3,149.60000
1	2,496.71417	1	2,660.75583	1	2,824.79750	1	2,988.83917	1	3,152.88083
2	2,499.99500	2	2,664.03667	2	2,828.07833	2	2,992.12000	2	3,156.16167
3	2,503.27583	3	2,667.31750	3	2,831.35917	3	2,995.40083	3	3,159.44250
4	2,506.55667	4	2,670.59833	4	2,834.64000	4	2,998.68167	4	3,162.72333
5	2,509.83750	5	2,673.87917	5	2,837.92083	5	3,001.96250	5	3,166.00417
6	2,513.11833	6	2,677.16000	6	2,841.20167	6	3,005.24333	6	3,169.28500
7	2,516.39917	7	2,680.44083	7	2,844.48250	7	3,008.52417	7	3,172.56583
8	2,519.68000	8	3,683.72167	8	2,847.76333.	8	3,011.80500	8	3,175.84667
9	2,522.96083	9	2,687.00250	9	2,851.04417	9	3,015.08583	9	3,179.12750
770	2,526.24167	820	2,690.28333	870	2,854.32500	920	3,018.36667	970	3,182.40833
1	2,529.52250	1	2,693.56417	1	2,857.60583	1	3,021.64750	1	3,185.68917
2	2,532.80333	2	2,696.84500	2	2,860.88667	2	3,024.92833	2	3,188.97000
3	2,536.08417	3	2,700.12583	3	2,864.16750	3	3,028.20917	3	3,192.25083
4	2,539.36500	4	2,703.40667	4	2,867.44833	4	3,031.49000	4	3,195.53167
5	2,542.64583	5	2,706.68750	5	2,870.72917	5	3,034.77083	5	3,198.81250
6	2,545.92667	6	2,709.96833	6	2,874.01000	6	3,038.05167	6	3,202.09333
7	2,549.20750	7	2,713.24917	7	2,877.29083	7	3,041.33250	7	3,205.37417
8	2,552.48833	8	2,716.53000	8	2,880.57167	8	3,044.61333	8	3,208.65500
9	2,555.76917	9	2,719.81083	9	2,883.85250	9	3,047.89417	9	3,211.93583
780	2,559.05000	830	2,723.09167	880	2,887.13333	930	3,051.17500	980	3,215.21667
1	2,562.33083	1	2,726,37250	1	2,890.41417	1	3,054.45583	1	3,218.49750
2	2,565.61167	2	2,729.65333	2	2,893.69500	2	3,057.73667	2	3,221.77833
3	2,568.89250	3	2,732.93417	3	2,896.97583	3	3,061.01750	3	3,225.05917
4	2,572.17333	4	2,736.21500	4	2,900.25667	4	3,064.29833	4	3,228.34000
5	2,575.45417	5	2,739.49583	5	2,903.53750	5	3,067.57917	5	3,231.62083
6	2,578.73500	6	2,742.77667	6	2,906.81833	6	3,070.86000	6	3,234.90167
7	2,582.01583	7	2,746.05750	7	2,910.09917	7	3,074.14083	7	3,238.18250
8	2,585.29667	8	2,749.33833	8	2,913.38000	8	3,077.42167	8	3,241.46333
9	2,588.57750	9	2,752.61917	9	2,916.66083	9	3,080.70250	9	3,244.74417
790	2,591.85833	840	2,755.90000	890	2,919.94167	940	3,083.98333	990	3,248.02500
1	2,595.13917	1	2,759.18083	1	2,923.22250	1	3,087.26417	1	3,251.30583
2	2,598.42000	2	2,762.46167	2	2,926.50333	2	3,090.54500	2	3,254.58667
3	2,601.70083	3	2,765.74250	3	2,929.78417	3	3,093.82583	3	3,257.86750
4	2,604.98167	4	2,769.02333	4	2,933.06500	4	3,097.10667	4	3,261.14833
5	2,608.26250	5	2,772.30417	5	2,936.34583	5	3,100.38750	5	3,264.42917
6	2,611.54333	6	2,775.58500	6	2,939.62667	6	3,103.66833	6	3,267.71000
7	2,614.82417	7	2,778.86583	7	2,942.90750	7	3,106.94917	7	3,270.99083
8	2,618.10500	8	2,782.14667	8	2,946.18833	8	3,110.23000	8	3,274.27167
9	2,621.38583	9	2,785.42750	9	2,949.46917	9	3,113.51083	9	3,277.55250

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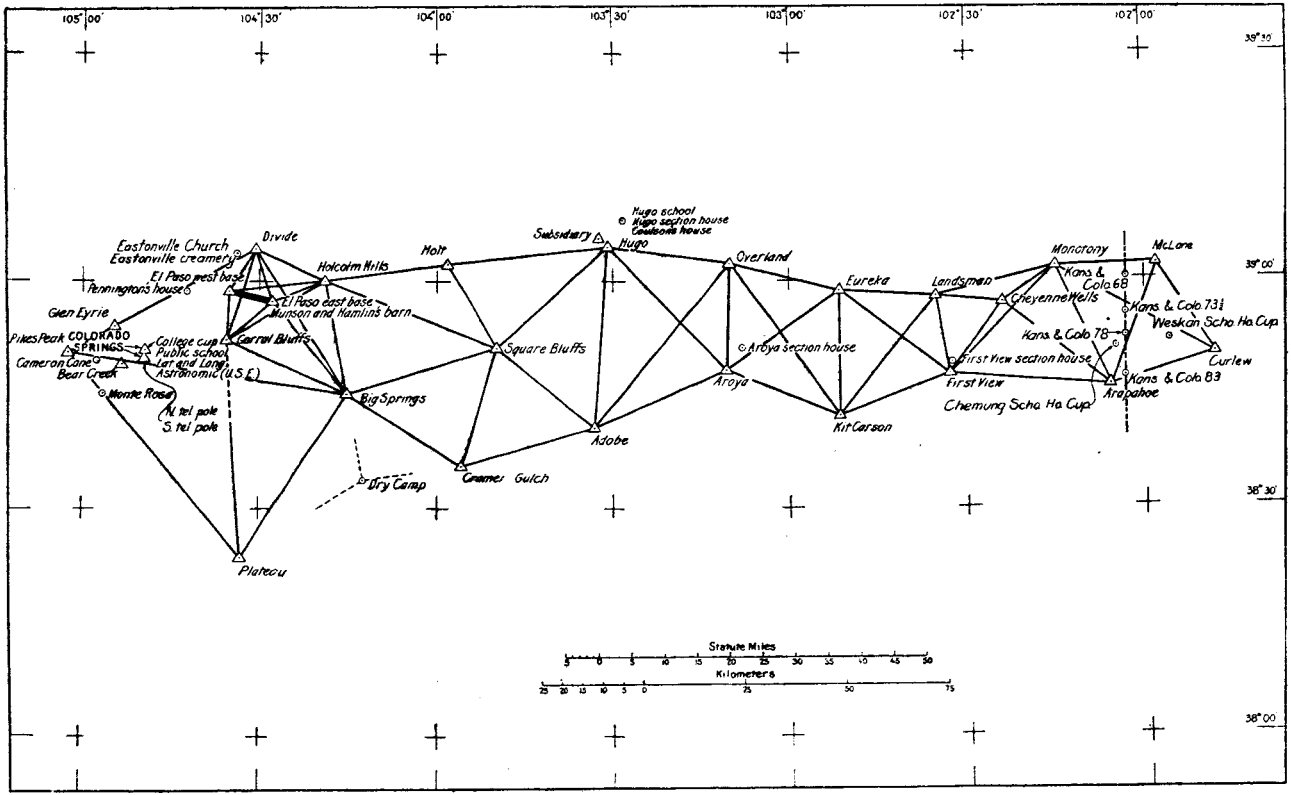

FIGURE 3.—Triangulation, thirty-ninth parallel east

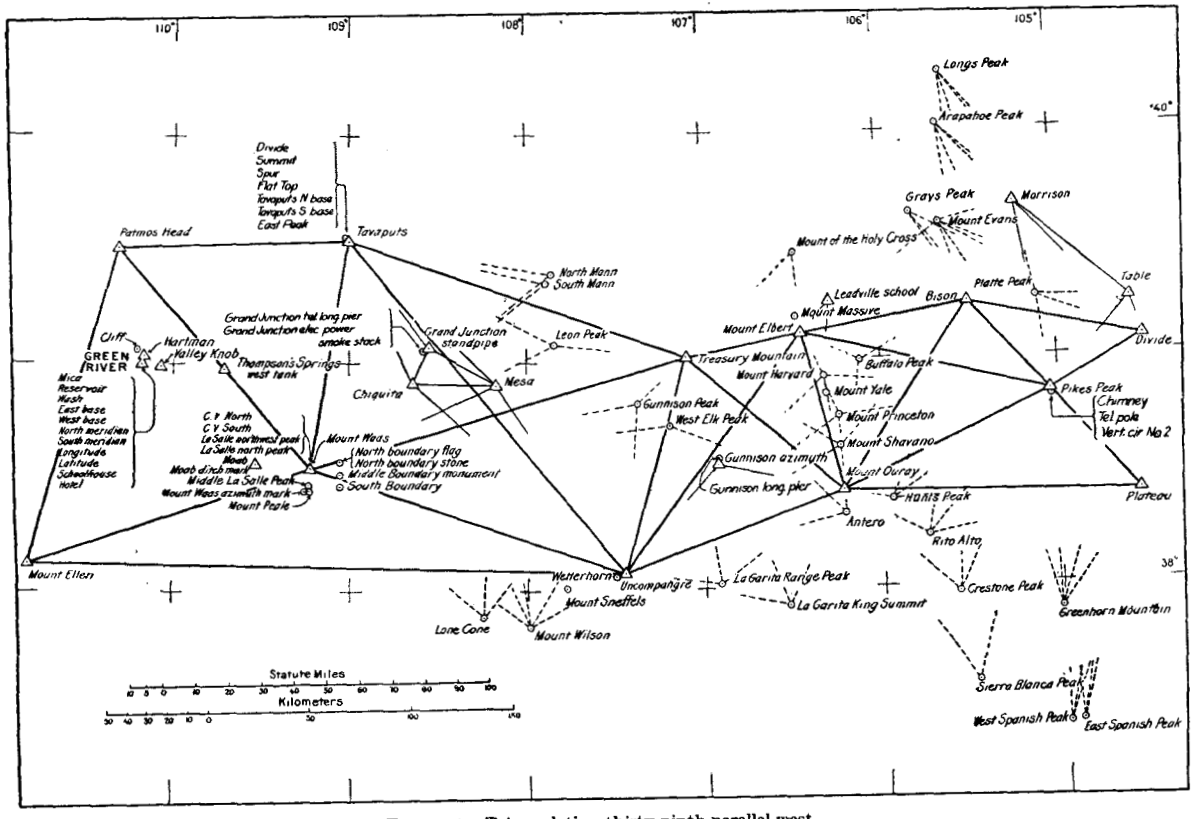

FIGURE 4.—Triangulation, thirty-ninth parallel west

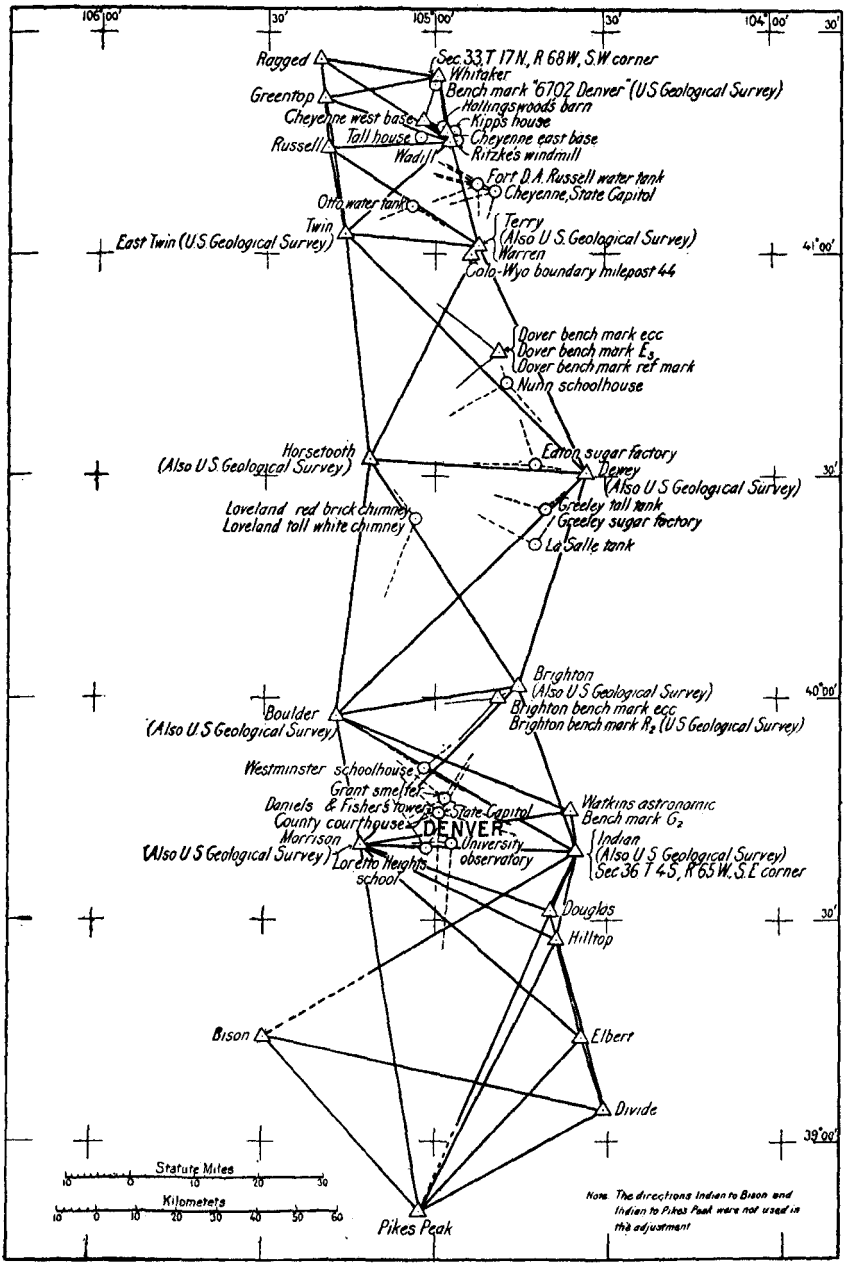

FIGURE 5.—Triangulation, one hundred and fourth meridian north

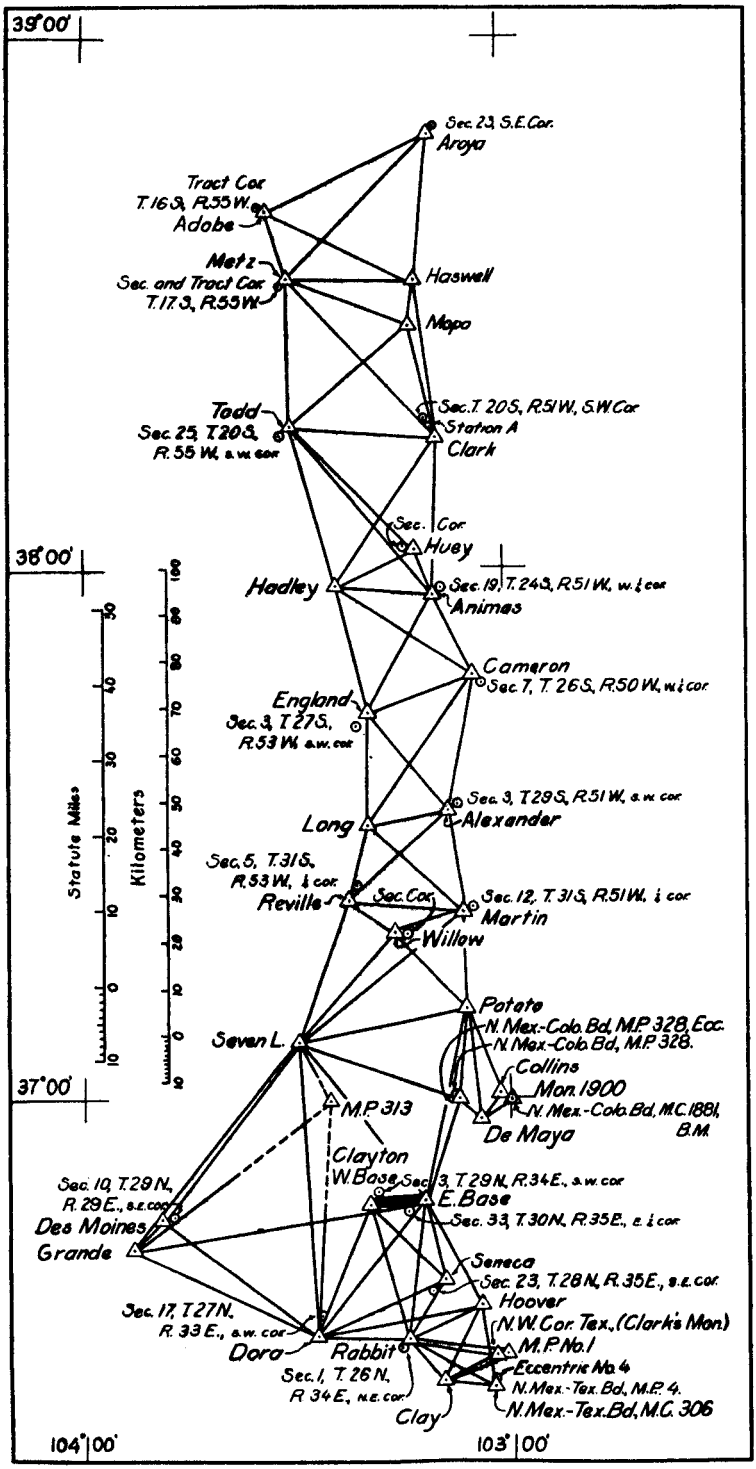

FIGURE 6.—Triangulation, one hundred and fourth meridian south

INDEX TO TRAINGULATION STATIONS